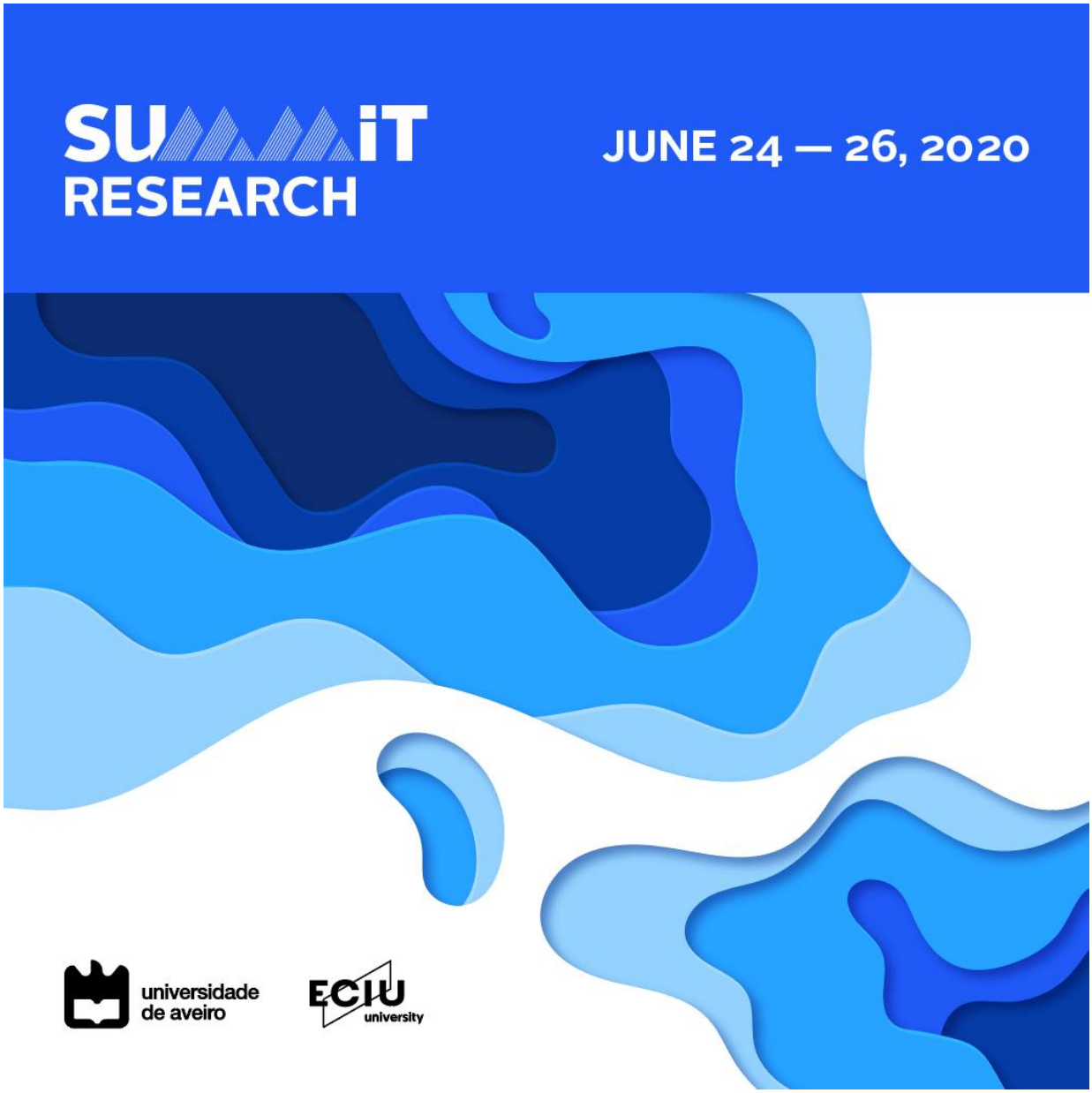

Research Summit |Book of Abstracts

PhD pitches

Universidade de Aveiro

Doctoral Programme

Accounting

Determinants of Irregularities in the Management of Educational Resources in Brazilian Municipalities

Abinair Silva, Augusta Ferreira; Luiz Miranda; Vítor Moutinho.

This work aims to analyze the Determinants of Irregularities in the Management of Educational Resources in Brazilian Municipalities from the analysis of the audit reports issued by the External Control of public accounts, Court of Auditors, so that it is also possible to evaluate the quality of the internal controls of these municipalities and recurring material deficiencies in internal control systems. It is intended to analyze the efficient management of resources for education carried out by municipal managers based on the irregularities detected by the courts of accounts. To achieve these objectives, a database consisting of 10,000 irregularities collected from 970 audit reports will be used, referring to 470 Brazilian municipalities. So that it is possible to verify the quality of the municipal internal controls based on the irregularities identified in the audit reports of the courts of auditors, the systematic occurrence of the irregularities in the reports will be analyzed in 8 consecutive years. Panel data logistic regression will be used to verify the systematic occurrence of irregularities.

Accounting

Taxation costs in digital age: empirical evidence in Portugal

Ana Brites, Carlos Ferreira, Cidália Lopes

The purpose of this research is to present an evaluation of compliance costs incurred by individuals subject to the personal income tax in Portugal, and explain/quantify how digitalization influence those costs. The benefits of digital technology are well documented, leaving no doubt that it can also ease tax compliance, reduce tax collection costs, and increase administrative efficiency.

Accounting

Management Accounting contribution to the hotel's financial performance

Ana Lucas, Graça Azevedo, Luís Lima Santos, Jonas Oliveira

Portugal is a country where tourism has unique economic and cultural importance. Hence, following the evolution of tourism in recent years, the hotel industry has increased its capacity and its improvement in hotel management tools.

Management accounting is an important tool in companies' accounting information systems. This tool provides valuable information in decision making in a company. Decision making has the ultimate objective of improving the company's financial performance.

The hotel industry uses internal results determination processes specific to this industry, as well as specific management accounting techniques. However, hotels, like other companies, use management accounting to improve their financial performance.

This study intends to know the real relationship between the use of management accounting techniques and the financial performance of the hotel. The research questions are: (1) What are the management accounting techniques most used by hotels ?; (2) What are the most used financial indicators in the hotel industry ?; and (3) Is there an association between the management accounting techniques used and the financial performance of the hotels, measured through the financial indicators most used in the hotel industry?

Based on previous literature, the study will follow the contingency theory and will consist of a survey, as primary data, and database analysis of secondary data regarding financial performance. The survey will be applied to the financial responsible of hotels, and the methodology will consist of a stratified analysis using the following factors: hotel category, location, and affiliation.

The expected contributions are directed not only to the academy (research and teaching) but also to the industry. The first contribution, more directed towards a small advance in the literature on management accounting research for hotels, will be the identification of the methodologies, theories, and models studied in previous literature, in the context of the hotel sector. The second contribution, more targeted at financial decision-makers in hotels, will be the empirical evidence of the contribution of the use of certain management accounting techniques to the financial performance of the hotel, depending on its category, affiliation and location.

Accounting

The management of non-profit entities: the case of Private Social Solidarity Institutions

Carla Joaquim, Augusta da Conceição Santos Ferreira, Helena Coelho Inácio

The development of this research work aims to identify the management policies in entities of the non-profit sector of social solidarity, which provide the best financial and non-financial performances that guarantee sustainability.

It is intended that the study is developed in mainland Portugal, through exploratory studies with documentary analysis of the reports of the entities, semi-structured interviews with senior managers or staff and questionnaires to the stakeholders.

The study is in a preparation phase through a bibliographic search of related studies that allow to base the fieldwork.

The bibliographic research highlights studies in non-profit entities with management practices, highlighting management and financial accounting and operations management. Other studies related to the search for alternative sources of funds and adjustment strategies, in the case of reductions in state subsidies. The importance of accounting reports, in the sense of informing donors about the application of donated amounts, is also a way for entities to seek to maximize notoriety. On the other hand, the efficiency of non-profit entities must be evaluated by the economic result and not only by the financial results, but also the responsiveness considering the available resources. It should be noted that the management of these entities is also influenced by the profile of the manager.

At this moment, there is still no development of fieldwork, however it is expected that its beginning will be brief, taking into account the current limitations, with special expression in the area to be studied.

(em português)

O desenvolvimento do presente trabalho de investigação visa identificar as políticas de gestão em entidades do setor não lucrativo de solidariedade social, que proporcionem os melhores desempenhos financeiros e não financeiros que garantam a sustentabilidade.

Pretende-se que o estudo seja desenvolvido em Portugal continental, através de estudos exploratórios com análise documental dos relatórios das entidades, entrevistas semiestruturadas a dirigentes ou quadros superiores e questionários aos stakeholderes.

O estudo encontra-se numa fase de preparação através de pesquisa bibliográfica de estudos relacionados que permitam fundamentar o trabalho de campo.

Da pesquisa bibliográfica destacam-se estudos em entidades sem fins lucrativos com as práticas de gestão, destacando a contabilidade de gestão e financeira e a gestão de operações. Outros estudos relacionados com a procura de fontes alternativas de fundos e as estratégias de ajustamento, no caso de reduções de subsídios do Estado. A importância dos relatórios de contabilidade, no sentido de informar os doadores sobre a aplicação dos montantes doados, é também uma forma de as entidades procurarem maximizar a notoriedade. Por outro lado a eficiência das entidades sem fins lucrativos deve ser avaliada pelo resultado económico e não só pelos resultados financeiros, mas também a capacidade de resposta considerando os recursos disponíveis. De relevar que a gestão das referidas entidades também é influenciada com o perfil do gestor.

Neste momento ainda não há desenvolvimento de trabalho de campo, contudo espera-se que seu o início seja breve, tendo em conta as atuais limitações, com especial expressão na área que se pretende estudar.

Accounting

Essays on the application of the Integrated Reporting

Cláudia Da Conceição, Professora Doutora Graça Azevedo, Professora Doutora Cláudia Maria Ferreira Pereira, Professor Doutor Jonas Silva Oliveira

A origem do relato integrado (Integrated Reporting - IR) desenvolvido pelo International Integrated Reporting Council (IIRC) teve por base conceitos prévios de relatórios integrados e iniciativas de relatórios corporativos. O conceito IR foi acompanhado de um crescente interesse regulatório, sendo até ao momento considerado como uma forma de aprendizagem para as empresas com valores cotados na preparação dos seus relatórios e contas na combinação da informação financeira e não financeira de responsabilidade social e de sustentabilidade. O IIRC prevê obter relatórios empresariais integrados obrigatórios por todas as empresas com valores cotados. Estudos indicam que as empresas de grande dimensão tendem a implementar objetivos mais amplos, mais objetivos e comparam práticas de informação, porque esta dimensão adicional permite-lhes gerar valor acrescentado e um impacto social e ambiental. Além disso, possuem maiores recursos para compilar as informações. Compreender quais os motivos que levam os gestores a adotar o IR, bem como os determinantes da adoção do IR e a evolução do IIRC, assim como, analisar em que medida o nível de gestão dos resultados varia com a adoção do IR continuam a ser áreas de investigação em IR sub-investigadas. Esperamos propor uma metodologia para medir o IR a nível de Earnings Management e testar suas

ligações com algumas características determinantes. Assim, acreditamos que podemos preencher gap's teóricos positivamente do grau de intensidade de relacionamento entre o IR e contribuir aos investigadores e autores.

The origin of Integrated Reporting (IR) developed by the International Integrated Reporting Council (IIRC) was based on previous concepts of integrated reporting and corporate reporting initiatives. The IR concept has been accompanied by a growing regulatory interest, and has so far been considered as a form of learning for companies with quoted values in the preparation of their reports and accounts in the combination of financial and non-financial information on social responsibility and sustainability. The IIRC expects to obtain mandatory integrated business reports by all companies with listed values. Studies indicate that large companies tend to implement broader, more objective objectives and compare information practices, because this additional dimension allows them to generate added value and a social and environmental impact. In addition, they have greater resources to compile the information. Understand the reasons that lead managers to adopt the IR, as well as the determinants of the adoption of the IR and the evolution of the IIRC, as well as analyze the extent to which the level of results management varies with the adoption of the IR continue to be areas under-investigated IR research. We hope to propose a methodology for measuring IR at the level of Earnings Management and testing its links with some determining characteristics. Thus, we believe that we can fill theoretical gaps positively on the degree of relationship intensity between the IR and contribute to researchers and authors.

Accounting

Essays on Gender Diversity in the Board of Directors

Fátima Borges, Graça Azevedo, Isabel Mota

The present research addresses an emerging research topic in the European context: the gender diversity of corporate boards.

Based on a sample of European firms included in the Standards & Poors Europe 350, it is intended to analyze how the gender diversity of corporate boards influences two crucial firms' indicators to justify greater representativeness of women in top management bodies: audit quality and company value. It is also intended to study how these relationships are moderated by the country's institutional environment, the firms' organizational context and the managers' personal characteristics. This innovative methodological approach has never been used in previous literature.

It is expected that the present investigation can theoretically contribute to expand the existing literature, as well as for the current European debate on Gender Equality as reflected in the Equality Strategy Gender 2020-2025 of the European Commission, influencing in particular the establishment of an European Directive in this field.

Accounting

The holy house of mercy in bahia, the accounting and the use of labor slave - a case study.

Henrique Cabirta, Lúcia Lima Rodrigues, Alberto J. Costa.

The purpose of this thesis is to demonstrate how accounting was used by Holy House of Mercy in Bahia, in the period to be studie here, and how they used slave labor and how they were accounted for. We will also investigate how the change from simple-Entry Bookkeeping to double-Entry Bookkeeping occurred at Holy House of Bahia.

Accounting

Audit Quality and Bank Financing Decision: an Empirical Study in the Mozambican Context

Luís Cumbe, Professora Doutora Helena Coelho Inácio and Professora Doutora Elisabete Fátima Simões Vieira

A informação financeira produzida pelo órgão de gestão da empresa é utilizada pelos credores para a tomada de decisões financeiras. A credibilidade dessa informação assume importância para os credores, sendo que a auditoria, pela sua natureza, desempenha um papel fundamental na garantia da sua fiabilidade. A qualidade da auditoria melhora a qualidade das demostrações financeiras, reduzindo problemas de assimetria de informação entre a empresa e os credores. No entanto, qualidade da auditoria é considerada um conceito complexo que tem sido muito discutido ao longo dos anos e tem levado a divergências de opiniões. Assim a presente pesquisa pretende

analisar a influência da qualidade da auditoria nas decisões sobre o financiamento bancário em Moçambique. Para o alcance deste objetivo a nossa investigação irá dividir-se em duas fases. Na primeira fase através de um inquérito por questionário iremos procurar a mensuração da qualidade da auditoria em Moçambique na perceção dos credores. Na segunda fase, iremos usar a experimentação. Nesta fase procuramos testar o impacto dos diferentes tipos de opinião do auditor nas decisões de financiamento bancário em Moçambique. Do ponto de vista de implicações, esta pesquisa contribui para a compreensão da relação entre qualidade da auditoria e decisão de financiamento bancário em Moçambique. Do ponto de vista prático, esta pesquisa constituirá um instrumento para a melhoria da prática de auditoria através da melhoria na regulação da profissão do auditor em Moçambique

Accounting

The influence of inventory management on the quality of accounting information in commercial sector companies

Maria Filipa Nogueira, Augusta da Conceição Santos Ferreira, Carlos Manuel dos Santos Ferreira

Inventories are one of the most important elements of a commercial company. The company value is crated based on the selling of the products. Based on the importance of inventories, is considered that this active item is used to achieve company desired results.

The quality of accounting information is a topic of study that continues to arouse interest among researchers. Associating the quality of information with inventory's discritionary management, through accounting policies and real activity, produces knowledge about the performance of managers and their influence on the value of companies.

Accounting

Online disclosure of financial information by Portuguese local government: transparency, quality, and explanatory factors

Miguel Lira, Augusta da Conceição Santos Ferreira; Carlos Manuel dos Santos Ferreira; Carlos Alberto Lourenço dos Santos

One of the twelve principles of good democratic governance, enshrined in the Strategy on Innovation and Good Governance at Local Level and endorsed by a decision of the Committee of Ministers of the Council of Europe in 2008, is 'Openness and Transparency'. This principle ensures public access to information and understandability of how local public affairs are conducted, which leads to an increase of governments' accountability.

In the public sector, these concepts of 'accountability' and 'transparency' are closely linked and can be defined as the openness of information about internal procedures, decision-making, policies and resource allocation towards citizens, which are positively associated with increasing of their confidence in public institutions.

In this context of greater concern with accountability and transparency, in recent years there has been an increase in the openness of financial and non-financial information on the websites of Portuguese local authorities, showing an increasingly communicative attitude, even if some of that openness is a result of legal imposition.

However, despite the importance attributed to accountability, the level of transparency and the disclosure of financial and non-financial information on the websites of public entities, including local authorities, the truth is that few studies have explored this issue, particularly in the Portuguese context.

Therefore, the aim of this paper is to analyze financial disclosure on the web, by Portuguese Local Government Authorities, as a means of assessing their financial accountability, measuring their level of transparency and quality, and ascertain some key variables that could play a role in Portuguese local government financial disclosure on the internet. For that to happen, we will use the EAGLE_Index, and regression and correlation analysis. The results will be analyzed through the lens of legitimacy and institutional theories.

Accounting

The subsequent measurement of goodwill: the pharmacy sector in Portugal

Mónica D'Orey, Professora Doutora Carla Carvalho

Several business sectors were affected by the return of goodwill amortisation, particularly in the pharmacy sector, one of the sectors in Portugal with the largest number of companies showing goodwill in their balance sheets.

According to the European Parliament, in the EU the business sector consists of 99% micro, small and medium-sized enterprises, however studies that have been published on the subsequent treatment of goodwill have focused on listed companies.

The purpose of this study is to analyse the reason for the non-compliance with the amendment to the Accounting Standardization System (SNC) due to the transposition of Directive 2013/34/EU of the European Parliament and of the Council, of June 26, 2013 (Accounting Directive), in the subsequent measurement of goodwill. The purpose is to identify the determinants of non-amortisation of goodwill in Portuguese pharmacies, complemented with the financial statements preparer's perception on the aforementioned amendment, as well as the auditors' perception on the reintroduction of amortisation and its impact on the audit quality. Three studies will be carried out, with distinct but interconnected objectives.

Keywords: Goodwill; Amortisation; Impairment; Directive 2013/34/EU; Subsequent measurement; Pharmacy sector.

Accounting

Determinants of readability level and CEO's personal characteristics influence in the Integrated Report

Patrícia Monteiro, Graça Azevedo, Jonas Oliveira

The way companies communicate and disseminate information has evolved in order to respond appropriately to the increasingly demanding request of information users. The Integrated Report (IR) represents the latest evolution of organizational reporting and has garnered quite following. IR as a unique disclousure document of organizations and the prospect reporting feature may be more susceptible of use Impression Management (IM) strategies. In this sense, it would be interesting see if CEO's (Chief Executive Officer) personal characteristics, of the top of the organizational hierarchy influence the IM strategies used.

Accounting

Financialization Politics: CEOs' Compensation Mechanics – evidence in Portugal

Rita Vieira, Graça Azevedo; Jonas Oliveira

The research work aims to determine the relationship between financialization police and incentive/remuneration's systems and ,between financialization policies and the CEO's profile. It's expected to develop this research work in 3 studies:

- Study 1: literature review on financialization: existing concepts, assumptions, investigations and results; economic, social and political consequences and to what extent they contributed to the changes that were felt in accounting policies (new accounting paradigms; regularizing organizations, implemented practices);

- Study 2: Study focused on the relationship between Financialization Policies and the incentive systems of CEO's: measure/evaluate the extent to which remuneration policies (as an internal mechanism of Corporate Governance) may have contributed to an increasing weight financialization measures by companies;

- Study 3: study focused on the determinants of the profile of CEOs that are correlated with their financialization policy choices.

Accounting

The adoption of SNC-AP in Portugal: impact and perceptions.

Susana Pereira, Doutora Augusta Ferreira, Doutora Patrícia Gomes

Public accounting systems have been suffering pressure towards harmonization through the International Public Sector Accounting Standards (IPSAS), aiming for accountability and transparency in public management policies.

In Portugal, a new Accounting Standardization System for the Public Administrations (SNC-AP), was approved, based on the IPSAS, being in place in 2018 for the general public institutions and in 2019 for the Local Government entities.

This new accounting framework, based in increased accrual accounting and more complex measurement methods, has obvious impacts in the public entities' financial information, raising questions about their usability in the decision-making process.

Since one of the objectives of the SNC-AP is to provide information that is useful for the purposes of accountability and decision making, supporting the New Public Management goals of transparency and reliability of the financial information, it becomes relevant to investigate

the perceptions of the preparers regarding the new framework and the difficulties of its application. Their perspective is also important as who are de users of this information and if, in their perception, it is useful for the purposes of accountability and decision making.

Exploiting the preparers intake, and by analysing the financial statements in the transitioning year, we can observe the quantitative impact of the new accounting framework as well as understanding the reasons for the changes.

This evidence will help to determinate if the financial information complies with the objectives set by the SNC-AP, being useful to the decision-making process and for the purpose of accountability and transparency.

This research aims to help to determinate if IPSAS (or a framework based on) fulfils the goals of harmonization and international comparison alongside enhanced public management and accountability. Furthermore, it aims to give a better understanding of who are the preparers, the difficulties perceived in applying the new framework and if they impacted on how the information is prepared and its usefulness.

Accounting

Advanced materials and processing

New approaches to synthesis and applications of layered double hydroxides containing functional cations

Daniel Vieira, Joaquim M. Vieira, Christopher M. A. Brett, Andrei N. Salak

Layered double hydroxides (LDH) find a wide application mainly owing to their unique anion-exchange properties. LDH are composed of the alternating positively-charged mixed metal MII-MIII hydroxide layers and interlayers occupied by anions and crystal water molecules. Anions of different nature size, configuration and charge can be intercalated into the interlayer. The metal cations in the hydroxide layers are coordinated by six hydroxyl ions in such a way that O-H bonds are perpendicular to the plane of the layers. The functionalities of LDH can be extended by the inclusion of specific cations, in particular, magnetic ones.

The main method for the LDH synthesis is co-precipitation from aqueous solutions followed by anion exchange. This method is rather direct and reproducible; however, it is slow and water-consuming.

In this work, the authors demonstrate an alternative to accelerate the co-precipitation method and the anion-exchange process. The application of high-power sonication allows to decrease the time necessary to finish the process, from days/hours to minutes. The crystallites of LDH produced with application of ultrasounds were found to be less agglomerated. It was found that high-power sonication was also useful in the hydration of mixed metal oxides.

LDH with different Co-Al cation ratios were synthesized and study. The results revealed a temperature behaviour of the inverse magnetic susceptibility at 75 and 175 K. The paramagnetic Curie temperature values obtained from the higher temperature range data are about twice higher than those obtained from the lower-temperature range ones which suggest reducing of the ferromagnetic correlations between cobalt ions with decreasing temperature.

In the frame of the detected magnetic properties, the authors present a study in particles of LDH deposited on substrates by applied magnetic field oriented in-plane or perpendicular to the substrate, to create thin film continuous and uniform with an electrochemical response and magnetic anisotropy.

Advanced materials and processing

FLASH sintering of lead free perovskite oxides towards sustainable processing of materials for energy and related applications

Ricardo Serrazina, Paula M. Vilarinho, Ana M. O. R. Senos, Luis Pereira

Piezoelectrics as K0.5Na0.5NbO3, KNN, have currently an emerging importance due to its lead-free nature and wide range of high-tech applications as sensors, actuators, energy harvesters, biosensors, etc. However, monophasic dense KNN ceramics are yet difficult to produce by conventional methods.

This PhD proposes a new method to densify materials abruptly above a threshold condition using FLASH sintering where the transition occurs by a combination of furnace-environment and electrical field directly applied to the specimen. There are several proposed

mechanisms for FLASH. Joule heating is the most accepted one, but also defect-associated theories have been proposed. A clear understanding of the phenomena does not exist yet, but FLASH sintering seems to be a combination of both effects.

The present work aims to exploit FLASH sintering, understanding its phenomena and parameters influence, using KNN as the material for demonstration and validation. A clear contribution for alternative sintering of ceramics knowledge is expected.

Advanced materials and processing

Applied mathematics

On the theory of spatio-temporal models or time series of counts and its application to health outcomes

Ana Martins, Sónia Gouveia, Manuel Scotto, Christian Weiss

The relationship between air pollutants and health outcomes (i.e., number of deaths or hospital admissions per time interval) is commonly described through generalised additive models due to their flexibility. Nevertheless, these models exhibit some drawbacks namely, they neither preserve the integer-valued nature of the outcome nor allow modelling via information of its past values nor spatial location, which well-justify further developments in spatio-temporal discrete-valued models. Hence, the goal of this research is to develop novel probabilistic models for the analysis of time series of counts, exhibiting temporal and spatial dependence and influenced by covariates of interest. Specifically, we will introduce a novel class of space-time thinning-based models using, as a starting point, the conventional spatial-temporal autoregressive moving average models firstly proposed by Pfeifer and Deutsch (1980). Furthermore, we will develop a class of space-time integer autoregressive conditionally heteroskedastic-type models with conditional marginal distribution belonging to the class of infinitely divisible discrete probability laws, generalizing the work of Gonçalves et al. (2015). The models will be applied to the analysis of air quality and health outcomes in Portugal, to assess to what extent air quality affects hospital admissions and mortality. Finally, the developed models will be made available in an R package for the widespread use and spin-off to other applications.

Applied mathematics

CPR Graphs of Highly Symmetric Hypertopes

Claudio Piedade, Maria Elisa Fernandes

The study of the regular objects, such as polytopes, and their symmetries is a subject that attracts researchers from different areas of mathematics, such as geometers and algebraists, but also researchers from other areas of knowledge such as chemistry, thanks to the highly symmetry of the molecules. Recently the notion of hypertope was introduced as a polytope-like structure but more general and complex. During my work, I have described faithful transitive permutation representations of toroidal (hyper)maps and of locally toroidal polytopes and searched new hypertope structures using these representations.

Applied mathematics

Generating individual trajectories of HIV patients: a Bayesian approach

Diana Rocha, Sónia Gouveia, Carla Pinto, Manuel Scotto

The development of personalized HIV treatment plans is based on the evaluation of the status of the patient, through the analysis of the viral load (VL) values and the counts of CD4+T cells along time. This work aims at contributing to the characterization of the patient follow-up by using a mathematical model that describes the VL and {CD4}^+T temporal dynamics, whose parameters are estimated from (sparse) temporal observations of the patients' clinical markers.

The parameters of a mathematical model can be estimated from simulation-based approaches, as the Markov Chain Monte Carlo (MCMC), despite being computationally demanding. More recently, Approximate Bayesian Computation-based (ABC) approaches became promising alternatives to overcome the MCMC computational drawback. In this work, ABC-based approaches are further explored aiming to improve the estimation process while increasing its computational efficiency.

Applied mathematics

Multiperfect numbers in unique factorization domains

Gabriel Cardoso, Paulo José Fernandes Almeida, António José de Oliveira Machiavelo

A multiperfect number is an integer N such that the sum of all its divisors is a multiple of N and N is perfect if the sum is equal to 2N. The concept of perfect numbers was extended by Spira to the ring of Gaussian integers and to the ring of Eisenstein integers by McDaniels. The Euclid-Euler theorem gives a structural formula based on Mersenne prime numbers for even perfect numbers and analogues of this theorem were obtained by McDaniels for some unique factorization domains (UFD).

Our first goal is to obtain generalizations of the Euclid-Euler theorem for c/d-perfect numbers and our second goal is to obtain generalizations of these structural theorems on the ring of integers as well as in some UFDs.

Heath-Brown (1994) has shown that if N is an odd c/d-perfect number with r distinct prime factors and c > d, then N ≤ (4d)^4r. This inequality was improved to N ≤ (d + 1)^4r by Nielsen (2003). Ou third goal is to improve the upper bound for N, for a few instances of c/d, namely when c is sufficiently greater then d.

Applied mathematics

The Queens' Graph and its generalization

Inês Costa, Domingos M. Cardoso, Rui Duarte

The generalized nxnxn chessboard is the cube with n^3 black and white unit cubes, that we call the chesscube. It is assumed that it is possible to place a queen inside any unit cube.

We define the (n,n,n)-Queens' Graph, Q(n,n,n), as the graph whose set of vertices is the set of unit cubes and where two vertices are adjacent if two queens in the corresponding unit cubes are attacking each other.

Our main contributions to the study of Q(n,n,n) are related to its spectral properties. In our previous work, we studied the n-Queen's Graph, Q(n,n), associated to the chessboard nxn, built in a similar way to Q(n,n,n). For Q(n,n) we already know many combinatorial properties and some properties of its spectrum.

Since Q(n,n) is a subgraph that is obtained by sectioning the chesscube following a plane parallel to any of the faces, we also analyzed the spectral properties of other subgraphs of Q(n,n,n) obtained by sectioning the chesscube in diferent directions. These subgraphs can be represented in a retangular, triagular or hexagonal boards.

Applied mathematics

Soliton No-go theorems and duality in Einstein-Maxwell-Scalar models

João Oliveira, Carlos Herdeiro, Filipe Mena, Eugen Radu

In the Einstein-Maxwell-Scalar model, the scalar field interacts with gravity and electromagnetism in novel ways due to a stronger coupling between the scalar field and the electromagnetic field than in most other models. The study of the properties of this model is the main objective of this thesis. Aspects most studied in this thesis include the search of solutions for the equations of motion (like solitons) and how to restrict the possible space of these solutions through uniqueness and no go theorems. Another important subject of study is the possibility of duality transformations of the electromagnetic and scalar fields as a solution generation technique and how these can be generalised to more complex models that include the EMS model.

Applied mathematics

The stochastic time-delayed model for the effectiveness of Moroccan covid-19 deconfinement strategy.

Zine Houssine, Delfim F. M. Torres

Coronavirus disease 2019 (COVID-19) poses a great threat to public health and the economy worldwide. Currently, COVID-19 passes in many countries to a second stage, characterized by the

need for the liberation of the economy and relaxation of the human psychological effects. To this end, numerous countries decided to implement adequate deconfinement strategies. After the first prolongation of the established confinement, Morocco will move to the deconfinement stage on May 20, 2020.

The relevant question is about the impact on the COVID-19 propagation by considering an additional degree of realism related to stochastic noises due to the effectiveness level of the adapted measures. In this paper, we propose a delayed stochastic mathematical model to predict the epidemiological trend of COVID-19 in Morocco after the deconfinement. To ensure the well-posedness of the model, we prove the existence and uniqueness of a positive solution. Based on the large number theorem for martingales, we discuss the extinction of the disease under an appropriate threshold parameter. Moreover, numerical simulations are performed in order to test the efficiency of the deconfinement strategies chosen by the Moroccan authorities to help the policy makers and public health administration to make suitable decisions in the near future.

Applied mathematics

Biochemistry

Development of micromotors based on cellulose via microfluidics for biomedical applications

Ana Silva, Carmen Freire, Armando Silvestre, Carla Vilela

The present thesis project aims to develop cellulose-based micromotors prepared through dissolution of cellulosic substrates (or its derivatives) with alternative solvents, e.g., ionic liquids (ILs), and following regeneration via a microfluidic approach to design and assemble theranostic systems, i.e., platforms with simultaneous drug delivery and diagnosis functionalities. Incorporation of fuel-free propulsion moieties that allow directed movement, e.g., gold nanoparticles (AuNPs) or magnetic nanoparticles, will be studied for preparation of self-propelled micromotors, as well as functionalization with therapeutic, imaging (e.g., fluorescein-5-isothiocyanate (FITC)) and targeting (e.g., folic acid) functions. The ensuing cellulose-based micromotors will be characterized and the most promising will be evaluated as potential theranostic systems for cancer treatment and diagnosis.

Biochemistry

Metabolic Reprogramming of Tumor-Associated Macrophages (TAM) in Triple Negative Breast Cancer

Ana Sofia Dias, Iola Duarte, Catarina Almeida, Luisa Helguero

Breast Cancer (BC) is the leading cause of cancer-related deaths in women and the second most lethal when considering both sexes. Within different BC subtypes, triple negative breast cancer (TNBC) is one of the most aggressive, being associated with the worst prognosis. Cancer development, disease progression and response to therapy are strongly influenced by tumor microenvironment (TME). Tumor-associated macrophages (TAMs) are abundant infiltrating immune cells, which, according to their activation state, may display either tumoricidal functions (inflammatory M1-like macrophages) or pro-tumorigenic functions (anti-inflammatory M2-like macrophages). In BC, higher frequency of M2-like TAMs strongly correlated with increased relapse rate, poor outcome, and ER negativity. Hence, shifting TAM polarization towards an anti-tumoral M1-like phenotype has emerged as an attractive strategy to elicit tumor regression and aid cancer treatment. To develop such immunomodulatory strategies, it is important to establish and thoroughly characterize in vitro cellular models of TAMs. This work aims to establish an in vitro model of breast TAM and to characterize their phenotypic and metabolic changes. To generate TAMs in vitro, we have incubated human monocytes (THP-1)-derived macrophages with medium conditioned by TNBC cells (MDA-MB-231 cell line). The generated TAM showed an increase in CD163 expression (M2 marker) compared to prototypical M1 macrophages, whereas HLA-DR expression (M1 marker) was very low. The transcript levels of M2-markers such as CD36, arginase1, IL10 and TGFb were also increased compared to uncommitted M0 macrophages. Moreover, generated TAMs secreted the anti-inflammatory cytokine IL-10, while secretion of the pro-inflammatory cytokines IL-6 and TNF-α was reduced. Furthermore, NMR metabolomics revealed several metabolic adaptations when macrophages were cultured in the medium conditioned by TNBC cells. These included, for instance, lower consumption of pyruvate and serine, together with lower excretion of lactate, glycine and formate. Another striking difference regarded alanine, which was excreted by M0 macrophages but consumed by TAMs, showing this aminoacid to be a preferred substrate for these cells. The results set the basis to establish an in vitro model for studying TAM metabolism, function and immunomodulation.

Biochemistry

Lipidomics of microalgae: unravelling their lipid signature and bioprospecting bioactive phytochemicals

Daniela Couto, Pedro Miguel Dimas Neves Domingues, Maria do Rosário Gonçalves Reis Marques Domingues, Joana Gabriela Laranjeira da Silva

Microalgae are used in food, feed, and industry. They are rich in lipids with nutritional and health beneficial effects, representing an emerging and sustainable resource with potential applications in different fields. However, there is a lack of knowledge on their polar lipidome, hindering the full exploration of their biotechnological potential. Moreover, the microalgae lipidome is very sensitive to environmental and growth conditions, which can be used to increase the production of added value products. This work aims to characterize the lipidome of distinct microalgae with industrial added value, using mass spectrometry-based approaches, to identify variations in the lipidome with growth conditions and evaluate their bioactive properties, aiming to contribute to the use of microalgae as sustainable and renewable natural sources of bioactive compounds and to foster the exploration of novel applications.

Biochemistry

Biofluid metabolomics and proteomics for biomarker discovery in preterm birth and gestational diabetes mellitus

Daniela Duarte, Prof. Ana Gil, Prof. Pedro Domingues

Preterm birth (PTB), birth before 37 gestational weeks (gw)[1], affects ca. 10.6% of all live births worldwide[2] and it is the leading cause of neonatal deaths[3]. Metabolomics, as reviewed recently, has been used to study PTB at pre- and post-natal levels[4].

In the present thesis, Nuclear Magnetic Resonance(NMR) spectroscopy-based metabolomics, is used to explore urine and saliva in two longitudinal portuguese cohorts (Aveiro and Coimbra) of pregnant women (n=50 each cohort), to describe the dynamic excretory and salivary signatures of healthy and PTB pregnancies. To assess PTB specificity, metabolic profiling of gestational diabetes mellitus (GDM) is considered and the metabolic biomarkers found are used to predict conditions, impacting on treatment guidance. Follow-up of PTB baby (urine only) during probation enables to uncover metabolic markers of organ maturity and the follow-up of GDM mother (urine and saliva) during treatment reveals responsive/resistant fingerprints and, hence, potential biomarkers for personalized disease management. Proteomic characterization of selected urine samples will be carried out for biomarker strengthening in GDM study.

The first study performed was the follow-up of the PTB newborn. Firstly, a cross-sectional study was performed to compare the urinary metabolic profile between different sub-categories, from extremely (birth < 28 gw) to late (34-37 gw) PTBs, enabling the identification of key metabolites expected to vary significantly between development stages. Subsequently, a longitudinal cohort of PTB newborns were followed during hospitalization. The urinary metabolic trajectory of each subject was assessed and the metabolites identified in the cross-sectional study were followed specifically in this cohort. This information enabled the assessment of the development processes of liver, kidney, lungs and gut microflora, since birth until theoretical term time. Preliminary results were presented as a poster in a national conference (6PyChem, 2018) and extended work was presented as a poster in an international conference (SMASH-Small Molecule NMR Conference, 2019). This work will be submitted to a scientific journal.

To obtain trustworthy results, bias during sample collection and handling in the laboratory needs to be avoided. A saliva 1H NMR-based metabolomic study was performed for the first time to assess metabolic changes induced by room temperature (RT-~22ºC) and 4ºC up to 48h, and -20ºC up to 4 weeks at collection. Concomitantly, sample stability after thawing and during handling in the laboratory at RT(25ºC) up to 8h and 4ºC up to 48h, with and without the addition of sodium azide(NaN3), a commonly used bacteriostatic preservative, was also investigated. It was concluded that saliva stability is individual dependent. At collection, saliva can be stored at RT and 4ºC up to 3h, and at -20ºC, at least 4 weeks, without any statistically significant variation. Observed variations are related to bacterial metabolism, TCA cycle, glycine, alanine, serine, threonine and purine degradation metabolisms. In the laboratory, NaN3 should be used. No statistically significant variation was found, at least, during 8h at RT and up to 24h at 4ºC. In the near future, this work will be submitted to a scientific journal.

All urine (both cohorts) and saliva samples (Coimbra cohort only) were analyzed by NMR. Multivariate analysis of urine NMR data for GDM study (ongoing work) will aid to select samples for proteomics, a work to be done in the near future.

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Biochemistry

Valorization and traceability of cultured macroalgae using elemental and lipid signatures

Diana Lopes, Ricardo Calado, Ana Lillebo/ Maria do Rosário Domingues

The growing interest in cultured macroalgae for food, feed and pharma in Western countries demands a new knowledge on their constituents and new tools for traceability. Macroalgae's polar lipids have nutritional, health benefits, and bioactive properties, contributing to their valorisation. Lack of knowledge on their polar lipidome hinders their full biotechnological potential. Lipids are strictly dependent on macroalgae phylogeny, life stage and environment, being good potential tools for their traceability. This work aims to characterize the polar lipid profile of macroalgae produced on land based aquaculture using modern lipidomics, bioprospect bioactive compounds and develop lipid signatures for product identification, origin certification and quality control of raw macroalgae and/or macroalgae-based products. This work fosters the exploration of novel macroalgae applications, in line with Europe's 2020 Bioeconomy recommendations towards innovating for sustainable growth.

Biochemistry

Bioactive compounds from sulphite pulp production streams for applications in functional food and cosmeceutical industries

Dmitry Evtyugin, M.R.M. Domingues, S.I.P. Casal Vicente

Sulfite spent liquor (SSL) and alkaline extract from bleaching stages (AEB) form the major part of waste streams from acidic sulphite pulping. Nowadays, SSL and AEB, mostly burned for inorganic base and energy recovery, are considered as underutilized natural resource. In the production of dissolving pulp from eucalypt wood these industrial streams are known to contain ellagic acid (EA) and sterols, including their derivatives, whose structure and properties have not yet been studied. The valorization of EA and sterols, compounds with paradigmatic biological functions, could represent an important profit for pulp companies and meet the ever growing demand for highvalue natural compound recovery from wastes and by-products, employing costefficient and eco-friendly methodologies. Hence, the development of a large-scale production of EA and sterol-based products from industrial streams of acid sulphite pulping of eucalypt, and a subsequent evaluation of the aforementioned compounds as potential bioactive additives in functional food and cosmeceutical industries, are the main topics of the present PhD project.

Biochemistry

COFFEECOAT - Holistic use of coffee byproducts as a sustainable source of paper coating raw materials

Gonçalo Oliveira, Idalina Gonçalves, Cláudia Passos, Paula Ferreira

Paper-based materials are usually coated with petroleum-based polymers to be used as food packaging. However, the use of these polymers compromises the paper recyclability, giving rise to environmental issues when landfilled. Therefore, alternative biodegradable plastic formulations for paper coating are required. Coffee industry byproducts are rich in valuable biomolecules as polysaccharides, lipids, and phenolics. Their use for developing biodegradable formulations for paper coating may represent an opportunity for their valorisation. During this Doctoral Thesis, the feasibility of using coffee husks (CHs), a byproduct derived from coffee cherries drying; coffee silverskin (CS), a byproduct derived from coffee bean roasting; and spent coffee grounds (SCG), a byproduct resulted from coffee beverages preparation, as sources of biomolecules of interest for developing biodegradable coating formulations will be studied. Aiming to develop coffee byproducts-based coating formulations, the biomolecules' extraction methodologies will be carefully selected and optimized. After characterizing each coffee byproducts-based extract, their film-forming ability will be assessed through solvent casting technique. Coffee byproducts-based formulations will be adjusted by studying the films morphology, mechanical, physicochemical, barrier, and biodegradability properties. Moreover, aiming to develop bioformulations compatible with conventional industrial paper coating processes, the extrusion and impregnation ability of coffee byproducts-based formulations will be studied. This Doctoral Thesis will contribute for exploiting a sustainable approach that underlies a circular economy, whose success may offer biodegradable formulations competitive with the petroleum-based ones nowadays used for paper coating.

Biochemistry

Differential metabolic effects of articaine and lidocaine in Schwann cells

Gustavo H. Rodrigues da Silva, Luís Mendes, Ludmilla D. de Moura, Eneida de Paula, Iola F. Duarte

Articaine (ATC), launched onto the market in 1984, is the only local anesthetic (LA) of the amino-amide type that has a thiophene ring as lipophilic moiety. Its use has become increasingly popular, mainly in dental practice, due to its rapid hydrolysis and reduced systemic toxicity compared to other LA. Indeed, the clinical dose for infiltrative anesthesia by ATC is 4%, which is the highest amongst commercially used LA. Despite low systemic toxicity, there is growing concern about the local toxicity of this agent, based on reported cases of paresthesia (nerve damage). However, in vitro and in vivo tests conducted so far have found no evidence that ATC has greater neurotoxicity than other LA, so further research in this direction is needed. This work aims to study the metabolic responses of Schwann cells (SC, glial cells of the peripheral nervous system) to ATC, in comparison to lidocaine (LID, considered a "gold standard" in local anesthesia). SC cells were exposed for 24h to ATC or LID at respective IC10 and IC50 concentrations (i.e., concentrations causing 10 and 50% decreases of cell viability, as assessed by the MTT assay) and changes in their exo- and endometabolome determined by 1H NMR analysis of culture medium and cell extracts. Multivariate analysis identified an evident separation between cells exposed to articaine in relation to lidocaine, when considering either the cell media (PLS-DA, Q2=0.854) or aqueous cell extracts (PLS-DA, Q2=0.975). Specifically, ATC was found to stimulate glycolysis and the TCA cycle, while inducing increased intracellular levels of several amino acids (leucine, isoleucine, valine, phenylalanine, methionine, histidine, tyrosine and glycine). On the other hand, these amino acids were decreased in LID-treated cells. Overall, ATC had a greater impact on SC metabolism than LID, especially at the IC10 concentrations. This in vitro study identified differential metabolic responses of SC to ATC and LID, enabling new hypotheses on their modes of action to be generated.

Biochemistry

BioBlisterPack – Agrofood byproducts for biodegradable blister packaging

Joana Lopes, Idalina Gonçalves, Paula Ferreira, Manuel A. Coimbra

Agrofood byproducts contain valuable compounds for interest of various applications, while providing their recovery. In this work, it was studied the feasibility of using a locust bean gum (LBG) processing-derived byproduct for the development of biobased materials. LBG byproduct started to be chemically characterized and applied on the preparation of films by a solvent casting methodology. Up to now, particle size distribution and SEM analysis allowed to observe that LBG byproduct presented an average particle size of 6 µm and a heterogeneous rectangular shape. In terms of sugars content and glycosidic linkages, only 28% was representative of LBG sugars fraction, being (1→4)-Man, (1→4,6)-Man, and t-Gal the main glycosidic linkages. Moreover, elementary data analysis revealed the presence of 56% of protein in LBG byproduct. When applied on films production, LBG allowed to attain materials with 50% of elongation at break and a water contact angle of 90º that can be improved by changing the LBG amount. Therefore, LBG revealed to be suitable for developing stretchable protein-rich films resistant to water, opening an opportunity for its valorization. Further experiments will be carried out aiming to fulfill the LBG byproduct physicochemical characterization and to optimize the LBG-based film formulations, targeting to obtain biodegradable LBG-based blisters, the main goal of this PhD thesis.

Biochemistry

Applications of protein design

José Pereira, Sérgio Santos, Bruno Correia

Computational design of proteins has opened the way for new applications of this technology. In this presentation, two distinct usages of computational resources for protein design are exemplified. First, a FN3 domain was grafted into a PDZ domain of Htra1 protease, with the aim of increasing affinity for the cleavage of alpha-synuclein, a protein whose miss-fold may cause fibrillar aggregation and degenerative cognitive diseases such as Parkinson's. The second project sees the design on a new recognition and binding site for carbamazepine, a known resistant water pollutant, in an initial inert small peptide, via forced emergence. Based on these two works, a new computational simulation suite for polymer manipulation in being developed, called ProtoSyn, with several state-of-the-art features that enable the usage of computational design technologies by everyone.

Biochemistry

Photodynamic Therapy in prostate cancer using chlorin and isobacteriochlorin photosensitizers

Mariana Mesquita, Amparo Faustino, Margarida Fardilha

Photodynamic therapy (PDT) is a promising methodology that can be used in the treatment of several types of cancer. This therapy involves the administration of a non-toxic photosensitizer (PS) that in the presence of oxygen is selectively activated by light to cause cell death

through the production of reactive oxygen species. Porphyrins are the most extensively studied PSs used in PDT due to their absorption in the visible range, long-lived triplet excited state, and effective phototoxicity towards cancer cells. In addition, several analogues such as chlorins and isobacteriochlorins, which are distinguished from the parent porphyrins by the presence of reduced peripheral double bonds, are also being considered promising PS molecules. In fact, these reduced macrocycles possess greater absorption in the red region of the visible spectrum than porphyrins, allowing them to cause deeper tissue photodamage. In this sense, we have prepared chlorin and isobacteriochlorin derivatives using 5,10,15,20-tetrakis(pentafluorophenyl)porphyrin as template and have evaluated their efficacy as PS against one prostate cancer cell line (PC-3). We will briefly discuss the synthetic strategy giving access to the PSs, their spectroscopic and photophysical properties, as well as their photodynamic efficacy against prostate cancer cells.

Biochemistry

Bioelectronic tongue for the detection of paralytic shellfish toxins

Mariana Raposo, Alisa Rudnitskaya, Maria Tereza Gomes, Maria João Botelho

Most of coastal countries are affected by harmful algal blooms and resulting episodes of marine toxin poisoning. Due to unpredictability of these outbreaks routine monitoring of marine toxins in bivalves is mandatory. Paralytic shellfish toxins (PSTs) are of particular concern due to the lifethreatening neurological symptoms they can cause in humans. There is an interest in development of inexpensive and rapid methodologies for the detection and quantification of PSTs that could be used both as a screening and alarm tools.

This project aims to develop a bioelectronic tongue system for the rapid detection of PSTs commonly encountered at Portuguese waters. Development of electrochemical biosensors based on PST transforming enzymes is proposed. Novelty of this work lays not only in the utilization of PST transforming enzymes for biosensor development but also in the use of array of biosensors as only few electronic tongues employing biosensors have been reported.

Biochemistry

Dynamic microfactories encapsulating cells for bone tissue engineering

Sara Nadine, Doctor Clara R. Correia, Professor João F. Mano

A plethora of bioinspired cell-laden hydrogels are being explored as building blocks that once assembled are able to create complex and highly hierarchical structures recapitulating the heterogeneity of living tissues. Yet, the resulting 3D bioengineered systems still present key limitations, mainly related with limited diffusion of essential molecules for cell survival, which dictates the failure of most strategies upon implantation. To maximize the hierarchical complexity of bioengineered systems, while simultaneously fully addressing the exchange efficiency of biomolecules, we propose the fabrication of liquefied and multilayered capsules for bone tissue engineering. The liquefied capsules are composed by (i) a permselective multilayered membrane; (ii) surface functionalized poly(ε-caprolactone) microparticles loaded into the liquefied core acting as cell adhesion sites; and (iii) cells. Results show the development of an effective engineered bioencapsulation strategy for the in vitro production of bone-like microtissues in a more realistic and cost-effective manner. Additionally, we could demonstrate that besides the typical spherical liquefied capsules, it is also possible to obtain multi-shaped blocks with high geometrical precision and efficiency. We intend to use the proposed system as hybrid devices implantable by minimally invasive procedures for bone tissue engineering applications.

Biochemistry

Deep eutectic solvents comprising active pharmaceutical ingredients for incorporation in biopolymer-based drug delivery systems

Sónia Pedro, Carmen S. R. Freire, Mara G. Freire, Armando J. D. Silvestre

Many drugs are insoluble or sparingly soluble in water and conventional pharmaceutical solvents, which difficult their formulation and drug delivery. Deep eutectic solvents comprising active pharmaceutical ingredients (API-DES) emerge as new alternatives, once they confer high drug solubility and dissolution, being possible to use different API classes in their composition. However, their combination with natural polymers, as well as the range of therapeutic targets and the biomedical approaches used to prepare these delivery systems is still limited. In this vein, the aim of this PhD work is to develop innovative drug delivery systems based on distinct API-DES and biopolymers for application in controlled drug release.

Biochemistry

Toxicometabolomics of graphene based materials (GBMs): towards mechanistic insights and new biomarkers

Tatiana Silva, Iola F. Duarte, Helena Oliveira, Peter Hoet

Graphene-based materials (GBMs) have been widely regarded as promising candidates for industrial and biomedical applications because of their exceptional rigidity and mechanical strength, excellent electrical conductivity, high optical transparency and good biocompatibility. However, GBMs increased production and applications raise challenges regarding their health risks and safety, calling for a better understanding of their biological effects. Omics approaches offer the opportunity to uncover unforeseen impacts in human cells and to define new biomarkers of toxicity. This work aims to investigate the biologic effects of GBMs through NMR metabolomics integrated with traditional toxicity assessments. A first goal is to obtain well-characterized GBMs (differing in number of layers, lateral size and surface oxidation) for the biological assays. Hence, we have started by optimizing the processing of graphene oxide (GO) samples from different origins, including the removal of contaminants and the preparation of GO with different dimensions. Amongst the different methods tested, bath sonication was the most suitable for obtaining GO samples with distinct lateral sizes in the range 200-1400 nm and relatively low polydispersity. The next step will consist of exposing lung epithelial cells and macrophages to these GOs, in order to study their impact in cell viability, phenotype and metabolism. Overall, this study is expected to provide new mechanistic insight and biomarker signatures of GBMs toxicity, supporting progress in the risk-benefit assessment of these materials.

Biochemistry

Biology

Generational transmission of pro-genotoxic/anti-genotoxic alterations induced by pesticides - a path to predict the real impact on aquatic populations

Ana Raquel Marçal, Mário Pacheco, Sofia Guilherme

The transgenerational effects of non-target organisms exposed to pesticides are still poorly explored. Procambarus clarkii, an invasive crayfish, is known to inhabit locals contaminated by pesticides, such as rice paddies. Penoxsulam is an herbicide highly used in rice production, although its toxic effects on non-target populations, namely on the red swamp crayfish, still need to be disclosed. The major aims of this study were: (i) to assess the penoxsulam genotoxic potential on P. clarkii F0 generation; (ii) to assess the oxidative stress on juveniles of F1 generation induced by the herbicide; (iii) to assess the DNA methylation patterns after penoxsulam exposure on F0 and F1 generations. A crayfish population from a pesticide-free local was exposed to environmentally relevant concentration (23 µg.L-1) of penoxsulam. The comet assay was used to assess the genotoxic potential in P. clarkii' somatic cells (gills and hepatopancreas) and male gametes. The oxidative stress was evaluated on juveniles' gills and hepatopancreas by assessing the LPO and the response of antioxidant enzymes (CAT, SOD, and GPx). The DNA methylation was measured in the crayfish muscle with the Methylflash Global DNA Methylation (5-mC) ELISA Easy Kit (Epigentek). The results showed that penoxsulam: (i) caused DNA damage on adult's crayfish somatic and germinative cells; (ii) induced oxidative DNA damage on juveniles' crayfish hepatopancreas cells; (iii) did not affect the methylation pattern on F0 generation, however, it caused hypomethylation on unexposed crayfish offspring (F1) from a penoxsulam-exposed population. These findings demonstrated that the herbicide penoxsulam is genotoxic and pro-oxidant for the species P. clarkii. Moreover, it was unveiled the penoxsulam ability to alter the DNA methylation pattern in the crayfish offspring. Changes in the epigenome can lead to alterations in the genetic expression of the crayfish juveniles, and this could impact its success. Overall, these results highlighted the value of integrating more endpoints in the pesticide risk assessment, that allow an evaluation to predict the real pesticide impact on aquatic populations.

Biology

Ecotoxicological and biochemical risks of xenobiotics on the health status of marine aquatic environments

Andreia Filipa Mesquita, Fernando Gonçalves; Ana Marta Gonçalves

This project aims to address single and combined toxic and biochemical effects of pollutants in non-target marine species at different temperatures, with the selection of specific fatty acids as biomarkers of stressors. Intergovernmental Panel about Climatic Changes (IPCC) report predicts a raise in temperature at the next 100 years with the major effects on estuarine and coastal environments. Metals and organic pollutants from anthropogenic activities cause the most damage to the ecosystem. In the last decades,was observed an increase on the pesticides applications, mainly in the Mediterranean zone due to the great need of food production related with exponential raise of mankind.This work pretends to support material to IPCC group and provide information to additional legislation and regulation of pollutants

to protect water quality and minimize environmental damages and ultimately in humans,with significantly reduction of marine pollution. Finally, this proposal intends to model stressors' effects, based on biochemical analysis to predict populations and ecosystem vulnerability.

Biology

Effects of sewage outfalls on marine protected species

Bruno Ferreira, Catarina Eira, Pedro Santos

Coastal waters represent a resource of enormous economic and environmental value, attracting industry, commerce, and human population. The Portuguese continental coast has been affected by population migration from interior to coastal regions, and even though the problem was initially focused around the larger coastal urban areas, over the years it generalized to the whole coastal Portuguese area. Human related pressure factors derived from urban nucleus, like marine outfalls discharges, represent potential hazards to the marine environment. Marine outfalls discharges represent a potentially dangerous and nearly invisible source of pollution, whose effects have been understudied. Outfalls are a source of large quantities of biological and chemical contaminants which may represent a relevant threat to endangered, threatened and protected (ETP) marine species. In order to assess the effects of the discharges in the environment and on ETP species, a holistic approach was used, including cetaceans and seabirds coastal census, in control and outfall locations, to evaluate species occurrence and habitat use, water and sediment microbiological analysis using traditional and novel methods (16S-based metabarcoding) to evaluate the microbial community and head-space solid-phase microextraction (HS-SPME) coupled with GC/MS to identify hydrocarbons in seawater. Seasonal census were performed from may 2018 to may 2019, and data is currently under analysis. Regarding the microbial community, traditional methodology showed that all sampled stations had an excellent water quality at the time of sampling (in accordance with the decree-law nº 113/2012). Eighty water and sediment samples were collected for the 16S-based metabarcoding approach, and after sequencing (Illumina) the data is now under analysis. Twenty-four water samples were collected to search for hydrocarbons in seawater through HS-SPME coupled with GC/MS and will be processed as soon as possible. When all the data is analyzed and processed, this integrated approach will provide insight into the use of ETP species as indicators of the ecosystem's health state and the effect of marine outfalls on them.

Biology

Wastewater-borne nanoparticles in aquatic ecosystems: from individuals to population responses

Carlos Pinheiro, Susana Loureiro, Isabel Lopes

The production of silver nanoparticles (AgNPs) has increased vastly over the past decade resulting on their release into the aquatic environment. Even though AgNPs are mostly removed during wastewater treatments (WWTs), their remaining levels in effluents are significant and may represent an increased toxicity for aquatic organisms due to their physical-chemical modifications after WWT. Considering these modifictions, the aim of this work is to study the fate and effects of wastewater-borne NPs in aquatic ecosystems. For that, the biological impact of pristine AgNPs and Ag2S-NPs (nanoparticle simulating a wastewater-borne NPs) were evaluated on species from different functional groups, including producers and primary and secondary consumers. In general, pristine AgNPs were more harmful for the test aquatic species than Ag2S-NPs, showing that the use of pristine nanoparticles is a conservative way of assessing their potential risk to the environment.

Biology

Ecotoxicological Effects of Emerging Contaminants in Lentic and Lotic Environments

Carlos Silva, Prof. Fernando Gonçalves, Dr. Joana Pereira, Dr. Nelson Abrantes

Emerging Contaminants are a global cause of concern. The scientific community only recently focused on this issue making the evaluation and identification potentially harmfully chemicals an up to date task. Wastewater treatment plants (WWTP) are in general ineffective in removing these contaminants, making their accumulation in the effluent discharge point frequent.

Our research plan will be focused on sampling sediment in areas near WWTP effluent discharge, in order to characterizing contamination levels. Additionally, we will perform chemical analysis of the effluent itself to isolate its effects from other pollution sources.

Parallelly biological community samples (macroinvertebrates, periphyton and microbiological communities) will be collected in order to evaluate effluent driven ecological impacts in the water bodies were the discharge occurs.

Biology

Mechanistic and functional studies on a novel Symbiodinium–driven calcification process under current and future climatic conditions

Cláudio Brandão, Jörg Frommlet; João Serôdio; David Suggett

Mechanistic and functional studies on a novel Symbiodinium–driven calcification process under current and future climatic conditions

Biology

Wild mammals in Portugal: their faecal microbiome as a source of pathogenic bacteria and antibacterial resistance.

Diana Dias, Tânia Caetano, Carlos Fonseca, Sónia Mendo

A high number of human infectious diseases arise from wildlife. These so called zoonoses are diseases shared between animals (including livestock, wildlife, and pets) and humans. In 2018 about 360 000 zoonoses were reported in EU by the EFSA and the ECDC. Shiga toxin-producing Escherichia coli (STEC) and Salmonella spp. infections were among the most reported causes of these zoonotic diseases. Additionally, since 2014, WHO considers antibiotic resistance (AMR) as an emerging global problem and a threat to the public health. However, wild animals are rarely exposed to antibiotics and therefore low levels of AMR are expected.

The main goal of this work is to characterize the AMR in wild mammals while investigating the possibility that they are reservoirs of pathogenic bacteria. Faecal samples of mammal species with distinct phenology (wild boar, red deer, otter, and red fox) were collected from areas under distinct anthropogenic pressures, in Portugal (Montesinho Natural Park, Lousã Mountain, Baixo Vouga Lagunar, Freita, and Tapada Nacional de Mafra). A total of 286 samples were processed. Of these, 175 E. coli isolates were subjected to AST and according to clinical breakpoints, resistance was detected for ampicillin (17%), streptomycin (9%), cefoxitin (9%), tetracycline (9%), co-trimoxazole (5%), ciprofloxacin (2%), nalidixic acid (2%), amoxicillin/clavulanic acid (2%), chloramphenicol (1%), tobramycin (1%), ceftazidime (1%), gentamicin (1%) and amikacin (1%). A multiresistant phenotype was detected in 10 isolates.

Regarding the potential pathogens, we have isolated 13 Salmonella spp. strains and 53 STEC, which will be further characterized (serotypes, virulome, and resistome).

Our preliminary results show that wild mammals are reservoirs and potential sources of pathogens and AMR and, considering the “One Health” concept, it is crucial to establish local monitoring programs worldwide that will benefit human, animal and environmental health.

Biology

pErCEPT- Quantification of ConcEntration and time resolved Effects: towards an Adverse Outcome PaThway.

Fátima Santos, Mónica J.B. Amorim, Cornelis A. M. van Gestel

The Adverse Outcome Pathway (AOP) concept was proposed as a tool for chemical risk assessment in 2010. This framework aims at causal understanding of biological responses on different levels of organismal complexity, from the molecular up to the apical phenotypic or population effect levels. The definition of molecular initiating events or key events within an AOP as determining factors for adverse effects are, however, challenging as they do not only depend on chemical-biomolecule interactions and exposure concentrations but also on toxicokinetics and toxicodynamics.

The connections between molecular and apical effects within AOPs are described mostly in a qualitative manner based on observed effects at the different levels rather than on the basis of knowledge of causal interactions, due to a lack of mechanistic information. To improve the scope for AOP-based predictions, experimental designs that produce data required for establishing ‘quantitative AOPs’ are needed. This however, is challenging as it requires interconnected data about chemical uptake rates, effect translation cascades described by dynamic alterations of biomolecule concentrations, and concentration and time resolved observations of apical effect occurrence. The consideration of exposure concentration and time is key and may especially discriminate molecular and physiological responses responsible for adaptation, stress response and contaminant elimination from those leading or initiating an adverse outcome. This therefore is essential in order to offer scope for AOP-based predictions of toxicological effects.

The study is being performed with the soil oligochaete Enchytraeus crypticus, an invertebrate and whole organism model for which a range of tools is available: full transcriptome microarray, standard survival, reproduction and bioaccumulation and the novel full life cycle or embryotoxicity options.

Biology

Developing epigenetic biomarkers of metal exposure in Daphnia

Guilherme Jeremias, Fernando J. M. Gonçalves, Joana L. Pereira, Jana Asselman

Freshwater ecosystems are largely endangered as a consequence of human activities. An efficient monitoring of metal contamination is an emerging concern and major challenge towards preventing freshwater biodiversity loss. Epigenetic mechanisms reflect the impact of environmental factors, including contaminants, on genes. Epigenetic modifications are highly responsive to stressors, which sets them as early-warning signals of environmental exposure and potential new molecular targets for biological remediation. The aim of this project is to develop and validate epigenetic biomarkers of metal exposure, using copper as a model contaminant and test stressor. Daphnia, a key organism in freshwater ecosystems widely considered in regulatory frameworks, will be tested under different scenarios of copper exposure (assessing the sensitivity and selectivity of epigenetic modifications). Individual, population, genetic and epigenetic endpoints will be assayed, and the holistic analysis of such results will represent a key validation step towards incorporating epigenetic biomarkers in the risk assessment of metals.

Biology

The Pteridophytes of Timor with special focus on Timor-Leste

Hermenegildo Costa, Paulo Silveira, Helena Silva

Abstract

Pteridophytes are vascular plants without seeds, that reproduce by spores, including ferns, whose sporangia grow on the ventral surface of the leaves and lycophytes whose sporangia grow in the leaf axils. Despite their great taxonomic diversity (51 families, 337 genera and approximately 12,000 species) with representation in very diverse habitats across the globe, especially in tropical environments, Pteridophytes constitute a group of vascular plants little known and studied. In this context, the territory of Timor-Leste is found, framed in two important biogeographic regions, Malesia and Wallacea, not only in terms of biodiversity but also in terms of conservation.

Thus, the main objective of this work is to study the diversity of Pteridophytes in the territory of Timor, with special emphasis on Timor-Leste, highlighting the potential medicinal and food applications of their taxa. To this purpose, this investigation had as its starting point collection of material not only for herbarium but also for phytochemical analysis, complemented with the study of Timorese specimens included in international herbaria. As a result of this study, it is worth mentioning: (1) the listing of 220 taxa Pteridophytes (belonging to 89 genera and 29 families), of which 30 taxa are new to the territory of Timor; (2) elaboration of an identification guide for Dare (Dili region) Pteridophytes; (3) the phytochemical study of one of the species with food and medicinal potential.

Biology

Application of the biorefinery concept in cyanobacterial blooms valuation

Inês Macário, Fernando Gonçalves, Joana Pereira, Sónia Ventura

Global warming and the anthropogenic degradation of water quality are pointed out as two major causes of the worldwide increase in frequency, severity, and duration of harmful algal blooms (HAB). Cyanobacteria, major constituents of HAB, can cause ecological, economic and human health problems, highlighting the urgency of improving HAB management strategies to ensure water quality. An innovative perspective for cyanobacteria management is the exploitation of their biotechnological potential. Several exploitable products produced by cyanobacteria (e.g. bioactive pigments, lipids, proteins, polysaccharides) present high market value. This work proposes the use of the biomass of cyanobacteria blooms, physically removed within traditional control actions, as a feedstock for future valuation, thus allying profit to water quality management. Therefore, its main goals are (i) the extraction of phycobiliproteins from laboratory cultures of common bloom-forming cyanobacteria; (ii) and the application of improved extraction processes to natural blooms. Following a concept of biorefinery, we intend to create a win-win relationship for water quality management jointly benefiting economic and environmental sustainability.

Biology

Dechiphering Pinus defence response against Fusarium circinatum infection: from physiology to Omics

Joana Amaral, Glória Pinto, Luis Valledor, Artur Alves

Pitch canker, caused by the fungus Fusarium circinatum, is an introduced non-native pine disease in both natural and planted stands of Europe subjected to quarantine measures. Besides the great importance of European pine forests and this high biotic threat, little research has been conducted on this topic. We will use a multidisciplinary approach to unravel host-pathogen interaction focusing on Pinus spp. with increasing levels of susceptibility to F. circinatum infection (P. pinea, P. pinaster, and P. radiata). Mechanisms regulating plant stress response include changes in energy production (photosynthesis and energetic metabolism), plant defence and hormones. By linking physiology and Omics, we will expedite the dissection of stress-sensing and signalling networks behind Pinus-Fusarium interaction. This will fulfil knowledge gaps on tree stress responses and may allow developing markers for selection of pitch canker-resistant pine genotypes.

Biology

Effects of drought and contamination on freshwater macroinvertebrates

Joana Santos, Fernando J. M. Gonçalves, Joana L. Pereira, Bruno B. Castro

Climate change has been increasing the frequency and magnitude of droughts. These have serious repercussions on freshwater ecosystems, causing negative effects on the biodiversity they sustain. The occurrence of drought can also enhance the adverse effects of other impacts to these ecosystems, such as chemical contamination from agriculture. Thus, it is imperative to accurately assess the influence of drought in the response of freshwater communities. Given the high sensitivity and bioindicator value of benthic macroinvertebrates, their response along drought and contamination gradients is being studied in this work to assess whether their resilience to anthropic impacts is compromised or not by drought.

Biology

Environmental Friendlier Plant Protection Products

Libânia Queirós, Prof. Fernando Gonçalves, Dr. Joana Luísa Pereira, Dr. Patrícia Pereira

The development of environmental friendlier Plant Protection Products (PPPs) is a current concern and a regulatory requirement. The agrochemical industry has been invested in this regard, especially by the re-formulation of available PPPs, both considering the PPP' composition and new types of formulation. However, two major problems have been identified in this context: (1) the mixture of active ingredients (a.i.) has not been tested in a systematic way, in order to identify effective combinations that may be less harmful to the environment; (2) the microencapsulation of the a.i. can pose a threat to soil biota, by compromising the recognition and avoidance behavior response. This work addresses these two issues based on laboratorial assays with non-target and target indicators of selected PPPs, contributing to the development of greener formulations, while ensuring the maintenance of their effectiveness.

Biology

Photodynamic inactivation for blood disinfection by immobilized photossensitizers

Lúcia Marciel, Adelaide Almeida, Amparo Faustino

Currently, there is no approved disinfection protocol for red blood cells concentrates (RBC) due to the collateral damages caused by treatments. Antimicrobial photodynamic therapy (aPDT) can be an alternative method with promising outcomes. This method requires light, a photosensitizer (PS) and molecular oxygen (O2) to produce reactive oxygen species (ROS) responsible by the oxidative damage of microbial vital components. In some cases, the synthetic access to highly efficient PS requires laborious processes related with chromatographic purifications. In this study, it was evaluated the suitability of a formulation (FORM) constituted with porphyrins bearing different positive charges, obtained during the synthesis of the highly efficient PS 5,10,15-tris(1-methylpyridinium-4-yl)-20-(pentafluorophenyl)porphyrin tri-iodide (Try-Py+-Me-PF). The results demonstrate that FORM, in phosphate buffer saline (PBS), was equally effective in the photoinactivation of Staphylococcus aureus (reductions of 8 log CFU.mL-1) as the highly efficient Try-Py+-Me-PF used separately. For S. aureus in plasma and whole blood, the photoinactivation was also similar to those obtained with Try-Py+-Me-PF, with reductions of 8 log in the plasma and 3 to 6 log in whole blood. The effective reduction of Gram positive bacterium with FORM provided promising indications towards its use in blood disinfection procedures, leading to a substantial decrease in PS costs and production time.

Biology

Lifestyle factors and human reproductive health

Magda Henriques, Maria Teresa Herdeiro, Susana Loureiro, Margarida Fardilha

Exposure to mercury (Hg) or other lifestyle factors have been associated with the decline in human fertility, but the molecular mechanisms responsible for the decline of the human reproductive outcomes are still unknown. The main objectives of this work are to: i) assess human exposure to Hg in the Aveiro region using non-invasive biological matrices; ii) examine the influence of variables that may contribute to Hg exposure during pregnancy; and iii) study the impact of Hg exposure on the human fertility. Thus, this study is carried out in eligible women and men hospitalized at Centro Hospitalar do Baixo Vouga, located in Aveiro. A detailed questionnaire regarding sociodemographic, diet, lifestyle and reproductive data is completed by participants. Samples of hair, saliva, urine, blood, semen, placental tissue and umbilical cord are collected in the normal setting of the hospital from participants. Total Hg levels are then quantified in biological samples by atomic absorption spectrometry after thermal decomposition of the sample using the Advanced Mercury Analyzer (AMA-254, LECO). Our preliminary results yielded additional information for conducting Hg risk assessment for the human reproductive health. Also, our study demonstrated Hg accumulation in biological samples from participants living in the Aveiro region. Further and continuous monitoring of Hg exposure should be required in order to prevent possible adverse effects in human reproduction. Moreover, it is imperative to further investigate the molecular effects of Hg exposure on male and female reproductive health.

Biology

Antimicrobial photodynamic therapy of virus in Wastewater

Maria Bartolomeu, Adelaide Almeida, Amparo Faustino

Pathogenic viruses are frequently present in marine and estuarine waters, due to antimicrobial ineffective treatment performed in wastewater (WW) treatment plants, which consequently affect water quality and human health. Chlorination, one of the most common methods used to ensure microbiological safety in tertiarily treated effluents, may lead to the formation of toxic chemical disinfection by-products through the reaction with organic matter present in the effluents. Antimicrobial photodynamic therapy (aPDT) can be a promising disinfecting approach for the inactivation of pathogens, without the formation of known toxic by-products. Additionally, some studies have reported the potentiator effect on aPDT in combination with some compounds as potassium iodide (KI) and hydrogen peroxide (H2O2). In the present study, it was evaluated aPDT efficiency of a PS combination based on a low-cost formulation constituted by five cationic porphyrins (Form) and the potentiation effect by KI and H2O2 in the inactivation of E. coli T4-like bacteriophage in different aqueous matrices with different organic matter content and several Form concentrations. The results showed that the efficiency of bacteriophage photoinactivation is correlated with the concentration of the used PS and the increasing of the organic matter promotes a decrease in aPDT efficiency. Nevertheless, Form can be an effective alternative to control viruses in WW, particularly if combined with H2O2. On the other hand, when combined with KI, the Form is less effective to inactivate E. coli bacteriophage.

Biology

Single and combined effects of microplastics and adsorbed contaminants on molecular and biochemical responses of freshwater species

Mariana Rodrigues, Prof. Dr. Fernando Gonçalves, Dr. Ana Marta Gonçalves, Dr. Nelson Abrantes

Microplastics, ubiquitous and persistent particles with < 5mm, are one of the most emerging aquatic pollutants. The environmental occurrence and the potential effects of microplastics and its combination with adsorbed contaminants has been widely reported for marine systems. Notwithstanding, regarding freshwater systems there is still an immense gap of knowledge. Hence, this work, as a pioneering study in Portugal, aims to provide new insights into the ecotoxicological effects of single microplastics (microspheres of polyethylene), as well the combined effects of microplastics with an organic or inorganic contaminant (a polycyclic aromatic hydrocarbon and a metal, respectively) at relevant environmental concentrations. Distinct freshwater organisms from different trophic levels will be used for short-term exposure and, the three most-sensitive species for long-term exposures. Furthermore, this work also aims to assess the potential for bioaccumulation through the food web, its biochemical implications for organism's health and, lastly, for ecosystem.

Biology

Marine Fungi: Diversity and Biotechnological Potential

Micael Gonçalves, Artur Alves, Ana Cristina Esteves, Yves Van de Peer

Blue biotechnology is becoming one of the main drivers for the development of sea economy. Biotechnological applications related to marine organisms, namely microorganisms, are increasingly leading to the generation of economic value and of innovative solutions. Fungi are ubiquitous members of ecosystems that are economically, biotechnologically and medically important. The total diversity of the fungi

has been estimated to be 1.5–1.6 million species, while marine fungi have an estimated diversity around 12.500 species with less than 1500 species described so far over 500 genera. Marine fungi are frequently present in intertidal zones, salt marshes and mangroves but can also be found in extreme environments such as deep-sea sediments, ice and hypersaline waters. They act as pathogens and symbionts of other marine organisms, such as algae, corals and sponges and are ecologically relevant due to their performance in biochemical processes such as nutrient regeneration while acting as decomposers of organic matter.

Fungi from Portuguese marine environments are poorly studied, and therefore, their diversity is poorly known. Through culture dependent methods this project aimed to exploit the diversity of Portuguese marine fungi with characterization of the novel species for posterior studies on production of bioactive compounds focusing in a sustainable use of marine resources. During an extensive survey of the fungal diversity in marine and estuarine environments in Portugal, we obtained a collection of 615 isolates including 20 novel species and 1 new genus. Forty-four genera were found in our fungal collection of saline water, algae, sponges, driftwood and submerged wood samples, being that 5 genera are typically marine. Overall, the most represented species belong to the genera Cladosporium and Penicillium, both common soil-associated fungal genera that are commonly found in marine environments and Lulworthiopsis, a typical marine genus associated to submerged wood.

To assess the biotechnological potential of these isolates, some of them were selected, and preliminary screenings of enzymatic and antibacterial tests ate currently ongoing. Also, through a metabolomics approach, identification and characterization of secondary metabolites that are associated to the biological activities are ongoing.

In future, the genomes of selected strains exhibiting the most promising features will be sequenced and properly annotated in order to identify biosynthetic genes or gene clusters for the synthesis of relevant compounds, as well as their regulatory mechanisms.

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Biology

The role of emerging contaminants and environmental factors on fish personality

Niedja Santos, Dr. Miguel Oliveira, Dr. Inês Domingues

The influence of human activities on the aquatic environment has been extensively studied in the last years. Although the assessment of biochemical and physiological alterations induced by contaminants on fish has been increasingly studied, little is known to respect their effects on personality, a definer factor in responses to stimuli, including predators and feeding opportunities, and thus, organisms to survival and reproduction. Thus, anthropogenic substance/abiotic alterations that affect an individual personality can also influence the population in a determined environment, hence affecting their ability to succeed, and the entire equilibrium of an ecosystem. The present research project aims to determine several responsive endpoints, for example, personality and personality traits transferred from parents to offspring, at different stages of fish life, and determine how these endpoints are affected by emerging contaminants.

Biology

NANOPTION - Determining the Suitability of Nanopestices for Sustainable Agriculture

Nuno Costa, Isabel Lopes, Miguel Oliveira, Ruth Pereira

The increase of farming practices and intensive agriculture is directly related with the boom of pesticide usage, resulting in the presence of toxic residues in various environmental matrices and causing severe adverse effects in biota. To prevent pesticide permanency and reduce their concentrations in the environment, nanotechnology has looked for an alternative that would reduce the negative environmental impacts. Nanopesticides are able to release controlled amounts of pesticide in the target plant, avoiding excessive use and exposure in the surrounding environment. Accordingly, and within the EU green chemistry paradigm, this project aims at determining if acetamiprid nanoformulations are good and environmental friendly surrogate of its conventional formulation, in order to promote sustainable agriculture. For this, efficiency (eliminate target species), ecotoxicity (effects on non-target biota) and productivity (crop species) potential will be assessed and compared with the conventional formulation.

Biology

Prevalence of antibiotic resistance in the Ria de Aveiro

Patrícia Matos, Marta Tacão, Isabel Henriques

Currently, antibiotic resistance is a serious public health issue, as thousands of people die each year with complications related to resistant bacteria. Therefore, many studies have been carried out in clinical settings to better understand this problem.

However, antibiotic resistance cannot be seen as a problem a clinical environment-specific problem, as antibiotic resistance is also found in natural environments. Yet, little is known about the prevalence of antibiotic-resistant bacteria in the environment, including aquatic systems.

Thus, it is essential to understand the prevalence of antibiotic-resistant bacteria in these settings, since both rivers and estuaries are often used as water sources, for instance for domestic consumption after treatment, for crops irrigation, and for leisure activities.

Thus, the objective of this work is to determine the prevalence of Enterobacteriaceae, bacteria considered highly relevant in clinical settings and linked to serious threats to public health, resistant to two antibiotics, imipenem (from the carbapenems group) and ciprofloxacin (from the fluoroquinolone group), along the estuary Ria de Aveiro. Ria de Aveiro estuary is a natural aquatic system widely used by humans for several different purposes like, as an example, fishing, aquaculture and recreational activities, with an extension of 80 Km2, across 7 municipalities. It is highly impacted for example by industry and livestock.

Sampling was performed in the four seasons from 2018 to 2020, in 26 locations in Ria de Aveiro. Water collected was filtered and membranes were placed in culture medium m-FC and m-FC supplemented with imipenem (4ug/mL) or ciprofloxacin (4ug/mL). After incubation at 37ºC for 24h, bacterial colonies were counted and registered as CFU/mL. The proportion was calculated based on the total bacteria enumerated in m-FC compared with those enumerated in antibiotic supplemented medium.

Prevalence of imipenem-resistant bacteria was higher in the warmer seasons (spring and summer), while the prevalence of ciprofloxacin-resistant bacteria was higher in autumn and winter.

In conclusion, this study provides for the first time an image of the dynamics of antibiotic resistance along the Ria de Aveiro, highlighting pronounced seasonal variation.

Biology

Juvenile fat metabolism in migratory waders

Samara Menezes, Dr José Augusto Belchior Alves, Dr. José António Masero

Migratory waders are true global connectors as these species travel the globe twice a year, migrating between breeding and wintering areas during their annual routine. Central to such stunning physiological performances is a plastic digestive machinery and a fine tuned fat metabolism, as this is the underlying fuel for such long distance flights. In this context, fatty acid composition of fat stores could be more important than fat quantity in explaining migration performance. In some species, juveniles have to undertake such flights within 2-3 months after being born. Interestingly, surviving the first migration is a major achievement for juvenile birds, and in many species mortality rates decrease considerably after successful completion of the initial migration. Thus far much attention on the lower survival of juveniles during migration has focused on navigation and orientation. However, some life history traits such as age could have important effects on fat metabolism, and recent evidence suggests that juveniles underperform in terms of fat metabolism in relation to adults. This PhD thesis will use field and experimental data to explore juvenile fat assimilation and metabolism, and its potential implications for migratory performance.

Biology

The genus Diaporthe on blueberry plants in Portugal: from species diversity to pathogenicity

Sandra Hilário, Liliana Santos, Artur Alves

Blueberries (Vaccinium corymbosum) are widely cultivated worldwide and largely consumed due to their antioxidant and medicinal properties. Its production in Portugal has been increasing over the last 20 years, becoming a highly profitable crop since most of the production is to supply markets in the North of Europe. However, due to the spread of blueberry plants across continents, blueberry production has been affected by several fungal pathogens. Among these, members of the genus Diaporthe are well-known agents of canker, dieback, blight and fruit rot, which may lead to productivity losses. Furthermore, Diaporthe vaccinii has been treated as a quarantine pathogen in Europe, but there is still a lack of information regarding its pathogenic potential, lifestyle and host specificity. Although Diaporthe twig blight and dieback symptoms have been observed in blueberry growing areas of Portugal, no exhaustive studies have been carried out to identify the causal agents of the symptoms observed. Therefore, this research plan aims to fill this gap by studying the diversity and pathogenicity of Diaporthe species occurring in Portuguese blueberry productions.

For this, a collection of 116 fungal isolates obtained from symptomatic blueberry plants was initially evaluated based on their overall genetic diversity, through Microsatellite-Primed PCR (MSP-PCR) fingerprinting. From this analysis, 25 isolates were selected and characterized based on DNA sequence data of five genes. The phylogenetic analyses placed the isolates into nine distinct clades representing seven known Diaporthe species, one new species and one hybrid, described for the first time in this genus. All these species were also characterized in terms of their morphology.

This work has revealed, the occurrence of a diverse assemblage of Diaporthe species associated with diseased blueberry plants in Portugal, which is an essential step to formulate robust species concepts and clear descriptions. Further studies will be conducted to assess the pathogenic potential of the identified species to different blueberry cultivars, understand whether the quarantine status of D. vaccinii is still appropriate, as well as to sequence and analyze the genome of some relevant species identified during this research. This approach will allow us to gain insights into the potential virulence genes associated with different pathogenic strategies, evaluate the adaptability of the pathogens and enlighten about disease management to improve plant yield.

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Biology

Application of the biorefinery concept to value the invasive species Procambarus clarkii

Telma Veloso, Fernando Gonçalves, Sónia Ventura

The red swamp crayfish Procambarus clarkii, native from EUA, is the most well-established invasive species in Europe, becoming the major biodiversity threat of freshwater systems. The success of their environmental compatibility is related to high plasticity, borrowing activity, ability to integrate into the food web at many levels and low predation rates. In spite of the several and diversified methods that have been proposed or used, all have high costs and noneconomical return.

The exoskeleton of P. clarkii is composed by chitin (15-20%), proteins, including pigments (25-40%) and calcium carbonate (40-55%), which represents a considerable source of these biocompounds with biotechnological relevance. In this way, we propose the development of sustainable efficient techniques to extract astaxanthin, chitin and collagen from the invader P. clarkii in order to enrich environmental management strategies with an economic resource that can support the removal of the crayfish from invaded ecosystems.

Biology

Development and Assessment of Ecological Indicators for the Management of an Endangered Migratory Fish Species (Anguilla anguilla)

Vanessa Ferreira, Dr. António Nogueira, Dra. Ana Lillebø

Many coastal ecosystems are at risk of being irreversibly damage by human activities and pressures, that threaten their sustainability, the provision of ecosystem services and ultimately human well-being. Ria de Aveiro coastal lagoon is influenced by marine and freshwater circulation, the lagoon connection to the Vouga river is essential for migratory species like Anguilla anguilla (catadromous), this environment is critical to complete their reproductive cycle. The main objective of this research consists in the assessment of ecological indicators relevant for the management of endangered species of migratory fishes, including the development of innovative management tools, concepts and business models, to understand the ecological and socio-economic components of these complex ecosystems, addressing the case study in an ecosystem based-management approach. This study will be carried out in Ria de Aveiro Natura 2000 sites that includes freshwater (Vouga and Antuã rivers), transitional and marine/coastal waters and will be carried out in the framework of the EU H2020 project AQUACROSS.

Biology

Squaring the circle of bivalves' valorization: how to ensure food safety preserving nutritional features?

Vitória Pereira, Prof. Dr. Mário Pacheco, Dr. Rui Rocha, Dr. Luís conceição

Aquaculture of low-trophic species, as marine bivalves, can represent a path for sustainable food production. However, bivalves may bioaccumulate pathogenic microorganisms, so that its purification is mandatory, depending on the production area. Yet, purification can induce physiological stress and nutritional losses, compromising product quality and reducing shelf life. Bivalve feeding during purification may be the solution to overcome these problems. Overall, the main objective is to evaluate if bivalve (Ruditapes decussatus and Cerastoderma edule) feeding during purification can contribute (or not) to improve product quality and reduce food losses, through survival,

biochemical profile, antioxidant and antigenotoxic biomarkers analyses. It will be organized in 3 working packages (WP): i) effect of bivalve feeding with live microalgae vs. freeze-dried microalgae vs. microalgae-based microencapsulated diets; ii) effect of diet supplementation with natural antioxidants (vitamin E, green tea extract and turmeric); and iii) potential of enriched bivalves as functional foods.

Biology

Espécies botânicas raras ou ameaçadas do cerrado goiano e promoção da cultura

Wilma Ferrari, Amadeu Mortágua Velho da Maia Soares /UA, Marcos Antônio S. Silva Ferraz/UnB, Brasil

Elaboração de ilustrações científicas de plantas raras e ameaçadas de extinção no bioma Cerrado do estado de Goiás, Brasil, com vistas á conscientização e preservação da natureza e enquanto embaixadores de ações de divulgação científica e de sensibilização para a conservação ambiental regional e, ainda, apresentar quais as implicações futuras em termos da biodiversidade e consequente sustentabilidade dos ecossistemas regionais e do bioma em si, caso esta tendência não for travada.

Biology

Nanomaterial fate and speciation in the terrestrial environment

Zahra Khodaparast, Dr. Susana Loureiro (Department of Biology & CESAM, University of Aveiro), Dr. Cornelis A. M. van Gestel (Vrije Universiteit Amsterdam)

AgNPs are currently used in several applications, but it is already known that AgNPs won't be in the same condition as their initial form upon production, and their characteristics will change based on the receiving environment. Because of the presence of a large proportion of sulfide and the reduced conditions during wastewater treatment, Ag2S is expected to be formed from Ag ions or AgNPs. By application of sewage sludge or nanoagrochemicals, AgNPs reach the soil compartment, therefore the relevant hazard assessment practices must be accurately performed. For the present work plan, several Ag NPs were chosen, synthesized for different purposes by several partners from the EU project NanoFASE, providing the use of particles presenting different characteristics. A stepwise approach was carried out where, at the first step, the study of the Ag bioaccumulation was assessed in different terrestrial organisms upon exposure to different Ag forms (pristine NPs, Ag2S NPs and AgNO3). A toxicokinetics approach was used for the Ag exposure in three different organisms (Tenebrio molitor, Enchytraeus crypticus, Brassica rapa), where uptake and elimination rate constants, along with other parameters (e.g.BAF, DT50) were derived. In the second step, the bioaccumulation of Ag2S NPs was investigated in more relevant environmental conditions by running multispecies microcosms. Ag2S NPs showed different behaviour compared to other Ag forms as their bioavailability and bioaccumulation was found to be different in the mealworms T. molitor and plant B. rapa. So, considering the species-specific reactions of NPs with their surrounding environment and resulting bioavailability, studying the more environmental relevant NPs species is essential for the risk assessment of NPs.

Biology

Biology and ecology of global changes

Response of Mytilus galloprovincialis and Hediste diversicolor to cosmetic chemicals, under climate change scenarios

Alessia Cuccaro, Prof. Rosa Freitas, Prof. Carlo Pretti

In the last few years, personal care products (PCPs) have raised significant concerns as one of the most important classes of emerging pollutants due to their widespread use and, in turn, their constantly release into several aquatic matrices, representing significant environmental and ecotoxicological risks. Specifically, organic UV filters and parabens can be accumulated in sediment and in surface waters. Increasing attention has been associated with their environmentally persistence, bioactivity and their potential bioaccumulation into biota, but still scarce information is known about their fate and toxicity. In addition to these emerging pollutants, alterations in physical and chemical properties of aquatic environments, namely marine coastal systems, caused by the Climate Change (CC) could influence wildlife. In the Global Change scenario, the increase of the temperature, salinity shifts and surface pH reduction of marine water bodies will be expected. Nevertheless, the toxicity resulting from these emerging pollutants together with climate change in marine ecosystems has still received little attention up to date. Overall, the identification of possible effects caused by predicted CC together with the chemical toxicity of emerging pollutants in marine ecosystems must be a priority in order to prevent impacts towards wildlife and, ultimately, loss of biodiversity. To achieve these objectives, the impact of both stressors will be assessed on two different populations (Atlantic and

Mediterranean) of two marine invertebrate species, the ragworm Hediste diversicolor and the mussel Mytilus galloprovincialis, under current and predicted CC scenarios (temperature increase, water acidification and salinity variations), using short and long-term exposures.

Biology and ecology of global changes

Effects of long-term exposure to antibiotic in zebrafish

Ana Almeida, Isabel Henriques, Inês Domingues

Many pharmaceutical classes are nowadays considered emerging environmental pollutants. Its effects may not be limited in time and be observed not only during exposure period but also after the exposure ceases. Nevertheless, most of the studies only take in consideration short exposure periods and conventional endpoints (e.g. mortality). Consequently, there is a lack of information about chemical effects in the organism itself and associated microbiome during a long-term exposure period and after exposure ceases. Organisms' microbiome is in intimal association with its host and plays an important role on its health and survival. Therefore, an unbalance in host-microbiome relation due to a chemical exposure may have serious consequences to the organisms. Hence, the objective of our work was to evaluate the effects of long-term exposure to antibiotics, namely oxytetracycline (OTC), in zebrafish (e.g. behavior and enzymatic activity) and zebrafish gut and water microbiome. Effects were assessed during (5 days and 2 months) and after exposure ceased (5 days and 1month). Moreover, the role of a long-term exposure to OTC in the selection of OTC-resistant bacteria was also evaluated. Our results revealed that long-term exposure has an effect in fish behavior (e.g. increase of hyperactivity) biochemical activity (e.g. decrease of energetic reserves) and organism microbiome (e.g. structure and predicted functions). After exposure ceases, the effects of OTC were attenuated, suggesting that organisms were able to recover at both energetic reserves and fish gut and water microbiome. Besides, we observed the selection of multidrug-resistant bacteria. To conclude, our results revealed that long-term exposure to OTC may have an impact on zebrafish at several biological organization levels. Nevertheless, after exposure ceases a recovery was observed. Yet, effects were still noticed and the selection of multidrug-resistant bacteria was observed which may raise health concern. Therefore, in future works, the analysis of more realistic scenarios is needed for a better understanding of the real impact of antibiotics exposure.

Biology and ecology of global changes

Exploring potential drivers of wintering wader declines in the tropics

Ana Coelho, José A. Alves, Theunis Piersma

Migratory waders are birds famous for travelling long distances, but they are particularly suffering the consequences of global environmental change. After breeding in at high latitudes, some migrate to the coasts of West Africa, where they spend the winter. The Bijagos Archipelago in Guinea Bissau is one of the most important wintering areas in Africa for these birds, where extensive mudflats and mangrove forests provide food and shelter during that period of the year and allow to fuel the flight back north. Although some of the Bijagos are protected, growing human population, increased fisheries and sea level rise are some of the threats these birds currently face, with populations decreasing at a fast pace. I will try to disentangle what may be causing such declines by looking at past surveys, interactions with local populations, availability of food resources and habitat use.

Biology and ecology of global changes

Breaking down barriers in One Health: an integrative approach to parasitic diseases from Portugal to Africa

Ana Figueiredo, Carlos Fonseca, Rita Torres, Atle Mysterud

Emerging infectious diseases (EIDs) are a worldwide research priority with huge impacts on public and animal health. The continuous anthropogenic influence on the ecosystems triggered the spread and persistence of EIDs, mainly with zoonotic significance, which increased risks of disease spill-over on the human-animal interface. Due to its complex interactions with ecosystem dynamics, EIDs must be considered under the One Health holistic framework, and the study of infectious and parasitic diseases (IPDs) is a top priority within this field. But few have focused on such an integrated approach and especially in developing countries there is still a huge gap regarding this topic. Using a multidisciplinary framework, with DNA pathogen characterization, connecting also to the landscape ecology models, the main goal of this project is to understand the role of wildlife as reservoirs and spreaders of IPDs for humans/livestock. To achieve these goals, we intend to collect samples from humans, wildlife and livestock species in two contrasting socioeconomic and environmental scenarios: Portugal and Mozambique. We predict that wildlife species are important reservoirs and spreaders of parasitic diseases, and an increased incidence of disease in areas with higher density. Higher prevalence of IPDs in Mozambique is expected, given the limited access to basic needs, with children being the most affected group. Spatial differences in habitat structure, resource availability and urbanization induce modifications on wildlife community structure which we believe will increase contact and cross-transmission risk. Additionally, as an outcome, we aim to implement disease surveillance networks and awareness campaigns to prevent and control parasitic outbreaks.

Biology and ecology of global changes

Small cetaceans and Persistent Organic Pollutants

Ana Tavares, Dr. Amadeu Soares, Dra. Catarina Eira

Human activities have increased contaminants in marine ecosystems up to harmful concentrations. Despite the legally enforced bans, POP concentrations are still high in small cetaceans. Organochloride pesticides, polychlorinated biphenyls and polycyclic aromatic hydrocarbons are highly persistent contaminants that can cause several health effects. Contamination affects reproduction, growth and general health of small cetacean populations, and it may be particularly detrimental to the harbour porpoise population, presently declining towards extinction in Portugal.

This study will contribute to the evaluation of POP bioaccumulation in common dolphin, harbour porpoise, bottlenose dolphin, and striped dolphin off continental Portugal. Organochlorine pesticides, polychlorinated biphenyls, and polycyclic aromatic hydrocarbons will be measured in a representative number of blubber samples collected by the stranding team and later stored at the Tissue Bank (Ecomare). Results will be related will individual's age, reproductive status and health condition.

Since cetaceans are top predators and good biomonitoring organisms of ecosystem health, this study will contribute to evaluating not only the cetacean contamination status in Portuguese waters but also that of their prey, which includes commercial fish, with possible implications to Human health. Results will also contribute to feed legal frameworks that demand marine contamination monitoring in Europe.

Biology and ecology of global changes

Meridional Harbour Porpoise in Maceda – Praia da Vieira Site.

Andreia T. Pereira, Andreia T. Pereira, Sara Sá, Marisa Ferreira, Silvia Monteiro, Jorge Bastos-Santos, Hélder Araújo, Amadeu Soares, José Vingada, Catarina Eira.

A new harbour porpoise ecotype was recently proposed for the Atlantic Iberian Peninsula. This species is listed in the Habitats Directive - Annex II and classified as "Vulnerable" status in Portugal. Their low abundance and coastal preferences overlap with human activities, being necessary data on porpoise ecology and related anthropogenic impacts to build effective management plans, including conservation and mitigation measures. This work includes morphological analysis, life history and demography characterization, distribution, abundance, use of space and threats in critical habitats. Focusing in harbour porpoise abundance, distribution and use of space, two vessel campaigns ("Nereide") were carried out in 2018 and 2019. The study area is located in the costal waters of the recently designated Maceda – Praia da Vieira site. Only 1 and 6 sightings were recorded in 2018 and 2019, respectively. For the 2019 campaign, the heatmaps revealed cetacean presence in all study area with the largest groups occurring near Porto and Aveiro. It is also worth emphasizing the more notable harbour porpoise occurrence between Aveiro and Figueira da Foz. Distance sampling analyses estimated an abundance of 112 animals for the study area, however caution is needed in the interpretation of these numbers (%CV = 47). More effort should be done to obtain more robust data.

Biology and ecology of global changes

Ecological effects of microplastics in freshwaters

Carlos Silva, João Pestana, Carlos Gravato

Microplastics are being reported in high concentrations in riverine sediments. Thus, freshwater benthic invertebrates are particularly susceptible to ingest microplastics. The present study intends to investigate if different freshwater invertebrate species can ingest microplastics and assess potential deleterious effects triggered by MP ingestion. Apical and sub-cellular endpoints will be used to investigate the effects at different levels of biological organisation. Since in the field the stressors usually do not act separately, a combination of MPs and natural stressors like temperature, salinity and food limitation will be used to test how can these natural stressors alter MPs toxicity. At the end of this research, a mesocosms approach will be used to consider possible effects on natural benthic communities and ecosystem functioning.

Biology and ecology of global changes

Sustainable Plant Protection Products: from conventional to novel practices

Catarina Malheiro, Susana Loureiro (CESAM & dbio, UA), Rui Morgado (CESAM & dbio, UA)

Current global food demands pose huge challenges for sustainable food production, putting more pressure to the ecosystem, alongside with services provided for society. The current negligent use of plant protection products (e.g., insecticides) and the misuse/overuse of fertilizers are one of the major causes of ecosystem services deterioration. Therefore, it is highlighted the need to improve and develop sustainable agricultural methods to meet productivity demands and achieve food security, without compromising environmental integrity and public health. Novel technologies, such as nanofertilizers, organic fertilizers and bio(nano)pesticides, have been receiving attention by the plant nutrition and protection sectors due to their ability to achieve more efficient use of resources, by matching crop demands with controlled nutrient supply. Thus, it is a great scientific challenge to verify if these more efficient agroproducts are capable of increase agricultural productivity and meet global trends without compromising functional biodiversity and damaging public health. Looking at the soil functional biodiversity and using bioassays to assess these functions is the baseline of this PhD workplan. The final output is to provide tools to evaluate sustainable agricultural practices and validate the non-hazardousness of novel agriproducts that are nowadays being developed and produced.

Biology and ecology of global changes

Effects of fluoxetine in zebrafish under ecologically relevant exposure scenarios

Daniela Correia, Marcelino Miguel Oliveira, Inês Domingues

Psychiatric drugs have been increasingly prescribed, leading to an increase in their concentration in aquatic ecosystems due to the reduced efficiency of their removal in urban and wastewater. Fluoxetine is a selective serotonin reuptake inhibitor (SSRI) and is detected at concentrations in the range from ng/L to µg/L, producing potentially harmful effects. This work aims to evaluate the effects of fluoxetine on the development and behavior of zebrafish (Danio rerio) at various stages of its life cycle. Fish will be subject to acute (96h) and chronic (21 days) exposure to fluoxetine concentrations in the order of nanograms (1000, 100, 10 and 1 ng/L) plus control, and at the end their behavior will be evaluated. The behavioral tests will allow to assess anxiety-like behavior (locomotor activity, thigmotaxis and novel tank diving test), social behavior and feeding. In parallel, multigenerational tests will also be performed in order to observe the effects of drug exposure over generations, as well as a study of transcriptomic parameters, allowing the evaluation of mechanistic effects at gene expression and level behavior.

Biology and ecology of global changes

Project MDR Map, Detect and Research Botryosphaeriaceae species in Portugal

Eduardo Batista, Artur Alves, Pedro Miranda

The fungal family Botryosphaeriaceae (Botryosphaeriales, Ascomycetes) is known to include several species of opportunistic pathogens or latent endophytes that affect many angiosperm and gymnosperm hosts worldwide. These fungi usually attack plants exposed to environmental stress like drought or plants that are already affected by other pathogens or pests. Diseases caused by these species result on fruit rots, leaf spots, wood necrosis and eventually tree death. Recent studies have identified the occurrence of four Botryosphaeriaceae genera in Portugal in different forest hosts. However, the diversity and distribution of these plant-pathogens in our country is still poorly understood. Several surveys were conducted across Portugal with aim to isolate and identify Botryosphaeriaceae-related diseases associated to the main forest tree species in Portugal (Quercus suber, Eucalyptus globulus and Pinus pinaster). Additionally, a meta-analysis was performed to compile and organize all records in Portugal.

Twenty-two different Botryosphaeriaceae species were reported and 44 different plant hosts were recorded in several studies from agricultural crops to forest and ornamental species and it was possible to verify more than 100 host-pathogen interactions.

In the national survey, 12 different Botryosphaeriaceae species were identified in 23 different plant-fungi interactions. We reported for the first time the occurrence of Diplodia insularis, Dothiorella plurivora and Dothiorella yunnana in Portugal and 8 new plant-fungi interactions. Pathogenicity tests reveal highly susceptibility of Quercus suber to Neofusicoccum parvum and N. eucalyptorum and Pinus pinaster to Diplodia corticola.

Biology and ecology of global changes

Ecotoxicological assessment of trabectedin, an anticancer drug

Évila Damasceno, Amadeu Soares, Susana Loureiro, Leticia Costa-Lotufo

Currently, dozens of millions of patients treat cancer using cytotoxic drugs, that are highly toxic at low doses also to non-cancer cells, causing genotoxic, mutagenic, and carcinogenic effects. Besides, cytotoxic drugs are low degraded by conventional wastewater treatment plants, even using advanced treatment technologies. Thus, due to their high toxicity and environmental presence, cytotoxic drugs represent high environmental risk. The aim of the current study is to assess the effects of trabectedin, a cytotoxic drug, to the zebrafish Danio rerio, through an integrative approach using endpoints that are disregarded by environmental risk assessment of pharmaceuticals. In order to address the objective, the present work will try to answer three questions: 1) Does trabectedin cause eco-, geno- and neurotoxicity to D. rerio?; 2) How does trabectedin affect the microbiota of D. rerio? and 3) Is trabectedin altering the metabolic pathways in D. rerio? Preliminary results using the zebrafish embryo, at a biochemical level, indicated that the exposure of D. rerio to 22.5 µg L-1 of trabectedin inhibited cholinesterase activity. Regarding behavior analysis, trabectedin increased total distance moved by larvae. DNA damage was registered to D. rerio larvae at low concentrations of trabectedin (up to 1.7 µg L-1), however not significant compared to the control exposure. Results showed that trabectedin may pose a risk to this aquatic species at the range of µg L-1.

Biology and ecology of global changes

Ecotoxic response by biochemical markers in Mytilus galloprovincialis after exposure to seawater previously contaminated with Hg and remediated by GO-PEI

Francesca Coppola, Amadeu M.V.M. Soares, Etelvina Figueira, Paula Marques, Eduarda Pereira, Rosa Freitas

The modern technology brought new engineering materials (e.g. nanostructured materials) with advantageous characteristics such as a high capacity to decontaminate water from pollutants (for example metal(loid)s). Among those innovative materials the synthesis of nanostructured materials (NSMs) based on graphene as graphene oxide (GO) functionalized with polyethyleneimine (GO-PEI) had a great success due to their metal removal capacity from water. However, research dedicated to environmental risks related to the application of these materials is still non-existent. To evaluate the impacts of such potential stressors, benthic species can be a good model as they are affected by several environmental constraints. Particularly, the mussel Mytilus galloprovincialis has been identified by several authors as a bioindicator that responds quickly to environmental disturbances, with a wide spatial distribution and economic relevance. Thus, the present study aimed to evaluate the impacts caused in M. galloprovincialis by seawater previously contaminated by Hg and decontaminated using GO-PEI. For this, histopathological and biochemical alterations were examined. This study demonstrated that mussels exposed to the contaminant (Hg), the decontaminant (GO-PEI) and the combination of both (Hg + GO- PEI) presented an increment of histopathological, oxidative stress and metabolic alterations if compared to organisms under remediated seawater and control conditions The present findings highlight the possibility to remediate seawater with nanoparticles for environmental safety purposes.

Biology and ecology of global changes

Development of handmade diets for tilapia nutrition in community based aquaculture in Mozambique

Henriques Bustani, Rui Miranda Rocha, Amadeu Soares

Tilapia fish farming in Mozambique emerged in 1950s, by repopulating lakes and dams to increase fish production. However, this activity has never been sustainable due the lack of quality juveniles, adequate feed and technical capacity. The inexistence of fish feed factories implicates fish feed importation, aggravating production costs and therefore economical sustainability. The manufactured fish feed, for community tilapia farming, may represent a giant step to development of this activity. If improvements are also made in the breeding process and training of human resources, we can contribute to the sustainability of this activity. This project aims to develop manufactured diets for tilapia nutrition in community based aquaculture in Mozambique. We intend to use agricultural by-products to make tilapia alternative feed in rural communities and expect contribute to the improvement of the quality of life of people by produce their own nutritional food, in a sustainable way.

Biology and ecology of global changes

Challenges of artisanal fishing for the sustainability of fishing stocks and the production chain (Pemba, Cabo Celgado, Mozambique). historical perspective of socio-economic and environmental relations

Iracema Hussein, Fernando Morgado, Maria de Fátima Pereira Alves, Luis Miguel Russo Vieira

Challenges of artisanal fishing for the sustainability of fishing stocks and the production chain (Pemba, Cabo Celgado, Mozambique). historical perspective of socio-economic and environmental relations

Biology and ecology of global changes

Microplastics: methodologies, sampling and ecotoxicity

Joana Prata, Teresa Rocha-Santos, João P. da Costa, Isabel Lopes

Microplastics are ubiquitous and persistent environmental contaminants. Determination of environmental concentrations is an essential foundation on which to base toxicity assays and, posteriorly, risk assessment. Despite the increasing sampling efforts, no standard sampling protocol has been implemented for microplastics. The objective of this work is to determine the impacts of microplastics in aquatic environments. This will be accomplished through the development of an easy, cheap, and reliable sampling procedure for microplastics, sampling to determine environmental concentrations in freshwater and seawater, and finally toxicity assays in aquatic organisms based on these findings. So far, a sampling procedure has been established based on sampling of four replicates of 1 L, removal of organic matter based on a Fenton reagent, staining with Nile Red, and quantification under 470 nm. Currently, environmental concentrations in Portugal are being determined, producing necessary information to then proceed to the toxicity assays.

Biology and ecology of global changes

Juvenile settlement as driver of population responses to environmental change

Joshua Nightingale, José A. Alves; Jennifer A. Gill

Understanding biodiversity responses to global environmental change is among the most urgent of challenges facing ecologists and conservationists. Changing climatic conditions have been linked to changes in phenology, distribution and demography across many taxa, but the mechanistic processes driving these changes in free-ranging animals and their population-level consequences remain poorly understood. While predicting species responses to future scenarios requires a mechanistic understanding of the ecological and behavioural factors that influence species demographic and distributional responses to changing environments, quantifying these mechanisms is also key in identifying associated conservation actions. Focusing on Arctic-breeding waders, which currently face rapid rates of climatic change on their breeding grounds and environmental change on their coastal wintering areas, I will investigate juvenile settlement processes and their capacity to drive demographic and distributional changes at the population level in changing environments.

Biology and ecology of global changes

Tunicates ability to remove dissolved and particulate organic matter in an integrated multi-trophic aquaculture under climate change scenarios

Luisa Marques, Ana Isabel Lillebo, Ricardo Jorge Calado

Integrated Multi-Trophic Aquaculture (IMTA) has the potential to support aquaculture's growth, by culturing species with complementary ecosystem functions, allowing selected species to feed on available organic matter resulting from the use of formulated feeds. However, global climate changes for the oceans of tomorrow reveals that current selected species for IMTA may need revision, in order to cope with expected changes. Tunicates are filter feeders that feed on living and non-living organic material, by circulating seawater through the inhalant siphon and expelling the filtered water through the exhalent siphon. The cultured biomass of these invertebrates has shown great potential as an ingredient for fish feed due to their high protein content, as well as a source for important bioactive molecules with biomedical application. The main objective is to study and evaluate the potential of ascidians as extractive species in an IMTA system, occurring in Ria de Aveiro Lagoon.

Biology and ecology of global changes

Emerging and classical pollutants in a changing environment: impacts to estuarine bivalves

Madalena Andrade, Rosa Freitas, Maria Eduarda Pereira, Montserrat Solé

Coastal zones face the eminence of new contaminants derived not just from innovative technological solutions in the industry and services but also from higher volumes of effluents resulting from the migration of populations towards the littoral. With the technological advance and economic development, the multiplicity and wide variety of applications of electrical and electronic equipment have increased, as well as the amount of end-of-life products (waste of electrical and electronic equipment, WEEE). However, the treatment of WEEE is not accompanied properly and the lack of recycling or its bad management may release many chemical elements and compounds in the environment, including classical and rare-earth elements. Nevertheless, the environmental risks resulting from the pollutants are almost unknown, especially considering marine systems, which may be challenged by foreseen climate changes as increasing temperature and waters' salinity shifts. Furthermore, the co-existence of mentioned pollutants may result in synergistic, additive or neutralizing effects, and so far, the combined effects of such mixtures have not been investigated. Thus, identifying early warning signals in bivalve species, as the mussel Mytilus galloprovincialis and the clam Ruditapes philippinarum, worldwide considered as good bioindicators, by measuring the alterations induced by WEEE (containing technological critical elements such as rare earth elements, e-waste elements), at biochemical and physiological levels, under actual and predicted climate change scenarios and considering the abiotic changes natural of their habitats, it is of utmost importance.

Biology and ecology of global changes

Climatic niche dynamics and diversification in scaled reptiles (Lepidosauria: Squamata)

Matthew Moreira, Carlos Fonseca, Danny Rojas, John Wiens

What factors explain the variation in species richness throughout the globe? This is a central question in ecology and evolution. Diversification rates are ultimately responsible for the uneven distribution of species richness, and identifying factors that could explain the accumulation of species over time is important, especially under the current biodiversity crisis. Here, we address this issue using scaled reptiles (order Squamata). We aim to assess the effect of the evolution of the climatic niche and species traits (parthenogenetic reproduction and body temperatures) on diversification. Additionally, we will also test for habitat suitability under different future scenarios of climate change. Overall, these macroevolutionary and macroecological approaches will facilitate the understanding of the diversification of scaled reptiles, and ultimately how global changes impacts their diversification patterns.

Biology and ecology of global changes

Toxicokinetics of nanoparticles across aquatic food chains

Patrícia V. Silva, Susana Loureiro (CESAM & dbio, University of Aveiro), Cornelis A. M. van Gestel (Department of Ecological Science, Faculty of Science, Vrije Universiteit Amsterdam)

The emergent demand of the nanotechnology field has led to the large-scale production and commercialisation of engineered nanomaterials (ENMs), resulting in their potential release into the environment. Aquatic environments, particularly sediments, are important final sinks for ENMs, and benthic organisms may be the most potentially affected biota as they can be exposed through water and sediments. There is increasing need of hazard data for the improvement of the environmental risk assessment of ENMs. However, this assessment is very challenging due to the specific features and the several physico-chemical transformations ENMs undergo during their entire life-cycle. It is fundamental for risk assessment to understand bioavailability and exposure of ENMs to organisms. Therefore, emphasis should be given to the determination of toxicokinetic processes such as uptake, internal distribution and depuration. The present thesis aims at studying the toxicokinetics of silver nanoparticles (Ag-NPs) in freshwater benthic invertebrates, under environmentally relevant exposure scenarios. The work can be divided into two main tasks. During the first main task, single-species tests were conducted to determine toxicokinetics of different pristine Ag-NPs and of silver sulfide NPs (Ag2S-NP), simulating an aged form, which has higher environmental relevance. Snails (Physa acuta), insect larvae (Chrironomus riparius) and planarians (Dugesia tigrina) were exposed to the different Ag-NPs via different exposure routes (water, sediment and food). The second main task was to conduct a mesocosm experiment, simulating a natural stream environment. The aims were to determine toxicokinetics in a more complex scenario, compare the parameters with those derived in the previous task, and evaluate potential trophic transfer. In an overview of the main results, the bioavailability of the different Ag-NPs was largely influenced by their own characteristics and by the exposure route type. Mesocosms results revealed some similarities of uptake patterns between single-species tests and mesocosms tests, although in most cases single-species tests underestimated bioaccumulation, which can be a reflection of the higher complexity of mesocosm experiments, where several exposure routes are acting simultaneously.

Biology and ecology of global changes

Decoding different signatures and defence mechanisms in Pinus species against emergent needle blight pathogens. An integrative toolbox.

Pedro Monteiro, Dr. Gloria Pinto, Dr. Luis Valledor, Prof. Dr. Julio Casero

European forest trees healthiness has been increasingly threatened by climate changes and emerging pathogens had been reported in new locations, threatening several and important plant species. Pine blight diseases are responsible for the loss of productivity and tree death putting in risk both countries' economy – loss of raw material to industries and anthropogenic activities and existing ecosystems – loss of biodiversity and habitats. In order to reverse this course European Union (EU) established a new plant health policy setting ambitious goals for protection of trees, focusing their efforts in preventive measures – pests' resistant species/varieties, monitoring of pest and diseases - field inspection, forecasting models and diagnostic tools, and pests' control using preferably biological, physical and other nonchemical methods. Gathering an international interdisciplinary team in tree physiology (Glória Pinto, University of Aveiro), system biology (Luis Valledor, University of Oviedo) and forest pathology (Julio Casero, University of Valladolid), this project is aligned with UN Agenda 2030 goals #13 – "Climate Action", and #15 – "Life on land".

The main mission of this PhD workplan is, using an integrative approach, fill the scientific knowledge gaps on mechanisms behind tree-pathogen interactions, specifically the casual agents of Dothistroma needle light disease (DNB) – Dothistroma septosporum and Dothistroma pini and Brown-spot needle light disease (BSNB) Lecanosticta acicola. Using different Pinus spp. (P. radiata and P. pinea) that show a differential behaviour against Pine needle blight (PNB) diseases, we propose a multidisciplinary research platform, studying different cell levels – from morphological and physiological to biochemical, protein, metabolites and gene expression levels, exploring these two and understudied emergent threats to obtain a complete response mechanism from Pinus spp. to theses pathogens, finding new stress resistance markers, supporting future contingency plans (selection of resistant genotypes and early detection methodologies) and integrated pest management strategies established by EU.

Biology and ecology of global changes

Enterobacteriaceae as mediators for carbapenem resistance transfer between environmental and human settings

Pedro Teixeira, Isabel Henriques, Artur Silva, Marta Tacão

The transfer of carbapenem resistance between the environment and humans threatens the efficacy of these antibiotics, which are extremely important for human health. Enterobacteriaceae can play a key role in this flow, including members of the human microbiome that can also proliferate in the environment. Although there is consistent evidence to support this hypothesis, there are knowledge gaps on this topic that are still to be filled. Our objective is to clarify the role of Enterobacteriaceae as carriers of carbapenem resistance between environmental and human scenarios.

Biology and ecology of global changes

Interdisciplinarity in coral reef conservation to mantain ocean biodiversity

Priscilla Campos, Etelvina Figueira

Coral reefs are one of the most diverse, complex, and productive marine ecosystems on the planet. Global climate change and other anthropogenic impacts have having a strong impact on the equilibrium of these ecosystems and causing the denominated "coral reef crisis". One consequence of the coral reef crisis is the phase shift in reef communities, where scleractinian corals responsible for the bioconstruction of the coralline building are replaced by macroalgae or soft corals. In Todos os Santos Bay (TSB), Brazil there is a rare case of phase shift caused by the soft coral Palythoa cf. variabilis. When in population outbreak, this coral species becomes dominant and leads to loss of scleractinian coral cover. Palythoa genus establishes a symbiotic relationship with dinoflagellate algae of the genus Symbiodinium, which is changed in phase shift coral reefs, but other alterations remain unknown. In this investigation, an interdisciplinary approach is used in order to respond to problem that have biological, social, and educational dimensions. The aim is to contribute to a better understanding of the socio-environmental problem that affects biodiversity conservation and angler's income due to the decrease in the fishing stock. In the biological approach, the metabolism and antioxidant response (oxidative damage, antioxidant and biotransformation enzymes, electron transport chain activity and photosynthetic pigments) of P. cf. variabilis from reefs in different conservation states was studied to identify and relate if changes that may occur in the biochemistry and metabolism of the coral might trigger the population outbreak. The identification of parameters identifying if corals are or not in stress and assessing if one or more parameters can reflect the level of stress organisms are experiencing were also goals of the study. The results obtained evidenced a clear distinction in the biochemistry and metabolism of corals from conserved sites and sites in phase shift. Some of the parameters were able to discriminate the level of stress corals were experiencing and may allow to recognize the most at-risk coral reefs that need immediate intervention and prevent the entry into or revert P. cf. variabilis outbreak and phase shift in coral reefs. In the social approach, we did interviews with local anglers living closer to the more affected coral reefs in TSB. From the interviews it was possible to identify a cause of coral reef disturbance, that is the collection and selling of a snail Tegula sp. for aquarium purposes that is a natural predator of this soft coral. This activity may have caused an ecological

disturbance in the ecosystem and influenced the population outbreak of Palythoa cf. variabilis. To raise awareness about the reef disturbance in TSB and worldwide an environmental education approach was taken with the angler's community for three months, which culminated with the Festival of Art Education for sensitizing them about. This work done until now won a grant from National Geographic Society and was published in two high impact articles in WOS journals, one Bilingual documentary (Portuguese-English) and production of support material for Educators, which is a platform for scientific dissemination. An integrated approach, including the most affected population, can be of vital importance for the preservation of TSB coral reefs and possibly for other threatened reefs worldwide.

Biology and ecology of global changes

Rhizobium tolerance to temperature: the influence of airborne exposure to different volatile compounds

Ricardo Pinto, Etelvina Figueira, Glória Pinto, Carmen Bedia

Climate change scenarios refer to warming as one of the main global future consequences. According to model predictions soil temperature will follow the increase in air temperature and in some cases, it will even be higher. In soil this increase will affect organisms and their functions in ecosystems. Rhizobium is a bacteria genus that inhabits the superficial layer of soil and is known for its ability to plant growth promotion. The persistence of microbial communities challenged by constraints such as temperature rise is linked to survival strategies. Bacterial volatile organic compounds (BVOCs) are important in the interactions of microbial communities at-a-distance and in the adaptation to environmental changes such as temperature rising. Exposure to high temperatures changes bacteria metabolome and volatilome. The higher production of some VOCs, when bacteria are in stress, could be a way to signal neighbouring cells of an eminent environmental stress situation and allow them to prepare in advance.

In order to elucidate the effects of distinct volatile organic compounds on bacterial cells response to temperature increase, Rhizobium strain E20−8 was airborne exposed to the monoterpene α-pinene, the aliphatic alcohol heptanol and the aldehyde nonanal. The effect of these compounds was evaluated by comparing growth, antioxidant and biotransformation activities, membrane damage, and protein levels in cells exposed to four different temperatures (26, 30, 35, 40◦C). This bacterial strain was not able to grow at 40◦C.

The Principal Components Ordination (PCO) analysis of the biochemical determinants for each condition indicates that no VOC exposure at 30◦C, α-pinene 26◦C and nonanal 26◦C did not show differences when compared to the control condition (no VOC at 26◦C). At 35◦C (no VOC, α-pinene and nonanal) protein level, GOT and SOD activity decreased compared to control. Heptanol conditions (at the three temperatures) induced the bacterial growth.

This work highlights the role of VOCs in bacteria response to temperature increase. The strain used belongs to a genus that promotes plant growth being very important in natural and agricultural ecosystems. The information presented may give solutions to increase the tolerance of crops to temperature and to help the food security goal in a sustainable way.

Biology and ecology of global changes

Effects of nanomaterials on the soil bacterial community

Sara Peixoto, Susana Loureiro, Isabel Henriques.

Due to overpopulation, and consequently increased food demand, the application of nanomaterials (NMs) intentionally or unintentionally in agroecosystems has been used to boost crop productivity. Nanopesticides, with nanosized active ingredient like Cu-based nanopesticides, are nowadays applied in agroecosystem to protect crops from microbial diseases and represent an intentional source for NMs in soils. Although this nanopesticide is more effective at lower application rates than conventional pesticides, hazards to soil fertility and functioning are still unknown. Besides, sludge-derived fertilizer application in agricultural soils may represent another unintentional source for NMs in the environment. Due to large production and use of AgNMs, their inevitable release into wastewater treatment plant (WWTP) sewage sludge increased in the last years. Yet, the impact of these sludge-NMs discharged in soils is not fully known.

We aimed to investigate the effects of a Cu(OH)2-nanopesticide and Ag2S NPs (mimicking AgNPs-aged in WWTP) on the structure and function of the soil bacterial community. Thus, indoor mesocosms were used in a multi-species approach where invertebrates (mealworms, terrestrial isopods, earthworms) and plants were present. Relevant concentrations of NMs were used: 10 mg/kg of soil for Ag2S NPs and 50 mg/kg of soil for Cu(OH)2-nanopesticide. During 28 days of exposure, soil bacterial community was analyzed to determine function-related parameters (enzymatic activity and community level physiological profile - CLPP) and structure (denaturing gradient gel electrophoresis).

Our results showed that the Ag2S NPs and Cu(OH)2-nanopesticide exposure changes the bacterial community structure, which presented lower richness and diversity. At the functional level, reduced beta-glucosidase activity and L-arginine consumption were detected in bacterial community exposed to Ag2S NPs, only after day 28. Upon exposure to Cu(OH)2-nanopesticide bacterial community presented reduced phosphatase, dehydrogenase and arylsulfatase activities; and increased carbon consumption (CLPP). These effects were detected after 14 and 28 days of exposure.

Our study indicates that using multi-species mesocosm was a suitable approach to assess the impact of both Ag2S NPs and Cu(OH)2-nanopesticide on soil bacterial community structure. Observed effects on the soil bacterial community might cause the imbalance of soil functions, namely those related to the carbon, phosphorus, and sulfur cycles. A distinct temporal effect of these NMs highlights the importance, as a future work, of long-term exposure experiments (Ag2S NPs) and both short and long-term exposure [Cu(OH)2-nanopesticide].

Biology and ecology of global changes

Marine litter baseline assessment in North-eastern Portugal

Sara Sá, Sara Sá, Andreia T. Pereira, Marisa Ferreira, Jorge Bastos-Santos, Hélder Araújo, Amadeu Soares, José Vingada, Catarina Eira.

Marine litter is presently recognised as a global anthropogenic threat to marine and costal environments impacting hundreds of marine species, through entanglement and ingestion. This PhD project consists of a marine litter baseline assessment in a marine coastal study area, in which is included the Natura 2000 Site Maceda – Praia da Vieira. Density and abundance estimates of marine debris (macro and microdebris) in the sea surface, beach sediment and marine biota, as well as their composition (type and size composition), spatial distribution and potential sources will contribute to evaluate the need to develop management measures in this marine protected area.

Special emphasis is given to macro-litter ingestion/entanglement frequency of occurrence (F.O.) rates in cetaceans found stranded in the north-central coast of Portugal, collected by the national marine mammal stranding network since the year 2000. For Mysticetes (n=76), only one case of ingestion was recorded (F.O.=1,3%), on a Minke whale (Balaenoptera acutorostrata). Considering Odontocetes (n=2232), marine litter including different plastics and derelict fishing gear was registered on 6 species, with variable frequencies of occurrence. Although the overall rate of ingestion/entanglement was equally 1,3%, when considering only animals with marine litter, Pygmy sperm whales (Kogia breviceps) showed the highest F.O. (33,3%), followed by Sperm whales (Physeter macrocephalus) with 28,6%. In terms of mortality rates, plastic ingestion or entanglement as cause of death was attributed to one Sperm whale, one Pygmy sperm whale and one Common dolphin, corresponding to 10% of all cetaceans that interacted with marine litter through ingestion/entanglement (n=30) and to 0,13% of all stranded cetaceans. It is important to note that marine litter reported from stranded animals represents only a portion of the overall affected marine animals, so the presented ingestion/entanglement rates are surely underestimated.

Biology and ecology of global changes

Antineoplastic ecotoxicological effects in estuarine bivalve species under a changing environment

Vanessa Queirós, Rosa Freitas, Ulisses Azeiteiro, Carlos Barata

In marine ecosystems, aquatic species are currently exposed to a combination of stressors that create a range of associated environmental risks. A variety of stressors have been identified as key and emerging elements that drive environmental change, which may significantly influence marine coastal ecosystems. These include alterations in the range and variability of physical and chemical conditions related to climate change and the magnitude and duration of exposure to emerging pollutants, namely antineoplastic drugs that present a worldwide application and increasing use in cancer treatments. However, although identified in aquatic systems, the toxicity exerted in non-target organisms is almost unknown, especially when acting as mixtures and under predicted climate change scenarios. The present PhD project will measure the impacts induced in two populations of the bivalve species, Mytilus galloprovincilis and Ruditapes philippinarum, when chronically exposed to recently environmentally detected antineoplastic drugs, 5-Fluorouracil, Ifosfamide, Cyclophosphamide, and Cisplatin, under actual and predicted climate change variables. The capacity of bivalves to recover their health status after exposure will also be evaluated. A suite of early warning signals will be evaluated, measuring the alterations induced at biochemical and physiological levels.

Biology and ecology of global changes

Toxicity of antifouling nanostructures to reef species under global climate change scenarios

Violeta Ferreira, Ricardo Calado (co-author), Susana Loureiro (supervisor)

One of the major challenges faced by the maritime industry is to prevent and control biofouling, the spontaneous biological colonization of submerged surfaces. The presence of fouler organisms contributes to surface roughness, increases friction drag and fuel consumption, with the consequent release of greenhouse gases. Besides the impacts on the carbon footprint, biofouling causes serious economic, ecological and social constraints, such as the transport of non-indigenous species, surface corrosion and increase dry-docking maintenance operations.

Given the advances on nanoparticle engineering to generate stimuli-responsive systems for coating applications, encapsulation of the biocide DCOIT in silica nanocontainers (SiNC) is proposed as an environmental safer solution to prevent biofouling when compared to the

use of commercial biocides in paints. According to the Biocidal Product Regulation (EU), antifouling products should not persist in the environment, be effective against target species, but harmless to non-target species.

Besides biocides and other chemical stressors that can be depicted in marine environments, global increment on seawater temperature has been highlighted as a major threat to marine life. Coral reefs are important biodiversity hotspots and provides several ecosystem services, they comprise a wide range of organisms, from microorganisms, crustaceans, molluscs, fish, amongst others. However, over the last decades, both climate and anthropogenic stressors have been responsible for reef populations decline, reported mainly as coral bleaching, i.e. the disruption of symbiotic corals mutualistic association to Symbiodinium microalgae.

The present study aimed to address some of these threats, using corals, its symbionts and fish to evaluate the hazard of a novel biocide, along with increments of temperature as a key issue in global changes scenarios. For that, it was divided into four complementary sections: 1) characterize the exposure of this novel biocide, looking at behavior of the innovative antifouling engineering nanomaterial (DCOIT biocide encapsulated in SiNC (DCOIT encapsulated)) in high ionic rich media; 2) evaluate the impacts of DCOIT biocide (free or encapsulated) toward the non-target species Sarcophyton cf. glaucum, a tropical coral that is also a model of the cnidarian-algae symbiosis found in some marine invertebrates, by comparing endosymbionts photosynthetic efficiency, holobiont morphology and biochemical parameters at two distinct temperatures (present day conditions and predicted to 2100); 3) compare the photobiology performance and the cell cycle of heat-tolerant and heat-sensitive Symbiodinium strains exposed to the antifouling biocides (free or encapsulated) under current ocean temperatures and considering future predictions for 2100; 4) determine the toxicity associated to the innovative DCOIT encapsulated and its free biocide counterpart to a reef fish considering both thermal regimes, by evaluating biochemical and behavioral endpoints.

The results show that the proposed antifouling technology, encapsulation of organic biocides in engineering nanomaterials (ENMs), reduces DCOIT biocide toxicity towards non-target reef species. Furthermore, it was revealed that ocean temperature increment, as predicted for 2100 under the IPCC worst-case scenario, will cause major threads to reef organisms by decreasing photosynthetic performance and arresting cell cycle progression in endosymbionts, and modulating oxidative stress responses and biochemical markers in both coral holobiont and reef fish. However, the aggregation/agglomeration pattern observed in ENMs in the presence of in high ionic strength media, such as seawater, may contribute to ENMs sedimentation and pose a risk for sediment dwelling marine organisms but also the risk of bioaccumulation.

Overall, promising results were obtained when using this innovative engineering nanomaterials to reduce marine contamination and prevent biofou

Biology and ecology of global changes

Biomedicine

Recoding the Saccharomyces cerevisiae genome through codon ambiguity

Ana Rita Guimarães, Ana Rita Bezerra, Manuel A.S. Santos

Although the genetic code is generally viewed as immutable, alterations to its standard form show significant flexibility in codon identity. Our laboratory has advanced within the field by reversing the CUG codon in Candida albicans, which is ambiguous and atypically translated as Ser, from Ser back to Leu. This raised the intriguing hypothesis that synthetic codon ambiguities combined with experimental evolution have the power to reassign rare codons from their frozen identity state. To test this hypothesis, we used a yeast tRNA gene deletion library, particularly a strain which is viable upon deletion of the single-copy tRNA gene. And to exploit the vulnerability of the Leu "orphan" codon, we engineered a seryl-tRNA to misincorporate Ser at these sites on a proteome wide scale and evolved the recombinant strains over 500 generations.

Initially, strains expressing mutant tRNAs had lower fitness than the control strain transformed with the empty plasmid, but recovered growth rate during evolution, showing high level of tolerance/adaptation to recoding. Combination of a loss-of-function fluorescent reporter with MS/MS confirmed the reassignment from Leu to Ser. Adaptation to reassignment comes with major changes to genome structure, such as ploidy alterations and a higher occurrence of copy number variations (CNVs), indicating high genomic instability..

The overall data show that the deleterious effects of tRNA loss can be overcome through codon ambiguity and reassignment. Such strains can be used to incorporate novel amino acids into proteins and to better understand how diverse organisms from the three domains of life reassigned codons throughout evolution.

Biomedicine

The role of Metal Induced Protein Phosphorylation in neuropathology related protein aggregation

André Nadais, Odete A. B. da Cruz e Silva, Ana Gabriela Henriques

Metal ions play essential roles in the brain and it is reported that their contribute to neuronal dysfunction across different neurodegenerative diseases, such as Alzheimer´s disease (AD).

Senile plaques (SPs) and neurofibrillary tangles (NFTs) are histological hallmarks of AD, resulting from extracellular Aβ1-42 deposition and intracellular TAU phosphorylation, respectively. In fact, several metals can bind to Aβ and promote aggregation of the peptide. Moreover, metals such as aluminium can promote Tau hyperphosphorylation.

Previous studies concluded that Protein Phosphatase 1 and 2 (PP1/2) activity diminished after exposure to different metals. Zn2+ can induce TAU phosphorylation through PP2A inhibition. However, the correlation between protein aggregation, metal exposure and protein phosphorylation has not been explored. We will address this in order to explore therapeutic strategies.

In our lab, a set of phosphatase interacting proteins (PIPs) that bind metals and PP1, and are relevant for neuropathologies was obtained using bioinformatic tools. Thus, one can target PIPs given that they provide a specific target, with respect to cell type and subcellular localization, thus limiting toxic effects.

The effect of metals on protein phosphatases (PPs) and binding proteins, as well as the impact on protein aggregation will be investigated using bioinformatics as well as cell and molecular biology approaches. Effects on synaptic signaling will also be evaluated.

Preliminary results show that protein aggregation decreases in SH-SY5Y cells treated with Zinc or nanoparticles of Zinc, suggesting a possible neuroprotective effect of these metals. On the other hand, iron increases this aggregation. An altered APP metabolism, an increase in p-TAU/TAU ratio and a decrease in PP1γ expression in cells treated with Aluminium and Iron suggests a metal-induced neurotoxicity. However, more experiences are needed. Successful conclusion of this project will allow accessing neuroprotective strategies involving metals and protein aggregation.

Biomedicine

The role of protein mistranslation in fungal pathogenesis

Carla Oliveira, Ana Rita Bezerra, Philippe Pierre, Manuel Santos

Candida albicans is a major fungal pathogen of humans. The complex biology of this pathogen is reflected in its ability to produce statistical proteins and live with a plastic proteome that generates high phenotypic and genomic diversity. Previous studies showed that such atypical proteome is produced through CUG-codon ambiguity, but its role in C. albicans pathogenesis remains unknown. In this project, we will test the hypothesis that C. albicans responds to host immune cells by diversifying its statistical proteome through elevated CUG ambiguity and we will use strains with variable CUG-Leu misincorporation rates to elucidate the role of proteome diversification on C. albicans. Until now, we have identified a functional role of CUG ambiguity in C. albicans pathogenesis. Germ-tube (GT) assays show that strains with higher CUG ambiguity have enhanced hyphal initiation compared to wild-type strains. During hyphal initiation, two independent pathways are involved in downregulation of the major hyphal repressor (Nrg1). Transcriptional downregulation requires the activation of the PKA pathway, whereas Nrg1 protein degradation requires release from farnesol inhibition. Hypermistranslating strains show no alterations in the cAMP-PKA transcription pathway but the pathway involving degradation of the hyphal repressor Nrg1 is altered as hypermistranslating strains produce less farnesol than control strains. Studies are underway to understand how mistranslation alters the quorum sensing mechanism to decrease the production of farnesol. Analysis of immune responses to C. albicans is also ongoing. Preliminary data from a Candida-macrophage co-culture assay indicates that hyperminstranslating C. albicans cells induce a higher production of inflammatory cytokines.

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Biomedicine

Nuclear accumulation of LAP1:TRF2 complex during DNA damage response

Cátia Pereira, Cátia D. Pereira, Filipa Martins, Mariana Santos, Thorsten Müeller, Odete A. B. da Cruz e Silva, Philippe Chevalier, Sandra Rebelo

Lamina-associated polypeptide 1 (LAP1) is an integral membrane protein of the nuclear envelope (NE) ubiquitously expressed in human tissues, but its function remains poorly characterized. In a recent in silico study of the LAP1 protein interactome, a putative role in the regulation of DNA damage response (DDR) has emerged and telomeric repeat-binding factor 2 (TRF2) was among the list of LAP1 interactors. TRF2 is a shelterin complex protein that inhibits DNA damage signaling at telomeres and is also involved in DNA repair in extra-telomeric regions. With the aim of getting novel insights into LAP1's physiological properties during DDR, its interaction with TRF2 was investigated in human cells exposed to DNA-damaging agents. Firstly, the direct binding of LAP1 to TRF2 was validated in vitro through a blot overlay assay, as well as in vivo by co-immunoprecipitation following hydrogen peroxide treatment. Moreover, the phosphorylation-dependent regulation of this interaction was demonstrated by co-immunoprecipitation and mass spectrometry upon cell exposure to okadaic acid. Consistent with the involvement of LAP1 and TRF2 in DDR, an increase of their nuclear protein levels was detected by immunoblotting after bleomycin treatment and the analysis of their subcellular distribution by immunocytochemistry further revealed that they co-localize with each other and with DNA lesions at the NE and in the nuclear interior. Overall, this work shows that LAP1:TRF2 complex formation in human cells occurs preferentially during a physiological response against DNA damage, raising the possibility that LAP1 may act co-operatively with TRF2 to promote DNA repair and that this biologically important mechanism may be disrupted in LAP1-associated pathologies.

Biomedicine

Development of an epididymal organoid: an innovative strategy to study and modulate sperm function

Daniela Patrício, Margarida Fardilha, João F. Mano

Reduced sperm motility and low interaction with the oocyte are main causes of male infertility. Sperm acquires motility through the journey in the epididymis, a highly specialized channel divided into four morphologically and functionally distinct regions. Although the importance of the epididymis on sperm maturation is accepted, the role of epididymis in sperm physiology is not fully understood. The challenge on epididymal biology research is the ability to mimic the epididymal environment in a laboratory setting, deepen the knowledge on sperm maturation. Organoids technology have been essential to model organogenesis, organ function, disease, or drug response in many tissues. On the male reproductive system, organoids and organotypic cultures have been developed for testis, but the epididymis remains almost forgotten.

To overcome the lack of knowledge on the epididymis role, we propose to develop, for the first time, a three-dimensional (3D) epididymis and blood-epidydimal barrier (BEB) organoid using hollow tubes technology. Hollow tubes were obtained by building-up multilayers of marine-derived polysaccharides on sacrificial tubular templates using layer-by-layer technology. Cell from bovine epididymis will be cultured in the inner side and the endothelial cells in the other side of the tube. The ability of the organoid to maturate sperm will be determined by access sperm motility, morphology, and proteomic profile. With a successful in vivo 3D epididymis and BEB organoid we will be able to study the epididymis-sperm interaction, unraveling possible targets to modulate sperm function; evaluate the toxicological effect of pharmacological compounds and test inhibitory drugs on the male reproductive system.

Biomedicine

The role of NAD metabolism in neuronal differentiation

Diogo Neves, Sandra Vieira, Brian Goodfellow, Raquel Silva

Background:

Nicotinamide adenine dinucleotide (NAD) is critical for energy production and cell metabolism. It acts both as a coenzyme for oxidation-reduction reactions that culminate in ATP synthesis and as a substrate for NAD-consuming enzymes which include sirtuins, ADP-ribose transferases (ARTs), poly (ADP-ribose) polymerases (PARPs) and cADP-ribose synthases. NAD+ biosynthesis in mammals is supported by several precursors including Nicotinamide (Nam), Nicotinic Acid (NA) and Nicotinamide Riboside (NR) and their respective limiting enzymes Nampt, Naprt and Nmrk1/Nmrk2. Some of these have been shown to be involved in tissue differentiation, an important process for regeneration.

Goals:

Our aim is to elucidate the roles of the NAD biosynthetic enzymes during neuronal differentiation. For this, we are using SHSY5Y cells as a model.

Methods:

Briefly, to induce differentiation SHSY5Y cells were exposed to Retinoic Acid for 5 days. Protein was extracted for Western Blot.

Results/ Expected Results:

Our preliminary results show a decrease in Nampt and an increase in Naprt protein expression levels during SHSY5Y differentiation which indicate that Naprt could be involved in neuronal differentiation.

Conclusions:

It is crucial to understand the role of NAD precursors and enzymes in brain development to unveil their potential as therapeutic targets in regenerative medicine.

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Biomedicine

The effect of mesenchymal stem cells secretome on axon regeneration and post-injury synapse formation

Diogo Tomé, Ramiro de Almeida, António Salgado

Throughout development, neurons exhibit an intrinsic growth capacity that allows their axons to grow and establish correct synaptic contacts. However, once the synaptic connections have been established, the developmental growth capacity of central nervous system (CNS) neurons declines. This loss, together with environment changes, largely account for the failure of adult CNS neurons to regenerate. Therefore, it is crucial to investigate the key molecules and mechanisms involved in axonal elongation and synapse formation. Mesenchymal stem cells (MSC) are important for neuronal survival and repair and these regenerative properties are largely linked to the expression and release of a wide range of molecules (neurotrophic factors and cytokines) and microvesicles, the secretome. We have recently shown that MSC secretome promotes axonal outgrowth of CNS neurons, but its effects on synaptogenesis remain elusive. In this work we aimed to uncover the effects of the secretome of a population of mesenchymal progenitors residing in the Wharton Jelly of the umbilical cord, known as human umbilical cord perivascular cells (HUCPVC), on synapse formation of CNS neurons. We found that application of HUCPVC secretome to rat hippocampal neurons induces synaptic vesicle clustering, a hallmark of synapse formation. In addition, we shown that this synaptogenic effect is axonal intrinsic with no contribution from the cell body. Finally, we observed an increase in synaptic activity after treatment with HUCPVC secretome, suggesting that the newly formed synapses are functional. Together, our results demonstrate that MSC secretome has synaptogenic properties and reveal a potential role of the secretome to act locally in axonal regenerative therapies.

Biomedicine

Effects of the SET7/9 methyltransferase on mammary epithelial cell differentiation

Fatima Monteiro, Ines Direito, Luisa Helguero

Introduction: SETD7 (SET7/9, KMT7) is a lysine methyltransferase that targets histone and non-histone proteins (including several oncogenes and tumour suppressors) which are known as master regulators of cell proliferation and differentiation pathways. Even though SETD7 exact role in normal or disease conditions are still unclear, over the past few years, SETD7 has emerged as a potential target to treat several human diseases. This work focused on studying the role of SETD7 on cell proliferation and differentiation during the normal mammary epithelial cell (MEC) differentiation process, where its expression is differentially expressed. We specifically studied the effects of SETD7 over genes involved in epithelial-mesenchymal transition (EMT) and lipid metabolism mechanisms, which we and others have found correlated to breast cancer survival.

Materials and methods: We used the HC11 MEC line to obtain three differentiation stages: Stem-like cell (SL-C), pre-differentiated (PD) and functionally differentiated (DIF). SETD7 effects on cell proliferation, epithelial cell differentiation and lipid metabolism were studied in each of these stages by inhibiting its expression using a siRNA or its catalytic activity using (R)-PFI-2, a potente selective inhibitor. Effects on cell proliferation, EMT and lipid metabolism were studied using cell counting, immunofluorescence, qPCR and western blot techniques. Results were corroborated using the EpH4 cell line.

Results and Discussion: SETD7 inhibition by siRNA affects both proliferation and epithelial differentiation processes during MEC differentiation. Blocking SETD7 inhibits cell proliferation independently of the cell differentiation stage; however, effects on E-cadherin and Beta-catenin protein levels are dependent on the cell epithelial differentiation stage. Interestingly, catalytic inhibition of SETD7 stimulates proliferation, but exerted the same effects as the siRNA on cell differentiation markers.

Conclusion: Altogether, the results suggest that SETD7 effects in MEC are differentiation-stage specific and that in terms of regulation of proliferation, blocking SETD7 expression is not the same as blocking its activity. Therefore, more studies are needed to establish if targeting SETD7 could be a therapeutic strategy in breast cancer.

Biomedicine

Protein aggregation and hormone-related cancers: a novel approach to improve diagnosis and overcome endocrine therapy resistance?

Inês Direito, Prof. Luisa Helguero, Prof. Margarida Fardilha, Prof. Gabriela Moura

Introduction: Alterations in the protein quality control (PQC) network are associated with breast cancer (BC) and endocrine therapy (ET) resistance. Since cell stress causes protein aggregation (PA) we hypothesized that PA could be a useful marker to identify ET resistant BC. Moreover, identifying the proteins that aggregate in response to therapy could disclose loss of pathways needed to resist to therapeutic stress.

Material and Methods: ET sensitive (MCF7 and T47D) or resistant (MCF7R and T47DR) BC cells were treated with 17β-estradiol, and ET consisting of 4-hydroxytamoxifen or fulvestrant for 24h. LC-MS/MS identified proteins in whole cell soluble and insoluble fractions.

Results: Sensitive cells show higher AP levels which correlated with increased cellular death. Aggregated proteins from MCF7S and MCF7R cells disclosed different biological pathways with significance for proteotoxic stress and a new potential therapeutic target which may be useful to revert ET resistance.

Conclusions: Unique proteins are significantly more aggregated in sensitive cells after ET. Evaluation of PA may be a useful diagnostic tool that can inform about tumor sensitivity and may allow a more precise and individualized selection of therapy.

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Biomedicine

Unravelling the roles of proteotoxic stress on genome diversification and disease

Inês Sousa, Manuel Santos, Gabriela Moura

Ageing is intrinsically associated with an increase in protein aggregation. The association of protein aggregation with several neurodegenerative diseases suggests that gradual proteome aggregation and the collapse of the proteostasis network may accelerate aging and the development of aging-related diseases. Given that the pleiotropic effects of proteotoxic stress, triggered by the accumulation of aggregated proteins, in the cell are complex and still unknown, the way this accelerates ageing and leads to the onset of disease are significant scientific challenges. Previous studies in bacteria and yeast have shown that the induction of proteotoxic stress increases the mutation rate in the genome. However, little is known about this association between proteotoxic stress and the accumulation of DNA mutations. Thus, the goal of this project is to assess whether protein aggregation and proteotoxic stress destabilize the genome and increase mutation rate through the combination of experimental evolution of humanized yeast, and NGS to evaluate the long-term effects.

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Biomedicine

Analysis of sperm RNA profile of subfertile men: identification of biomarkers to evaluate seminal quality

Joana Santiago, Margarida Fardilha, Manuel Santos, Joana Vieira Silva

A infertilidade afeta ~15% dos casais em idade reprodutiva e metade dos casos tem um fator masculino associado. A idade paterna avançada, exposição a químicos ambientais e doenças, afetam negativamente a fertilidade masculina. Porém, pouco se sabe sobre os mecanismos moleculares subjacentes a estas condições e não existe um método de diagnóstico de infertilidade masculina robusto. Apesar de o espermatozoide perder a maioria do citoplasma e organelos durante a maturação, vários RNAs envolvidos nas primeiras fases do desenvolvimento embrionário foram já identificados. No entanto, a associação entre o transcriptoma e infertilidade permanecem pouco claros. O principal objetivo deste estudo é estabelecer o perfil de RNAs de espermatozoides em grupos de indivíduos divididos de acordo

com: idade; níveis de bisfenol A no fluido seminal e diferentes condições de infertilidade. Esta abordagem permitirá identificar RNAs diferencialmente expressos nas condições em estudo, uma possível alternativa para a avaliação da qualidade seminal e gestão da fertilidade masculina.

Biomedicine

Profiling the mouse aging transcriptome

Margarida Ferreira, Gabriela Moura, Manuel Santos

Aging is characterized by a time-dependent decline of physiological function and it is considered the major risk factor for a wide variety of diseases, ranging from cardiovascular, metabolic, respiratory, neurodegenerative and cancer diseases, among others. These age-related chronic diseases consume over 80% of the National Health Service budget and such expenditure is expected to increase over the coming decades, demanding a better understanding of aging biology and pathology, better health care planning and more informed allocation of financial resources.

Among the many molecular hallmarks attributed to this process is the loss of proteostasis, characterized by the accumulation of toxic aggregates of misfolded proteins. While several lines of research have suggested the overload of the proteostasis network as the cause of the age-related proteotoxic stress, we believe that some of it is directly linked to protein synthesis and alterations in the native folding of proteins. Since mRNAs are key players in this process, we are interested in studying age-associated transcriptional dysregulation, as well as evaluating the implications of these alterations to the loss of proteostasis.

This work aimed to assess age-related gene expression alterations in mice, and its workflow comprised the re-analysis of raw data available in the Gene Expression Omnibus database (GSE132040).

We established gene expression profiles for the mouse brain, heart, muscle, and liver at 3, 6, 9, 12, 15, 18, 21, 24 and 27 months of age, comprising the entire lifespan of the mature animals. We determined tissue-specific age-related fluctuations in the expression of genes and performed pathway/network analysis based on the obtained expression profiles.

Our results will be complemented with additional datasets produced in-house and integrated with proteomics data to comprehensively provide insight into the aging phenotype and underlying biological mechanisms.

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Biomedicine

The role of BIN1 in Alzheimer's Disease and Type 2 Diabetes

Maria Cachide, Odete A. B. da Cruz e Silva, Ana Gabriela Henriques

With the world's population rapidly aging, the prevalence of both Alzheimer's Disease (AD) and Type 2 Diabetes (T2D) is increasing, representing two of the leading causes of morbidity and mortality worldwide. Furthermore, present knowledge permits one to conclude that there is a significant overlap between AD and T2D; both from a clinical and molecular perspective. In fact, AD has been termed as Type 3 Diabetes, due to shared molecular and cellular features. However, the molecular basis of this association is unclear, and given the prevalence of both conditions, it is urgent to understand the association from a molecular level. After several Genome Wide Association Studies, Bridging Integrator 1 (BIN1), a member of the BIN1/amphiphysin/RVS167 (BAR) family of genes, has been confirmed as a significant Late Onset AD-associated risk loci, occupying the second position just after Apolipoprotein E. Moreover, in a study performed by our group using a primary care based cohort (pcb-Cohort) from the Aveiro region, the polymorphism rs744373 of BIN1 was found to be associated with Diabetes (p-value = 0.026), and a strong link between cognitive decline and T2D was observed. Therefore, using bioinformatic tools, we aimed to address possible interactions between BIN1 and T2D proteins and identify proteins of interest to explain the possible role of BIN1 in the molecular overlap of AD and T2D. Through this approach, it was possible to identify a set of proteins of interest that could be evaluated in the future, through molecular techniques, to have better insight regarding these two pathologies, and also and to assess their potential as biomarker candidates which would be an asset for novel diagnostic methods, besides opening novel opportunities for therapeutic strategies.

Biomedicine

Cellular responses to viral infections

Mariana Marques, Daniela Ribeiro, Markus Islinger, Maria João Amorim

Viral infections are one of the most prominent and persistent threats to human health. Influenza A virus (IAV) is the causative agent for most of the annual respiratory epidemics in humans and the major influenza pandemics in the last century, resulting in high mortality rates and having an enormous impact on the economy. Currently, annual preventive vaccination and the available antiviral therapeutics specifically target each virus or strain and become quickly ineffective due to the continuous and rapid influenza antigenic evolution. Thus, there is a clear urge to understand the host cellular mechanisms involved in the pathogenesis of IAV, to ultimately develop an alternative antiviral approach, less susceptible to resistance, that instead targets virus-exploited host cell factors. USeveral processes related to protein synthesis and processing have been shown to contribute to an effective IAV replication. With this study, we aimed to further unravel the interplay between IAV and the host cell proteostasis-related mechanisms. Our results suggest that the virus disturbs the host-cell protein homeostasis, by inducing the accumulation of protein aggregates. The characterization of these aggregates by mass spectrometry, together with the induced disruption of protein aggregation during the infectious cycle, allowed us to theorize that the virus requires the accumulation of host proteins, mainly related to RNA processing and protein translation, to efficiently replicate. In the near future, we intend to further characterize this and other disruptions of cellular processes as a result of infection with IAV and contribute to the identification of novel therapeutic targets.

Biomedicine

Identification of novel therapeutic targets to modulate proteostasis in humans

Marisa Pereira, Ana Soares, Miguel Mano

Transfer RNA (tRNA) molecules undergo a variety of post-transcriptional nucleoside modifications that are essential for structural stability and protein translation efficiency. These modifications are catalyzed by tRNA modifying enzymes that have been recently found deregulated in age-related diseases, including neurodegenerative disorders. However, the contribution of tRNA modifications and tRNA modifying enzymes deregulation for the proteostasis imbalances observed in age-related diseases remains unclear.

We hypothesize that deregulation of tRNA modifying enzymes affects translation efficiency through tRNA hypomodification, leading to proteostasis imbalances that include aggregation of misfolded proteins and deregulation of the integrated stress response, hallmarks of the above-mentioned diseases.

After performing a protein aggregation high content screening to detect which tRNA modifying enzymes are involved in proteostasis regulation, we identified Elongator complex protein 3 (ELP3) enzyme, which acts on the wobble position, as the most promising candidate. Knocking down ELP3 induced protein aggregation, insoluble protein accumulation, increase ubiquitination, and decreased protein synthesis rate. Interestingly, we also found a significant downregulation of ELP3 expression in gene expression profiles of human prefrontal cortex brain tissues from Alzheimer´s patients. Analysis of cortices from the 5xFAD mouse model of Alzheimer´s disease confirmed ELP3 downregulation when neuronal loss and cognitive decline were present. We are currently quantifying the tRNA modification levels in cellular and mouse models to confirm that ELP3 deregulation affects tRNA modification levels, ultimately leading to compromised translation.

Our results point out that tRNA modifying enzymes constitute promising therapeutic targets and that tRNA hypomodification may contribute to the protein aggregation phenotypes observed in age-related diseases.

Biomedicine

Analysis of protein aggregation in plasma of patient with heart failure with preserved ejection fraction

Marisol Gouveia, Prof. Fernando Ribeiro, Prof. Sandra Vieira, Dr. Mário Santos

Heart failure with preserved ejection fraction (HFpEF) is responsible for premature morbidity and mortality and, currently, the available treatment options have limited success to improve prognosis. Thus, it is critically elucidating the pathophysiologic mechanism that underlies HFpEF, which will allow to establish novel therapeutic and prognostic strategies. The impairment of protein homeostasis network and accumulation of misfolded protein aggregates has been associated with HF development.

With this project, we aim to compare the level and content of circulating protein aggregates in HFpEF patients with the ones of subjects with hypertension and age-matched individuals, by using HF diagonal two-dimensional (D2D) SDS-PAGE. Our preliminary results with 15 individuals (5 of each group) indicate that the plasma levels of SDS-resistant protein aggregates were similar among the three groups. However, those HFpEF patients with lower VO2peak, and higher NT-proBNP showed higher level of protein aggregates. In the future, mass spectrometry identification of the isolated protein aggregates will allow to assess potential pathways related with HFpEF development.

Biomedicine

Synaptic mechanisms regulating Alzheimer's disease progression

Marta Dias, Ramiro D. Almeida

Retrograde transport within axons has been described to be impaired in several neurodegenerative diseases, including Alzheimer's Disease (AD). However, in AD, it is not well understood how local exposure to amyloid-B oligomers (ABO) in axons can trigger a retrograde cellular response and, as a consequence, trans-synaptic signaling. In this study, we want to unravel if and how axonal degeneration and cell death can be triggered by local treatment of distal axons with ABO, as well as how synapses are affected. To attain this goal, we cultured E18 rat primary hippocampal neurons in microfluidic chambers that allow a specific stimulation of axons and the assessment of its impact in neuronal function and viability. Our results show that local application of ABO to the axonal compartment of the microfluidic chambers decreases the number of synaptic clusters, followed by an increase in axonal degeneration. These results indicate that a localized stimulus in axons indices synaptic dysfunction and triggers neuronal degeneration. Our observations will clarify how an increase in protein aggregation in a neuronal subdomain triggers a cellular response that spreads from distal axons to the cell body, which are often localized far apart in the central nervous system and might explain the spread of the aggregation-based diseases between different brain regions.

Key words: Alzheimer's Disease, axonal degeneration, synaptic dysfunction, retrograde transport, amyloid-□ oligomers.

Biomedicine

Genetic determinants of age-associated protein aggregation

Nuno Fonseca, Gabriela Moura

Aging is a complex phenotype with contribution of genetic and environmental factors. Although many has been discovered about genetic variants or lifestyle behaviours that predispose to healthy or unhealthy aging, it remains unclear how genetics interplay with environment to determine this outcome.

Recent work emphasized the role of protein aggregation as a new phenotype of aging, which can result either from downregulation of cellular protein quality surveillance or from increased error rate of protein synthesis. Additionally, aggressive environments can accelerate both processes through DNA damage that will lead to increased somatic mutations.

We plan to study the contribution of somatic mutations for aging. For this, we are measuring the vulnerability of human genes to accumulate somatic mutations with age which we'll then compare to age-related transcriptional changes across the lifespan. This approach will give us clues on how somatic mutations increase with age and how they impact in aged-cells.

Biomedicine

New molecular targets and signaling pathways for spinal cord therapeutics

Patrícia Correia, Veronica Estrada, Andreia Reis, Sara Ramos, Gabriela Moura, Hans Werner Müller, Frank Bosse, Sandra Vieira

Spinal cord injury (SCI) is a neuropathology with devastating functional consequences to patients, but that lacks effective treatment. While the spinal cord does not rewire after lesion, injured peripheral nerves can regenerate. Hence, peripheral nerve injury (PNI) is a widely used model to discover new regeneration associated genes (RAGs) of the nervous tissue. Various transcriptomic studies have profiled injured spinal cord or sciatic nerve tissues aiming to discover new RAGs. However, it is difficult to depict neuronal-specific responses from these reported whole-tissue analyses. Since the first hours after injury are extremely important to trigger a regenerative program, we started investigating the early differential transcriptomic alterations in affected peripheral and central neurons 24 hours after PNI or SCI.

In this work we have used laser capture microdissection technique to dissect rat Dorsal Root Ganglia (DRG) and Motoneurons (MN) after PNI, and DRG and pyramidal cortex neurons after SCI. RNA sequencing was then used to provide insight into the transcriptome of the dissected neuronal populations, that changes in response to a lesion. Differential analyses of these transcriptomic databases will hopefully deliver highly relevant transcripts and enriched pathways.

Our data shows that the gene expression response in DRG neurons is more robust after PNI than after SCI. Further, despite suffering the same sciatic nerve lesion, the neurons from DRG, whose cell bodies are located in the peripheral nervous system (PNS), have a clear distinct transcriptomic response than the MN, embodied in the central nervous system (CNS). Pathway enrichment analyses revealed that apoptosis, growth-associated signaling and cancer pathways are some of the most regulated pathways in DRG neurons after PNI, while in MN, oxidative phosphorylation, thermogenesis, and retrograde endocannabinoid signaling pathways are altered. Interestingly, in MN analysis Alzheimer, Huntington, and Parkinson's Diseases pathways were also enriched.

This study will allow to identify the most relevant pathways regulated in the acute phase of PNI, activated in neurons from PNS or CNS. Overall, these results may help to develop molecular therapeutic strategies that stimulate regeneration and repair after SCI or other CNS-affecting pathologies.

Biomedicine

Deciphering the interplay between autophagy and Toll-like receptor 9 and 7 activation

Paulo Antas, Evelina Gatti, Catarina Almeida

Plasmacytoid dendritic cells (pDCs) are a subset of DCs specialized in antiviral defense, producing type-I interferons and inflammatory cytokines after viral sensing via Toll-like receptors (TLRs) [1]. Autophagy is a mechanism of lysosomal degradation used for the recycling of cytoplasmic contents such as damaged organelles and protein aggregates, as well as for the elimination of pathogens [3]. This process contributes to the maintenance of intracellular homeostasis and has recently been shown to play different roles in immunity [4]. In this work, we used a human pDC cell line to decipher the interplay between autophagy and pDC activation. We studied the impact of macroautophagy inhibition on TLR activation pathways, exposing pDCs to autophagy inhibitors and analyzing their response after stimulation with TLR7 or TLR9 ligands. The results suggest that the autophagy flux determines the response of human pDCs. These findings can be explored for development of novel therapies against infections or to treat autoimmune diseases and cancers. Presently, we are dissecting the molecular players regulating this autophagy – TLR signaling crosstalk.

Biomedicine

Aging: a spect(r)acular approach

Sandra Magalhães, Alexandra Nunes, Brian Goodfellow

The world is aging and we must face the challenges that this brings. One of the reasons for the increasing aging of the world's population is the increase in life expectancy and, since we live longer, it is of paramount importance to live well and to prevent age-associated diseases. In this way, it is crucial to improve knowledge of the aging process and of the mechanisms that contribute to it. Ideally it would be of great interest to have a panel of biomarkers of healthy aging that would allow an estimate of the biological age of an individual. The loss of proteostasis is one of the hallmarks of ageing and is well described in different aging models. Nevertheless, there is a substantial lack of information regarding the pattern of age-related protein aggregation in biofluids. FTIR spectroscopy is a simple and inexpensive method, widely used in biomedical research. It gives a metabolic fingerprint of the sample and is also sensitive to the secondary structure of proteins. Therefore, the goal of this this PhD work is to identify age-related protein aggregation profile and identify aging biomarkers using FTIR spectroscopy. At this point, we assessed the age-related protein aggregation spectroscopic profile in human plasma samples from the pcb-Cohort from the Aveiro region, using ATR-FTIR spectroscopy. Our results show a decrease in protein oligomers from middle to old age. They also support FTIR as a suitable approach for protein conformational studies and to reveal a healthy ageing signature.

Biomedicine

Could salivary microbiota be used as a COPD BIOMARKER?

Sara Melo-Dias, Ana Tavares, Carla Valente, Lília Andrade, Catarina Almeida, Alda Marques, Ana Sousa

Background: Chronic Obstructive Pulmonary Disease (COPD), an inflammatory disease of the airways with high morbidity and mortality (3rd leading cause of death worldwide), is highly heterogeneous in terms of clinical phenotype being very difficult to treat and manage [1–3]. Precision Medicine holds great promise for this type of diseases but relies on the existence of validated biomarkers for disease prognosis or treatment prescription [4]. So, it is important to unravel and validate new biomarkers that allow the definition of endotypes to help managing COPD. The airway microbiota is a likely candidate for this purpose as it has been implicated in COPD stratification. Nevertheless, evidence of the clinical implications of microbiota dysbiosis in COPD is still lacking, needs validation and is fundamental before we can consider it in a multiple-biomarker approach [5–7].

Objective: Here we aimed at exploring saliva's microbiota of patients with COPD to evaluate its potential as disease biomarker.

Methods: Thirty-eight outpatients with COPD (33 male, 66±8y, BMI 25.0±4.9, FEV1pp 33±7, GOLD III-26, IV-12) and 38 matched healthy controls (33 male, 66±9y, BMI 27.5±3.7, FEV1pp 103±18) were characterised based on sociodemographic, anthropometric, clinical parameters and 16S rRNA profiling of their salivary microbiota. A Random-Forest classification model was developed to assess the microbiota predictive ability of COPD.

Results: Using the total number of available operational taxonomic units (OTUs) (n=97) a mean accuracy of 82.5% (IC 95% 82.2-82.9) was achieved. Performing a refinement of the model to include as few OTUs as possible, has shown that 9 OTUs, S24_7, Helicobacter, Peptococcus, Clostridiales, Peptostreptococcus, Lactococcus, Lachnoanaerobaculum, Atopobium and Mogibacteriaceae, were sufficient to

achieve almost maximum mean accuracy (86.2%, IC 95% 86.5), with a sensitivity of 89.5% (IC 95% 82.6-96.4) (classification error: 10.5% for "COPD") and a specificity of 84.2%(IC 95% 76-92.4) (classification error: 15.8% for "healthy").

Conclusion: Our work explores the predictive power of the salivary microbiota for disease classification supporting its use as a valuable biomarker.

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Biomedicine

NAPRT expression and regulation in cancer

Sara Pereira, Raquel Silva (supervisor), José Luís Oliveira (co-supervisor)

In cancer, the pursuit of new therapeutic strategies remains one of the most important research goals. NAD metabolism is an attractive target for the development of anti-cancer therapies, given the high energy requirements of proliferating cancer cells and NAD-dependent signaling. Within NAD biosynthetic pathways, nicotinamide phosphoribosyltransferase (NAMPT) has been targeted under the rational of lowering NAD levels. Nicotinate phosphoribosyltransferase (NAPRT), responsible for NAD production via the nicotinic acid precursor, emerges as a potential therapeutic target and as a biomarker for the use of NAMPT inhibitors.

This work is focused on the study of NAPRT gene and aims to a) characterize its expression in cancer and in normal tissues and b) identify putative gene expression regulation mechanisms.

We have shown that NAPRT expression is ubiquitous in normal tissues at the mRNA level, but not in all tumor cell lines, and we confirmed this at the protein level (Duarte-Pereira et al 2016).

To study the variants that might have an impact on gene expression, we analyzed data from the cBioPortal in 16 types of cancer. We observed that the amplification of the locus was a frequent event, associated with NAPRT overexpression in 58% of the cases in ovarian cancer.

In conclusion, despite the high number of NAPRT genetic variants, their effects on gene expression might be cancer specific. This observation highlights the need to characterize NAPRT gene expression to improve its application in personalized therapeutic approaches.

Biomedicine

Combinatory use of RPA and PARP1 inhibitors in breast cancer cells

Soraia da Silva, Tatiana Magro, Rui G. Martinho/Rui G. Martinho, Maria Carmo-Fonseca, José Bragança

Loss of tumor suppressor BRCA2 is strongly associated to breast cancer. BRCA2 is essential to homologous recombination, which is a DNA repair pathway crucial to genomic stability. When cells become mutant for BRCA2, they cannot repair DNA damage through homologous recombination, which is an accurate repair pathway, and instead rely on alternative error-prone pathways for DNA repair. Tumor cells mutant for BRCA2 become therefore dependent on these alternative repair pathways for survival.

Most recent generation of target therapies for breast cancer are PARP1 inhibitors. PARP1 is a protein essential to initiation of several DNA repair pathways, including those alternative repair pathways, like the non-homologous end joining. Use of these inhibitors compromise the alternative pathways leading to tumor cells death. Though tumor cells mutant for BRCA2 are particularly sensitive to PARP1 inhibitors, the onset of tumor resistance has been frequently observed after long-term treatments. This motivate us to find alternative proteins whose inhibition specifically impaired, similar to PARP1, tumor cells viability and/or growth.

It was recently reported that BRCA2 regulates RNA polymerase II transcription and prevents formation of R-loops, which are 3-strand nucleic acid structures composed of DNA:RNA hybrids. Accumulation of these R-loops is implicated in process of carcinogenesis due to the accumulation of single-stranded DNA (ssDNA) and increased genomic instability. RPA is a ssDNA-binding protein whose function is crucial to protect ssDNA and avoid forming secondary structures, being crucial to DNA replication and DNA repair.

Our objective is to identify novel druggable targets whose inhibition can be used in combination or as alternative to PARP1 inhibitors, minimizing tumor resistance risk. Our working hypothesis is that combinatory inhibition of PARP1 and RPA will specifically increase loss of breast cancer cells viability.

Biomedicine

The role of insulin signalling in Alzheimer's disease – A Fyn-GSK3B pathway

Steven Alves, Odete da Cruz e Silva

Alzheimer's disease (AD) is a progressive neurodegenerative disease characterized molecularly by the extracellular accumulation of aggregated Abeta into senile plaques and the intracellular formation of neurofibrillary tangles of hyperphosphorylated microtubule associated protein Tau, where both Fyn and GSK3B are involved. Growing evidence links type 2 diabetes patients with an increased risk of developing AD, mainly due to impaired insulin signalling and brain insulin resistance, which are important factors contributing to AD pathogenesis.

We hypothesize that Fyn can influence the activity of GSK3B, in an insulin signalling dependent mechanism.

Our results prove that Fyn and GSK3B interact in SH-SY5Y cells and that insulin can inactivate GSK3B by increasing the phosphorylation of S9 and decreasing the phosphorylation of Y216. Moreover, acute exposure to high concentrations of Abeta peptide led to a decrease of Y216 of GSK3B, causing GSK3B to continue active, but not with maximum catalytic activity. This decrease of Y216 of GSK3B can be explained by a decrease in intracellular levels of Fyn tyrosine kinase, however more experiments are necessary to prove this theory.

Biomedicine

Urinary biomarkers in Prostate Cancer detection

Tânia Lima, Rui Vitorino; Margarida Fardilha; Rui Henrique

Prostate cancer (PCa) is one of the most prevalent types of cancer. At present, PCa diagnosis is based on a digital rectal examination (DRE) and/or prostate-specific antigen (PSA) serum levels, while needle biopsy is required for a definitive diagnosis. These diagnostic tools have revealed limited accuracy, especially PSA testing, which is organ- but not cancer-specific, displaying low specificity. Thus, it is imperative to identify new biomarkers for PCa prediction. In this sense, the specific features of the PCa urinary proteome were extracted from a discovery cohort composed of five PCa patients and five non-cancer subjects, to identify a protein-based signature for a non-invasive and accurate PCa prediction. For such purpose, a shotgun proteomics approach GeLC-MS/MS followed by a combined analysis of MS data using two different proteomics software packages (MaxQuant and Proteome Discoverer) and a bioinformatic and biostatistical analysis was performed to identify and select urinary PCa targets. Among the 22 dysregulated proteins identified by both software packages, Cadherin-1 (CDH1), Cystatin-C (CST3), EGF-containing fibulin-like extracellular matrix protein 1 (EFEMP1), Secreted and transmembrane protein 1 (SECTM1) and Transthyretin (TTR) stood out as potential targets in the discovery cohort and were validated in an independent patient cohort (validation cohort). Based on multivariable logistic regression analysis a five protein-based signature is proposed consisting of CDH1, CST3, EFEMP1, SECTM1, TTR, adjusted for age for assessing the risk of developing PCa, reemphasizing urine oncoproteomics as a promising source of novel non-invasive biomarkers for PCa.

Biomedicine

Blood-derived exosomes for biomarker discovery in Alzheimer´s disease (BMKDisc-AD)

Tânia Martins, Prof. Dra. Ana Gabriela Henriques, Prof. Dr. Jens Wiltfang

Alzheimer's disease (AD) is the most prevalent neurodegenerative disease worldwide however no molecular diagnostic tools are currently available in blood. The discovery of peripheral diagnostic biomarkers will be of great clinical value. Blood-derived exosomal biomarkers can carry specific disease condition signatures and represent easily accessible and cost-effective tools. Hence, the main goal of this PhD project is to identify and validate novel blood-derived exosomal biomarker candidates for AD diagnosis.

Different strategies are being employed: ranging from Mass Spectrometry analysis of the exosomal proteome from Controls and ADs, to characterization of the exosomal metabolic profile of cases by Fourrier Transformed Infrared Spectroscopy (FTIR).

The candidate biomarkers identified are being tested in distinct cohorts. Likewise FTIR applied to exosomes was shown to hold AD discriminatory value.

The discovery of new blood-based exosomal biomarkers and profiles for AD diagnosis, will allow for earlier therapeutic intervention and easy disease management, consequently impacting on quality and life expectancy of AD patients.

Biomedicine

Biorefineries

Biobased thermoplastic composites with high cellulose incorporation

Bruno Valente, Carmen Freire, Carla Vilela, Carlos Pascoal Neto

The increasing environmental awareness due the excessive consumption of non-renewable resources triggered the development of new sustainable and environmentally friendly materials. As a result, in the last decades, natural fibers have been used as replacement for synthetic fibers (glass fibers) in the composite industry.

Additionally, due to the increasing market demand for bio-based plastics, thermoplastic polymers such as poly(lactic acid) (PLA) and poly(hydroxybutyrate) (PHB) have also been used as substitutes for conventional polymeric matrices. However, the lack of compatibility between the hydrophobic matrices and the hydrophilic

natural fibers still poses a challenge for the development of composites with good mechanical performance and stability. In this regard, mechanical, physical and chemical treatments of fibers and the use of coupling agents have been tested to improve the overall performance of the natural fiber based composites.

In this context, this PhD work aims to develop and characterize fully biodegradable composite materials with high incorporation of pulp fibers. The work carried out so far involved the production and characterization of composites made of biodegradable thermoplastics, namely PLA or PHB matrices reinforced with mechanically treated pulp fibers. The results show a good dispersion of the fibers in the matrices and an improvement in the tensile strength and modulus with the increase in the fiber content (up to 40% w/w).

This work was carried out under the Project inpactus – innovative products and technologies from eucalyptus, Project N.º 21874 funded by Portugal 2020 through European Regional Development Fund (ERDF) in the frame of COMPETE 2020 nº246/AXIS II/2017.

Biorefineries

Chemical characterization and biological evaluation of extracts from residual biomass of Eucalyptus globulus and Acacia dealbata

Cátia Oliveira, Armando Silvestre, Artur Silva, Sónia Santos

Currently, there is a growing interest in the exploitation of natural resources as a source of bioactive compounds with potential added value, such as biological and functional properties, making them suitable for use in a wide range of application, including pharmaceutical, cosmetic and/or food.

The getting of these compounds can be combined with one of the most influential sectors in the national economy, which is the forestry and industrial activity associated with pulp and paper production.

The exploitation of wood from Eucalyptus globulus, the main raw material for the production of pulp and paper, generates high amounts of forest residues (branches, bark and leaves). In addition to these biomass residues, there are other species that during forest management are targeted for harvesting and are considered as forest residues. Invasive species, such as Acacia dealbata, with no economic value, are subject to slaughter, generating large quantities of wood and undifferentiated forest biomass that together with E. globulus residues are only used for the production of energy in the factories.

As such, the paper industry generates large quantities of by-products whose integrated valuation can make a significant contribution to the sector's profitability.

The extraction of compounds with high-added value and the exploitation of their potential (through their knowledge of their chemical composition, bioactivity and applications) is a topic that is of great importance for the national economy, since it will bring added value to the forest biomass before their use in energy production.

In this context, the objective of the PhD is to study the chemical composition of E. globulus leaves and also of the bark, wood and leaves of A. dealbata and to evaluate the bioactive potential of the extracts in order to contribute to the declassification of residues, reduction of residues and promoting the status of useful by-products with various industrial applications.

Biorefineries

Development of new technologies for the removal of phosphorus from pulp mill circuits

Celso Cardoso, Eduarda Pereira, João Rocha

Water contamination is receiving increasing attention in recent years, leading to the emergence of environmental policies aiming to reduce the concentration in water of certain elements, such as phosphorus (P), thus contributing to improve its quality. On the other hand, the European Union considers P a critical raw material and recognizes the need to find efficient methods to recover it. In this context, the pulp and paper mills are good sources of P. Low-cost techniques and new materials with high efficiency in the recovery of P are important to closing the loop in the supply chain and solve P and water scarcity in a circular economy. Sorption is a process that has been tested for P removal from waters with the advantages of low-footprint, minimal waste generation and the possibility to reuse and recover P. Here, we shall report on magnetic nanomaterials capable of recovering P from different pulp streams under realistic conditions of pH, ionic strength and P concentration. The recovery of almost all P (25 mg/L) from a real pulp mill wastewater is accomplish using 2.5 g/L of magnetic nanomaterials.

Biorefineries

New paper functionalization strategies by superficial photopolymerization

Fábio Silva, Cármen Freire, Ana Barros, Ricardo Pinto

Paper is one of the oldest commodities used by mankind, especially as a support for printing and writing. However, nowadays, it is also applied as packaging and sanitary products and, due to its biodegradability, recyclability and renewable characteristics, paper has found a wider range of advanced applications, including sensors, conductive papers for electronic devices, thin-film solar cells, and diagnostic papers for medical analysis. Many of these new applications are possible due to the application of functional coatings, which confer new functionalities to paper, such as conductivity, antimicrobial activity, hydrophobicity, or specific optical properties. An expeditious way of the functionalization of paper is the application of photopolymerizable coatings. This type of coatings can be formulated without solvent (avoiding the formation of VOCs) and their curing is done through the incidence of light, in a matter of seconds. Through the design and optimization of the coating formulation and application, the curing conditions and final properties of the coated papers can be tuned to better suit industrial production while attributing paper the desired properties. In this presentation, besides a brief introduction to the research challenges and methodologies of the project, the latest results regarding an hydrophobic coating will be also presented.

Biorefineries

Production of new polymeric materials from lignin

Fernanda Vieira, Ana Barros Timmons, Dmitry Evtyugin, Paula C.R. Pinto

Lignin is one of the most abundant by-products of the Kraft pulp mill with huge application potential. Being an aromatic oligomer rich in phenolic and hydroxyl groups OH, lignin can be considered as a suitable raw material for the synthesis of a diversity of eco-friendly polymers, which can boost the added value of Kraft lignin and can contribute to sustainable environmental. This PhD project focuses on the development of synthetic strategies to obtain lignin-based polyols from Kraft lignin isolated using the Lignoboost® process for the production of polyurethane (PU) foams and adhesives and subsequently for the preparation of functional composites. Oxyalkylation with propylene carbonate was the method used to obtain the lignin-based polyols and expanded graphite, graphene oxide, carbon nanotubes will be used to prepare the functional composites and thus enhance the added value of the ensuing materials. However, producing bio-based products does mean these products are safer. In fact, the isocyanate used in the synthesis of PU is very toxic. Therefore, strategies that have been

used to replace isocyanate to produce a novel class of polyurethane, namely non-isocyanate (NIPU) will be discussed to fully explore the potential of lignin as raw material to develop safer and greener products.

Biorefineries

Production and upgrading of producer gas from biomass gasification

Helena Gomes, Luís Tarelho, Arlindo Matos

Biomass gasification is a key technology to generate a gaseous fuel with potential to replace fossil fuels. However, it still faces several challenges that hinder the full implementation of the process at the industrial level: producer gas diluted in nitrogen and the presence of undesired byproducts.

Thus, the objective of this work is to experimentally produce a high-quality fuel gas from residual forest biomass gasification, using different gasification agents and gas improvement/cleaning techniques, including the use of catalysts to promote tar to gas conversion and the implementation of a high temperature filter to remove particulate matter – to get data for scaling up biomass gasification technology. Additionally, it will be evaluated and analyzed the technical and economic pre-feasibility of the biomass gasification process, to determine its potential in the Portuguese context. The framework for this study derives from the 7th and 12th Sustainable Development Goals from 2030 Agenda – United Nations.

Biorefineries

Fractionation of black liquor using aqueous biphasic systems

Inês L. D. Rocha, João A. P. Coutinho, Sónia P. M. Ventura

The conversion of pulp and paper mills in biorefineries requires the maximization of the value of process streams, particularly those of lower value, extracting or converting their compounds into added value compounds. Lignin and its degradation products, being a major component of black liquor, are some of the few natural sources of aromatic compounds widely available. Their recovery is one of the most important goals not yet achieved in the context of forest biorefinery. In this project we propose to extract and fractionate the aromatic components of black liquor, consisting mainly of lignin in macromolecular form but also as oligomers and monomers, by liquid-liquid extraction using aqueous biphasic systems (ABS).

Biorefineries

Production of cellulosic sugars and bioethanol

Mariana Amândio, Jorge Rocha, Ana Xavier

Currently, the conversion of residues into bio-based products, such as cellulosic sugars and bioethanol, is recognized as a key research area. According to the circular economy model, residues are renewable resources with the potential to be converted into valuable products. This approach contributes simultaneously to minimize the dependence of fossil fuels and waste generation, which are the two main challenges of modern society. Despite all the scientific and technological advances that have been made in this research area, the high capital investment costs and high operating costs are the two main barriers to the implementation of these bioprocesses into a commercial scale. Therefore, the integration of the production of cellulosic sugars and bioethanol into an existing pulp mill could be a promising alternative since it has relatively low investment costs.

In this context, the main objective of the PhD project consists of studying the production of concentrated solutions of cellulosic sugars obtained from pretreated pulp and studying their integration in a pulp and paper industry for the production of bioethanol. Moreover, it is intended to use the low-quality raw material, the agroforestry residues, and others from the pulp and paper industry, to produce the cellulosic pulp, which can be converted into high added-value products. For this purpose, it is crucial to optimize the operational conditions and study the effect of several configurations in the yield and efficiency of the process.

Biorefineries

Valorisation of biomass boiler ashes by incorporation in cement-based materials and geopolymers for environmental applications

Marinélia Capela, João Labrincha Baptista, Luís Tarelho, Paula Seabra

Global awareness about environmental issues has led to the increasing use of renewable and sustainable sources of energy, as substitutes of fossil fuels. Nowadays, the combustion of biomass is the most used alternative source of energy. Pulp paper plants are equipped with biomass cogeneration equipment's to produce steam and power that are used in the pulp manufacturing processes and, in some cases, they are also equipped with biomass power stations to produce electricity. Industrial by-products and wastes from the production process and forestry residues are used as fuel, but this process produces large quantities of biomass ash fluxes that, in the context of the circular economy, must be valorised.

In this work, it is intended to evaluate the possibility of upcycling biomass ash fluxes by using them in the production of an eco-cement (exploring the ashes self-hardening properties), or other construction materials (mortars/concrete), and in the production of adsorbents (for industrial wastewater decontamination or inertization of waste in landfills). Due to the temporal variability of the ash fluxes, in terms of chemical composition and physical properties, some pre-treatment processes were evaluated to obtain biomass ashes with adequate characteristics considering its end-use. A study on the influence of the biomass blends, used as fuel, in the ash characteristics was performed trying to ensure their physical and chemical uniformity.

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Biorefineries

Separation, fractionation and modification of technical lignin from Kraft pulping for advanced applications

Patricia Figueiredo, Falk Liebner, Dmitry Evtuguin, Paula Pinto

Kraft lignin is a virtually unexploited renewable resource that could be made available globally in ten-million-ton scale. It is one of the principal constituents of black liquor, the latter containing all pulping chemicals as well as all solubilized constituents of the biomass pulped. This liquor is typically concentrated by evaporation and fed to the recovery boiler for regeneration of both inorganic chemicals and electrical energy from burning of the organic constituents. Considering the relatively low heating value and elaborate up-concentration of black liquor on the one side and the fascinating properties of the biopolymer lignin on the other hand imparting higher plants intriguing properties, currently amplifying activities aiming at a better material use of lignin can be well understood. The good water solubility of lignosulfonates is a strong pro that paved way towards many commercial applications for this comparably small fraction of technical lignins, such as dispersants, emulsifiers, adhesives, complexing or retarding agents. Introduction of electrically charged moieties would render kraft lignin similarly attractive. While post-pulping sulfonation of kraft lignin has been studied to some extent confirming that competitive products can be obtained but at questionable expenditure, cationization of kraft lignin appears more appealing since beyond water solubility, other intriguing properties imparted by positive charge can be obtained, too. Particularly, applications relying on physical interaction with negatively charged surfaces or molecular receptors are of specific interest.

Therefore, this PhD project aims to explore the opportunities of chemical kraft lignin modification, in particularly cationization using different quaternization reagents and targeting increased water solubility largely independent of pH.

Biorefineries

Hot water soluble dialdehyde cellulose as a powerful platform for novel bio-based products

Sandra Dias, Falk Liebner, Carmen Freire

Periodate-mediated oxidation of cellulose is an interesting approach that can yield two types of 2,3-dialdehyde cellulose (DAC). Depending on the degree of oxidation, either a non-soluble surface-functionalized solid or a product nearly quantitatively soluble in hot water is obtained. Owing to its intermediary oxidation status, both types of products bear a great potential for chemical onward conversion or modification of other substrates. Hot water-soluble DAC (hws-DAC) is considered particularly appealing since it literally invites to be used in papermaking, food-grade packaging, biomedical coatings, high-performance bioplastics or oxygen barrier films. Besides being biocompatible and biodegradable, its production and processing can be regarded as a promising environmentally compatible technology since organic solvents are omitted and the oxidant can be recycled in high yield by ozone which, in turn, can be generated from atmospheric oxygen.

This PhD project aims to prepare hws-DAC by periodate-mediated oxidation of hardwood kraft pulp and to explore new applications. While the properties of hws-DAC from bleached pulp serve as benchmarks, one major goal of this project is to test to what extent different levels of lignin as remaining at the different stages of pulp production affect DAC yield, solubility, pH stability and properties of derived products. Dependent on these results and the success of possibly required stabilization measures, potential applications will be tested. This includes

incorporation of hws-DAC in papermaking processes and development of DAC-based films of high oxygen barrier properties. Furthermore, biodegradability and eco-friendliness of neat DAC and DAC composite materials will be evaluated.

Biorefineries

Subcritical and supercritical technologies for the production of natural extracts from forest biomass

Vítor Hugo Rodrigues, Carlos Manuel Silva, Inês Portugal

As the environmental awareness of the world grows, what was previoulsy seen as residues or by-products is now part of the valorization strategies of companies, under the biorefinery scope. Considering the pulp and paper industries, large amounts of forestry residues are generated being burned for energy production. These can be further valorized by extracting added-value compounds without compromising the energy production step. Techologies such as supercritical and subcritical fluids extraction, following the green chemistry principles, are a possible route for the extraction of different families of compounds of added-value. In this work, eucalypt and acacia biomasses valorization is assessed using these technologies.

Biorefineries

Biotechonology

Development of functional food targeting cardiometabolic risk

Andreia Silva, Artur M. Silva, Susana Cardoso, Manuel A. Coimbra

Cardiovascular diseases (CVDs), the leading cause of death worldwide, are closely related to several interrelated risk factors, namely hyperglycemia, hypertension, dyslipidemia, insulin resistance and obesity. Diet has been pointed as one of the most important strategies to fight CVDs and, in this topic, the phenolic compounds resveratrol, epicatechin-gallate and hydroxytyrosol assume particular relevance. Nevertheless, their usage as functional food ingredients need to overcome several challenges, including stabilization and solubility issues, that can be modulated by polysaccharides and proteins. This work intends to elucidate the impact of distinct vehicles of polysaccharides or proteins (either co-mixed or as complexes) on the stability and bioaccessibility of the aforementioned phenolics, as well to design functional foods fortified with specific phenolic-polysaccharides blends/complexes able to assure bioactivity towards CVDs prevention. Up to now, resveratrol was investigated to develop functional bread and lemon juice. The vehicles tested for bread fortification were zein nanoparticles and γ-cyclodextrin complex, at a final amount of 0.5% of resveratrol. For the lemon juice, it was applied the γ-cyclodextrin complex to a final concentration of 0.625 mg of resveratrol/mL juice. Overall, in both food products, the γ-cyclodextrin complex showed to be quite promising. Regarding the bread, the antioxidant potential of resveratrol complexed with γ-cyclodextrin was preserved and the bioaccessibility was raised to 40%, relative to the 30% noticed with free resveratrol. In lemon juice, the γ-cyclodextrin complex promoted the solubility of RSV in the aqueous matrix that, consequently, contributed to the slight increase of bioaccessibility as compared with free resveratrol (2%, compared to 0.5% of free resveratrol in the intestinal phase). Moreover, the antioxidant potential of resveratrol was preserved for at least 28 days. No apparent physicochemical changes were noticed in both products, but further sensorial analysis are required.

Biotechonology

Poly (glycerol sebacate) (PGS): a base for new materials

Bruno Godinho, Artur Ferreira

Poly (glycerol sebacate) (PGS) is a polyester prepared by polycondensation of glycerol and sebacic acid. Since 2002, when it was first reported, the PGS has received great attention by the scientific and medical community. PGS exhibits biocompatibility, biodegradability, elasticity, and flexibility, all highly relevant properties in biomedical applications, like soft and hard tissue replacement and regeneration. Furthermore, the mechanical properties and degradation kinetics of PGS can be tailored to match the requirements of intended applications by controlling synthesis conditions (i.e., time, temperature, reagents ratio) and addition of other elements (i.e., acrylate groups for acrylated PGS used in 3D printing).

In this PhD work, the aim is obtain new materials by modification/blend of PGS with other elements (i.e. diacids, hydroxy acids, inorganic charges) and give an attractive option for glycerol devalued sources, as crude glycerol, by product of biodiesel production.

Until now, one oral international communication and one publication were realized based in this PhD progress.

Effects of hyperbaric storage on food safety relevant bacterial and fungi spores

Carlos Pinto, Jorge A. Saraiva

Endospores (spores from bacteria) can be present in raw and pasteurized foods, as this processing technique only allows to eliminate vegetative microorganisms, remaining some endospores and some ascospores that can develop and spoil foods, or even worst, cause food poisoning outbreaks.

Indeed, pasteurized foods, according to their pH, usually need to be kept under refrigeration if the pH is higher than 4.5, while below this value, usually they can be kept at room temperatures, by complementing the acidity hurdle with some preservatives. Nevertheless, those whose pH is above 4.5 need to be kept under refrigeration conditions to temporarily inhibit spores' germination. Considering that refrigeration is an energetic costly process, raising environmental issues regarding the emission of considerable amounts of CO2 and other gases, new environmentally friendlier food preservation strategies are needed, without jeopardizing food quality and safety.

Hyperbaric storage (HS) is a new preservation methodology that uses storage pressure control, inasmuch temperature control as in refrigeration and freezing processes, to hurdle microbial development. Especially when performed at uncontrolled room temperatures, HS allows considerable energetic savings, as energy is only mobilized during the short compression and decompression stages of the pressure vessel, and no further energy is required to keep the foods under pressure, in addition to the needless temperature control.

A previous study from Pinto et al. (2018) suggested the possibility of controlling Bacillus subtilis endospore development under HS/RT at 50 and 100 MPa in highly perishable carrot juice (pH 6.00). The authors also suggested that the endospore behaviour under HS conditions was dependent of the nutrient availability. Nevertheless, considering that a vast majority of perishable foods' pH ranges between 4.50 and 7.50, it is important to study the behaviour of endospores at different pH values, while under HS conditions, using B. subtilis endospores as case-study, since can be used as a surrogate of the pathogenic Bacillus cereus and the food spoiler Bacillus stearothermophilus.

In this work, the effect of pH on the Bacillus subtilis endospores response under HS conditions (25, 50, 75 and 150 MPa for 30 days at 18-23 ºC) was accessed. To do so, a nutrient-free matrix (McIlvaine buffer) at three different pH values (4.50, 6.00 and 7.50) were inoculated with B. subtilis ATCC 6633 endospores. After each storage condition, samples were plated in BHI-agar places and then, an aliquot of each sample was heat-treated at 80 ºC for 20 min to eliminate possible vegetative microorganisms, remaining only the endospores.

The results showed an undeniable influence of pH upon endospore response under HS. Indeed, at pH 4.50, neither endospore development nor endospore inactivation was noticed, except at 150 MPa, where 2.00 log unit's endospore inactivation was observed. At pH 6.00 and 7.50, significant ($p<0.05$) endospore inactivation occurred, especially at 75 and 150 MPa along the 30 days of storage experiments, although at different rates.

These results are relevant to set the HS conditions more adequate to store food products according to their pH.

Biotechonology

Magnetic-responsive platforms to control cell behavior for tissue engineering applications

Lúcia Santos, Doutora Ana Sofia Silva, Professor Doutor João Mano

Magnetic responsive systems have been gaining momentum in the controlling of cell detachment in cell culture, as an alternative to temperature responsive ones that are only based on wettability changes. Such systems would suit critical applications, namely harvesting of sensitive cells and development of sheets of cells (CS). In this sense, we will explore the construction of CS aided through magnetic field to attain functional tissues. For this purpose, we will be focused in two different study lines. The first approach will involve the creation of magnetic CS through the incorporation of magnetic nanoparticles within cell environment. The second approach will comprise the development of smart magnetic responsive surfaces that will enable the development of biomaterial-free CS. Cells cultured on these surfaces will be easily collected by locating a magnet under the magneto-responsive glass surface. Such magneto-responsive systems will enable the harvesting of CS and creation of 3D tissue models which are held together by normal cell junctions and extracellular matrix using milder conditions than in the case of temperature-responsive surfaces.

Biotechonology

Development of Decellularized-Matrix Based Organotypic in vitro 3D Tumor Models

Luís Ferreira, Prof. João F. Mano, Prof. Jason A. Burdick, Dr. Vitor Gaspar

Advanced metastatic breast cancers such as triple-negative breast cancer (TNBC) continue evading effective treatment, with TNBC representing the deadliest breast cancer molecular subtype. Presently, an increasing number of therapies seeks to exploit the stromal and immune components of the tumor microenvironment as a therapeutic target in advanced and metastatic breast cancers, owing to their recognized influence in disease progression and metastasis. In this regard, alterations in extracellular matrix have been increasingly implied as promoting a pro-tumoral niches formation within which breast cancer cells can proliferate and invade surrounding tissues. However, despite tumors ECM crucial role in guiding stromal and immune cell behavior, few reports have been able to combine breast ECM mimetic materials in organotypic spherical and or 3D-bioprinted tumor models compatible with high-throughput screening methodologies. To overcome such limitations, we assembled dECM enriched spherical physiologically relevant 3D co-culture heterotypic spheroids (dECM-3D-MCTS) containing decellularized ECM microfragments. Furthermore, we are currently endeavoring to produce organotypic 3D-bioprinted models based on breast mimetic dECMs derived bioinks, idealized as improved surrogates for breast ECM and as ideal staging grounds for tumor ECM hallmark recapitulation.

Biotechonology

Development of metabolically active immunomodulatory biomaterials for the resolution of implant-related inflammation and promotion of tissue regeneration

Matias Cardoso, Dr Vítor Gaspar, Prof. João Mano, Dr. Iola M. Duarte

Host immune responses to biomaterials are key to their functional integration and optimal performance. Macrophages are essential players in the regulation of the inflammasome and, thus, in the overall innate response leading either to inflammation resolution or persistence. This work aims to develop biomaterial-based strategies to modulate the inflammasome and achieve favorable inflammatory responses. One of the strategies under development consists of encapsulating inflammasome-attenuating small molecules into nanoparticles (NPs) made of natural, biocompatible polymers, for specific targeting of macrophages. In particular, the results hereby presented regard the preparation, characterization and biological assessment of zein-hyaluronic acid NPs containing shikonin, a natural naphthoquinone with anti-inflammatory properties. The NPs prepared had hydrodynamic diameters near 200 nm and were efficiently taken up by human THP-1-derived macrophages, showing no toxicity up to 1 mg/mL. Assays to assess inflammasome attenuation by shikonin-loaded NPs are underway. Also, we will investigate the cellular metabolic responses upon inflammasome modulation, using metabolomics. This approach is expected to reveal fundamental knowledge on how metabolites and metabolic pathways influence macrophage responses to biomaterials and immunomodulatory small molecules. Looking forward, we hope to develop a novel class of versatile and cost-effective inflammasome-modulating biomaterials to mitigate implant-related chronic inflammation and failure.

Biotechonology

Innovative Biomedical System Based on Enzymatically Degradation of Hydrogels

Mehrzad Zargarzadeh, Dr. Catarina A. Custódio, Prof. João F. Mano

A major challenge in tissue engineering is providing an adequate supply of nutrients, in particular glucose, a main source of energy, to sustain cell function in 3D constructs [1, 2]. Recently laminarin as a low molecular weight β-glucan storage polysaccharide has been applied for the development of photo-cross-linkable hydrogels for cell culture [3]. Here, we develop a radically novel self-sustained 3D bioscaffolds for cell culture that takes advantage of the degradation products (mainly glucose) of the laminarin hydrogels. The degradation mechanism of choice in this work is enzymatic which will lead to the production of glucose readily accessible for cells to carry out their metabolic and biological functions. Such innovation is expected to circumvent the limitations of the current hydrogel constructs for cell culture that have limited nutrients diffusion and boosting their application in tissue engineering.

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Biotechonology

Dynamic Control across Adaptable Hydrogels and Engineered Cell Assemblies

Pedro Lavrador, Vítor Gaspar, João Mano

Natural matrices are not locked in a perpetual living state but are rather ruled by constant, permanent and transient dynamic alterations encompassing development, growth and maturation stages. Thus, attempting to recreate the dynamic nature of tissue matrices and its biological complexity cannot be achieved with conventional hydrogel matrices that are static, or with binary 2D patterning of biochemical

cues. This proposal will be supported by dynamic covalent chemistries for attaining adaptable 3D networks that can more closely convey the permissive mechanics of native matrices. Moreover, advanced cell surface engineering concepts can be leveraged to materialize cells as building blocks for assembling cell-rich structures that are also dynamic in nature due to their living components. Conceptually, harnessing dynamic control over hydrogel assemblies will collectively contribute to alternative design routes for establishing ECM-mimicking 3D platforms or to produce cell-rich materials that are generated via controlled cell assembly and present tissue-like densities.

Biotechonology

Storage under pressure of dairy foods as an alternative to refrigeration

Ricardo Duarte, Ivonne Delgadillo, Ana Gomes, Jorge Saraiva

The possibility to preserve foods under pressure at naturally variable (uncontrolled) room temperature (Hyperbaric Storage/HS) is a novel preservation methodology/concept that allows significant energetic costs reduction, since no energy is needed to maintain the temperature, while for pressure, energy is only needed to generate the pressure, but not to maintain it [1]. HS acts by microbial growth inhibition similarly to refrigeration [2, 3], with possible no temperature control throughout the storage period. As a consequence, HS also becomes an environmentally friendlier technology, with a carbon footprint estimated to be about 26-fold lower compared to refrigeration storage [4]. Effective management of cold chains utilizes about 50% of total energy in food industry [1]. Substitution of refrigeration by HS, would allow significantly energy reduction, as substantial reduction in food products losses during processing, storage, transport and sale, when refrigeration fails. Additionally, HS requires pressure levels much lower (up to 150 MPa) than those used for pressure pasteurization (500-600 MPa), but enough to significantly slow down/inhibit microbial growth similarly to refrigeration.

During this PhD work, HS showed great results in inhibiting as well as inactivate microbial load present normally in dairy products, as well as in inoculated microorganisms and endospores. Also, overall, the physicochemical properties of this products were maintained in values similar to does observed for refrigeration storage.

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Biotechonology

Valorisation of Opuntia ficus-indica L. through an integrated production of high value products

Ricardo Ferreira, Susana Cardoso, Jorge Saraiva

The species Opuntia ficus-indica L. is an important food resource throughout the Mediterranean basin. However, the commercial flow of the products of this crop will have to face strong challenges from the already rooted markets.

This project aims to develop new value-added Opuntia products, which include juices and functional products obtained from the main by-products of juice production, ie peels and seeds. Peels will be used as an ingredient in gluten-free flours, that in turn can be used in the formulation of distinct food products, namely for celiac persons. Instead, seeds remaining in the pomace will be used for oil extraction. Notably, innovative non-thermal processing technologies, namely high pressure processing (HPP), will be herein exploited as a non-thermal pasteurization in juices, as well as a green methodology for seeds oil extraction, aiming to achieve differentiated products from the currently marked.

Biotechonology

Business and economics

European Investment Funds, Portugal 2020 and Public Sector Modernisation

Adriana Nishimura, Manuel Luís Au-Yong Oliveira

Portugal has received European Structural and Investment Funds (ESIF), since before joining the European Union, in 1986. During this period community support agreements as well as the current Portugal 2020 Partnership Agreement, have led to a budget of more than 130 billion euros having been allocated to the Portuguese economy. The study in question is exploratory and descriptive, and its research design is based on qualitative and quantitative methods. The aims of the research are to analyse the impacts of European funds for the development of Portugal; to find out if there is a meritocracy and efficiency in the allocation and use of resources; and to acquire knowledge about the strategies adopted for the modernisation of the Portuguese Public Administration, a transversal domain of the Portugal 2020 program. The analysis of the data collected so far points to a consensus that European funds have been fundamental for the growth and development of Portugal. Albeit, some management failures in the allocation of funds have been reported, as well as gaps in the planning and evaluation of funded programs.

Business and economics

The Life of Consumption Communities: A Study on Vegan Communities

Ana Hungara, Helena Nobre

This PhD project aims at understanding how consumption communities are created and extended over time and the different styles in consumers' interactions within the community. The project starts by offering a literature review departing from a bibliometric analysis on Consumer Culture Theory (CCT), consumption/brand communities and vegan communities. In the second part, the paper presents the study design of the thesis and a timeline for the project development. This study will hopefully contribute to marketing research by defining typologies of consumers and mechanisms for community retention that can be applied to other research contexts.

Business and economics

Energy Literacy in Portugal

Ana Martins, Mara Madaleno, Marta Ferreira Dias

Involving the assessment of energy knowledge and financial knowledge, intentions and behaviors, energy literacy provides an overview of people's knowledge, feelings, concerns and habits related to energy use. Energy is a very important resource in our daily life, however, its production often requires the use of limited resources and aggravates existing environmental problems, so it is urgent to alert consumers to an efficient management of their consumption.

Using a questionnaire, applied to the university community in Portugal, we seek to assess the levels of energy literacy, considering all its dimensions, and to understand which factors influence these levels. The results show good levels of energy literacy, despite the low levels of energy and financial knowledge. Financial knowledge seems to be synonymous of energy knowledge and seems to contribute to more sustainable behavior.

Business and economics

From raw data to spatially bounded dynamical system; a regional application to financial stability, demography and employment

Aníbal Galindro, Mara Madaleno, João Marques

The main goal of my PhD is to be able to start from a set of observable financial and populational (demographic) spatial variables in a given timeline and extract valuable information from them by discovering the spatially dynamical system that better represents them. According to Ramsay (2004) the variable transformation into differential equations system is possible, however, we suggest a methodological upgrade by manipulating the Brownian Motion (Nelson, 1967) and Maximum Entropy (Jaynes, 1957a, 1957b) formulation to overcome small data issues, non-well posed problems and bidemensional spatial recognition. The resulting dynamical system should be then suitable for a spatial optimal control application and mathematical validation (system stability and equilibrium). Even though the application spectrum of such

methodology can be substantially broad, we intend to proceed our current studies on the impact posed over financial stability, demography and employment issues for Portugal.

Business and economics

Essays on Sports Economics: The European Super League of Football

Anthony Macedo, Marta Ferreira Dias, Paulo Mourão

Professional sports play an important role in social well-being around the globe. In Europe, football is the most popular sport, but its current structure has been repeatedly threatened by the creation of a breakaway league grouping the main clubs, the European Super League (ESL). The uncertainty is higher than ever due to COVID-19 pandemic and it becomes essential for clubs and for domestic leagues to be prepared for the potential emergence of a ESL and the change of European football paradigm. Therefore, from the perspective of sports economics, this study aims to gather existing scientific knowledge on the subject and to add new necessary considerations to the debate. The lack of bibliometric review is a major gap in the literature that this work intends to fill, as well as to evaluate the possible effects of a ESL in game overall attractiveness and stadium attendance.

Business and economics

Ensaios Sobre a Literacia Financeira e Empreededorismo no Contexto Moçambicano

Atanásio Cossa, Mara Madaleno

Financial literacy has been gaining its importance in academia and public policies, as it allows individuals to make the best financial decisions that positively impact their financial well-being and, therefore, improve countries' economic growth. Literacy assumes that individuals combine financial knowledge and financial attitudes that can generate positive financial behavior. This research aims to scan financial literacy in Mozambique, with a view to assessing levels of financial literacy, as well as identifying the sociodemographic factors that influence it. To carry out this research, a survey was administered in all regions of the country, based on previous research. This research contributes to the literature through a separate approach to the dimensions of financial literacy - knowledge, attitudes and financial behavior. It is a quantitative research, which is made from a database collected in Mozambique through surveys. With the same it was found that more than 61% of the respondents did not answer the questions regarding financial literacy. This shows that the levels of financial literacy in Mozambique are low. Individuals are not qualified to make the most appropriate financial decisions and end up compromising their financial well-being. It was found that age influences respondents' financial knowledge, gender influences financial behavior, educational level influences financial knowledge and behavior, and finally, the training area influences financial knowledge, attitude and behavior. Therefore, financial literacy is influenced by sociodemographic variables. This article contributes to the literature by providing information regarding the financial literacy of Mozambique, which is still scarce, on the one hand, and providing a scientific basis for decision makers to improve public policies regarding financial literacy, on the other hand.

Business and economics

Automated Trading Strategy in the Forex Market

Bianca Benedicto, Mara Madaleno

The present study aims, on the one hand, to broaden knowledge about artificial intelligence and trading by providing an overview of automated trading and, on the other hand, to build an algorithm capable of automatically operating in the financial market. It seeks to analyze the performance of the developed robot and the extent to which an investor can allocate its capital considering the complexity of the market and the technical specifications developed. In addition, it is intended to investigate the loss aversion bias in financial transactions. Therefore, it aims to not only build the computational framework and investment strategy, but above all to assist the decision-making process and contribute to the sharing of knowledge in this area of research.

Business and economics

Impact of R&D subsidies on company performance

Cátia Rosário, Prof.ª Doutora Celeste Varum , Prof.ª Doutora Anabela Botelho

Innovation and knowledge have been central themes in academic and political speeches over the years, and it is unanimous that these are the main factors that define the competitiveness of nations, regions, companies and even individuals.

It is therefore reasonable that investments in research and development (R&D) are viewed as a crucial strategic tool to business development, and that the effort in these investments has increased in recent years. Here, the influence of government is presented as one of the main determinants of R&D projects, and it is important to understand the evolution of public support and the political conditions that boost innovation projects.

In recent years, there has been a significant shift in state aid policy, aiming at making it more efficient. This change may be justified by the fact that economic development is based on the sustainable development of innovation and technological productivity. In addition, it is expected policy learning in the allocation of subsidies because innovation requires high investments and the results are uncertain.

It is possible to find in the literature a wide range of studies which seek to deepen our knowledge about the effect of R&D subsidies on the performance of companies. However, this theme is not exhausted since the results of these studies are often difficult to compare and occasionally lead to different conclusions. Some studies have found that subsidies increase production, but not productivity. Other studies suggest that companies receiving R&D subsidies are already stronger and more promising before receiving them. Hence, these companies do not seem to perform differently because they are supported.

In this context, and given the uncertain nature of the results that can be achieved in any R&D project, it is logical to question whether the positive effects found are the same for any company, market or economic cycle.

In order to deepen our knowledge on this topic, the following broad research question is formulated: what is the impact of R&D subsidies on the performance of Portuguese companies? To answer this question, the most recent data available in the CIS (Community Innovation Survey), Sabi and Amadeus databases are used.

The data are analyzed through multivariate data analysis.

The specific purposes of this research project are: Identify the characteristics of companies that receive R&D subsidies; Analyze the impact of innovation inputs on the outputs and innovation performance; Analyze the impact of R&D subsidies on the company's performance; and, Analyze the impact of innovation results on the company's performance. To complement the study, it is also intended to identify and compare the characteristics of the companies with the best outcomes, including comparison by sector of activity and geographical location (NUTS II).

Business and economics

Consumer behavior in ecotourism, an integrated approach

Cátia Sá, Vera Vale, Catarina Delgado

Ecotourism is a type of tourism that uses the natural and cultural heritage of cities in a sustainable way. The main objective of this study is to understand what are the main keywords that are being studied in consumer research in ecotourism. The article also intends to understand the main variables and methodologies used related to ecotourism.

Business and economics

Management and innovation in micro and small enterprises: a research proposal through Structural Equation Modeling

Cicero Eduardo Walter, Manuel Au-Yong Oliveira, Cláudia Miranda Veloso

Micro and Small Enterprises have emerged as an important alternative for the generation of jobs and income, mainly in countries that present serious market failures for the creation of productive jobs. However, the lack of commercial and managerial skills, inadequate access to markets, as well as the absence of entrepreneurial culture has led to a high level of failure in these ventures. In addition, the current competitive scenario has been increasingly based on innovation, responsible for the destruction of traditional competitive barriers, requiring a new approach on the part of Micro and Small Enterprises in order to be able to remain in the market in a sustainable manner. Accordingly, this research aims to determine the influence that business management has on the degree of innovation of Brazilian Micro and Small Enterprises through Structural Equation Modeling. As a theoretical contribution, the present investigation may point to statistical evidence that may support a causal inference between business management, understood in the present investigation as a decision process on strategic and operational aspects of a business, and the innovation capacity of companies. In addition, this research can provide important practical contributions by highlighting the relevance that business management has for Micro and Small Enterprises, also pointing to the need for Micro and Small Enterprises to adopt systematic business management practices that raise their potential with regard to the development of innovations and the maintenance of a sustainable competitive position.

Business and economics

Os determinantes do comportamento do consumidor face aos bens de luxo: um estudo aplicado a Angola

Cláudio Valentim, Vera Cristina Fontes Teixeira Vale

O consumo de bens de luxo tem sido desde há muito um componente importante da economia mundial (Wang et al 2015). Apesar de uma grande quantidade de pesquisas sobre o consumo de luxo, até à data, a maioria dos estudos foram conduzidos em países desenvolvidos ocidentais (Dubois, Czellar, & Laurent, 2005; Tidwell & Dubois, 1994; Wong & Ahuvia, 1998). Por outro lado, os países emergentes estão cada vez mais abertos as marcas de luxo (Krupka, Ozretic-dosen, & Previsic, 2014), pelo que é necessário compreender as motivações dos consumidores para a compra de marcas de luxo nesses países (Montanari, 2018).

No entanto, não tendo sido verificado nenhum estudo aplicado no contexto angolano, este estudo, permitirá identificar as motivações e traçar o perfil do consumidor angolano, preenchendo a lacuna existente na literatura sobre este expressivo tema e identificar os segmentos de luxo em Angola e direcioná-los de forma eficiente.

Business and economics

Analysis of the investor profile in Portugal

Diogo Ribeiro, Mara Madaleno, Anabela Botelho, Júlio Lobão

This project intends to analyze the investor profile in Portugal. To this end, a careful analysis is made of the characteristics that influence different decisions in the financial markets and their impact on the results of the financial market.

The results of a survey carried out in 2018 by the Portuguese CMVM will be used. Thus, 1136 responses were validated and the survey was addressed to investors in securities in Portugal and its main purposes were: to analyze the characteristics of investors; analyze their financial knowledge; analyze investors' attitudes towards risk and their decision-making process.

So, we start with a detailed analysis of some financial decisions, which requires some caution on some points related to individuals. Namely, what are the main characteristics that influence decisions and how they relate to market uncertainty. Therefore, in a first phase we infer two measures that quantify the tolerance to risk and loss in the securities markets. Subsequently, we used these measures to explain decisions in the financial markets, and the structure of a portfolio.

In this way, we will demonstrate that the structure of a portfolio results from at least three decisions: number of assets, which assets and how much to invest in each. And it will also be determined which characteristics were responsible for the different decisions and how the different characteristics of the individuals influenced the taking of different choices.

This work captures the complexity of financial decisions and the main characteristics that influence them, allowing to understand how the profile of individuals can lead to different financial decisions in the securities markets. Results are of high importance to the investors' decision making process and portfolio compositions, in order to weight the best binomials' risk and return.

Business and economics

Economic-Financial Analysis of the Oil Impact in Timor-Leste

Fernando, Anuno, Professora Doutora Mara Teresa da Silva Madaleno e Professora Doutora Elisabete F. Simões Vieira

O rendimento do Estado é a principal fonte de diversificação económica com o intuito de estabilizar a sustentabilidade do crescimento económico, sobretudo as atividades macroeconómicas, onde o PIB é o principal indicador. Além disso, a diversificação económica também depende muito da estabilidade macroeconómica, porque os preços do petróleo podem afetar o rendimento no apoio à diversificação económica. O fundo petrolífero de Timor-Leste permite investir em carteiras na forma de 40% de investimentos em ações e 60% em títulos. Esse investimento tem a expectativa de alcançar um retorno 3%. Com investimentos de carteiras, o Governo implementará o conceito de diversificação com o objetivo de maximizar retornos e minimizar riscos. Após compreender os fenómenos macroeconómicos da diversificação económica e investimentos de carteiras, este estudo tem como principal objetivo a análise económico-financeira do impacto do recurso Petróleo em Timor-Leste. No que se refere aos objetivos principais do trabalho de investigação, estes serão divididos em áreas principais nomeadamente: Efeitos Macroeconómicos do Preço de Petróleo, Gestão do Fundo de Investimento nas Composições das Carteiras e Estratégia de Diversificação da Carteira e Impacto Macroeconómico.

Ao nível do estudo empírico, e como forma de dar resposta às questões da investigação, iremos utilizar metodologias quantitativas para análise de séries temporais, entre 2000 e 2018 para o estudo de efeitos macroeconómicos. Os dados já foram recolhidos numa base mensal, tendo sido obtidos através da informação disponível no Banco Asiático de Desenvolvimento (ADB) e Direção de Estatística. Outras fontes de dados poderão ser usadas para complementar as várias análises a que nos propomos. E, no que concerne ao estudo de composições das carteiras, a recolha de dados vai ser realizada para o período de 2005-2019, no Ministério das Finanças. Os dados obtidos vão ser analisados de acordo com os modelos de Vetor Autorregressivo (VAR), Capital Asset Pricing Model (CAPM), utilizando-se o modelo de média-variância de Markowitz, estratégias de construção de carteiras de investimento, e passa ainda, para conseguirmos ter um elemento comparativo, pela implementação do modelo de 3 e/ou 5 fatores de Fama & French para nos auxiliar no estudo da diversificação de carteiras. Das análises esperamos retirar ilações sobre a melhor estratégia a seguir para a diversificação do fundo de petróleo, enquanto estratégia de investimento que garante mais retorno e menor risco, permitindo um maior crescimento económico.

Palavras-chave: Variáveis macroeconómicas, Preço do petróleo, Composição de Carteiras, Estratégia de diversificação da carteira

Business and economics

Relatório do Progresso da Tese Intitulada: Evolution of Urban Solid Waste Management: Evaluation of Brazilian Municipalities

Isabel Costa, Marta Ferreira Dias , Margarita Matias Robaina

A discussão sobre a Gestão de Resíduos Sólidos Urbanos GRSU ganhou contornos mundiais na década de 70, entretanto o aprofundamento dos seus desdobramentos nos países em desenvolvimento é relativamente recente, a exemplo do Brasil que somente aprovou o seu instrumento legal no ano de 2010 (Lei 12.305). A quase 10 anos da aprovação desse instrumento, identifica-se um cenário pouco evolutivo no que se refere aos 4 processos básicos da gestão (geração, coleta, coleta seletiva e disposição final de resíduos). Para tanto objetiva-se com essa investigação discutir sobre os processos que envolvem a GRSU perpassando por abordagens em diferentes países e na sequencia identificar o status da gestão no Brasil por meio de analises da eficiência dos seus municípios. A base de dados a ser trabalhada envolve séries temporais que contempla o período que compreende os anos de 2002 a 2018. O conjunto de metodologias definidas contempla abordagens qualitativas com estudo aplicado e quantitativas, como a Analise Envoltória de Dados e a Analise Hierárquica de Processo. Os resultados atingidos, a partir do modelo de avaliação proposto, deverá possibilitar a analise comparativa entre os municípios, a identificação daqueles com maior eficiência, assim como também, o levantamento dos fatores que influenciam na eficiência da GRSU. Espera-se oferecer contributos para a comunidade científica a partir da difusão do conhecimento e auxiliar no processo decisório dos gestores públicos e privados dos municípios brasileiros.

Business and economics

Financial Inclusion and Financial Stability: African Countries Analysis

João Jungo, Mara Madaleno and Anabela Botelho

The main function of the financial system is the intermediation of resources, that is, to capture savings from surplus agents and grant credit to deficit agents in the form of a loan. A stable financial system must be able to withstand shocks and respond to the demand for financial resources. Financial inclusion is how individuals and businesses can access and use a range of appropriate and responsible services, including financial services offered in a well-regulated environment. Financial inclusion aims to attract the “bankless” population to the formal financial system, so that they have an equal opportunity to access financial services ranging from savings, payments and transfers, to credit and insurance. However, there is growing evidence that increasing levels of financial inclusion contribute significantly to poverty reduction, financial stability and sustainable economic growth.

Literature fragments the reasons for exclusion into two: voluntary exclusion (“lack of money”, “religious reasons”, “family member has an account”) and involuntary exclusion (“too far”, “too expensive”, “lack of documentation”, “lack of confidence”). It is therefore essential to take into account this difference between voluntary and involuntary exclusion when implementing policies for inclusion. People excluded from the financial system use their accumulated savings in the purchase of animals, land or consumer goods, such as household appliances and other utensils. And when they need to sell part of their assets, due to a lack of financial resources, they face difficulties because they are in non-monetary and non-fractional form, forcing them to sell the complete asset. The situation is even more serious in developing countries.

The general objective of the investigation is to examine and evaluate the impact of financial inclusion on the stability of the financial system. Namely, understand the role of financial innovation in access to financial products and services and economic growth, as well as assess the impact of financial inclusion on monetary policy, and verify the existence of a trade-off between financial inclusion, bank stability and competitiveness in the banking sector of African countries. For this purpose, the thesis will consist of three essays, all of which are empirical studies.

The data will be obtained from the database of the World Bank and the International Monetary Fund and on which we will apply various methodologies of dynamic panel data such as PVAR in GMM (panel vector autoregressive models, using generalized method of moments techniques), panel models of fixed and random effects, as well as FGLS (feasible generalized least squares) and ARDL (autoregressive distributed lag (ARDL) cointegration technique) models.

Keywords: Financial Inclusion; Financial System Stability; Financial Innovation; African countries; Growth and Development

Business and economics

Corporate governance mechanisms effects on firm performance and risk: Empirical evidence from Portugal

João Teodósio, Elisabete Vieira, Mara Madaleno

Corporate governance mechanisms effects on firm performance and risk: Empirical evidence from Portugal" has the aim to fulfil several research gaps on the literature devoted to the outcomes of corporate governance mechanisms in Portuguese listed firms.

Literature on corporate governance of Portuguese listed firms has been focus on five major topics: financial performance; information disclosure; earnings management; executive compensation and corporate risk.

Using a sample of 38 non-financial and non-sport listed firms, between 2007 and 2018, we fulfill some of the identified research gaps by investigating the impact of board gender and nationality diversity on firm performance and corporate risk-taking.

Business and economics

Cluster Evaluation and Cluster Policy

Manuel Cruz, Prof. Dra. Celeste Varum

A survey of clusters, to find out if they respond to the objectives that underlie their creation, in order to encourage the participation of interested parties, their effectiveness and present methods and strategies to improve their results.

The study of the literature of the last 20 years reveals recurring situations of divergences in the appreciation of clusters in several domains, which go through the systems of company selection, governance, financing and the pursuit of the objectives for which they were created.

The integration of different corporate interests in the strategic management of clusters can be an important factor in the pursuit of their objectives and their success.

Clusters cannot limit their existence to periods of financial support programs, or to their existence, as if that were just their objective. The continuity of its objectives has to go beyond the temporal activity of the support, which requires finding alternative sources of financing.

Academic knowledge centers are a fundamental element in the success strategy of clusters, which has not always been achieved. The need to get closer to the objectives of companies in the areas of research and innovation, through an "open door system", can prove to be of great importance for the success of the cluster's objectives.

The inaccuracies of studies on these matters, raises the question about the validity of clusters as strategic factors for economic development. To contribute to the enhancement of clusters as a fundamental strategy in strengthening the economy and social development, this is our objective.

Business and economics

Women's careers in academia: the case of Portuguese Public Universities

Maria Pereira, Anabela Botelho

According to the European Institute for Gender Equality, Portugal is progressing towards full gender equality faster than the EU average. However, Portugal's rankings in the six areas assessed (work, money, knowledge, time, power and health) remain below the European average. In this context, the gender asymmetries in the careers of teaching staff at Portuguese public universities are not surprising. According to the Profile of the Professor of Higher Education (Directorate-General for Statistics of Education and Science), in the academic year 2018/2019, 46% of the assistant professor (career base) were women. However, at the top of the career, only 23.5% of the full

professors were women (compared to 19.8% in 2007). We are therefore facing a slow evolution that reflects the difficulties that women face in accessing the top positions of academic careers.

So, assuming that innate talent is equally shared between men and women, the results achieved by any organization, including universities, would necessarily be superior to the current results if women had the same opportunities as men to reach the top of their careers.

It is possible to find studies in the literature seeking to analyze gender asymmetries, particularly in research and higher education. However, these studies present results limited to specific geographic contexts, specific factors or at a given time. Other studies do not consider the specificity of disciplinary areas.

Using longitudinal data, this research project intends to go beyond the evidence of existing gender asymmetries, or of "glass ceiling", "sticky floor" or "leaky pipeline" in the academic careers of teaching staff at Portuguese public universities.

We intend to highlight the mechanisms producing these asymmetries, and to analyze how and when they occur. Thus, and using multivariate data analysis, we seek to:

- Identify the role of the main career management processes in the production of these asymmetries;
- Analyze the variation of these asymmetries according to disciplinary areas;
- Analyze the variation of these asymmetries according to the gender of the college leader (intermediate leadership) or the university (higher leadership);
- Identify the effects of public policies that affected higher education, and the implementation of new public management models, on gender asymmetries.

Business and economics

Impact of audit on enterprise performance. Euronext Lisbon Evidence.

NSIMBA PETEZI, Professora Elisabete Vieira

The enterprise needs to grow, it must produce performance for its development.

There are sometimes certain behaviors which can influence the performance of the company, in particular the problem of result management and the quality of information.

To overcome this, it is important to implement effective control and verification systems. Some literature shows the audit can provide the solution.

Our approach is based on audit as a means of detecting opportunistic behavior harmful to the performance of the company. On a theoretical level, we build on the work on the subject of audit and performance to create the theoretical foundation for research.

Empirically, we plan to work with data from companies listed on the Euronext Lisbon market, where we intend to collect data for eight years. So we think of exploiting the data in painel to specify the research model.

For estimates, the regression model and applications of statistical and econometric tests.

Business and economics

Enhancing Firms' Competitivity Through Trade Fairs: a set of articles.

Pedro Silva, Vera Vale; Victor Moutinho

Technological advancement and e-commerce are a reality, but this has not weakened the importance of trade fairs, because business events (including trade fairs) will continue to grow (Mitchell et al, 2016; UFI, 2019).

Tafesse & Skallerud (2015) demonstrate that trade fairs are a powerful and multifunctional marketing tool, as they facilitate the realization of different functions: transactional (sales), informational (knowledge sharing), social (relational), symbolic and cultural. In this sense, the main objective of the thesis is to study the trade fairs in their different multifunctionalities and in the perspective of the exhibitor. For this, the thesis will be developed in the form of articles. Each article will approach each of the functionalities and with appropriate methodologies.

Business and economics

Publication Performance: A Causation and Effectuation Analysis of the Publication (Entrepreneurial) Orientation of Researchers

Pedro Tribuzi, António Carrizo Moreira

The scientific community is becoming increasingly more aware of the importance of publication, as researchers compete with each other to publish in top scientific journals. This research departs from a parallelism between entrepreneurs and researchers, seeking to analyze and adapt different entrepreneurial scales to be applied to researchers. As such, similarly to entrepreneurs, who display Entrepreneurial Orientation that influences Entrepreneurial Performance, it is proposed that researchers exhibit Publication entrepreneurial Orientation that influences Publication Performance. The objective of this research is to analyze, using Causation and Effectuation decision-making theory, how Publication Orientation affects the Publication Performance of researchers.

Business and economics

Essays on the capital structure

Rute Pinho, Professora Doutora Elisabete Vieira, Professora Doutora Mara Madaleno

Abstract

The capital structure is a classic in corporate finance literature. Despite, the many existent studies there is not yet a general consensus on the applicability of the several theories, not even the theories can explain all real situations related to the decision-making process of investors and managers concerning firms' capital structure. In this sense, capital structure remains a topic of relevant interest for research in order to extend scientific knowledge. Besides, it is crucial to research about the impact of the current COVID-19 pandemic on firms' capital structure. This pandemic has brought new challenges to firms.

The contribution of our research is focused on three major purposes. The first one is a comparative analysis of the main determinants of the capital structure between the European Union countries, which were intervened by the IMF and those that were not, and those that are most developed and least developed, besides investigating the impact of the COVID-19 pandemic on European Union firms, over the period 2009 and the last year with available data. To achieve this purpose, we have this question of investigation: are there differences in the capital structure between samples of European Union firms, and what is the impact of the COVID-19 pandemic in the capital structure of those firms? The second purpose concerns the analysis of the impact of behavioral factors and personal attributes on the capital structure, and also the analysis of the impact of COVID-19 pandemic, with comparison in a sample of the 500 best and biggest Portuguese firms, over the period 2009 to 2019. Another research question is: does overconfidence and optimism, gender, age and graduation degree impact the capital structure? The final purpose is related to bankruptcy prediction and firms' capital structure, and the analysis of the impact of the COVID-19. This last research question is focused on determining the optimal capital structure such that the impact of the pandemic allowed the company not to go bankrupt. Thus, we are able to extend this analysis to other crisis periods in history and take out lessons from the study suitable for firms within the same characteristics group.

Keywords:

Capital Structure, COVID19, Overconfidence, Optimism, Gender, Bankruptcy

Business and economics

What individual's entrepreneurial characteristics impact on the entrepreneurial behavior among the higher education students

Shahzada Adeel, Ana Dias Daniel, Anabela Botelho

The concept of entrepreneurship is very old. Many researchers argue that entrepreneurship is the driver of society (Frederick & Kuratko, 2010) since it can reduce the unemployment level, eradicate poverty, increase innovation and productivity, etc. Although several authors diversely define entrepreneurship, it is defined as an individual's ability to turn ideas into action. So, entrepreneurship can be considered as the engine of the market economy as it focuses on wealth and employment, etc. within society.

Business and economics

Efeitos da experiência da marca no envolvimento do consumidor com a marca na mídia social.

Sousa de Sousa, Vera Vale, Víctor Moutinho

Abstract

Diversos autores afirmam que o sucesso da marca depende de uma experiência única (Dwivedi, Nayeem, & Murshed, 2018), memorável (Fournier, 1998; Iglesias, Markovic, & Rialp, 2018) e duradoura (Khan & Rahman, 2015; Schmitt & Zarantonello, 2009) proporcionada ao consumidor. Portanto, proporcionar experiências de marcas aos consumidores tem sido visto como uma estratégia que pode contribuir para o sucesso da marca (Khan & Rahman, 2015; Schmitt & Zarantonello, 2009). Tais experiências podem levar ao envolvimento emocional e motivacional do consumidor com a marca e desembocar no desenvolvimento de sensações, sentimentos, comportamentos e conhecimentos favoráveis ao bom desempenho da marca. Ou seja, as experiências que o consumidor desenvolve com a marca, sobretudo as experiências positivas, podem levar ao engagement do consumidor. Sobre a relação entre brand experience e brand engagement, várias pesquisas conceptuais e empíricas foram desenvolvidas desde 2005 (Islam & Rahman, 2016). Da revisão sistemática de literatura feita (Liberati et al., 2009), foram identificados 487 artigos publicados entre 2016 a 2019 que mencionam experience, engagement, brand engagement, consumer brand engagement, customer brand engagement e brand experience. Destes, 45 foram desenvolvidos no contexto do social media, 15 artigos no contexto do turismo e 11 no contexto da hospitalidade. Considerando que o contexto da hospitalidade aplica-se para viajantes em turismo de qualquer tipo que seja, então pode-se afirmar que 26 dos 487 artigos publicados entre 2016 a 2019 foram desenvolvidos no contexto do turismo e, destes, apenas 1 teve um país africano (Gana) como campo de estudo. Essa constatação leva à perceção de que o gap de literatura identificado por Islam e Rahman (2016), que indica que maior parte dos estudos sobre brand engagement foram desenvolvidos no contexto de países desenvolvidos e que, por isso há a necessidade de se realizar estudos em países não desenvolvidos ou em vias de desenvolvimento para compreender a relação entre estes constructos, ainda não foi preenchido.

Assim, o objetivo deste trabalho é compreender os efeitos do brand experience no brand engagement no social media, tendo em conta o contexto do turismo em Moçambique. Para o efeito começa-se por explicar os construtos brand experience e brand engagement, demonstrar a relação entre eles e demonstrar a influência da relação entre brand experience e o engagement do consumidor com a marca tendo como foco o turismo em Moçambique. Os dados serão colhidos exclusivamente via online para aumentar a probabilidade de certeza de que o respondente seja usuário de redes sociais tais como o Facebook e o Twitter e serão analisados com base no modelo de equação estrutural, com recurso à técnica de análise fatorial confirmatória.

Do ponto de vista de implicações de gestão, esta pesquisa contribui para a compreensão da relação entre brand experience e brand engagement no contexto do social media referente ao turismo em Moçambique. Do ponto de vista prático, esta pesquisa constituirá um instrumento que os marketeers e gestores de firmas do turismo em Moçambique poderão usar para melhorar o engagement dos consumidores com suas marcas no social media.

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Business and economics

Essays on Renewable Energy Communities

Susana Soeiro, Marta Ferreira Dias

With the implementation of the EU's key climate and energy policy objectives, there is a transition to a new energy system where renewable energy sources are pushed and where new technologies need to be developed and adopted. The energy transition may result in deeper participation of individual consumers or citizens in community-based initiatives. Those communities operate collectively in the energy market producing RE or in local networks, based on local collaborations. The development of energy communities is not the same in all member state. Moreover, it is noted that their development is different depending on the European country. The aim of this paper is to collect data, using a survey, to study and to better understand what the citizen energy initiatives are, their main features and the motivations of individuals to participate on it. The citizens participation is a crucial point for the development of this type of communities. The main motivation for participation in these communities seems to be concerns about environmental and climate impacts. We also note that in these communities the trust is very important for the development of any RE project.

Business and economics

Essays on the Impact of an Ageing Population in Residential Electricity consumption

Vera Pais-Magalhaes, Victor Moutinho, Margarita Robaina

Population ageing is accelerating, i.e., the share of older persons in the population is increasing which considerable impacts economic growth, energy use and related carbon emissions, affecting sustainable development. The main purpose is to study the effect of the demographic sift so-called ageing population on the electricity households' demand for the EU-28 in the period 2005-2016 through the employment of different macro-economic and micro-economic variables and methods. The main objective is to provide adjusted instruments for the employment of energy and demographic policies for policy makers, governments and society in general. The right combination between the households' electricity consumption efficiency and policies that addresses the necessities of the elderly at local level can expedite scale-up that makes a global difference.

Business and economics

The Role of Macro Economic Variables in Energy and Environmental Modeling: Econometric Evidence from Asian countries

Zeeshan Arshad, Margarita Robaina, Anabela Botelho Veloso

Three essays in this dissertation revolve around the area of energy and environment economics, with particular focus on the impact of macro-economic variables on carbon emissions in the South and Southeast Asian economies.

Essay 1 examines the effects of deforestation, economic growth, and urbanization on carbon dioxide (CO2) emissions levels in the South and Southeast Asian (SSEA) regions for the 1990–2014 period. our results suggest that deforestation and urbanization can aggravate environmental pollution in these regions and can further affect sustainable development in the long run. Besides, the most appropriate and cost-effective method to minimize CO2 emissions is found to be through the improvement of forest activities.

Essay 2 estimates the effect of ICT, trade, economic growth, financial development, and energy consumption on carbon emissions within the South and Southeast Asian regions for the period of 1990-2014. Cluster analysis was used to identify two groups (potential and advanced countries, based on their social development score). Results revealed that the use of financial development and ICT deteriorated the environment quality in the SSEA region. the increasing use of standby mode and Wi-Fi assistive devices, the rapid implementation of legislation regulating these technologies to make them more efficient is recommended.

Essay 3 determine the role of economic growth, renewable energy consumption, non-renewable energy, and natural resources in carbon emissions over the period of 1990-2014. The outcomes show that non-renewable and renewable energy consumption increase economic activities. Besides, natural resources impede the economic growth in the SSEA regions. Furthermore, results demonstrated that non-renewable and economic growth, increase CO2 emissions, whereas, renewable energy consumption lessens the carbon emissions. However, natural resources also contributed to CO2 emissions in the case of South Asian and full countries panels while improved the environmental quality in the Southeast Asian region. Findings suggested that the better use of natural resources, government special attention to education and decrease unlawful activities improve the economic growth in the selected studied areas.

Business and economics

Chemical engineering

Combining bioremediation with extraction for the recovery of metals from acid mine drainage

Ana Carreira, João A. P. Coutinho, Eduarda Pereira

Industrialization, urbanization and overall anthropogenic activities lead to the overexploitation of heavy metals, resulting in metal scarcity and price inflation. Consequently, there is an urgent need for novel and cost-effective methodologies to recover metals from secondary sources. This project aims to develop a sustainable and integrative methodology for metal's recovery from wastewaters by combining bioremediation-based on algae with benign liquid-liquid extraction. Bioremediation will allow the preconcentration of metals present in wastewaters while the liquid-liquid extraction will enable their separation and purification. The success of the bioremediation will depend on the type of micro- or macroalgae, pH, initial metal concentration, algae dosage and time of contact. After the bioremediation step it is

necessary to desorb the metals by application of acidic or alkaline solutions. This will afford a concentrated metal-rich solution and regenerate the algae. The regenerated algae can be used for other adsorption-desorption cycles and, at its end of life, it can be used as a fertilizer. As for the metal-rich solution, it will need further processing to enable the metal's reintroduction into the industry. Due to their high tunability, sustainability and demonstrated metal affinity, ionic liquids and hydrophobic eutectic solvents are suitable alternative solvents for metal's extraction. Using ionic liquids into (acidic) aqueous biphasic systems or forming biphasic systems with hydrophobic eutectic solvents are promising approaches for the separation of metals. This step needs to be optimized by adjusting the system composition, designing task-specific ionic liquids or hydrophobic eutectic solvents and evaluating the pH and temperature effect on the extraction of metals. If successfully designed, the liquid-liquid extraction step will allow the separation of metals into its two different phases. To recover the metals from the phases of the system it is possible to apply electrodeposition, back-extraction, co-precipitation or similar techniques. This will also enable the regeneration of the ionic liquid or the hydrophobic eutectic solvent.

Chemical engineering

Magnetic-responsive aqueous biphasic systems as alternative pre-treatment strategies of biological fluids

Ana Rufino, Mara G. Freire, João A. P. Coutinho

This PhD thesis aims the development of magnetic-responsive aqueous biphasic systems (ABS) able to act as pre-treatment strategies of biological fluids. ABS is a liquid-liquid biocompatible separation strategy, its major component being water, and which has a low cost associated. The fact that there are systems responsive to stimuli leads to increased advantages in the use of these as a separation technique, and the stimuli can be the temperature and the pH. These stimuli are being tested in IL-based ABS to soon be developed systems that respond to the stimuli of the magnetic field to the development of magnetic-responsive ABS as alternative and efficient pre-treatment strategies of human serum samples from prostate cancer patients to improve diagnosis and prognosis.

Chemical engineering

Measurment and computer simulation of diffusivities and polymer-solvent partition coefficients in supercritical fluids & liquids

Bruno Zêzere, Carlos Manuel Silva, José R. B. Gomes

Agroforestry and fishery residues are important sources of bioactive compounds like astaxanthin, squalene and quercetin. These molecules have well-established biological activities and high added-value, which raises their interest under the biorefinery concept. In order to obtain such compounds, a rigorous design of extraction processes and equipment is necessary, which requires equilibrium and transport properties, such as tracer diffusivities (D12). This work aims to determine D12 of said compounds in green solvents such as supercritical CO2 (SC-CO2), pure or modified with a cosolvent (e.g., ethanol and ethyl acetate), by two approaches: (i) modified chromatographic Taylor-Aris technique, and (ii) classical molecular dynamics (MD) simulations.

So far within the scope of this PhD, the D12 of quercetin, squalene and astaxanthin in ethyl acetate and of quercetin in ethanol have been experimentally measured. Regarding the MD simulations, a computational strategy for the calculation of D12 is under developement. Finally, since the phenomenological modelling is another target, an extension of the Tracer Liu-Silva-Macedo model has been successfully devised to multicomponent diffusion coefficients (D1,m).

Chemical engineering

Integrative platforms for the recovery of intracellular carotenoids from R. glutinis cells using alternative solvents

Cassamo U. Mussagy, Jorge F.B Pereira, João A.P. Coutinho

Carotenoids are natural pigments synthesized by plants and microorganisms widely applied in food, cosmetic, and pharmaceutical products. Besides their use as coloring agents, these pigments are also applied to prevent health diseases (e.g. cancer, macular degradation and cataracts). These naturally pigments are usually obtained in the intracellular microorganisms' environment, requiring adequate downstream processing technologies for their recovery. An alternative and more sustainable technology for the extraction and purification of intracellular carotenoids from R. glutinis yeast cells by using ionic liquids (ILs) and biosolvents was herein proposed. It was observed that concentrated aqueous solutions of hexanoate-based ILs (at 90% v/v) and ethyl acetate/ethanol/water mixtures are the most effective in the release of intracellular carotenoids from a cell suspension (0.2 g/mL). The environmental sustainability and recyclability of the processes was

demonstrated, by integrating the cell-disruption stage with subsequent three-phase partitioning unit, for the solvents recycling and pure carotenoids polishing. The biosolvents and IL-based solutions were recycled for three consecutive cell-disruption stages, maintaining high carotenoids extraction yields. This work shows the potential of biosolvents and IL-based platforms as alternatives for the extraction of biologically active molecules, at mild and accessible conditions.

Chemical engineering

Study on the improvement of reactive washing of cork stoppers

Diana Branco, Dmitry V. Evtyugin, Luís Cabrita

Cork is an external bark extracted from cork oak tree (Quercus suber L.) and has unique properties such as low density, low permeability to liquids and gases, ability to adhere to a glass surface, compressibility, resilience, elasticity, chemical inertness and resistance to microbial growth that promotes its use as stoppers for wine bottling. Nearly 49% of world cork production is concentrated in Portugal, largely contributing to the national economy. On the long way from oak bark to wine stoppers, cork material has to pass through several industrial steps, where the reactive washing plays an important role in disinfection and appearance of the final product in terms of color homogeneity and brightness. This PhD project focuses in the study of the stopper´s washing process, more specifically on the optimization of reactive washing currently in use by reducing the reagents consumption, the process time and by implementation of alternative bleaching reagents, in order to achieve better visual appearance, color uniformity and technical performance of the final stoppers. In this way, it is necessary to evaluate the changes in the surface chemical composition of the cork stoppers during the reactive washing and to find solutions how to diminish the negative effect of this technological operation on the surface properties of stoppers. These objectives presume the installation of a laboratory-scale reactor to perform the washing trials, the development of a methodology to analyze the ISO brightness of the stoppers and the surface evaluation of cork stoppers before and after washing process employing surface imaging analysis by SEM-EDS and AFM, FTIR-ATR, UV-Vis reflectance spectroscopy and surface energy analysis using contact angle measurements with different liquid probes.

Chemical engineering

Boosting Biorefinery: Eutectic mixtures as alternative solvents in the extraction and processing of polysaccharides

Eduarda Morais, Prof. Dr. Armando J. D. Silvestre, Dra. Mara G. Freire, Dra. Carmen S. R. Freire

Deep eutectic solvents (DES) are a new class of low-cost bio-based and renewable solvents, seen as greener alternatives to the conventional solvents used in chemical processes due to their simplicity of preparation, unique physicochemical properties, negligible toxicity and high biodegradability. DES emerged recently as one of the most promising classes of solvents for biomass fractionation, in a fully sustainable bio-based economy. Nevertheless, biomass fractionation using DES is still largely underexplored and clearly poorly understood in what concerns the macromolecular components of biomass. Therefore, this PhD aims at using DES for the extraction and transformation of several abundant and economically relevant polysaccharides from biomass (viz cellulose, hemicelluloses and starch), by selecting adequate DES, by optimizing the process conditions aiming at maximising extraction yield and selectivity, and by designing prospective applications for the obtained polysaccharide-based fractions towards the implementation of an integrated Biorefinery framework.

Chemical engineering

Building Better Wrong Models for the Oil & Gas Industry

Emanuel Crespo, João A. P. Coutinho; Germán Pérez-Sánchez

Thermodynamic models provide vital information for the accurate design, simulation, and economical evaluation of industrial processes.

Therefore, this Ph. D. project aims at the development and/or improvement of the thermodynamic models used to describe ethylene oxide-containing compounds that are relevant for the Oil & Gas industry.

The main goal is to increase the transferability and predictive ability of the current models by taking advantage of chemical similarities between the compounds of interest, decreasing the need for extensive time-consuming and costly experimental measurements.

By complementing the thermophysical properties and phase diagrams obtained through advanced molecular-based equations of state, derived from the SAFT theory, with the results obtained from Molecular Dynamics simulations, not only a wide range of properties can be obtained, as a deeper understanding of the system's behavior can be provided.

Chemical engineering

Towards the development of cost-effective downstream processes for monoclonal antibodies

Emanuel V. Capela, Mara G. Freire, João A.P. Coutinho, Ana M. Azevedo

Monoclonal antibodies (mAbs) have an increasing therapeutic role for the treatment of several diseases, being in some cases the only available therapy for a particular disorder. The upstream processing of mAbs suffered several improvements in recent years, being now the downstream processing the limiting stage of mAbs manufacturing. In fact, this step is currently extremely expensive, contributing for the downstream processing to cover up to 80% of the mAbs global production costs. Ionic-liquid-based aqueous biphasic systems (IL-based ABS) may be considered as promising alternatives for such purpose, once they were already reported successfully for the extraction and purification of several (bio)molecules. During this PhD thesis, novel ABS constituted by biocompatible ILs are being developed as sustainable alternative strategies in the downstream processing of mAbs, contributing for their widespread use for therapeutic purposes in the near future.

Chemical engineering

Unveiling the potentialities of eutectic solvents for Kraft lignin valorization

Filipe H. B. Sosa, Mariana C. da Costa, André M. da Costa Lopes, João A. P. Coutinho

The aromatic character of lignin has been stimulated interest in its exploration for the development of value-added products with a wide range of applications, such as fuels, concrete additives, resins, among others. However, the lack of efficient and environmentally safe solvents for lignin solubilization is preventing the successful development of most of these applications. A promising approach to the dissolution of this macromolecule is the use of eutectic solvents (ES). This study seeks to understand the use of ES in the valorization of lignocellulosic biomass. The literature shows advantages of applying ES and their aqueous solutions as cheaper solvents in the delignification of biomass and lignin valorization, in contrast to ionic liquids and other organic solvents. The results obtained aim to understand the potential of ES to dissolve lignocellulosic biomass fractions, the solubility of Kraft lignin in aqueous solutions of ES, and also to check possible structural changes in the lignin molecule after solubilization. The ES potential for lignin depolymerization will also be evaluated and the lignin solubility data will be compared with results obtained using the COSMO-RS model.

Chemical engineering

Integrated recovery processes for high-value bioactive compounds from agroforest by-products using ionic liquids

Inês Cardoso, Mara G. Freire, Armando J. D. Silvestre

The recovery of high-value bioactive compounds (HVBCs) from agroforest by-products is nowadays a topic of high priority within the Biorefinery (and ultimately within the circular economy) context. To this end, the development of sustainable recovery processes of HVBCs, suitable of industrial implementation, is in crucial demand according to the United Nations Sustainable Development Goals. This thesis addresses the creation of integrated extraction and recovery processes of HVBCs, namely phenolic compounds (PCs) and triterpenic acids (TTAs) in a sequential approach, from agroforest by-products using aqueous solutions of bio-based ionic liquids (ILs). The extract-IL-rich aqueous solutions will be used in the formation of aqueous biphasic systems to purify HVBCs, and applied in centrifugal partition chromatography to appraise the technology scale-up. Due to the expected ILs negligible cytotoxicity they can be combined with HVBCs extracts, thus overwhelming the HVBCs-ILs separation step, and directly used in a broad range of applications.

Chemical engineering

Study of the acid sulphite process for the production of dissolving pulp

Inês Mendes, Dmitry Evtyugin, António Prates

Dissolving pulp is a type of bleached chemical pulp, used as a raw material in the production of added value products, related to chemical processing for the production of viscose fibers, cellophane, cellulose ethers and esters, among others. This type of pulp can be produced either by the acid sulphite process or by the pre-hydrolysis kraft process, being characterized by the high content of α-cellulose and, also, by the low content of lignin and hemicelluloses. Bearing in mind that each application of the dissolving pulp requires different contents of α-cellulose, knowledge of the process is imperative to obtain a pulp with the desired quality. In this context, the present PhD has as main

objectives (1) the optimization of an industrial process for dissolving pulp production and (2) the determination of the reaction kinetics of the same process.

Chemical engineering

Advanced and innovative simulated moving bed strategy for the isolation of ternary mixtures of triterpenic acids

Ivo Azenha, Carlos Manuel Silva, Adélio Mendes

Betulinic, oleanolic and ursolic acids are ubiquitous compounds with multiple recognized biological activities. Nonetheless, their simultaneous occurrence and similar structures make their separation very challenging. Accordingly, in this PhD work the isolation of betulinic, oleanolic and ursolic acids by simulated moving bed (SMB) chromatography is addressed. In this short presentation, an assembled laboratorial SMB is presented and the whole work devoted to the selection of suitable stationary and mobile phases as well as modeling of different preparative chromatographic processes are briefly discussed.

Chemical engineering

Bioplastics production from coffee waste

Joana Pereira, Prof. Luísa Serafim, Prof. Paulo Lemos

Spent coffee grounds (SCGs) are residues generated by the coffee industry. With a high content in lipids and sugars, SCGs are a potential substrate for many added-value products. Polyhydroxyalkanoates (PHAs) stand out as possible products from SCGs due to their biodegradability and similar properties to traditional plastics. They can be produced from complex carbon sources by mixed microbial cultures (MMC), which combined can lead to the reduction of production costs. In this work, a three-step production system is applied. In the first step, SCGs were submitted to acidogenic fermentation to produce short-chain organic acids (SCOA). Different reactor configurations and operational conditions are being tested, as well as potential pretreatment options, to optimize the process. The second step is the selection of a PHA-accumulating culture using the acidified stream supplemented with SCOA. Finally, in the last step, batch accumulations to maximise PHAs production will be conducted and the produced polymer characterized.

Chemical engineering

Extraction of biocompounds from rosemary leaves: experimental and computational approach

José Pedro Wojeicchowski, João A.P. Coutinho, Marcos R. Mafra

There is an increase interest for alternatives to synthetic additives for food application, such as natural antioxidants. So, there are many challenges regarding the extraction of biocompounds from natural sources for food application. One of these is the choice of the best solvent, that must be aligned to the green chemistry principles. In this scenario, Rosmarinus officinalis L. is a potential source of industrial interest. But their applications demand a compatible solvent, able to extract their bioactive compounds. Here we proposed an experimental and computational approach to help in this process, based on COSMO-RS calculation. This methodology evaluates the interaction between solvent and solute and can indicate the most promisor solvents.

Chemical engineering

Natural Deep Eutectic Solvents as an efficient media for the fractionation of bleached kraft pulps' hemicelluloses and cellulose

José Silva, Doutor Armando J. D. Silvestre, Doutora Mara G. Freire, Doutora Carmen Freire

The fractionation of lignocellulosic biomass is a topic of high priority within the biorefinery and circular economy context, since this is the most abundant resource of renewable feedstocks, with an approximate worldwide production of 181.5 billion tons per year. In this framework, the development of cost-effective and sustainable solvent technologies, suitable for industrial implementation, play a significant role. This work addresses the development of extraction and recovery of cellulose and hemicelluloses in an integrated and sequential approach from products of the pulp and paper industry, namely bleached kraft pulps, using natural deep eutectic solvents (NADES). The use of promising NADES as the extraction media will allow the recovery of valuable compounds with safer, less toxic and cheaper solvents by

the industry. In this work, the recovery conditions from the desired products will also be investigated, followed by studies on the NADES recovery and reuse in new extraction-purification steps.

Chemical engineering

Breaking Bad Gas Emissions

Liliana Silva, Prof. João A. P. Coutinho / Dr. Pedro J. Carvalho

Aiming at reducing greenhouse gas emissions and average global temperature, mainly by lowering CO2 releases and ultimately its concentration in the atmosphere, innovative post-combustion technologies for CO2 capture are indispensable on the vision of a clean energy production. In this context, this work aims to develop a viable separation process, based on a gas-liquid membrane contactor coupled with a non-volatile solvent, to be tested in quasi-real conditions and evaluate it for real selectivity, loss of performance, life-cycle and impact of impurities. One of the main features in this process is the correct selection of the solvent, which should have properties such as low vapor pressure, cost, and viscosity while being capable of chemical reaction with CO2. To improve the solvent performance, the combination of different classes of solvents are proposed. These solvents will be used in gas solubility measurements and permeation studies aiming at identifying the most promising solvents in order to create a unique approach for gas/separation by developing a compact, low weight and cost-efficient capture/separation process based on membrane contactor technology.

Chemical engineering

Nanoparticles to improve mechanical properties of nanocomposites

Luiza Lima, J. Martinho M. Oliveira; Tito Trindade

Graphene-based materials (GBM) have attracted high interest from the automotive industry due to possible improvements in the physicochemical properties of common polymers, such as thermoplastic polymer blends (TPB). The improvement in mechanical performance, together with the possibility of reducing the weight of the automobile body, make GBM/TPB nanocomposites a new class of materials for the automotive industry. However, the properties and performance of these nanocomposites depend on factors such as: quality of the nanoparticles and the type of physicochemical interactions between the phases. This project aims to investigate and develop nanocomposites using commercial GBM and TPB (currently used in the automotive industry), with a view to application of this technology in car body parts.

Chemical engineering

New approach for lung cancer early diagnosis

Marguerita Rosa, Mara G. Freire; João A.P. Coutinho

Lung cancer is one of the deadliest types, usually only detected at later stages. The identification and accurate quantification of lung cancer biomarkers, such as CYFRA 21-1 and pentraxin-3 (PTX3) in human serum, is thus crucial for early-stage diagnosis, being also valuable in the patient's follow-up. Nevertheless, the identification and quantification of cancer biomarkers, which correspond to low-abundance proteins in serum samples, suffer from major interferences and are often masked by high-abundance proteins, leading to false diagnostics. It is therefore of high relevance to develop effective pretreatment techniques of biological fluids aiming the selective removal of high-abundance proteins. This work plan aims the use of aqueous biphasic system (ABS) composed of ionic liquids (ILs) as alternative and efficient pretreatment strategies of human serum samples from lung cancer patients, by taking advantage of the three-phase partitioning (TPP) approach to remove high-abundance proteins, in order to improve diagnosis and prognosis.

Chemical engineering

Extraction of bacteriorhodopsin from Halobacterium salinarum

Mariam Kholany, Prof. Sónia Ventura, Prof. João Coutinho

Nature has an outstanding capacity to efficiently harvest light. It has inspired us on a biomimetic application of natural pigments as optically active centres in luminescent solar concentrators, to improve the devices absorption and emission properties.

Halobacterium salinarum has currently been the new focus of this thesis as it is one of the major natural producers of bacteriorhodopsin. This pigment is a photon-pump transmembrane protein, with great foreseen applications in the photo-optical field.

The goal is to extract and purify the pigment from H. salinarum by applying aqueous biphasic systems based on novel solvents. The scale up of the process will be pursued. Aqueous extracts rich on pigment (raw or purified) will be used for the development of more efficient LSCs, in the framework of project SusPhotoSolutions.

Chemical engineering

Development of Ionic-Liquid-based Devices for the Removal of Cytostatic Drugs from Urine Excreted by Cancer Patients

Rafael Francisco, Mara G. Freire, Ana C. A. Sousa, Márcia C. Neves

Cytostatics are one of the most used therapeutic options in the treatment of cancer. However, these drugs are toxic, so their handling and elimination are sources of risk. With advances in oral procedures, chemotherapy can be complemented and/or replaced by treatments in the home environment, where excretion of cytostatics, which occurs through urine, can lead to contamination of surface water, since urine flows into the sewage system, reaching wastewater treatment plants that are unable to remove this type of compounds.

Given the potential shown by Ionic Liquids (ILs) to remove aqueous drugs, materials will be prepared using Supported Ionic Liquids (SILs). These SILs will be incorporated into a device to be used by cancer patients when urinating. After saturation, cytostatics will be removed and treated, and the SILs/device will be recycled.

Chemical engineering

Extraction of tannins from wine by-products using eutectic solvents

Rodrigo Neto, Armando Silvestre, Joana Oliveira, Sónia Santos

Modern lifestyle is dependent on the low prices of food goods and easiness of access to them which is only possible due to the high global agricultural production that was able to be achieved. This in turn leads to large amounts of by-products that have important contents of compounds with good properties for industrial applications.

One example of such are tannins which are polymers of catechin and its derivatives that are usually extracted from Quebracho heartwood but are also present in most plants, often in parts that are generally not consumed such as fruit skins and wood barks.

Tannin extracts usage is expected to substantially increase in the coming decades due to their application in leather, wood agglomerates, and wine and therefore more sustainable sources must be found in order to suppress these needs.

With my PhD I will be exploring the application of eutectic solvents (ESs) in the extraction and purification process of tannins from wine by-products with the objective of increasing the global tannin production without a significant impact on natural resources consumption.

Up until this moment it was possible to screen several ESs and to choose as the most suitable candidate a mixture of choline chloride and glycerol with the effect of adding water and ethanol also being explored. The total extraction yield was improved by 45% when compared to conventional extraction and further improvements can be expected.

Chemical engineering

New polymeric formulations from lignosulphonates

Sandra Magina, Dmitry Evtyugin, Ana Barros-Timmons

Lignosulphonates (LS) are by-products derived from lignin present in the sulphite spent liquor (SSL) obtained during the wood sulphite pulping process. SSL is mostly burned for energy production and recovery of the inorganic base and SO2. The valorization of LS represents a significant profit margin for cellulosic pulp companies being a challenge in the context of biorefinery and circular economy. LS from the magnesium-based acidic sulfite pulping of Eucalyptus globulus wood is the least studied for polymeric applications. Therefore, this doctoral project aims to develop new materials from these eucalypt LS for different applications. Specifically, the goal is to develop LS-based formulations for concrete (substitution of petroleum-based superplasticizers), adhesives (without formaldehyde) to be applied in biocomposites and replace the current ones of petroleum origin and containing formaldehyde. Additionally other polymeric formulations, namely conducting polymeric membranes are being explored and evaluated for potential in electronic devices such as solar cells and sensors.

Potential of Bleached Eucalypt Kraft Pulp for New Non-Papermaking Applications

Sofia M. Rebola, Micaela Santos, Leonor Margalho / Sofia Reis Jorge, Dmitry Evtuguin

Fluff pulp is used worldwide in the absorbent core of personal care products such as baby diapers, adult incontinence products, feminine hygiene products and air laid non-woven. Generally, fluff pulps are typically made from long fibered softwoods, namely loblolly pine. The long and bulky fibres are perfectly suited for making highly absorbent products that effectively distribute liquids and provide high pad integrity. In this study, it was evaluated the properties and characteristics of fluff pulp produced from hardwood bleached kraft pulp (HBKP) and compared with two commercial softwood bleached kraft pulp (SBKP) with enhanced fluff pulp properties. The Iberian Eucalyptus globulus wood chips were digested at constant temperature and time but with different active alkali charges (AA) 16%, 19%, 21% and 23%. The brownstock pulp were delignified with oxygen and bleached using an elemental chlorine free (ECF) sequence with the bleaching agents chlorine dioxide and hydrogen peroxide. Lab handsheets (approx. 600 g/m2) were prepared from the never dried bleached pulp and defibrated in a pilot scale hammermill at different intensities (rpm). It was found low knot contents (< 30%) at defibration intensity higher than 3000 rpm. Furthermore, pulps with high mechanical properties (strength and burst index) promoted the presence of knot and require higher defibration intensity. The network strength was enhanced with kinked and curly fibres. Regarding the absorption properties, HBKP fluff showed good absorption capacity improved by the presence of carboxylic acid groups and the hemicelluloses removal. The widths for the cellulose fibrils and fibril aggregates were estimated via spectral fitting at the C4 region in the CP-MAS 13C NMR spectra and no significant differences were found in the studied hardwood kraft pulps.

Chemical engineering

Chemistry

Metabolomics of an endocrine-related breast cancer mouse model

Ana Rita Araújo Silva, Luisa Helguero, Ana M. Gil

Breast cancer (BC) is the most common and deadliest type of cancer in women, corresponding to ca. 1 in 4 of all new cancer cases in women worldwide. In most cases, breast tumors are hormone-dependent (HD) which means that they rely on steroid hormones (estrogens and progestins) to activate intracellular receptors and stimulate tumor growth [1]. Antagonist therapy directly aimed at hormone receptors is the primary treatment strategy, however, about half of the subjects, in time develop resistance [2]. It is known that the corresponding process involves the development of hormone independent (HI) tumor growth, initially therapy-responsive and, subsequently becoming resistant (HIR). The mechanisms that promote HI and HIR are varied, and not completely understood. Specifically, the metabolic remodeling that results from activation of HI and HIR mechanisms remains mostly undisclosed. Exploring tumor and organ metabolome is the be the best way to reveal changes in metabolism and my thesis project aims to apply metabolomic strategies to identify the metabolic characteristics of the progression from HD to HI, and then to HIR tumors, in order to understand the process of resistance to endocrine therapy and identify metabolic markers potentially useful to predict therapy response and define tumor prognosis.

Tumor tissue, serum and multiple organ samples of mice implanted with HD, HI and HIR tumors have been obtained from the medroxyprogesterone acetate (MPA)-breast cancer mouse model [3]. This model has been refined to evolve through the three stages of hormone dependence and responsiveness to endocrine treatment and was analyzed by nuclear magnetic resonance (NMR) metabolomics for the first time. Mammary carcinomas samples will allow us to characterize tumor tissue, address intra- and inter-tumoral heterogeneity and determine specific progression stage biomarkers obtained by 1H-NMR metabolomics together with other biochemical information. Samples of lung, spleen, liver and serum will be analyzed for metastization biomarkers detection and systemic effects of the disease. Furthermore, analysis of serum metabolites represents an important approach for early detection of treatment resistance.

We have observed that, compared to healthy tissue, all tumors showed the expected low glucose and high lactate levels (Warburg effect), as well as many other changes (for instance in amino acids, choline compounds, nucleotides). Multivariate analysis revealed very clear separation between all three groups of tumors. Principal component analysis (PCA) and Partial least squares-discriminant analysis (PLS-DA) scatter plots show robust separation between the HI and HD tumor and between HIR and HI tumors. We have observed that acquisition of independence reflects tumoral glycolytic enhancement and changes in cell biosynthesis and cell proliferation and in nucleotide biosynthesis, while changes in resistant tumors were mostly related to amino acid metabolism, glycosylation mechanisms, energetic metabolism and oxidative stress.

The observed distinguishing metabolic signatures of HD, HI and HIR tumors may be the basis for the definition of biomarkers of endocrine-related breast tumors at different stages of progression and will also provide information for future studies of metabolic pathways activated during BC progression.

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Chemistry

Valorization of industrial wastes as adsorbents for remediation of contaminated water with pharmaceuticals: chemical activation and modification

Guilaine Jaria, Valdemar Inocêncio Esteves, Vânia Maria Amaro Calisto, Marta Otero

Sustainable development involves the implementation of strategies to reduce, reuse and recycle industrial residues and to treat wastewater effluents efficiently. With the increase of the population, the management of residues must prioritize their valorization as raw materials in a circular economy perspective. Another important environmental challenge is the treatment of wastewater contaminated by pharmaceuticals, whose levels have been increasing in the environment. Hence, and since adsorption by activated carbon is a well-established and efficient process for water and wastewater treatment, this work focuses on the production of this type of adsorbent using paper mill sludge as precursor, and its application in the removal of pharmaceuticals from water. The use of these residues from the paper industry may be relevant for decreasing economic costs associated to the production of activated carbons, also contributing for their sustainable management.

Chemistry

Poring over Pores for Carbon Dioxide Capture

João Pereira, Luís Monteiro Mafra, Snorri Thor Sigurdsson

Carbon Dioxide Capture technologies are evolving fast but still the only methods widely practical at an industrial scale are still based on decades old liquid amine scrubbing technology. Porous solid materials are among the most promising materials to replace these but face specific issues: capacity and recyclability. With my project I face the specific challenges in characterising the transformation mechanisms within these materials upon CO2 adsorption and their degradation, namely using labelling strategies with ssNMR and DNP-NMR.

Chemistry

Metabolomics-driven discovery of immunometabolic dysregulations and therapeutic targets in atherosclerosis

Luís Mendes, Iola Duarte, Artur Silva, John Jones

Atherosclerotic cardiovascular disease (ASCVD) is a major cause of mortality and morbidity in the world, calling for additional risk refinement and therapeutic strategies. Low-grade chronic inflammation of arterial walls underlies plaque progression and destabilization, leading to life-threatening acute events like myocardial infarction and stroke. Persistent hyperactivation of innate immune cells (monocytes/macrophages) by circulating atherogenic compounds (such as oxidized lipids) has been linked to non-resolving inflammation in atherosclerosis. Recent findings suggest this activation to be critically dependent on intracellular metabolism, with monocytes/macrophages undergoing metabolic reprogramming to support different effector functions. In this work, we aim to expand and clarify the picture of metabolic dysregulations in pro-atherosclerotic monocytes/macrophages, while exploring the potential of metabolic immunomodulation to prevent/treat ASCVD. Our central approach to achieve that goal consists of using NMR metabolomics and metabolic flux analysis to reveal altered metabolites and metabolic pathways upon monocyte/macrophage pro-atherogenic stimulation. Our first results show extensive metabolic rewiring of human THP-1-derived macrophages incubated with 7-ketocholesterol. We will proceed to further investigate the metabolic pathways/enzymes involved in this response and to assess the functional consequences of their modulation, mainly using natural plant-derived small molecules.

Chemistry

Hybrid nanostructures of graphene materials and polyoxometalate clusters for photodriven applications

Maria João Martins, Helena Nogueira, Tito Trindade

In recent years, the chemical modification of graphene has been largely explored in order to obtain new properties. Several graphene based materials have shown unique thermal, electric, mechanical and optical properties. However, the preparation of luminescent graphene materials remains poorly studied.

The extraordinary properties of polyoxometalates clusters (POMs) have led to a wide spectrum of applications in areas such as electrochemistry, photochemistry, energy storage and catalysis. The inclusion of lanthanide ions (Ln3+) in POMs (LnPOMs) has been widely explored with potential applications in optical materials, single molecular magnets and catalysis[1].

This research aims to prepare a new type of hybrid nanomaterials based on LnPOMs clusters supported in graphene for photodriven applications. The incorporation of LnPOMs in graphene may originate a luminescent behavior due to the presence of the LnPOMs, with a new set of properties resulting from a synergistic effect by the two components.

In this work, we have performed the incorporation of LnPOM in reduced graphene oxide (rGO) obtained by GO functionalization with ionic-liquid cations. Photoluminescent studies were performed for the LnPOM and for the hybrid nanomaterial showing different excitation spectra, with both materials showing the typical Eu3+ 5D0 → 7Fn emission.

Chemistry

Small organic fluorophores. Structure – property correlation of solid emissive compounds

Patrícia Vaz, Artur Silva, João Rocha, Samuel Guieu

Luminescent small organic chromophores, in particular fluoroborates complexes, have attracted significant attention in recent years due to their potential optoelectronic and biological applications. Solid-emissive dyes are scarce because most of them suffer a self-quenching in concentrated solution or in solid state. An elegant approach to improve the luminescence in solid state relies on the aggregation-induced emission enhancement (AIEE) effect, where chromophores which are poorly emissive in dilute solution become highly fluorescent or phosphorescent in the solid state. Based on many theoretical and experimental studies, the restriction of intramolecular rotations has been proposed as the main cause of enhanced emission for these solid emitters. In the search of all-organic luminophores efficient in solid state, halogen bonding (XB) that promotes inter-system crossing through the heavy atom effect, and thus induces phosphorescence, has emerged as an important factor.

Combining XB, AIEE effect and structural modifications in some fluoroborate complexes to minimize the effects of intramolecular rotations in solid state has been our strategy to develop new luminescent small organic dyes as promising blue-emitting materials. We synthetized and studied different families of organic dyes (chalcone, benzophenone and benzimidazole derivatives) decorated with halogen atoms as wells as fluoroborates complexes with structural features to produce blue-emitting materials. The boron complexation, the study of occurrence of XB, the complementarity or competition with hydrogen bonding, their importance for the organization of the compounds in the crystal packing and their influence on the luminescent properties allowed us to develop new fluoroborates of pure blue color in the solid state. This work contributes to the development of new light emitters starting from simple and small organic molecules.

Chemistry

Natural biosorbents for contaminated water treatment

Paula Figueira, Eduarda Pereira, Carlos Vale

The increasing of human population and industrialization has led to an excessive demand for different natural resources resulting in a dramatic pressure on global ecosystems. Metal contamination is one of the worldwide major concerns since these contaminants are toxic even at low concentrations, as also as they are non-degradable and therefore tend to accumulate in rivers, lakes and oceans, disrupting aquatic life and ultimately cause negative effects in human health.

Thus, it is crucial to find effective ways to protect ecosystems by reducing the levels of potentially toxic elements in waters, which means to reduce the release of these contaminants into aquatic systems, protecting water quality. Also, it is important to adopt a water recycling and reuse mentality, reducing the excessive exploration of this natural resource. Several techniques have been employed in the field of water

decontamination but the majority of them have some drawbacks, such as high costs, high volumes of sludges, that do not fulfill with the increasingly strict criteria imposed by the legislation.

This work intends to propose an alternative water treatment solution with lower costs than conventional methods, enabling to achieve a considerable improvement in water quality, in an environmentally friendly way, and allowing the further reuse of the treated water.

Chemistry

Covalent Organic Frameworks as adsorbents to capture hazardous compounds from water

Soraia Fernandes, Artur Silva, Begoña Espiña, Laura Salonen

Water contamination is a serious worldwide problem that endangers both the environment and human health. Despite the wide variety of organic contaminants found in water, new emerging contaminants (ECs) have been legislated and classified as priority hazardous substances. The EC group include pharmaceuticals. In addition, frequently some groups of biotoxins have been found in water raising concerns about their potential negative effects.

Among the wide variety of techniques already reported for the extraction of contaminants from water and wastewater, sorption appear as the most promising, owing to their simplicity, low cost, and possibility of reuse of the adsorbent selected.

Covalent organic frameworks (COFs) [10,11] are fully organic, crystalline nanoporous materials, which feature large surface areas, tunable pore size and functionality, and high thermal and chemical stability. Recently, COFs have raised increasing interest for the extraction of different organic contaminants from water [12–14] such as biotoxins [15,16], perfluoroalkyl compounds [17], polycyclic aromatic hydrocarbons (PAHs) [18], and pharmaceutical pollutants [19–21].

Have this into account, during my PhD, COFs have been used to extract pharmaceutical compounds and, even, biotoxins from water. Different studies have been performed with focus on the study of the interactions involved on the adsorption of the different contaminants by COFs, as well the possibility of its application in environmental field.

Chemistry

Civil engineering

Energy performance and thermal comfort of residential Lightweight Steel-Framed buildings (LSF): challenges and enhancement strategies

Eduardo Roque, Romeu S. Vicente, Ricardo M.S.F Almeida

Historically, the southern European residential architecture has been based on the heavyweight constructive system. However, alternative, more industrialised, constructive systems have been emerging and proliferating. Catalysed by its advantages, the Light Steel Framing (LSF) system is an example of this growing trend. Regardless of the proliferation of LSF buildings, there is a shortage in research work oriented to the experimental comparison between these buildings and the current concrete and masonry buildings, in terms of indoor thermal environment and thermal comfort.

The present work intends to focus on this research gap by characterising and comparing the passive performance of these two constructive systems located in a warm-summer Mediterranean climate. In order to achieve this goal, an experimental campaign was adopted involving the design, construction and monitoring of two identical experimental cells, side by side, differing only on the constructive system. The cells will be monitored for a period of twelve consecutive months, including all the four seasons.

This work aims to contribute not only to a better understanding of LSF buildings but also to improve their energy performance and interior thermal environment. Several constructive designs, materials and operational strategies will be considered. The final goal of this study is to provide design and construction guidelines for improving the energy performance and indoor thermal comfort of LSF buildings in the Mediterranean climate zone.

Civil engineering

Fire design of tapered steel members

Élio Maia, Paulo Vila Real, Nuno Lopes, Carlos Couto

Non-uniform (tapered) steel members are widely used in steel construction due to their structural efficiency as material savings can be achieved by optimizing member geometry to withstand non-uniform loads.

At normal temperature, the out-of-plane stability check of non-uniform members should be performed using the General Method (GM), as the variation in member geometry precludes the use of the usual stability verification clauses. However, the existing fire design methods of Part 1-2 of Eurocode 3 (EC3) are limited to uniform members and no specific rules are provided for their non-uniform counterparts.

This research effort describes a numerical/parametric investigation on the stability of tapered steel members using software SAFIR to perform GMNIA (Geometrically and Materially Non-linear Analyses with Imperfections) calculations. This numerical framework will be the foundation for the development of new straightforward procedures for the fire design of non-uniform (tapered) steel members on a consistent derivation of the buckling phenomena according to the Ayrton–Perry formulation. The simplified procedures to be developed aim to be consistent with the current fire design principles of the Eurocode 3 for prismatic members, with the goal of being considered for inclusion in future editions of this norm.

Civil engineering

Circular economy approach to construction materials incorporating paper & pulp industry wastes

Fábio Simões, Victor Ferreira, Miguel Morais

The construction sector consumes a lot of quantities of raw materials and other resources (water and energy) and, at the same time, these resources are withdrawn on Earth. In addition, there is an increase of wastes production and pollution. The solution for this problem can be to use wastes as alternative raw materials in construction sector or development of competitive circular solutions on construction sector. For example, pulp and paper industry is an intensive consumer and, at the same time, a producer of wastes (approximately 11 million tonnes). In the same way, other sectors consume lots of amounts of natural resources, like the construction sector (approximately 5,4 billion tonnes of raw material consumption. Thus, these sectors (pulp and paper, and construction) can work in symbiosis to create a circular model, where pulp and paper wastes are secondary raw materials to construction sector.

This research involves a literature review on pulp and paper and other wastes used as alternative raw materials in construction products. It also includes a literature review on circular economy and sustainable construction, as well as, a literature review of life cycle analysis on construction materials. The case study involves two demonstrators in the construction materials area (precast concrete and road pavements) to research and confirm the developed solutions at laboratory and real scale. In the end, the sustainability and business models of developed solutions are analysed in order to be framed in the context of circular economy.

This PhD work is being done and supported by H2020 project PAPERCHAIN (Grant Nº730305).

Civil engineering

Geosynthetics for coastal protection: design and long-term performance

Fabrício Galvão, Carlos Coelho

Geotextile-encapsulated sand elements are an alternative solution for coastal defense structures. Some advantages of these structures are the speed and ease of construction, and the lower cost compared to the traditional solutions . However, geosysnthetics application for coastal defense still requires important research and experimental work, mainly related to the stability and durability of the solutions, especially when exposed to energetic wave climates. This three-dimensional systems manufactured from geotextiles (woven and/or nonwoven materials) filled with sand can be regarded as innovative, economics and environment-friendly systems for hydraulic structures along island and coastal waters, where they form an alternative to the use of traditional materials. However, these elements are hardly used for coastal defense works yet. . So, efforts of this research will be concentrated on situations where the geotextile-encapsulated sand elements are directly exposed to the wave climate,, mainly focusing on the structural stability of these elements and their long-term performance. To achieve the main goal, all available design methods for these solutions will be compiled, aiming the potential development of new tools, both in terms of structural performance and material characteristics. A large monitoring campaign of geosysnthetic application in Portugal is being done and experimental works were conducted in a wave channel, at the laboratories of UPC (Universidad Politecnica de Catalunya), evaluating the stability predictions of various design formulations. Those laboratorial tests can also enable the calibration of existing design equations, improving new design proposals.

Civil engineering

Methodology for the seismic assessment of mixed buildings

Gonçalo Lopes, Romeu Vicente, Miguel Azenha, Tiago Ferreira

Mixed unreinforced masonry – reinforced concrete (URM–RC) buildings have revealed to be extremely vulnerable to seismic loads, and the interaction effects from coupling RC structural elements to URM loadbearing walls is still a contentious issue for most of the research community. Considering their constructive complexity, with different structural modifications over time, these URM-RC structures may take advantage of innovative and practical tools for a fast and reliable seismic performance assessment.

The use of Building Information Modelling (BIM) has been changing the paradigm of the Architecture, Engineering and Construction (AEC) industry. Regarding the assessment of existing buildings, one of the applications of BIM with more significant potential concerns the so-called 'reverse engineering', which consists in recreating the existing 'as-built' structure into a BIM model, which can be automatically converted into an accurate 3D numerical model, to be analysed by any commercial structural analysis software, exploiting all the information collected and organised during the survey phase. Then, based on its numerical analysis, it is possible to perform the structural health assessment and, eventually, the design of possible structural retrofit solutions.

This BIM environment will represent the backbone strategy for bridging the research gap associated with a particularly vulnerable structural typology when subjected to seismic loads: the mixed URM–RC buildings.

Civil engineering

Behaviour of Aluminium Structures Under Normal and Fire Conditions

Joaquim Cruz, Nuno Filipe Ferreira Soares Borges Lopes; Paulo Jorge de Melo Matias Faria de Vila Real

Aluminium is more and more used in structural applications. Its thermomechanical characteristics result in a tremendous versatility, leading their combination to a huge range of benefits in terms of structural purposes. Its structures are more sensitive to fire exposition than steel, due to aluminium low density & melting point, and high thermal conductivity. Eurocode 9, the European standard for the design of aluminium structures, is of primary importance to both the design and Construction sectors of the Civil and Building Industries. In this context, the main objective of this work is to investigate the behaviour of aluminium structures under normal and fire conditions, namely evaluate numerically resistance of aluminium structures in both normal and fire conditions, and to compare these numerical results with those (analytical) proposed in both current and upcoming versions of Eurocode 9.

Civil engineering

A promoção da eficiência energética em edificios inteligentes através de uma metodologia baseada em machine learning

Rui Oliveira, Romeu Vicente, Ricardo Almeida, António Figueiredo

The research of new technologies, which can enhance a transition towards smart buildings from user perspective and high-energy efficiency is one of the challenges of the 21st century. Smart buildings are growing fast and the use of "smart things", such as, smart sensors, smart appliances, etc, is becoming widespread. These devices can be connected to each other, providing important inputs for a building energy management system. On the other hand, the importance of the occupants' actions for the often-reported buildings performance gap is well established. Therefore, the incorporation of predictive models in building energy management systems has an enormous potential. The first steps to link real-time monitoring data and user preferences have already been taken and described in the literature. However, the focus is always on the energy performance, relegating thermal comfort.

This work focuses on the development of a predictive "smart algorithm", which couples energy efficiency and thermal comfort, taking into account the users' preferences and habits. The methodology uses data from a real-time monitoring system installed in a case study building and weather forecast data as boundary conditions for building energy simulation.

Civil engineering

Computer engineering

Remote Collaboration using Augmented Reality

Bernardo Marques, Paulo Dias, Beatriz Sousa Santos

AR is starting to be used in remote collaboration to help with unfamiliar incidents that require specific know-how and additional information. Remote users can use AR-based solutions regardless of their localization to guide local users through tasks, providing real-time spatial information, highlighting specific areas, or sharing annotations. Further research needs to be conducted to explore how remote users can interact with local users and how their presence and awareness can be improved. It is important to understand how to increase the sense of collaborative spatial interaction in a shared workspace. But how can AR-based solutions be used most efficiently in remote collaboration? This research project aims to explore remote collaboration using AR-based interfaces. The goal is to propose new methods of interaction and presentation of information. Thus, a generic AR-based collaborative framework must be developed. Another goal is to propose new methods for evaluating AR-based solutions for remote Collaboration.

Computer engineering

Planning for Games

Fernando Duarte, José Nuno Panelas Nunes Lau, Artur José Carneiro Pereira, Luís Paulo Gonçalves dos Reis

Games in general pose interesting and complex problems to the implementation of intelligent agents and have always been a popular domain in the study of Artificial Intelligence. In fact, games have been at the center of some of the most well-known achievements in Artificial Intelligence. Planning and learning, two well-known and successful paradigms of Artificial Intelligence, have greatly contributed to these achievements. Although representing distinct approaches, planning and learning try to solve similar problems and share some similarities. They can even complement each other. This has led to research on methodologies to combine the strengths of both approaches to derive better solutions. The objective of this thesis is to study and implement techniques to integrate planning and learning in order to devise better solutions in the context of videogames.

Computer engineering

Patient Diagnosis Prediction in Multimodal Medical Information

Jorge Miguel Silva, Sérgio Matos, Diogo Pratas.

Preventive healthcare is essential, given the worldwide rise in the prevalence of chronic diseases. A large amount of medical information lays dormant, which can be used to extract relevant information and perform diagnosis prediction. However, medical data is complex, high-dimensional, and heterogeneous. Herein we explain our ongoing research where we aim to use probabilistic-algorithmic information measures to perform diagnosis prediction.

Computer engineering

Context mixed reality for situated visualization

Nuno Martins, Beatriz Santos, Paulo Dias

The augmented and mixed reality (AR/MR) is becoming more and more relevant to our society. In this kind of realities, the humans can access and interact with both digital and real contents, increasing the information captured by their senses in a normal situation. To take advantage of the user situation, some of the AR/MR applications use situated visualizations, which define all the visualizations that change their appearance based on context, by considering visualizations that are relevant to the physical context in which they are displayed. In situated visualization there are challenges that must be dealt with, such as the limitation of the user's egocentric viewpoint and the user's interaction with all the context or multimodal information. The work that was carried out in the year to which this report refers tried to find new solutions to extend the AR/MR user's egocentric viewpoint.

Computer engineering

World Model Integration for Cooperative Robotic Teams

Ricardo Dias, Nuno Lau

A Multi-Robot system can benefit from cooperative task assignments to achieve a common goal, as well as from merging information from all agents to form a better world model. Highly accurate and responsive perception is still a fundamental step for effective cooperative robotics teams, especially in dynamic, stochastic and partially observable environments like the ones provided by the RoboCup soccer competitions.

This research project aims at developing new solutions for data fusion in a distributed approach in a real robotics soccer team as well as improving the current high-level coordination strategy with novel methodologies. The main result of the thesis will be a new approach to cooperative robotics in general with emphasis on distributed data fusion techniques.

Computer engineering

Dynamic Security Mechanisms for Softwarized and Virtualized Networks

Vitor Cunha, João P. Barraca,Daniel Corujo

The advancements of softwarized (SDN) and virtualized (NFV) networks, such as 5G and beyond, unlock Network Slicing and newer use-cases in tighter cooperation with business verticals. The Industry 4.0 revolution, smart electrical grids, and improvements in transportation safety are just some examples. Network security plays a significant role in these scenarios, and the technology shift presents new challenges as well as opportunities. Highly flexible and dynamic networks require equally nimble security mechanisms. Working alongside the existing security practices, we introduced Moving Target Defense (MTD) mechanisms that focus on disrupting the fundamentals of a network attack, within the network context at that time. Our results include a basic network security Key Performance Indicator (KPI) and an SDN-powered MTD mechanism capable of delivering that KPI. Future work includes integration with the pilots of the H2020 5GROWTH European project and the exploration of other novel security mechanisms.

Computer engineering

Computer science MAP-i

Querying and Visualization of Semantic Data

Arnaldo Pereira, José Luís Oliveira, Rui Pedro Lopes

Over the years, a growing number of semantic data repositories have been made available on the web. However, this has created new challenges regarding how to exploit these resources efficiently. Querying services, such as SPARQL, require knowledge that is beyond the typical user's expertise. The use of natural language interfaces can facilitate access to semantic data. But this problem is far from being solved and remains a very challenging topic.

Computer science MAP-i

Securing Remote Database Access for Dynamic Soft Access Policies

Diogo Regateiro, Óscar Mortágua Pereira, Rui L. Aguiar

The amount of data being created and shared has grown greatly in recent years, thanks in part to social media and the growth of smart devices. Developing applications to access and manipulate this data is time-consuming and requires extensive testing to verify its correctness. Furthermore, the nature of the data may lead to independent subjects to request access to the data for different purposes, requiring security experts to grant permissions manually, which delays access and lowers data availability. A solution based on policy-aware data access APIs tailored to each subject is researched and implemented which aims to ease the development burden, along with a fuzzy-based access control system to automatically grant permissions to new users based on trusted information to increase data availability.

Computer science MAP-i

Multimodal Content Fusion For Modelling Patient Trajectories

João Figueira Silva, Sérgio Matos

For years, technology advancements have been applied in health care with the goal of preventing, diagnosing and treating diseases, as well as improving the quality of life of the general population. More recently, the increasing availability of medical data opened opportunities for the development of better technological solutions to help doctors in patient follow-up, clinical management, and decision making.

These solutions could benefit from exploring the multimodality of medical data, which comprise information from numerous sources such as EHRs, medical imaging and omics. However, incorporating these data sources is achalle nging task due to their complex and heterogeneous nature. Moreover, certain data sources can be particularly challenging to explore, for instance EHR data which contain valuable text information stored as unstructured data.

This PhD aims to investigate solutions that can lever EHR data, extracting relevant information stored as unstructured data in EHRs, and that can combine multimodal clinical information to model patient trajectories. In this work, we will explore the potential of Deep Learning approaches to address the problem of multimodal content fusion.

Computer science MAP-i

Compression-based Tools for Non-Symbolic Data

João M. Carvalho, Armando J. Pinho, Susana Brás

The main goal of this project is to explore alternatives to data representations, such as SAX, aiming at increasing the performance of compression-based data mining or machine learning problems involving non-symbolic data. As testbed application, we will focus on ECG (electrocardiographic) signals. The idea is to use compression-based measures to compute similarities between segments of ECG, aiming, for example, at biometric identification. Clearly, this is a difficult problem, due to the high variability in the ECG of individuals along time, as well as to the acquisition conditions. Some attempts have been made regarding multi-dimensional data, although at a very preliminary level.

Computer science MAP-i

Representation of Spatiotemporal Phenomena in Databases using Continuous Models in Space and Time

José Duarte, Prof. José Moreira, Prof. Paulo Dias

There is a growing number of applications and services based on spatiotemporal data, in the most diverse areas of knowledge and human activity. However, the methods proposed in the spatiotemporal databases literature do not always generate a natural representation of the evolution of deformable moving objects, i.e. objects whose position, shape and extent change continuously over time, and the quality of the representation is measured (evaluated) visually. Methods exist used in other areas that can generate a more natural representation than the methods proposed in the spatiotemporal databases literature but cannot be used directly in the context of spatiotemporal databases. In this research project, these alternative methods and data models defining the necessary data structures to use them in the context of spatiotemporal databases will be studied, algorithms for spatiotemporal operations involving these new defined data structures will be developed, and the results obtained will be evaluated. Finding methods which can overcome some of the limitations of the methods proposed in the spatiotemporal databases literature, the development of algorithms without the restriction that moving segments are not allowed to rotate, and the study of metrics to evaluate the quality of the representation, are potential contributions of this research project.

Computer science MAP-i

IoT technologies for animal grazing and posture control

Luís Nóbrega, Pedro Gonçalves, Paulo Pedreiras

The unwanted and adverse weeds that are constantly growing in vineyards, forces the producers to repeatedly remove them through the use of mechanical and chemical methods. These methods include machinery usage as plows and brushcutters to remove the weeds between plant rows, and herbicides on the line between plant feet, in order to kill or prevent the growth of weeds. Nonetheless, such methods are considered very aggressive for vines, as well as harmful for the public health, since chemicals may remain in the environment and hence contaminate water lines. Moreover, such processes have to be repeated over the year, making it extremely expensive and toilsome. Using animals, usually ovines, is an ancient practice used around the world. Animals grazing in vineyards, feed from the unwanted weeds and fertilize the soil, in an inexpensive, ecological and sustainable way However, sheep may be dangerous to vines since they tend to feed on grapes and on the lower branches of the vines, which causes enormous production losses. To overcome that issue, sheep were traditionally

used to weed vineyards only before the beginning of the growth cycle of grapevines, requiring the use of mechanical and/or chemical methods during the remainder of the production cycle.

Thereby, this work addresses the development of an autonomous mechanism to control sheep's posture and location during vineyards grazing periods. The main goal of this PhD workplan is the development of a based-IoT architecture solution with an energy efficient communication mechanism and posture control.

Computer science MAP-i

Cultural studies

The Glocalization of Wellness: Producing Difference

Ema Silva, Helena Nobre, Vania Baldi

Purpose: This thesis dives into the wellness ideology by discussing wellness consumption and the appropriation of global wellness practices in lifestyle performances and their articulation at the local level.

Design/ Methodology/ Approach: In-depth interviews were conducted with informants of two different countries to understand how wellness acquires distinctive meanings within the different socio-cultural and historical contexts, moreover, how local appropriations of wellness are shaped by discernible structural commonalities.

Findings: Informants' appropriation of wellness are shaped by one primary structure of common difference that gives rise to localized lifestyle's articulations. The holistic self-improvement was identified as one structure of common difference. The ever-increasing need to take care of oneself holistically, and the pursuit of wellness-related choices are presented in both contexts as a reference for achieving an optimal-self.

Research limitations/ implications: The study goes beyond accounts of global homogenization and local appropriation by examining the glocal structural commonalities in wellness practices in distinct contexts.

This study offers cues on how managers and policymakers can improve wellness consumption strategies.

Originality/ Value: This study contributes to an emerging stream of consumer research that investigates the relationships between globalization and everyday consumption practices.

Keywords: Consumer Culture Theory; Glocalization; Wellness Consumption

Cultural studies

Género e Artistas de Teatro

Helena Ferreira, Aline Ferreira, Francesca Rayner

Entre todas as artes, as artes performativas têm sido, tradicionalmente, as menos acessíveis a mulheres artistas em sociedades patriarcais porque, na sua grande maioria, são produções coletivas que envolvem muitas pessoas que, ao longo dos tempos foram, maioritariamente, homens. A maior pesquisa realizada até hoje sobre este tema foi conduzida pela Purple Seven, no Reino Unido, entre 2012 e 2015, e envolveu cerca de um milhão de respostas projetáveis para todos os locais que identificam a diversidade do seu público antes da estreia de um espetáculo. Este estudo mostra claramente que 65% da receita dos bilhetes provém de mulheres, mas, apesar disso, apenas 39% dos atores, 36% dos diretores e 28% dos dramaturgos de peças teatrais são mulheres.

"Em português, Eunice quer dizer teatro", afirmou Tiago Rodrigues enquanto Diretor Artístico do Teatro Nacional D. Maria II, que como entidade pública teve, ao longo de 174 anos, apenas uma única mulher como diretora. Em Portugal, durante séculos, coube aos homens dizerem qual a posição que as extraordinárias "Eunices" ocupavam nas artes performativas. Foram sempre eles que as escolheram para interpretarem papéis de peças que não escreveram nem elegeram e que, na maioria das vezes, apresentavam as representações de mulheres idealizadas pelos homens, porque os teatros eram dirigidos por homens, os elencos principais eram maioritariamente masculinos e as peças que interpretavam eram escritas por homens. Basta analisar os livros da história do teatro em Portugal para perceber que as mulheres foram invisibilizadas e empurradas para segundo plano em lugares de poder como encenadoras, dramaturgas ou diretoras de companhia.

Deste modo, o presente projeto centra-se genericamente nas mulheres artistas portuguesas, mais especificamente nas que passaram pelo Teatro Experimental do Porto (TEP), pretendendo-se dar resposta às seguintes questões: Existe ou não um número elevado

de mulheres no mundo das artes performativas? Qual o papel destinado a estas mulheres e por que é que não ocupam os lugares considerados hierarquicamente, por toda a sociedade, lugares de poder? E, por último, podem as suas histórias de vida ser reveladoras das motivações que contribuem para essa situação?

De modo a dar resposta a estas questões, aborda-se primeiramente a situação das mulheres artistas na história do teatro em Portugal, explicitando a sua dinâmica própria na conjuntura nacional, com base numa pesquisa exaustiva da dispersa documentação existente. De seguida, dá-se conta do estudo empírico, partindo-se de um corpus constituído pela diversa documentação que se encontra no arquivo no Teatro Experimental do Porto relativa às mulheres das artes performativas que, ao longo dos 67 anos de existência desta companhia de teatro exerceram lá a sua atividade. Após a análise pormenorizada desta documentação é possível desvendar quantas e quais foram as mulheres que passaram pelo TEP e que lugar de hierarquia ocuparam nesta companhia, concluindo-se que, apesar de, por vezes, se encontrarem em maioria relativamente aos homens, foram muito poucas as que se destacaram e conseguiram atingir os ditos lugares de poder, como o cargo de direção da companhia que nunca pertenceu a uma mulher.

Considerando-se que, através do material a que tivemos acesso não conseguimos explicar este facto, a não ser através das inferências que fazemos das normas patriarcais institucionalizadas, decidimos partir para uma segunda parte do estudo empírico, realizando entrevistas a várias mulheres artistas portuguesas, para tentar perceber através da metodologia de estudos de vida quais os fatores que contribuem para que as mulheres que desenvolvem as suas carreiras nesta área não consigam atingir lugares de poder. A abordagem escolhida é a análise de conteúdo, que permite a descoberta de conteúdos e estruturas que possibilitem entender os motivos para que esta situação seja um dado adquirido.

Cultural studies

The Cinema of Consciousness: David Lynch in the Light of António Damásio's Neurophilosophy

Luís Branco, Orientador, Anthony David Barker

ABSTRACT: The main object of study for my research project is David Lynch's film work. There are numerous critical approaches to his cinematography, however, it remains considered difficult to exegesis, almost uninterpretable. I propose to study it through António Damásio's Neurophilosophy, namely through this neuroscientist's conceptions about Culture, Creativity and Consciousness. In this way, I intend to analyze Lynch's films as projections of his conscience. At the same time, I will deepen the scope of Damásio's work. Thus, the interdisciplinary articulation between Humanities and Neurosciences is fundamental for the development of my work.

KEYWORDS: David Lynch, António Damásio, Film Studies, Neuroscience, Creativity and Consciousness.

Cultural studies

English and Social Identity among University Students in a Global Age

Margaret Gomes, Professor Gillian Moreira (Supervisor), Professor Luís Guerra (Co-Supervisor)

Over the last decades English has become a language increasingly used by non-native speakers as a lingua franca to communicate with other non-native speakers. Globalisation, increased mobility and intercultural contact, communication technology and greater access to information have enabled English to become a facilitator of global communication. The prevalence of English in popular culture also makes it attractive to young people, who are particularly motivated to learn and use it. English borrowings have become increasingly popular among young people, who use linguistic choice to assert their own sense of group identification and belonging. The aim of this thesis was to gain a better understanding of these processes, namely how young university students use English borrowings in their native discourse and whether there is a link between language use and identity construction among young people in a global age.

This study gathered data from students in university settings. It looks at the English borrowings which are most frequently used by groups of university students and analyses to what extent English may play a role in the construction of a youth identity. A mixed methodological approach was used to gather data in three phases between 2012 and 2017. The first phase comprised an online questionnaire, which was completed by 789 respondents from various universities in different countries, followed by a second phase, which collected over six hours of recordings of students in informal contexts, and finally an online discussion forum with fifteen students from three different countries.

Results showed that English is an important part of the native discourse of the university students who took part in this study, who perceived English as being central to the way they expressed themselves, and sometimes used it in creative ways. Findings also showed that although English was valued above all for its role in international communication, and its use also strongly associated with young people, who felt empowered to use it in unique ways, thus contributing to a sense of group identity.

Cultural studies

Us/Them in European Crises

Rita Himmel, Maria Manuel Baptista

When building Europe as a political unit, political and legal advances were always accompanied by ideological views of a European identity. However, recent crises, such as the Eurozone crisis, and the migration crisis, have challenged this unity. In this project, we aim to explore current hegemonic ideologies about cultural identities (in the Portugal-Germany-Europe axis). We will do so by performing a qualitative content analysis of media articles selected from 4 news outlets (Bild and Spiegel in Germany, Correio da Manhã and Diário de Notícias in Portugal), around 5 electoral periods (two legislative elections in Portugal and Germany and the Elections to the European Parliament) in 2011, 2013, 2014, 2015 and 2017. Stuart Hall's concepts of ideology and hegemony make up the main theoretical framework on which this thesis is developed. We will be guided by the following questions: What are the ideological hegemonies in the historical context under analysis? What are its contradictions? How are the media discourses encoded within this dominant hegemony? What does that say about power relations in the European context?

Cultural studies

Cultural Dissonance in Tourism Information Sources

Tim Oswald, Gillian Moreira

Visitors to tourist destinations form a prior destination image based on their access to online information sources. Information sources may be induced, autonomous or organic. In their attempt to offer the (cultural) incongruity that drives the formation of a positive perceived destination image, they may unwittingly create dissonance or cultural information gaps that undermine the destination image process. This study looks at such sources for non-beach tourism in Northern/Central Portugal. Initial findings indicate there is some cultural dissonance between the sources. Such gaps may be usefully highlighted for the authors of induced/autonomous information.

Cultural studies

DBI- initiative

Estudo do desempenho de feltros planos, produzidos por diferentes métodos de consolidação

Acácio Coelho, Martinho Oliveira, Raul Fangueiro

Este projeto de doutoramento tem como objetivo o desenvolvimento de feltros planos, a partir de fibras de lã ultrafinas, combinando os processos de compactação por feltragem, utilizados normalmente na produção de feltros para chapéus, com os processos de consolidação mecânica por agulhagem, utilizados na produção de não tecidos. Este projeto conduzirá à aquisição de conhecimento técnico e científico sobre a influência das caraterísticas das fibras de lã ultrafina, das condições de processamento e da tecnologia, possibilitando o desenvolvimento de processos combinados otimizados e, consequentemente, a criação de novos produtos, resultantes do processamento de feltros planos obtidos por consolidação mecânica. Este projeto, permitirá à FEPSA efetuar o salto evolutivo do feltro para chapéus para feltro plano customizado, para os mercados-alvo de acessórios de moda, vestuário, decoração e calçado, onde a FEPSA atualmente não se insere, mantendo a sua caraterística de líder mundial nos produtos que fabrica.

DBI

Democratic Talent Management in an i4.0 environment

Alberto Rendo, Manuel Oliveira, Ana Dias

This report intends to show the first steps taken by the candidate on the exploration of the research theme agreed with his company. It starts by introducing the reasons for choosing the theme, related with personal, society context and business circumstances. The candidate proposes to study and implement in a professional context an innovative approach to Talent Management based on the need of change that organizations are facing due to a disruptive environment brought by the fourth industrial revolution: the digital revolution. Its nature

and impact on society, on management systems and on business organization are described as the stage where a significant change movement is happening in an extent and intensity never seen before. To deal with it, the candidate elaborates around the need of increasing agility and flexibility as determinant factors for the competitiveness of organizations and business. In that sense, a new approach to Talent Management is proposed based on an innovative concept of talent. By describing the key elements of this innovative concept, a new approach to HR Management is also described, arguing the need of moving towards a disruption in traditional policies, processes and practices. To achieve the aimed DBI results, a mixed research methodology is proposed and reasoned: Grounded Theory and Autoethnography.

DBI

Leveraging Smart Factories: A digital transformation on the shop floor of a Felt Hat Bodies Industry

Alexandre Rios Paulo, Ana Luísa Ramos, Joaquim Borges Gouveia

Leveraging Smart Factories:

A digital transformation on the shop floor of a Felt Hat Bodies Industry.

DBI

Additive Manufacturing for Smart Plastics

Ana Silva, Paula Vilarinho, Pedro Fonseca

The continuous evolution of nowadays technologies implies a modification in our daily life objects, like the car. Every year Original Equipment Manufacturers (OEMs), like PSA and VW, are presenting new car concepts with focus on the User eXperience (UX) and the Human Machine Interface (HMI). Also, the automotive industry is heading to deliver a customized car to each user. This idea will be possible due to the advancement of Industry 4.0 concepts, namely end-to-end engineering, from conception to delivery.

This PhD project aims to design, develop and demonstrate a set of innovative solutions through the use of Additive Manufacturing (AM) technologies, to produce customizable parts and to improve user interaction. This work will investigate and propose processes, methodologies and materials to allow the use of AM technologies for the development of customizable parts to be inserted in an injection-, mass-produced body panel.

DBI

Photonic integrated circuits for passive optical networks

Francisco Rodrigues, António Teixeira

The ever-growing bandwidth demand due to the increase of number of users and to the bandwidth hungry applications appeal for improved networks that can grow organically with the needs. Passive optical networks connect, through optical fiber, the final users with the remaining network structure. These networks being the interface with the end users are also evolving, and its electro-optical hardware must keep up with the growth pace imposed by the users. Strategies for electro-optical hardware evolution for passive optical networks are being investigated throughout industry and academia so that these networks can deliver in the next 5 years at least 10 Gbps to the final users and in 10-15 years reach 25 Gbps per user. The work to be developed on this thesis, aims at contributing on the evolution of the next generation electro-optic hardware through the integration of photonic integrated circuits in passive optical network transceivers, replacing the commonly used optical bulky structures based on free space optics. Novel photonic integrated circuits building blocks and architectures for passive optical networks equipment will be designed, simulated, fabricated, and packaged up to module level aiming to explore a path that allows passive optical networks to grow on a sustainable manner.

DBI

Development of novel thermoset formulations for bathroom hardware

Isabel Correia, Ana Timmons, Dmitri Evtyugin

Development of novel thermoset formulations for bathroom hardware

DBI

400Gbps Silicon Photonic Transceivers

James Wang, António Teixeira

This report describes the development progress of a 400Gbps silicon photonics transceiver. Current 400Gbps Silicon photonic transceiver technologies, there are some problems, big couple insertion loss, not easy to coupling for different parts like LD array to modulator or Demux to receiver PD side, short distance and large scale. We design a new 400Gbps silicon photonics transceiver, which can improve the coupling efficiency, also to improve the transmittance reach above 10km, the whole silicon photonics integration with LAN WDM MUX&Demux Silicon photonics Array, InP or Silicon photonics PD Array, Silicon photonics modulator, and planar waveguide, etc. The whole silicon photonics integration makes low power consumption and lower cost, lower scale.we propose the general idea of the integration scheme of 400G transceiver, with highlight of the integration of III/V laser and Ge photodetector. Optimization of both laser integration and photodetector will be performed for 100G/lane application. And we give the plan about the thesis timeline.

DBI

A MA de postiços para moldes de injeção por Fusão Seletiva a laser

João Vieira, Martinho Oliveira, Ricardo Torcato

A indústria de moldes usa maioritariamente tecnologias subtrativas para a fabricação de componentes para moldes de injeção de plástico. A Manufatura Aditiva (MA) vem mudar o paradigma e traz soluções disruptivas para a indústria e em especial para a indústria de moldes, oferecendo liberdade de design e alargando a funcionalidade do molde. A Fusão Seletiva a Laser de Metais (SLM – Selective Laser Melting), é uma tecnologia de elevado potencial para o fabrico de postiços com refrigeração conformada (CC – Conformal Cooling), onde o circuito de refrigeração acompanha as superfícies a refrigerar, não sendo possível de fabricar pelos métodos convencionais. Tal solução aumenta significativamente a eficiência da refrigeração na zona onde é aplicado o postiço ou componente.

O objetivo deste trabalho é usar o potencial da tecnologia SLM para processar pós de aço 18Ni300, estudar a influência dos parâmetros do processo de fusão a laser nas características deste aço e desenvolver componentes com soluções de design otimizadas para aumentar a eficiência e produtividade dos moldes de injeção, ou seja, definir componentes paramétricos multifuncionais (CPM).

Durante este último ano, foram efetuadas caraterizações físico químicas do material a processar no SLM (pós MS 18Ni300), envolvendo estudos referentes à distribuição granulométrica dos pós, Difração de Raios X (DRX), compactação de pós e morfologia. Em relação aos provetes, estes foram fabricados recorrendo aos parâmetros standard do SLM e os resultados decorrentes da sua caracterização física/mecânica/térmica foram comparados com resultados similares para o aço comercial MS 1.2709 (módulo de elasticidade, tensão de cedência e tensão de rotura, resistência ao impacto, dureza, densidade e condutividade térmica). No âmbito do CPM foram definidas as seguintes funções: ventilação, durabilidade, estado de superfície (polishability), refrigeração e custeio. Procedeu-se ao desenho de um modelo digital que incorpora estas funções. Posteriormente foram projetados e fabricados três provetes/protótipos mono funcionais que permitam testar as funções ventilação, durabilidade e refrigeração. Paralelamente, e com vista à definição das soluções em molde, foi desenhada uma peça plástica que permita testar estas cinco funções. Foi também projetado o respetivo molde. Este molde foi projetado de forma a comparar uma versão de molde convencional e versões CPM. Atualmente está em fabrico a versão de molde convencional.

DBI

Orchestration Framework to Support Decision Making in Value Stream Oriented Organizations

Maria João Lopes, Eugénio Rocha, Pétia Georgieva

Nowadays organizations have at their disposal a variety of data related with their business operations due to high investments in digital transformation. However, data is not a synonym of information or value. A framework to orchestrate the different needs of an organization

which is value stream oriented is increasingly becoming a necessity. In this report, we will describe the process to plan and design such a methodology merging Computer Science and Mathematics. The Management and Business perspective concludes this triad of domains. The orchestration framework relies on a modern micro-service design structure that accommodates real time streaming, Big Data storage and Machine Learning pipelines.

DBI

Traceability for Industrial Environments, a High Tamper Proof System Enabled by Blockchain Technology – TRUTHOFCHAIN

Miguel Teixeira, Armando Pinto, José Santos

The world is changing, consumers are more informed and more demanding. They want to track their products and their origins. Transparency plays a key role in the moment of choice. High customization is struggling the value stream and the supply chain. Manufacturers need to track efficiently their products and processes and give real time information for all interested parts internally and externally. Many challenges need to be addressed on a plant shop floor. This thesis proposes a decentralized network architecture approach to track and trace physical and logical assets on an industrial environment, by means of a tamper proof system, using blockchain technology, based on data capture on the field using identification and IoT devices. Discusses how to deal with concerns like security & privacy; efficiency & latency.

DBI

Design

Narrativas aumentadas: contributos das tecnologias digitais para o design de informação

Ana Marques, Vasco Branco; Rui Costa

Assumindo o Design enquanto atividade de mediação cultural da tecnologia, este projeto de investigação pretende explorar o potencial das tecnologias digitais, nomeadamente a Realidade Aumentada (RA), na construção de narrativas em Design de Informação.

Esta investigação será enquadrada pelo projeto Design Obs. - Para um Observatório de Design em Portugal: Modelos, Instrumentos, Representação e Estratégias, iniciado em Agosto de 2018, que pretende: "por um lado, recolher dados, sistematizar informação e desenvolver investigação estratégica sobre o ecossistema do design que torne possíveis e sustente decisões relevantes sobre iniciativas empresariais, institucionais ou de política pública que se relacionem com o design português; e, por outro lado, conceber, desenvolver e testar novas estratégias de representação dessa informação (uma mistura entre novos media e suportes convencionais) com vista a uma melhor compreensão e visibilidade desse ecossistema para a promoção de um maior envolvimento público."

É no contexto deste último desígnio que este doutoramento ganha pertinência.

Esta investigação adota uma abordagem baseada na prática (Saikaly, 2005) ou, segundo as tipologias de Frayling (1993), é uma investigação a realizar "através" do Design (Research through art and design).

Dada a natureza projetual desta proposta, prevê-se o desenvolvimento de narrativas aumentadas geradas pelo design de informação implicado na comunicação dos resultados do projeto Design Obs. que será assegurada através de livros, exposições e qualquer outro material de disseminação do projeto onde a utilização desse meio tecnológico se evidencie como mais valia.

Estes artefactos serão avaliados para confirmar, quer a sua qualidade experiencial, quer o seu contributo para o incremento da compreensão sobre o Design Português. Esta investigação deverá também contribuir para colmatar a atual escassez de reflexão escrita sobre as convergências possíveis entre design de informação e as tecnologias da realidade aumentada.

Design

Design e envelhecimento: mapeando ações no terreno

Cristiane Menezes, Luís Nuno Dias Coelho, Vasco Afonso da Silva Branco

Esta apresentação relata uma pesquisa exploratória feita no terreno, com o foco em ações que promovem o bem-estar, melhoram a autoestima e estimulam a autonomia dos séniores ativos. Sendo assim, foi necessário visitar e conhecer alguns dos projetos que estão em desenvolvimento, dentro do contexto deste público. Foi feito ainda um inquérito online, com 75 participantes maiores de 60 anos, para se perceber como os séniores entendem o envelhecer, como vêem a velhice e qual o seu plano para a próxima década. Obteve-se como resultado algumas pistas sobre o que busca este público tão diverso e crescente e de que forma o design pode atuar para colaborar com a melhoria da qualidade de vida e para o bem envelhecer.

Design

Firefighters personal protective equipment. An answer through Design to the performance vs comfort dichotomy.

Filipe Bento, Prof. Doutor Francisco Providência, Prof. Doutor Nuno Dias, Eng. Gilda Santos

The evolution of the fabrics thermal barrier has increased in the firefighters (FF) conductive protection. However, lack of garment breathability result in saturation of undergarment microclimate, increasing skin injuries and premature exhaustion; being even worse for women FF. Conduction burns represent only 3% of injuries, against 40% of convective heat related. In addition to heavy and bulky Personal Protective Equipment (PPE), the majority of FF are overweight.

Firefighting is changing. The willful and adventurous FF-warrior paradigm has given way to a new model, under a command with multi-media solutions, allowing less proximity to the fire- -front, requesting, however, more agility to respond quickly. Protection wise, this study shifts the focus from conductive (PPE has been standard-driven) to convective and radiative heat protection. Comfort wise, functional solutions mitigate ergonomic and physiological issues.

Still, the symbolic dimension is decisive in the rhetorical representation of the contemporary FF meaning. The self-representation should improve psychological comfort, redefining the FF behavior on-duty.

The theoretical framework, technology and FF ethnography are the sources of evidence, whose assumptions will be validated in a triangulation exercise to shape the design program. A concept lead to prototypes, validated in laboratory, simulation and real-fire context in cooperation with the partners LatinoGroup1, Inuteq2, BVC3 and ADAI4.

A design-driven, user-centered, gender-specific FF PPE will be developed as an answer to the protection vs comfort dichotomy promoting a paradigm shift to firefighter-athlete. A lighter and flexible PPE with new strategies to mitigate convective and radiant heat; anticipating the FF needs and aspirations; prepared to incorporate wearable technology (firefighter-smart ready); able for industrial production; motivating other health and well-being areas to collaborate in the holistic firefighter-athlete approach; could be a relevant contribution to the FF, scientific community and society. The theoretical model from this project-grounded research should have methodological potential to be replicated in other countries.

1 LatinoGroup – Industry specialized in FF PPE for 35 years; 2 Inuteq – Company responsible for the cooling strategies;

3 BVC – Bombeiros Voluntários de Cantanhede (FF corporation); 4 ADAI Associação para o Desenvolvimento da Aerodinâmica Industrial (Coimbra University laboratory specialized in wild-land fires).

Design

The White Space as a Semantic Strategy in Design

Gilberto Ribeiro, Francisco Providência

With a White Space as a Semantic Strategy in Design, it is proposed to understand the action of emptiness in the language of forms and that links it to the consciousness of being, the possibilities of expanding critical capacity and respect for individuality, contradicting capitalist subjections and going against the life that takes us away from ourselves. This need for space (a consequence of the society that imprisons us), obliges us to reflect on the possibilities of being, gravitating to some notions such as silence, emptiness and nothingness, vulgarities that by their prejudiced pre-understanding they prove only an incomprehension. An incomprehension that traditionally understands it as a simple absence, contradicting the appreciation of philosophers, artists and designers where in some of these cases it is given an enormous existential, functional and deeply poetic relevance to the forms.

Design

Art in the Fruition of the Place: social well-being through interactive installations

João Castro, Paulo Bernardino Bastos, Heitor Alvelos

The distance between people and the emotional detachment from the inhabited place are critical problems of contemporary cities. The objective of this proposal is to produce interactive installations to strengthen ties between individuals, from these to the territory and, consequently, the growth of social emotional well-being. The bibliographic research carried out indicates that, in interaction, links of emotional attraction are established through participation, achieved by: Sense, Select and Signify. It is inquired whether interactive installations that incorporate sensory stimuli with contents that individuals feel more appeal/affinity, will provide beneficial effects. For this matter, is intended to identify content to be used, shapes/colours/images/sounds/textures, with questionnaires to a sample of individuals from Vera-Cruz/Aveiro, adapting the Delphi method; discussion and validation of data in focus groups; establishment of elements that contribute to interactions; production of installations in municipal spaces. Is promoted the development of interactive installations designed, by approaching the populations, with contents adjusted to the modulation of the specific artistic communication space, towards an increase of place fruition and interpersonal connection.

Design

4 Design Strategies for mapping places

José Miguel Cardoso, Rui Costa, Paulo Freire de Almeida

Nesta investigação, defendemos que cada lugar tem múltiplas representações possíveis e que o design enquanto mediador cultural tem um papel a desempenhar neste processo de representação, sendo o desenho de observação e o património existencial, ferramenta privilegiadas. Neste pitch apresentamos quatro estratégias de design, para a representação dos lugares.

Design

drawing of an edible container made from vegetables and fruit with finger food purposes

Lígia Afreixo, Francisco Providência, Sílvia Rocha

Traditional finger food types in Europe have a concentration of saturated fats and an excess of carbohydrates in wheat (a product of the group of the main classified allergens), contributing factors for obesity. The wheat pasta used in containers or bases combine a high plastic appetite with a low price.

This investigation proposes, combining design with food chemistry, to develop an alternative system of edible containers for consumption by hand (finger food), which must satisfy three premises:

1. production of conformable organic film in individual containers made from vegetable fibers (fruit and vegetables) wasted by quality control;

2. promote new eating behaviors, guaranteeing better nutritional performance by replacing wheat semolina, maintaining a playful and pleasurable organoleptic experience;

3. promote awareness of food through morphological and chromatic communication encoding nutritional content so that the consumer acquires more food awareness.

Design

‘Cooperativa Árvore’ poster collection: progress notes from an ongoing investigation

Mariana Almeida, Helena Barbosa

The ‘Árvore – Cooperativa de Actividades Artísticas’ has been active in Oporto since 1963, but its posters remains unstudied. The research project that is being presented here has resulted from the identification of the existence of the unstudied poster collection, which brings together c.3700 different specimens (plus c.3000 copies). The collection content is now beginning to be known, but it is already understood that this represents a wide legacy of graphic material that goes back to the 1960s and follows the institution's path up to c.2019, imbued with the significance inherent to the cultural action of the cooperative.

This research, still in its initial phase, uses this collection in order to analyse themes of history and theory of design, memory and graphic design in Portugal that will lead to a narrative based on hermeneutics.

Proposing design as a cultural mediator, the aim of this study is to contribute to the broadening of the understanding of Poster in Portugal, since the lack of mention of the Portuguese poster in design history international works was noticed. By interpreting the collection, it seeks to achieve a broader view on the poster and a holistic understanding based on the new interrelated knowledge formulated about these artefacts.

According to the research plan, actions are being carried out in an effort to counteract the identified lack of maintenance and handling required by the collection under study and, therefore, to promote the preservation of the graphic heritage collected within an entity of recognized cultural merit.

Reinforced by the 'Cooperativa' programme, a qualitative approach has been prepared to inventory this heritage to provide further analysis from a design perspective, considering links to the national context. It is important to reflect on design, visual culture, memory and issues raised by the archiving practice, narratives and counter-narratives stemming from collections. The aim is to contribute to knowledge about design, starting from methodologies based on direct contact with the artefacts and the identified authors, as well as case studies related to private National archives and also interconnections with other documentary sources.

The structuring of the 'Árvore' poster collection is a pretext for and a desired result of research, i.e. its original condition is the initial focus, but once the organization, digitization and inventorying process has been completed, the dedicated database obtained for further analysis constitutes an intermediate product of the research.

The production of a digital image in conjunction with the data collection can promote the public visibility of this posters, particularly through the integrated data provided by the on-line catalogues. The predicted outputs are a PhD thesis converted in an exhibition with catalogue, to be published for 'Árvore's 60th anniversary, in 2023.

Design

Design for the Territory: a collaborative model of Place Branding

Marlene Ribeiro, Francisco Providência

Design makes visible, the invisibility of the Genius Loci through the brand, which can be the visual representation of the inheritance or the ambition (political decision of strategic positioning of the territory, now subject to the competitive presuppositions of the global market). Integrating the local agents (University, Local Authorities and Industry) in the construction of the brand, Design acts as mediator and by Design Management (attribution of holistic coherence) is an instrument to support decision making.

Design

Design e estigma: bengalas personalizáveis para seniores

Yago Rodrigues, Luis Dias, Ana Veloso

O foco desta investigação foi problematizar, através do Design, o estigma em produtos destinados à população sénior . O tema se distancia da concepção de que estes equipamentos são apenas um "mero produto de apoio", pois os compreendemos como uma extensão do corpo do sênior, relacionado com seu cotidiano e que pode proporcionar experiências boas ou ruins, descrenças e esperanças no processo de envelhecer. Assim, a conexão entre o Design e a produção do estigma, a partir de produtos assistivos no envelhecimento, parece exigir uma abordagem necessariamente interdisciplinar para compreender a emancipação simbólica-emocional pela materialidade. Nesse sentido, o principal contributo desta investigação foi detectar o processo de estigma dos equipamentos de auxílio a marcha no envelhecimento e melhorar a qualidade estética por meio de um acessório de encaixe simples para bengalas e muletas que minimize o estigma social, provendo sua personalização e conexão emocional entre o equipamento e o sujeito sênior.

Design

Education

English or Englishes? – an open door to language and cultural diversity

Ana Costa, Gillian Moreira, Ana Sofia Pinho

The challenges and restrictions people are facing these days all over the world, due to the COVID-19 pandemic, have reinforced two (already) widely recognised needs: the need for a greater sense of belonging, unity and humanity, while preserving the unique and individual features of each person, community or country; and, complementarily, the need to communicate empathically.

In this context, languages, and language education in particular, play a very important part, not only because of the acquisition of linguistic competences, but also, and more importantly, because they may develop the speakers' ability to act 'interculturally', that is, to deal with, engage and (inter)act in situations of language and cultural diversity. In fact, this plurilingual and intercultural education may contribute to the preservation of linguistic and cultural diversity, encourage the learning of languages throughout citizens' lives and promote the development of learners' plurilingual and intercultural competences (Cavalli, Coste, Crisan & van de Ven, 2009).

Among all the languages, we have taken English as the focus of our research project. Considering its status as a global language, its predominant position in the education systems across Europe and its internal diversity (Bhatt, 2001; Jenkins, 2003), we believe that the English classroom can be a door to other languages and cultures, by creating opportunities for the development of the attitudes, knowledge and skills involved in intercultural dialogue.

Therefore, the project aims to understand the contribution of a teaching approach based on the linguistic and cultural diversity of the English language to the development of learners' plurilingual and intercultural competences. By adopting methods of a case study (Stake, 2000), we created and implemented a classroom intervention plan ("A journey through the linguistic and cultural diversity of the English language"), in a 9th year class, constituted by didactic sessions/units that privileged the contact with different varieties of English (or Englishes).

The content analysis (Bardin, 2000) of the data collected during the implementation of this plan (transcriptions of the sessions, worksheets, written essays and group work activities) has highlighted hints of a potential development of learners' plurilingual and intercultural competences by pointing out evidence of the knowledge, skills and attitudes they revealed in the contact with different Englishes and their speakers.

The results have also showed that the teaching of English can be organised and performed in order to raise learners' awareness to the existence of other languages and cultures, beyond those offered in school, while still developing their linguistic and communicative competences in the English language. This can be achieved by adopting a plural approach, like the one used in our project, which focused on the different varieties of a language to bridge the contact with language and cultural diversity in general, thus innovating from the most common method of using different languages and cultures in the classroom.

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Education

Science teachers' in-service education to enhance students' critical and creative thinking

Ana Sofia Sousa, Rui Marques Vieira

The present investigation is framed in Science Education and proposes to develop a Science Teacher Education Programme to enhance students' critical and creative thinking, as recommended by the Portuguese educational reference documents for the education system' organization. This work, a descriptive-oriented case study falls within the constructivist paradigm to explore the impact of the education programme on the professional development of nineteen in-service Science teachers. Findings indicated positive effects on these teachers' professional development and also identified some challenges regarding the effective enhancing of students' critical and creative thinking. In addition, the positive feedback from teachers revealed the programme's suitability to respond to their professional needs and expectations.

Education

Students' Personal Resources and Academic Success

Andreia Sousa, Manuela Gonçalves

The study intents to analyze the relation between university student's personal resources such as self-efficacy, optimism, hope, positive emotions and academic success.

It was conducted a transversal study with 307 university students with a mean age of 24.7 years old.

Thus, this research intends to promote the understanding of student's academic success process , underlying the relevance of positive individual factors in academic settings, in order to achieve excelent academic performance.

Education

Language teaching and learning through plurilingual virtual curricular interaction

Ângela Espinha, Maria Helena Araújo e Sá, Maddalena De Carlo

After the so-called "social" turn in foreign language teaching and learning, interaction has been at the center of the language training process in several pedagogical approaches. Intercomprehension (IC) is a pluralistic approach on Language Education which, in its interactional dimension, assumes that interaction between students that live in different languages and cultures would allow them to develop plurilingual and intercultural competences. The evolution of communication technologies (synchronous and asynchronous) brought new opportunities for collaborative and interactive pedagogical practices. Since, in the school setting, it is not always possible to promote by face-to-face contact, new forms of communication can help to solve this limitation. This study is situated in virtual interaction and presents an analysis of chat conversations in Romance languages – French, Italian, Portuguese and Spanish – between pupils from several Secondary schools from different countries. Thus, the aims of this study are: (i) to analyze the competences mobilized and developed in virtual training session in IC using the Framework of Reference for plurilingual communication in Intercomprehension (REFIC), in order to contribute to the operationalization of this framework; (ii) understand how these competences fit into the languages policy documents in the teaching and learning of languages (national and international), in order to contribute to the curricular integration of Intercomprehension. REFIC was recently developed and one of its aims is to be the basis for a consistent evaluation of the competences developed in an intercomprehensive experience. For analysing the plurilingual chat sessions we will be using conversation analysis and the dimensions and descriptors from REFIC.

Education

Escola, identidade e resistência em Timor: o caso do Externato de São José durante a ocupação indonésia

Ângelo Ferreira, António Neto-Mendes, Onésimo Teotónio Almeida

Durante 24 anos (1975-1999), os timorenses lutaram, na frente militar, clandestina e diplomática pela sua independência como estado-nação e contra a violenta ocupação indonésia. Apesar do massivo esforço educativo do Estado ocupante para os indonesiar, uma escola da Igreja Católica (Externato de São José), que funcionou entre 1976 e 1992 (até ser encerrada e destruída), decidiu manter o ensino em língua portuguesa, desde o básico ao secundário, apesar de as autoridades terem proibido aquela língua, vista como elemento que atrasava a integração efetiva do povo timorense na grande Indonésia.

Neste estudo de caso, de natureza qualitativa, sob o paradigma descritivo-interpretativo, faz-se a análise de conteúdo de 30 entrevistas - realizadas a antigos alunos, antigos professores e membros da sociedade que acompanharam a sua atividade, atualmente espalhados por 9 países - e de documentos da escola, com a finalidade de caracterizar a sua cultura, o sistema de valores subjacente, qual o contributo para a preservação da identidade timorense durante a ocupação e para a luta pela independência, assim como perceber a sua repercussão na edificação do novo estado-nação. Este trabalho visa dar um contributo para a história da Educação de Timor-Leste, resgatando ao desconhecido e ao potencial esquecimento, dos timorenses e da comunidade internacional, o conhecimento da ação e do legado daquela escola, assim como iluminar os traços distintivos da identidade timorense ali preservados e promovidos.

A investigação permite concluir que a escola teve um papel único e fundamental na sobrevivência da língua portuguesa e da cultura luso-timorense em Timor-Leste, defendidas como marcas distintivas da identidade timorense. Além disso, a escola contribuiu decisivamente para a amplificação e qualificação da luta pela independência através dos seus professores e estudantes, que se têm notabilizado como líderes e profissionais determinantes na edificação do novo país.

Education

Multiliteracias em Estudantes surdos de Ensino Médio: contributos de um Programa de Intercompreensão em Línguas

Carolina Lúgaro, Orientadores: Ana Isabel Silva; Maria Helena de Araújo e Sá

O escasso conhecimento do mundo e das línguas e linguagens que os surdos apresentam no Ensino Médio contribui para seu insucesso no percurso acadêmico, limitando o exercício de uma cidadania plena. Assim, é urgente realizar investigação sobre o desenvolvimento das multiliteracias deste público desde uma perspectiva multilíngue e multimodal.

Neste quadro, esta investigação tem como objeto de estudo as multiliteracias ao nível da leitura em alunos surdos de Ensino Médio de Natal, Brasil, e seu objetivo geral é conceber, implementar e avaliar os efeitos de um Programa de Intercompreensão em Línguas (PIL) no desenvolvimento das multiliteracias deste público, tomando como base as dimensões e descritores da Intercompreensão.

O PIL terá um semestre de duração e será aplicado em duas turmas de Ensino Médio do IFRN, Natal Central e de Escolas Estaduais.

Utilizando como base teórica a Pedagogia das Multiliteracias, a abordagem didática Intercompreensão em Línguas e literatura sobre Surdos, Linguagem e Multiliteracias, esta investigação configura-se como um estudo de caso, inserindo-se no paradigma interpretativo de natureza qualitativa. Utilizar-se-ão diversas técnicas e instrumentos de recolha de dados que irão configurar uma narração multimodal das práticas didáticas implementadas.

Através do PIL, pretende-se compreender o contributo da leitura de textos plurilingues e multimodais para o desenvolvimento das multiliteracias em alunos surdos de Ensino Médio. Acreditamos que o PIL será de grande valor para aplicações futuras, numa perspectiva sempre contextualizada, proporcionando oportunidades que potencializem as capacidades linguistico-cognitivas dos jovens surdos para uma cidadania ativa e plena.

Education

Inclusion of children with special needs in Arts Education: Research to Action

Davys Moreno, Moreira António; Tymoshchuk Oksana; Marques Carlos

In order to contribute to the Inclusive Education (EI) of children with Special Needs (NE) in Specialized Artistic Education (EAE), and in opposition to what is commonly assumed in the sense that they are unable to learn, we intend to find solutions so that children with motor disabilities resulting from Cerebral Palsy (CP) join EAE da Música, in the 1st CEB, and can develop their artistic potential and skills using ICT. Using Research-action methodology, we intend to develop an Intervention Program at EAE da Música (including specialized and inclusive artistic teacher training) focused on the use of Technologies to enhance: (i) community learning, in an active and collaborative way , (ii) responding to the needs of children with respect for their difficulties, and (iii) stimulating the potential of children with CP in order to transform the EAE into an EI for children with NE.

Education

Teaching resources on mechanics to support teaching practices in the 1st cycle of basic education

Dulce Vaz, Dr.ª Ana V. Rodrigues e Dr.ª Filomena Teixeira

This project aims to develop and evaluate Didactic Resources for the experimental teaching of sciences in the 1st Cycle of Basic Education on mechanics (forces and motion), as well as strategies for continuing education of teachers online to support the contextualized use of these teaching resources with the classes, in a perspective of promoting scientific literacy.

The investigation is framed in the sociocritical paradigm and qualitative nature since it presents an interventionist and transforming tendency in the teaching of mechanics in the 1st Cycle of Basic Education.

Education

Estratégias que visam potenciar a transição e a inclusão de estudantes com NEE no Ensino Superior

Evelyn Santos, Dayse Neri de Souza, Paula Santos, Paula Vagos

Numa perspetiva de educação para todos e de equidade de oportunidades, o presente pitch sustenta-se numa investigação de doutoramento em curso, a partir de uma perspetiva de cariz quali e quantitativo, compartimentado por dois diferentes estudos (Estudo 1 e Estudo 2) que se entrelaçam. Desta forma, objetiva-se apresentar os aspectos referidos como essenciais para a transição e inclusão de estudantes com Necessidades Educativas Especiais (NEE), seus familiares, colaboradores de Instituições de Ensino Superior Portuguesas e de escolas do distrito de Aveiro (Estudo 1) e dar a conhecer o PIP, um Programa de Intervenção Psicossocieducativo, que visa potenciar a transição e a inclusão de estudantes com NEE no Ensino Superior, por meio do desenvolvimento, implementação e avaliação de um programa presencial de curta duração para os familiares (Estudo 2). Tal como corroboram diversos investigadores, existe uma correlação entre o suporte familiar eficaz e o que ele providencia para o ajustamento académico e a inclusão do estudante com NEE ao nível do ensino secundário. Neste sentido, espera-se que o PIP possa ser uma ferramenta que potencie esta transição também para o Ensino Superior. Importante salientar, pelos resultados obtidos, que com o apoio deste tipo de programas de intervenção, de modalidade presencial, com um pequeno grupo e de curta duração, os familiares passam a constituir um espaço de partilha de experiências e a conhecer as perspetivas de outros familiares, com problemáticas semelhantes e também diferentes das suas, mas que propiciam um leque de novas possibilidades de estratégias, compreensões e reflexões sobre os principais fatores que interferem e/ou afetam os filhos na transição e ajustamento no Ensino Superior. Os resultados conseguidos até o momento favoreceram a perceção de alguns dos reveses enfrentados no âmbito da inclusão, dando a conhecer as inúmeras estratégias que tem sido atentadas pelos diferentes grupos de participantes (estudantes com NEE, familiares, colaboradores de Instituições de Ensino Superior Portuguesas e de escolas do distrito de Aveiro), principalmente no grande grupo das acessibilidades (digitais, materiais, culturais, atitudinais, estruturais, físicas, de entre outras). Desta forma, constata-se que os estudantes com NEE têm vindo a desafiar barreiras e a enfrentar obstáculos e desafios com êxito e que a inclusão para ser estabelecida, de entre outras estratégias, precisa ser um processo afetivo para que possa ser efetivo.

Education

Práticas de documentação pedagógica em creche. Um estudo em Portugal e no Brasil

Flávia Gontijo, Gabriela Portugal, Luciana Ostetto

Adotando como pano de fundo as recomendações nacionais e internacionais para a utilização de registros e documentação pedagógica (DP) como forma de acompanhar e avaliar oas aprendizagens das crianças assim como práticas educativas, a finalidade desta investigação é entender o que se pratica como DP em creches no Brasile em Portugal e refletir sobre as suas implicações conceptuais e pedagógicas, nomeadamente ao nível das práticas de planejamento e avaliação. Para essa pesquisa, portanto, nos interessa pensar na especificidade do modo como professores planejam e avaliam suas práticas e as aprendizagens das crianças na e a partir da DP. Porque os primeiros anos de vida são fundacionais e se a creche é um espaço educativo e não apenas de cuidado, torna-se pertinente conhecer que processos de DP acontecem nestes contextos, e que implicações a experiência em documentar traz nas concepções e práticas pedagógicas.

Education

Percursos de inclusão de crianças com deficiência visual na escola primária em moçambique: desafiar barreiras

Gracinda Siyawadya, Manuela Gonçalves (Universidade de Aveiro), Rosa Madeira (Universidade de Aveiro), Antonio Braço (Universidade Licungo)

As preocupações com a universalização do acesso ao ensino primário e com a educação inclusiva têm vindo a ser focalizadas como escopo de políticas no âmbito da educação à escala transnacional e também no contexto nacional Moçambicano. Contudo, apesar da evolução positiva das taxas de escolarização neste país, muitas são as crianças que não se encontram no sistema escolar; e a inclusão escolar de crianças com deficiência, especificamente deficiência visual (DV), está longe de ser uma realidade.

Neste seguimento, a finalidade do presente projeto consiste em contribuir para a promoção da educação inclusiva de crianças com DV no ensino primário na cidade da Beira, em Moçambique, ampliando o conhecimento científico, atualmente muito escasso, sobre esta problemática. Para tal, desenvolver-se-á, através do método da investigação-ação participativa, uma proposta socioeducativa para a inclusão de crianças com DV no ensino primário, fundamentada na compreensão das condições sociais, culturais e psico-pedagógicas que moldam os processos de inclusão escolar destas crianças.

A investigação, de natureza qualitativa, sustenta-se no paradigma sociocrítico, tendo como participantes centrais crianças inseridas no sistema escolar (Instituto de Deficientes Visuais da Beira - IDV e escolas primárias da cidade da Beira), suas famílias e professores, e diretores de escolas. Análise documental (AD), Analise de Conteúdo (AC) entrevistas semiestruturadas (ES), focus groups e conversas informais (CI) serão as técnicas privilegiadas para a recolha/geração de dados.

Education

Formação de professores de português- língua e justiça social: um estudo sobre o currículo universitário no contexto amazônico

Helane Fernandes, Supervisors Ana Isabel Andrade

O estudo 'Formação de professores de português- língua e justiça social: um estudo sobre o currículo universitário no contexto amazônico' coopera com o atual movimento intelectual que procura romper com o modelo de formação profissional historicamente imposto, determinado pela racionalidade econômica capitalista de pensar a educação, a formação de professores e as práticas de uso da língua que colaboram com a manutenção das desigualdades sociais. Seu propósito investigativo gira em torno do tema formação de professoras/es de português para a promoção da justiça social. Seu objetivo maior é compreender o currículo de formação de professoras/es de língua portuguesa e seu contributo para a promoção da justiça social. Apoia-se nos estudos de perspectivas teóricas emancipatórias sobre educação, fundamentadas na pedagogia da libertação, nos movimentos pedagógicos contra hegemônicos, no pensamento descolonial, nos estudos críticos do discurso e nas noções de justiça social como participação e reconhecimento. Metodologicamente, o estudo foi conduzido dentro do paradigma interpretativo e de natureza qualitativa, com os planos de investigação estudo de caso, investigação participante e metodologias etnográficas na pesquisa em educação. Para a constituição do corpus, utilizou-se diferentes estratégias tais como a observação participante, levantamento de documentos, observação participante, entrevistas e aplicação de questionários. A análise dos dados foi realizada dentro de uma abordagem que uniu a análise crítica educacional e os estudos críticos do discurso, baseada na interação de estratégias de análise como a Análise do discurso e Análise de conteúdo. Entre outros resultados, destacam-se que: (i) língua desempenha papel importante na execução das pedagogias contra hegemônicas ao longo da história da educação, nesse sentido o estudo dessas pedagogias e seus precursores devem fazer parte de um currículo de formação de professoras/es de línguas para a justiça social (FPLJS); (ii) existe uma coerência intelectual entre as noções de justiça social como participação e reconhecimento, a concepção interativa e discursiva de língua e o pensamento descolonial, sendo essas noções pertinentes na composição de um currículo para a FPLJS; e que (iii) a noção de justiça social como participação e conhecimento, a perspectiva interativa, dialógica e polifônica de língua e a teoria crítica do discurso são campos de estudo que colaboram entre si para o remédio das injustiças sociais por meio da compreensão e transformação de práticas comunicativas opressivas. O estudo e seus resultados ajudaram a constituir uma agenda para a formação de professores de português no contexto amazônico - Brasil.

Education

Mobile learning no desenvolvimento de competências matemáticas: estudo de caso no ensino médio do instituto federal de Pernambuco

Hugo Dantas, Isabel Cabrita

No Brasil, existem mais dispositivos ativos de telefonia móvel do que habitantes e esses aparelhos estão presentes na maior parte das residências. É principalmente pelo celular que os brasileiros acessam à Internet. No contexto educativo brasileiro, apesar das inúmeras limitações de recursos tecnológicos, existiram leis para coibir o uso dos celulares em salas de aula e há professores que resistem à sua utilização. Por outro lado, há cada vez mais investigadores a defender um uso inteligente das tecnologias móveis no processo educativo, designadamente em matemática.

Neste contexto, concebeu-se um projeto de investigação que visa analisar o impacto de uma adequada exploração de tecnologias móveis no desenvolvimento de competências matemáticas transversais e específicas em estudantes do ensino médio/técnico do Instituto Federal de Educação, Ciência e Tecnologia de Pernambuco.

Optou-se por um estudo de casos múltiplos, de natureza qualitativa e interpretativa, envolvendo estudantes de três turmas de três campi distintos do IFPE. Os dados recolhidos, principalmente, através das técnicas de observação, recolha documental e inquirição, serão alvo de análise estatística descritiva e de conteúdo orientada por um sistema de categorias definidas a priori. Não se exclui, no entanto, uma definição recursiva das mesmas.

Espera-se que os resultados obtidos nos permitam refletir sobre as condições que potenciam a exploração de tecnologias móveis e as suas ressonâncias nos processos de ensino mas, principalmente, de aprendizagem dos estudantes dos referidos cursos.

Education

Desenvolvimento Profissional do Professor do 2º Ciclo do Ensino Básico em Moçambique: Contribuição Didática dos Saberes Locais

José Chamo, Professora Doutora Ana Carlota Teixeira de Vasconcelos Lloyd Braga Fernandes Tomaz, Professora Doutora Filomena Rosinda de Oliveira Martins

O desempenho do professor tem constituído uma das temáticas mais questionadas nas abordagens sobre a qualidade de ensino em diferentes contextos educativos. Moçambique por ser um país caracterizado por uma enorme diversidade cultural, no currículo do ensino

básico, centralmente definido, preve-se que sejam abordados na sala de aula os conhecimentos contextualizados, denominados Saberes Locais, facto que concorre para novos desafios para as práticas educativas dos professores. Deste modo é importante que estes conheçam os contextos educativos, valorizem a diversidade cultural e os saberes locais e desenvolvam atividades de ensino a partir desses saberes, enquadradas por uma educação intercultural. Para que os professores sejam capazes de dar resposta a estes desafios é necessário criar-se espaços de formação nas escolas que contribuam para o seu desenvolvimento profissional. Estudos anteriores realizados em Moçambique mostram que os professores por não estarem preparados nem possuírem uma formação específica sobre as formas de integração dos saberes locais apresentam muitas dificuldades nas práticas de ensino e aprendizagem que envolvem esta componente.

O estudo a realizar tem como finalidade construir conhecimento sobre o papel didático dos saberes locais no desenvolvimento profissional dos professores, por se reconhecer o seu contributo na promoção de aprendizagens significativas nos alunos e o desenvolvimento de competências profissionais nos professores. Trata-se de um estudo de caso, de natureza qualitativa, a desenvolver na Escola de Danga, Província de Sofala, em Moçambique, enquadrado no paradigma interpretativo.

Education

Administração Local da Educação em Angola: A intervenção dos municípios em contexto centralizado de administração educativa

José Zacarias, António Augusto Neto Mendes

A presente investigação elege como objetivo central analisar as potencialidades e os constrangimentos que se colocam à ação dos municípios na educação, em Angola, ante uma administração centralizada, e as suas implicações na eficácia e equidade das políticas educativas. De cariz, eminentemente, qualitativa, e ancorada no paradigma interpretativo, nesta pesquisa optar-se-á por uma abordagem do tipo exploratória e descritiva. Com efeito, dado o contexto em que se pretende navegar nesta investigação, para além da análise do corpus bibliográfico e normativo existente, serão também entrevistados alguns atores locais da educação, nomeadamente: administradores municipais, diretores municipais da educação, representantes de sindicatos de professores, representantes de comissões de pais e encarregados de educação, técnicos e chefes de divisões dos serviços educativos dos municípios, bem como representantes de outras organizações da sociedade civil. A aludida entrevista visará recolher as perceções em torno da ação dos municípios na educação e suas implicações para a eficácia e equidade do serviço público de educação. Espera-se que o presente trabalho venha a subsidiar a conceção e implementação de medidas com vista a uma maior participação dos municípios na educação, e melhoria da prestação do serviço educativo, ao nível local.

Education

Relações intergeracionais entre crianças e idosos: diálogos, práticas e perspectivas

Márcia Leardine, Orientadora: MARIA HELENA ALMEIDA BEIRÃO DE ARAÚJO E SÁ,Coorientador1: LILIANA XAVIER MARQUES DE SOUSA,Coorientador2: MARIA GABRIELA CORREIA DE CASTRO PORTUGAL

Esta investigação toma como objeto as relações intergeracionais (RI) em idades extremas (infância/velhice), em contexto de instituições educativas/apoio social que trabalham com estas duas populações e tem como finalidades: identificar e descrever, designadamente nas suas intencionalidades e configurações educativas, práticas existentes neste domínio; analisar os possíveis contributos no desenvolvimento de competências de diálogo intercultural (DI) dos envolvidos num projeto em parceria com uma instituição educativa que ofereça esta dupla valência; elaborar, com base nos resultados obtidos, um referencial de formação e de intervenção que contribua para fomentar práticas intergeracionais. Motivadas pela convicção que a interculturalidade é inerente ao diálogo; ocorre entre sujeitos que se (re)conhecem de universos culturais plurais e que constroem entre si pontes; só nos tornamos sujeitos na interação com Outros diversos, espera-se que esta investigação possa colaborar para incrementar a sua qualidade das RI, tornando-as mais relevantes e pertinentes para a construção de práticas contextualizadas de DI.

Education

Music Education in Secondary School: didactic contributions to quality education

Maria João Vasconcelos, Helena Caspurro, Nilza Costa

The focus of this study lies in the need to debate theoretical and practical perspectives on the teaching, learning and assessment of music, specifically within the scope of the basic education curriculum, which can enhance and provide more effective responses to what is currently sought for quality education for all (UNESCO, 2015). In the context of the Music subject, there is a tendency to value forms of knowledge based on performative reproduction of music. That is, of products or responses resulting mainly from what the teacher taught and not so

much from processes and results of what the student was able to learn based on the possibilities generated and focused on discovery, action and creativity. Thus, this project assumes a didactic thinking and acting, by a teacher-researcher (author of the project), directed to the development of creative-musical thinking in the subject of Music in Secondary School*. The principle "sound before symbol"/"sound before sign" (McPherson & Gabrielsson, 2002; Mills & McPherson, 2006), processes based on problem solving and the acquisition of specific music and transversal skills (collaborative work, communication, self/hetero evaluation) will be highlighted. This way, the didactic action of the teacher-researcher assumes a coherence between the triple teaching & learning & assessment, as advocated by several authors (e.g. Fernandes, 2009; Fautley, 2010). This presentation reports on the results obtained in the exploratory study even though it generically addresses the objectives and methods of all study.

*Designated in Portugal as "3º Ciclo do Ensino Básico".

Keywords: Musical learning; Teaching, learning and assessment; Critical and creative thinking; Problem-based learning

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Education

Processo de inclusão de "estudantes" com Dificuldades Intelectuais e Desenvolvimentais no Ensino Superior

Marisa Machado, Paula Coelho Santos, Marilyn Espe-Sherwindt

Apesar de as instituições de Ensino Superior (ES), em Portugal, se encontrarem a transformar as linhas de ação para possibilitar o acesso e a frequência de estudantes com deficiência, a extensão dessas medidas ao grupo de jovens com Dificuldades Intelectuais e Desenvolvimentais (DID) ainda está em vias de ser alcançada.

No entanto, após a conclusão da escolaridade obrigatória, tal como acontece com os seus pares sem DID, há jovens com limitações ao nível do funcionamento intelectual e do Comportamento Adaptativo que desejam continuar a sua formação académica no ES.

Apesar do aumento, ao nível internacional, da implementação de programas inclusivos no ES, constata-se que, em Portugal, é ainda um processo a carecer de desenvolvimento.

Assim, procedeu-se ao desenvolvimento de uma investigação - Projeto InclUA -, visando explorar e gerar condições para compreender como pode ser desenvolvido o processo de inclusão desta população no ES e quais as transformações a operar.

A investigação compreende três estudos, a saber: Estudo I – Participação em Unidades Curriculares de cursos de licenciatura; Estudo II – Participação em módulos curriculares específicos desenvolvidos; e Estudo III – Projeto de Investigação Inclusiva.

Os dados preliminares gerados sugerem que, com apoios e as metodologias pedagógicas apropriadas, é desejável, desejada e possível a inclusão de estudantes com DID no Ensino Superior.

Despite evidences Higher Education (HE) institutions, in Portugal, are increasing actions to enable access and attendance of students with disabilities, the extension of these measures to young people with Intellectual and Developmental Disabilities (IDD) isn´t yet accomplished.

After completing high school, there are students with limitations, as intellectual functioning and Adaptive Behavior who wish to continue their education in HE but find no options to fulfill this dream.

At the international level, the implementation of inclusive programs in HE has increased, however, in Portugal, it´s still at a very early stage of development.

Hence, an investigation was developed - Project InclUA -, aiming to explore and generate conditions to understand how inclusion process of this population can be developed and what transformations are necessary to achieve this purpose.

The investigation included three studies: Study I – Participation in Curricular Units of bachelor degree; Study II - Participation in curricular modules specifically created; and Study III - Inclusive Research Project.

The preliminary results obtained from the generated data suggest that it is absolutely possible to include these students in HE, with support and the appropriate pedagogical methodologies

Education

Programa de Ensino Experimental das Ciências no 1.º CEB: da Organização Curricular à Avaliação da Aprendizagens

Patrícia Christine Silva, Ana Valente Rodrigues, Paulo Nuno Vicente

O presente estudo consiste no desenvolvimento (conceber, planificar, produzir, validar, implementar e avaliar) de um programa para o ensino experimental das ciências no 1.º CEB que integra: i) uma proposta curricular de ensino experimental das ciências sequencial e sistemática ao longo dos quatro anos; ii) atividades e recursos didáticos de suporte à sua implementação em contexto letivo; e iii) uma componente de avaliação de aprendizagens focado no desenvolvimento de competências científicas que inclui atividades (ex. serious games) e instrumentos de registo de avaliação.

Este projeto visa a promoção da literacia científica desde os primeiros anos e tem por base a orientação CTS & IBSE e será desenvolvido tendo por base uma experiência piloto que conta já com sete anos de existência: Escola Ciências Viva de Vila Nova da Barquinha – Centro Integrado de Educação em Ciências.

Este estudo de natureza qualitativa enquadra-se no paradigma socio-crítico e assenta no método de Design-Based Research com o intuito de resolver problemas em contexto real tendo por base ciclos iterativos, envolvendo investigadores, professores, alunos, programadores e designers. Como técnicas de recolha de dados destacam-se o focus group, observação, inquérito e compilação documental recorrendo aos: questionários, entrevistas, notas de campo e diário de investigadora. A técnica de análise de dados envolve a análise de conteúdo.

Como principal produto do estudo, pretende-se a disponibilização online do PEEC, em formato digital e não digital, para ser usado de forma livre por todos os professores do 1.º CEB, bem como em contextos de formação inicial e contínua.

Education

Desenvolver a Educação para a Sustentabilidade Ambiental na Formação de Futuros Professores de Matemática do 2.º Ciclo em Angola

Paxe Amazonas, Teresa Neto, Fátima Paixão

Um dos objetivos do desenvolvimento sustentável para 2015-2030 é garantir a sustentabilidade ambiental através da proteção dos ecossistemas. Em Angola, a legislação tem vindo a refletir preocupações com o meio ambiente. O nosso estudo tem por objetivo desenvolver um programa de formação de futuros professores de matemática, do 2.º Ciclo do Ensino Secundário de Angola, que favoreça uma educação para a sustentabilidade ambiental explorando matemática realista. Os participantes da investigação são estudantes, futuros professores de licenciatura em ensino de Matemática. Trata-se de uma investigação com uma abordagem metodológica de natureza qualitativa, na modalidade de estudo de caso, uma vez que é descritiva e interpretativa. Este estudo visa contribuir para a construção de conhecimento na área da Educação para a Sustentabilidade Ambiental com vista a favorecer práticas e políticas de formação de professores no sentido de uma formação de cidadãos informados para a relevância da inter-relação entre Ciência, Tecnologia, Sociedade e Inovação.

Education

Inovar e formar para a articulação de práticas educativas em contextos exterior e interior na educação pré-escolar

Raquel Ramos, Aida Maria de Figueiredo Ferreira, Ana Maria Sarmento Coelho

A presente investigação propõe-se a conceber, implementar e avaliar um programa de formação colaborativa (PFC) blended (presencial e online), em Educação Pré-Escolar (EPE), integrado no projeto "Limites Invisíveis: Educação em Ambiente Natureza" (LI) e com os Jardins-de-Infância (JI) que nele participam, no sentido de articular práticas educativas em contextos exterior, designadamente natureza, e interior.

O projeto emergiu das preocupações apontadas pelas investigações atuais relativamente à ausência de oportunidades de ação da criança no espaço natureza e as suas repercussões ao nível da sua saúde e desenvolvimento cognitivo, socio-emocional, motor e consciência ambiental.

Através de um estudo de caso, de natureza qualitativa, pretende-se avaliar os contributos do PFC referido, por um lado, na reorientação das conceções e práticas educativas de quatro educadores(as) antes e após a sua participação no PFC, recorrendo-se a múltiplas técnicas de recolha e tratamento de dados – diário do investigador, análise documental, entrevistas semi-estruturadas, observação participante, registos escritos, fotográficos e em vídeo e análise de conteúdo com apoio do software Webqda, e, por outro lado, na qualidade das experiências desenvolvidas com vinte e quatro crianças, através da aplicação da escala de bem-estar emocional e implicação de Portugal e Laevers (2018), antes, durante e após o PFC.

O estudo poderá contribuir para o desenvolvimento de estratégias inovadoras em contextos diversificados, numa abordagem transversal, através do trabalho colaborativo e articulado entre profissionais – investigador, coordenadores, educadores(as), auxiliares e especialistas na educação em ambiente natureza. Em última análise, a pertinência deste projeto advém da necessidade de investigação, formação e intervenção na área, bem como do contributo e implicações que aspira alcançar na qualidade das ofertas educativas e formativas em Portugal.

Education

Metanálise da Política Pública PROEJA - Programa de Integração da Educação Profissional à Educação Básica na Modalidade Educação de Jovens e Adultos no Estado da Bahia -Brasil

Tânia Flores, Supervisors: Prof. Drª Dora Maria Ramos Fonseca

Este estudo sustenta-se no conhecimento da necessidade de avaliação da execução das políticas públicas educacionais, especialmente aquelas destinadas à Educação de Jovens e Adultos – EJA, justamente pelo seu caráter inclusivo tanto no sistema educacional, do qual esses sujeitos, notadamente pelas desigualdades sociais e de acesso à educação, foram excluídos, como no mundo do trabalho pela qualificação profissional. Dado o processo histórico de exclusão dos sujeitos da EJA, a avaliação da política pública PROEJA - Programa de Integração da Educação Profissional à Educação Básica na Modalidade Educação de Jovens e Adultos - é de suma importância no sentido de se perceber possíveis desvios, distorções ou outras nuances que distanciem a execução da política dos seus objetivos e, assim, sinalizar alternativas para que a política alcance os objetivos propostos. O presente projeto de investigação circunscreve-se no paradigma interpretativo, de natureza predominantemente qualitativa, visto que se propõe a avaliar uma política pública em execução há 13 anos, e os órgãos responsáveis pelo seu monitoramento/avaliação alegam não possuir dados sobre seus impactes. Dada a sua relevância social, por ser uma política inclusiva com vistas à emancipação dos sujeiros da EJA, essa avaliação, através da metodologia de metanálise qualitativa, tendo como corpus investigações dos cursos de pós-graduação strictu senso dos programas de educação de universidades brasileiras, é fundamental para que se tenha um panorama geral sobre sua execução e impactes no Estado da Bahia, que compõe o Nordeste brasileiro, região cujo Índice de Desenvolvimento Humano – IDH – e indicadores educacionais configuram-se entre os mais baixos do país

Education

Abordagem da Diversidade linguística e cultural nos discursos e nas práticas de ensino e aprendizagem de LP em Moçambique

Tomásia Mataruca Nhazilo, Maria helena Araújo e Sá

A diversidade linguística e cultural de Moçambique, ainda, não se vê integrada, de forma efetiva, na escola, o que constitui um problema em relação a construção da identidade dos alunos e da cidadania mais participativa. Este projeto parte desta problemática, definindo como objeto de estudo a abordagem da diversidade linguística e cultural nas práticas comunicativas da aula de LP, 8ª classe, em Moçambique.

O estudo é de natureza qualitativa, paradigma interpretativo com design de estudo de casos múltiplos e será realizado em três escolas de Maputo. A recolha de dados recorre às seguintes técnicas e instrumentos: i) observação não participante com recurso a áudio e vídeogravações das práticas comunicativas dentro da sala de aulas; ii) questionário aos alunos e entrevista semi-estruturada aos professores; iii) documentos reguladores e manuais de LP da 8ª classe. A análise dos dados fudamenta-se na análise de conteúdo cujos resultados serão validados por um grupo de especialistas.

As conclusões deste estudo contribuirão para a compreensão das reais práticas de abordagem da diversidade linguística e cultural no contexto de ensino-aprendizagem da LP em Moçambique, o que poderá, posteriormente, fazer-se refletir na formação dos professores, através do desenho de programas de formação que visem torná-los mais conscientes e mais crítico-reflexivos sobre as suas escolhas e práticas profissionais enquanto professores de LP num contexto de diversidade.

Education

A disciplina de História no ensino primário em Angola: do currículo instituído ao implementado e propostas de melhoria

Vita Emanuel, Nilza Costa, Isabel Barca, Maria Helena Araújo e Sá

O presente estudo objetiva a análise dos pressupostos político-normativos e teórico-metodológicos do currículo instituído da disciplina de História (5ª e 6ª classes) no Ensino Primário (EP) em Angola e sua relação com as conceções e práticas pedagógico-didáticas (PD) de professores na gestão do processo de ensino-aprendizagem-avaliação da disciplina. Trata-se, em suma, de um estudo cuja finalidade é a compreensão das relações entre o currículo instituído e implementado no quadro da disciplina de História. O estudo empírico enquadra-se no paradigma interpretativo, de natureza essencialmente qualitativa e com uma abordagem de Estudo de Caso, que envolverá todos os professores e coordenadores da 5ª e 6ª classes de uma escola pública do EP na província de Luanda. A recolha de dados será feita através das técnicas de análise documental, inquérito e observação participante e inclui uma variedade de instrumentos, como grelha de análise dos programas curriculares, entrevista e diário do investigador, visando a validade interna da investigação. O tratamento de dados será feito com recurso à análise de conteúdo. Como contributo, pretende-se potenciar a qualidade do ensino da História através da "voz" do currículo instituído e implementado e sua articulação.

Palavras-chave: Ensino Primário em Angola; Currículo(s) de História; Disciplina curricular de História; Conceções e práticas de professores.

Education

Electrical engineering

Optimization of Hybrid Structures in Integrated Photonics

Adebayo Emmanuel Abejide, Prof. António Luís Jesus Teixeira , Prof. Mario Lima

Increase of data rate and mobility in future networks (5G and beyond) require increase of data travelling in the networks. This can be adequately achieved with Photonic Integrated Circuit (PIC) but these introduce new quest for the components since maturity of integrated photonics is still ongoing. Optimizing Hybrid combination of components will allow bringing the best out of each components. With this approach, the performance of actual integrated photonics components can be increased. Using simulation and modeling of existing key components (lasers, modulators, receivers, filters and amplifiers), optimized and simplified combinations can be obtained with increased reach and data rate

Electrical engineering

Energy Harvesting Mechanisms for Smart City Solutions.

Ajibike Eunice Akin-Ponnle, Prof. Nuno Borges Carvalho.

Energy Harvesting proffers solution to the energy challenge of wireless sensor networks by enabling them to physically or chemically scavenge ambient energy from the environmental sources either by natural or man-made phenomena. In our work, we propose a Hybrid Energy Harvester (HEH) from existing forms of energy harvesting techniques, while also exploring new methods. This is with the motive of providing a system of ubiquitous and self-sustaining energy supply to an IoT network, whereby there will be no need for replacement of batteries or connection to the grid.

Electrical engineering

Resource Management in B5G user-centric cell-free networking

Alaa AlZailaa, Supervisor: Prof. Dr. Rui Aguiar. / Co-supervisor: Dr. Ayman Radwan.

The 5G has come to light and becomes a reality which now used in some countries. In this presentation, I will mention the features and drawbacks of 5G. Then the desired solutions from Beyond 5G. The Ph.D. work will focus on managing heterogeneous network components and find the best way to achieve high reliability.

Electrical engineering

Smart Antennas for the Future Low-Earth Orbit Satellite Constellations

Amélia Ramos, Prof. João N. Matos, Dr. Tiago Varum

Half of the world's population is not online and empowered by many space industries there is an on going distribution of Low-Earth Orbit (LEO) satellites which will allow to reach remote areas with less economical power. One of the key elements in this future communication systems is the antenna element and thus the main goal is to develop an adaptive antenna structure, suitable to for tracking satellites and aligning its beam with the most favorable. Meanwhile the antenna prototype will be integrated efficiently with the compact RF frontend, lowering production costs and easing mass production.

Electrical engineering

Packaging of Photonic Integrated Circuits

Ana Tavares, António Teixeira

The industrial sectors where optical components are used will evolve together with (and as a consequence of) the photonic integration evolution. Examples of this are the telecommunications and sensors sectors. PICs (Photonic Integrated Circuits) are already a reality but not yet fully ready to the market. One of the main challenges is their packaging which is very sensitive and includes several features: thermal efficiency, opto-electronic interface performance and fiber alignment are some of the most important.

This work intends to study and develop new packaging techniques for this kind of chips, customizable and with good performance in all components.

Electrical engineering

Optimization of industrial communication systems based on 5G

André Perdigão, Rui Aguiar

As everyone knows, 5G will have a big impact on the world with its improvement in the network, but it will also cause a major transformation in the industry that can finally implement the Industrial IoT, which will connect everything in production to the network. The implementation of IIoT will bring a huge change in the way factories operate.

Electrical engineering

Adaptive Transceivers for Elastic Access Networks

Beatriz Oliveira, Fernando P. Guiomar, Maria C. R. Medeiros, Paulo P. Monteiro

The steadily growing traffic demands impose high capacity and low latency requirements in future networks. For example, fronthaul links should be able to provide beyond 400 Gbit/s to cope with the demands of the emerging 5G communications. With the current digital radio-over-fiber approach based on binary modulation, this can only be achieved at the expense of transmitting several channels multiplexed in the wavelength domain. Coherent optical transceivers have been proposed for the fronthaul link because their robustness allows higher order modulation formats, thus increasing spectral efficiency and potentially solving the fronthaul bottleneck. This will reduce the number of transceivers at the expense of more complex digital signal processing (DSP). Therefore, the use of coherent communications will only be commercially attractive if it brings an effective reduction of both cost and power consumption per transmitted bit. In this presentation, these topics are discussed, and some major contributions are presented.

Electrical engineering

A GaAs-based Active Phased-Array Antenna-on-Chip for Satcom-On-The-Move Applications

Bernardo Lopes, João Matos, Nuno Carvalho, Ricardo Correia

The ever-increasing global demands for inter-connectivity, higher coverage, higher bandwidth and lesser latency is putting a strain on the capacity of satellite communication. The blooming of the smart antennas technology has driven researchers to utilize its added benefits such as, the ability to adjust the antenna's beam pattern to highlight the level of signals of interest and yet minimize the interfering signal's level, to enhance network capacity throughout the most relevant areas of wireless communication systems such as 5G and Satcom. Advanced and highly integrated Galium Arsenite (GaAs) systems will be a competitive technology to reduce hardware cost and enable high performance, single-chip and mmWave front-ends. This PhD aims to contribute to the development of K/Ka-band System-on-Chip for Satcom-On-The-Move purposes by exploring the use of GaAs substrates. The main goal is to implement and characterize a GaAs Active Phased-Array Antenna-on-Chip contributing to the future use of smart antennas.

Electrical engineering

RF Power Amplifier Design using Artificial Intelligence

Catarina Belchior, Luís Nunes, Pedro Cabral

The next generations of communication systems will need to fulfill very demanding requirements which will certainly impact the usual component design methodologies and constraints taken into account during project stages. Due to their impact on the overall system performance, power amplifiers are key elements to be studied.

The traditional power amplifiers design flow is driven by specific requirement sets which, due to complexity reasons, renders the process inflexible design rules. Whenever there is a need to a specific modification a complex and timely design process must be repeated with no guaranteed success. The objective of this PhD work is exactly to incorporate artificial intelligence in the overall power amplifier design process giving the possibility to generate optimal new designs with no human interaction in record time.

Electrical engineering

Highly Linear and Efficient Power Amplifiers for Massive MIMO Transmitters

Cristiano Gonçalves, Pedro M. Cabral, José C. Pedro

Radio Frequency (RF) Power Amplifiers (PAs) are designed to operate with a fixed load. However, in 5G massive MIMO antenna arrays, due to mutual coupling between contiguous antenna elements, they can operate under load varying scenarios, where their performance can be severely degraded. The objective of this work is to reduce the performance degradation of PAs under these load varying conditions.

Electrical engineering

Energy Efficient Transmitters for Far-Field Wireless Power Transfer Applications

Daniel Belo, Pedro Pinho, Nuno Carvalho

This doctoral work plan will focus on new design approaches for dedicated far-field WPT, from a system perspective. Both transmitter and receiver will be designed in order to cooperate to achieve higher transmission efficiency. Special attention will be given to the design of alternatives to generate suitable waveforms, their amplification and radiation. It is expected to have a full working demonstrator with features that may lead to advances to the state-of-the-art of far-field WPT systems' power management, tracking/localization and

wake-up radio techniques. All these techniques shall be compatible with battery-less receiving devices. Due to their low power operation principle, backscatter communications are usually associated to these systems to provide data transfer. However, backscatter communications have several major limitations, being the most important one the short transmission range. Thus, in this doctoral work plan it is also planned to provide alternatives to further extend their communication range.

Electrical engineering

Noise in CV-QKD

Daniel Pereira, Nuno A Silva, Armando N Pinto

Continuous Variable Quantum Key Distribution (CV-QKD) has been intensely studied due to the its ability of distributing quantum secure cryptographic keys using telecom grade material. CV-QKD works by encoding information in the phase and amplitude of weak coherent states. The weak nature of these states makes any extra noise a substantial impairment. In order to make these systems widely available it is of paramount importance to identify all noise sources, quantify and minimize their impact on the protocol's security and perform accurate real-time estimations of their parameters.

Electrical engineering

Multi-Input Radiofrequency Power Amplifier Architectures

Diogo Barros, Pedro Miguel da Silva Cabral, José Carlos Esteves Duarte Pedro

The aim of this PhD research project is to study and model the mechanisms that degrade the performance of wideband power amplifiers and, thus, limit their instantaneous bandwidth under wideband and multi-band excitation. Additionally, this work also focuses on the development of improved PA design methodologies that take into account these mechanisms to optimize the performance of high-efficiency wideband PA architectures. In particular, a systematic design methodology for Doherty-Outphasing Continuum PAs will be developed to take full advantage of the wide RF bandwidth that this topology can achieve, and also simplify it's design procedure which is still highly reliant on heuristic Monte Carlo simulations and measurements.

The Doherty-Outphasing Continuum architecture is able to achieve a bandwidth higher than an octave while still keeping a high efficiency profile over a large OPBO, similar to what is obtained with Doherty and Chireix PAs. These characteristics make it an appealing architecture, as it can not only cope with the increasing bandwidth requirements but also with the large PAPR of current wireless communication signals and linearity requirements. Despite its strong potential, the best approach to design the analog output combiner and the respective input driving profiles for wideband and concurrent multi-band operation is still not fully developed.

Moreover, the actual performance of MISO PAs in the presence of wideband modulated signals is still not fully explored from a theoretical perspective. In fact, the mechanisms that degrade the performance of single-ended PAs under modulated signal excitation have been thoroughly explained theoretically very recently, as a direct product of the ongoing work of this PhD project.

Electrical engineering

Software Defined Radio Beamforming System for 5G/Radar Applications

Diogo Marinho, João Nuno Pimentel da Silva Matos; José Manuel Neto Vieira; Tiago Miguel Valente Varum

Based on the flexibility of software defined radio techniques applied to an array of antennas, this presentation presents a beamforming architecture designed to operate in millimetre-wave bands (28 GHz), with possible applications in radar and 5G systems. In addition is mentioned some drawbacks found while development of the systems that can be used as future work. in the particular case of phased array calibration.

Electrical engineering

Millimeter Wave Transceivers Design for IoT applications

Diogo Matos, Ricardo Correia, Nuno Borges Carvalho

With the emergence of 5G and the new space, the number of IoT devices that have been gradually increasing every year will increase even more, where all devices are interconnected. The objective of this work is to develop circuits in millimeter frequencies, which allow reducing the size of all the components of the systems, in order to make them more compact. For this, most of the work will be developed using integrated circuit technologies, in order to increase its efficiency, communication range, and with reduced power consumption.

Electrical engineering

Disaster-resilient network design and resource management of elastic optical networks

Fábio Barbosa, Amaro de Sousa, Agostinho Agra

Disaster based failures became more frequent in time and wider in scope, degrading drastically the communication services supported by telecommunication networks. This is of utmost importance since communication services are an important part of our society critical infrastructure. This issue is even more critical in core optical networks where a single optical fibre can carry a very large amount of service demands. When a disaster occurs, it is important not only to quickly recover the failed network elements (post-disaster problem) but also to evaluate and minimize the disaster impact on services between nodes outside the disaster area (pre-disaster problem). This work focuses on the pre-disaster problem and aims to enhance the preparedness of optical networks to disaster-based failures by exploiting the advantages of spectrally (provided by elastic optical networking) and spatially (provided by multicore fibres) flexible optical network planning and operations.

Electrical engineering

Artificial Intelligence and Acceleration in 6G Physical Layer

Fábio Coutinho, Arnaldo Oliveira

The introduction of the fifth-generation (5G) mobile network in the society is currently happening but given to the explosive growth in mobile data traffic and the necessity of elevating the Quality of Service (QoS) of key domains connected with human life, the emergence of the smart sixth-generation (6G) networks is an idealized future.

The 6G introduces the vision of providing connectivity to the global population as it allows people to modernize, innovate and balance opportunities for world development. In other words, ensures 'cost-efficient operation of society', in which Higher Frequencies (>100 GHz), Distributed Coherent Massive MIMO, Integrated Connectivity and Sensing, Artificial Intelligence (AI), Service-based Networks, flexible Topologies and Deployments, and Zero-energy devices, are technology component enablers of this new wireless technology.

AI is a key feature of 6G systems and some researchers predict the introduction of this technology at the edge of the network. An AI platform will be capable of offering intelligent services to the edge devices, where dedicated hardware capable of running AI algorithms are implemented, and this novel system is called 'AI at the Edge'. Other researchers look to the physical (PHY) layer as the target platform to introduce the AI and machine learning techniques, due to the necessity of channel coding and signal processing improvement (introduction of new multiple-access methods), synchronization enhancement (channel estimation and channel decoding) and link adaptation, developing a self-learning adaptive and dynamically reconfigurable architecture. Furthermore, the Intelligent Wireless Communications is a term introduced on the 6G systems, in which the AI technologies open the possibilities of PHY layer optimization owing to a wide variety of impairments in the reception chain, and it is presented as a solution for those problems.

In this thesis, intelligent wireless communication architectures and hardware acceleration in PHY Layer will be studied and investigated to obtain an innovative end-to-end PHY design, with improved performance and reduced complexity for target scenarios. The hardware platform will be the Field Programmable Gate Array (FPGA) considering the flexibility in the workflow and in the parallel computation, in which hardware-level programming is providing. Moreover, the Vitis Acceleration Libraries, Vitis AI and the Adaptative Compute Acceleration Platform (ACAP) will be explored, due to their software programmability, functionality acceleration for a wide range of scenarios, and dynamic adaptable reconfiguration.

Electrical engineering

Energy and Communication in IoT

Felisberto Pereira, Nuno Borges Carvalho, Pedro Pinho, Sérgio Ivan Lopes

The primary motivation behind this work comes from the need for new solutions to overcome the restriction that energy and communication impose in IoT systems. These solutions encompass passive, semi-passive, and active devices that use Wireless Power Transmission (WTP), backscatter, chipless and energy harvesting techniques. Whenever possible, these solutions should be directly applied to real application scenarios.

Electrical engineering

A Cooperative Jamming Technique to Protect a Two User Broadcast Channel with Confidential Messages and an External Eavesdropper

Gustavo Anjos, Dr. Daniel Filipe Marques Castanheira; Prof. Dr. Adão Paulo Soares da Silva

The challenge of protecting a non-orthogonal broadcast channel is related with the necessity of securing the system, not only against eavesdropping attacks originating from external nodes, but also to ensure that registered users do not eavesdrop on each other's information. To address this issue, the present work proposes a cooperative jamming scheme that provides protection against eavesdropping attacks carried out by inside users and external eavesdroppers. The developed scheme combines real interference alignment with a blind cooperative jamming technique defined in the literature. An information theoretical evaluation shows that positive secure degrees of freedom are achievable using the proposed solution.

Electrical engineering

Nonlinear Modeling of GaN HEMTs for RF and Microwave Applications

João Gomes, Luís Cótimos, Nikolai Sobolev

In modern telecommunication systems, the energy efficiency and linearity are of paramount importance. In a base station, the power amplifier is the most critical component that will determine the performance. To achieve simultaneously energy efficiency and linearity, Digital Pre-Distortion (DPD) is commonly used.

In a DPD system, a model of the behavior of the PA is used to correct for non-linear distortion introduced by the amplifier. Therefore, it is important to understand the root cause of observed non-linearities, such that they can me mitigated by technology changes when they cause issued for the DPD algorithms.

The aim of this PhD is to study the physical root of non-linear and dynamic effects observed in power amplifiers built with GaN HEMTs. The focus will be on modeling the transistor-level behavior. More specifically, to construct transistor models that allow to identify the physical phenomena influencing the amplifier performance in a DPD system.

Electrical engineering

Dynamic RF Transistor Behavioural Models for Power Amplifier Design

João Louro, Luís Nunes, José Carlos Pedro

The design of radio-frequency power amplifier (PA) architectures for wireless communication systems have been evolving so that, nowadays, the use of nonlinear transistor models is indispensable to fulfill the stringent requirements in terms of efficiency, linearity and bandwidth. Behavioral models are a good alternative for the cases where equivalent circuit models are very difficult to extract or when the foundries do not have time to provide them for the newest technologies. Unfortunately, although there are already several works to present dynamic

behavioral models for complete PAs, only a few works have dealt with the inclusion of the dynamics at transistor level, which is fundamental for PA design. The main objective of this PhD work is exactly to extract and conceive and implement a transistor dynamic behavioral model in a simulator, which is sufficiently fast and robust to be used for PA design.

Electrical engineering

Space Debris Radar Data Processing Techniques

João Pandeirada, José Miguel da Silva Bergano, Domingos da Silva Barbosa

Space debris is a current threat for satellites and space-based operations, both in-orbit and during the launching process. The yearly increase in space debris led to major space agencies like NASA/ESA to develop programs for dealing with debris. In 2014 the European Commission launched the EU Space Survey & Tracking (EUSST) program, aiming to establish a network of sensors in order to provide an SST services to the EU user community such as spacecraft operators and civil protection authorities. Portugal is a membre of the EUSST program and is developing capabilities both in optical and radar sensors. As part of the national EUSST project led by the national Ministry of Defense (MoD), Instituto de Telecomunicações is contracted to upgrade and operate its 9-metre Cassegrain Antenna with a new monostatic radar at 5.67 GHz that aims to provide information on objects in LEO orbits up to 10 cm2 of cross section at 1000 km radar range. This PhD aims the development in partnership with the space and defense industry of a fully automated signal processing algorithm toolset to operate radar at request, process object detections, derive orbital parameters, interface with an operational center to enable object identification and generate information catalogue files.

Electrical engineering

Hardware Virtualization and Software Acceleration based on Open Specification Architectures

José Domingues, Arnaldo Oliveira

The RISC-V is an open source instruction set architecture (ISA) that is based on reduced instruction set computer (RISC) principles. Not only does it avoid incremental development, but also its design is bound to be cost-effective, operate on small code sizes and simple, leaving space for growth. Since 2015 several implementations of this ISA have been portrayed, not only in FPGAs but also in ASICs. When compared to other ISAs ranging from commercial solutions to open-source ones like MIPS, RISC-V scientific publications have increased, providing motivation for this dissertation area. Besides being widely accepted for applications in embedded systems, its open source status allows for a freely evolution depending on the needs of the application. This dissertation's focus is on the development of hardware accelerators allied to a RISC-V processor. The main processor will offload tasks such as machine learning ones to the accelerators to achieve reduced execution times in specific tasks. The architectures will be implemented and prototyped on FPGAs.

Electrical engineering

Cooperative Transmit and Receive Techniques for massive MIMO Systems

Joumana Kassam, Supervisor: Prof. Dr. Adão Paulo Soares da Silva. / Co-supervisors: Dr. Daniel Filipe Marques Castanheira, Prof. Dr. Rui Miguel Henriques Dias Morgado Dinis.

In this presentation, I will talk about the motivation of my Ph.D. work and what is the main objective. As I started the doctoral program this year in the second semester, I will present the obtained results from the recent work about a hybrid beamforming technique designed for mMIMO and mmWave systems.

Electrical engineering

Waveforms and Signal Processing Algorithms optimized for cooperative scenarios

Leonardo Leyva Lamas, Atílio Manuel da Silva Gameiro, Adão Paulo Soares Silva, Daniel Filipe Marques Castanheira

Radio spectrum scarcity has become a problem for the telecommunication sector, motivating research new methods to manage more efficiently interference. One of these methods seeks to design from the ground up a system that jointly performs communication and radar functionalities, which is known as RadCom systems. This research project pursuit to design an advanced signal processing algorithm optimized for cooperative scenarios to achieve the convergence of sensing and communications functionalities at the millimeter-wave band (mmW).

Electrical engineering

Concealed target tracking using enhanced radar techniques

Luís Duarte, Luís Nero Alves, Carlos Ribeiro, Rafael Caldeirinha

Radar has been in existence for nearly a century with an initial interest towards military purposes and it had a recent steep growth trend due to a wide variety of industrial applications. Spatial reconstruction of the environment surrounding the radar becomes an important issue in many applications, including concealed-object detection, identification and tracking. With the foreseen radar massive deployment, interference is sought to be a bottleneck on future radar technology.

This thesis aims at addressing a novel radar using the Swept Time- Delay Cross-Correlator (STDCC) technique that presents high-resolution and multi-user operation with its good interference immunity. Its radar signal processing is based on all-digital binary sequences that represent a quantum leap in radar future front-end architecture, presenting significant advantages in terms of low baseband computational demand and low-cost radar system

due to its time-relaxed data acquisition and its all-digital waveform generation. In particular, the envisaged technique is sought to mitigate incumbent and mutual interference risks. This work will also address multi-PN transmission for direction-of-arrival estimation and radar imaging.

Electrical engineering

Millimeter Wave Signal Generation Propagation and Conditioning for access optical networks

Madhavareddy Kota, Antonio Teixeira

The usage of data rate is escalating day by day through the Internet of Things (IoT) devices. IoT devices, however, required more bandwidth, to fulfill the data requirements of users. Such high bandwidth is only available at millimeter-wave (mm-Wave), ISM band. This work is focused on the mm-Wave signal generation propagation and monitoring methods for IoT applications.

Electrical engineering

Quantum Technologies to Support Secure and Fast Multiparty Computation

Mariana Ramos, Professor Doutor Armando Nolasco Pinto; Doutor Nuno Alexandre Peixoto Silva; Professor Doutor Paulo Alexandre Carreira Mateus

Current Telecommunication networks have two big issues, that have been under discussion by scientific community: Security and Privacy. Security can be solved using Quantum Key Distribution (QKD) to implement symmetric cryptography. This is widely accepted in scientific community, since there already are comercial solutions in the market. Furthermore, there is an European project funded with 15 million euros to implement an European testbed for QKD.

On the other hand, privacy is a more complex problem to solve. Privacy is crucial in scenarios where multiple parties want to perform statistical analyzes using joint databases but keeping their inputs private. Secure Multiparty Computation (SMC) has occurred as a generic tool for computing on private data, since it has a natural advantage in solving security and privacy issues in a wide range of areas such as medical, financial and government applications.

Oblivious transfer arises as the cryptographic primitive to enable SMC implementation. In scenarios where multiple distrusted parties are connected in the same network and want to interact remotely, security, privacy and obviously speed are crucial, which makes the classical OT not feasible for SMC applications. Another approach is Quantum Oblivious Transfer (QOT) in conjunction with classical bit commitment. In this work, we propose an hybrid solution using QOT and classical bit commitment, using polarization encoded single-photons to transmit information.

Electrical engineering

Over-The-Air Characterization of 5G MIMO Systems

Marina Jordão, Prof. Nuno Borges de Carvalho, Prof. Arnaldo Oliveira, Prof. Rafael Caldeirinha

The main objective of this thesis work plan is to provide methodologies to characterize of MIMO antenna arrays and IoT devices in 5G scenarios Over-the-Air (OTA).

OTA methods are currently being explored to characterize and calibrate MIMO systems. In this sense, in this Ph.D. OTA techniques to characterize and calibrated MIMO antennas are presented with the main goal of improving MIMO systems operation, using multi-sines.

A thorough understanding of each antenna element contribution to the coupling factor when the beam is made to steer across the intended angular range is crucial for the design optimization of MIMO systems. In this sense, it will be present a characterization system that can be used to extract active reflection coefficients in MIMO antenna arrays when the antenna beam is steered along a specific direction.

IoT devices will play a significant role in 5G, such as RF-DC converters and backscatter systems, and measuring them to improve their efficiency is a requirement. Characterizing these devices taking into consideration different specifications such as multi-sines, voltage sweeping, and power is difficult, using only the traditional measuring equipment. Thus, methodologies combined with appropriate measurement strategies to characterize IoT devices will be a main goal in this work plan.

Electrical engineering

Energy Efficient Power Amplifier for Next Generation Mobile Handsets

Maryam Sajedin, Prof. Jonathan Rodriguez Gonzalez (orientador) Prof. Manuel Alberto Reis de Oliveira (coorientador) Prof. Mónica Fernández Barciela Esta (coorientador),Dr. Issa Elfergani (advisor)

This work aims to develop an energy efficient and broadband power amplifier (PA) for 5G mobile handset to enable very high speed connectivity through small cell technology. The active load modulation Doherty power amplifier (DPA) is one of the dominating architectures among efficiency enhancement techniques in both base station and handset PAs, due to its tunable efficiency characteristics and moderate linearity. As a first contribution, the advanced asymmetrical two-way Doherty topologies focusing on harmonic tuning approaches (ClassF/F^(-1)) have been researched theoretically. As a proof of concept, a systematic design approach of a wideband GaN HEMT Class-J DPA based on the second harmonic tuning has been proposed. Then, for realizing an energy-efficient, low cost, small size, and low power 5G user equipment, the integrated circuit implementation of DPA (MMIC DPA) has been investigated and aimed to design and develop at mm-wave frequency (26GHz) band frequencies based on a 0.15-µm enhancement mode (E-mode) GaAs pHEMT process that can support the 5G multiple carrier's transmission at RE-Front End.

Electrical engineering

Integrated approaches to energy management in service robots

Mojgan Ghanbari, Pedro Fonseca

In the past decades, due to rapid technology growth, the influence of Robots and Robotic technology features in our way of living is unavoidable. In The 21st century, efforts have been done to exploited new solutions in order to enhance their efficiency and working performances. Among the approaches, increasing accuracy to reduce faults as well as increasing operating time through energy autonomy management. Therefore, the goal of this work is to find and explore methods to increase the performance time of the robot

Electrical engineering

Visible Light Communication based Indoor Localisation

Neha Chaudhary, Luis Nero Alves, Zabih Ghassemlooy

In the current research work, we aim to achieve high-precision indoor localization techniques for indoor scenarios. The particularity of this work is the possible presence of objects or obstacles in the environment and the different probable configurations of the user. The simplicity of infrastructure deployment and its cost-effectiveness are among other requirements that we will consider. In addition, signal transmission from LEDs will be adapted appropriately to offer both indoor localization and broadband communication. We will also consider the design of reconfigurable light source emission parameters to optimize the positioning accuracy or transmission quality. The theoretical work will be complemented with simulation as well as experimental work that includes the development of a comprehensive experimental testbed

for the proposed indoor VLC system. A comprehensive system performance measurement including signal-to-noise ratio (SNR), BER, accuracy, positioning error (PE) amongst others, will be carried out and compared with the predicted and simulated results.

Electrical engineering

Smart Analog Passive Circuits using Ferroelectric Materials for Software Defined Radio Systems

Patrícia Bouça, Nuno Borges de Carvalho,João Nuno Matos,Paula M. Vilarinho

Radio System designs are moving towards fully digital transceivers, where the input signal should pass through an analog to digital converter. This thesis proposal approaches the evolution of smart analog circuits, such as input filters, that somehow will limit the existence of potential jammers and allow all signals within the dynamic range of the converter in an SDR approach, Fig.1. The innovative features will be focused on the development of input analog RF front-ends that are adaptable in frequency and power, which may vary according to input power, and of ferroelectrics that have predictable nonlinear behavior and adaptability at mmWave frequencies for wireless and satellite communications.

The challenge in need of a solution is to design 3D analog RF front-end that can vary its three functional dimensions (frequency, output power, and bias voltage) and limit the dynamic range by using ferroelectric thick and thin films.

Electrical engineering

New transceiver architecture for millimeter-wave phased-arrays

Raul Arruela, João Nuno Pimentel da Silva Matos, Nuno Miguel Gonçalves Borges de Carvalho, Tiago Miguel Valente Varum

To meet the high demand for wireless communication systems with high data transfer rate, aggregation of more users on the network, more connected electronic devices, low latency and high reliability, new systems and techniques have been investigated. The state of the art in this field shows that one of the chosen paths is to explore spatial diversity using Beamforming technology in the millimeter wave band. In this presentation a brief introduction to this technology is made. The goals and the main idea behind the doctoral thesis are also presented.

Electrical engineering

RF Massive MIMO Transceiver Characterization and Optimization

Ricardo Figueiredo, Nuno Carvalho

RF transceiver architectures are ever more complex in order to comply with data rate requirements of modern wireless applications such as mobile and satellite. The increasing number of components and RF chains introduces additional sources of non-ideality, while the increasing integration reduces the number of probing point for performance assessment. This, allied with the focus on system performance over component performance, hinders the task of probing and optimizing RF transceivers. This PhD work is focused on the study of novel figures of merit, modeling structures and optimization techniques to enable performance evaluation and optimization of RF transceivers given modern wireless communication demands and constraints.

Electrical engineering

Wireless Power Transfer by Focusing Microwaves

Ricardo Pereira, Prof. Nuno Carvalho, Prof. Mário Silveirinha, Prof. Rui Araújo

The aim of this PhD project is to improve wireless power transfer (WPT), potentially resulting in and important improvement in our society. A shift of paradigm is proposed, with the goal of improving the transfer efficiency. Metamaterials will be used to study and improve each components' efficiency, while the overall system analysis is done using the quasi-optics theory. The control theory will be paramount in order to optimize the position and orientation of the different components.

In conclusion, the main goal of this thesis is to improve the overall WPT efficiency via the novel concept of electromagnetic energy focus through theoretical means, simulation and testing.

Electrical engineering

Automated Cognitive End-to-End Service Management

Ricardo Rocha, Rui Aguiar, Diogo Gomes

The fifth and sixth generations of mobile and wireless communications networks evolution demand new solutions for network and services management, due to the requirements for massive capacity, imperceptible latency, very high reliability, support for massive machine-to-machine communications and customized services with an emphasis on customer experience. Digital Service Providers and Consumers will require extreme agility to manage the Network and Services that will depend on ephemeral and dynamic entities (e.g., Network Functions, Services, and Slices) which requires the cognitive automation that will need to encompass all the necessary phases to deliver a service, and combined with the network effective utilization.

In this thesis, we will explore new and innovative automatization opportunities in Network and Service Life Cycle Management, which might impact not only future networks but also other IT areas.

Electrical engineering

Simplified Coherent Transceiver for Optical Communication Networks

Romil Patel, Prof. Armando Pinto, Dr. Nelson Muga

The main goal of the proposed research is to design and develop simplified coherent transceiver architectures for short-reach optical links. This presentation shows an overview of a novel DC-Value iterative method for the simplified coherent transceiver architecture. Also, major outcomes and future scope of the proposed method are briefly summarized.

Electrical engineering

Information extraction from biomedical text

Rui Antunes, Sérgio Matos

There is a huge throughput of scientific publications in the life sciences field. This hinders the update of current knowledge, creating the need for automatic methods to extract information from free text. A major task is the identification of named entities and their relations, with the main goal in the biomedical domain to identify interactions between proteins, chemicals, diseases, amongst others. The extracted information allows creating valuable structured data for re-use and exploitation in precision medicine, drug discovery, and basic biomedical research.

In our work we investigate deep learning neural networks and contextualised word embeddings for joint extraction of entities and relations.

Electrical engineering

Multi-technology RU for nG Networks

Samuel Pereira, Arnaldo Oliveira, Nuno Borges Carvalho, Paulo Monteiro

In the current telecommunication landscape several technology generations are still present. From 2G to 5G, each generation uses diferente frequency bands and protocols, which means that for a single basestation to handle multiple technologies there is only two choices; either diferente hardware is used to support each technology, or a single, flexible system is used to support several technologies at the same time. My PhD is focused on this problem and pretends to demonstrate that All-digital transmitters combined with Radio-over-fiber are a solution to enable inexpensive and flexible remote units (RUs). These RUs will be capable of supporting several technologies, while being inexpensive enough to enable massive deployments.

Electrical engineering

Design and Characterization of Power amplifiers for emerging technologies

Sanket Chaudhary, Prof. Dr. Nuno Borges Carvalho, Prof. Dr. Arnaldo Oliveira

Digital power amplifier is an alternative approach to the traditional power amplifier for the future smart digital transceivers, such as software-defined-radio (SDR). The digital power amplifier provides benefits, such as high linearity and average power efficiency. However, designing this type of power amplifier needs more advanced procedures with comprehensive study on memory effects, such as baseband impedance load pull, multi-tone load pull, harmonic matching network etc. With the new approach characterization, the performance of the digital power amplifier can be enhanced.

Electrical engineering

High density Photonic integrated Circuits

Sushma pandey, Dr. Antonio Luis Jesus Teixeira

Photonic Integrated Circuits (PICs) integrates two or more photonic functions on a single chip providing a cutting-edge solution in terms of space and efficiency. However, size reduction clearly brings a problem related to heat dissipation. This problem not only affects the heat-generating functional block but also its neighboring functional blocks due to thermal crosstalk. This research work addresses paths to model, optimize, and reduce the impact of thermal crosstalk between elements inside the PIC. For this purpose, a detailed study of several functional building blocks will be performed followed by modeling of functional blocks considering thermal crosstalk effects. The proposed plan has a strong emphasis on research, laboratory testing, and model development aiming at increasing the data rate and size reduction simultaneously without sacrificing tunability. The ultimate result will be a set of design rules for heat crosstalk minimization and performance optimization of mapping inside a PIC.

Electrical engineering

Continuous Monitoring Using RFID Technology

Tagleorge Silveira, Nuno Borges Carvalho, Pedro Pinho

The insertion of a continuous monitoring system presents a new horizon for increasing the quality of human life. As with the advent of the 5G deployment, it will be possible to take advantage of a low latency network, which will favor the use of RFID technology in continuous, non-invasive and comfortable monitoring systems for humans, as the readings will be taken remotely without the need electrical wires or data cables.

Electrical engineering

Quantum Secure Multi-Party Computation

Zeinab Rahmani, Prof. Armando Pinto

Quantum computing aims to speed up computational calculations using a quantum computer. An important turning point in this field takes place when quantum computers are able to apply computational procedures beyond the capabilities of classical computers, a phenomenon known as quantum supremacy. Recently, with the rapid development of newly emerging technologies such as Cloud Computing, Internet of Things, and Mobile Computing, peoples' lifestyle is undergoing a drastic change. These technologies present new methods of collecting, storing, and processing information which can provide a great convenience for society even though they could be privacy intrusive to the same extent. Secure Multi-Party Computation (SMC) offers technological solutions that provide remote interaction between untrusted parties assuring that a malicious entity cannot profit from the inputs of others. In this work, we aim to design and implement a fast, efficient, and secure quantum SMC framework based on the Quantum Oblivious Key Distribution protocol.

Electrical engineering

Energy systems and climate change

THERe - Towards Health and Environment in Renovation

Alexandre Reis, Marta Dias, Alice Tavares

The energy performance of buildings directive (EPBD) establishes that Member States (MS) must introduce minimum energy performance requirements for buildings and building components. Studies must be done based on a cost-optimal levels (COL) methodology, considering the investment and operational costs to reach nearly Zero Energy Buildings (nZEB). However, there is a lack of information on the European Union (EU) guidelines concerning social and environmental issues. The existent framework requires MS to make the calculations based on an economic perspective - a macroeconomic level and a financial level. Thus, the three-pillars (social, economic, and environmental) conception of sustainability is not fulfilled in the implementation of the present COL methodology. Neither indoor environmental quality (IEQ) is considered nor the environmental impact of the embodied CO2 in building components. Apart from this, current energy performance certificates (EPC) are only energy-related. However, they have the potential to track also IEQ and the global environmental impact of building components. A new approach, both for COL and EPC, considering IEQ and the embodied CO2 in building components through a life cycle assessment (LCA), could fill the social and the environmental gaps.

Energy systems and climate change

Factors underlying green mobility adoption: an assessment of climate change perception influence

Ana Jesus, Marta Ferreira Dias

In "Financing the Transition" (2018), European Union stated: "It is clear that the clean energy transition and the achievement of net-zero GHG emissions in the European economy can only happen with citizens' buy-in. Consumer choice will increasingly become complementary to technological change and often a pre-condition for technology change to happen."

Green mobility is an important vector for carbon-neutral goals achievement, meanwhile, the current demand for alternative fuel vehicles is quite modest. Several authors' studies suggest that climate change and environmental concerns are not a decisive factor in adopting green technological innovations. In this context, the purpose of this thesis is to determine which factors will boost the wide green mobility technology adoption and to understand the real influence of climate change perception on the decision-making process.

Energy systems and climate change

SmartGrid's Production and Consumption Management Algorithms - THE GRID AS BACKUP SYSTEM

Antonio Duarte, José Paulo Oliveira Santos (DEM, UA)

Legislation and regulation allow more and more Prosumers (individual) and Energy Communities to act in the energy market. New realities (e-mobility, DER, e-sotrage, power2gas, etc.) are driving energy distribution and market to new realities. In the near future prosumers and energy communities may look to the grid as the backup system only. With less oil and carbon taxes governments will look at the distribution grid as a source of income. Small, balanced and optimized small scale energy systems have to improve performance to be less dependent of the distribution grid and centralized production.

Energy systems and climate change

Evaluation of Impacts on Intercity Corridors for Efficient and Sustainable Mobility – Innovative Ways to Address Corridors Pricing

Carlos Sampaio, Eloísa Macedo, Margarida C. Coelho, Jorge M. Bandeira

Intercity corridors movements account for 65% of the total of the kilometres travelled in Portugal (for 2017) and more than 55% of CO2 and NOX emissions.

These types of movements receive less attention from the scientific and political community when compared to urban transport.

The main objective of the thesis is to propose a methodology to tackle intercity corridors issues with respect to environmental impacts, by focusing in smart and dynamic toll systems, integration of impacts in pricing schemes, and optimization of public transport fares, coupled with a scheme based on the "polluter pays" principle. The final objective is to lead to a more efficient usage of the infrastructures. The

optimization is mainly focused on an environmental perspective, which can be important for decision-makers to improve specific intercity corridor measures/policies.

Energy systems and climate change

Challenges of energy projects decommissioning: wind farms

Gisela Mello, Marta Alexandra da Costa Ferreira Dias; Margarita Matias Robaina

The decommmissioning theme was chosen due the challenges encountered in the end of service of wind farms, whose expected operating time is 20 to 25 years. The decommissioning process can be understood as the adoption of all necessary measures for the area of the park to return as conditions or as close as possible, from the removal of equipment. However, remanufacturing and reusing equipment, as well as remanufacturing the park, are also possible alternatives at this stage.

It is important to highlight that the source of wind generation was chosen because it is considered “clean” and “without CO2 use”, to assess the entire life cycle of the project from production to operation of the wind farms, it appears that in some The phases, which involve the manufacture of equipment, have significant energy consumption and also use CO2.

In general, the aspects associated with the life cycle phases of wind farms are considered well consolidated in the literature, whether from an environmental, energy or economic perspective. However, at the stage of the life cycle there are still questions that can be used to assess and research, since this specific topic was not prior to the past. This way, a definition of decommissioning strategies, considering the uncertainties that this phase carries, becomes relevant for long-term energy planning.

This process presents difficulties associated mainly with environmental legislation and regulations, the identification of environmental and social impacts, the disposal of equipment and waste, technological alternatives, costs and policies for economic incentives. Thus, the need to discuss these issues and the possible socio-environmental and economic impacts at this stage becomes evident, considering the future challenges pointed out for the electricity sector: the decarbonization of the energy matrix, the fight against climate change, the development of new technologies, digitization of information and growth of renewable energies.

Energy systems and climate change

STRATEGY FOR THE INTEGRATION OF WIND ENERGY IN THE ELECTRICAL NETWORK: AN APPLICATION TO THE CAPE VERDE ENERGY SYSTEM - ISLAND OF SANTIAGO

Jorge Tavares, Fernando Neto

In this work intends to carry out a quantitative and qualitative diagnosis of the strategies for the integration of energy from renewable sources, in particular wind energy, in the electrical network in order to maximaize the use os this resource for the systems of the island regons especially for the islands of Cape Verde. In particular, it is intended to develop static and dynamic models of loads, including storage systems and to analyze the generation adequacy, the load flow, contigency situations and the quality of energy available for all loads situations, for diferente configurations of the grid. Finally to propose the best model that allows the maximum integration of wind enrgy in the network, guaranteeing its stability and the sustainability (economic, social and enviromental) of the system. The critical values of the LOLP (Loss of Load Probability) and EDNS (Expected Demand Not Supplied), chieved through dynamical siulation, with the help of DIgSILENT Powerfactory software, and applying the Monte Carlo Probabilistic Method, showed that the best scenario is the following combination: Centralized generation through thermal machines and decentralized wind generation and associated with a storage system by means of batteries. Applying this model to the electricity grid of the island of Santiago in Cape Verde, we conclude that with a battery storage system with capacity equivalent to 67.4% of the total production, where the wind contribution is equals at 63.7% and diesel 36.3% it is possible to power, under all load conditions, a time-varying load system whose peak value is 40MW. However, for a storage system with capacity equals 38.6% of the total generation, there is an average of 8, 33% of Loss of Load Probability and 0.35 MW of Expected Demand Not Supplied.The contributions of current and voltage harmonic distortions increase with the increase in the contribution of wind energy. Technically it is possible to have important contributions of wind energy to finite electrical networks without storage systems. However, for a high contribution of this energy, robust energy storage systems are indispensable, since storage systems contribute decisively to the generation adequacy, avoiding load losses and allowing demands to be covered in situations of great fluctuations in energy consumption. This strategy contributes immensely to reducing emissions. For example, it is possible to avoid the emission of around 180 tons of CO2eq per year, on the island of Santiago alone.

Energy systems and climate change

Artificial Neural Network Modelling of Solar Thermal Hybrid Façade

Luís Martins, Fernando Neto

Climate change and sustainable development are some of the 21st century greater challenges. Renewable energies technology has reached a point where it becomes affordable to produce on-site the energy necessary to fulfill the needs. This producer-consumer paradigm can become a synonym of sustainability (supply-to-demand matching), energy efficiency (closer production and consumption means less energy transport losses) and security of supply (production is endogenous). It should be noted that the cost of renewable energy is becoming increasingly lower (the cost of energy obtained from renewable sources is easily calculated and relates to the return on investment made in the system and its maintenance) and the uncertainties in the fluctuation of energy costs have a low degree of instability and will depend mostly on the maintenance of the system. This approach leads to a better environment with less air and noise pollution resulting in greener cities. In this work it is intended to demonstrate the potential offered by a hybrid solar thermal façade which heats air and water, cools air and may also be used for passive ventilation. The façade can be used in several contexts, such as: industrial processes with lower enthalpy requirement, commercial buildings, hospital and hotels. The economic/financial analysis of the solution is a rather important factor that may decide the viability of such a façade in a determinate location. To provide such information a model of the façade will be created using an Artificial Neural Network (ANN). The use of artificial neural networks in various applications related with renewable energies, energy management in buildings and thermal systems analysis has been increasing significantly over the years. This technique has, however, a different approach when compared with others as it uses and depends on data collected previously from a working prototype or a simulated system. This data should characterize the system behavior/performance during a rather large period and will be used afterwards to train the network which will then replicate the façade's working behavior.

This presentation is focused on some of the results achieved for the 1 year long data monitoring process like: peak power achieved, monthly energy gathered and temperatures inside and outside the building. Some savings achieved by using this device will also be revealed.

Energy systems and climate change

Decarbonising Portugal: Impact of climate change on renewable energy resources

Michael Russo, Alexandra Monteiro, Nelson Martins, David Carvalho

Increasing renewable energy production is one of the most effective answers to decarbonisation. In the context of future energy targets and a step towards net-zero greenhouse gas emissions, the EU aims to achieve a renewable energy share between 80% and 95% by 2050. However, renewable energy projections are hampered in part by our lack of knowledge regarding the impacts of climate change on renewable resource availability. This thesis aims to fill the knowledge gap regarding the technical impacts and costs of climate change on renewable energy resource variability. The main objective of this work is to quantify these impacts using high-resolution weather prediction modelling at a national scale in Portugal. A multi-criteria decision analysis will be applied to choose the optimal balance between energy supply decarbonisation and costs. This work will support the decision-making process and achieve national and EU energy goals.

Energy systems and climate change

Energy Efficiency and the P2020 - The impact on the triple bottom line of Portuguese municipalities

Petra Vaquero, Marta Dias, Mara Madaleno

On February 27, 2015, it was published, in Portugal, the Regulation for Sustainability and Efficient Use of Resources (RESEUR), one of the thematic areas created for the operationalization of Portugal 2020, a partnership agreement between Portugal and the European Commission, that establishes the rules to the access to European Structural and Investment Funds.

RESEUR frames different investment priorities (IP) and Intervention Areas. The focus of this research is the IP that respects to the support for energy efficiency, intelligent energy management and the use of renewable energy in public infrastructures, namely in local government service buildings. Through seven Regional Operational Programs (ROP), several calls for proposals were launched and, all of them, force an evaluation methodology based on the information available in the building's Energy Certificate (EC). As in any certification, for assess their energy efficiency, buildings are tested under standard operating conditions, allowing different buildings to be compared with each other on a common basis. But, if the EC is prepared under standard operating conditions that do not necessarily correspond to those of the actual operation, then the economic, financial and environmental impact of each energy efficiency improvement presented in the EC, also does not reflect the real impact in energy consumption reduction and CO2 emissions avoidance. Therefore, the economic, financial and environmental indicators resulting from these proposals, which are the object of the assessment and the financing decision, do not reflect the reality of the building and distort its contribution to the strategies of the European Union (EU), with regard to adaptation and mitigation of climate change.

The purpose of this investigation is to study whether this assessment base will affect the Municipalities' Triple Bottom Line and what should be the evaluation model that assures the equilibrium between, economic, environmental, and social parts.

Energy systems and climate change

Environmental sciences and engineering

Nature-based solutions for climate change adaptation: impact on heat island effect and air quality

Ana Ascenso, Ana Isabel Miranda, Peter Roebeling

Nature-based solutions (NBS) can provide effective answers to current and future environmental problems in urban areas, due to CC and increasing urbanization. Direct impacts of NBS are widely recognized and include urban cooling, AQ improvement and enhancement of cities resilience to CC. NBS also have a positive socio-economic impact, by improving the health and well-being of citizens. Indirect impacts of NBS are less well known, and consist of population dynamics and urban compaction that, in turn, impact on urban cooling and air quality improvement.

This thesis aims to fill the gap in knowledge regarding the implementation of NBS in an urban environment, to better understand their effects and consequences, and to support the decision-making process. The main objective of this work is to evaluate the impact, direct and indirect, of NBS on urban heat and air quality in urban areas under present and future climate.

Environmental sciences and engineering

"Water-wise-cities and circular-economy – roadmaps through governance and co-creation pathways ".

Catarina Miranda, Teresa Fidélis, Peter Roebeling, Inês Meireles

Under a constantly changing world, increasing environmental costs of population growth and urbanization, prioritized the circular economy on political agendas. Nevertheless, the development of water-circular-economy (WCE) national strategies worldwide, is still limited. Simultaneously, water-wise-cities (WWC) initiatives, seeking sustainable and resilient communities, started to emerge. Synergies between these two concepts are, however, poorly explored in literature and can be influenced by legislation, stakeholders' perceptions and associated networks, among others. Thus, further efforts are required to develop integrated approaches by cities, including institutions as municipalities, water utilities and citizens. This research proposal aims to explore how synergies can be shaped between the concepts of WCE and WWC initiatives at the city level. A conceptual model is built to assess current strategies to implement these concepts and to identify barriers and drivers to foster the development of integrated initiatives in cities through co-creation of roadmaps and governance pathways.

Environmental sciences and engineering

Integration of remote sensing data to facilitate multi-hazards risk assessments in coastal regions

Eduardo Oliveira, Fátima L. Alves, Leonardo Disperati

This work is a development of a previous model for flood extent estimations, created by the same authors, which has since been adapted for estimating burned areas from optical satellite remote images, combining a change detection approach and multi-index application. The new method is now fully automatic and implemented in Python-GrassGIS environment, including an improved binning processing, which allows to maximise the signal-to-noise ratio and reduce the user induced subjective interferences. The method has been implemented in a study area in coastal central Portugal region and compared with the official annual burned areas from 2000 to 2018.

Environmental sciences and engineering

Chemical characteristics and toxicity of particles from residential biomass combustion

Estela Vicente, Célia dos Anjos Alves, Susana Marta Almeida, Maria Teresa Pinheiro

Wood combustion in appliances operated in batch mode is a recognised source of both in- and outdoor airborne pollutants, especially particulate matter (PM). Residential settings are of utmost importance regarding human exposure to environmental pollutants since it is where people spent most of their time. Despite its importance, the chemical composition and toxicity of indoor particles arising from the use of biomass combustion appliances has been less studied.

The present work aimed at investigating the toxicity induced by wood burning particles with distinct chemical composition, using two bioassays. Particulate matter with aerodynamic diameter lower than 10 µm (PM10) was collected, indoors and outdoors, when wood burning appliances (open fireplace and woodstove) were in use. The overall toxicity was assessed using aqueous extracts of PM10 samples by the Vibrio fischeri inhibition assay. The cytotoxicity of the PM10 organic extracts was evaluated by the WST-8 assay using A549 human lung epithelial cells. The bioluminescent inhibition assay allowed to discriminate between different levels of toxicity highlighting that samples resulting from the operation of the open fireplace were more toxic than those collected when the woodstove was in use. Indoors, the reduction in A549 cell viability was over two times higher for the fireplace in comparison with the woodstove (32 ± 3.2 % and 72 ± 7.6 % at the highest dose, respectively). PM10 samples from the room with fireplace induced a significant decrease in cell viability at lower doses. The metabolic activity decreased from 21 to 48% when A549 cells were exposed to outdoor samples. The extracts from outdoor samples were significantly less cytotoxic than their corresponding indoor air counterparts during the operation of the fireplace, whereas no such effect was observed with the woodstove samples. The correlation analysis results indicated that particle bound constituents can induce changes in biological responses. For indoor-generated PM10, organic carbon and PAH were significantly correlated with cell viability and bioluminescence reduction, suggesting a role of organic compounds in toxicity. Additionally, the impairment of A549 viability was significantly correlated with several biomass burning biomarkers (e.g. levoglucosan, dehydroabietic acid, β-sitosterol and several phenolic compounds). In outdoor samples, a lower number of compounds were found to correlate with the impairment of the targeted cells.

Environmental sciences and engineering

FORFUN - Integrated impact assessment of terrace construction on FORest soil FUNctions

Martinho Martins, Jan Jacob Keizer, Nelson Abrantes, Meni Ben-Hur

This pitch addresses how primary forest soil functions are affected by construction of terraces in forest plantations, and how these functions are re-established with time-since-terracing. Terracing has become a widely applied practice in forested areas of north-central Portugal but has received little attention, regarding implications for hydrological and erosion processes but also for soil biological activity/functional diversity and associated ecosystem services. Addressing this research gap will use a three-fold interdisciplinary approach, through assessment of: (i) immediate (before vs. after) and short-term impacts by field monitoring over the first 12-months after-terracing; (ii) medium- to long-term consequences along a chrono-sequence of time-since-terracing; (iii) the mitigation potential of state-of-the-art soil amelioration/conservation techniques. A selected set of well-established physical, biochemical and ecological soil quality indicators will allow monitoring soil functional changes.

Environmental sciences and engineering

Planning instruments to mitigate negative impacts and potentiate expected benefits of nature-based solutions for urban global change adaptation: an integrated environmental, economic and social analysis

Rita Mendonça, Dr. Peter Roebeling, Prof. Dra. Teresa Fidélis, Prof. Dr. Paulo Pinho

European cities are facing environmental, economic and societal challenges, such as climate change, economic development and population growth and associated impacts and consequences for quality of life – requiring cities to adapt and become more resilient. Nature-based solutions (NBS) are recognized as adaptation measures that increase cities' resilience in the face of global change, given their multiple benefits and co-benefits. Nevertheless, there is a lack of evidence on the expected impacts, benefits and co-benefits of urban NBS in an integrated way. Furthermore, potential negative impacts (such as gentrification) are scarcely assessed and policy instruments to steer urbanization patterns (to reduce negative impacts and enhance benefits) are poorly explored. Hence, the overall objective of this research is to assess the environmental, economic and social impacts of NBS as well as to assess the effectiveness of policy instruments to mitigate negative impacts and potentiate expected benefits of NBS for urban global change adaptation.

Environmental sciences and engineering

Assessing air quality in cities under climate change scenarios: a source apportionment approach

Sílvia Coelho, Myriam Lopes, Joana Ferreira

This study aims to develop a modelling approach able to assess the impacts of future climate and projected emissions, including the relative contribution of different source regions/categories, on air quality (AQ) at urban scale. Weather conditions and atmospheric emissions from difference sources are the main causes of air pollution (AP), thus the implications of climate change (CC) on AQ need to be better understood. AQ modelling, associated with CC scenarios, is a powerful tool to understand and assess the physical and chemical processes occurring in the atmosphere. For that, an AQ modelling system, with source apportionment and process analysis tools, will be applied to the Aveiro Region. This work will overcome the existing gaps in this scientific domain and support decision makers to define the best mitigation and adaptation strategies to reduce CC impacts on AQ.

Environmental sciences and engineering

Literacia ecológica e ambiental na formação de professores do 1º e 2º ciclo do ensino básico

Susana Silveira, Filomena Martins, Filomena Teixeira

Os desafios da educação para a sustentabilidade, inscritos em referenciais estratégicos da política ambiental e de educação, pressupõem o desenvolvimento da literacia ecológica e ambiental (LEA) durante o percurso formativo em Educação Básica e na Formação de Professores do 1º e 2º ciclo do Ensino Básico.

Um levantamento de informação inicial, efetuado sobre amostras de estudantes destes ciclos de formação numa instituição de ensino superior, revela que o conhecimento dos/as estudantes sobre questões de natureza ecológica e ambiental é na generalidade superficial, evidenciando por vezes conceções alternativas, bem como insuficiente domínio dos conceitos fundamentais e na compreensão de processos inerentes aos sistemas ecológicos e ambientais.

Planifica-se uma investigação suportada numa metodologia de natureza qualitativa e interpretativa, incidente sobre práticas de ensino e de aprendizagem em contextos facilitadores da LEA, com o objetivo de promover aprendizagens significativas e que integrem a visão holística suportada por uma abordagem compreensiva e sistémica dos processos em estudo.

Privilegiam-se as abordagens metodológicas que permitam o envolvimento dos e das estudantes, no estudo de sistemas naturais em contextos reais, bem como a exploração de equipamentos e recursos de interpretação ambiental, em contextos de educação não formal em articulação com a educação formal.

Pretende-se desenvolver um modelo conceptual para práticas pedagógicas convergentes com os objetivos da EDS associado à elaboração de um guia de apoio à formação inicial e contínua de professores 1º e 2º CEB.

Environmental sciences and engineering

Bio- and photodegradation as strategies for the removal of estrogens and antibiotics from wastewaters

Vitória Louros, Helena Nadais, Valdemar Esteves, Jorge Leitão

The aquatic environment is continuously loaded with different types of contaminants, including pharmaceuticals and endocrine-disrupting chemicals (EDCs). Their main source are the discharges from wastewater treatment plants (WWTPs), which are not effective barriers to these pollutants. Estrogens and antibiotics are particularly concerning contaminants, due to endocrine disruption and bacterial resistance induction, respectively. To better understand the removal of these contaminants, as well as to draw possible strategies to mitigate their presence, naturally occurring processes as photodegradation and biodegradation must be considered.

Photodegradation of antibiotics: sulfadiazine (SDZ) and oxolinic acid (OXA) as well as two estrogens: estrone (E1) and 17α-ethynylestradiol (EE2) were investigated and results demonstrated that antibiotics photodegraded faster than estrogens. Also, in WWTPs, estrogens tend to adsorb onto sludge, being less available to photodegradation in aqueous phase. In fact, among estrogens, E1 and EE2 are the ones occurring more frequently and at higher concentrations in WWTPs treated effluents and sludge samples. Thus, biodegradation seems to be a much more effective way for the removal of estrogens in WWTPs.

In the present study, an innovative process for wastewater treatment contaminated with estrogens was proposed based on the intermittent operation (IO) of Upflow Anaerobic Sludge Blanket (UASB). In this context, the performance of the continuous operation (CO) and IO of UASB reactors was investigated regarding the removal of E1 and EE2 from wastewater. Results suggest that the IO contribute to the improvement of the overall removal of estrogens (above 95% for E1 and EE2) when compared to CO (49% for E1 and 39% for EE2). In both CO and IO, biodegradation was the principal E1 removal mechanism, while for EE2, adsorption onto sludge was the major removal pathway. Moreover, the IO exhibited a better performance in estrogens' biodegradation than the CO (69.4% vs. 43.3% for E1 and 21.8% vs. 8.0% for EE2). The beneficial effect of IO can be justified by effluent recirculation during the feedless period that promotes the adaptation of microbial biomass for the estrogens' biodegradation. Thus, the IO of UASB reactors appeared to be a sustainable and robust strategy to remove E1 and EE2 from wastewaters and, therefore, preventing their release into the environment.

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Environmental sciences and engineering

Food science and technology and nutrition

Healthypassion - Integral valorization of the Purple Passion Fruit (Passiflora edulis Sims f. edulis): from bioprospecting to the development of a health-promoting food product for asthmatic patients

Alexandre Fonseca, Sílvia M. Rocha, Armando J. D. Silvestre, Cláudia C. Loureiro

Asthma affects nearly 340 million individuals worldwide and its prevalence within countries varies between 1 and 16% of their population. Available data demonstrate the substantial socioeconomic impact that this disease represents for societies and is therefore considered an important public health issue. Asthma is characterized by a chronic inflammatory of the respiratory airways induced by cellular mechanisms that produce increased levels of reactive oxygen species (ROS). The accumulation of these compounds leads to oxidative stress in the airways, which in turn leads to exacerbation of asthma. The intake of exogenous antioxidant compounds through diet has been reported as one of the potential strategies to mitigate the effects of oxidative stress in asthma and existing epidemiological studies have confirmed the correlation between ingestion of polyphenols and lower disease incidence. Oral administration of purple passion fruit peel extract, which is rich in antioxidants, has already been demonstrated to reduce several symptoms associated with asthma in a human trial.

This work aims to take advantage of this potential of purple passion fruit and develop a functional food capable of promoting health and well-being in asthmatic patients. The product obtained should meet market trends by using a sustainable production process and capable of being personalized according to consumer needs.

With this intent, the different fruit parts will be firstly characterized and screened in for antioxidant capacity and subjected to eventual extraction procedures to improve their potential. Most promising fractions will be evaluated in vitro for their biological activities (antioxidant and anti-inflammatory) and safety profile and used to formulate a food product through 3D printing. After nutritional and sensory analysis, the developed food product efficacy will be evaluated in a human trial with control and asthmatic patients.

Food science and technology and nutrition

Shelf-life extension of pasteurized and ready-to-eat foods by hyperbaric storage at room temperature

Álvaro Lemos, Dr. Jorge Manuel Alexandre Saraiva, Drª. Ivonne Delgadillo

Highly perishable foods, i.e., foods with high water activity/low acidity, need an efficient preservation methodology to increase its shelf-life, usually refrigeration (RF), but RF is considered the third major source of CO2, representing approximately 1% of the CO2 emissions worldwide. Thus, environmentally friendlier food preservation methodologies are of upmost importance without compromising food safety

and quality. Hyperbaric storage (HS) is a new concept of food storage, being the pressure applied during all the storage time, between 25-220 MPa, from a few days to some months. Recent results hint HS as the possibility to store foods at room temperature (RT) with reduced energetic costs at levels of 0.001 €/kg to HS instead of 0.026 €/kg to RF. In fact, energy is only necessary during compression/decompression phases, and not to keep it along storage.

So, in this work HS/RT feasibility was studied to evaluate the possibility of shelf-life extension of pasteurized milk and ready-to-eat foods. For that, the foods were maintained under HS/RT at 50-100MPa/RT, up to 60 days. The results showed lower microbial loads than the initial ones on samples under 75 and 100 MPa, while at RF, the microbial loads were maintained stable for 40 days. Actually, HS was capable not only of microbial inhibition, as occurred with RF, but also of microbial inactivation, originating the reduction of microbial loads comparing with initial samples. Globally, HS/RT resulted in physicochemical parameters similar to RF. In addition, HS/RT promoted the extension of microbial shelf-life, with microbial loads always under the values of RF samples. However, when NMR spectroscopy was used, the multivariate analyses allowed to see a separation between RF and HS samples, independently of the level of pressure used.

In conclusion, further studies will be necessary to understand why RF and HS samples are different, being both samples stable in terms of microbial and physicochemical parameters evaluated, although HS/RT samples, mainly at 75 MPa and 100 MPa presented lower microbial levels.

Food science and technology and nutrition

Valorization of European brown macroalgae through its application as food ingredients in functional foods

Ana Circuncisão, Manuel António Coimbra, Susana Cardoso

Brown macroalgae are known for their richness in health-promoting compounds, attractive for the development of added-value functional foods through the use of whole seaweeds or selected extracts/fractions. Therefore, it is essential to establish the scientific basis for an environmental-sustainable extraction of bioactive compounds, assuring their safety, stability, biodigestibility and functionalities. Fucus vesiculosus and Laminaria digitata are being studied as sources of fucoxanthin, phlorotannins, fucoidans, laminarans, and alginates, the bioactive principles of the food ingredients that will be incorporated into pasta, used as case study. The employment of a holistic sustainable extraction strategy will allow to obtain fractions suitable to evaluate the properties of the new food products, as well as to study their biodigestibility and functionality.

Food science and technology and nutrition

Innovative Sequentially Combined Processing Technologies to Improve the Quality of Egg Pasteurized Products

Ana Ribeiro, José A. Lopes-da-Silva, Jorge A. Saraiva

Eggs are a globally important food, but often associated with salmonellosis and avoid this problem, thermal pasteurization is usually applied, but this treatment causes changes in functional properties, thus hindering/limiting the subsequent production of several egg-derived products. A possibility to minimize these limitations is the use of high pressure (HP) to cause sub-lethal damages in microorganisms, thus decreasing their thermal resistance, allowing a subsequent less intense thermal pasteurization.

The aim of this study was to evaluate the effect on egg white (EW), of pre-processing by HP (50 – 200 MPa/ 5 – 20 min) followed by heat treatment (HT) (55 ºC/ 3 min) on: (1) the lethal efficacy on inoculated microorganisms (Salmonella Seftenberg 775W) and (2) functional and physicochemical properties.

Results showed that, when the combined treatments (HP+HT) were applied, pressures above 90 MPa cause an inactivation ≥ 4.3 log CFU/mL to below the detection limit. On the other hand, the industrial HT (55.6 ºC/6.2 min) reduced S. senftenberg 775W below the detection limit, while, the HT alone (55 ºC/3 min) only reduced S. senftenberg 775W counts ≈ 3.00 log CFU/mL. Concerning the functional and physicochemical properties, parameters such pH, total soluble solids and water holding capacity, no changes were observed regardless the applied treatment. The instrumentally measured colour changes in EW would be not detected by the naked eye ($\Delta E^* < 5$). Turbidity increased and soluble protein decrease after processing, may be due to some denaturation and formation of insoluble aggregates. Foaming capacity (FC) decreases slightly after HP+HT processing, but foaming stability (FS) remained similar to that of the raw EW. HT caused a sharp reduction in FC, however, the FS was improved when compared to raw EW. These hint the possibility to use sequentially combined treatments (HP followed by HT) to enhance inactivation of S. Senftenberg 775W and also to improve the functionality of EW. Therefore, the results so far revealed very promising results to obtain safe egg products with higher functionality compared to currently thermal pasteurized commercial eggs.

Valorisation of broccoli by-products

Sónia Ferreira, Manuel A. Coimbra, Susana M. Cardoso, Dulcineia F. Wessel

Broccoli by-products from the frozen-food industry account for 45% of the initial broccoli head. They consist on stalks, inflorescences, and leaves, having the nutritional value and bioactive compounds of commercial broccoli heads. Therefore, broccoli by-products can be valorised as source of food ingredients, bioplastic fillers, and polysaccharides with immunomodulatory activity. For that, they were characterized for their glucosinolates, pigments, carotenoids, phenolic compounds, and cell walls polysaccharides. A new technology based on microwave hydrodiffusion and gravity (MHG) was used to dehydrate broccoli by-products and simultaneously recover the water-soluble diffused compounds for food ingredients use. The dehydrated broccoli by-products were evaluated as fillers to create starch bioplastics with improved mechanical properties and hydrophobic surfaces for the food industry. Additionally, taking advantage of pectic polysaccharides abundance, hot water extracts polysaccharides were studied regarding structure-immunostimulatory relationships.

Food science and technology and nutrition

Valorisation of pine nut skin

Soraia Silva, Elisabete Coelho, Manuel António Coimbra

Stone pine (Pinus pinea L.) is widely present in the Mediterranean region and is well-known mainly for the economic value of its edible pine nuts. Pine nut skin, resultant of the pine nut processing, represents about 2.4% of the whole kernel weight [1], having an annual volume of approximately 550 metric tons worldwide [2]. Although nuts skins have been demonstrated as valuable sources of phytochemicals with health beneficial effects [3,4], pine nut skin composition is not yet established. The skins potential as inexpensive sources of bioactive compounds, along with the growing interest for functional ingredients and with the current environmental situation that demands the utilisation of wastes and by-products, justify its interest.

To characterise this by-product, pine nut skin was milled and separated with sieves of 0.5 mm (P50) and 0.09 mm (P09), yielding 15% and 85% respectively. Proximate composition was established, namely moisture, ashes, protein, total dietary fibre (TDF), lignin, polysaccharides, and lipids.

Moisture content was 6.8 % and 13 %, for P50 and P09, respectively. The mean composition, in dry weight, was 1.3 % ash, 3.0 % protein, 83.6 TDF, 71.7 % lignin, 14.2 % polysaccharides, and 9.2 % lipids for P50; and 3.4 % ash, 6.8 % protein, 83.9 % total dietary fibre, 45.9 % lignin, 37.5 % polysaccharides, and 7.3 % lipids for P09.

TDF sugar analysis showed glucose was the major sugar (56 % and 59 % for P50 and P09, respectively), followed by arabinose, xylose, galactose, and uronic acids. These results indicate the presence of cellulose, xyloglucans, and pectic polysaccharides.

The free and total (free and esterified) lipophilic extractives were characterised after derivatisation in trimethylsilyl esters/ethers, by gas-chromatography mass-spectrometry analyses. The lipophilic components identified and quantified were grouped in five major families: fatty acids, sterols, terpenic compounds, long-chain aliphatic alcohols, and secondary/secondary alkanediols. For P50, all compounds were in the free form, while P09 had 7 % of esterified compounds. Linoleic and oleic acids were the major compounds in both samples and, combined, represented more than 40% of the total content of identified compounds. Besides, the saturated fatty acids from C6:0 to C30:0 were detected, as well as β-sitosterol (32.0 and 22.3 mg/g, for P50 and P39), campesterol (6.4 and 3.3 mg/g), stigmasterol (2.6 and 0.6 mg/g), and stigmastanol (1.2 and 0.8 mg/g).

Pine nut skin was shown a source of dietary fibre, and a simple mechanical separation allows to obtain polysaccharide or lignin-rich fractions. Additionally, it has a promising lipophilic composition, with the presence of unsaturated fatty acids and sterols, especially β-sitosterol, which is recognized as a hypocholesterolemic agent, besides other beneficial functions.

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Food science and technology and nutrition

Geosciences

Self-burning of coal mining wastes - environmental and ecotoxicological approaches

Aracelis Narayan Rajnauth, Deolinda Flores, Jorge Espinha and Sara Antunes

Self-burning of coal-waste piles occurs in worldwide, including in Douro Coalfield where the 2017 forest fires caused the ignition of several piles in the Pejão mining area. An effort to extinct the fire focus on Fojo pile was done by the coal-waste material remobilization using water and cooling accelerator agent. A geochemical and hydropedological characterization of unburned and burned coal-waste materials, including the burned coal-waste pile affected by the cooling accelerator agent will be conducted. Moreover, as the evaluation of surrounding soils, together with the composition of the released gases will permit to establish the effects of self-burning on soils and waters. Furthermore, assessed the ecotoxicological effects in aquatic species of the bioavailable compounds, after lixiviation of these coal-waste tailings, is vital as these are stressors with different impacts on non-target species. The integration of geochemical, hydropedological and ecotoxicological data will identify environment impacts and contribute to their mitigation.

Keywords: coal mining residues; soil and water; environmental pollution; ecotoxicology;

Geosciences

Geophysical and geochemistry soil contamination study in the surroundings areas of the Hulene-B dump, Maputo, Mozambique

Bernardino Bernardo, Fernando Rocha , Carla Candeias

This research study aims to integrate geophysical and geochemical techniques in order to characterize soil contamination on the surroundings of the Hulene-B waste dump, Maputo, Mozambique. Geophysical study was undertaken in areas of potential contamination. Additionally, 86 soil samples were collected for the mineralogical and geochemical characterization. Preliminary results suggest the presence of contamination plumes, with origin on the dump.

Keywords: geophysics, geochemistry, soil, contamination.

Geosciences

Geological study of the hydrothermal alteration of ultrabasic rocks from the Upper Allochthonous Complex of the Bragança region: Implications for the regional economic geology

Guilherme Ínsua-Pereira, Prof. Iuliu Bobos (PhD, Dr. Sci) (Supervisor)

A set of exotic rocks is known to occur in the NW of the Iberian Peninsula, in the Spanish region of Galicia and in the regions of Bragança and Morais (Macedo de Cavaleiros), NE Portugal. The main goals of this PhD project focus on the interpretation of a characteristic alteration process that affects these rocks in the presence of hydrothermal fluids, called serpentinization, which leads to the transformation of the primary magmatic minerals into secondary (serpentine) minerals. We intend to constrain P-T conditions and fluid properties during the alteration of these rocks, by the structural and crystal-chemical characterization of secondary minerals and by evaluating the contents of fluid-mobile elements (FME) and stable isotopes. On the other hand, the analysis of immobile elements (e.g. High Field Strength Elements (HFSE), Rare Earth Elements (REE), Ni, Cr, Y, V) and radiogenic isotopes (e.g. Sm-Nd) is intended enable the identification of the precursors of these rocks and to interpret the magmatic processes behind their formation. These exotic rocks are also known to contain Cr and Platinum-Group Elements (PGE) mineralizations, to which we intend to bring new insight and study their relationship with the deformation of these rocks. Concluding this PhD project, we expect to be able to present a model for the alteration process of these exotic rocks in the Bragança region and correlate it with other models for similar occurrences in the Iberian Peninsula and Europe. The results and interpretations of this

research are intended to be published in the form of several scientific articles in international journals and exposed in conferences and congresses related to this issue. Finally, I would like to acknowledge my supervisor, as well as Fundação para a Ciência e Tecnologia for financing this PhD project.

Key-words: Exotic; Serpentinization; Cr and PGE mineralizations; Bragança.

Geosciences

Gerontology and geriatrics

Deprescribing in the elderly

Anabela Pereira, Òscar Ribeiro, Manuel Veríssimo

Deprescribing is the process of withdrawal of an inappropriate medication, supervised by a health care professional to manage polypharmacy and improve outcomes. It is a complex process influenced by multiple factors, facing several barriers to its implementation. The attitudes and perspectives of physicians and patients towards deprescribing are the most frequent barriers encountered.

In Portugal, the prevalence of polypharmacy in the elderly is among the highest in Europe (36.9%), which means that probably there is a high prevalence of potentially inappropriate medication (PIM). Deprescribing is a planned and patient-centred process that allows reducing PIM safely, but it is a new concept that is not part of the usual clinical practice in our country.

Successful deprescribing strategy implementation needs to know the Portuguese reality regarding the attitudes and perspectives of doctors and patients. These are one of the main objectives of our research, which also aims at identifying deprescribing barriers and facilitators in Portugal.

To assess physicians' attitudes and perceptions toward deprescribing we use: semi-structured interviews to opinion leaders in the area; focus group with physicians general and family medicine and internal medicine; online questionnaire for Portuguese physicians enrolled in the Portuguese Medical Association.

We use the rPATD questionnaire (revised version of the questionnaire Attitudes of patients toward deprescribing) to investigate the attitudes and perceptions of patients or caregivers. First, we carry out translation and cultural validation of the rPATD questionnaire (patients' and caregivers' versions), and then studied a convenience sample of around 300 patients aged 65, and of 80 caregivers.

Based on the results, we intend to build proposals for the implementation of deprescribing in the elderly in Portugal

Gerontology and geriatrics

Between_Generations: intra and inter-generational transmition of health behaviours in families with genetic conditions

Carla Oliveira, Orientadores: Liliana Sousa, Álvaro Mendes, Jorge Sequeiros

A generatividade constitui uma tarefa da adultez centrada no interesse em educar e guiar as gerações mais novas. As doenças genéticas existem na família e os processos de transmissão genética são conhecidos; contudo, é escasso o conhecimento sobre a transmissão familiar de comportamentos de saúde, particularmente sobre o papel das gerações mais velhas. Este projeto visa aprofundar o conhecimento sobre o papel das gerações mais velhas, em famílias com doenças genéticas (doença de Huntington e Paramiloidose), considerando a generatividade, em geral, e os comportamentos de gestão da saúde e do risco, em particular. Adota-se uma metodologia mista: i) generatividade: (quantitativa + qualitativa: Loyola Generative Scale; entrevista semi-estruturada) e ii. comportamentos de gestão da saúde: (qualitativa: Técnica dos Incidentes Críticos). Os resultados são pertinentes para conhecer as tarefas desenvolvimentais dos mais velhos nestas famílias; e compreender influências familiares que facilitam ou dificultam a gestão da doença.

Gerontology and geriatrics

Cuidados em Serviço de Apoio Domiciliário

Joana Barbosa, Ignácio, Martin

This thesis entitled, Home Care Service brought together a number of studies. In the first article, it presents a case study conducted in two IPSS in Braga. Based on this article, a second one was carried out with the aim of characterising the functioning profile of the SAD existing in twenty IPSS in the district of Braga. In the 3rd article it reflected on the variables that influence the quality indicators in these IPSS. In a 4th article he defined the profile of elderly people in the IPSS with SAD, characterized by RAI-Home Care.

Gerontology and geriatrics

Vocal Aging: Acoustic and articulatory study of speech changes with age

Luciana Albuquerque, Catarina Alexandra Monteiro de Oliveira, António Joaquim da Silva Teixeira, Daniela Maria Pias de Figueiredo

This study intends to analyze the age effects on acoustic and articulatory data for European Portuguese speech produced by healthy speakers of different ages and both genders.

A more in-depth knowledge of the acoustic and articulatory changes resulting from the natural process of aging are an important basis for understanding speech and voice disorders associated with health conditions that affect older individuals (e.g. hearing loss, dentofacial alterations, neurodegenerative diseases, stroke, cancer, or psychological distress).

The knowledge of these changes is also essential for the development of automatic speech recognition systems suitable for elderly's voices (e.g. personalized reading aids and voice prostheses), to provide information for biometric recognition and forensics, and to clinical assessment and treatment of speech disorders.

Gerontology and geriatrics

Effectiveness of the Lifestyle Integrated Functional Exercise for People with Dementia

Sara Almeida, Alda Marques, Madalena Gomes da Silva

Background

People with dementia wish to live at home as it is internationally recommended. Exercise capacity and health-related quality of life are important domains for living well at home and can influence and be influenced by being physically active. Nevertheless, physical activity programmes for people with dementia, especially conducted at home, are scarce. The Lifestyle Integrated Functional Exercise for People with Dementia (LiFE4D) might overcome this gap.

Objective

To explore the effectiveness of LiFE4D on exercise capacity and health-related quality of life in people with dementia.

Methods

A randomised controlled trial was conducted with people with dementia living at home. The experimental group (EG) received 3-months of an individualised home-based physical activity programme (LiFE4D), integrated in everyday tasks with the supervision of carers (when possible). Face-to-face sessions with the health professional were progressively reduced over time (1st month 3x/week, 2nd month 2x/week, 3rd month 1x/week). The control group (CG) continued with usual care (pharmacological treatment). Measures exercise capacity (2Minute Step Test) and health-related quality of life (Quality of Life – Alzheimer's Disease) were assessed. Effectiveness of LiFE4D was analysed with an intention-to-treat analysis. Generalised Estimating Equations (GEE) were used to compute the effect of interaction time*group and to deal with missing values.

Results

Forty-seven people with dementia (30 female (63.8%), 80.7±6.7 years old) were enrolled in this study. Significant interactions between group*time were found for the 2Minute Step Test (p=0.027) and for the Quality of Life – Alzheimer's Disease (p=0.005) measures.

Conclusions

The LiFE4D seems to be an effective intervention to improve exercise capacity and health-related quality of life of people with dementia.

Keywords: Major neurocognitive disorder, tailored physical activity, community-dwelling.

Indicadores de qualidade em cuidados de longa duração

Susete Abrunhosa, José Ignácio Martin, Hélder Jaime Fernandes

Introdução

As unidades de internamento da Rede Nacional de Cuidados Continuados Integrados surgem como resposta intermédia. Visam dar resposta a situações de privação, apresentando-se como respostas diversificadas que satisfazem as necessidades de pessoas em situação de dependência que, independentemente da idade, precisem de cuidados continuados de saúde e apoio social, e consequentemente cumprir a prestação de cuidados de saúde com a maior qualidade possível.

Para avaliar a qualidade dos cuidados prestados, e devido à inexistência em Portugal de indicadores de qualidade para os cuidados continuados integrados de utilização obrigatória, é essencial desenvolver uma proposta de atuação padronizada de indicadores de qualidade, que sirva de guia orientador de boas práticas de equipas multidisciplinares para utentes em regime de internamento, nas Unidades de Média Duração e Reabilitação (UMDR) e Unidades Longa Duração e Manutenção (ULDM).

Métodos

Na primeira fase serão identificadas e caraterizadas as Unidade de Cuidados Continuados Integrados, os responsáveis pela definição dos indicadores, e as Equipas Coordenadoras Locais, de Trás os Montes.

Na segunda fase é aplicado o Método de Delphi, o questionário será enviado através de correio eletrónico e o preenchimento será realizado individualmente, e posteriormente remetido, via correio eletrónico. E, a aplicação da escala de Avaliação de Utilização de Recursos para avaliar o tempo despendido na prestação de cuidados, a um profissional de cada categoria e cada instituição participante.

Numa terceira fase será feita a validação interna do estudo com o preenchimento de uma base de dados, em SPSS, através de informação dos Processos Individuais em Cuidados Continuados, dos utentes internados à data da recolha, no Gestcare das unidades.

Resultados

Contribuir para a existência de um instrumento de medida padronizado para avaliar a qualidade dos cuidados prestados em cuidados continuados integrados.

Discussão e conclusão

Em Portugal é necessário desenvolver um conjunto de indicadores que permita quantificar a eficácia dos cuidados, a eficiência dos custos e o desempenho das instituições de internamento da Rede.

History of sciences and scientific education

Dynamics of Scientific Research in Mozambique (1962-1987)

Eurides Tendaunga, Supervisor: Isabel Maria Coelho de Oliveira Malaquias (DFis., CDITFF), Co-Supervisor: Víctor Hugo da Rosa Bonifácio (DFis., CIDTFF)

Dynamics of Scientific Research in Mozambique (1962-1987)

The thesis under development has the theme "Dynamics of scientific research in Mozambique". The study aims to identify scientific research dynamics in Mozambique during the period from 1962 to 1987, specifically in the General Studies University of Mozambique (GSUM), at the Lourenço Marques University (LMU), at the Eduardo Mondlane University (EMU), and in research institutions that stood out in the period under study (Institute for Scientific Research of Mozambique - IICM), seeking their possible influence in the consolidation of scientific research and education. For the effectiveness of the study, a descriptive exploratory research was developed, with a qualitative approach. The data collection used the techniques of bibliographic research, documentary research and semi-structured interview.

The thesis seeks to identify the research dynamics that existed and that were evident in Mozambique in the period between 1962 and 1987, and the reflexes that they had in the consolidation of scientific research and teaching, at the time when universities and scientific research

institutes started to arise. Right at the beginning, there were research activities, translated by the publication of scientific journals that, in turn, integrated works developed at the level of existing laboratories, by professors and researchers from those institutions.

Data analysis has been carried out by the GSUM scientific journal, and the EMU Science and Technology magazine, as well as analysis of other previously selected documentation, which allows a better framework for the present investigation. The interviews, transcription and analysis were carried out; just as an article is being prepared for publication in the Brazilian Journal of African Studies.

Due to the passage of Cyclone Idai in Mozambique, specifically in the Beira city, in 2018, the author had to change the course of the thesis, which implied enrolling in a semi-presential regime. In view of the current situation of COVID-19, it will not be possible to travel to Portugal to carry out the research provided for in Portuguese archives and libraries, as well as Mozambican libraries, summarizing what exists online.

Scholarship from Zambezi University, Mozambique

History of sciences and scientific education

Perspectives on Science Outreach in the Period 1945-1975: The Case of the Space Race

Luís Pereira, Isabel Malaquias

The current PhD thesis involves a comparative case study between two reference magazines – the American magazine National Geographic and the French magazine Science et Vie. The research purpose is to understand the dynamics of scientific outreach found within the scope of space exploration led by the USA and the USSR in the period between 1945 and 1975 – a dispute that became known as the Space Race – characterizing possible differences.

National Geographic was first published in October 1888. This magazine, which distinguished itself by giving visibility to the exploration and discovery of the ultimate frontiers unattainable by man, gained a reputation in very wide areas that extended from geography to natural sciences and, finally, to space. Science et Vie was first edited in April 1913. This magazine has gained expression in different branches of science, including the aerospace domain. With distinct editorial policies, the popularity of both publications grew remarkably during the period under study.

As part of the ongoing research, the relevant published articles by the two magazines have been identified and surveyed. A research tool was defined based on the content analysis method that has been applied to these articles, including a biographical study of the main authors, collaborators and other influential characters of both publications. The collected information has been contrasted with the timeline events of the Space Race, in order to compare the two publications. This allows to characterize their objectives and audiences, highlighting a subject that still presents an enormous visibility, half a century after the manned lunar landings.

History of sciences and scientific education

A Perspective on the Brazilian scientific history: the creation of the Brazilian Society for the History of Science

Luiz Neto, Dra. Isabel Malaquias

A Perspective on the Brazilian scientific history: the creation of the Brazilian Society for the History of Science

The aim of this research is to understand the reasons embedded in the genesis of the Brazilian Society for the History of Science (SBHC), its historical path, and relationships with other institutions and people that were fundamental to its development. In this way, it will be possible to unveil and understand aspects of the Brazilian scientific context in the period under study (1983-2019), and mostly to better realize the importance of a scientific society focused on the study and development of history of science and of a community of historians of science.

Documental surveys will be carried out concerning the creation of the Brazilian Society for the History of Science; the journals fostered; and interviews with members of the current and old direction boards, in order to: systematize the discourse, reaching a reflection on what is the SBHC; its motivation, goals and importance, against different contexts (social, political, economic ...), noting that such an institution is a space for debates on the history of sciences and fosters the (re) construction of broad perspectives in the over time.

History of sciences and scientific education

Roots of Constructive Geometry in Science and Arts

Parisa Kharazmi, Prof. Dr. Helmuth R. Malonek, (UA, CIDMA)

Safavid's architecture and art relied heavily on the work of the medieval geometer Abu al-Wafa Buzjani (940-998). The impact of some of his geometric methods on almost all patterns that have been used by artisans is overwhelming. The roots of constructive geometry in general, and particularly their relationship to patterns in azulejos are just one of the goals of our research. Researching the development of applied geometry to teach geometry with original sources from different regions and at different times is another challenge of our upcoming work.

History of sciences and scientific education

Industrial engineering and management

Absenteeism and Ergonomics in the Cork Industry: some insights and tools to improve working conditions

Alfredo Silva, Ana Luísa Ramos, António Ramos, Marlene Brito

Although there has been an improvement in working conditions over time, as well as incentive policies, absenteeism due to occupational diseases is still one of the main issues companies have to deal with, mainly in intensive hand work labor.

This study is being conducted at a Portuguese cork stoppers company, faced with a situation of high absenteeism which results in an annual loss of 1,200,000€. It aims to evaluate the company's workstations with greater absenteeism related to musculoskeletal diseases and suggests adequate ergonomic working conditions for those workplaces. Measures such as the automation of a process are also implemented. This automation, however, results in some problems related to decreases in quality and relocation of employees.

Although the automation of the manual tasks avoids many issues related to musculoskeletal diseases, it raises other problems for companies which are difficult to manage, such as the relocation of workers and the resistance to change and new knowledge acquisition by older and more experienced workers.

The main challenge is to design tools to improve the working conditions, reducing the absenteeism rate, and consequently, to improve the productivity of the company.

Industrial engineering and management

Modelação em Engenharia de Sistemas: o caso do apoio à decisão na governança urbana

Audir Assunção, José de Vasconcelos Ferreira ; Ana Luísa Ferreira Andrade Ramos

The research goal is to develop a decision support system using techniques and concepts from systems engineering, especially the model-based systems engineering (MBSE). As a case study It will be explored decision support in urban governance.

Industrial engineering and management

Urban Logistics Optimization

Bruno Machado, Carina Pimentel,

This research aims to develop a new urban logistic service based on decision support tools, ensuring environmentally sustainable urban logistics. This support tools are based on optimization approachs.

Industrial engineering and management

Strategy on the deployment of next generations optical networks

Cláudio Rodrigues, António Luis Jesus Teixeira, Marlene Paula Castro Amorim

This work analyze in-depth the actual telecommunication networks in several contexts, namely, type of implemented networks, requirements and competitiveness.

Through the study and analysis of the future networks technologically as well as exploring its limits and expectations the work intends to analyze the future implementations, when and in what context and what its benefits and how it can influence the telecom service architecture.

The developed work intends to address telecom industry and telecoms as service organizations to continuously improve their business operations in order to achieve competitive advantage and to pursue efficiency and sustainability targets.

Industrial engineering and management

Methodologies to support the geographical distribution of human health resources

Diana Lopes, Ana Luísa Ramos, Eduardo de Castro

Understanding geographical imbalances in the spatial planning of the health personal is essential for the improvement of many health outcomes, such as equity access to health care services targeted by the United Nations Sustainable Development Goals in 2015.

Primary health care (PHC) is a key component of the Portuguese health system, representing the first level of contact with the National Health Service (NHS), through functional PHC units. Thus, understanding geographical imbalances in the spatial planning of the PHC units (namely Family Health Units (FHsU) and Personalized Health Care Units (PHCsU)) is essential because a proper distribution ensures an effective prevention of disease progression on a large scale. In this context, it is critical to have a correct identification of the population's spatial accessibility to the FsU. Although this issue has been present on the public health agenda for many years, it remains a major concern.

Few studies and methodologies embrace those issues, lacking a comprehensive and substantiated framework. This study proposes to develop methodologies (with application in the Portuguese case) in order to: (a) assess the current state of PHC units; (b) measure the spatial accessibility to PHC units; and (c) evaluate policies to correct geographical imbalances.

Industrial engineering and management

Decision Support Platform in Strategic Planning for Smart Cities and Industry 4.0: Study and Development of Frameworks

Diogo Correia, Leonor Teixeira

For many years, the mobilization of people to cities has led to rapid urban pressure, which has contributed to the enormous challenge of these having to adapt their urban structure without planning. The term "Smart City", that appeared in the 1990s aims through Information and Communication Technologies (ICT) to solve the problems caused by urbanization and globalization. Issues related to the level of traffic, waste management, air quality, pressure and social inequality, economic speculation, and emergency bodies' inefficiency are some that the concept of Smart City aims to solve.

However, until today the concept itself has been evolving not only motivated by technological advances, but also by the advancement of society. Initially, the focus of the concept was entirely on technology (Smart Cities 1.0). Nowadays, it is related to the co-creation of cities with all stakeholders (Smart Cities 3.0).

The literature is not clear about the definition of the concept. It also lacks an index allowing a continuous evaluation based on all dimensions, in addition to sustainability. In practice, mechanisms to assess the maturity of a smart city and, at the same time, help plan and build roadmaps to achieve the desired future, are still non-existent. On the other hand, the need for cities to have a proactive rather than reactive attitude also highlights the need to use ICT to support decision-making concerning cities' strategic planning.

This project aims to contribute to answering the challenges raised here, investigating the main requirements, and conceptualize a decision support system to assist the strategic planning of smart cities. It is also intended to assess and return the level of maturity of a city in terms of its intelligence, as well as enhancing the definition and elaboration of roadmaps towards the pre-established objectives and the digitization of cities.

Interoperability between systems, and data processing and analysis to predict events are hot topics not only on Smart Cities but on what is now the new paradigm of the industry. Therefore the conceptualized content for Smart Cities will also be adapted to the theme of Industry 4.0, creating tools to help guide decision-makers in their implementation in a standardized and interoperable way.

Industrial engineering and management

End of life products: how to maintain assembly line efficiency in a high-mix low-volume production environment

Filipa Pinheiro, Raquel Xambre

The proposed PhD thesis will focus on the study of assembly lines that are producing products at the end of life stage of their cycle.

Nowadays, the focus of industrial companies is to achieve high efficiency levels since clients are more demanding than before and they are only willing to pay for added value. Additionally, products' life cycles are shorter which requires that companies become more flexible and capable of adapting their production quickly in order to be prepared to produce the next generation of products.

Traditionally, companies plans their assembly lines considering the product maturity phase, where it is easier to achieve high efficiency level, but the question is how to maintain this level when the quantities are reducing and the company is losing its efficiency due to the new products coming into the assembly line?

Taking this context into consideration, the goal of this project is to study how the assembly line can quickly adapt, maintaining the efficiency level. To do this it is essential to analyze the issues related to the layout planning of the line, the balancing of the workstations and to propose more integrated methods/algorithms that can help find a good solution.

Industrial engineering and management

Sustainability Function Deployment : Identification of sustainability requirements and parameters in cork sector

Marco Rocha, Professor Doutor João Carlos Matias

Sustainability or sustainable development has been an area of research in multiple aspects, including the way results are reported and verified, methodologies for assessing sustainability itself with reference to critical success factors or indicators, the design and development of sustainable products, among others. According to the literature, several aspects need to be addressed, such as specific practical applications, consideration of the interdependence of criteria, a more "balanced" approach between the various dimensions of sustainability. To try to fill these gaps, the establishment of a model to identify the requirements and parameters of sustainability in the cork industry, in the context of the design of sustainable products, is under development. To this end, the first stage is the construction of a questionnaire based on a collection of indicators from the literature, with validation/reformulation by a group of experts, the Delphi method being used throughout the process.

In the second phase the model, based on the so-called "Sustainability Function Deployment" will be built, integrating circular economy and industry 4.0 concepts and using MCDM and AHP techniques. This model will be applied in a real context in order to validate it and finally try to extrapolate it to other activities.

Industrial engineering and management

Impact of energy cost management on the financial performance of companies by focusing on exergy

Maryam Hajishams, João Carlos de Oliveira Matias and Margarita Matias Robaina

Managing the energy cost by improving energy efficiency is a very important issue to protect energy as natural resources. In this research, the relationship between energy efficiency (exergy) and financial performance will be investigated. Also, the measurement methods of environmental performance and financial performance will be studied. After that, the theoretical model will be constructed and finally, this model will be implemented in the case study. Mixed methods will be used in this research such as library research, interview, multiple analysis methods such as Principal Component Analysis (PCA), and Data Envelopment Analysis (DEA). some benefits are expected from this research such as helping the environment to avoid wasting resources, reassuring to society that energy is not wasted based on the proposed model in this study, showing the impact of energy efficiency on the financial performance of companies' managers for editing and improving

their strategies about sustainable development and/or more budget for news investments to create added value for the society. The results of this study are mainly related to Sustainable Development Goals 7 & 12.

Industrial engineering and management

Development of Supply Chain Management Strategies for de Angolan Cement Industry

Pedro Campos, Carina Maria Oliveira Pimentel, José Manuel Lopes Dias

In this pitch a project aimed to develop supply chain management strategies to strengthen the Angolan cement industry will be presented as well as the project research methods and some of the results achieved so far.

Industrial engineering and management

Information systems for the development of tourism in the digital era: A framework for accessible tourism.

Pedro Teixeira, Orientation: Professora Doutora Leonor da Conceição Teixeira, Co-orientation: Professora Doutora Maria Celeste de Aguiar Eusébio

With the fourth industrial revolution, changing the tourism sector, it is essential to study what impacts the latest emerging technologies will have in this sector. Tourism is an activity that enriches people in many dimensions. However, it is difficult for disabled tourists to travel without any constraint. Accessible tourism is a crucial topic for the development of a more inclusive society, enhancing tourism among people with disabilities (PwD). Since technology needs to be at the service of society, then the promotion of accessibility in various tourist activities, through various technologies is a must. This project can be seen as a bridge that connects the technologies of the fourth industrial revolution and accessible tourism. The new digitalization era primarily focuses on improving connectivity, thus making information a critical factor. There are new technologies, developing connectivity with the ability to carry the concept of Smart Tourism even further and at the same time, contribute to more accessible tourism, as one of the main problems, preventing PwD from traveling is mainly related to the shortage of information. Web applications are a great example, to illustrate how digitalization is revolutionizing accessible tourism, improving accessibility through information and connectivity. Therefore, the main goal is to design, develop and implement a concept of a Web-based Intelligent System (WBIS) to support information management and knowledge sharing, in the accessible tourism context, promoting the co-creation of tourism experiences. To accomplish this, the Design Science Research (DSR) and User-Centered Design methods will be followed. A deep literature review on the topic and user requirements studies will be applied, to obtain, what can be described as an "artifact" (a concept of an information system to promote accessible tourism). The conceptualization and validation of the concept will follow a 4-stage process: Stage 1: Identify the main functional requirements of the tourism market; Stage 2: Identify the main non-functional requirements of the tourism market; Stage 3: Develop a solution model using Unified Modelling Language (UML) and Stage 4: Develop the vertical prototype. Linking technological development, tourism, and social inclusion components, this project presents itself as an interdisciplinary and important study. In the future, this project could be of high importance for engineering information systems for tourism, and also have a big social impact, especially for people with disabilities.

Industrial engineering and management

Ferramentas de análise e avaliação da transformação organizacional

Ricardo Ferreira de Mascarenhas, Prof. Dra. Carina Pimentel, Prof. Dra. Maria João Pires da Rosa

NOT AVAILABLE AT PUBLICATION TIME.

Industrial engineering and management

Process Management and Digital Twin: Capacity-building support tool within the scope of Industry 4.0

Sara Castro, Leonor Teixeira

In an industrial era characterized by the digital transformation business processes, a new paradigm arises: The Industry 4.0. Digital Twin is a tool associated with this new concept consisting of a virtual representation of companies, being its main objective the replication and

analysis of production systems in real time. However, the design of business processes involving those digital ecosystems remains a pressing challenge for companies. Therefore, this project arose by the need to answer to these difficulties through Business Process Management, by building a framework of good practices and a capacity-building instrument for organizations to implement industry 4.0 concepts. The results of this study will contribute to: i) provide a better understanding of the current implementation state of the Digital Twin in industries, from a BPM perspective; ii) facilitate decision making by the management level of companies, from the synchronization of processes in the virtual world with the real one.

Industrial engineering and management

Sustainable Development of Marine Renewable Energies Supply Chain Management in Portugal

SeyedAsghar BayatGhiasi, Main Supervisor: Professor Fatima Lopes Alves / Co-supervisors: Professor Joao Carlos de Oliveria Matias, Professor Mohamadreza Kamali

Commercialization of marine renewable energies (MREs) is able to play a prominent role for the sustainable development of the societies due to its abundant and environment-friendly characteristics. Availability of extensive marine areas in Portugal allows using these types of energy to meet the current and future needs of the clean and renewable sources of energy. Four hypotheses will be tested in this study: (i) various technical, economic, social and environmental criteria can affect the promotion of MREs sustainable supply chain (SSC) in Portugal. (ii) The efficiency of MREs-SSC is highly dependent on the technical parameters. (iii) Socio-economic analysis considering the sustainability criteria has a huge influence on commercialization of MREs. (iv) life-cycle assessment of MREs can mitigate the subsequent environmental impacts of development of these technologies considering the sustainable development criteria. For this purpose, a sustainable supply chain management in renewable marine energy is proposed considering all the sustainability criteria.

Keywords:

Sustainable supply chain, Marine Renewable energy, Commercialization

Industrial engineering and management

Information and communication in digital platforms

Content Unification and Personalisation: Approachability and Opportunity Space

Bernardo Cardoso, Jorge Ferraz de Abreu

The growing number of on-demand multimedia OTT offers, side by side with increased functionalities provided by the traditional TV services, which include Video-on-Demand (VOD), time-shifted, and catch-up TV functionalities, have created on the users a need to navigate disparate UI and interaction concepts to allow them to reach the content they want. An alternative proposition, based on a personalised experience, with a content-first approach delivered through a UI promoting the aggregation and unification of content and sources may represent a set of leading features that could meet the need of these users. This work presents such a proposition in the form of an interactive TV prototype, complemented with the respective UX validation and evaluation of willingness for the users to change their current solution for a new unified and personalised one.

Information and communication in digital platforms

Seniors and iTV Services: Identification of Interaction Typologies

Daniel Carvalho, Telmo Silva, Jorge Abreu

With the increase in longevity and the decrease in birth rates, humanity is experiencing an increase in the senior population compared to that of the young population. Thus, it is important to understand what is meant by senior citizens and what are the challenges or opportunities that are generated with aging. Aging brings physiological, social and psychological changes, often creating obstacles in daily life. However, with the increase in longevity, new opportunities and challenges appear. In this context and at a technological level, television stands out as the technology closest to senior citizens, enhancing a better quality of life and feeling of inclusion in a community. However, the preferred way of watching television by the senior population has been live viewing. This type of "simple" interaction is often due to the loss of physical skills and memory of this population. Other reasons for not adopting new forms of interaction stem from aversion, perception

of uselessness or difficulty in using new technologies. The technology itself may also be poorly designed for the senior population, which leads to the info-technological exclusion of this population. Therefore, people's needs must be anticipated, and it is important when creating an interface to provide not only good looks and style, but also to provide elements necessary for easy access, understanding and use of technology. Thus, iTV projects / services conceived in the last 5 years were analyzed and later those developed for senior citizens were selected. From this analysis it was possible to better understand interactive television, which devices are used as remote controls for interacting with iTV services and what types of interaction / modalities were used on these devices. Using these data, a methodology was defined for a research work that is under development. Some of the devices and respective modalities that have been analyzed will be used. In the initial phase, tests of physical parameters will be used in a group of senior people. These people will then interact with different iTV service devices, participate in questionnaires that address issues related to usability and user experience, will be interviewed, will participate in Focus Group or in Think-aloud processes. In the end, it is intended to define a case study, exposing a set of good practices that identify the most appropriate types of interaction for the promotion of senior citizens' digital inclusion.

Information and communication in digital platforms

Precaução e percepção das agressões online: o comportamento info-comunicacional face aos riscos no âmbito universitário português

Eliza Oliveira, Vania Baldi

O uso das tecnologias digitais é cada vez mais intenso e amplo. Todavia, a tal incremento acompanha-se também, em 2019, um aumento significativo de jovens portugueses envolvidos em ciberagressões. À medida que as políticas públicas e intervenções sociais tentam diminuir o número de vítimas, as agressões online trazem incomensuráveis repercussões negativas aos jovens envolvidos. Assim, identificar quais os perigos que constituem os maiores riscos relacionado às ciberagressões, analisar os contextos causais, bem como as dificuldades à sua precaução, pode direcionar a elaboração de políticas abrangentes e eficazes no âmbito nacional. A proposta desta investigação é compreender como os jovens portugueses percebem os riscos associados às agressões online e verificar quais são os comportamentos de precaução face a tais riscos. Os dados serão recolhidos junto aos universitários, pois representam a franja social que mais utiliza as tecnologias digitais, permanecendo constantemente expostos aos riscos de experienciar diretamente ciberagressões.

Information and communication in digital platforms

The multimedia technology in the creation of collaborative practices in community

Inês Santos Moura, Vania Baldi

Os desenvolvimentos tecnológicos e a evolução da Internet ao longo dos últimos anos, permitiram a conceção de diferentes plataformas digitais e o desenvolvimento de comunidades de partilha online que permitem a construção e distribuição de conteúdos multimédia. As plataformas digitais poderão ser apropriadas por cidadãos ativistas que procuram novas formas de manifestar os seus protestos e reivindicações (Mattoni & Teune, 2014). A cultura participativa é caraterizada por Jenkins (2009), quando ocorre em contextos democráticos, como algo que reduz as restrições e os limites para uma expressão criativa e o envolvimento cívico, estimulando o apoio na criação e na partilha das iniciativas com outros. Neste sentido, o presente projeto de tese pretende analisar e refletir sobre as potencialidades das tecnologias digitais no fomento da participação cidadã em contextos online e offline, como é o caso do contexto urbano da ilha Bairro Herculano na cidade do Porto.

Information and communication in digital platforms

Location Based-Games and Active Ageing: The Pokémon Go Study in Seniors Life

Jesse Filho, Ana Isabel Veloso

As tecnologias digitais e móveis têm feito parte do cotidiano das pessoas e estes tem trazido facilidades para o dia-a-dia delas, para todas as idades e nos mais diversos setores, inclusive a saúde, segurança e participação, os pilares para obter um envelhecimento ativo na sociedade, como aponta a Organização Mundial de Saúde. Os seniores têm tirado proveito dos usos das tecnologias e pesquisas vem crescendo em torno disso, mas observa-se poucos estudos com o uso de jogos digitais, principalmente os que utilizam a geolocalização como mecânica de jogo. Deste modo, o objetivo deste estudo é verificar o potencial dos jogos móveis baseados em localização para engajar os pré-seniores a ter um envelhecimento ativo. Serão feitos inquéritos e observação participante de jogadores de Pokemon Go que possuam mais de 50 anos de idade e residam na cidade do Porto. Esta observação será feita durante os momentos de interação do público alvo com os jogos. Espera-se encontrar indicadores que relacionem os jogos móveis baseados em localização e os fatores que levam a um envelhecimento ativo, criando posteriormente um guia para outros seniores que desejam tirar maior proveito destes tipos de jogos.

Information and communication in digital platforms

Semi-Autonomous and Secure Tangible Media Interface: A Framework and a Prototype to Use At-Home By Children With Speech Sound Disorders

Joaquim Santos, Mário Vairinhos, Luís Jesus, Jonathan Rodriguez

This research takes previous work (Santos, Vairinhos, & Jesus, 2019), a step further by encompassing a greater scope and objectives. It intents on designing a framework and working prototype(s) that allow a hassle-free transformation of typical speech and language therapy intervention activities, for children with Speech Sound Disorders, into a tangible user interface (TUI). This artefact, akin to an internet of things device should be better suited for a post-intervention, at-home continuation of the session, allowing a Speech and Language Therapist to set up and monitor activities, at distance. This Thesis proposes, as an alternative to the traditional "pen and paper" approach for homework) the use of a TUI artefact, based on a set of known activities or games, to deliver and log the homework. Tangible User Interfaces can mix the better aspects of the digital with the properties, cognitive value (Santos, Vairinhos, & Jesus, 2019) and affordances of a physical object.

Santos, J., Vairinhos, M., & Jesus, L. M. T. (2019b). Treating Children With Speech Sound Disorders:

Development of a Tangible Artefact Prototype. JMIR Serious Games, 7(4), e13861. https://doi.org/10.2196/13861

Information and communication in digital platforms

Proteção de Dados Pessoais: proposta de plataforma digital para a democratização do conhecimento e a promoção da transparência

Larissa Melo, Orientadora: Maria João Antunes | mariajoao@ua.pt/ Co-orientadora: Isabel Fortuna de Oliveira | ifortunaoliveira@ua.pt

O projeto busca propor uma plataforma digital para a democratização do conhecimento e a promoção da transparência por meio da promoção da discussão dos direitos de proteção de dados pessoais com os titulares dos dados, empresas e órgãos da administração pública.

Information and communication in digital platforms

Bibliotecas Escolares... what else?

Maria José Pereira, Orientador: Prof. Doutor Óscar Mealha

Temos assistido a constantes alterações relativamente ao modo como se acede à informação nos novos media, questionamos o papel da biblioteca escolar no acompanhamento e preparação dos utilizadores (alunos) para os desafios nos ambientes informativos. É nossa intenção refletir acerca do posicionamento da biblioteca dentro do ecossistema educativo na redefinição dos processos infocomunicacionais, através dos smartphones, potenciando novas aprendizagens.

Information and communication in digital platforms

Infocommunication and Digital Platforms in the Sharing Economy: A Multicases Study about the Trust in Sustainable Contexts [Infocomunicação e Plataformas Digitais na Economia de Partilha: Um Estudo Multicasos Sobre a Confiança em Contextos Sustentáveis]

Raissa Sales, Vania Baldi, Ana Carla Amaro.

A investigação visa analisar experiências de partilha de bens e serviços digitalmente mediadas e propor boas práticas no âmbito da cultura e economia colaborativas em rede. Pretende-se investigar experiências de partilha entre quem se oferece para trabalhar sem remuneração monetária, num contexto onde deseja adquirir determinadas competências, e quem disponibiliza gratuitamente o seu saber e espaço social para efetivar tal aprendizagem. Analisaremos a emergência da confiança e dos interesses partilhados entre voluntários e anfitriões na utilização de plataformas digitais e nas experiências no âmbito da troca social não monetizada. Assim, desenharemos um modelo baseado nos comportamentos e-infocomunicacionais desses utilizadores e nas experiências consequentes. Esse constructo fundamentará um conjunto de propostas para o bom êxito das práticas de partilha. Espera-se, diante de um ethos colaborativo, promover uma cultura

participativa de boas práticas digitais e culturais, fomentando o cruzamento entre as discussões acadêmicas, as políticas das plataformas analisadas e instituições interessadas.

Information and communication in digital platforms

Storytelling na formação, empoderamento e inclusão feminina em TI - Modelação e prototipagem do impacto em comunidades

Renata Frade, Mário Vairinhos

Esta investigação visa mapear e modelar ativismo feminino coletivo tecnológico português e brasileiro, como ocorrem interações e realização de objetivos em plataformas digitais (PD), o impacto das estratégias online e presenciais sobre públicos-alvo. Os aspetos e resultados deste fenómeno comunicacional e organizacional serão relacionados à luz de teorias e conceitos do Feminismo Tecnológico, do Transmedia Storytelling (associado à convergência, cultura da participação e cibercultura) para avaliar narrativas em comunidades ativistas, e do Design de Interação (relacionado aos domínios da Interação Humano-Computador/HCI, Design centrado no utilizador, Computação Social, Interatividade Incorporada, Design de Experiência para criação de plataforma tecnológica feminista.

Pretende-se com esta pesquisa deixar um contributo relevante nas áreas científicas das Tecnologias da Informação, com áreas científicas de Ciências e Tecnologias da Comunicação, Ciências da Comunicação e Ciência da Informação. A aplicação teórica, a partir da modelagem comunicacional, no desenvolvimento de um protótipo feminista tecnológico pode representar um legado social para portuguesas e brasileiras e as sociedade destes países na busca pela diversidade, inclusão, formação e empoderamento.

Information and communication in digital platforms

Playable Characters in Video Games: Model proposal for creating Empathetic Characters

Tânia Ribeiro, Ana Isabel Veloso

This research aims to understand and codify the characteristics of playable characters in videogames that are able of trigger empathy states in the players. The main result of this research is the proposition of a methodology for the design of main characters in videogames and also a set of recommendations.

Information and communication in digital platforms

Qualificação e empregabilidade de pessoas com deficiência: proposta de plataforma baseada em processos de "correspondência mútua"

Virgínia Chalegre, Ana Margarida Pisco Almeida

Esta investigação tem o propósito de identificar que características as soluções digitais devem ter para promover a empregabilidade de pessoas com deficiência, através de um processo de correspondência entre as competências das pessoas e as características das oportunidades disponíveis no mercado de trabalho. A presente investigação visa também dar destaque às habilidades das pessoas, para que o foco do processo de recrutamento e seleção das empresas não seja a deficiência. A partir de um levantamento teórico, um benchmarking das soluções existentes e o desenvolvimento de um estudo de caso, com estratégias metodológicas inspiradas na abordagem Design Thinking e Educational Design Research, será desenvolvido um protótipo sob a perspectiva das diretrizes de acessibilidade, heurísticas de usabilidade e cultura participativa. Esta plataforma servirá de conexão entre as pessoas e as empresas. Além disso, serão sugeridos percursos de aprendizagem, para que as pessoas possuam maior qualificação e sejam inseridas no mercado de trabalho, como qualquer outro profissional.

Information and communication in digital platforms

Literary studies

A desmesura do quotidiano em Dulce Maria Cardoso

Anabela Coutinho, Maria Eugénia Pereira

Este trabalho tem como ponto de partida o estudo das obras de Dulce Maria Cardoso, cujas narrativas, reflexos de um sujeito organizador de um discurso descentrado e fragmentado, se enquadram no atual panorama da ficção portuguesa: o pós-modernismo. Pretende-se analisar a dinâmica narrativa do quotidiano, a configuração discursiva que o mesmo assume e os desafios colocados pela sua representação nas obras de Dulce Maria Cardoso. Interessa, também, abordar a relação que estas obras tecem com o seu referente preconizado, numa perspetiva etnográfica e sociológica.

Literary studies

Luanda, um Retrato do Espaço Pós-Colonial em Narrativas de Ondjaki

Dapeng Sang, António Manuel Ferreira (orientador)

A presença de Luanda revela-se como uma constante na literatura angolana contemporânea. No entanto, além de servir de cenário, a cidade também se constrói, nas diferentes narrativas, como uma metonímia de Angola. No caso de Ondjaki, o espaço geográfico da capital descolonizada inscreve-se nas suas narrativas, quer de caráter autobiográfico, quer de matriz utópica, e transforma-se num espaço literário que mimetiza o quotidiano dos seus habitantes. O presente projeto de investigação destina-se a apurar a representação literária de Luanda nas produções artísticas do escritor, especificando as suas idiossincrasias aos níveis geográfico, humano, social e utópico. Através de uma abordagem sistemática, pretende-se desvelar a correlação cidade/literatura patente em diversas narrativas ondjakianas, bem como formular a construção da identidade da literatura angolana por meio da representação de Luanda no contexto pós-colonial.

Literary studies

Negotiating Power between Literature and Law: Unity Dow's Women

Dulce Biscaia, David Callahan

Abstract

It is a commonly acknowledged fact that women continue to be denied equality in the private, social and political spheres. It is also a fact that crises in whatever social or economic domain continue to affect women more acutely than they affect men, a probable sign of women's long and continuing inequality in accessing resources such as health, education and political and legal representation. In her novels Unity Dow, a human rights lawyer, magistrate and politician from Botswana, elaborates in socially situated narratives the asymmetric power relations, grounded in patriarchal beliefs and practices, which are the causes for such inequality in the specific environment of her own culture and nation. Literary strategies provide one way of exploring the intelligibility of the causes of women's oppression and of indicating potential pathways to women's empowerment, understood as financial independence, access to education and health, and strong institutions to underwrite these.

Keywords – women's empowerment, education, female legal representation, Unity Dow

Literary studies

The last colour of the rainbow: transgender representations in children's literature

Emanuel Madalena, Ana Margarida Ramos, Sandra Palma Saleiro

This research aims to identify, contextualise and analyse trangender representations in children's literature, namely from the themes, structures and elements that explicitly represent the transgender, in a group of books for pre-readers and early readers published between 2000 and 2019, in English, Spanish and/or Portuguese.

Literary studies

Planeta Tangerina in the publishing world: transfer and mediation in the internationalization of Portuguese children's literature

Inês Costa, Ana Margarida Ramos, Maria Teresa Cortez

This thesis focuses on the internationalization of contemporary Portuguese children's literature, including the process of mediation and the analysis of the several transformations books undergo throughout the process of editorial transfer. Its interdisciplinary approach demands

a theoretical framework that relies on disciplines such as Literary Studies, Translation Studies and Publishing Studies. The research is divided in two phases. The first comprises a qualitative analysis of the Portuguese corpus through a process of close reading, combining the interpretation of text, image and materiality of the book. The second phase includes a comparative analysis between the Portuguese works and its corresponding foreign editions. The research aims to identify themes and characteristics that are appealing to foreign publishers; to identify and analyse the adaptations that are made when books are published in other countries; to identify the profile of foreign publishing industries and their evaluation of children's competences; and to reflect on the consequences of internationalization on the posterior Portuguese literary production.

Literary studies

Movimento e heterotopia na obra de Lídia Jorge

Susana Martins, Isabel Cristina Saraiva de Assunção Rodrigues Salak

Este trabalho pretende refletir sobre o modo como as deslocações dos indivíduos determinam, na globalidade da obra de Lídia Jorge, a criação de lugares-outros, heterotópicos, salientando assim a importância que o espaço assume como definidor de identidades individuais e coletivas. Interessa compreender como a mobilidade se evidencia não só como nomadismo físico, mas também mental e social, valorizando ainda o modo como estas itinerâncias se apresentam como criadoras de espaços de alteridade, de questionamento, de contestação e, principalmente, de recriação do real.

Literary studies

Marine science, technology and management

Climate Change Impact on West Iberian Coast Port Defenses and Maritime Traffic

Américo Ribeiro, João Miguel Dias/Moncho Gomez-Gesteira

The largest ports of the west coast of Iberian Peninsula, which is exposed to the Atlantic, are mostly situated in estuaries or rivers' mouth, often with bars at the entrance. The storms that the Atlantic arc faces during the last winters highlighted the needs and the interrogations about the efficiency of port defenses against the sea. Future engineering projects to maintain or construct more ports require a proper wave analysis and flow conditions of different layout alternatives in order to minimize impacts on navigation due to changes in port hydrodynamics. Nowadays, there is a special concern about the possible impact of climate change in circulation of estuarine systems and adjacent shelf as well as its consequence in port engineering works. Climate change evidences modifications in mean sea levels and especially in wind patterns that will result in changes of the extreme wave events and therefore affecting coastal systems. Previous studies showed that in the Portuguese coast the sea level will rise and the wave climate could be modified in the future as a result of climate change. Thus, it is important the existence of studies focusing the impact of climate change in the ports defenses and circulation, as well as to mitigate or nullify the problems related to climate change.

Marine science, technology and management

Physiological adaptations and strategies for toxins elimination by shellfish living with Harmful Algal Blooms

Ana Braga, Pedro R. Costa, Ana Gago-Martínez, Mário Pacheco

Harmful algal blooms (HAB) are responsible, among many other environmental issues, for the closure of shellfish harvesting, causing significant economic losses. These events have been reported to be increasing in frequency, intensity, persistence and geographic distribution. The acute effects of HAB toxins in humans have been extensively studied, and their mechanisms of action are almost defined. Nevertheless, the ecological impacts and physiological effects caused on marine organisms have not been addressed in the same detail.

Phytoplankton cells, including those from HABs, are the primary nutritional source of shellfish. Therefore, the ability to metabolise and detoxify HAB toxins is critical to shellfish survival, which has certainly evolved to acquire additional resources that enable them to tolerate HAB toxins. Different lipophilic toxin profiles have been reported in different species harvested in the same location at the same time when a HAB phenomenon was occurring. Also, discrepancies between the shellfish and algae profiles have been observed. These findings indicate that the phytotoxins effects may differ between shellfish species and that the toxins dynamics in an in vivo scenario is very complex.

However, very little is known about the mechanisms that rule toxins in shellfish. A few studies have shown that different species have different responses on biochemical parameters when exposed to toxins, especially when native and non-native are compared, suggesting that some species can be better prepared to cope with marine biotoxins.

Under this context, a combined toxicokinetic and ecophysiological approach was used in order to investigate the physiological adaptations and biochemical responses that provide shellfish with the ability to live in toxins-contaminated water bodies. The primary goals pursued in this work were:

i) To determine whether native and invasive species cope with exposure to Harmful Algal Blooms differently, providing new insights on the species-specificities towards the prediction of ecosystem functioning fragilities in the presence of invasive species and harmful algal blooms.

ii) To evaluate how commercially valuable shellfish species cope with simultaneous exposure to several climate change drives and harmful algal blooms, providing new insights on how environmental changes, conditions shellfish species toxicokinetics, physiological and genotoxic responses, under harmful algal blooms.

iii) To assess, in an anthropogenic point of view, marine biotoxins bioaccessibility, contributing for new information passively of being used in health risk assessments about these compounds.

Marine science, technology and management

Morphodynamics of coastal environments in mixed sediment beds

Caroline C. Ferreira, Paulo A. Silva, Ana M. Bernabeu

The majority of the world's coastal regions comprise heterogeneous sedimentary environments. At a beach, the sediment grain size shows a horizontal variability, with coarser sand normally found near the wave breaking or in the swash zone from where both an offshore and onshore finning takes place.

This research project aims to study the sediment dynamics and transport of mixed sediments under the action of waves. A set of field experiments (carried out in Patos beach, Vigo, Spain) as well as laboratory experiments (carried out in the Large Wave Flume, at Hannover, Germany) made in controlled conditions and with heterogeneous sediments was made with the fluorescent tracer technique. The movement of the fluorescent tracer was tracked, allowing to study the displacement of the coarse and fine sand fractions. These results provide the basis for the improvement of sediment transport formulations.

It was possible to observe that the transport of each size-fraction was influenced by the presence of other fractions. For example, the fine particles in sand mixtures are relatively less transported than in a uniform sand bed (hiding effect).

Marine science, technology and management

An innovative approach for the prevention of infections affecting farmed fish

Cátia Vieira, Maria Adelaide de Pinho Almeida , Maria do Amparo Ferreira Faustino , Pedro Pablo Gallego

The aquaculture is a growing sector of worldwide importance, currently responsible for more than 47% of the total fish production. However, disease outbreaks caused by microorganisms such as bacteria and parasites lead to high financial losses in the aquaculture industry and can endanger both consumers and the environment. Moreover, the available chemotherapeutical compounds to control infections in fish-farming systems results in many severe ecotoxicological effects such as water contamination and leads to the development of resistant microorganisms. To address these challenges, innovative and alternative antimicrobial approaches must be developed. The antimicrobial PhotoDynamic Therapy (aPDT), is an environmentally friendly and cost-effective technique that combines three components (a photosensitizer - PS, light, and dioxygen), to produce highly reactive oxygen species (ROS). These reactive species promote the inactivation of a broad spectrum of microorganisms without the development of resistant microbial strains. Recent advances recognized the efficiency of the photodynamic process and suggest its application to control microbial diseases in the environment. Therefore, the aim of this study consists in developing a protocol to disinfect aquaculture waters, as well, to prevent and control fishery infections.

Marine science, technology and management

Recycling wasted nutrients from aquaculture effluents through the integrated use of polychaetes assisted sand filters (PASFs) and halophytes in aquaponics

Daniel Jerónimo, Ricardo Calado, Ana I. Lillebø, Javier Cremades

Integrated multitrophic aquaculture (IMTA) is an ecosystem-based approach where species of different trophic levels are integrated to maximize the recovery of nutrients introduced in the production system. In this concept the species located downstream in IMTA design recover in the form of valuable biomass otherwise wasted nutrients (uneaten feed and faeces) produced by upstream located species, while promoting water purification. Polychaetes and halophyte plants can play a key role in the recovery of wasted nutrients present in particulate organic matter (POM) and dissolved inorganic nitrogen and phosphorus (DIN-N and DIP-P), respectively. In a first research line, the bioremediation and growth performances of polychaetes (Hediste diversicolor) cultured in sand filters (PASFs) were evaluated as a single extractive unit and combined with halophytes in aquaponics (Salicornia ramosissima). The PASFs and halophytes contributed to the retention of ≈ 80% of POM and 50-60% of DIN-N and DIP-P in the form of extractive species biomass. The combined culture of both extractive species in the same tank (S. ramosissima grown on the water column of PASFs) allowed to achieve the same performances using half of the required footprint than the culture of both species in separate tanks. In a second research line, the fatty acid (FA) profile of H. diversicolor was characterized , with the biomass obtained under IMTA conditions exhibiting a profile with higher levels of n-3 highly unsaturated fatty acids (HUFAs) (e.g. EPA and DHA) than the ones displayed by conspecifics harvested from the wild. In this work it was also possible to perform for the first time the FA profile characterisation of Diopatra neapolitana, Terebella lapidaria and Sabella cf. pavonina cultured under IMTA, polychaetes whose larvae naturally colonised PASFs. This species emerge has candidate extractive species for alternative IMTA designs in future studies. In a third research line, the performance of the halophyte S. ramosissima was tested under different concentrations of dissolved iron in hydroponic medium, with plants under higher concentrations exhibiting a significantly higher growth rate and iron content in their biomass. The feasibility of integrating this species over a wide range of temperatures (17-27 ºC) and brackish waters (salinities of 15-25) was also demonstrated.

Marine science, technology and management

Feeding Hermetia illucens under a circular economy framework

Daniela Rodrigues, Olga Ameixa/Ricardo Calado/Xosé Álvaréz

There is an overall expectation that aquaculture can fulfil the ever-growing demand for food of world population. However, this quest is yet conditioned by feed ingredients sustainability, availability and prices. The dependency of feed formulations on fish meal and fish oil, two key-ingredients rich in n-3 highly unsaturated fatty acids (HUFA), is a major constraint to sustainable fish production in aquaculture. The present project aims to respond to this challenge by using an authorized species for insect meal production (Commission Regulation (EU) 2017/893), the Black Soldier Fly (BSF) Hermetia illucens. Experimental evidence suggests that the content of n-3 HUFA in insects can be enhanced through manipulation of insect diets. We aim to explore this opportunity further by testing different organic by-products, namely, fish and seaweed wastes, to produce value added insect meals, under bio-based and circular economy frameworks.

Marine science, technology and management

Modeling the physical processes that underlie Harmful Algal Blooms in North-Western Iberian shelf and Rias Baixas

Elisabet Rodríguez Cruz, Jesús Dubert, Rita Nolasco, Toni Padín

North Western Iberian shelf and Rias Baixas (NWISR) are a coastal upwelling region with a recurrent annual presence of Harmful Algal Blooms (HAB) of Dinophysis species and decadal intermittent blooms of Gymnodinium catenatum. These species are responsible for diarrhetic shellfish poisoning (DSP) and paralytic shellfish poisoning (PSP). Different physical mechanisms have been suggested to explain the presence of HAB on the NW Iberian coast. Some authors support that the inner-shelf transport of already established offshore populations is enough to account for the numerical increase of HAB after upwelling relaxation and downwelling. Others consider that only the hypothesis of an alongshore transport of allochthonous populations by inshore currents can explain sudden outbreaks of HAB on the coast. There is evidence that both hypotheses can occur and that there are blooms with epicenters in the Portuguese coast that can reach the Galician Rias and viceversa.

A two-way nesting configuration of CROCO, a 3-D hydrodynamic ocean model, was computed to obtain a high-resolution configuration with tidal and river forcings. Model output was validated with observational data from a buoy, CTD, and ADCPs located at a region near cape Silleiro (Spain). The surface and bottom comparison of temperature, salinity, and zonal velocity component showed good accuracy between the model and the observational data. Once a good representation of the ocean model conditions was verified, model outputs can be used to run a lagrangian model. In our study, we used the Connectivity Modeling System (CMS) to represent HAB transport along the NWISR.

Marine science, technology and management

The use of endogenous insects to promote a more sustainable shrimp aquaculture

Felipe Lourenço, Olga Ameixa, Ricardo Calado, Isabel Medina

Aquaculture is a growing and efficient food production system in line with the Blue Growth strategy. However, worldwide, aquaculture industries rely on wild fisheries as a source of fishmeal and fish oil to meet nutritional requirements of several marine species (mainly in protein and long-chain omega-3 polyunsaturated fatty acids), contributing to the collapse of fisheries stocks. Evidence shows that costal and marine insects, due to their feeding habits, present a nutritional composition richer in omega-3, being potentially good candidates to feed marine species. This project is investigating this by testing endemic costal insect species regarding their nutritional composition, as well as dietary needs and develop adequate diets and rearing methodologies which can be readily used to produce adequate aquafeeds and contribute to ensure food security through native insect biodiversity.

Marine science, technology and management

Population dynamic of mussel Mytillus galloprovincialis (Lamarck) in two Portuguese Marine Protected Areas and its fecundity along the coast

Gabriela Oliveira, Henrique Queiroga, Laura Peteiro

Understanding the population dynamics of complex-life species is crucial to understand the spatial structure of coastal populations and develop effective management strategies. Larval dispersal patterns determine local population size and the degree of connectivity between sub-populations, providing crucial information for MPAs design. Studies of settlement patterns combined with local oceanography are essential to infer larval dispersal patterns and potential connectivity pathways between populations. In this context, this project aims to study larval dispersal patterns of Mytilus galloprovincialis in the Western Iberia Upwelling Ecosystem in the frame of two existing MPAs and fecundity along the Portuguese coast. Spatial settlement patterns are being evaluated inside and in adjacent areas of two MPAs exposed to different oceanographic characteristics (e.g. upwelling intensity). Post-settlement mortality and growth rates of early settlers are being inferred from the settlement time series. Estimates of fecundity and its relationships with the environmental conditions along the Portuguese coast will be performed. The integration of this information will allow us to increase our understanding on the population dynamics of this model specie.

Marine science, technology and management

Climate change impact on estuarine aquaculture activity along the Portuguese coast

Humberto Pereira, João Miguel Dias, Inés Álvarez

Portugal is one of the world's countries with the highest consumption of fish per capita, not capturing or producing enough fish to ensure its needs. To respond to the high demand for fish consumption, aquaculture infrastructures for fish and bivalve's production have been installed in most of the national estuarine systems. However, there is limited information about the best physical, chemical, and microbiological conditions for aquaculture production of species with high commercial value.

This work aims to identify and evaluate areas, along the Portuguese coast, with high potential for aquaculture activity (as well as critical areas), promoting its sustainable growth considering the possible impacts of climate change.

High resolution biophysical numerical models will be explored for several Portuguese estuaries and lagoons to develop local maps of physical, chemical, and microbiological variables under present and future climate change scenarios. These results will allow us to establish classes for a Suitability Index to fish and bivalve species, contributing to increasing the available knowledge on high potential areas and species to explore in Portuguese coastal systems.

Marine science, technology and management

Salt intrusion modeling in Aveiro Lagoon under morphological and climatic changes

João Pinheiro, João Miguel Dias, Edward Stephen Gross

Most studies to date on climate change have neglected effects on saline intrusion in estuarine environments. Furthermore, most estuarine environments have highly dynamic morphologies, with concurrent natural variability and effects of human actions, which may amplify

climate change impacts on salt intrusion. These may be particularly meaningful in changing salinity distribution and, consequently, impacting the ecological equilibrium of estuarine habitats. Indeed, such variations could be critical for the development and survival of certain species used to live in a specific range of salinity.

The purpose of this PhD work is to evaluate changes in salinity distribution in Aveiro Lagoon in response to climate change and morphological modifications, assessing past and future differences and quantifying the main physical drivers' relative contributions. Modifications of salt transport mechanisms induced by both factors will be analyzed and characterized, aiming to understand the local estuarine dynamics. To achieve these goals, a novel three-dimensional application of the Delft3D modeling suite will be developed for Aveiro Lagoon, and different numerical simulations will be performed for scenarios of climate change and human induced morphological modifications. As a case study, Aveiro Lagoon is an area of great interest since it has been exposed to several dredging operations during the past decades that changed the Lagoon morphology, which are planned to continue in the future.

Marine science, technology and management

Integration of halophytes production to promote coastal aquaculture eco-intensification

Marco Custódio, Ana Lillebø, Ricardo Calado, Sebastian Villasante

Aquaculture activities, especially fed aquaculture (e.g. fish and shrimp farming), originate a relatively high quantity of suspended and dissolved matter that is usually wasted and can negatively impact surrounding ecosystems (e.g. eutrophication). Plus, this nutrient wastage represents an economic loss to aquaculture farmers. The development of sustainable, integrated, and circular production frameworks is therefore crucial for better nutrient-use efficiency and waste valorization in aquaculture. In this context, Integrated Multi-Trophic Aquaculture (IMTA) can partially solve the problem through the enhanced production of aquatic organisms of two or more functional groups (with complementary ecosystem functions), that are trophically connected by demonstrated nutrient flows. In saline systems, halophytes have been showing potential as extractive species of dissolved matter and could be developed into valuable nutritious saline crops with multiple uses in different industries. The objective of the present thesis was to test the capacity of the edible halophyte Halimione portulacoides (sea purslane) to extract dissolved inorganic nitrogen and phosphorous from saline hydroponic solutions that mimick real aquaculture scenarios and evaluate its horticultural performance and potential economic value, through biomass valorization and consumer-based surveys.

Marine science, technology and management

Rhizosphere Engineering of Salicornia ramosissima with Plant Growth Promoting Bacteria

Maria João Ferreira, Ângela Cunha, Javier Cremades, Helena Silva

Halophyte plants thrive in saline environments while displaying interesting nutritional properties related with adaptations to salt and oxidative stress and therefore its cultivation is regarded as a promising alternative to the challenges imposed by scarcity of fresh water for irrigation, the necessity of using reclaimed or brackish water for irrigation, and the progressive salinization of soils as a consequence of sea level rise.

Integrated multi-trophic aquaculture (IMTA) systems represent another important field of application of halophytes. Inorganic dissolved nutrients, specially nitrogen (N) and phosphorus (P), and particulate organic matter cause eutrophication, changing water chemistry and impact ecological relations. So far, most IMTA systems use shellfish and seaweed. However, the integration of halophytes with economic value has recently received growing attention.

Salicornia species are among the most promising candidates for halophyte crop cultivation and in IMTA systems and, although tests are still scarce, some Salicornia species showed promising results in bioremediation.

However, in high salinity media, either in soils or in aquaponics, seed germination, growth and physiological condition of Salicornia are negatively affected. Plant-bacteria interactions taking place at the rhizosphere compartment are known to contribute to the tolerance of halophytes to salinity. In fact, the rhizosphere of halophytes allowed the isolation of plant growth promoting rhizobacteria (PGPR) that have been applied in stress-mitigation, biofertilizers and biocontrol agents in traditional crop vegetables. Detailed information on the natural microbiome of the rhizosphere and endosphere of Salicornia species is restricted to a few studies. Attempts of modulation of halophytes rhizosphere communities for improved crop production, enhancement of tolerance to multi-stress conditions, modification of metabolite expression or improved performance in IMTA systems are very scarce.

This project aims to formulate a consortium of autochthonous PGPB with different growth promoting traits that can positively impact crop halophyte growth, stress tolerance, metabolite expression and performance in IMTA systems in terms of recycling of N and P in heavily

charged aquaculture effluents. The validation of a PGPB-assisted cultivation protocol in field or IMTA conditions significantly contributes to current practices of halophyte crop cultivation and to the sustainability of aquaculture.

Marine science, technology and management

Selecting monitoring indicators for Portuguese MPA. A participatory process.

Mariana Andrade, Henrique Queiroga, Jorge Gonçalves, Jesús Troncoso

Um dos objetivos comuns aos projetos financiados pelo Programa Operacional Sustentabilidade e Eficiência no Uso de Recursos (PO SEUR), é a criação de um modelo de monitorização do estado da biodiversidade e de pressão das áreas marinhas protegidas (AMP) em Portugal. Para o efeito, os três projetos organizaram um processo participativo, formalizado por três workshops. Durante o processo definiram-se, de forma faseada, indicadores de monitorização que permitam informar a comunidade científica, os gestores e os decisores políticos sobre o sucesso ou insucesso das medidas de conservação implementadas para o cumprimento dos objetivos/metas gerais e específicos das AMP portuguesas. Dado que a objetividade dos indicadores está intimamente relacionada com as metodologias de monitorização utilizadas para a recolha de dados, foram também criadas bases para a determinação de metodologias comuns eficazes, i.e., que correspondam à realidade contextual biofísica e socioeconómica de cada AMP e dos seus órgãos intervenientes.

Na execução de um programa de monitorização que visa a interoperabilidade entre os sistemas de monitorização que têm vindo a ser adotados na gestão das diferentes AMP, a concordância entre indicadores e metodologias utilizadas para medir o efeito de reserva, é de particular importância, especialmente quando validada pelos seus principais intervenientes (investigadores e gestores).

Marine science, technology and management

Phage therapy in Bivalve Depuration

Pedro Costa, Adelaide Almeida, Jesús L. Romalde

With the rising of bivalve production in aquaculture to reduce our dependence from natural stocks and to avoid human diseases transmitted by bivalve consumption (e.g. Vibrio and Salmonella), it is necessary to develop new methods of decontamination. With this study it is aimed to efficiently decontaminate bivalves (Ruditapes decussatus and Cerastoderma edule), employing phage therapy (using bacteriophages, viruses that only infect bacteria) during depuration (method currently used). The results will give information regarding the use of phage cocktails for the control of several pathogenic bacteria at the same time during depuration. The possibility to inactivate bacteria with phage cocktails (which production cost is low) without any risk to the bivalves nor the consumer makes decontamination safer, effective and faster, thus more attractive to companies and regional operators.

Marine science, technology and management

Isotopic niche metrics on the neustonic zooplankton

Rui Albuquerque, Henrique Queiroga, Juan Ignacio González-Gordillo, Antonio Bode

Zooplankton plays a key role in the ecology of the marine realm. Among zooplankton's community, in the thin layer of the atmosphere/ocean boundary, lays one of the less described and understood ecological groups of metazoans: the neuston. The neuston is commonly divided into three ecological categories corresponding to their vertical migration behavior in the water column (euneuston; facultative neuston; and pseudoneuston). The diel vertical migrations of the neuston involve the transfer of food and energy from the surface to deeper layers, impacting the composition of vertical particle flux, and as component of the CO2 biological pump they also take part in the removal of atmospheric CO2.

However, to this day only a few geographically-limited studies have focused in the neuston. To help bridge this gap, the present study aims at exploring the neustonic community from a global scale perspective. Samples used in this study were collected in the Malaspina 2010 Expedition. A comprehensive contribution to the biological diversity, biomass, biogeography patterns, and role in the trophic chain of the world oceans is expected.

Marine science, technology and management

Marketing and strategy

The leaders' spiritual intelligence influence in the health institution

Andréa Fidelis, Andreia Vitória - Antonio Carrizo Moreira

Este trabalho é a apresentação resumida do projeto doutoral em andamento sobre a influencia da inteligencia espiritual (SI) do líder nas organizações de saúde. A pesquisa está sendo conduzida nos hospitais do Brasil e de Portugal. Serão apresentados os resultados da revisão sistemática da literatura sobre o tema central que conclui que a cultura influencia a interpretação do construto na investigação acadêmica.

Marketing and strategy

The impact of innovation capabilities on export performance of mozambican SMEs

Eurico Navaia, António C. Moreira, Cláudia Ribau

Abstract

Purpose - From the point of view of dynamic capability theory and resource-based view, innovation capabilities are a vital source of competitive advantages. Due to the variety of its inconsistent dimensions and applicability of the constructs, this article systematically analyzes existing research on the different metrics used in innovation capabilities.

Design/Methodology/Approach - A systematic literature review protocol was used to conduct this review. The results are organized in descriptive - characteristics of the articles and qualitative - concepts and metrics of innovation capabilities.

Findings – variety of constructs, dimensions and items used to measure innovation capabilities and theories related.

Research limitations/implications - This study contributes to the literature because it clearly presents what is and is not known - about the main dimensions used to measure innovation capabilities. The limitation of our research is the lack of information in some studies on the dimensions of innovation capabilities, which made it difficult to identify them.

Marketing and strategy

Environment and Sustainability in the Urban Context: Investigating the role of natural change in people's lives – more specifically people who are moving to another country - as a path to the recycling habit.

Josefa Gondim, Marlene Amorim

This research has, as object of study, the urban development and actions of the municipality to promote a recycling behavior in the citizens. Thus, the objective of this investigation is to characterize the behavior of foreign families which live in Portugal in relation to recycling, in order to understand the relationship between the change of country and the impact on their recycling habits. It is intended that this work is a contribution, not only theoretical, but also practical, since it contributes with relevant information, both for public managers, and for developers of social participation campaigns.

Marketing and strategy

Identification of Determinants Leveraging Workplace Innovation

Maria Leonor Almeida, António Carrizo Moreira. Joaquim Borges Gouveia

Identification of Determinants Leveraging Workplace Innovation:

Workplace innovation (WI) plays an important role at the institutional level, enabling firms to improve their competitive advantage. However, it remains an under-researched theme. The purpose of this research is to extend current knowledge of the mechanisms that facilitate innovations in the workplace, identifying the main determinants that leverage WI, based on a systematic literature review (SLR and on qualitative applied methods, as case studies which allow a study of the Reality in firms.

This research has as main objective to identify and propose a framework that identifies determinants leveraging workplace innovation. Research points to some frameworks, but none is complete, all complement each other, there is no holistic view about WI. It has also the objective to interpret the dependencies among determinants and include those in the framework.

Keywords: Workplace Innovation, Determinants, Framework, Organizational Dynamics, Human Resources Management, Collaboration, Information Technologies, Other Facilitators, Case studies.

Marketing and strategy

Multisided Platforms (MSP): business model and value creation

Nuno Mocica Brilha, Helena Nobre (UA), Cláudia Simões (UM)

The topic of platform ecosystems has gathered growing interest in the academic and managerial fields over the last decade.

The interest in the topics of two-sided platforms or multi-sided platforms in the literature reflects a business reality of superstar platforms such as Amazon, Apple, Google and Facebook which represent the fastest growing organizations in the global economy.

This interest is not difficult to understand since according to the most conventional measures of corporate success (revenue, market capitalization, brand value), businesses operating as multi-sided platforms and their associated ecosystems constitute the majority of the fastest growing organizations in the global economy.

Marketing and strategy

Family Wine Tourism: Experiences and challenges for holidays with children in wine destinations

Rafaela Malerba, Prof. Elisabeth Kastenholz, Prof. Maria João Aibéo Carneiro

The lack of child-friendly activities is reported as a constraint for wine tourism, while some studies identify families as a significant potential segment for this activity. On the other hand, in different destinations, some wineries and cellar doors already offer services and experiences suitable for family and children interests. Hence, this research aims to understand the experiences of families visiting wine destinations and the related opportunities and challenges faced by wineries when hosting this market. Through a mixed-methods approach, it intends to: describe services and experiences offered by family-friendly wineries in different countries, in terms of proposed benefits, activities and restrictions; analyse the perceived benefits, the dimensions of the experience and the determinants of satisfaction expressed on online reviews about family-friendly wineries; explore the influence of the presence of children in the behaviour and experiences of adult family wine tourists visiting Bairrada, in Central Portugal; recognise the motivations, experiences and constraints faced by those families, and to identify wineries' managers perceived opportunities and challenges regarding this market.

The project addresses different perspectives of family wine tourism: the practices of child-friendly wineries in different destinations, based on documentary research; the experience of visitors to at an emerging family wine destination based on a quantitative survey and in-depth interviews; the perceptions of Bairrada Route suppliers, through in-depth interviews and questionnaires; and finally the experiences of visitors to child-friendly wineries, based on online reviews. It may contribute to marketing and tourism theoretical bodies, concerning situational influences (group composition) on tourist behaviour and experiences, as well to the knowledge about the family tourism market, in a context especially marked by contradictory motivations and interests. It also provides evidence about best practices and strategies that may enhance wine destinations' development through family wine tourism, using as a particular case the Bairrada Route in Central Portugal.

Marketing and strategy

The Perceived Value of Angel Investing

Rui Falcão, Maria Joao Carneiro, Antonio Carrizo Moreira, Harry Sapienza

Abstract

Purpose - Despite the growing prominence of business angels (BAs) as crucial players in the development of high-potential, early-stage startups, who they are and what drives them is not fully understood. In what sense are they really "angels"? Where do our portraits and assumptions regarding BAs come from, and how accurate are these portraits? Many of the images of BAs depart significantly from more conventional views. Yet the conventional views stubbornly persist. To gain a comprehensive view of the goals of BAs, we went beyond the traditional economic and financial models to perspectives from marketing and consumer behaviour as additional lenses.

Design/methodology/approach – We employed a mixed research approach with a qualitative followed by a quantitative study (including laddering and Structured Equation Modelling) to uncover angel's goals and measure the perceived investment value of their activity assessing the value perceived by the angels on six distinct value dimensions: economic, functional, emotional, altruism, self-esteem and entrepreneurial. The quantitative data were collected through a survey questionnaire with 869 BAs from 69 countries.

Findings - The results reveal that: (i) BAs want to develop themselves and expect more than money from their activity; (ii) angel perceived investment value positively influences their job satisfaction; and (iii) angels satisfied with their jobs are more likely to reinvest their money and engage in positive word-of-mouth.

Originality – Contribute to change the traditional view of the angel investor. Development of a scale to measure the angel perceived investment value (APIV), due to the lack of an instrument to assess this construct. The research enables to deeply understand the relevance of non-economic value outcomes of the angel investing, including entrepreneurial, emotional, altruism and self-esteem. Implications and guidelines to gatekeepers, entrepreneurs and angel leaders are pointed to enhance value perception and guarantee the maximum satisfaction with the angel investing activity.

Marketing and strategy

Materials science and engineering

Self-healing layered double hydroxide coatings for intelligent protection of zinc galvanized steel structures

Aliaksandr Mikhailau, Dr. Kiryl Yasakau, Prof. Mário G.S. Ferreira

Increasing complexity of composite materials is an inevitable consequence of continuous scientific research. In this case, galvanized steel which proved to be resistant to atmospheric corrosion is an object of the next improvement. Layered double hydroxide (LDH) grown directly on the surface of zinc galvanized steel is a feasible solution to provide a self-healing component to its protection. The main object of this this work is LDH grown by chemical conversion of superficial zinc. Details of the synthesis were studied, as well as anionic exchange kinetics and corrosion protective properties.

Materials science and engineering

Hybrid NbxMoyOz thin films with electrochromic response deposited by reactive magnetron sputtering and atomic layer deposition

Alice Trabulo, Manuel Pedro Graça, Rui Ramos Ferreira e Silva

In the field of electrochromic materials relevant efforts have been made to promote the implementation of electrochromic materials in displays and light modulation systems. In the last years, a special attention has been given to transition metal oxides (TMOs), in the thin-film form, as a promising class of materials for those types of electrochromic applications. The main purposes of this research are the grow, by both reactive magnetron sputtering and atomic layer deposition, of NbxMoyOz thin films on flexible substrates and the study of their electrochromic characteristics as for example the kinetics of the colouring/bleaching states, by adding organic or inorganic electrolytes. For each prepared device/prototype, every material used in their construction is characterized by the point-of-view of the structural, chemical, optical, electrical, and electrochemical properties.

Materials science and engineering

Modelação de troca tónica em materiais apatíticos

Avito Rebelo, José Maria da Fonte Ferreira (Orientador)

Cadmium is a chemical element that finds application in many fields. As a consequence of the numerous human activities related to its wide spread applications, the environment gets contaminated. One of the most severe consequences happens in aquatic habitats. Cadmium removal from aqueous solution by many different materials has been studied. However, the limited ability of the existing models to fit the experimental data, determination of important parameters such as mass of extracted heavy metal per unit mass of decontaminant, or predict how fast the process will occur, such as adsorption kinetics constants, is still a concern. In this work, two models are used to fit the adsorption data gathered at different temperatures by two distinct decontaminant calcium phosphate (CaP) powders, hydroxyapatite (HAp) and tricalcium phosphate (β-TCP). The fitting models are nonlinear forms of pseudo first-order adsorption kinetics and the pseudo second-

order adsorption kinetics. Determination of important parameters of both models was performed for both HAp and β-TCP under each of the experimental conditions used. The results disclose very interesting adsorption properties of cadmium ions from aqueous media by β-TCP.

Materials science and engineering

T-RTM development: thermoplastic composites production for autoparts

Filipe Martins, Martinho Oliveira

Polyamide 6, sometimes erroneous denominated as nylon 6, is an engineering thermoplastic. Among other sectors, polyamide 6 is used in automotive, construction and food industry due to their high mechanical strength, thermal and chemical resistance.

Industrial in-situ polymerization strategies allow the synthesis of polymers inside the mould. Regarding polyamide, e-caprolactam in-situ polymerization reaction can be driven by anionic ring-opening polymerization. At a given temperature, the process starts once monomer is mixed with an activator and a catalyst. Then the viscosity of mixture will tend to increase to the point where the liquid reagents solidifies and polymerize into a polyamide.

Comparing to traditional methods, in-situ polymerization requires a lower processing temperature and the process is particularly useful in the development of polyamide matrix composites. When in-situ polymerization starts, melted reagents have a very low viscosity which could be beneficial due to a superior adhesion to compatible reinforcing phases. Polyamides are moisture sensitive which lead to a careful manipulation of raw materials and process inertization.

Polyamide 6 can be used on structural components if it´s reinforced with carbon fiber. Even at low concentrations, the addition of graphene-based nanoparticles has the potential to increase the mechanical behavior of the composite.

Nowadays the T-RTM industrial process presents several problems. More knowledge is necessary to address important fields like raw materials, processing conditions and mold project. In this thesis this fields will be approach with special attention to the processing parameters and the technology itself. The use of new formulations involving carbon and/or polyamide fibers and/or nanoparticles require new processing parameters and new mixing solutions.

Materials science and engineering

Hybrid Nanostructures of Carbon/Metal Oxides for Solar-Driven Abatement of Organic Pollutants

Inês Oliveira, Rui Silva, Cláudia Silva

Wave-like pattern carbon nanotubes of 2.3 µm in height were produced by thermal chemical vapor deposition (TCVD) on Si/SiO2 substrates. These CNTs arrays were coated with zinc oxide (ZnO) via atomic layer deposition (ALD) technique. Conformal, uniform and very thin films (max. 26 nm) around the CNTs were obtained after 200 ALD cycles. The photocatalytic performance of these nanocomposite materials was tested in the degradation of rhodamine B (RhB), a harmful dye present in food and textile wastewaters. The optimal degradation performance is already obtained after 100 ALD cycles on wave-like pattern CNTs, which provide 77 % of RhB degradation after 420 min of irradiation. The photocatalytic results suggested a remarkable synergistic effect between the CNT and ZnO phases. The stability of ZnO/wave-like pattern CNTs nanocomposites after being used as photocatalysts was demonstrated by Raman spectroscopy, as the CNTs structure stayed intact and the ZnO remained coupled to the CNTs. Thus, a main advantage of the present approach is the immobilization of the photocatalyst material on a solid support, avoiding further complex nanomaterial separation from the treated water stream.

Materials science and engineering

Groovy

Isabel Bjørge, João F. Mano, Clara R. Correia

Structure and organisation are key aspects of the native tissue environment, which ultimately condition cell fate via the activation of mechanotransduction pathways. Features such as geometry and topography are two preponderant features that actively regulate interactions between cells and the extracellular matrix. We have therefore evaluated the effect of macro scalegeometry and grooved topography on cell behaviour and differentiation into the osteogenic lineage. These studies aim to take a step further towards the development of a functional histoarchitecture, ultimately applying fine-tuned microcarriers presenting intricately tailored topographical cues.

Materials science and engineering

T-RTM – A strategy to produce thermoplastic composites

Joana Lagarinhos, J. M. de Oliveira

In recent years, new strategies have been developed to reduce polluting emissions in automotive industry. Reducing car weight is still one of the most economical solutions to reduce fuel consumption, contributing to the reduction of CO2 emissions.

Polyamide 6 (PA6) has been widely used, due to its potential to replace metals, when it is intended to improve the performance of mechanical properties, chemical resistance and processability.

This work focuses on the development of PA6 through in situ processing using the Thermoplastic Resin Transfer Moulding (T-RTM) technology. In this technology, polymerization occurs directly in the mold (in situ). The incorporation of fibres and nanomaterials in the thermoplastic matrix processed in situ has become an efficient approach in the development of composite materials. Due to its ease of production of lightweight composites and the fact that the final composite can be cheaper and recyclable, T-RTM is considered a promising technology.

Materials science and engineering

Catalytic Upgrading of Biomass-Derived Raw Gas in Fluidized Bed Gasifiers

Luís Ruivo, Jorge Frade, Luís Tarelho

Gasification is considered a future key technology for the utilization of biomass as a renewable energy source; this requires improved gasification technologies with higher efficiency and the upgrading of the raw gas by tar conversion to meet the required syngas quality as a commodity for different applications. In this interdisciplinary work, one seeks the development of novel concepts of catalytic tar conversion by an improved understanding of relevant mechanisms, in order to meet the requirements of cleaner gas with increased heating value; this is expected to provide comprehensive guidelines for selection of catalysts, which is still dictated mainly by low cost criteria and empiricism, and to assess the impact of some underestimated effects such as cooling of active sites by endothermic reforming and the contribution of carbonated catalysts to dry reforming.

Materials science and engineering

Study of inhibition of galvanic corrosion issues in industrial multi-material structures

Marco Oliveira, Alexandre Bastos, Silvar Kallip, Mikhail Zheludkevich

The main objective of this work is to further our understanding of new corrosion inhibition strategies for industrially relevant multi-material assemblies where galvanic combinations occur. While the galvanic couple of Zn-Fe is industrially widespread (galvanised steels), the Al(alloys)-CFRP couple is becoming more and more common. It is certain that corrosion concerns arise when these materials are galvanically coupled, corrosion of the less noble material occurs as the nobler of the couple is protected. Even if in some cases (like galvanised steel), this is the desired effect, protecting the ferrous material via sacrificial anode (Zn in most cases), in most cases the accelerated corrosion of specific structural parts leads to catastrophic failure of the structure.

In this way the objectives of this thesis are driven by a strong industrial demand but at the same time have an important research component on a fundamental scientific level. An essential starting point is a the detailed investigation of the protection mechanisms of different corrosion inhibitors and how they differ as the metals of the couples are changed.

The presented work was carried out mainly using electrochemical techniques such as galvanic current measurements, scanning vibrating electrode technique, electrochemical impedance spectroscopy and linear sweep voltammetry (polarization curves).

The obtained results shows new information for the electrochemical behavior of RE3+ ions and contribute to a significant impact on their use to control corrosion in dissimilar metal combinations.

Materials science and engineering

In-situ lanthanide-doped organic–inorganic flexible and transparent white-light hybrid materials for solid state lighting

Ming Fang, Luís António Ferreira Martins Dias Carlos (Supervisor); Maria Rute de Amorim e Sá Ferreira André (Co-supervisor); Lianshe Fu (Co-supervisor)

The society issues including energy crisis and global warming keep pushing the development of more efficient lighting systems. Hence, light-emitting diodes (LEDs) are replacing conventional lighting sources, like incandescent and fluorescent lamps, due to much higher efficiency, lower energy consumption and environmental friendliness characteristics. The commercial white-light emitting LEDs (WLEDs) are based on Y3Al5O12:Ce3+ (YAG:Ce3+) broad-band yellow phosphor in combination with blue LED chips through a low cost and simple procedure, in which the yellow phosphor converter YAG:Ce3+ dispersed in epoxy or silicone is directly packed on the blue InGaN chip. However, these two-colour-based WLEDs exhibit the disadvantages of low colour rendering index (CRI, usually <75), high correlated colour temperature (CCT, 4500-8000 K) and chromaticity drifts due to the intrinsic absence of efficient red light emission from YAG:Ce3+, which only gives cool white-light and inevitably limits its applications in indoor or back lighting. In addition, LEDs still face some other shortcomings such as an insufficient cyan emission limiting color render index and a relatively low efficient green emissions, termed as “cyan gap” and “green gap” problems, respectively. Thus, it is necessary to synthesize the efficient white and green emission materials for the phosphor-converted LEDs applications.

To overcome these drawbacks, the researches on lanthanide (Ln3+)-based emitting materials are attracting increased attention both in industry and academia because the unique optical properties of Ln3+ ions such as emission range spanning from ultraviolet (UV) to visible spectral regions. To boost the emission performance, Ln3+-based complexes are widely explored. The most efficient complexes emitting in the visible range involve the Eu3+ and Tb3+ ions. To enable the processing as films and increase thermal and optical stabilities those complexes are incorporated into host materials, such as organic–inorganic hybrids. In this fields, the white-light emission materials based on the dU(600) hybrids incorporated with Eu3+, Tb3+ and Gd3+ three kinds of Ln3+ ions were synthesized. Furthermore, the efficient green emission of Tb3+ doped dU(600) was also prepared and utilized to prepare the NUV-LEDs based on the commercial 365 nm LED chips. Other interesting optically active centers are based on dyes and carbon dots (CDs) which can be combined with Ln3+ complexes to implement more phosphors. Here, to avoid solubility issues of the complexes and dyes, in-situ sol–gel technique should be stressed, as well as the use of polycarboxylates as ligands. Furthermore, the room temperature sol–gel synthesis process meets the requirement of large-scale manufacture. This project will primarily focus on fabricating transparent and flexible organic–inorganic hybrids (termed ureasils) codoped with efficient Ln3+ complexes, dyes and CDs combinations by in-situ sol–gel technique. In fact, Ln3+-based complexes, dye and CDs already have been used in light emitting devices, temperature map, solar cell concentration, sensors, and so on. In addition, this program will not only synthesize efficient emission materials based on doped hybrids, but also analyze the material structures and their energy transfer mechanisms. This program will also focus the fabrication of LEDs prototypes emitting in a wide range of colours using doped ureasils for solid state lighting applications with tunable emission, lower CCT and enhanced CRI.

Except the main idea of this program, the cooperation with other colleagues involves some relevant investigations as following: 1) preparation of white-light emitting diodes by utilizing the red Eu3+-activated La2Ce2O7 inorganic phosphor to promote the CRI of blue/ YAG:Ce3+ system; 2) preparation of pure green UV light emitting diodes by utilizing the efficient green Tb3+ complex as phosphor for the “green gap” challenge.

Materials science and engineering

Production of porcelain parts by additive manufacturing

Pedro Duarte, Paula M. Vilarinho, Martinho Oliveira, Jorge Marinheiro

Additive manufacturing (AM) is a disruptive technology to produce objects, allowing the production of functional, complex-shaped and highly customized objects/products. AM is currently well known for the fabrication of polymeric and metallic materials due to its easier adaptation to a broad range of AM processes and applications. Nevertheless, for ceramics production is far behind its scientific and technical interest. There is yet a long way to go to turn AM of ceramics an industrial reality and more research and development is indeed required. Porcelanas da Costa Verde, S.A., is a Portuguese company that produces porcelain parts, for tableware, via conventional processes such as slip casting, pressure casting and plastic molding and more advanced powder processes as isostatic pressing. Always looking for ways to add value to their products and for new processes that can reduce manufacturing time, improve efficiency, reduce waste, be more sustainable and open new markets, Costa Verde is currently very interested in the use of AM to produce porcelain parts. The process of Binder Jet Printing (BJP) is already used in the company for prototyping and shape validation. In this sense, the interest in the use of BJP as a production route increased in the last years. However, the raw materials produced by Costa Verde for the conventional production processes are not suitable for the use of BJP for the production of porcelain parts. This fact raised the need to study and adapt the raw materials for BJP process, and the post conformation steps adaptation, as well.

Materials science and engineering

Strain engineering of lead-free thin films for efficient energy harvesting

Rui Pinho, M. Elisabete Costa, Paula M. Vilarinho

Electronic devices are currently powered by batteries, which are bulky, require high maintenance (e.g., recharging and replacing), and carry a large environmental footprint. Such limitations are rather expensive, or not feasible, in remote places, wireless sensors and wearable devices[1]. Thus, lighter, smaller, and long-lifespan power sources are requested. Due to the recent advances in electronics towards low power consumption devices, harvesting environmental vibrational energy is one possible solution[1–3]. Piezoelectric effect is the simplest method to convert mechanical into electric energy, with the easiest maintenance and higher durability[2]. Energy harvesters require high electromechanical factor and piezoelectric coefficient[1]. The market for piezoelectric thin film materials is vast. It reached 16B dollars in 2015, and it continues to grow[4].

The standard piezoelectric is Pb(Zr,Ti)O3, PZT. Yet, health and environmental restrictions to lead, led to a hunt of lead-free alternatives[5]. Among them, potassium sodium niobate (KNN) withstands due to high Curie temperature (TC = 420 °C), reasonable piezoelectric and electromechanical coupling coefficients[6].

Following the miniaturization trend, the fabrication of these materials in the form of thin films is mandatory. The performance of thin films markedly differs from their bulk counterpart (polycrystalline or single crystals) due to strains caused by lattice mismatch and/or differences of thermal expansion coefficient between the substrate and the film, the interface between the different layers, and local polar regions created by point defects, such oxygen vacancies. Strain is the most critical feature because it affects the low frequency (the useful frequencies for piezo harvesting) dielectric properties, which are directly related with the soft phonon mode. In ferroelectrics, atomic positions and lattice vibrations are stress dependent, and therefore polarization and transition temperatures as well[7].

Strains can be imparted to thin films and have already been used to improve the mobility of charge carriers in semiconductors for transistors, and to tailor transition temperatures in ferromagnetic and superconductor materials[7]. Due to the direct coupling between strain and ferroelectricity, large shifts in TC were obtained. It is widely accepted that compressive strain decreases permittivity and TC while compressive strain increases them[8–10]. The effects of strain on ferroelectric transition, structure and microstructure have been studied for several materials, including PZT, PbTiO3, BaTiO3, BaTiO3-SrTiO3 and SrTiO3, which is not ferroelectric but exhibits ferroelectricity when strained[9–11]. This knowledge is rather scarce for KNN thin films and it is very relevant for the development of better lead-free piezoelectric harvesters.

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Materials science and engineering

Mathematics

Multivariate Contributions in the Decomposition of a Time Series

Alberto Silva, Adelaide Freitas

The extraction of essential features of any real-valued time series is crucial for exploring, modeling, and producing, for example, forecasts. Taking advantage of the representation of a time series data by its trajectory matrix of Hankel constructed using Singular Spectrum Analysis,

as well as of its decomposition through Principal Component Analysis via Partial Least Squares, we implement a graphical display employing the biplot methodology. A diversity of types of biplots can be constructed depending on the two matrices considered in the factorization of the trajectory matrix. In this work, we discuss the called HJ-biplot, which yields a simultaneous representation of both rows and columns of the matrix with maximum quality. Interpretation of this type of biplot on Hankel related trajectory matrices is discussed from a real-world data set.

Mathematics

The arrival of quantum computers, though far away, is already a real threat to conventional information security systems. In order to study alternatives to current cryptosystems, post-quantum cryptography emerges. Cryptosystems based on error-correcting c

Cláudia Sebastião, Paulo Almeida, Diego Napp

In this research we develop a variant of the McEliece cryptosystem that use a convolutional encoder. We analyse it security and study the best parameters.

Mathematics

Necessary optimality conditions for variational problems involving distributed order fractional derivatives with arbitrary kernels

Fátima Cruz, Natália Martins/ Ricardo Almeida

In this work we study optimality conditions for variational problems dealing with a new fractional operator. This fractional derivative combines two known operators: distributed order derivatives and derivatives with respect to another function.

Mathematics

Dynamic fuzzy logics for quantum programs: Foundations and applications

Manisha Jain, Alexandre Madeira and Luis Barbosa (Supervisors)

This proposal intends to combine developments in the following domains:

(Quantum) Dynamic logics : Initially takes as a generalisation of the Floyd-Hoare Logics, DL grew to an entire family logics prepared for the verification of a wide class of programs domains and paradigms. Remarkable for this work is its quantum versions by A. Baltag and S. Smets.

Parametric generation of (dynamic) logics: The demand-driven generation of logics is an active research line in the supervising team, that contributes to the program logics with systematic methods to build program logics on-demand, parametric on both the computational model and whatever is chosen as the (graded, possible fuzzy) truth space.

Mathematics

Bayesian inference in censored linear regression model with AR(p) errors

Rodney Sousa, Isabel Pereira, Maria Eduarda Silva

The problem of estimating linear regression (LR) model with autocorrelated errors term may arises in many environmental and social studies. The usual approach is to use the Feasible Generalized Least Squares (FGLS), but when the response variable is censored data (limited-dependent variable), these methods result in inconsistent estimators. Moreover, the likelihood function of censored data has a very complex form, making it difficult to use in real problems. To handle this problem, we implemented Gibbs sampler with data augmentation method (GDA), which allows us to use the likelihood function of uncensored data to compute the posterior distribution of the model parameters. Simulation studies showed the the accuracy of the GDA estimates still good even in scenarios where the proportion of censored observations is large (40%).

Mathematics

Mechanical engineering

Modelling, simulation and control of tankless gas water heaters: a hardware-in-the-loop approach

André Quintã, Jorge Ferreira, Nelson Martins

There is a growing concern about to the scarceness of natural resources and the emissions problematic. Water heating is a relevant part of a household's energy use, and tankless gas water heaters are widely used. There are design and engineering challenges to develop more efficient devices, with lower emissions of pollutant gases, reduced water waste, and providing comfort improvements from the user point of view.

The overall purpose of this PhD project is to study and develop tools and methodologies to implement and evaluate advanced control strategies that improve TGWH environmental and comfort indices.

The PhD student will develop mathematical models of individual components, parametrized with experimental data. Based on these models, research on advanced predictive and adaptive control strategies will be carried out for embedded applications. A virtual-test-bench platform will be developed based on hardware-in-the-loop-simulation methodologies, for evaluation on different TGWH configurations and control strategies performances.

Mechanical engineering

Development of an arcade-like collagen structure in engineered cartilage through a joined approach of anisotropic scaffolds and mechanical stimulus

Ângela Semitela, António Completo, Paula A.A.P. Marques

Tissue engineering (TE) strategies for repairing and regenerating articular cartilage face critical challenges to approximate the biochemical and biomechanical microenvironment of native tissues. The major challenge of TE cartilage is the difficulty to mimic their mechanical properties to the native ones. The importance of the arcade-like collagen fibre structure for the load-bearing properties of native cartilage is well emphasized in literature. However, despite extensive cartilage TE research, few studies have assessed the importance of collagen fibril depth-orientation on the mechanical properties of engineered-cartilage. Thus, a new strategy to be explored is the combination of depth-dependent fibrous/porous electrospun scaffolds with depth-varying mechanical stimulus protocols on a bioreactor environment, to mimic the native arcade-like collagen organization, reducing the risk of failure of this promise method for osteoarthritis treatment.

Mechanical engineering

Components manufacturing for medical applications - case studies

António Festas, João Paulo Davim Tavares da Silva, António Manuel de Amaral Monteiro Ramos

A medical device can be described as an instrument, an appliance or software that is intended to be used in human beings in a way that will help to improve or analyse its clinical situation.

One of the major requirements for a medical device to be considered or be used as such is the need to comply with several criteria. To be compatible with living systems is one of those, and these lead to the need of using biomaterials.

Amongst metal biomaterials currently the most used are titanium alloys. Due to its properties it's a reference biomaterial for most orthopaedic applications. Even so, titanium alloys do not fully meet all biocompatibility requirements, hence the need to develop new alloys in search of an ever-increasing level of biocompatibility.

With the development of new titanium alloys, it is necessary to know their degree of machinability, that is, the ease with which they can be machined. With this knowledge, it is possible to assess whether these alloys, compared with traditional alloys, can replace them and what are the advantages they offer in their manufacturing.

The work carried out in the scope of this PhD comes to evaluate the machinability of new titanium alloys and to verify if they can be a valid substitute for the most used alloys.

Mechanical engineering

Heat transfer and energy storage in phase change materials: a CFD approach

Bruno Pereira, Fernando Neto

Use of renewable energy has been rising over the years, with efforts to reduce emissions reinforcing this trend. However, renewable energy production is intermittent and a bridge over production/demand gap is required, with energy storage becoming increasingly needed. For thermal energy storage (TES), Phase Change Materials (PCMs) represent a safe and inexpensive technique to match solar or residual heat availability to thermal requirements. To design and operate latent heat-based TES, adequate tools must be developed and tested. The objective of this work is to develop tools that enable an improved usability of PCMs in TES applications. After initial assessment of state of the art, CFD will be used to study the performance of PCM based TES systems (heat availability, heat requirements, material and geometric characteristics) while maximizing thermal storage capabilities. The proposed goal is to create a tool that allows for the transient study and optimisation of LHTES systems with emphasis on their long-term usability.

Mechanical engineering

Smart Refrigerators: A computational approach for the addition of phase change materials

Daniel Marques, Prof. Fernando Neto, Prof. Nelson Martins

Food preservation techniques are indispensable modern-day requirements for providing safety and comfort to human life. However, food preservation equipment is responsible for 17% of global energy consumption. The use of renewable energy sources (RES) is at the forefront of the combat against climate change challenge. Integration of RES, energy storage technologies and advanced control strategies into refrigeration devices/facilities will be an important energy efficiency breakthrough. The proposed research aims at the evaluation of the combination of PV-generated electrical energy, low electrical energy tariffs, adequate control algorithms and energy storage techniques such as phase change materials (PCMs) to increase energy efficiency and reduce operational costs with refrigeration/freezing equipment both for domestic and professional use. Outcomes of the project includes CFD based simulations to map the PCMs behaviour as a storage media, lumped-parameter models to study, experimental tests for global system transient model validation purposes, design optimization and prototype manufacture.

Mechanical engineering

Distortion analysis in Advanced High Strength Steel Laser Welding

Eva Marques, António B. Pereira, Francisco J.G. Silva

Currently, welding processes have become one of the most used methods for joining materials in all kinds of industries, thanks to properties such as high speed and high tensile strength. However, despite these advantages, this type of connection method has some drawbacks, for example, residual stress and structural distortion, mainly due to the process thermal cycles. Structural distortion is one of the major concerns of industrial joining practice. In order to decrease distortion, the variation of welding sequence, direction and clamping conditions, have been applied through several years, by trial and error tests. However, numerical simulation enables virtual examination of the welding, mainly due to the progress on the numerical methods, which stimulated the research on welding simulation models. These models can cover a wide spectrum of physical and thermal processes occurring during, and after welding. The aim of this paper is to provide wider information about types of Finite Element Method (FEM) in fusion welding processes and to demonstrate the accuracy of FEM models results comparing to experimental.

Mechanical engineering

Adsorption heat pumps for space and water heating

João Dias, Vítor Costa

Given their low environmental impact, adsorption heat pumps (AHPs) have gathered academic and industrial attention. AHPs can improve household's energy efficiency by extracting heat from free energy sources. Furthermore, AHPs work with zero global warming potential (GWP) substances and can be driven by waste heat and renewable energy sources. The proposed work intends to develop an AHP system suitable for central and domestic water heating applications. First, physical models will be developed and implemented, allowing the dynamic simulation and performance evaluation of AHP systems. Resorting to the results obtained by simulation, an AHP system will be

optimized and designed. Lastly, the prototype of the best solution will be built and tests carried out, evaluating the AHP's performance and validating the dynamic model. This study will output a dynamic model capable of describing an AHP system that is still unavailable and will be a powerful tool for better performance achievement.

Mechanical engineering

Enhancing the Virtualization of Metallic Sheets

Miguel G. Oliveira, A. Andrade-Campos, S. Thuillier

Numerical simulation has become mandatory for material processing optimization. Reliable virtual forming can lead to stiffer, stronger, safer and lighter metallic parts through the use of advanced constitutive models. Simulation software uses complex models and their success in reproducing the mechanical behaviour of materials is dependent on the quality of these models and related parameters. However, methods to experimentally characterize the mechanical behaviour of materials and to identify parameters of constitutive models are still expensive and non-robust. The aim is to develop an efficient methodology for determining the material parameters of advanced elastoplastic models, using dedicated tests that involve heterogeneous strain fields and complex strain paths. This heterogeneity can lead to richer information than more traditional approaches with quasi-homogeneous tests, thus leading to a decrease in the number of experiments. Finally, a database of material constitutive equations calibrated to high strength steels and copper alloys is also proposed.

Mechanical engineering

Intelligent methodologies for digital manufacturing in machining

Sílvia Carvalho, João Paulo Davim, Ana Horovistiz

The reindustrialization of Portugal and Europe implies the integration of information and communication technologies in manufacturing (industry 4.0). The industry retrofitting will be important to overcome the crisis caused by the current public health calamity.

Digital manufacturing is a reality in some production sectors, where digital systems are monitoring the processes and interacting with the operator. In order to control machining operations using digital data, preliminary efforts must be made, among them, to create reliable and effective process models and develop strategies to convert machining information in digital data (digitization).

Modeling with finite element method and artificial intelligent algorithms have proven to be effective in predicting the machining response while digital image processing has great applicability in extracting data from the machined parts, metal chips, and tools. The digitization of the machining system will allow the creation of tools to support machining operations, promoting sustainable and smart production patterns.

Mechanical engineering

Enabling closed-loop additive manufacturing through an on-demand feedstock material customization system

Tiago Gomes, Victor Fernando Santos Neto, João Alexandre Dias de Oliveira

Awareness about the need for circular production models has been growing, derived from alarming issues such as the amount of plastic waste that is ending up in the oceans. The application of circular material flows where plastics from the end of life original products is reprocessed and used to produce a similar value product has, however, an important drawback: material properties degradation and variability. Those issues often discourage the use of reprocessed feedstock in traditional mass-production technologies, especially when repeatability is an important factor. At the same time, extrusion-based additive manufacturing is promising for the creation of such material flows, since the batches are much smaller. This puts it at the center of an emerging recycling proposition: distributed recycling, which shows great sustainability potential. However, when functionality and consumer-oriented products are considered, the issues stated before may still be a hindrance. That served as a starting point for the present doctoral program. Here the objective is the creation of conditions for reliably printing thermoplastics in closed loop. For that, the feasibility of a production method with thermoplastic reparation, accounting for the feedstock properties variability using specific additives, through the application of prediction algorithms, will be investigated.

Mechanical engineering

Multimedia in education

Peer learning and its impact on peer teacher students' academic performance - proposal of a procedure model

Ana Raquel Carvalho, Professor Carlos Santos (supervisor)

This PhD project stems from the evidence-based relevance of peer learning in the educational scenario, for its potential to address some of the challenges 21st learners and teachers face, based on the social constructivism nature of its principles, and the transformative role it may have in learners' academic path. Under the framework of Educational Design Research (EDR), the project comprehends three milestones: the preliminary research stage, already concluded; the development stage, currently under implementation; and the assessment stage of the educational intervention. The pedagogical solution developed consists of a prototype of a digitally enhanced peer learning program, aimed at consolidating learners' skills based on the syllabus of English as a foreign language for basic and secondary education. The goal of the project is to assess participation impact on peer teacher students' academic performance, under the cognitive (as for metacognitive skills), affective (as for motivation), and social (as for collaborative and communication skills) dimensions. Simultaneously, the role of digital technologies in the design and implementation of the project is also going to be assessed. Contributions of the study are expected to improve teaching and learning quality in basic and secondary education as well as facilitate teachers and learners' experience at school, at a time when both digital technologies and interpersonal relationships assume a critical role in guaranteeing effective communication between teachers and learners as well as learners' engagement and inclusion.

Multimedia in education

Resiliência e engajamento escolar de estudantes de tecnologia da informação no brasil: papel da literacia e inclusão digital

Andreza Santos, Ana Margarida Pisco Almeida, Marlos Alves Bezerra

Este trabalho tem como objetivo principal compreender o papel da literacia e inclusão digital na resiliência e engajamento escolar de estudantes de Cursos Técnicos em Tecnologia da Informação de uma universidade brasileira. Trata-se de uma pesquisa de métodos mistos, exploratória e descritiva. Espera-se investigar se uma maior literacia digital proporciona um incremento na resiliência e engajamento escolar de estudantes. Nesta investigação, estão sendo utilizadas as seguintes estratégias para a coleta de dados: estudo bibliográfico, análise documental, inquérito por questionário online e por entrevista. Para o levantamento dos dados junto aos estudantes que possuem de 15 a 23 anos e estudam no polo da cidade de Natal-RN, foi aplicado um questionário elaborado via Software LimeSurvey, que traz um conjunto de questões fechadas relacionadas a aspectos sociodemográficos, ao engajamento escolar e à inclusão e literacia digital. Destaca-se o uso da escala de medida de resiliência CYRM - 28 (Child and Youth Resilience Measure) na sua versão brasileira. Já o questionário voltado aos gestores comporta perguntas abertas para melhor se conhecer as estratégias institucionais de suporte à resiliência e ao bem-estar psicossocial dos alunos. Para a análise estatística estão sendo utilizados os programas SPSS (Statistical Package for the Social Sciences), R e Minitab, enquanto que as perguntas abertas sofrerão análise lexicométrica com o apoio do software Iramuteq. Os resultados parciais mostram que: jovens com maior literacia digital são mais resilientes; 96% dos estudantes possuem smartphone; 53% possuem wi-fi em casa; 38,7% apresentam baixa literacia; apenas 23,4% apresentaram alta literacia. Desse modo, busca-se compreender o impacto de uma intervenção em inclusão digital, identificando quais medidas no âmbito educacional podem desenvolver positivamente a resiliência e o engajamento escolar de jovens em vulnerabilidade social.

Palavras-chave: Resiliência, Engajamento Escolar, Inclusão Digital, Literacia Digital.

Multimedia in education

Problem Based Learning and Pedagogical digital competence: contribution to teacher training

Ângela Bezerra, António Moreira, Ana Balula

Os direcionamentos da educação remetem para a necessidade de redesenhar o processo de ensino e aprendizagem. Com a quantidade de informação disponível para acesso, os papéis de alunos e professores devem seguir um novo rumo, onde alunos tenham participação ativa na construção do conhecimento e o professor atue como um guia, facilitador nesse processo. Nesse âmbito o destaque incide na Aprendizagem Baseada em Problemas(ABP) e nas tecnologias digitais. Pretende-se contribuir com a formação continuada de professores de ciências do ensino fundamental (2o e 3o ciclos) de Sobra/Ce/Br, inserindo-os em uma vivência prática com a estratégia de ensino ABP e as tecnologias digitais, com o objetivo de avaliar o desenvolvimento/aprofundamento da competência digital(CD) destes no que se refere ao processo de ensino e aprendizagem. Também é interesse verificar até que ponto a estratégia de ensino aplicada é promotora da CD. Para

isto foi realizado levantamento bibliográfico e em seguida identificado os documentos norteadores do estudo, o que corresponde a dois quadros de referência europeu de CD, DigComEdu e DigComp2.1, e o delineamento das estratégias de ABP segundo o autor Robert Delisle. A partir da análise dos quadros de referência de CD e da abordagem de estratégias de ABP, e considerando os objetivos e a metodologia do estudo, foi elaborado um quadro de análise, contendo as fases do estudo, instrumentos de coleta de dados com os objetivos pretendidos, as categorias e as técnicas de análise dos dados. Foram elaborados 2 inquéritos por questionário, um roteiro semi-estruturado para observação e um roteiro com elementos essenciais que devem contemplar os e-portfólios. A fase inicial ou diagnóstica foi representada como fase 0. Para esta foi aplicado um inquérito por questionário e analisado os dados através da técnica de estatística descritiva, para seguir com o planejamento da formação, que na verdade é uma vivência prática dos professores, participantes deste estudo, como já referido. Pretende-se ao iniciar a formação, fase 1 do estudo, aplicar um inquérito por questionário elaborado para avaliar o nível de CD inicial dos professores no contexto que se propõe e avançar com a formação/vivência, passando em seguida para a fase 2 do estudo, o acompanhamento dos professores durante a implementação da ABP em uma turma de alunos em suas respectivas escolas. Durante a fase 1, os dados serão coletados através do inquérito por questionário e do e-portfólio, e durante a fase 2, através da observação em campo e inquérito por questionário (o mesmo aplicado no início da fase 1). É de referir que se houver mudança na modalidade de ensino das escolas de Sobral em decorrência da COVID19, passando para aulas à distância, a coleta de dados será através de inquérito por questionário. Após análise dos dados coletados através dos instrumentos, serão comparadas as análises referentes aos inquéritos por questionário, assim como também comparadas às análises referentes aos e-portfólios e a observação, em seguida serão cruzadas as duas análises para que seja possível responder aos objetivos propostos no estudo.

Multimedia in education

Nonverbal communication and social inferences from public speaking

Ângelo Conde, Prof.a Sandra Soares; Prof. António Moreira; Prof. Paulo Ferreira

Public speaking arena is dominated by “experts” nonverbal inferences of a speaker or a teacher performance. However, an individual expert could kind some subjectivity prone. In public speaking literature, there is an analysis absence on the audience’s perceptions contrasting to expertise perceptions. Meaning a potential gap between experts’ interpretations and audience’s perceptions. A possible solution is setup an exploratory dataset of orator’s short videos scored by common “audiences”. To achieve such purpose, we designed a multimodal experience, seeking to establish what speakers’ best predictors are for social inferences of success while communicating, first resorting to a custom behaviour encoding software to evaluate thirty-six short video speakers. So far, our results show two robust natural performance speakers clusters, based on the First Impressions participants scores, i.e., weak, and good orators. Among several posters published, a conference minute was recently approved, exploring the practicality of computer methods in speaker evaluation.

Multimedia in education

Recursos Educativos Digitais Online e promoção do pensamento crítico e criativo dos estudantes do ensino básico e secundário

Carlos Marques, Rui Marques Vieira; Amanda Franco

A alucinante evolução tecnológica verificada desde o início do milénio ajudou a imprimir alterações assinaláveis em todas as áreas da sociedade atual. O ritmo de vida vertiginoso que carateriza a aldeia global, sustenta-se em seres humanos com uma grande capacidade de adaptação à mudança. Particularmente aos jovens, é exigido que sejam capazes de pensar crítica e criativamente, que se orientem na heterogeneidade, que participem quer individual quer colaborativamente, mantendo-se sempre focados na sustentabilidade global.

Desde há anos que os referenciais educativos mencionam o pensamento crítico e o pensamento criativo como competências-chave a desenvolver no perfil do aluno do século XXI. Também os empregadores os consideram como algumas das competências mais valorizadas no momento de contratar colaboradores. A escola tem um papel preponderante no desenvolvimento dessas competências.

A presente investigação tem como objeto de estudo os recursos educativos digitais disponíveis online, usualmente adotados por professores do ensino básico e secundário na sua prática educativa. Pretende, numa primeira fase, aferir a que nível possuem caraterísticas promotoras do pensamento crítico e do pensamento criativo. Partindo dessa análise, será desenvolvido e implementado um programa de formação de professores focado na utilização educativa dos recursos digitais, bem como nas reformulações que os próprios professores poderão efetuar, no sentido de os tornar mais adequados ao seu contexto, para potenciar o pensamento crítico e o pensamento criativo dos seus alunos.

Será um estudo acorado no paradigma sociocrítico, de natureza mista, mas com maior ênfase nos métodos qualitativos. Como suporte de todo o estudo, adota-se a investigação-ação, que, em dois ciclos, permitirá o esclarecimento das questões de investigação. Como instrumentos e estratégias de investigação serão utilizados o inquérito por questionário, a análise documental, a formação de professores, a análise colaborativa, reflexiva e cíclica. Tudo isto visando, em última análise, o uso fundamentado de recursos educativos digitais promotores do pensamento crítico e do pensamento criativo.

Multimedia in education

Teacher Professional Development promoter of innovative pedagogical practices with the use of technologies in basic education

Catarina Moreira, Lúcia Pombo, António Moreira

This investigation is running on the continuity of the third year EduLab from AEGN, based on the constituent teacher's previous year assessment needs, and has the main purpose of training course (TC) performance evaluation in the teacher pedagogical practices.

The TC were developed and taught (25h) focused on 3 thematic: (1) outdoor learning (ENAbLE project responsibility); (2) collaborative learning; and (3) learning assessment. This investigation was deployed on three investigation phases: I) TC planning; II) TC monitorization; and III) evaluation of the short and medium-term impact of TC on teachers' pedagogical practices.

Multimedia in education

The use of mobile applications in the University of Aveiro: an exploratory measuring approach

David Oliveira, Luís Pedro, Carlos Santos

The proliferation of mobile devices and mobile applications has facilitated access to information and changed the way people communicate, work and study.In the context of higher education, the applications are used considering three main approaches: improving or complementing classes, access to information and services, and promotion of interaction, communication and access to courses and work.

However, users have very different application usage habits from each other, and the reports that typically support the studies are based on issues that rely on the perception that users report on their own use. Hence, the reported user perception may not match the actual usage. It is therefore important to identify what applications are used, their type of use and whether its uses vary according to the context, and also to understand if the actual use and the reported perceived one differ.

Based on an exploratory approach, this research aims to analyze the use of mobile applications by the students of the University of Aveiro. The study has a mixed approach that contemplates non- participant observation, the application of a questionnaire and log analysis.

The triangulation between log records, the obtained data from the non-participant observation and the questionnaire surveys will allow a more objective assessment of the user profiles and will help to identify potential discrepancies between self-perception and actual use.

Based on the conclusions, we pretend to draw a profile of the use of mobile devices and digital applications in an university context, obtained by the analysis of different variables, creating a model for the implementation of good practices in mobile learning and an integration/strategy plan for the mobile applications of higher education institutions.

Multimedia in education

Ambientes multimédia numa unidade curricular do ensino superior em contexto blended-learning ancorado pela Sequência Fedathi

Delano Klinger, Ana Maria Reis D'Azevedo Breda, Maria Teresa Bixirão Neto, Hermínio Borges Neto

Esta proposta de investigação consiste em conceber, preparar e implementar uma unidade de ensino da componente curricular de Geometria Analítica Vetorial que é oferecida regularmente num curso de Graduação de uma Universidade Brasileira. Nesta unidade de ensino pretende-se potencializar o ensino e a aprendizagem por meio de envolvimento de recursos multimédia (textos, imagens, áudio e áudio-vídeo) e simulações interativas, ancorado pela metodologia de ensino da Sequência Fedathi, uma metodologia promissora para esse desafio. Esta metodologia tem como princípio uma mudança de postura, por parte do professor, perante seus estudantes, que respeite e tente reproduzir o método científico de trabalho de um matemático transpondo-o para um ambiente de ensino. A investigação será de natureza mista (qualitativa e quantitativa), considerando que a principal questão de investigação se debruça sobre o uso de ferramentas multimédia nos pressupostos da Sequência Fedathi e no apoio ao ensino e aprendizagem, em uma unidade de ensino universitário.

Multimedia in education

Utilização do transmedia no ensino das Geociências

Elisabete Peixoto, Luís Pedro, Rui Vieira

Esta investigação pretende desenvolver um conjunto de atividades transmedia para o ensino das Geociências na disciplina de Ciências Naturais do ensino básico. Estas atividades, consentâneas com a perspetiva CTS (Ciência-Tecnologia-Sociedade), pretendem contribuir para a diversificação dos recursos educativos para o ensino e aprendizagem daquela disciplina e o desenvolvimento, nos estudantes, de competências cruciais para a cidadania. Para isso, as atividades em causa foram enquadradas numa narrativa transmedia relacionada com a utilização que o Ser Humano faz das rochas no quotidiano, cujo objetivo final se prende com a construção online de um puzzle na plataforma Campus. Este estudo, de natureza predominantemente qualitativa, assenta na metodologia design-based research, uma vez que envolve a conceção, implementação e avaliação de um conjunto de atividades segundo um processo cíclico e reflexivo. Esta investigação pretende contribuir para o desenvolvimento de recursos educativos mais próximos do quotidiano dos alunos, com o auxílio das tecnologias digitais, e que promovam a educação CTS.

Multimedia in education

Assistive technologies for children with cognitive and/or motor disabilities: a training plan for informal caregivers

Ivone Almeida, António Moreira, Jaime Ribeiro

Assistive technologies promote communication, personal and social independence as well as the inclusion of children with cognitive and/or motor limitations. The actual implementation of assistive technology in many family settings is still a struggling task, despite the human resources and materials available. Within an action research methodology, our aim is to study that specific context and intervene with the purpose of instilling change and improvement in the practices and thus contribute to reducing the problem of technology abandonment. In order to identify the training needs of caregivers of children with cognitive/or motor limitations who use assistive technology, focus group, interviews and participant observation sessions were carried out. The content analysis of the data contributed to a parental training project on the use of high-tech augmentative communication devices, currently in progress.

Multimedia in education

Impact of DEEP Psychoeducational Campaign on Portuguese University Students

Lersi Durán, Ana Margarida Almeida

Education and health promotion campaigns are strategies that facilitate the process of alerting population to health problems and contribute to their prevention. DEEP is a psychoeducational intervention that is intended to deliver a set of resources that allow Portuguese University Students (EUP) to know the depression phenomenon in a deeper level. Depression is considered the main cause of disability worldwide by the World Health Organisation. It causes emotional imbalance that may contribute to suicide among young people. DEEP is an audiovisual campaign (AV) that comprehends a set of short-videos and challenges released by messaging services on a social network. This study aims to assess the impact of the psychoeducational campaign DEEP in EUPs' knowledge of depression. The methodological approach is related to the positive paradigm, having a mixed nature, and being structured in 5 stages: diagnosis, promotion, assessment, data analysis and interpretation of results. The target population are EUPs, divided in 4 Groups: Group 1 (G1), that will receive the AV campaign; Group 2 (G2), that will receive neutral information on depression; Group 3 (G3), who will receive the campaign in text format via email; Group 4 (G4), that will not receive the campaign during the assessment period.

Multimedia in education

The potential of the Internet of Things to promote participatory citizenship

Manuel Santos, Vânia Carlos, António Moreira

This study is based on the issue of the poor involvement of students in their respective educational community, as far as participatory citizenship is concerned. In order to answer the research question – "How to develop citizen science strategies using the Internet of Things, within the scope of a Smart School Lab, aiming to enhance the participatory citizenship of students?" – open and interventionist design-based research strategies will be applied. An iterative evolutionary approach will also be used, involving action and reflection in an interchanging way, with integrative activities that will fuel the project in a cyclic process.

Several workshops were conducted to develop a smart education community, the community of users, and to build community dynamics. Research instruments were implemented in the educational community to build the portrait of the institution and of the participants.

Artefacts and guidelines are being co-constructed between researchers, teachers, students and the local community – didactic kits with transdisciplinary contents, promoters of citizen science skills and supported by digital electronics and IoT – that should persist beyond the study and be subsequently adopted, adapted and used by other teachers from the institution where this study takes place. Regarding the results expected with this study, we highlight: design principles and technology innovation, i.e., the production of "education" and "citizen" didactic kits, which will contribute, per se, to the common good, with the detection of environmental problems in the target city of study; the improvement of the students' citizen science skills and their participatory citizenship; and the realization of the potential of the IoT by the teachers who take part in the study, mainly as far as the development of pedagogical-didactic and social-communicative skills are concerned.

Multimedia in education

Literacia e inclusão digital de grupos vulneráveis: estratégias de ação para as Autarquias

Maria José Cabral, Ana Rita Costa Bonifácio Selores dos Santos, Patrícia Alexandra Pacheco de Sá

A necessidade de ajustamento da população portuguesa à sociedade da informação levou à construção de políticas nacionais e internacionais, promotoras e orientadoras de estratégias para a inclusão e literacia digital de grupos vulneráveis (idosos, pobres, desempregados, minorias étnicas, portadores de deficiência, entre outros). Desta forma, este estudo objetiva perceber como estão as autarquias a dar resposta a essas necessidades e que estratégias baseadas nos media digitais, poderão utilizar para esse efeito. Para a concretização dos objetivos e finalidade desta investigação optou-se pela metodologia da teoria fundamentada. Assim sendo, está em curso um levantamento sobre a realidade existente nas autarquias em Portugal, procurando-se saber que iniciativas promotoras da literacia digital para grupos vulneráveis estão a ser implementadas nestas instituições públicas de grande proximidade com a população. Pretende-se ainda contribuir com um documento disseminador e orientador das boas práticas existentes, referindo estratégias e recursos facilitadores e promotores dessa missão. Considerando que todos são importantes para uma cidadania ativa na sociedade atual e que um elevado grau de literacia digital na população, contribuirá para o crescimento e desenvolvimento económico do país e do mundo, pretende-se com este estudo, conhecer melhor a realidade existente do país, o trabalho realizado pelas autarquias no âmbito da promoção da literacia e inclusão digital de grupos vulneráveis e fornecer ferramentas facilitadoras desse propósito. Contribuindo desta forma, para a diminuição do fosso digital, das desigualdades sociais e cumprimento das metas internacionais.

Multimedia in education

Avaliação de jogos educativos: proposta de uma aplicação digital

Maria Reis, Ana Margarida Pisco Almeida

O estudo tem como finalidade apresentar um contributo para o campo da avaliação de jogos educativos digitais. Pretende-se aprofundar o conhecimento sobre a identificação das dimensões chave a considerar no desenho de uma proposta de uma aplicação digital que permita ao professor a avaliação e seleção eficaz de um jogo educativo digital segundo três indicadores: a 'motivação', a 'User eXperience' e a 'aprendizagem'. Procura-se também compreender de que forma a proposta pode contribuir no futuro em mudanças de atuação por parte dos professores motivando-os para o uso de soluções de jogo digital no ensino. Para o efeito foram utilizados dois casos: o jogo UNLOVE (prevenção da violência no namoro) e o jogo SANDIEGO INC (multiculturalidade). Participam na investigação alunos do 11.º ano do ensino profissional, professores, diretores de turma e peritos que possam auxiliar no desenho do modelo da aplicação digital. No estudo exploratório, foram entrevistadas as principais editoras nacionais.

Multimedia in education

Collaborative environments with a transmedia approach to promote students` motivation and autonomy within the scope of mathematical learning

Marina Pereira, PhD supervisor Professor Luís Pedro

This publishable abstract reports on a study carried out with vocational education students with a significant risk of failure or dropping out in their school career. Bearing in mind that these students have reduced levels of autonomy and motivation, an action-research plan was designed in which, through a transmedia collaborative approach and using digital technologies, it was intended to act, gradually, in the development of these 2 aspects over 2 research cycles, each with 4 and 2 weeks, respectively. The results obtained in the 1st implementation cycle indicate an improvement in mathematical knowledge. However, there were no statistically significant differences in motivation and

autonomy. The results obtained in the 2nd implementation cycle indicate an improvement in mathematical knowledge, motivation and autonomy.

Multimedia in education

Promoting students' attitudes towards nature conservation with a mobile augmented reality approach – the EduPARK game

Rita Rodrigues, Lúcia Pombo e Teresa Neto

The use of mobile devices in teaching and learning has become an innovative and attractive alternative strategy in education. The EduPARK is a research and development project that promotes interdisciplinary mobile learning, supported by the development of an app to be used in an urban park, providing students' involvement, motivation, and engagement to enhance authentic and contextualized learning. In addition, EduPARK project aims to develop formal, non-formal and informal learning with outdoor activities, using mobile devices augmented reality (AR) and games based on geocaching principles, in outdoor environments, particularly in an urban park, the Infante D. Pedro Park, in Aveiro - Portugal to promote learning.

This research aims to promote a contextualized learning to make students aware of environmental problems. To achieve this goal, we developed an interdisciplinary educational guide, focusing on attitudes of nature conservation, to be integrated in the EduPARK app. The main target public are students at basic education in non-formal educational context.

This work follows a case study approach and the research question is: "How do the strategies used in EduPARK, in line with the exploration of the Interdisciplinary Educational Guide, promote motivation, the construction of knowledge and influence the students to change their attitudes towards nature conservation?" so, the objectives are:

- To realize the contribution of mobile and game-based learning strategies with augmented reality in the motivation of students in learning, in non-formal context;
- To analyze the construction of knowledge in terms of nature conservation using the Educational Guide, involving issues on Natural Sciences, Mathematics and Education for Citizenship;
- To evaluate the impact of the activity on the changes in attitudes of the involved students in terms of nature conservation, before and after the activity.

It is expected that the Interdisciplinary Educational Guide articulated to the innovative EduPARK strategies may promote: i) motivation for new forms of learning; ii) the construction of new interdisciplinary knowledge; iii) change of attitudes towards environmental problems in the current world; iv) nature conservation attitudes and v) healthy lifestyles.

Multimedia in education

Science Education mobile app integrating an educational data mining framework

Rita Tavares, Rui Vieira, Luís Pedro

This presentation reports research work related to an ongoing study, aiming at the development of a Science Education mobile application (app) for primary-school students, integrating an educational data mining (EDM) framework to enhance the students' scientific competences development and self-regulated learning. For that, the Educational Design Research approach was adopted, which foresees mixed methods, several data collection techniques, and the participation of different stakeholders, according to three interactive and iterative phases: Preliminary Research, Prototyping Phase and Evaluation Phase. In the Preliminary Research a questionnaire was implemented to primary-school teachers (n=118), to define the mobile app, namely (i) the target audience – 4th grade primary-school students; (ii) the Science Education theme to approach in the mobile app – Human Body; (iii) the digital educational contents to integrate in the mobile app – animations, games, simulations, quizzes and information areas; (iv) the app learning approach – an authoring one, relating the Inquiry-Based Science Education, BSCS 5Es and the Universal Design for Learning principles; and (v) the app' learning management components – formative feedback, recommendations and real-time help, triggered by the mobile app according to the EDM framework. Based on these, a creative writing and drawing activity was was implemented with the target audience (n=25), to define the mobile app concept: (vi) Science Education topic to approach – Healthy eating and physical activity; (vii) sub-topics to approach; (viii) the mobile app' characters; and (ix) the mobile app' graphical environments (e.g., kitchen garden). According to the learning management components definition (v) the relational structure of the EDM framework was defined, i.e., the questions "asked" to the system and the events read by the mobile app through the adopted EDM methods and techniques. Finally, based on the state of the art of Portuguese mobile apps for Science Education, we defined the mobile app' graphical and functional specifications: main screens, buttons and features. In the Prototyping Phase, a focus group session was implemented with User Experience experts, validating the mobile app' graphical and functional specifications. Based on document analysis, the mobile app' didactic specifications were defined: the focussed scientific contents; the learning goals; and the expected scientific

competences to develop with the mobile app' usage. This definition allowed us to develop the mobile app' digital educational contents scripts and storyboards. Finally, the mobile app' EDM framework was designed according to 11 flowcharts, i.e., how the mobile app "answers" to the students' actions, helping them to develop scientific competences and promoting their self-regulated learning. Finally, in the Evaluation Phase, the mobile app' prototypes were validated: the mobile app' wireflow, the mobile app' digital educational contents scripts and storyboards, and the EDM framework. The use of the various data collection techniques and the participation of the different stakeholders allowed us to validate the study decisions and options, giving to our research a greater richness, strength and research robustness in terms of final products.

Keywords: Mobile app; Science Education; Educational Data Mining; Educational Design Research

Multimedia in education

Music

Seeing the world from a "sense of possibility": perspectives on an experience of choral practice in the daily life of a refugee camp

Ágata Ricca, Prof. Paulo Maria Rodrigues

Choral practice has been an important social intervention tool in many community contexts, such as prisons or homeless populations and has shown very positive results. Singing together in situations of marginalization can bring such benefits as the creation of interpersonal relationships, stress reduction and the sense of identity and self-actualization. The psychophysiological, socio-psychological and well-being factors that choral practice can bring to its participants are evidenced. Refugees are a specially vulnerable groups, who suffer discrimination and face constant barriers to access basic human rights.We are living the worst refugee crisis since the world war two, with one person forced to run from their home each two seconds. Using the advantages of choral practice studied in other contexts of conflict and social inequality, this project pretends to create an experience of artistic communication through choral practice in a refugee camp. The methodology chosen was action research. The data will be collected in the first person: the facilitator of the choir sessions is the researcher. The involvement of any participant in the choir is voluntary. Currently some field work has already been done by following and participating in other projects that use choral practice as a tool for social inclusion, in Lebanon and in Mozambique. The creation of the choirs in the refugee camp (Kara Tepe, Greece) was planned for January 2021. It will be adapted if needed because of the pandemic situation.

Music

Neither pampa nor canon: ethics and interpretation a folklorically informed performance

Alexandre Simon, Advisor: Prof. Dr. Paulo Vaz de Carvalho, Co-advidor: Prof. Dr. Gilvano Dalagna

The music made of solo guitar in the Pampa Gaucho's place (i.e., pampeano guitar) has been object of experimentation of different performers from academic environment, whose training is extremely influenced by classical guitar's approach (i.e., classic guitar). However, in spite of the artistic possibilities than this crossing can reveal, this experimentation neither always is able to promote a balanced dialogue between two approaches; there is yet a strong commitment with the formal codes that influence the classical guitar approach, which does not always permit other expressive resources that are typical of the pampeano guitar to reveal themselves in these experiments. In light of the perspectives presented so far, this paper aims to promote a greater dialogue between the different guitarist approaches above-mentioned in the interpretation and performance of written music for solo guitar in the extreme south of Brazil. This dialogue will materialize through of a proposal of performatic reading that clarify the pampeano guitar influence in the set of pieces, with a folkloric inspiration, written by composers rooted in Rio Grande do Sul. In order to this aim above-mentioned to be achieved, a reflective phenomenology approach will be adopted. This procedure aims more in the study of the impact in the experience lived than in the source that motivates it. From this perspective the author will seek inspiration to his interpretative decision in the experiences he had, and he has with the folklore from Rio Grande do Sul and with the pampeano guitar. Through this performance proposal, it intends to reveal new strategies for studying the repertoire written to guitar in southern Brazil.

Music

Reconquering the past. An exploration of technical-expressive composition resources for recreating the calypso of Costa Rica

Alonso Torres, Sara Carvalho

Despite their patriotic implications, musical nationalisms in Latin-American Art Music served to consolidate a colonial pattern of western supremacy. By inverting the nationalism creative paradigm, this work aims to defy musical conventions in Costa Rican calypso, western art music and folklore, taking advantage of resources from contemporary western art music to propose a calypso recreation exploring the boundaries of its expressive nucleus.

Music

Musical activity's regulation and the construction of a musicians's social status during the estado novo: the case of the national radiostation's wind quintet

Ana Cardoso, Maria do Rosário Pestana,Manuel Deniz Silva

Through this research project, I want to study the biographical and artistic routes of five musicians, who were founders of the National Radiostation's Wind Quintet. This group maintain its activity during 1940 and 1980, approximately, and it was constituted by the flautist Luis Boulton (1908 – 1993), the oboist José dos Santos Pinto (1915-2014), the clarinettist Carlos Saraiva (1910-2001), the bassoonist Ângelo Pestana (1925-2004) and the horn player Adácio Pestana (1925-2004). Those musicians started their musical apprenticeship in local philharmonic and military bands, where they learned to play an instrument, to conduct and to compose. Some years later, they entered on military bands of their districts and then, in Lisbon. That participation was added with the activity in the context of orchestras like Orquestra Filarmónica de Lisboa or Orquestra Sinfónica do Teatro Nacional de São Carlos, two of the three professional orchestras of Portugal, at that time. However, the musical activity was regulated through a "professional card", in the context of the corporatism implemented by the Estado Novo. That card certified the kind of musical participation in what musicians acted, for example, "oboe player", "Philharmonic and Civil bands' conductor", "composer", "orchestra's director", and so on. Through the studies developed by Manuel Deniz Silva (2010, 2017) and the research that was done in the National Trade Union's Archive, we conclude that having a professional card didn't mean that musicians were recognized for all their musical activity, for example, as instrumentalists, conductors and composer. Besides the existence of a lot of works in their personal archives, the majority of them was never stared and just a few of them were performed.

In this way, this study aims to contribute to better knowledge about the legitimacy process and the codification of a musician's social status, during the Estado Novo.

Music

Towards an understanding of the role of music in historical reenactment public events in Portugal

Ana Clément, Jorge Castro Ribeiro

Among the wide range of themed outdoor animation events involving music that occur annually in numerous parts of Portuguese territory, the so-called "feiras medievais" and other historical reenactments have been acquiring increasing visibility over the last 15 years. These institutional initiatives, often associated with celebrations or local policies, include exhibitional and performative ingredients intended to evoke, stimulate and represent collective imaginaries attached to the past. The natural scenery of this kind of "medieval festivals", such as castles, squares, historic centres, etc. is complemented by entertainment groups and visual, discursive and performative scenographic elements, that refer to specific imagery. The music plays an essential role in the process of referral of this imaginary distant past, contributing to its construction of meaning. This presentation arises from the research questions raised from my work experience as a performer and singer, within the context of historical reenactment events and "feiras medievais" (medieval fairs and festivals) in Portugal. The main purpose of this doctoral research is to contribute to the understanding of the role of music within the mobilization processes of the imagined past that underlie historical reenactment events.

Music

Intercultural Music perceptions in 20th century in Macau: Recreation of the piano works of Áureo Castro

Ana Neves Ferreira, Shao Xiao Ling

Áureo Castro's was a Portuguese musician that had a profound influence on the development of erudite music in Macao (China), a place of secular dialogue between the East and Western cultures. As a composer and enthusiastic of Chinese folk music and with a deep affection for Macao and its people, Áureo Castro composed some works that merges Western style and Chinese style, revealing traces of Sino-Western interculturality.

This research aims for a performative recreation of Áureo Castro´s solo piano works, composed in the second half of the 20th century, as an artistic expression of a singular intercultural exchange between China and the West.

As a performer, who also had living experiences in Macao, I aim to create a scenic-musical event. To achieve this purpose, I will explore new performative approaches that express not only the composer´s affection to Macao´s culture, but also to communicate to the audience the imaginary of an intercultural and mystic world of Macao.

This project will provide a wider recognition of Áureo Castro in Macao's cultural heritage and will contribute for the dissemination of his solo piano works. Furthermore, I hope to contribute for the development of Artistic Research and to encourage the study of new performative approaches that enhance musical interculturality.

Music

Parlando rubato: The presence of Romanian popular music in the interpretation of George Enescu's piano works

Andra Carstea, Luca Chiantore

Parlando rubato: The creation of my interpretative style for George Enescu's piano works as an interaction between the Moldavish dialect and the performance patterns of Romanian popular music.

PhD student: Andra Carstea (UA, INET-md)

Abstract: The actual performance is represented by the regular pulse and a tight sense of values proportions, where the metronome plays an important role as it indicates us the "right" spaces between the beats. The loss over time of phonetical and dialectal features turn the analysis of the dialectal pattern, like the length of the syllables in the pronunciation, the stressed syllables or the voice intonation, into a challenge by itself. This happens because previous studies or literature published on this topic about Moldavish pronunciation could not be found yet.

A part of the Romanian popular music rhythmic systems, rhythms such as syllabic giusto or parlando rubato seems to be generated by the dialectal pronunciation, due to the fact that the interpretation of these songs, based on these rhythmic systems, depends on the speed of the syllables or the manner of pronouncing. These rhythms are used in George Enescu's compositional style, composer whose speech seems to have been preserved a dialectal pronunciation, inspired by the Romanian popular music not only in his compositional style, but also in his performance. Enescu's multiple "senza rigore" indications, the voice references and the louré specific graphic notation, leave space to rethink the interpretation of his works.

Music

The futuristic thought in the piano solo repertoire of Leo Ornstein, Henry Cowell and George Antheil

Andrés Ruiz, Helena Maria da Silva Santana, Shao Xiao Ling

Futurism was an artistic movement that tried to break with the instituted and tethers of the past. At the beginning of the twentieth century, futurism has spread from Italy to other European countries and many parts of the world, in spite of the criticisms of this movement to several authors' works, which have been considered as the 'death' of art and accused for a reigning academism by futurism.

The futuristic piano repertoire considers a human being's and its body's playing a significant feature of the movement according to many ideas from the futuristic writings, based not only on the mechanization of epoch. Hence, looking for the mechanism and noise in futuristic piano writing, this presentation values the works of American composers/pianists Leo Ornstein, Henry Cowell, and George Antheil.

Music

Cândido Lima: contribution to the contemporary guitar repertoire.

Antonio Fruscella, Supervisor: Pedro Rodrigues

The present work aims to discuss the guitar production of the Portuguese composer Cândido Lima (1939). His guitar opus is constituted of 28 solo pieces and 53 chamber music pieces according to the Portuguese Music Research & Information Centre catalogue and the composer himself. Despite its considerable dimension, the Lima's guitar work is not introduced into the classical repertoire. The lack of a revised edition added to the intrinsic difficulties of these guitar pieces from an idiomatic standpoint constitute a significant barrier to the wide knowledge of this repertoire.

This research suggests a creation proposal upon the guitar music by Cândido Lima: a new version, developed through a collaborative relationship with the author, for adapting his work to the instrument features thus for revealing the importance of his repertoire for guitar.

The arrangement methods implied in this project will focus to how it may possible to reach a balance between the thoughtful composing technique, implied by a non-guitarist composer, and the instrumental practicability.

Authors like Lima (2003), Martingo (2011), Marinho and Carvalho (2012), Peruzzolo-Vieira (2017), Ivanovic (2014), Ostersjo (2008) and Rodrigues (2011) contribute to frame this project from a theoretical standpoint.

This process aims to arrange Lima's guitar repertoire with technical solutionsand esthetical result without changes of the primary musical intention evoked by the composer.

Music

"Easter Mysteries" in Idanha-a-Nova: Processes of Patrimonialization and Turistification

António Ventura, Maria do Rosário Pestana

This investigation is part of the Doctoral Program in Music, ongoing at the Institute of Ethnomusicology - Center for Studies in Music and Dance, Department of Communication and Art at the University of Aveiro. Integrated in the FCT project "EcoMusic - Sustainable Practices: A Study on Post-Folklorism in Portugal in the 21st century" focuses on the musical performances of the "Easter Mysteries in Idanha", a tourist event created by cultural agents from the municipality of Idanha- a- nova, held annually since 2009. In consultation with the tourist prospects of Idanha-a-Nova, we can read that the time of the "Easter Mysteries in Idanha" has been going on for about 90 days, since Ash Wednesday until Pentecost Sunday. The events marked in these prospects, refer to the musical performances "Encomendação das Almas", "Martírios", "Passos", "Louvado Nocíssimo", "Ladaínhas", "Procissão dos Homens", "Via Sacra" and "Terço Cantado", held in different locations in the municipality. In the preliminary research I observed that they are carried out by mixed groups, female or male, that alternate chants, with prayers and other social acts, in a performance that they say is "traditional" and that they intend to be recognized as Intangible Heritage of Humanity, by UNESCO. Some of these musical performances, after being extinct in most localities and a process of decontextualization triggered by local folkloric ranches throughout the 20th century, have been "revitalized" (Livingston 1999) and recontextualized in time (from Lent / night)) and space (of local streets) defining tourist routes and "cultural" destinations (Kirshenblatt-Gimblett 1998).

An application for the performance of the "Mysteries of Easter in Idanha" to the List of UNESCO's Intangible Cultural Heritage is in progress, in which the municipality, local scholars and an expressive group of idanhenses participate in addition to the anthropologist Paulo Lima, researcher who accompanied the processes of heritage of the "Cante Alentejano" and the "Chocalhos of Alcáçovas". I argue that in the performances of the "Easter Mysteries in Idanha" different intentions and meanings converge, apparently not in a conflictual way, either (i) around the individual religious experience; (ii) the social construction of the place as a feeling structure; (iii) or performance as heritage and "cultural destination". This study proposes a reflection and critically discusses the process of revitalizing these musical performances.

Music

The piano music of Ruy Coelho: contexts and performance

Bernardo Santos, Helena Marinho

This research project seeks to understand how the political, aesthetic and interpretative contexts related to Ruy Coelho influenced the creation of a specific writing style for piano by the composer and how the characterization and contextualization of the repertoire in question can be reflected in an performative approach of Ruy Coelho's piano works. There is not yet a single study that analyzes, catalogs and draws conclusions regarding Ruy Coelho's works for piano, be it solo, chamber music or concerti repertoire, or that analyzes his work in a performative perspective. The lack of knowledge and difficult access to the his music, with few edited piano and chamber music works, and a single CD dedicated to his piano music, is also one of the issues, among others, that the present investigation intends to solve. Some of the objectives of this research project include an understanding of the total dimension of the study universe and its characteristics; the

assessment of the relationship between the musical discourse of the works in the universe of study and the different aesthetics identified by the composer, along with their performative implications; by resorting to the performance, highlight the characteristics of Ruy Coelho's compositional thought in his piano works and its differences and similarities over several compositional periods.

Music

Migrating to the origin: Bird-becoming and musical performance through an interpretation of the Catalogue d'oiseaux by Messiaen

Carolina Santiago Martínez, Luca Chiantore

Migrating to the origin: bird-becoming and musical performance through an interpretation of the Catalogue d'oiseaux by Messiaen consists of an innovative interpretation of the solo piano work Catalogue d'oiseaux by the French composer Olivier Messiaen. The work is modified searching for an approach to the birdsongs that appear cited in it, changing the score through the composer's sketches from his cahiers of birdsong transcriptions, and also performing in cooperation with a theater actress where the intrinsic narrative of the pieces' prefaces will be visualized. This performance will include a message of environmental awareness - extrinsic to this musical work, and justifying this change of the interpretative perspective - born of my concern about the disappearance of avian species and changes in their migration routes, consequences of the overexploitation of natural resources for the human being. The pianist will research on new technical resources making an approach to the birdsongs that originated this work by performing at the artistic practice the becoming-bird, and also blurring the 'final work of art' concept using the cahiers by Olivier Messiaen. The prefaces of each movement of the work will be transmitted in the performance giving rise to an unconventional and interdisciplinary concert format.

Music

Spirituality and Musical Composition: An Artistic Research in the Creation of Multimodal Works

Daniel Escudeiro, Sara Carvalho; Gilvano Dalagna

Spirituality has become a central theme of human interest. Its relevance has motivated several artists to explore this topic in their production. However, composers, in particular, have neglected the performative, scenic or spiritual aspect of compositional practice. This is a problem because the possibility of highlighting the spiritual theme is lost and, consequently, creating greater empathy with the public. Based on these perspectives, it is proposed to create a portfolio of multimodal compositions that vivify the spiritual experience in the scenic context.

Music

Beyond Gesture: The interpersonal communication between conductor and orchestra

Daniel Nery, António Vassalo Lourenço – Deca/Inet-Md; Margarida Cerqueira –Essua/UA and Clarissa Foletto -Deca/Inet-Md

This project assumes that, despite the wide and multifaceted training of the conductor, a gap becomes evident: interpersonal communication between conductor and a symphony orchestra. Thus, this research project has the general objective of responding to the difficulties identified in the communication between conductor and orchestra, proposing rehearsals strategies that emphasize negotiation rather than imposing a desired artistic outcome. Methodologically the research will be divided into two main phases, proposed in a flexible qualitative study design: (i) Phase 1 - Observational Study, with the purpose of collecting data that will provide evidence to diagnose the role of the orchestra and the conductor and thus create a rehearsal strategy plan for the second phase and (ii) Phase 2 - Action research, where I will act as a conductor and apply the data collected in the first phase. At the end of this investigation we intend to: (i) understand how the instructional communication between conductor and orchestra occurs during rehearsal; (ii) understand the use of rehearsal strategies in conductor´s verbal communication; (iii) to diagnose, from the perspective of the musicians and the conductor, what is the role of each one in search of the desired artistic outcomes; (iv) to understand how the orchestra's contributions during the rehearsal can influence the performative decisions of the conductor and (v) to diagnose and understand in the perspective of musicians and conductor how the negotiations are in search of the desired artistic outcomes.

Music

4D Expressiveness: Timbre deviation in re-creation and co-creation processes of the saxophonone repertoire

David Sánchez Blázquez, Professor Jorge Manuel Salgado de Castro Correia

This research explores the possibilities that timbre offers as a resource of expression during the musical performance. It does it from two points of view that summarise the spirit of this research project. Firstly the performance of the saxophone as the main subject of the artistic practice and secondly the discussion that rises up around the performance of the repertoire of this instrument through two ways: one facing the score already written -Recreation- and other next to the contribution that the performer can offer during the colaboration with the composer -Cocreation-.

We can find a big lacuna on the academic research around performance practice of the contemporary repertoires; particularly expressiveness field has been gone in depth very little. Therefore, the discussion that is part of the project, departs from a hypothesis in relation to this question: the concept of timbre expressiveness. This proposal arises from the research around the expressiveness on the more traditional repertoires and expects to be reinforced during the first part of the thesis. The second part -recreation processes- comes from the empiric application of the discussed concepts on remarkable pieces -as to their performative demand and, in the other hand, with their artistic and aesthetic contribution- of the instrument. The third part -cocreation processes- comprises the contribution or inspiration that the knowledge of the idiomatism of the instrument by the performer -derived from the previous experimentation- can grant to the composer through the systematic collaboration with a group of selected composers, all of them chosen because of their astounding careers as well as personal and artistic affinity. The last part expects to agglutinate the analysis of the results -premieres, recordings and scores editions- of the dissertation.

Music

The Franco-Belgian and Russian schools as references to perform Latin American repertoire for violin and piano

Diana Rodríguez, Luca Chiantore, Antonio Lourenço

The purpose of this artistic research project is to put forward to a performance proposal of music for violin and piano composed in Colombia by Luis Carlos Figueroa and Mario Gómez Vignes. Taking as references the divergences of the sound and stylistic aesthetics of Franco-Belgian and Russian violin schools, which are pedagogical and performance approaches that remained in force until much of the twentieth century, showing particular characteristics regarding the sound production and use of musical expressive elements that made the most difference between the violinists representing each one of these two schools.

Taking into account that in Latin America and more specifically in Colombia there has been no pedagogical and performance tradition of the violin with its own aesthetic, as it has occurred in Europe. By taking these two schools as references, paths and possibilities can be opened for the performance of academic repertoire for the violin that has been composed in Latin America.

Music

Agapito de Miranda composer of memories. The notebooks of a song collector from XXth century Goa

Eduardo Falcão, Susana Sardo, supervisor; Rafael Fernandes, co-supervisor

This Ph.D. project focuses on the analysis of the unpublished work of the Goan self-taught ethnographer Carmo Gonzaga Miguel Agapito de Miranda (1911-1995) consisting of 8 manuscript volumes. These notebooks sum 5155 pages and contain scores, song lyrics, own compositions, and ethnographic notes in Portuguese about Goa's musical practices. From a decolonial epistemological perspective, the project intends to place the work of Agapito de Miranda within the intellectual production about music and, thus, contribute to the historiography of musical practices in Goa. The research problematizes which proposal of "Goan musical culture" is implicit in its work. To this end, it seeks to biography Agapito's musical journey to understand how he performed in Goa's musical scene. Due to the repertoire's ethnographic and symbolic importance registered in the manuscripts, the analysis of this document will contribute to a better understanding of the politics of memory in a postcolonial context.

Music

The performance of music for live trumpet and electronics: a proposal for recreation

Elielson Gomes, Advisor: Dr. Jorge Correia, Co-Advisors Gilvano Dalagna e Cesar Traldi

During the 1970s, interest in the repertoire written for trumpet and live electronics intensified. The first works used tapes to create effects such as delay, loop, echo, reverb, reverse, in addition to different timbristic and melodic changes. However, over the years, this technology has become obsolete and part of this repertoire has fallen into oblivion, to the point that few trumpeters know about it. Based on these perspectives, this work intends to rescue works for trumpets and live electronics, proposing an aesthetic update of them. A multi-case study will be carried out, where different technological resources (eg, loopstation, pure data) will be explored, accessible to trumpeters interested in this repertoire and an analysis of the compositional process and the creation of the technological part used in the performances of the works .

Music

Conducting Practices in Youth Choirs: Pedagogical Approaches and M-Learning Resources

Eric Lana, Supervisor: Ph.D ANTÓNIO JOSÉ VASSALO NEVES LOURENÇO, Co-supervisors: Ph.D ANTÓNIO GUILHERME ROCHA CAMPOS, Ph.D CLARISSA GOMES FOLETTO

The connections established by adolescents with music, namely, their Music Learning Ecologies (MLE) are increasingly linked to the use of mobile computing devices. A pilot study carried out with 60 choral adolescents associated with a systematic literature review on pedagogical strategies and technological resources in choral singing with adolescents showed the potentialities of m-learning (mobile learning) to children's choral performance. However, most of choral conductors teach based on their own experiences producing a “traditional” rehearsal style, specifically structured by vocal training and repertoire (Liao & Davidson, 2016). The aim of this research project is to develop new forms of choral practice that consider MLE and m-learning as elements of pedagogical approaches applied to adolescent's choral performance. This qualitative research is divided into two phases: (i) systematic literature review based on the PRISMA protocol (Moher et al. 2009); and (ii) fieldwork - which includes an observational study in virtual communities and an action-research project (Mackay and Marshall, 2001) applied in the Canarinhos de Itabirito, a Brazilian Choir. It is expected that the aggregation of the innovations addressed and implemented will optimize choral practice and contribute to the engagement of choralists and conductors. The research results will be available on a digital platform, which aim to disseminate the resources used and enable new perspectives for children's and youth choir practice.

Music

Harmonizations on the electric bass inspired by the Lydian Chromatic Concept of Tonal Organization

Fausto Pizzol, Advisor: PhD Paulo Vaz de Carvalho, Co-advisor: Gilvano Dalagna

This research aims to expand the possibilities of performance and musical creation for electric bass, developing a proposal for its use as a harmonic instrument. The electric bass, organologically classified as a melodic instrument, has timbric and ergonomic characteristics that can potenciate its use beyond that designation. Supported by this perspective, several bass players have been trying to use the instrument in a harmonic way, however, the lack of research and systematization of this approach hinder its development. Based on a tonal system alternative to the consolidated practice, called Lydian Chromatic Concept of Tonal Organization (Russell, 2001), the research involves (i) the definition of a harmonic vocabulary; (ii) the creation of musical works from this vocabulary, and (iii) the systematization of didactic material for teaching the harmonic approach. This work will contribute to the construction of a new paradigm for the practice of the instrument, for the academic discussion about it and, consequently, it will bring pedagogical implications.

Music

Ordinary emotions: the affective work of brazilian live music performers in porto

Felipe Vargas, MARIA DO ROSÁRIO PESTANA

This study approaches the work of musicians that play “live Brazilian music” in Porto’s nightlife concerning about how this practice remain sustainable as a musical work. Live music performance in adult leasure has been studied, mostly in the past 20 years. The development of

notions as “dance musicians”(Becker, 1968), ordinary artist (Perrenoud 2007, Becker&Faulkner 2009, Perrenoud&Bataille 2017) , affective musical worker (Hoffman 2003, Negri 1998, Salgado 2005 , Requião 2003) and others, helped to define this recent fieldwork.

In what extend is “live music” in night leasure a professional field for musical performance? What do a musician develop in terms of musical competences, habilities and strategies to work on this context? What does the expression “brazilian music” means when describing a category of musical performance in Porto? I’ve been working with “live brazilian music” in Porto since 2012, solo and with different bands. In 2017 I developed an etnograpihic study in my working field, with the participation of musicians and producers, sharing their perspectives about that working context.

Those parcial results bring to light the professional statute where the performer has to adapt his way of creating and performing to keep relevant for low status gig economy contracts, developing competences that gives him flexibility to make arrangements and repertoire decisions at the spot, adapting to a different set of audiences, learning the signs and topics associated to Brazilian music that are consumed outside of Brazil.

Music

E-flat: An interpretative proposal-“ new-creative” of repertoire for E-flat clarinet

Francisco José Gil, Luís Carvalho

The E-flat clarinet is the smallest clarinet in the family that is used nowadays. It is not usual to see a specialist in this instrument that plays it in a recital, as it’s done with the soprano clarinet. In the 20th and 21st century the E-flat clarinet has had certain attractiveness because some composers have written for him.

On the one hand, the end of this work is to make a study about the soloistic music of E-flat clarinet to make known its repertoire. On the other hand, all Spanish compositions founded will be analyzed to propose solutions about the particularities required by the E-flat clarinet and what differentiates it from the clarinet. There is short specific pedagogical literature, so the research will help anyone who may need information about it.

Music

Cantocando: Self-accompaniment practice's challenge

Germán Enrique Alcántara, Orientadores: Luca Chiantore, Isabel Alcobia

Cantocando is an artistic research project that seeks to generate unconventional performative proposals exploring the practice of self-accompaniment applied to the nineteenth-century repertoire of singing and piano. Problematizing the dyadic relationships that permeate our views on musical practice (piano-singing, solo-accompaniment, among others), we explore from the double practice of playing and singing or "cantocar", the vicissitudes and characteristics of the repertoire and the possibilities that provides its performative realization.

It is intended not to result in an arbitrary proposal for interpretation, or in a reconstruction of a historically informed practice, but rather the use of singing to develop new resources and interpretative modes in addition to generating, for both the artist and the public, new experiences that evoke new scenarios, generate new spaces, programs and why not new musical material.

Music

Ampliação dos recursos expressivos da marimba através de elementos de expansão sonora

Giuliano Ribas, Jorge Salgado Correia

A presente investigação aborda a performance de obras para marimba solo que utilizam elementos de expansão sonora, sobretudo explorações tímbricas, técnica estendida, marimba preparada e a utilização de ferramentas alternativas de produção Sonora. A pesquisa buscou identificar a presença destes elementos em uma determinada amostra do repertório escrito para marimba, suas principais características e os respectivos desafios de performance envolvidos. Através de três estudos de caso referentes às obras Mani.Matta (2008) de Pierluigi Billone, Blue skin of the sea (2014) de Tonia KO e I don´t belong to your world (2013) de François Sarhan, foram elaborados um catálogo comentado referente aos recursos específicos encontrados nestas obras e um conjunto de estudos reflexivos de apoio à performance. Os estudos criados foram resultado do trabalho de preparação para performance das obras feito pelo próprio investigador,

sob uma perspectiva de investigação artística. Estes estudos são destinados a servir de base para outros intérpretes, compositores e investigadores interessados na performance deste tipo repertório. Conclui-se à partir deste trabalho, que as obras selecionadas possuem de fato contribuições consideráveis à ampliação dos recursos expressivos da marimba e que a execução deste repertório exige abordagens de performance específicas e complexas, as quais esta pesquisa buscou oferecer de forma crítica, alternativas relevantes.

Music

"Mixing as an Artistic Process: creative approaches in Portuguese urban popular music"

Hedisson Mota, Maria do Rosário Pestana

In the context of record production, music mixing is widely regarded as a specialised technical stage. But due to its dependence on musical outcome, creativity must play a decisive role in the affirmation of its artistic nature. In the context of Portuguese urban popular music, this research study focuses on the expertise of two highly regarded mixing engineers, António Pinheiro da Silva and Fernando Abrantes, in order to understand how their musical references and creative decision making determine the successful artistic outcome of a record. By observing and analysing studio mixing sessions out of two Portuguese record projects, this study presses emphasis on the engineer's creative mixing practices, how they use their various audio editing and processing tools as contributing instruments for musical expression and their creative decision making strategies (aesthetic elements/ parameters of music expression) during the process. This research study does not intend to ignore the technical aspects of mixing practices, but will essentially focus its attention on observed artistic-musical approaches and its musical outcome.

Music

The violin in Portugal in the First Republic: contexts, performers and repertoires

Hélder Sá, Helena Marinho

This investigation aims to assess the contribution of violinists in the First Republic presenting the performance contexts of these musicians and the mapping of the repertoire for violin written in this period.

The survey favoured archival work in libraries, museums, foundations, music schools, private archives and composers and performers collections. Documentation consulted include concert programs, yearbooks, activity reports, scores, correspondence, as well as newspaper clippings. The press was another pillar of this investigation. Specialized newspapers such as A Arte Musical and Eco Musical were consulted as well as several generalist journals.

Professional violinists performed in the most diverse places and groups, from opera, operetta and vaudeville orchestras, to saloons, casinos, musical societies and even in the early cinemas. The survey indicates a circulation between erudite and informal contexts and the frequent collaboration between professional and amateur musicians. The relevance of some violinists in the promotion of music is notable, with emphasis on Bernardo Moreira de Sá, Pedro Blanch and Júlio Cardona.

The repertoire for violin in Portugal in this period had a considerable increase having been written predominantly for violin and piano. Two Concerts for violin and orchestra were also composed.

To this moment, these investigations resulted in my participation in eleven conferences resulting in five publications: three written, one on video and one in the poster's format. Two book chapters and an article are waiting for publication.

Music

21st Century repertoire for unaccompanied solo xylophone: performance proposals

Helvio Mendes, Helena Marinho, Cesar Traldi

The present work intends to explain the progress of research that addresses the sound potentialities that xylophone can present as a solo instrument without accompaniment in the context of contemporary classical music of the 21st century.

Through the concepts of affordance, resignification of the object, and free improvisation, it promotes the rescue and development of a repertoire for the solo xylophone within the aforementioned context. The performance and the repertoire lead and question the use of the instrument's timbrical resources, raising reflections during this process.

So far, four works for solo xylophone with live electronics have been cataloged and four new works have been commissioned. A database was created with possibilities of timbres and technological platforms as a source of resources for future works.

The results obtained involve publications in congresses, articles in journals, and concerts with premieres of new musical works for xylophone in Portugal and Brazil.

Music

Aesthetic of hōgaku and its mediation in the re-contextualized creation using the shakuhachi

Horacio Curti, Horacio Curti Bethencourt, Dra. Susana Sardo

For a shakuhachi player educated inside a Japanese traditional transmission system in Japan, considerations of sound and its articulation are central to everyday work.

Complementing this performative side, my profile of ethnomusicologist led me to explore sound in the Japanese context in a more academic way, identifying hōgaku (an emic category translated as 'music of the Japanese country') as a meaningful classification, and a series of concepts that proved relevant to the aesthetic considerations in that frame.

This thesis is born from the ambit of Ethnomusicology, aligned with an understanding that acknowledges the value of the act of performing and creating music as valid means for knowledge production.

At the same time other fields that explore less conventional ways of production, transmission and organization of knowledge inside an academic framework such as the ones proposed by action research in the context of artistic research has proven both epistemologically relevant as well as useful for the purpose of this study and have thus been take into consideration and played a central role in the transdisciplinary artistic creation process and its study.

Finally, audio-visual is playing a central role in the project not only as a registration tool but as a means to communicate academic knowledge since the outcome of this research is divided in three parts: a manuscript, a trans-disciplinary piece (as result from the creation process) and an audio-visual documentary presenting a reflection on the ethnomusicological process as well as the artistic creation one.

Music

"Unpredicted Music": the practice of the creation-performance shared

Ítalo Araújo, Profª Drª Susana Sardo (Aveiro University), Prof. Dr. Alexsander Duarte (Aveiro University)

This work is dedicated to the study of collective performance practices in which sound, with musical intention and in an unpredictable way is used as material for creation in real time, and this musical practice is called here "unpredicted music". It is then a type of group musical practice where performance and creation are assumed by the agents as inseparable and that are connoted with forms of adjectivation of other performative practices such as "improvised", "free", "experimental" and/or "spontaneous". These modes of making music, which dilute the composer/interpreter dichotomy, offer other values to the process of musical performance such as "music" without pre-conceived musical materials and unpredictability in the sound construction. The research is based on an ethnographic work with two groups practicing this model, one in Brazil and the other in Portugal, and the theoretical model of analysis used is based on the context of unpredictability in making music that ends up formatting a model of collective performance.

Music

Miroir:..l'autre c'est moi. A study on the inter modality of musical gesture

Jean Michel Garetti, Profs. Jorge Salgado Correia and Gilvano Dalagna

The research project "Miroir:…l'autre c'est moi. A study on the intermodality of the musical gesture" belongs to the field of Artistic Research – Performance. It involves two members: an oboe player and a mime. The main goal is to develop a performance of two solo oboe pieces, B.Britten's 6 Metamorphoses after Ovide Op.49 and Le rite de la lune from Edouard Salim Michael, sustained by an investigation, in which

intermodality is creatively explored originally in an effort to compensate the eventual lack of corporal expression of the oboe player . The mime's challenge will be to perform the visual representation of what the oboist imagines. The author uses the Disney Strategy to develop pragmatically all his creative process. The project enlightens the differences between mime and pantomime. It also proposes a new interpretative perspective of the Britten's 6 metamorphoses based on the psychological character of the personages and a new visual experience to the public placed between the two artists.

Music

Looking for the desired sound: An alternative proposal for arranging of guitar music

José Santos, Jorge Salgado Correia (advisor); Gilvano Dalagna (co-advisor)

The present artistic research is focused on the processes of music re-elaboration for guitar duo, whose repertoire has historically been constituted by adaptations and transcriptions. These processes are anchored in postulates perpetuated by tradition where the maintenance of the "musical text" prevails, which often limit the creative possibilities concerning performance and composition. To respond to these limitations, the present project intends to propose and discuss new perspectives for the performance with guitar duo, seeking to develop a critical reflection on the processes that involve such practices. Its main objective is to contribute to the development of the repertoire for guitar duo through new arrangements conceived in the light of the concept of knowledge tacit (Polanyi,1958), embodiment meaning (Merleau-Ponty, 1968) and affordances (Gibson, 1977). To realize these objectives, the present project will be developed in three phases: planning, action, and reflection (practice-based research). The expected results of this project include: the publication of a book of scores with the arrangements elaborated from the investigation; the recording and editing of a CD with new arrangements; the performance of premier recitals of these artistic products. It is hoped with this research proposal, beyond to generate new artistic products, to collaborate for the discussion about the musical creation and performance for guitar duo, aiming to foment the development of artistic research in this area.

Music

Two generations amidst changing aesthetics: an artistic research on the divergences between Robert Schumann and Johannes Brahms

Juan Camilo Rojas, Dr. Luca Chiantore

Instrumental performance as a means for a historiographic revision of the piano output of Robert Schumann (1810–1856) and Johannes Brahms (1833–1897) lays at the base of this artistic research. The concept of German romanticism, at the core of the traditional musicological canon, embraces both Schumann´s and Brahms´ piano compositions, in spite of the chronological gap between both of them: Brahms last piano works are more than sixty years ahead of the first, and most popular, Schumann's piano compositions. This musicological stance is often reflected in current performance practices, which in turn, go on to reinforce the status quo of musical historiography in a process that does not cease to feedback itself, as shown by the narrow frame of possibilities that mainstream performance allows to differentiate between both composers. On the other hand, most historicist recordings of 19th century piano music reveal yawning divergences in relation to historical evidence of 19th-century performance practices as found on contemporary written sources and recordings from the early 20th century. This gap was already highlighted by authors such as Clive Brown, Peres da Costa and Anselm Gerhard. Hence, this artistic research aims to reflect, on the modern piano, the changes and characteristics of performance practices in Schumann's and Brahms's piano works by means of a non-conventional reading of their works, also considering that, in this concrete case, the performer is being informed and inspired by historical sources. Among the surveyed sources we found: treatises, methods, concert critics, etc.; organological modifications and changes of instrumental technique; recordings made by those pianists near to the Schumann-Brahms' circle like Carl Reinecke, Adelina de Lara, Fanny Davies, Ilona Eibenschütz, Carl Friedberg and Etelka Freund. Concerning the performance, several parameters are to be transformed in order to show the difference between those performance practices own to each composer. That includes the broadening of the dynamic range linked to organological transformations as well as to the overall changes in performance's aesthetics;long-line phrases substitute a phrasing based on small melodic cells; asynchrony of hands and arpeggiation of chords decrease in favor of an accentuation based on the regularity of down- and upbeats; among other changes in pedalling, ornamentation, agogics and tempo management.

Music

Without distances: A performance proposal regarding Domenico Scarlatti's sonatas transcribed by Enrique Granados

Laia Martin, Luca Chiantore

Enrique Granados published 24 transcriptions of Domenico Scarlatti sonatas in 1905 as a part of a tradition started in 1785 in which many pianists published their Scarlatti editions and transcriptions. Through their diversity, the paradigms of digital listening, the use of sound technology and the collaboration with other performers I rethink the performance of transcriptions with a non-conventional performative proposal in which I form a cycle with my live performance of the transcriptions on the piano fused with a fade out of the first bars of the corresponding Scarlatti sonatas recorded in different historical keyboard instruments.

Music

Improvisation in western art music: A theoretical and practical model applied to the Douze Etudes pour Guitarre by Heitor Villa-Lobos

León Salcedo, Gilvano Dalagna (Orientador)

The current performance practice of the canonical repertoire in western art music lacks on the inclusion of improvisation processes compared with other music styles. However, there is a growing interest for improvisation in performers of western art music. In most cases, performers lack of strategies for improvisation that help them to guide their already acquired skills in their work and training. Professional performers have strong training in developing mechanical operations that allow them to play, this set of operations become mechanisms expressed in formulas of melodic designs, chord structures, arpeggios, scales, polyphonic or timbrical textures, etc, as part of the learning and practice of canonical repertoire. As result of this training, the average professional performer of western art music knows and can play a large number of mechanisms. These mechanisms can be deconstructed and transformed to become vocabulary that may be used as material for improvisation. Therefore, considering this perspective, we can propose a theoretical and practical model for improvisation in western art music departing from this first level of generating structural material from mechanism and oriented to performers. In this project, this approach will be applied to the Douze Etudes pour Guitarre by Heitor Villa-Lobos to obtain both, theoretical and artistic outcomes. To obtain these results, the proposed method is designed in phases, that spans documentary research, exploratory, experimentation and creative stages.

Music

"This sound that we feel here inside!": connection, subjectivity and social memory in the practice of bombos

Lucas Wink, Maria do Rosário Pestana

This is a research supported by the theoretical framework of Ethnomusicology, Sound Studies and Acoustemology and which takes as universe of observation, participation and analysis the context of bombos, a social practice repeatedly cultivated in different localities in Portugal. The study relies on ethnographic fieldwork carried out along with Grupo de Bombos Regional de São Simão Os Completos, Grupo de Bombos da Casa do Povo do Paul e Grupo de Bombos de São Sebastião de Darque.

Considering (i) the significant presence of bombos in Portugal and the scarcity of systematic studies; (ii) the set of derogatory judgments around percussion and, in particular, the bombos and its practice; (iii) the possibility of the delineation of new narratives brought by the transdisciplinary area of Sound Studies regarding, for example, the poetics and politics of social relations, the intersubjectivity and the expressive human behaviors, challenges are posed in the studies of musical practices and musical instruments in Portugal. In this sense, this project aims to contribute to the reflection, discussion and development of approaches on the study of sound within the scope of Portuguese popular musical practices and instruments. The research has the following specific objectives: i) understand the values, meanings and processes of participation in the practice of bombos; (ii) identify the relations established between means of production and performative results; (iii) understand the articulation between music, sound and space in the performance of bombos.

Music

!No sólo Böhm! Flautas traveseras alternativas al sistema Böhm en Alemania en la segunda mitad del siglo XIX y principios del XX

María del Carmen Fuentes, Orientador: Jorge Salgado Correia. Co-orientador: Pedro Couto Soares

Las flautas de Maximilian Schwedler (1853-1940) constituyen un capítulo importante en el desarrollo de la flauta travesera. Capítulo hoy olvidado, pero que en ese momento histórico fue crucial para el desarrollo de la forma de tocar la flauta travesera en Alemania, donde la invención del sistema de Theobald Böhm (1847) no fue aceptada. Flautistas y directores de orquesta criticaron la homogeneidad de su sonido y de su afinación, escribiendo públicamente su posicionamiento en contra del sonido del nuevo sistema y a favor del de las flautas

cónicas de madera de sistema antiguo. Esta tradición sonora se perpetuó en Alemania hasta bien entrado el s. XX. Siguiendo esta corriente nos encontramos el último eslabón de flautas de sistema antiguo en las innovaciones de Maximilian Schwedler (modelos de 1885, 1895 y 1898), realizadas para competir en volumen sonoro y en facilidad técnica con la flauta de sistema Böhm, pero sin perder el color del sonido de las antiguas.

El objetivo de mi investigación artística es descubrir cómo suenan estas flautas alternativas a las de sistema Böhm. Con esta investigación pretendo crear un documento sonoro con las flautas originales de ese período, un documento que se sirve de la investigación musicológica, de la organológica, pero sobretodo de la experimentación. Este documento sonoro es lo único "vivo" que nos queda de estas flautas, el resto de informaciones son escasas y cortas descripciones de ellas en libros y artículos alemanes.

Es por ello que se hace necesaria una investigación artística, para crear ese nuevo imaginario sonoro, para buscar nuevos caminos interpretativos que den pie a la reflexión y a una implicación personal del intérprete, poniéndolo a éste en el centro de la actividad musical. A través de esta experimentación se consigue un enriquecimiento en la búsqueda tímbrica del sonido de la flauta, permitiendo nuevas reinterpretaciones de las fuentes históricas.

Music

With Tiger Claw: Endemic piano performance in Baja California Sur from 1880 to 1980

María Fernanda del Peón Pacheco, Advisor:Ana Flávia Miguel, Co-advisor: Luca Chiantore

The geographical and social conditions in Baja California Sur, Mexico from the end of the 19th century until the 1980's, determined a particular way of playing different piano repertories. The arrival of European and Asian people to Baja provided important cultural and musical diversity. Geographic isolation determined by a condition of almost insularity and backwardness in comparison to central Mexico modernity, made piano music an essential part of cultural and social life. Domestic recitals and social gatherings created an interest in learning the instrument. The importance of music education was well known, almost all families had a piano at home, that made regional interpretation developed its own peculiar ways, and now, is still kept almost intact, according to the tradition, with some interpretative practices used before the 20th century, as well as developing techniques and concepts that respond to its own aesthetic. Loudness and resonance were primary elements of this aesthetic, where the subtleties in the sound are not a priority, and where the dynamic, "piano" is not understood as playing softly, but rather that the piano should be listen firmly. Ornamentation and improvisation were key elements in piano music performance, the last one was even commonly used to connect works of different genders in the same performance. For this purpose, the socio-cultural and musical traditions found in piano performance practices of Baja California Sur between 1880 and 1980 will be referred to as endemic interpretation. The main objective is to propose and create an interpretation for piano repertoire with the socio-cultural and musical distinctive traditions found in the endemic interpretation of Baja Sur; first will be defined the elements that characterize the endemic interpretation and subsequently create my own artistic proposal. It is important to confirm women's roles in piano interpretation and teaching and contrast those with the myth created around femininity and interpretation.

A comprehensive ethnographic study is needed to determine which regional performance practices may be incorporated into the repertoire and when. The discoveries and knowledge gained in this research will come from regional practices as it contrasts with traditional western. An analysis of interpretive facts will be used through an extensive ethnographic study. With it we create the first musical historiography of Baja Sur; the methodology that is developed bring relevant elements that could be used by other researchers in the understanding of their characteristics and/or configuration of their own interpretive facts and identification of their own regions. Claiming and dignifying the value of locality and local practices found in different regions, provides specific and distinctive traits of our own interpretative practice for current musical interpretation within a framework where the aesthetic references have been unified.

My research and experiences shall be presented as a reflection through written and audiovisual documentation, as also result of the aesthetic crash between the academia practices I had been instructed and what I listened as a native in Baja Sur. The final performance decisions will be a part of the autoethnography that includes the ways in which regional performance traditions have affected my own playing and the analysis of these affects, thus determining the final repertoire to be performed using contemporary interpretative practices enriched with the endemic elements present in Baja Sur. The final artistic decisions that set the interpretative proposal will be determined by the clash and connection between aesthetic codes and the concrete artistic experience lived, thus increasing the aesthetic-musical options a performer or listener has. With the concept of endemic interpretation, I will be helping the study and recovery of artistic practices and musical values from other communities.

Music

Phytopoetic creation: an example of Ecoethics concerning musical performance

Marisa Ponce de León, Supervisor: Jorge Salgado Correia, Coadvisor: Doutor Professor Filipe Lopes Cunha

Honoring nature as a resource, refuge and vital component of our life is fundamental in an era of volatiles social, economic, health and environmental change. The performing arts can constitute themselves as powerful and influential means of intervening socially, enabling us

to reconfigure the imaginaries and mentalities of our relationship with nature and the world. Through the immersion in contexts of musical performance with plants, it will be sought to generate subjective forms of connection that allow the triangulation of empathic relations between performer, plants and public. Applying the artistic research model proposed by Correia and Dalagna (2020), a process of experimentation and musical exploration of technological media for the sound of plants will begin, as well as scenic resources, leading to the final presentation of the performative ritual: Phytopoetic Creation. It is also intended to produce knowledge within a line of artistic research that focuses on the relevant articulation between ethical responsibility and the search for aesthetic results.

Music

A contextually informed edition proposal for Joseph Achron's Concerto for Violin and Orchestra No. 2 Op. 68

Miguel Gomes, Evgueni Zoudilkine, David Wyn Lloyd

This investigation seeks to contribute to the knowledge in the outline of musical editing, starting from the practice of contextually informed transcription and editing, focusing on a case study involving Joseph Achron's Violin and Orchestra Concerto No. 2 Op. 68. Through bibliographic research and artistic research, it is intended to highlight the various contexts inherent to the work, which include the composer, his historical and social dimensions, as well as the researcher's own research and reflection procedures, as a contribution to the creation of an analysis tool, open in the field of the relationship between editing and interpretation. As a final objective, the dissemination of the product of this investigation is anticipated through the registration of technical-interpretative options and the phonographic recording derived from the edition of the manuscript.

Music

Control of Music Performance Anxiety as a Potentiator of the Flow Experience

Nery Borges, Supervisor: Dr. Helena Marinho (INET-md, DeCA-UA), Co-supervisor: Dr. Anabela Pereira (DEP-UA), Dr. Marcos Vinícius Araújo (DA-UFRGS)

This research aims to explore the control of Music Performance Anxiety (MPA) as a Potentiator of the Flow Experience in Musical Performance (FEMP). Studies point out that MPA and FEMP are antithetical states, that is, if the level of anxiety increases, it reduces the flow and vice versa. However, these studies did not use objective measures, nor did they test intervention programs with simulation of performance in Augmented Reality (AR) and training with Biofeedback (BFB). Therefore, this study seeks to develop and test virtual environments for simulating performance; to translate and adapt EFPM scales to Portuguese; and, to implement intervention programs involving the AR and the BFB for the control of the MPA. It is intended to achieve results that, in addition to contributing to the reduction of MPA levels, also generate knowledge regarding the Flow Experience, its indicator dimensions, and its connection to the performer's psychophysiological behavior.

Music

Guitar in Jorge Peixinho's Music

Pedro Baptista, Pedro Rodrigues, Evgueni Zoudilkine

Jorge Peixinho (1940-1995) was a Portuguese composer at the forefront of the avant-garde musical movement from the second half of the twentieth century. Among his lifework, there are 21 guitar pieces (some with several versions), composed over a period of 24 years (1971 to 1994). This communication proposal presents a project of Artistic Research that focuses on Jorge Peixinho's guitar output. Consists on the framework of Jorge Peixinho's guitar works, identification of the composer's writing specificities for the instrument and exploration of its technical and musical implications. The aim is to inform the performance and to raise awareness of these largely unknown works, which deserve its rightful place in the main guitar repertoire from last century's European art music.

Music

The role of the instrument in the western music after the Second World War: the lineage Nono-Lachenmann-Billone

Pedro Berardinelli, Sara Carvalho, Beat Furrer

This project's main goal is the analysis of the role of the instrument in the musical output of the lineage Nono-Lachenmann-Billone having in account the approach to the instrument as a mechanism of creative uprising.

Consequently, bibliographic research and comparative analysis of instrumental pieces with similar setups of each composer will be undertaken.

As a result of the research process, the comprehension of how the changes in the role of the instrument in the different generations manifest themselves in the compositional conception and subsequent sonic universe is sought. In direct articulation with the carried research, the project encompasses the creation of a set instrumental pieces that seeks the expansion of the results of the carried research.

The main contributions of this project are the relational analysis of the changes of the role of the instrument in the western music after the Darmstadt generation centred in the above mentioned lineage of composers.

Music

Galicia fiddle: from local revival to the creation of a transnational interweaving net

Rosa Pampillo, Maria do Rosário Pestana

This ethnomusicological study focuses on the dynamics that have been taking place around the fiddle in Galicia for the last twenty years. One of these dynamics was the foundation of the Cultural Association Galicia Fiddle in 2010. Since then, the fiddle in Galicia and specifically in Pontevedra province has been going through a process of interweaving. "Galicia is a community that transcends geographical borders" (Rodríguez, 2015). Galicia Fiddle has been part of this interweaving process, and as a consequence, it has developed an expansive course from Galicia, between musicians from Galicia and other countries around the planet. Those musicians have been weaving a net of transnational interweaving around the processes of musical practice of the fiddle within the frame mark of traditional and folk music from Galicia.

The development of the Galician fiddle as an expansive trajectory in different parts of the planet can be understood through the Planetarism concept in the sense of: "Interrelatedness that runs along smooth surfaces, comprises multitudes, and manifests movements" (Song, 2015). Besides, Planetarism also allowed understanding the artivism: the direct actions through music and arts that Galicia Fiddle Association has been employing with an ecological vision and horizontal policies and which foster relationships and the creation of shared spaces between professional and amateur musicians.

With this research I tried to present the role that music occupies in the transformation and the acquisition of meanings in the daily life of people and musical institutions. In order to develop this study, I used the ethnographic method through participant observation in concerts, festivals, courses and congresses around fiddle. Aware of the critical and questioning power of auto-ethnography, through it I intended to make visible the dominant and oppressive discourses that have been built around the violin for centuries and how in the context of Galicia Fiddle and the e-Trad in Vigo there is a set of intentions of change and the creation of alternative performance contexts, which are developed under horizontality policies and following the idea of "Show, don't tell" (Boyd y Owald, 2014).

Music

Isabel Gomes Silvestre's "voice": Translocation processes in local and global domains

Rui Madeira, Maria do Rosário Pestana

Isabel Gomes Silvestre is a singer of rural music from Manhouce who has achieved national and international projection. Having been an artist at the record label EMI-Valentim de Carvalho, she is currently active in safeguarding, transmitting and disseminating local culture, as well as revitalizing local folklore and cultural tourism. Starting from the analysis of the musical path of Isabel Gomes Silvestre, in her perspective as well as in the perspective of several intervening parties related to her, I intend to understand about the construction of her career as a soloist in the music industries and how the singer redefined the songs of Manhouce and revitalized folklore and cultural and local tourism. In this sense, I will focus on the process of construction and institutionalization of performative practices, as well as the acquisition of musical, social and cultural skills, the incursion into other musical, social and cultural realities and the objectification process carried out by Isabel Gomes Silvestre. The methodology I am going to adopt focuses on biographical ethnography based on the perspective of "subject-centered musical ethnography". The methods to be used are (1) bibliographic research and analysis, (2) archivist research and (3) fieldwork. The objectives are to understand about (1) the path of Isabel Gomes in the redefinition and objectification of the songs of Manhouce through new established musical and social relations, (2) her action in the revitalization of contexts and practices of rural matrix and transformation

of the village of Manhouce in a tourist destination and (3) the relationship between local and global domains discussing notions such as “translocation”, applied to the analysis of Isabel Gomes Silvestre's rural expression “voice” to a commercial “voice”, as observed by the singer's forays into other musical and cultural realities.

Music

Music performance anxiety: a systematic review on undergraduate music students' characteristics

Samuel Barros, Helena Marinho, Anabela Pereira

Music Performance Anxiety (MPA) is described as a persistent apprehension that compromises performative skills, both in solo and group performances, nonetheless, little is known about the reason. This systematic review will allow a broad and detailed view of the main characteristics of MPA, making it possible to understand its origin in undergraduate music students. A systematic literature search was conducted via search algorithms in the databases Web Science, PubMed, Scopus and Eric. Of 1526 article, 50 were included for review. The main hypothesis of this preliminary review are: 1) female gender with more MPA than male gender; 2) no clear explanation about the origin of MPA and, 3) unsatisfactory methodology at study design level, mainly in participants selection. Therefore, it is expected to contribute with a wide knowledge on MPA in high music education and, this way, supports 3 studies that will be the core of my thesis (Mapping musical performance anxiety: quantitative and qualitative study of its prevalence in higher education), namely a qualitative study around MPA aetiology in Portugal, a study to build the first Portuguese scale on MPA and, finally, mapping Portugal’s undergraduate music performance anxiety.

Music

The legacy of António Leal Moreira (1758-1819): music, dramaturgy and vocality for an interpretation of his dramatic works

Sara Braga-Simões, Jorge Salgado Correia

With this research the author aims to contribute to the knowledge of the Portuguese musical production in the eighteenth century, particularly in the context of dramatic works, analyzing the unexplored universe of Leal Moreira’s legacy, considered by the literature as one of the most important Portuguese composers of the 18th century. The author intends to establish relations between the dramatic and musical narrative, analysing the composer's stylistic choices - that is, analysing the composer’s musical work upon the literary narrative - seeking to define a style. One of the goals is to verify if 'A Vingança da Cigana' - one of his few works with modern interpretation, inspired by the so called ‘Teatro de cordel’- is an exception to the remaing work of Leal Moreira which is characterized by the influence of the Neapolitan school. The analysis and systematization of these data will lead to the selection of musical excerpts and will feed the author’s interpretation processes of the chosen characters; these processes will also be described and analyzed.

Music

Listening and Creative Processes: musical individuation and the free improvisation performer

Sérgio Lima, Susana Sardo (orient.) /Rogério Costa (Coorient.)

This research investigates how musicians elaborate their creative processes and perceive themselves during free improvisation performance. A free improvisation performance is understood by practitioners and scholars more as an environment or territory for creating and performing free from predefined styles and aesthetics than as a musical genre. I have proposed to investigate improvisation activity based on the interwoven relationship between two of its faces: technique, as a mode of action and thought, which develops solutions to foster performance and, on the other hand, its aesthetic face that, on the musician, acts by informing and regulating his/her technical action through processes which occur on the sensitive field. The aesthetic face, in the theoretical perspective here adopted, would be like a bundle of sensations that guides the musician, enhancing and modulating his/her technical action. At this sensitive level, listening is a central process for the elaboration of the musician's (re)action, potentiating and configuring the performative act. Listening is the production of the presence consolidated as an activation of a receptive state of sensitive attention to aural phenomena in the interior and exterior of the musician. The investigation has had its action structured through three biases. The first dealt with theoretical reflection on the improvisation as a kind of the musician’s individuation during a live performance. In the second one, in the field of artistic research, I sought to modulate the philosophical question into the form of a concept and artistic problem. By setting up a laboratory of sonic practices with two other musicians working in the area, I aimed at a view to the elaboration and assembly of free improvisation performance whose resulting theme of this operation was "creation as a collective network act". The third and final bias is, in fact, the central axis and concern that conducts all research.

It deals with the improvisational musician's perspective regarding the way he/she experiences his/her creative processes in an environment of free improvisation. Through an ethnomusicological approach, to review my initial questions and encourage new questions for future works, I gathered published reports from musicians on the theme, interviews with musicians participating in the laboratory and the performance produced during this investigation, and various other documents produced in the context of the performance production. Thus, I intended a philosophical articulation between two plans of operation: the methodological and the ontological, by putting in dialogue the performance and the thinking that underlies it, understood as devices that are intercepted in a symbiotic way permanently during the research.

Music

A partilha do conhecimento artístico com instituições em contextos diferenciados

Tiago Coimbra, Orientador Luís Carvalho

A música é uma linguagem universal e não conhece fronteiras. No entanto, o acesso ao conhecimento artístico esbarra frequentemente em várias barreiras de natureza física, económica e social. Durante o meu projeto de investigação artístico tive a possibilidade de apresentar o concerto para oboé e orquestra de Rutland Boughton em Yakutzk, na Rússia, onde fui convidado a lecionar um masterclasse na escola profissional da região de Yakutia. A partilha de conhecimento com jovens músicos que vivem na cidade mais fria do mundo (fonte: National Geographic) e que está isolada durante dois períodos de três meses cada levou-me a debruçar sobre a necessidade moral que as instituições mais sólidas têm de colaborar com instituições que necessitam de mais apoios. Questionei dois colegas meus, da Tonhalle Orchester Zürich (Zurique) e da Orquestra Real do Concertgebouw (Amesterdão) sobre a colaboração destas duas orquestras com a Filarmonica Joven de Colombia e sobre a parceria que têm para enriquecer a formação dos jovens músicos colombianos. Deste modo, parece-me importante que as entidades competentes se debrucem sobre a criação de um projeto de colaboração entre o DECA da Universidade de Aveiro com uma instituição que possa beneficiar com a colaboração dos docentes da UA.

Music

Computer Vision and Musical Performance

Tiago Lestre, Isabel Soveral, Guilherme Campos

The research “Computer Vision and Musical Performance” aims to combine music and technology to create musical pieces that make use and help develop the application of computer vision on musical performance scenarios.

This goal leads inevitably to the creation of new repertoire and new software that focuses on the current difficulties and necessities of the performer. The use of this technology seeks to find alternatives that enhance the manipulation of live electronics in the musical performance. There are several concerns that this investigation seeks to answer, such as:

- Free the stage from wires and other “visual noise” inherent to the several interfaces used.
- Free the performer from the burden of having to master different interfaces, sometimes used for one specific piece of his/her repertoire.
- Be free for all, with open-source code, so everyone can use the software, play the pieces, and create their own pieces.
- Be a DIY instrument of sorts, relying only on a computer and regular camera to function (which can be the laptop’s webcam, or the phone camera).
- Be intuitive and ease of use to everyone, musician or not, programmer or not.

During the research, there has been some work made with some performers, which pointed out some limitations in the manipulation of sound in real time. The clarinet player is an interesting case study for this research because both his hands are “tied” to the instrument, and using the feet to control live electronics brings its own limitations, related to both hardware and “choreography”. The computer vision software unravels new possibilities to control the live electronics, such as eye tracking. Doing this, the performer needs to focus solely on his craft, while the live electronics is naturally performed without his “conscious” engagement on two different instruments (clarinet + live electronics). This approach, however, requires that the programming part of the piece be sturdy enough to “survive” very different scenarios, such as poor lighting conditions, anxiety of the performer and random errors usually related to musical concerts.

Music

Intertextual dimensions: Compositional dialogues between tradition and contemporaneity.

Túlio Santos, Sara Carvalho (Supervisor)

This work deals with the investigation of compositional processes driven by the intertwining of structural aspects and elements of popular and classical music. Its main principle is the intertextual attitude as a motivating approach. It is an investigation in the field of compositional theory and practice based on intertextuality in music as a creative tool. However, it aims to broaden the approach of reframing elements of popular tradition culture, even maintaining recognizable elements circumscribed within the Portuguese-speaking sphere.

Music

Le charme du son: technical and aesthetic experimentation on piano music by Cécile Chaminade

Zanya Escolar, Shao Ling, Luca Chiantore

The main purpose of this research is to create an approach to the piano repertoire by Cécile Chaminade from the experimentation with treatises on piano technique and other written and sound sources from that period. The writings of Marie Jaëll, Blanche Selva, Maurice Dumesnil and E. Robert Schmitz reveal unique interpretative and pedagogical features and embody an important source of information about the pianism of the time that has not been explored at a practical level in an Artistic Research yet. Applying this experimentation on the piano music of Chaminade –non-canonical repertoire– allows us to broaden the historiographical vision we have of its contemporaries and to better understand the heterogeneous French music scene of the late 19th and early 20th centuries. Performance plays a fundamental role in this process as it is the key tool to redesign established stylistic frames and historiographical categories and, at the same time, claiming the value of body experimentation within the field of Artistic Research.

Music

Nanosciences and nanotechology

Graphene-based macrostructures for cleaning contaminated waters: optimization towards a more efficient water re-use

Ana Bessa, Paula Marques, Maria Eduarda Pereira

Water pollution has become one of the most serious problems worldwide. Any contamination of water with chemicals or other foreign substances that are detrimental to human, plant, or animal health could origin serious health issues. Included in a wide list of water pollutants, heavy metals are an extreme hazardous class of non-biodegradable and bio-accumulative elements that present a serious threat to all forms of life, even at trace levels concentrations. Therefore, considering the booming of nanotechnology and the amazing breakthroughs in research on graphene-based materials (GBM) for environmental remediation, in this project we propose the development of GBM macrostructures specifically functionalized towards heavy metals sorption, namely mercury (Hg), ranked third of the most toxic elements to human health by the United States (US) Government Agency for Toxic Substances and Disease Registry. Further, and very important, these new materials are being tested in natural waters (tap, river and sea) under realistic concentrations with very promising results. A detailed chemical/structural characterization of the materials, before and after the sorption studies, is being implemented to establish the possible sorption mechanisms.

Nanosciences and nanotechology

2D nanomaterials functionalized with porphyrins for cancer therapies

Ana Monteiro, Tito Trindade, Graça Neves

The functionalization of 2D nanomaterials (as GO) with photoactivable molecules (as porphyrins) has been acquiring an increasing importance in biomedicine, namely in cancer therapies. This project aims to explore the synthetic routes to design hybrid materials comprising GO and porphyrins through multiple types of interactions (covalent and non-covalent). Such hybrid materials shall be explored

in cancer therapies, as photo-antiproliferative agents and as potential G-quadruplex detectors and stabilizers. The molecular, structural and morphological characteristics of the hybrids shall be optimized to generate promising anticancer systems.

Nanosciences and nanotechology

Can a graphene bridge reconnect the injured spinal cord?

André F. Girão, Paula A.A.P. Marques, María Concepción Serrano, António Completo

Spinal cord injury is a traumatic incident with devastating lifetime repercussions that affects thousands of people worldwide. Tragically, there are no available therapies proficient to significantly reverse the condition of the patients, who are caught in a spiral of hopelessness fomented by a drastically decline in their quality of life together with high lifelong healthcare expenses. Therefore, and considering the deficient natural regeneration process of the central nervous system, in this project we purpose a neural tissue engineering scaffold capable of combining the bioactivity of graphene with a fibrous-porous architecture suitable for mimicking the morphology of the spinal cord. This biomimetic 3D microenvironment should present biochemical, electrical and mechanical features able to enhance neural stem cell differentiation towards neurons and glia. With effect, by understanding which factors influence the formation of a functional spinal cord neuronal network in vitro, it will be possible to highlight new directions for an ultimate spinal cord regeneration strategy.

Nanosciences and nanotechology

Cold Sintering for the manufacture of lead-free piezoelectric ceramics towards sustainable electronics

Anna Wlódarkiewicz, prof. Paula M. Vilarinho, prof. M. Elisabete Costa

Lead zirconate titanate (PZT) is currently the piezoelectric material that dominates the market, because of its high electromechanical coefficients. However, PZT contains more than 60 wt% of lead, which is a toxic element, and should be replaced with alternative, lead-free materials [1]. Potassium sodium niobate (K1-xNaxNbO3, KNN) is one of the most promising lead-free piezoelectric materials due to its high Curie temperature and good piezoelectric performance [2]. Unfortunately, KNN presents difficulties during fabrication by conventional sintering at high temperature [3,4]. Therefore, development of low-temperature sintering routes is crucial for rendering KNN competitive.

Sustainable, low-temperature sintering techniques are also of fundamental importance from the industrial, economical, and environmental perspective. For the industrial sector, being a major contributor to global emissions and environmental pollution [5], meeting the sustainability goals of the European Green Deal is one of the major challenges. Ceramic technologies, in particular the sintering step at high temperatures (800-2000oC), are energy intensive [6] and require improvements to reduce their environmental impact. In this context, the present work aims at the development of Cold Sintering Process (CSP), which is currently considered to be the most economically attractive sintering technique [5,6], for the lead-free KNN ceramics. CSP utilizes a second phase, a transient liquid (4-20 wt% added to the initial powders) that facilitates mass transfer for densification via a dissolution-precipitation process at low temperature (120-200°C) over a short time when uniaxial pressure is applied [7].

The main objectives of this work are: i) to design and construct the Cold Sintering reactor, ii) to optimize the composition of an aqueous solvent for Cold Sintering of KNN, taking into account the tendency of KNN to incongruent dissolution, iii) to sinter the KNN ceramics by Cold Sintering and to determine the most adequate parameters of the process, iv) to characterize the KNN ceramics prepared by Cold Sintering and to identify the relations between conditions of the process and properties of the material.

It is expected that achieving these objectives will contribute to the knowledge development in the field of sustainable ceramics processing, namely KNN and to its application in the production of electronic devices, as well as to establish an advanced, energy efficient sintering technology with the significant potential application in the fabrication of a broad range of functional electroceramics.

This work was developed within the scope of the project CICECO-Aveiro Institute of Materials (UIDB/50011/2020 & UIDP/50011/2020), financed by national funds through the FCT/MCTES and when appropriate co-financed by FEDER under the PT2020 Partnership Agreement. Anna Wlódarkiewicz acknowledges FCT for financial support, under the scholarship SFRH/BD/133784/2017.

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Nanosciences and nanotechology

Graphene on paper for flexible devices: sensors and OLEDs

Bohdan Kulyk, Prof. Florinda Costa, Prof. Luiz Pereira, Prof. Elvira Fortunato.

The growing interest in flexible electronics has been increasing the need for products and devices with novel functionalities. Graphene, thanks to its unique blend of outstanding properties, appears as a prominent candidate for this type of applications. At the same time, paper has been taking on an important role in the field of flexible electronics. Thus, the possibility of combining these two materials is highly appealing for the development of innovative devices and disruptive technologies.

The aim of this work is to develop two types of graphene-on-paper devices: sensors and organic light emitting diodes (OLEDs). All stages of this process are to be covered, from the synthesis of graphene to the microfabrication and characterization of the resulting devices, with the final objective of obtaining functional proof-of-concept prototypes.

This presentation covers the initial phase of this PhD work, which focused on the study and optimization of the graphene growth process by chemical vapour deposition. As a result, millimeter-sized single-layer graphene domains were obtained, providing a reliable basis for the future progress of this work.

Nanosciences and nanotechology

Biodegradable and active fruit packaging using potato by-products as raw materials

Jéssica Santos, Paula Ferreira, Idalina Gonçalves, Selçuk Yildirim

Large amounts of fruit losses and wastes are generated worldwide [1]. Appropriate packaging may contribute to solve or minimize this global problem, while assuring the products quality and safety [2]. However, sustainable issues have occurred regarding the fossil fuel-based packaging materials disposal in the environment.

Bio-based biodegradable polymers, namely the abundant starch and cellulose polysaccharides, have been proposed as potential alternative raw materials for the production of sustainable fruit packaging. However, their high cost, non-competitive technical properties (hydrophilicity, low mechanical strength, and poor gas and water barrier properties), and the inherent ethical issues related with land-use are still obstacles for their use on packaging [3,4]. In this context, and considering the large amount of by-products of the agro-food industry containing starch and cellulose, there is an opportunity to explore them to achieve economic viable packaging, not using food target raw materials. Furthermore, these bio-based fruit packaging can be tailored to enhance fruits shelf-life. Although only a few studies exist regarding with the incorporation of ethylene scavengers into bio-based matrices [5,6], it may confer an advantage to extend the fruits' shelf-life. Ethylene scavengers are able to oxidize, decompose, or absorb ethylene, a phytohormone that is responsible for inducing biochemical, physiological, and structural changes during the fruit ripening process [7,8]. Potassium permanganate, nanosized TiO2, activated carbons, and silica-mesoporous materials are the most used materials for inhibition of ethylene action through chemical or physical processes [7,8]. However, a strong effective, low-cost, biocompatible, and sustainable platform for ethylene scavenging that fits a commercial packaging market is still necessary.

In this PhD Thesis, potato by-products will be used as alternative raw materials for the development of and starch-based composite films/coatings through sustainable methodologies. Porous particles derived also from agro-food by-products will be produced targeting the adsorption of the ethylene produced by the foods, and the simultaneous reinforcement of the mechanical and water resistance of the packaging. Furthermore, the feasibility of using these bio-based and biodegradable composites as active packaging for highly perishable fruit will be studied.

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Nanosciences and nanotechology

Nanostructures for biodetection: Synthesis, surface functionalization and, application in protein enrichment and diagnosis of cardiovascular diseases

Maria António, Ana Luísa Daniel-da-Silva, Rui Vitorino

The present work was written in the scope of the doctoral program in Nanoscience and Nanotechnology and aims to provide an overview of the different strategies applied to the detection of C-reactive protein (CRP), N-terminal pro brain natriuretic peptide (NT-proBNP) and angiotensin II (Ang II) biomarkers using nanomaterials.

The main objective of the work is the synthesis, modification and bioconjugation of gold nanoparticles (AuNPs) and iron oxide nanoparticles (IONPs) for CRP, NT-proBNP and, Ang II detection in different biological fluids.

CRP, NT-proBNP and, Ang II were the selected biomarkers for the construction of a strategy for CVD diagnosis with focus on atrial fibrillation (AF) and aortic valve stenosis (AS) diseases. Gold nanoparticles (AuNPs) and iron oxides nanoparticles (IONPs) will be used for biomarker detection and preconcentration on biological fluids, respectively. The detection method is localized surface plasmon resonance (LSPR)-based with the objective of developing a colorimetric lateral flow assay, explained on work plan section. For the construction of this strategy, literature overviewed about the elements used in this strategy was made. The most recent strategies for CRP, NT-proBNP and Ang II detection using nanomaterials were divided into electrochemical assays, optical-based assays, point-of-care sensors, aptasensors, fluorescence assays, and multiple biomarker detection approach were reviewed. Also, a resume of synthesis methods, intrinsic properties of AuNPs and IONPs, strategies for its surface modification and bioconjugation with antibodies, aptamers and other interesting molecules was achieved. Finally, the desorption of biomarkers from IONPs and the interference of proteins from different biological fluids will be reviewed.

Nanosciences and nanotechology

Exploiting cellulose nanofibres to design nanostructured bioinks for 3D bioprinting

Nicole Lameirinhas, Carmen Freire, Ricardo Pinto, Helena Oliveira

Three-dimensional (3D) bioprinting is driving a revolution in many areas, such as in tissue engineering and regenerative medicine, on the development of novel drug testing systems and on diseases research.

This technique consists on the deposition bioinks (cell laden biomaterials) in a previously defined distinctive pattern, following a layer-by-layer fashion. Nowadays, there are many polymeric materials (synthetic and natural) that can be used for the development of bioinks. However, it has been noticed an increasing interest in search/investment in renewable materials, i.e., biopolymers such as chitosan, agarose, gelatin and alginate. Yet, these biopolymers don't possess the desired mechanical properties. Therefore, many strategies can be used to improve the mechanical properties of the resulting bioinks. One example consists of the preparation of composite bioinks using reinforcing agents. An up-and-coming reinforcing agent is cellulose, in particular cellulose nanofibers (bacterial cellulose (BC) and nanofibrillated cellulose (NFC)). Thus, the paramount goal of this work is the formulation of novel fibrous nanostructured hydrogels and microcarriers with high bioprintability, mechanical performance and stability, as well as cell density and viability, for use in the 3D bioprinting of different living tissue constructs.

This work will address some of the key issues associated with bioinks, mechanical performance and cell viability, promoting the progress of 3D bioprinting technology.

Nanosciences and nanotechology

Magnetic bio-hybrid sorbents for the uptake of active pharmaceutical ingredients and pesticides from water

Sofia Soares, Ana Luísa Daniel-da-Silva, Tito Trindade

This research aims to develop novel organic-inorganic hybrid materials derived from polysaccharides extracted from renewal resources and will involve a strong component of synthesis and characterization of nanomaterials. The properties of the bio-hybrid materials will be optimized aiming applications as adsorbent materials for the capture of emerging pharmaceutical pollutants and pesticides from water. Hence, innovative synthetic strategies based on the sol-gel process are explored aiming the development of hybrid materials with biopolymer and siliceous phases linked together through strong covalent chemical bonds.

Magnetic composite nanoparticles comprising shells with bio-hybrid compositions are also prepared foreseeing application in magnetically assisted water purification. The combination of easy and fast magnetic separation with the advantages of low cost and chemically functionalized bio-hybrid materials is expected to yield efficient eco-friendly materials for the uptake of pharmaceuticals from water.

Nanosciences and nanotechology

Protein nanofibrils for myocardial regeneration

Tiago Carvalho, Carmen Freire, Hélder Santos

Cardiovascular diseases, notably myocardial infarction, are the leading cause of death in the modern world. Currently, the only available form of treatment is heart transplantation. Therefore, it is urgent to develop alternative and efficient therapies for the treatment of myocardial infarction. For instance, tissue engineering that combines cells with biomaterials, has the therapeutic purpose of regenerating damaged myocardial tissue, inducing cell growth and differentiation, while biomaterials are slowly bioabsorbed. The results obtained in this domain demonstrate the potentialities of this strategy in myocardial regeneration, however the development of biomaterials with adequate properties is still one of the main limitations.

In this context, this innovative project aims to develop and characterize protein fibril-based biomaterials, namely injectable hydrogels or patches, for myocardial regeneration. During this presentation, it will be highlighted the results already obtained using protein nanofibrils-gelatin electrospun scaffolds.

Nanosciences and nanotechology

Magneto-plasmonic nanoassemblies using dendrimers: chemical synthesis and water quality monitoring

Tiago Fernandes, Prof. Tito Trindade (DQ), Dr. Ana Luísa Daniel-da-Silva (DQ)

The main goal of this project is to develop new hybrid magneto-plasmonic nanostructures for application in water quality monitoring. Colloidal noble metal nanoparticles (NPs), for surface enhancement Raman scattering (SERS) detection, and magnetic metal oxide NPs, as vehicles for magnetic separation, are assembled into multifunctional nanosorbents mediated by dendrimers. These are hyperbranched polymers with high density of functional groups which are used here as colloidal stabilizers and coating agents. Moreover, their chemical composition and architecture can be exploited to tune the optical/magnetic properties of the resulting nanoassemblies. These hybrids are investigated here as analytical platforms for the uptake of vestigial pollutants from water after magnetic separation and subsequent detection by SERS. The performance of the magneto-plasmonic nanoassemblies is assessed using laboratorial water samples containing pesticides (e.g. paraquat), a class of emergent pollutants whose increasing use has brought a need of innovative detection methods for a variety of contexts.

Nanosciences and nanotechology

Tailoring proton ceramic materials for electrochemical ammonia synthesis

Vanessa Graça, Dr. Duncan Fagg

A principal aim of the Horizon 2020 program is reduction in carbon dioxide emissions by the development of new technological methods for industries and their processes. Interest in ammonia (NH3) synthesis research has been increasing over the past years due to its application

in many essential products such as medicines and fertilizers. The current industrial process for NH3 synthesis is the Haber-Bosch process (HBP). However, this process is estimated to be responsible for 2.5 % of worldwide greenhouse-gas CO2 emissions due to it reliance on hydrogen sourced from natural gas. To solve this problem, research has been focusing on alternative fabrication technologies, where one of the most promising is the electrochemical synthesis of NH3 from steam and nitrogen. Work focuses on development of active materials for the disruptive technology of carbon-free, electrochemical synthesis of ammonia at ambient pressure, using a protonic ceramic membrane with nitrogen and steam as primary reactants.

Nanosciences and nanotechology

Physical engineering

Development of graphene-based transducers and devices

Alexandre Carvalho, Florinda Costa, Elvira Fortunato

With the uprising of the internet-of-things, a crave for both cheap and high-performance new generation sensors emerged to feed this new paradigm with data. Graphene is demonstrating its potential as a sensing platform in areas as distinct as photodetection, bio-sensing and mechanical sensing, among others. In the case of graphene electromechanical sensors, piezoresistive sensing has been one of the most studied mechanisms for graphene oxide foams and composites, while pristine graphene membranes, either single or multi-layered use the capacitive sensing approach. In this work, we explore both CVD graphene and Laser-Induced Graphene (LIG) as sensing platforms, devising different mechanical sensors. LIG sensors were patterned as strain gauges in polyimide and cork films and used as sensitive and low-cost piezoresistive sensors for mechanical biosignals. Few layered CVD graphene was used to produce a broadband capacitive microphone through a new transfer method which allowed to achieve the best aspect ratio (area by number of layers) for graphene membranes in the literature.

Physical engineering

Electrolyte materials for intermediate temperatures fuel cells

Bruno Melo, Manuel Pedro Fernandes Graça, Luís Manuel Cadillon Martins Costa

The ever-present need for reducing the greenhouse gases emission encourages the research of alternative energy sources. Fuel cells with highly efficient catalysts and electrolytes are one of the most promising hydrogen-based technological solutions. Nowadays, proton-conducting Polymer Electrolyte Membrane Fuel Cells are used for temperatures below 100 °C and Solid Oxide Fuel Cells between 800-1000 °C. Intermediate Temperature Fuel Cells (ITFCs) remain under improvement, since new capable electrolytes between 200-500 °C are still needed. This class of fuel cells has potential to overcome some of the challenges found in fuel cells nowadays.

Proton-conductive materials such as CsH2PO4, SnP2O7 and its doped materials have been reported as promising materials for ITFCs. However, since they have low mechanical strength and low thermal stability, usually a matrix material is mixed with the conductive phase to form composite electrolytes. The present work wishes to extend the existing study regarding composite materials for ITFCs.

Physical engineering

Fiber optics sensors for e-Health applications

Cátia Tavares, Paulo Antunes, Hugo Silva

My research plan focuses on the development of optical sensors for the next generation of e-Health monitoring systems, through the design of a network of fibre optic sensors integrated in equipment to be used by patients, able to monitor their health conditions through the observation of physiological parameters. Thus, vulnerable groups such as patients with diabetes, wheelchair users or bedridden patients may have access to instant help with the possibility of a constant physician/ caregiver/ patient interaction through an e-Health connection.

Physical engineering

Assessment of the easyPET.3D system performance: NEMA NU 4-2008 standard and animal model

Fabiana Ribeiro, João Veloso; Ana Cristina Santos

The study of human diseases and the initial development of new drugs and therapeutics, as well as new Positron Emission Tomography (PET) radiopharmaceuticals, is often done using animal models. Preclinical PET systems enable spatial and temporal in vivo measurement of biological processes at a molecular level. Since they are non-invasive, the animal can be imaged repeatedly, serving as its own control. Hence, the effects of inter-animal variability, the number of laboratory animals and the costs associated with the experiments are reduced, with results rapidly available. The easyPET.3D is a cost-effective benchtop PET system, having a simple and unique (patented) image acquisition method based on the rotation of two detector modules with two degrees of freedom. Compared to ring-based PET (standard systems), easyPET.3D technology allows to significantly reduce the number of components and, thus, the final cost of the equipment. This work aims to assess easyPET.3D performance both with phantoms, through methodologies (NEMA NU 4-2008 standard) that enable direct comparison of commercial scanners, and with animal models, determining its potential for preclinical studies.

Physical engineering

Intensity based POF sensors for water quality assessment

Filipa Sequeira, Lúcia Bilro, Rogério Nogueira, Alisa Rudnitskaya

Nowadays there is the need for low-cost and user-friendly solutions for water quality assessment which can allow for remote, in-site and real-time monitoring of water contaminants. POF sensing technologies combined with specially developed sensitive layers for chemical detection may offer these possibilities, with proper interrogation systems.

POF sensing platforms based on low-cost procedures were developed and characterized using aqueous solutions of different refractive indices (RI). The POF RI sensors were optimized by varying the length and/or roughness of the sensing region.

The suitability of these sensing platforms for chemical detection was evaluated through the coating with sensitive layers, namely molecularly imprinted polymers (MIPs) using different deposition techniques. The dependency of proteins immobilization on the POF's surface was evaluated aiming future developments in chemical detection using POF biosensors.

A D-shaped POF chemical sensor was successfully developed using a sensitive MIP layer, allowing the detection of perfluorooctanoate (POFA/PFO-) in aqueous media with a limit of detection of 0.20 – 0.28 ppb.

Physical engineering

Luminescent QR codes for smart disposable labelling and real-time temperature sensing

João Ramalho, Rute Ferreira, Paulo André, Luís Carlos

The general use of smartphones assigns additional relevance to QR codes as a privileged tool to the Internet of Things (IoT). Crucial for QR codes is the evolution to IoT-connected smart tags with enhanced storage capacity and secure accesses. This PhD workplan proposes the development of multiplexed luminescent QR codes, activated by UV/vis radiation, based on organic-inorganic hybrid materials doped with lanthanide ions to the increase of storage capacity per unit area using the colour multiplexing but also through the use of spatial multiplexing, creating news designs. The QR codes are able to sense temperature in real time using a photo taken with the charge-coupled device of a smartphone. The methodology based on the intensity of the red and green pixels of the photo yields. Using the concept of super-modules (s-modules) built from adjacent spatial multiplexed modules with regular geometrical shapes, assisted by colour multiplexing, we modelled and design a single QR code with, at least, the triple storage capacity of an analogous size black/white QR code, acting as a smart-tag ensuring restrict access and trackability. The s-modules are printed using luminescent low-cost and eco-friendly inks based on organic-inorganic hybrids modified by lanthanides with multiplexed colour emission in the orthogonal RGB space. The access to the restrict information is attained only under UV irradiation and encrypted for secure transmission. The concept of active QR codes for smart trackability and IoT was materialized through the development of a free friendly-user mobile app.

A prototype of a QR code with increased storage capacity, able to simultaneously provide safety features and temperature sensing is opening new fields of applications for QR codes as smart disposable sensors labels. This prototype will work closely with a smartphone application that was designed to leverage the full capabilities of this new smart sensor label.

Physical engineering

Eu-implantation of AlxGa1-xN NWs towards efficient red emitting devices

José Cardoso, Maria do Rosário Correia, Nabiha Ben Sedrine

This pitch will be focused on the strategy used to try to improve the efficiency of group III-nitrides red emitters. This consists of the implantation of trivalent europium ions (Eu3+) in AlxGa1-xN nanowires (NWs). The incorporation in III-N hosts (particularly in GaN) was already proposed to be a viable alternative to boost the efficiency of this kind of red-emitters. By taking advantage of the narrow and thermally stable intra-4f6 transitions, GaN:Eu red LEDs were already demonstrated. Depending on the surrounding environment (for example, cation or nitrogen vacancies) different optically-active Eu centers can be detected through optical spectroscopic techniques. Two predominant Eu centers, identified as Eu1 and Eu2, were identified in GaN and AlN hosts. Moreover, it was found that Eu2 is favored under electrical excitation in GaN hosts, and thus engineering the Eu centers is crucial to optimize these devices. Studies on ternary AlxGa1-xN:Eu were only performed in layers, and an enhanced Eu luminescence efficiency was observed for wider bandgap hosts as well as a reduced thermal quenching of the Eu luminescence is expected. Furthermore, it was already observed a reduction of the Eu3+ luminescence thermal quenching in GaN NWs.

In this work, I study the capability of Eu-implanted and annealed AlxGa1-xN NWs as a potential solution for the development of efficient red emitters using optical spectroscopy techniques (photoluminescence, and cathodoluminescence). The Eu3+ emission shows a typical behavior of at least two distinct optically active Eu centers, being identified as Eu1 and Eu2 analogously to that observed in GaN hosts. The formation of the preferential Eu center is found to depend on the Al content and the annealing temperature, and thus the possibility to engineer the relative abundance of the two centers is identified. The influence of the interface AlxGa1-xN/GaN in the optical activation of the Eu ions is also highlighted and it impacts the formation of the two predominant Eu centers.

Physical engineering

Development and optimization of fiber optic sensors produced by femtosecond laser

Tiago Paixão, Dr. Francisco Araújo, Prof. Dr. Paulo Antunes

Delivering ultrashort laser pulses (~130 fs), the femtosecond laser system implemented at the Nanophotonics and Optoelectronics group-I3N laboratory allows the fabrication of different optical fiber sensors, such as fiber Bragg gratings (FBGs) and/or Fabry-Pérot interferometers (FPIs), either in polymer or silica optical fibers. During my PhD, I developed and optimized many optical fiber sensors, which went through rigorous experimental tests to assess and optimize their response to physical parameters, such as temperature, strain, humidity, magnetic fields and refractive index. These tests were carried out in customized setups, and performed at partner's facilities (HBM FiberSensing, S. A.) and in the Physics Department of the University of Aveiro.

Several fruitful collaborations were stablished with recognized foreign Universities and research institutes, which led to the development of new optical fiber sensors and techniques, namely FBGs inscribed in multicore polymer optical fibers, FPIs fabricated with polymer optical fibers subjected to fuse effect, FPIs with enhanced sensitivity fabricated by the direct-writing technique, and FBGs inscribed in optical fibers doped with Er-MgO nanoparticles.

Physical engineering

Physics MAP-fis

Black Holes and compact solitonic objects with bosonic fields

Alexandre Pombo, Carlos A. R. Herdeiro, Eugen Radu

The recent development in Black Hole (BH) observation through gravitational wave emission and imaging led to one of the most important observational advances. Never before was possible to study highly compact objects, allowing the possibility to test alternative theories of gravity and discern between BHs and hypothetical exotic stars that can present similar characteristics to the latter. These are known as BH mimickers and can make part of the missing dark matter. In this thesis, we study new Black hole models and gravitational solitons that are allowed by models where scalar and vectorial fields occur, with different types of coupling to Einstein gravity. With this study, we aim to bring some light into the dark matter and dark energy phenomena as well as to connect alternative theories of gravity with astrophysical observations.

Physics MAP-fis

Assessing the role of atmospheric rivers in Arctic precipitation in present and future climate

Carolina Viceto, Irina Gorodetskaya, Alfredo Rocha, Annette Rinke, Susanne Crewell

The Arctic region shows high sensitivity to global warming (known as "Arctic Amplification") with significant implications for both regional and global climate. Recently, significant increase in the atmospheric moisture content has been documented over this region, which is partially explained by the reduction of sea-ice cover, enhancing the local evaporation. Others argue that the predominant reason is the recent enhanced poleward moisture flux, which is expected to continuously increase in the future. This might be due to several factors or a combination of them, such as changes in the atmospheric circulation patterns, increased moisture transport intensity, and/or higher evaporation rates in the lower-latitude moisture source regions. Our study focuses on the anomalous moisture transport events confined to long, narrow and transient corridors, known as atmospheric rivers, which are expected to have a strong influence on Arctic mass and energy budget.

This PhD focuses on the relation between the atmospheric rivers and intense precipitation events in the present and future Arctic climate. It uses observational data and numerical model simulations to explore the underlying atmospheric dynamics and air-ocean interactions responsible for the atmospheric rivers and their role in producing intense precipitation. Results from a field campaign in May-June 2017 near Svalbard (North Atlantic), show three atmospheric rivers with different moisture sources (Atlantic pathway and Siberia), which caused precipitation in different phases (rain, snow and mixed-phase). Building on the detailed case study analysis, the work is now extended to longer time periods from the recent past into the future using reanalyses and global climate models. Particularly, we investigate the importance of the drivers behind the projected shift towards recurrent rainfall compared to snow in the Arctic, which can accelerate the sea-ice decline.

Physics MAP-fis

Structural peculiarities of directed networks and their impact on synchronization dynamics: application to neuronal networks

Edgar Wright, Alexander Goltsev

Directed networks are a useful abstraction of complex systems such as neuronal networks, for example, the suprachiasmatic nucleus (which orchestrates the body's circadian rhythms) or the neuronal connectome of the C. elegans nematode. In turn, structural peculiarities of directed networks such as bow-tie organization, reciprocal connections, and community structure constrain the emergence of collective synchronized activity, a key processes in the functioning of neuronal networks. Thus, by studying how these structural peculiarities impact synchronization we seek to unravel how the organization of theses systems affects their function.

Physics MAP-fis

Luminescent primary thermometers for bio-imaging

Joana Martins, Luís António Ferreira Martins Dias Carlos, Maria Rute de Amorim e Sá Ferreira André

The potential biomedical applications led to a rapid evolution of luminescence thermometry. In the last decade, luminescent thermometry based on trivalent lanthanide ions has become very popular due to the unique versatility, stability, and narrow emission band profiles of the ions that cover the entire electromagnetic spectrum with relatively high emission quantum yields. One typical example used for thermometry is Er3+/Yb3+-doped materials. These upconversion materials are suitable for biological applications since they use low-power density infrared excitation (within the biological windows) and can work as a primary luminescent thermometer, as the temperature is predicted by a well-established state equation. In this work, Er3+, Yb3+, Nd3+ co-doped core-shell structures are characterized as primary thermometers using excitation wavelength at 808 and 980 nm.

Physics MAP-fis

Astrophysical Phenomenology of Non-Kerr Black Holes

Jorge Delgado, Carlos Herdeiro, Eugen Radu

A considerable body of evidence supports the existence of black holes (BHs) in the Universe. It is still unknown, however, if the observed BH candidates realize the paradigmatic BH of General Relativity: the Kerr solution. The next decade promises to shed light on this issue: ongoing observations are mapping the spacetime geometry close to BH candidates with unprecedented accuracy. This evidence will come from i) gravitational wave astronomy, in particular with the LIGO/Virgo detectors; ii) X-ray observations with the next generation of satellites (e.g.

ATHENA and eXTP); iii) large baseline interferometry, using the Event Horizon Telescope; and iv) astrometric measurements, using the GRAVITY instrument. These forthcoming experiments make it timely to explore the associated phenomenology for alternative models to the General Relativity BH paradigm. This is the purpose of this thesis, focusing on the theoretically most well established alternative models to the Kerr solution, both in and beyond General Relativity.

Physics MAP-fis

Nanostructured carbon materials obtained from C60 under pressure and temperature

Jorge Laranjeira, Leonel Marques, Manuel Melle-Franco

Carbon materials are nowadays subject of intense investigation due to their outstanding properties. These materials have different dimensionalities making them versatile for prospective technological applications. Our work is focused on the study of new nanostructured carbon materials obtained from squeezing C60 at extreme pressures and temperatures. Under high pressure and temperature C60 molecules are binding to each other forming, in a first step, dimers and then extended polymers. One-dimensional (1D) polymerized chains, two-dimensional (2D) polymerized layers and three-dimensional (3D) polymerized structures, are prepared at increasing applied pressures. Presently, 1D and 2D polymers are very well characterized phases, in contrast to the poorly studied 3D polymers. We are trying to characterize the already synthesized 3D polymers, in particular their promising structural, electronic and elastic properties.

Physics MAP-fis

Cosmology and Particle Physics

Luís Ventura, João G. Rosa, Miguel Lévy, Jamie Mc Donald

In this talk, we shall introduce the objects of study of Theoretical Cosmology, discuss a particle-physics approach to it and present some unique insights of this approach. Several concrete examples from our own research will be presented, where we address the problems of i) inflation, ii) dark matter, and iii) dark energy.

Physics MAP-fis

Online coupled atmospheric-aerosol regional forecast model for solar energy production

Rui Silva, Alfredo Rocha, Ana Carvalho

Solar radiation has been explored for energy purposes as a renewable energy source. The installation and running of solar energy systems require a good solar radiation climatology and radiation forecast. Such information has been obtained to a great extent using atmospheric numerical models. However, the aerosol interaction with radiation and clouds is frequently omitted in these models. The radiative forcing of aerosols can be considerable under particular conditions. It is now established that atmospheric aerosols must be included in models to improve NWP and climate simulations. Despite the existence of studies on the feedback mechanisms related with aerosols, there are still scientific questions to answer regarding their influence on the radiation budget, atmospheric dynamics and thermodynamics. The work proposed here intends to include aerosols in NWP and climate models by implementing an online coupled atmospheric-chemistry model for the Iberian Peninsula to improve radiation simulation at the surface for energy production.

Physics MAP-fis

Political science

Implementação de Políticas Locais de Gestão do Património Cultural das Cidades Património Mundial: a importância dos sistemas de governação

Diamantino Raposinho, Luís Mota, Filipe Teles

Este projeto pretende identificar quais os principais desafios para a implementação de políticas públicas de gestão de cidades Património Mundial (PM). O tema escolhido pretende responder a uma falta de estudos empíricos que se debrucem sobre o processo de formulação e

implementação de políticas públicas de gestão de cidades PM ao nível local e, desse modo, contribuir para a crescente literatura sobre gestão de Património Mundial e de políticas públicas em análise comparada, através de uma abordagem diferenciadora e inovadora em relação ao que a literatura refere até hoje.

Está prevista a caracterização dos sistemas de governação nas cidades PM, definindo tipologias, percebendo o seu efeito sobre os resultados e impactos das políticas de gestão de cidades PM. Através de uma análise comparativa internacional mundial e de estudos de caso na Europa, será possível identificar os fatores críticos para a implementação, a importância relativa dos sistemas de governação e entender melhor o processo de políticas públicas em contextos complexos como são as cidades PM.

Political science

Natureza e Política: realidades inconciliáveis?

Gonçalo Rosete, Carlos Jalali (Orientador); José Augusto Graça (Co-orientador)

Antifonte desenvolve o seu pensamento político em torno da antinomia entre o primado da natureza e o primado da política. Esta antinomia relaciona-se com o com o conflito existente entre a natureza, que tem leis universais, invariáveis e benéficas para o homem, e as leis políticas que, maioritariamente, são adventícias, resultam do artifício, variam consoante a cultura de cada povo e que por vezes são prejudiciais ao ser humano. As leis da natureza proporcionam liberdade e primam pela preservação do homem enquanto ser vivo. Algumas leis políticas, por outro lado, violam a natureza e as suas disposições naturais colocando, por isso, limitações ao ser humano que podem ser severas para a sua vida. No meio desta antinomia, encontra-se evidentemente homem que, a todo o momento, se tentar furtar às imposições políticas, tentando reconciliar-se com as leis da natureza. Assim, coloca-se o dilema: deve o homem seguir as leis políticas quando estas podem ser impeditivas do exercício da sua liberdade e para a sua segurança?

Political science

Eurosceptics in Brussels? the politicization of the EU in the European Parliament

João Moniz, Carlos Jalali

It has become a commonplace to say the European Union (EU) has become a politicized issue. This process is grounded in each country's domestic public sphere, as European issues become more salient for both public opinion and interparty competition. However, how is the EU politicized in the European Parliament (EP)? This communication will present a research project that aims to answer this question.

The politicization at the EU level itself has been neglected by the literature. Given the second-order nature of EP elections which favour challenger parties, the EP is disposed to the presence of issue entrepreneurs willing to politicize the EU. Additionally, the EP offers great comparative framework for the analysis of party politics since it hosts a wide variety of ideologically distinct political parties from diverse political cultures within the same institutional constrains across time.

To answer this research question, plenary speeches from the 5th to the 7th EP terms (1999-2014) are analysed through automated text analysis methods. These innovative methods of quantitative text analysis can process large amounts of textual data to estimate party positions.

Political science

Descentralização em Cabo Verde: Impacto das políticas de formação dos quadros municipais

Risanda Soares, Doutor Filipe Teles, Doutor Luis Sousa

O nosso trabalho de investigação tem por objetivo central analisar as políticas de formação dos profissionais administrativos municipais em Cabo Verde, com o objetivo de os compreender e avaliar a sua importância na consolidação do processo de descentralização política em Cabo Verde.

Nossa atenção centrar-se-á nos programas de formação implementados em Cabo Verde desde 1992, ao qual se seguirá a análise objetiva da sua importância no quadro da descentralização. Esta análise permitir-nos-á aferir os momentos mais importantes desse processo e procurar enquadrá-los no contexto político cabo-verdiano.

Numa altura que se apela ao reforço e maior autonomia política e administrativa das ilhas/regiões em Cabo Verde torna-se necessário levar a cabo um estudo que poderá evidenciar os pontos fortes e fracos e sugerir medidas e alternativas para os atores que lidam diretamente com as necessidades das comunidades locais e desta forma sairá mais reforçada a descentralização do estado Cabo-verdiano.

Political science

As the Tide Ebbs... What is Radical Left in Latin America?

Tiago Conceição, Varqa Carlos Jalali

The turn of the millenium has brought a change of fortune for the Left in Latin America, as several leftist parties have not only managed to increase their representation in parliament but also reach the executive. The present study seeks to fill two gaps on two different but connect sets of literature. First, it aims to contribute to the study of this renewed Latin American Left that has so far limited itself almost exclusively to the analysis of incumbent parties. It does so by attempting to identify which among these parties - having reached parliament at least twice between 1999 and 2019 - integrate the contemporary Latin American Radical Left. Second, a (partially) novel way to indentify a party family based on the mapping of transnational ties shared between political parties is proposed and is soon be tested. The mapping process will follow a Social Network Analysis perspective and will draw on a set of documents such as party (as well as transnational party organisations) official documents, press articles and secondary literature.

Political science

Chinese Democratization at local level – Comparative study between cases of Hezhai and Nanhai

Zhongpu Fan, Jorge Tavares da Silva, Carlos Jalali

The Chinese political system is introduced as Chinese model, which has demonstrated confrontation between autocracy and democracy. As for superior levels, even have been existing democratic practices, CCP is still playing a dominant role. With central permission, democratic behaviors started at local levels like villages and urban communities (Shequ), from 1980s. In consideration of practical factors expressed in local cases, the central government has authorized limited self-governance at local levels. Models are different from cases. China has been seeking for an equilibrium point between autocracy and democracy at local levels, in an incremental way, whose purpose is social stability and economic development. This work will present the village political models of two cases. Then investigates the difficulties during local democratization, especially economic condition, which is related with instrumental support of people. With collected dates, the work is going to analyze the trend of democratization in Chinese village.

Political science

Psychology

Reproductive concerns in young adult female cancer survivors

Ana Bártolo, Sara Monteiro, Isabel M. Santos

Anticancer treatments may lead to fertility loss and pose challenges related to disruption of family building projects. Evidence suggests that cancer survivors report several reproductive concerns related to fertility potential, child's health, personal health and/or partner issues, and these concerns are considerably underexplored. The current PhD project focused on the evaluation of reproductive concerns among Portuguese female cancer survivors aged 18 to 40 years, and explored its relationship with distress and impaired quality of life. Based on this, we provided a validated measure to assess reproductive concerns among younger women. Our findings suggested that the experience of breast cancer survivors, facing uncertainties arising from reproductive capacity, seems to mirror the emotional response of non-cancer infertile women. Cancer survivors exhibited identical fertility concerns and distress levels. Furthermore, reproductive concerns among young women diagnosed with breast cancer have been shown to compromise physical, emotional and social functioning. An additional aim of this project was to understand how implicit cognitive processes can contribute to concerns and maladjustment. Specifically, we investigated whether reproduction-related cognitive processing is related to psychological morbidity. Data pointed to a cognitive bias toward reproduction-related cues, which was associated with greater concerns related to partner's disclosure about fertility status and depression levels. Altogether, our results encourage the development of dedicated programs for younger women at risk of infertility due to cancer-related treatments.

Psychology

How different cues signal disease: Linking behavioural and biological immune systems

Ana C. Magalhães, Sandra C. Soares, Gün R. Semin

Throughout evolution, human behaviour has been shaped by selective pressures related to pathogen and parasitic infections. This led to the development of two bidirectional and compensatory systems: the biological (BIO) and the behavioural immune system (BIS). While the BIO defends against harmful organisms that enter the body, the BIS identifies perceptual disease-signalling cues and facilitates their avoidance through affective, cognitive and behavioural adaptations, granting a unique adaptive benefit by preventing the occurrence of an infection in the first place. While disgust-eliciting objects are commonly used to study the BIS, focus has recently shifted towards social stimuli. Of particular interest to this project, are the studies focused on visible cues in the face and disease-signalling body odours. However, more studies are needed to further understand the characteristics of these cues and how we respond to them. Thus, this project aims to study how the three dimensions of the BIS respond to perceptual disease connoting stimuli (social and non-social) and how its intrinsic connection with the BIO may affect these responses. Specifically, behavioural and cognitive tasks will be used to study the mechanisms underlying the socio-emotional processing of BIS' related stimuli and to disentangle if the differential effects reported with disease cues are due to a distinctiveness effect (i.e., the cue makes the stimuli stand out), or to their imminent threat of contagion. Furthermore, by collecting BIO and psychophysiological parameters, and using clinical populations, we aim to study if changes in the BIO (e.g., overactivation vs underactivation) lead to distinct BIS responses.

Psychology

Cognitive Functioning and Work-Related Outcomes in Cancer: Efficacy of a Web-Based Cognitive Rehabilitation Program

Ana Filipa Oliveira, Isabel M. Santos, Ana Torres, Linda M. Ercoli

Cancer-related cognitive impairment (CRCI) is one of the most frequent and worrying side effects experienced by non-central nervous system (CNS) cancer survivors, generally related to oncological treatments. Considering its detrimental impact on quality of life, including work-related outcomes, it is necessary to identify effective intervention options. Cognitive rehabilitation is considered the first-line intervention to address CRCI, being effective at improving cognitive functioning. The UCLA Cognitive Rehabilitation Intervention Program for Breast Cancer Survivors is one of such programs, with documented efficacy to ameliorate CRCI. To date, no cognitive rehabilitation program has taken into consideration its impact on work-related outcomes. Furthermore, in Portugal, there are no specific programs available to intervene in this population. Since web-based interventions have the potential to overcome accessibility issues and are cost-effective, the purpose of this research is to translate and adapt the existing UCLA Cognitive Rehabilitation Intervention Program for Breast Cancer Survivors into a web-based platform to the Portuguese context, evaluate its usability, and determine its efficacy concerning CRCI and work-related outcomes on working non-CNS cancer survivors. This will be a unique program in Portugal, being the first online cognitive rehabilitation program specifically developed to address cognitive functioning of cancer survivors.

Psychology

Neuropsychological and Psychophysiological Correlates of Healthy Aging

Ana Silva, Isabel M. Santos, Sara M. Fernandes, Fernando Maestú

The world population is increasingly aging, and dementia is a problem that affects not only those who suffer, but also their caregivers, family members and society as a whole. Thus, it is necessary to identify the fundamental factors in prevention and/or delay of its manifestation. We propose a study that aims to identify the characteristics of healthy elderly of advanced ages, in terms of cognitive, brain function, and lifestyle. We also aim to identify which of these variables will be similar or different in relation to healthy elderly of younger age. Being a multifactorial study, the weight of each of these factors will be explored, both individually and from an integrative point of view. A sample of 52 healthy elderly people between 65 and 84 years old and 52 elderly people between 85 and 100 years old will be recruited, as well as a control group with 52 participants. Our project consists of six activities: i) cognitive screening, ii) neuropsychological assessment, iii) assessment of cognitive reserve and collection of sociodemographic information, iv) use of surveys for nutritional and physical activity assessment, v) recording of brain activity by electroencephalogram (EEG) at rest, and during the performance of a memory task related to executive control, and vi) connectivity analyses of EEG data. We expect that this project will contribute to the development of programs aimed at preventing cognitive impairment in old age.

Psychology

How anxiety drives our predictive nature: perceiving our social environment when under threat

Fábio Silva, Sandra C. Soares, Marta I. Garrido

In recent decades, the idea that our perception is a process of active and probabilistic inference has gained a considerable amount of support. Particularly, under the framework of predictive coding, this idea has since been used to explain how our visual perception is a result of a careful comparison between predictions and sensory input weighed by their relative precision. As a result, one can more promptly anticipate forthcoming sensory events and decode sensory information when such is presented in weak or ambiguous manner. For instance, studies have shown that interpersonal communication (i.e., communication between two agents) under non-optimal condition is highly contingent on predictive mechanisms (e.g., for decoding ambiguous gestures and anticipating responses). Besides the quality of incoming information, other contextual factors appear affect the weight predictions exert over our perception. Emotion, more specifically anxiety, seem to be one of those critical contributing factors. In states of anxiety, visual processing tends to favor sensory over prediction-based vision, providing better sensitivity in detriment of specificity/discrimination. The carry-over that the latter conclusion might have to something as fundamental as the perception of communicative/social interactions, remains relatively unexplored. This project aims at answering these questions by exploring how we use predictions to aid perception of social scenes when under anxiety, be it induced or part of an underlying anxiety disorder. Moreover, it will investigate how attentional demands might be critical in our ability to use predictive cues. Lastly it will probe the overall neural dynamics of prediction usage in individuals in neutral and anxiety states.

Psychology

Olfaction as a social facilitator in the autism spectrum

Filipa Barros, Sandra C. Soares, Gün R. Semin, Valentina Parma

Altered social cognition is a core feature of the Autism Spectrum (AS), including decreased attention to social stimuli and impaired face processing. Nevertheless, most of these alterations have been shown only with visual stimuli. Odors constitute a valuable source of information about the world, influencing emotion, cognition, and behavior, including social interaction. However, little is known about olfactory perception in the AS. This project aims to study visual and olfactory socioemotional processing in the AS, especially considering the expression of autism traits (AT) in the general population. The project encompasses six phases: 1) Literature review; 2) Adaptation and validation of instruments measuring anxiety (State-Trait Inventory for Cognitive and Somatic Anxiety; STICSA) and AT (Autism Spectrum Quotient; AQ) for the Portuguese population; 3) Collection and selection of emotional body odors and common odors; 4) Analysis of the relationship between AT and olfactory perception; 5) Analysis of the relationship between AT and attention to social stimuli; and 6) Analysis of the role of olfactory cues in visual processing, considering the expression of AT. Available results suggest that STICSA and AQ are adequate instruments to measure anxiety and autism traits, respectively. Furthermore, being woman, as well as higher attention to detail (a dimension of AQ), are associated with better odor discrimination, while higher somatic trait anxiety is associated with poorer odor discrimination. This project aims to extend available evidence about sensory processing in the AS, which can yield important implications for both the clinical and subclinical manifestations, including improved and adequate interventions.

Psychology

Stress in higher education teachers: evaluate to promote occupational health.

Isabel Souto, Professora Doutora Anabela Sousa Pereira, Professora Doutora Elisabeth Brito, Professora Inês Direito

It´s known that occupational stress (OS) can seriously impair worker´s physical and mental health. To tackle this global health risk, adequate prevention guidelines need to be developed, based on the identification of different work contexts specific needs.

The study of OS is particularly relevant in of Higher Education (HE) context. Recent studies evidenced that lecturers working in Portuguese HE have high distress levels, correlated with many Psychosocial Risks. Furthermore, significant differences were found between gender groups, reinforcing that the integration of gender perspectives should be considered when addressing OS in HE.

This project aims to study OS in the HE by implementing a mixed methods research with innovative gender integrated approach. We intend to contribute with evidence-based data that allows: 1) development of an interactive platform, that enable data analysis on classic resources and Artificial Intelligence, for risk assessment by institutions; 2) development of guidelines that strength and promote occupational health, welfare and teacher's performance, with gender perspective integration.

This project is line up with UN's 2030 agenda, namely decent work achievements, promote safe and secure working environments, as well as gender work equality.

Psychology

Threat perception in schizophrenia-spectrum: Exploring the mechanisms underlying emotional processing

Joana Grave, Sandra C. Soares, Birgit Derntl, António Macedo, Nuno Madeira, Samuel Silva, Nuno de Sá Teixeira

Schizophrenia (SZ) is a severe mental disorder, characterized by deficits across a number of domains, such as emotional processing. SZ individuals are significantly impaired in recognizing facial expressions. These deficits are also observed in healthy individuals who score high on schizotypal traits, suggesting a SZ-spectrum vulnerability. Along this line, few studies have found an abnormal (social) threat perception. However, the basis of emotional processing in SZ is still unclear. In addition, there is growing evidence for chemosignaling in humans, with studies showing that body odors (BOs) can convey emotions and elicit subjective and physiological responses in healthy individuals. Still, little is known about emotional chemosignaling in conditions characterized by social dysfunction. Across four tasks, we aim to explore the mechanisms underlying visual and olfactory processing of social cues in SZ-spectrum and related conditions, with emphasis on threat perception. The first task investigates the interference by distractor facial expressions in bipolar disorder (BD); previously study by us in SZ. The second task analyses the access to visual awareness by facial expressions in SZ. The third task explores the perception of moving facial expressions in SZ-spectrum. The fourth task studies the responses to emotional BOs and common odors in schizotypal traits, autistic traits, and autism-spectrum-disorder (ASD). The inclusion of clinical (i.e., SZ, BD, ASD) and non-clinical populations (considering personality traits) allows a broader comprehension of the phenomena. We hypothesize that social deficits in SZ-spectrum and related disorders could be partially explain by abnormal responses to socio-emotional cues.

Psychology

Effects of body odors on processing of emotional stimuli

Marta Rocha, Sandra C. Soares, Gün R. Semin

Body odors play a key role in communicating social information, especially when exposure to a body odor is associated with a meaningful social context (e.g., angry faces, emotional film clips). Given that chemosensory stimuli play an important role in crossmodal perception the experiments outlined in my research plan aim to examine the influence of the BO's for the individual who is producing the chemosignals (self BO's) and the influence unknown chemosignals for recipients (stranger BO's) in terms of behavioral and psychophysiological responses (e.g., heart rate, electromyography). To answer the question related to the stranger BO's, we ran a recognition task with angry and happy dynamic visual stimuli under a context of an anxiety or a neutral BO of an unknown person (Stanger BO´s) while heart rate was recorded. The results revealed a selective reduction in the HF of the cardiac response, a pure index of parasympathetic (vagal) activity, for the anxiety group, suggesting odor-induced stress induction. Concerning the questions about the adaptative benefits of self BO's, the experimental paradigm rest on a simple question: If a person is in an emotion-inducing situation (e.g., they are threatened), does accessing one's own chemosignals have an added value and advantage over being in the same situation but with no access to one's own chemosignals? Does the fear sweat in a fear-inducing situation lead to stronger adaptive sensory-acquisition responses in the individual than when fear sweat is not accessed? An affect-misattribution task and a Continuos flash supression task under a context of neutral, happiness and fear BO's or without no access to their own BO, were used to examine these research questions. Data analyses are running.

Psychology

Validação e avaliação da eficácia de um programa conjunto de estimulação cognitiva e atividade física no envelhecimento saudável / Validation and evaluation of the effectiveness of a joint program of cognitive stimulation and physical activity in healthy

Rute Rocha, Prof. Doutora Isabel Santos e Prof. Doutora Sara Fernandes

With this project, we intend to explore the impact of regular physical activity and cognitive stimulation, alone or in combination, on the cognitive functioning of sedentary elderly people with the same level of cognitive reserve. For the cognitive stimulation, the online Sincrolab program will be used, which will be validated for the Portuguese population in the first phase of the project. Subsequently, the impact of the three training conditions (cognitive stimulation, physical activity, or both together) on cognitive functioning will be studied, assessed with standardized neuropsychological tests. We will also assess its impact on resting brain activity, namely the characteristics of the alpha band (amplitude, individual frequency, inter-hemispheric asymmetry, oscillations), assessed by electroencephalogram (EEG). We also intend to monitor the maintenance of possible effects through a follow-up assessment 3 months after the completion of the interventions.

Psychology

Animacy Effect: Occurrence in old ages, influence in prospective memory and potential applications

Sara B. Félix, Josefa N. S. Pandeirada, Marie Poirier, James S. Nairne

Why does our memory work the way it does? According to an evolutionary perspective, cognitive functioning (namely, memory) works in the service of survival and reproduction of our species. The animacy effect – the finding that people remember animate/living items (e.g., animals) better than inanimate/nonliving items (e.g., objects) – is an example of a memory tuning likely driven by natural selection; indeed, animates are relevant in many aspects (e.g., they can be mates, preys, predators). Such effect has been obtained in different languages, using several memory procedures and in various age-groups (e.g., children and young adults). Animacy has inclusively been identified as the best predictor of free recall (Nairne et al., 2013). However, the occurrence of the animacy effect has not yet been established in healthy and pathological ageing. Responses to these questions, ambitioned by the present doctorate project, will increase our theoretical knowledge of this mnemonic tuning and inform about the extent to which this effect resists to cognitive decline. Additionally, there is one type of memory that still merits exploration in this effect – prospective memory. Prospective memory is the memory for future events (an example of this type of memory is having to remember to take medication at a specified time, or to deliver a specific message to a given person the next time we encounter him/her). Indeed, the ability to perform prospective memory tasks enables people to live in an independent way, and failures in this capacity may lead to several problems (e.g., health problems). Understanding if and how the animacy effect can be obtained in prospective memory is theoretically relevant but also entails a wide range of possible applications (e.g., one could potentially empower prospective memory performance by using animates). This project aims to investigate these questions in a systematic way. Additionally, we propose to explore some potential applications of the animacy effect, particularly, in everyday life tasks of older adults.

Reference: Nairne, J. S., VanArsdall, J. E., Pandeirada, J. N. S., Cogdill, M., & LeBreton, J. (2013). Adaptive memory: The mnemonic value of animacy. Psychological Science, 24, 2099–2105. doi: 10.1177/0956797613480803

Psychology

Public policies

Governança multinível da política educativa para a promoção da coesão territorial: a articulação entre as escalas local e europeia em Portugal

Ana Grifo, João Lourenço Marques

Alinhados com orientações supranacionais e locais, argumentamos que a política educativa pode e deve ter pretensões de promoção da coesão territorial. Pretendemos aferir de que modo este objetivo é perseguido na dimensão local em Portugal, através das políticas e iniciativas de autarquias e escolas. Concomitantemente, propomo-nos a aferir como as orientações e políticas formuladas na dimensão europeia são implementadas localmente e, na direção contrária, como a esfera europeia integra as preocupações, singularidades e práticas locais neste domínio. Questionamos: "De que modo as políticas de educação promovem, ou poderiam promover, a coesão territorial em contexto de governança multinível?", de forma a identificar e caracterizar as iniciativas e, simultaneamente, propor caminhos e iniciativas adicionais. Assentamos, assim, o nosso projeto na necessidade de tirar proveito e valorizar a dimensão local das políticas públicas, em articulação com as restantes esferas da governação, assim promovendo o desenvolvimento regional, bem como a coesão intra e inter-regional.

Public policies

As Duas Faces de Janus da Modernização das Políticas Públicas: Inovação e Tradição. O Caso do Sistema Judicial Português

Ana Melro, Filipe Teles, Lídia Oliveira

As políticas públicas, em Portugal, têm sofrido uma evolução que, por motivos óbvios, desde 1986, encontra paralelismo com a experiência de outros países europeus, dada a adesão à Comunidade Económica Europeia (atual União Europeia). O processo de europeização (Ongaro, 2009, p. 238) foi acompanhado de uma mudança de paradigma no entendimento das políticas públicas, influenciando quer a sua dinâmica de formulação e de execução, quer de evolução.

Neste projeto de doutoramento far-se-á a investigação e avaliação da modernização do sistema judicial português, perspetivado enquanto política pública, considerando a articulação entre processos e modos de fazer tradicionais, típicos de um sistema que tem séculos de história e de intervenção na sociedade, e inovadores, fruto também das mudanças sociais e da evolução societal.

Public policies

Evolution of health policies in People's Republic of China: formulation and communicational strategies

Anabela Santiago, Carlos José de Oliveira e Silva Rodrigues, Jorge Manuel Tavares da Silva

Political communication is a concept that tends to expand its level of influence in the way policies are formulated. Its evolution and effects have been largely studied, in opened political systems, nevertheless not enough for the case of closed and non-democratic political systems, essentially in what refers to the perspective of agenda-setting and policy-agenda. Aligned with this purpose, this thesis project intends to study the evolution and impacts of political communication in health policies formulation, specifically in agenda-setting and policy-agenda, over four historic events that marked distinct periods in People's Republic of China: Cultural Revolution, the reform of opening up, the "Three Represents" and the "China Dream". A qualitative approach based on a deep content analysis will be applied for the empirical approach.

Public policies

Policy relevance of the Ecological Footprint and biocapacity

Armando Abrunhosa Alves, Filipe Teles

The Ecological Footprint Accounting framework is one of the most known and used sustainability indicators. Yet, after decades of debate, it is still not clear among authors the exact importance of the Ecological Footprint to policymaking. This research aims to fill this gap by bringing together science-policy, decision support methods and case-study analysis to develop novel methodologies to assess the policy usefulness and relevance of the Ecological Footprint Accounting framework.

Public policies

Quem pode ser cidadão na América Latina: a atuação da Assembleia Legislativa de Minas Gerais (ALMG) e as políticas públicas de cidadania para a população negra

Aruanã Rosa, José Carlos Mota, Fabrício Pereira da Silva

O presente trabalho busca apresentar como a construção dos Estados na América Latina impactaram o desenvolvimento dos processos de cidadania na região, em especial no Brasil e para a população negra, na medida em que esta ainda apresenta, no século XXI, altos índices de desigualdades políticas, econômicas e de violências estruturais. A partir disso, buscamos refletir como a Assembleia Legislativa de Minas Gerais tem respondido as cifras da desigualdade, construindo políticas públicas de cidadania para a população negra no estado, em particular no período 1989-2020. As ferramentas metodológicas-conceituais para responder aos questionamentos levantados, abordam desde a utilização de fontes primárias como legislação, relatórios técnicos do Instituto Brasileiro de Geografia e Estatística (IBGE), Instituto de Pesquisa Econômica Aplicada (IPEA), Sistema Nacional de Promoção da Igualdade Racial (Sinapir), a tecnologias do software Atlas.ti para qualificação de dados referentes a ALMG. Além disso, está previsto uma visita de campo a quatro instituições brasileiras: Assembleia Legislativa de Minas Gerais, Biblioteca do Legislativo, Memorial do Legislativo Mineiro e Museu Afro-Brasil. Por fim, propõe-se constituir com esta tese, uma ferramenta de "enfrentamento propositivo" para uma sociedade efetivamente emancipada.

Public policies

Ocean, Public Policy and Development: the transformative role of Smart Specialisation Strategies (RIS3)

Carla Santos, Carlos Rodrigues, Sara Moreno Pires

The PhD Thesis has two research objectives: 1. Create knowledge about how to enhance public policies (PP) for transformative actions on national and regional territories; 2. Study and propose an innovative approach to sea policies for sustainability with a territorial dimension, aligned with Agenda 2030 SDGs, European Strategies and Smart Specialization Strategies for regions. It scientific and social relevance is

contribute to enlarge a still scarce knowledge on blue economy and smart specialization policies and their relation with territorial sustainable development and governance. The main expected results are: to develop an analytical tool to measure impacts of RIS3 public policies focused on the sea and their transformative capacity for sustainable regions; to support public policies on sea and blue economy in Portugal, namely RIS3, for a sustainable transition.

Public policies

Avaliação de desempenho para o ensino médio técnico do ifrr, campus boa vista zona oeste

Cícero Reis, Teresa, Carvalho

Dado a ausência de estudos e as constantes críticas aos vastos objetivos formativos e políticos de instituições federais de educação tecnológicas, o presente projeto, baseado em estudo de caso, objetiva o desenvolvimento de uma avaliação sistemática de desempenho que contemple o ensino médio técnico do IFRR/CBVZO, Roraima, Brasil. A pergunta: "Como estruturar uma avaliação institucional que vá ao encontro das diferentes expectativas dos stakeholders sobre o programa?" permeará o trabalho. Para estudo dos conflitantes pontos de vistas e estruturação da avaliação, será lançado mão dos modelos: Advocacy Coalition Framework, Logic Model e Macbeth Multicriteria Analysis.

Public policies

Política de humanização na saúde mental: um olhar sobre avanços e desafios.

Edyane Raposo, Teresa Carvalho

Dialogar acerca da saúde mental e seu trajeto no avanço da humanidade nos conduzem ao acontecimento histórico da Reforma Psiquiátrica. Essa surge como forma de repensar as políticas públicas relacionadas à loucura e ao que não se encontra dentro dos padrões estabelecidos pela sociedade.

Neste contexto, a Política Nacional de Humanização, apresenta grande relevância no que se refere às ações em saúde, em destaque ao atendimento de pessoas nos serviços de saúde.

Procuramos avaliar as contribuições que as diretrizes e dispositivos da PNH já trouxeram para os serviços de saúde mental do Brasil por meio dos olhares dos profissionais. Usaremos grupos focais como instrumento para colher os dados. Para organização e análise dos dados da pesquisa utilizaremos a análise de conteúdo.

A pesquisa se propõem a transitar pelos temas que integram a saúde mental, inicialmente com a trajetória da história da loucura na sociedade e o processo da reforma psiquiátrica. Em seguida, adentrar ao campo das políticas públicas em saúde mental e a contribuição dos modelos de formulação, execução e avaliação em políticas públicas. Posteriormente percorrer as questões relacionadas aos profissionais dos serviços de saúde mental. Sucessivamente explorar o Sistema Único de Saúde do Brasil e a implantação da Política Nacional de Humanização. Por último analisar a criação e caracterização dos Centros de Atenção Psicossocial, como serviços substitutivos dos hospitais psiquiátricos. Considera-se que essas temáticas proporcionem o avanço dos estudos e nos possibilitem encaminhar teoricamente nossa pesquisa. A construção dessa pesquisa busca contribuir para discussão acerca do ponto de vista de profissionais, refletindo sobre os construtos teóricos e práticos que permeiam a Política Nacional de Humanização na Saúde Mental. Além de garantir uma reflexão sobre o modo de produção de cuidado estabelecido no contexto dos serviços de saúde mental e possíveis mudanças na prática cotidiana do serviço e proposta de reformulação nas políticas públicas. Por fim, realizar a aproximação da academia aos serviços de saúde fortalecendo a troca entre teoria e prática, buscando mudanças e crescimento.

Public policies

Policy networks and public policies in protected areas: what role can NGOs play?

Emily Santos, Sara Moreno Pires

As ONGs têm sido eficazes na formação de coalizões, reunindo recursos e coordenando esforços de lobby (Paul, 2000). Essa necessidade de juntar forças para promover mudança política é ainda mais evidente em países com menor capacidade de recursos (humanos e financeiros) como é o caso de países latino-americanos (Risley, 2015).

A projeto tem por objetivo entender de que forma as ONGs podem influenciar as políticas públicas em áreas protegidas. Com isso, pretende-se entender quais os fatores, circunstâncias e mecanismos, sejam eles de natureza social, econômica, ideológica ou política, podem

incentivar ou inibir a formação de redes e coalizões entre essas instituições e outros atores, com o intuito de dar notoriedade a uma causa ou problema eincluí-la na agenda política local, regional ou nacional.

Public policies

As políticas públicas com foco no bem-estar do servidor público: construções simbólicas e estratégias de gestão

Eriton Sousa, Teresa Carvalho, Marlene Arenas

O presente trabalho é um projeto de pesquisa cujo objetivo geral é analisar o papel da política de humanização da gestão pública no estado do Acre. A pesquisa é um estudo de caso, cuja abordagem é qualitativa e quantitativa, com fundamentos na teoria neo-institucional. O conceito de bem-estar é entendido como um fenômeno multidimensional, incluindo elementos das concepções hedônicas e eudaimônicas. O conceito de humanização trabalhado está voltado para o bem-estar do servidor público, diferindo do empregado pela política nacional de humanização. O público-alvo são servidores públicos efetivos em nível de gerência, diretoria e corpo técnico. Os instrumentos de coleta de dados são questionários e entrevistas semiestruturadas. Os instrumentos de análise de dados são análise de conteúdo, matriz lógica e escala de bem-estar no trabalho. A contribuição teórica consiste na proposta de identificar a construção simbólica dos conceitos de bem-estar no trabalho sob a ótica dos servidores públicos, bem como o papel de políticas públicas desta natureza como instrumentos de governança.

Public policies

Alimentação saudável e consumo sustentável: o contributo das políticas locais na alteração de estilos de vida insustentáveis

Filipe Rocha, Sara Moreno Pires

A alimentação assumiu, desde sempre, um papel crucial no desenvolvimento humano, e apesar de já existirem diversos estudos sobre a sua importância na vida quotidiana das pessoas, as políticas direcionadas à promoção de uma alimentação saudável e consumo sustentável não são ainda uma prática consistente ao nível local.

Pela proximidade que este nível de ação política tem em relação aos indivíduos deveriam ser equacionadas novas metodologias de trabalho, assim como ferramentas que permitam, aos decisores políticos, um papel determinante na mudança das atuais, e indesejáveis, práticas de consumo das famílias, com diversas consequências, tanto em termos ambientais, como em termos de saúde pública e individual.

Com a presente investigação pretendemos construir uma reflexão recente, de resposta à inexistência de abordagens teóricas sobre o contributo que as políticas locais podem dar à inovação de práticas de consumo ecologicamente sustentáveis e hábitos de alimentação saudáveis das famílias, especialmente, a partir do envolvimento que podem ter junto de outros agentes locais (e.g. escolas, instituições sociais e organização não governamentais). Desta forma, ambicionamos comparar dois municípios portugueses, desde as políticas existentes à utilização do cálculo da Pegada Ecológica como ferramenta para identificar as áreas em que mais devemos intervir, ao nível dos hábitos quotidianos das famílias.

Esperamos, por isso, a partir da análise deste estudo de caso múltiplo, elaborar um conjunto de recomendações de possíveis novas formas de consciencializar e melhor informar as populações do mundo, a partir de políticas concretas ao nível local.

Public policies

Territorialização de políticas públicas urbanas - Análise de estudos de casos de implementação de políticas sociais em grandes cidades

Gabriela Chaves, Professor Filipe Teles

Na literatura especializada expressões como “territorialização de políticas” ou “dimensões territoriais de políticas” têm sido utilizadas para destacar a necessidade de recortes territoriais intra-urbanos, expressando uma lógica de espacialização das políticas. Nas metrópoles e grandes cidades esta lógica tem se tornado cada vez mais presente uma vez que a complexidade social destes espaços exige a produção de respostas setoriais a problemas locais.

Assim, as cidades podem ser percebidas como laboratórios de governação e ambientes de prototipagem de políticas públicas. E é, portanto, nelas que se propõe observar e analisar as experiências em busca de respostas aos desafios da implantação de políticas sociais com poder de transformação.

Estudar casos reais de políticas territorializadas pode permitir compreender se a territorialização das políticas também pode ser percebida como uma estratégia para otimização de recursos e esforços públicos de modo a garantir o maior e melhor atendimento possível, ou se estas são lógicas opostas.

Public policies

Política de Habitação, Envelhecimento e Cidadania: A Tecnologia da Informação e Comunicação a Serviço do Idoso em Portugal e no Brasil

Guilherme Santana, João José Lourenço Marques

Diante do envelhecimento global da população, e do aumento da expectativa de vida, as questões que envolvem a habitação para os idosos permeiam os debates na sociedade, e as preocupações das políticas habitacionais como um imperativo de cidadania. Os idosos em todo o mundo preferem envelhecer nas suas residências, fenômeno conhecido como aging in place.

A Tecnologia de Informação e Comunicação (TIC), dispõe de um conjunto de ferramentas tecnológicas de apoio à tomada de decisão de Gestores, públicos e privados, que permitem a construção de programas de habitação, cujo enfoque nos idosos, favorecerá o seu envelhecimento ativo na sua própria residência.

Este trabalho pretende mostrar como a utilização das TIC's, pode auxiliar a construção de políticas de habitação voltadas para os idosos, permitindo-lhes envelhecer com segurança na própria residência, com qualidade de vida. A aplicação das TIC nas habitações dos idosos, pode facilitar as suas rotinas diárias, bem como permitir-lhes acesso digital à sociedade, favorecendo o envelhecimento ativo. As TIC's podem, ainda, propiciar a integração dos programas habitacionais, reduzindo os custos orçamentais.

Public policies

Políticas de saúde num contexto de envelhecimento demográfico: um estudo sobre Cuidados de Saúde Amigos das Pessoas Idosas

Jéssica Tavares, Gonçalo Santinha, Nelson Rocha

Dado o rápido crescimento do envelhecimento demográfico, os cuidados de saúde prestados às pessoas idosas, com necessidades de saúde complexas, constituem atualmente um desafio para os serviços e profissionais de saúde e para as políticas públicas. A aposta em "Cuidados de Saúde Amigos das Pessoas Idosas" surge neste contexto, ambicionando uma mudança no ambiente de prestação de cuidados que ofereça um novo conjunto de oportunidades a este grupo populacional. Contudo, a ideia de "Cuidados de Saúde Amigos das Pessoas Idosas" encontra-se ainda por descobrir na sua concetualização, na aferição das suas potencialidades e na verificação de como a sua operacionalização pode ser adequada pelas políticas públicas. Com este projeto ambiciona perceber-se a sua aplicabilidade no contexto português e os princípios orientadores que norteiam a sua operacionalização. A nível metodológico, combinar-se-ão abordagens quantitativas e qualitativas, incluindo a realização de questionários, entrevistas e focus group a atores-chave da área da saúde e governança.

Public policies

Avaliação de políticas públicas de integração de imigrantes em Portugal: o caso de trabalhadores imigrantes provenientes dos PALOP

José Nkosi, Maria Cristina Gomes, Miguel Lucas Pires

Verifica-se nos últimos anos em Portugal uma política migratória mais acolhedora no sentido de abrir mais as portas para a imigração. Diante dos desafios, sobretudo económicos, aos quais faz frente o país, entende-se a necessidade de políticas públicas que estimulem a imigração de substituição, pois esta facilita entre outras coisas, a entrada da mão-de-obra para manter ou aumentar a produção e alavancar a economia. Nossa investigação pretende avaliar os resultados das políticas públicas de integração social de trabalhadores imigrantes em Portugal. Pretendemos fazer uma investigação qualitativa, além da pesquisa bibliográfica, a pesquisa documental (documentos oficiais, jornais etc.) a fim de compreender os propósitos pelos quais foram traçadas essas políticas. Realizaremos também as entrevistas (pesquisa de campo) aos supostos beneficiários dessas políticas, a saber, os trabalhadores imigrantes sujeitos a essas políticas, provenientes dos Países Africanos de Língua Oficial Portuguesa (PALOP). Ou seja, faremos uma análise de políticas públicas segundo as perspectivas de quem foi objeto dessas políticas. Esperamos, no final da investigação, compreender se essas políticas públicas atingiram (completa ou parcialmente) os objetivos pelos quais elas foram elaboradas e implementadas, na óptica da população-alvo dessas mesmas políticas públicas.

Palavras-chave: imigração, trabalho, integração social.

Public policies

O Modelo Fundacional na Governação das Instituições de Ensino Superior Públicas Portuguesas.

Manuel Carmelo Rosa, Orientadores: Professora Doutora Teresa Carvalho, Professor Doutor Pedro Nuno Teixeira

Os objetivos deste projeto de investigação são analisar a experiência da criação das Universidades Fundação em Portugal e em que medida esta mudança contribuiu para a melhoria da governação das IESP. Para concretizar este objetivo proceder-se-á à análise do contexto, à análise da natureza e objetivos do modelo fundacional de governação, à análise das principais tendências da investigação sobre governação institucional na área das políticas de ensino superior, à análise de experiências comparáveis noutros setores e noutros países e ainda à análise das perceções de diferentes atores no setor do E.S. Para a construção das hipóteses de resposta às questões de investigação a fundamentação teórica vai basear-se na teoria das políticas públicas do neo-institucionalismo. Para análise da evolução das políticas de governação das IESP, serão considerados os processos de mudança, o papel das influências normativas nos processos de decisão organizacional e a tendência de criação de estruturas similares ou que convergem para as mesmas estruturas conduzindo ao isomorfismo institucional. A metodologia de investigação assentará em análise documental; estudo de casos, com recurso a análise comparada; entrevistas semiestruturadas; e, análise qualitativa e quantitativa dos dados obtidos e dos dados existentes, caraterizadores das IESP analisadas.

Os principais resultados preliminares são:

(i) O modelo fundacional de governação das IESP introduz limitações no autogoverno institucional – afasta-as da classificação de entes da administração autónoma;

(ii) Influência do contexto internacional nos modelos de governação das IES e do seu funcionamento (RJIES), em especial o papel da UE e da OCDE; e

(iii) Emergência de novas formas organizacionais nas IESP (e. g., criação de fundações privadas para coadjuvar as IESP no desempenho dos seus fins).

Public policies

From smart to wise cities civic innovation in the provision of public service in the digital era

Margarida Campolargo, José Mota

How to develop a model which guarantees the necessary conditions for the promotion of civic innovation in the provision of public services, on an urban scale, in the digital age?

Public policies

Public policy on e-health: a study of e-health literacy on the Portuguese population

Marta Estrela, Maria Teresa Herdeiro, Fátima Roque, Pedro Lopes Ferreira

e-Health involves a broad group of activities that include telemedicine, mHealth and e-learning. Electronic means are used in order to deliver health-related information, resources, and services. It uses information and communication technologies for health, whether exclusively informational, or for many other purposes such as for communication between health professionals and patients, clinical decision support, diagnostics, treatment, or follow-up.

Digital technologies in health are seen as crucial to not only promote the well-functioning of health systems but also in empowering individuals as part of a transition to integrated, person-centered care. As such, health and e-Health literacy among both health professionals and the public should become an area of focus to guarantee that e-Health is successfully adopted while ensuring the reduction of health inequalities by improving accessibility to digital health services. Public policy strategies should be developed and implemented towards the goal of improving e-health literacy and consequently, the empowerment of individuals.

Public policies

Decision aiding for public policy formulation

Monique Borges, Eduardo Castro, João Marques, Joaquim Pires Valentim

This presentation is based on the ongoing PhD research of the author Monique Borges, focusing the decision-making during policy making processes. Generally, the challenges rely on the ability to structure long-term goals; evaluate alternatives; and make informed decisions. Often, it requires group decisions, for which is required the development of strategies to give meaning to the knowledge and information dispersed by several people. Therefore, it involves high levels of subjectivity, which are reflected on preferences and options. The baseline of the PhD concerns three research questions: What are the balances of individual and collective decisions; What is the effect of the group on individual decisions; How groups deal with uncertainty.

Public policies

Cross-Border Higher Education: an overview of quality assurance policies

Nathan Carvalho, Maria Jõao Rosa, Alberto Amaral

Higher Education (HE) has been changing over the past decades. The increase of Cross-border Higher Education (CBHE) provision is one of these changes and brings new possibilities and challenges for HE systems. This project intends to study the multiple facets of CBHE in Europe and its quality assurance, understood as a public policy. The research question is defined as: How is Cross-border Higher Education being operated in Europe and what are the main challenges it poses for quality assurance? This project follows a qualitative research approach, framed in the development of case studies. Three case studies will be elaborated under this research: Portugal, the Flemish Community of Belgium and the United Kingdom. To elaborate the cases, systematic literature reviews will be performed on the themes of CBHE and quality assurance in higher education, as well as document analysis and interviews with relevant actors, both at institutional, national and supranational levels

Public policies

Policy Options for Increasing Parental Leave Usage Amongst Fathers: a comparative case study

Nicholas Nolin, Maria Cristina Sousa Gomes, Joao Jose Lourenco Marques

Increasing father's participation in the child rearing process has become an important goal for countries throughout the developing world. The benefits of this outcome not only helps to build stronger families but also helps to reduce gender inequalities by reducing the amount of time that new mothers must spend away from their careers in order to care for children. My research will examine competing policy options that aim to increase the amount of time that fathers spend on either parental or paternity leave. In order to treat the most common policy options in this specific field, I will examine the policies of Portugal, Canada and the province of Quebec as they have enacted policies that mandate paternity leave, reward fathers for taking shared parental leave and reserve father-specific leave respectively.

Public policies

Nature and impact of the transformative change of smart specialisation strategies in EU outermost regions through mission-oriented innovation policies

Patrice Santos, Artur Rosa Pires

The notion of smart specialisation (S3) defines a virtuous process of diversification of regional resources and competences in a certain number of economic domains that represent possible paths for transformation of productive structures (Foray, 2014). These challenges are particularly relevant for “low density economies,” such as more rural areas and outermost regions (ORs) of the European Union. These areas offer specific opportunities and development trajectories, but also require strong support as stakeholders are fewer, with less developed structures that favour interaction and a tailor-made approach. Due to their abundance of natural resources and their stronger path dependence, ORs have been struggling for a long time to identify what represents a resource, aside from their traditional agricultural products. A “smarter approach” of the unique biodiversity of the ORs can therefore play a fundamental role in meeting diverse societal challenges: securing healthy food, rediscovering nature (sociocultural and economic dimensions, fighting climate change (by fostering new sources of energy from the sea), blue and green growth (resource efficiency and eco-innovation). This research aims at creating a new narrative for regional development of EU remote territories. The main objective of this research is to propose a new approach to innovation-

based development by evaluating the nature and the impact of the transformative change of smart specialisation strategies in EU outermost regions through the new dimensions of socio-ecological innovation and social innovation .

Public policies

Roadmaps for strengthening the institutionalization of 'Nature-based Solutions" in Spatial Planning

Rúben Mendes, Teresa Fidélis / Filipe Teles/ Peter Roebeling

Nature based solutions (NBS) are gaining relevance in the scientific community, enabling innovative tools to deal with the resilience, adaptability and sustainability of cities. In spite of progresses, gaps are still present in the literature regarding their institutionalization in the daily spatial planning and decision-making processes. The objective of this research is to define a set of actions able to facilitate the incorporation of the NBS in those processes, especially in the articulation between public policies and urban planning. To do so, it will be used a conceptual model based on discursive institutionalism framework to understand the drivers and barriers to the incorporation of NBS in a set of cities. These cities will be used as case studies with examples from both Portugal and other European cities. We intend to establish a set of measures, as a roadmap, to help the process of institutionalization of NBS within urban planning practices.

Public policies

Estratégia de inovação digital "sensível" aos territórios: Princípios estruturantes e desafios para as áreas rurais e remotas

Rui Lopes, Orientador: Professor Doutor Artur Rosa Pires

O aumento contínuo da cobertura territorial e qualidade do acesso à Internet traz claras vantagens aos territórios abrangidos, existindo atualmente um conjunto de iniciativas e avanços tecnológicos que permitem antecipar a continuidade desta trajetória favorável. No entanto, observa-se que este aumento de cobertura não corresponde à adoção da Internet, limitando desta forma os desejados impactos socioeconómicos que as tecnologias digitais poderiam trazer a estes territórios. Este desfasamento é particularmente evidente nas áreas rurais e remotas, já que as suas características específicas podem exacerbar as restrições circunstanciais e sociais que contribuem para o "fosso digital". Assim, é essencial perceber como é que esta diminuição das barreiras de conetividade pode ser capitalizada, desbloqueando o potencial de desenvolvimento destes territórios, afirmando o seu papel na resposta aos desafios societais e proporcionando bem-estar (económico, sociocultural e ambiental) aos seus cidadãos. Partindo do contexto das áreas rurais e remotas, a tese pretende identificar os princípios estruturantes de uma estratégia de inovação digital "sensível" a estes territórios, indutora de "mudanças transformadoras" que permitam aliar o desenvolvimento rural com o potencial de evolução dos sistemas agroalimentares, onde indústrias de maior dimensão e pequenos produtores coabitam enquanto atores num processo de "transição justa".

Public policies

Public Libraries in Portugal: roles, challenges and future

Sílvia Lourenço, Maria João Manatos

Public Libraries are spaces providing a different number of services for the community. Most libraries are managed at the local level and this local management brings advantages and disadvantages. In the beginning of our research are the following questions: Why there is no legislation for Public Libraries in Portugal? What is the relationship between the size of the local authorities and the services provided by the municipal library? Could Intermunicipal Library Networks be an instrument for improving and creating synergies to provide a broader library to populations? To provide answers to these questions, throughout this work, a contextualization of the library sector will be carried out at national level, to assess the general panorama for the sector. Subsequently, focusing to local level, the libraries of the eleven municipalities of the Aveiro Region will be analyzed in its different dimensions (services, users, size). Data from primary and secondary sources will be collected using surveys and interviews. The collected data will be subjected to quantitative and qualitative analyzes (mixed research method). The relevance of this work is based on the idea that there is no public policy defined at the national level for the public libraries sector but a number of separate actions that try to support the implementation of these public facilities by the local authorities, without having a firm intention that these public infrastructures reach everyone, with the same level of services.

Public policies

ICT and Public Participation in the decision-making process in Mozambique

Vicente Dauce, João José Lourenço Marques

The thesis is based on the thesis that information and communication technologies combined with the improvement of GIS technologies contribute and constitute important tools in the decision-making process. In order to achieve at this process, a field study will be carried out in which information will be collected on how the population participates in the decision-making processes, what is the vision of the technicians specialized in urban planning in this situation and how public managers deal with the process, as well as the verification of the relationship between the normative documents that guide participation in the decision-making processes, its knowledge by the different stakeholders and its implementation. The results will be used to implement future Public participation Geographic Information System methodology in urban planning in developing countries

Public policies

A Política da criação dos municípios de Timor-Leste

Vicente Faria, Filipe Teles

Um estudo e análise da implementação sobre a politica da Descentralização Administrativa e Poder Local

Para o estudo sobre a Política de Criação dos Municípios de Timor-Leste, os objetivos da investigação são:

1) De forma genérica, um estudo sobre o tema da Decentralização Administrativa e do Poder Local como tendência de reforma nas últimas décadas.

2) De forma específica, identificar e caracterizar as políticas adotadas pelo Estado de Timor-Leste sobre a Divisão Administrativa do Território e a institucionalização do Poder Local segundo a Constituição da República de 2002.

O estudo pretende responder à seguinte questão de investigação: Quais são os obstáculos à implementação da Política de Descentralização e Poder Local em Timor-Leste, durante o período de 2002 a 2019?

Public policies

Refining, petrochemical and chemical engineering

Direct gasification of biomass for fuel gas production

Daniel Pio, Luís António da Cruz Tarelho, Francisco Manuel da Silva Lemos, Paula Cristina de Oliveira Rodrigues Pinto.

The foundation of the current society production of services and materials is largely based on finite feedstocks extracted from earth, which are being depleted at an unsustainable rate. Environmental and economic issues associated to these feedstocks urge the transition to a more sustainable production system. To answer these issues, a partial or complete adjustment of the current economy to one based on renewable raw materials, denominated by bioeconomy, must happen. This will require technologies development and significant scientific advancements, as well as innovative thinking and research approaches and proper support from governments and stakeholders.

Lignocellulosic biomass is a key material for the transition to a sustainable bioeconomy by being a non-intermittent renewable source of energy capable of fitting into the current carbon-based (fossil) fuel infrastructure. Biomass can be used for CHP and the production of gaseous/liquid fuels, chemicals and other bioproducts, using thermochemical conversion processes. These processes include biomass gasification to produce a fuel gas with diverse applications, pyrolysis for production of biochar and bio-oils or combustion for direct production of energy. In the bioeconomy context, the gasification process is extremely relevant due to: i) the recognition that gaseous fuels have practical advantages over solid fuels, such as handling and application, ii) the necessity of renewable fuels that can replace gaseous fossil fuels in distinct applications and iii) the flexibility of gasification processes, due to the various bioproducts that can be obtained from the produced fuel gas. Thus, biomass gasification technologies are expected to have a major role in this future bioeconomy and in future biorefineries that will produce a diverse number of value-added products from biomass and compete with current petrochemical refineries.

The objectives of this work revolve around obtaining new scientific knowledge to support the development of direct gasification of biomass in bubbling fluidized bed reactors to produce a gaseous fuel with suitable properties to replace natural gas in industrial gas burners, such as the burners installed at kiln ovens and boilers of the pulp and paper industry. This is the first step for the integration and development of gasification-based biorefineries in the pulp and paper industry. These objectives include:

- Characterization of the state-of-the-art of gasification technologies, including commercial and technical barriers, integration of potential gasification-based biorefinery processes in the pulp and paper industry and status in Europe.

- Development and evaluation of numerical tools to predict and support gasification processes.

- Characterization of the direct gasification process of distinct low-cost feedstocks in BFB reactors, including byproducts from the pulp and paper industry and refused derived fuel, focusing on the influence of the process operating parameters (e.g., bed temperature and ER) and feedstock chemical composition, on the combustible gases concentration in the clean and dry gas, tar concentration in the raw PG and efficiency parameters (e.g., carbon conversion efficiency).

- Testing of primary measures to improve the PG quality from direct biomass gasification:
  - Steam injection in the bottom bed of the reactor.
  - Low-cost catalysts in-situ application above the bottom bed of the reactor.

- Evaluation of the combustion process of byproducts from the pulp and paper industry to consider as a co-integrable process in a future gasification-based biorefinery design.

- Development of a technical-economical pre-feasibility analysis for the replacement of the natural gas used in the kiln ovens and boilers of the pulp and paper industry by PG from direct gasification of wastes. This is the first step for the integration of gasification-based biorefinery processes in the pulp and paper industry.

Refining, petrochemical and chemical engineering

Development of a Hexane and Heptane (commercial grade) Purification Process with Ionic Liquids

Diogo Barros, Pedro Carvalho, Luísa Neves, Jorge Ribeiro

Aliphatic solvents are obtained through fractional distillation of petroleum with utility in the food, pharmaceutical and polymer industries. With increasing demands of purity from the industries, petrochemical industries that employ traditional purification methods face the possibility of being left out of the market. It is then relevant to find an alternative and more efficient process. This work aims to develop a new and more efficient process for the purification of these streams. It proposes to do so with the use of ionic liquids as extraction solvents and using membrane contactor technology. The process of selection of the best ionic liquids for the purification of the stream using the COSMO-RS model will be described as well as choice of configuration for the membrane contactor unit which will allow for a regeneration of the extraction solvent.

Refining, petrochemical and chemical engineering

Tailoring the anionic sublattice of vanadium oxynitride (VOxN1-x)

Laura Holz, Dr. Duncan Fagg / Prof. Dr Adélio Mendes / Dr. Diogo Mendes

Vanadium oxy(nitrides) (VOxN1-x) are very attractive materials for a wide range of applications including heterogeneous catalysis, supercapacitors, and superconductors. Their unique combination of very high electrical conductivity and selectivity for several catalytic reactions strongly depends on the N/O ratio in their structure. Hence, in this work, several oxynitrides, (VOxN1-x, $0 < x < 1$), are prepared by the ammonolysis route, by conversion of the parent oxides under flowing gaseous ammonia at high temperatures. Powders are characterized by combining X-ray powder diffraction (XRD), thermogravimetry (TGA), X-ray photoelectron spectroscopy (XPS), and diffuse reflectance spectroscopy (DRS) to establish a correlation between the synthesis temperature and the structural, chemical and optical properties of the new compositions. This work opens an exciting new method for materials tailoring by precise control of chemical composition and N/O ratio.

Refining, petrochemical and chemical engineering

Sustainable chemistry

Expanding azaindole synthesis via metal-catalyzed reactions

Ana Santos, Professor Artur Silva, Professora Maria Manuel Marques

Azaindoles are heterocyclic structures that when properly functionalized can possess a wide range of medicinal applications. Metal-catalyzed reactions like, the well-known Sonogashira, Heck, and Suzuki cross-couplings have been used on the synthesis of azaindoles. The metal-catalyzed C–H activation reaction has been scarcely explored in the assembly of azaindole core, as well as on its functionalization.

Unlike other common metal-catalyzed reactions, C−H activation usually involves cleavage of a C−H bond, to create a new C−C, C−O or C−N bond. When applied to azaindole synthesis, metal-catalyzed reactions usually require previous halogenation of aminopyridines, which are low yielding and poor regioselective. C−H activation reaction rely on the activation of a C−H bond present in the aromatic ring, thus this method allows use of commercially available starting materials, while avoiding the halogenation step.

On the follow-up of our previous work using amino-halopyridines to attain several azaindole derivatives via Heck reaction, we investigated of a new methodology using non-functionalized aminopyridines. The method consists on the formation of imine/enamine intermediates followed by in situ C–H activation/functionalization reaction to afford the desired azaindoles. Furthermore, synthesis of 4-zaindole and 6-azaindole scaffolds was attained in a regioselective manner.

Sustainable chemistry

Polysaccharides from the microalgae Chlorella vulgaris and Porphyridium cruentum: potential biotechnological applications

Andreia Ferreira, Cláudia Nunes, Tiago H. Silva, Manuel A. Coimbra

Microalgae are photosynthetic microorganisms considered an important and promising source of high added-value compounds, namely fatty acids and other lipids, amino acids and polysaccharides. Chlorella vulgaris and Porphyridium cruentum have great commercial interest and are easily available.

C. vulgaris is one of the only two microalgae approved for human nutrition and is rich in starch and structural polysaccharides that could have potential to be valued as food ingredients. The starch revealed an amylose/amylopectin composition and a granule size similar to the starch found in cereals. The structural polysaccharides are mainly galactans composed by 1,3-, 1,6- and 1,3,6- linked galactose residues. These linkages were also observed in the polysaccharides recovered from the growth medium, showing similarity between the exopolysaccharides and those present in the cell wall. This exopolymeric material revealed immunostimulatory effect on B lymphocytes. This opens the possibility of the use of both starch and exopolysaccharides of C. vulgaris as food ingredients.

P. cruentum is a red saline microalga that have raised interest due to its ability to excrete into the medium high levels of sulfated polysaccharides (sEPS). The sulfated polysaccharides purified with graded ethanol from the polymeric material were mostly constituted by terminally linked, 1,3 and 1,4-Xyl, 2,3,4-Gal, and 3-Glc, and mainly sulfated at C-3 and C-4 of t-Xyl and C-6 of O-3 linked Glc. These sEPS revealed immunostimulatory effect on B lymphocytes, which effect significantly decrease when sulfated polysaccharides were subjected to a desulfation, revealing the relevance of sulfate esters in biological activities. P. cruentum polysaccharides showed a great potential to be applied in diverse fields, namely food and biomedical sector.

Sustainable chemistry

Study of interactions between chitosan-based films and food components

Angélica Rocha, Manuel A. Coimbra, Cláudia Nunes

Chitosan films cross-linked with genipin (Ch-Ge) have been proposed as a sustainable strategy for wine preservation, allowing safe consumption of the beverage by the consumers who are intolerant to sulphites. These films have antimicrobial and antioxidant activities that can be explained by their uptake capacity for transition metal ions, such as iron. In addition, these films allowed the production of wines with positive aroma notes. The challenges of this doctoral thesis are to understand the impact of Ch-Ge films on the preservation of beverages through iron ions uptake and the influence of these films can affect the volatile composition having wine as an example.

The iron uptake capacity of Ch-Ge films was explained by electrostatic interaction between protonated amino groups of films and anionic iron-tartrate complexes in the case of wine. At pH 3.5, it is possible the formation of ternary chitosan-carboxylate-iron ion complexes due to the interaction of these films with iron ions in the presence of α-hydroxypolycarboxylic acids, namely malic, tartaric or citric acids present in wine, fruit juices, cider, and vinegar. Ch-Ge films also modulate the wine volatile composition through hydrophobic interactions and by

the promotion of Maillard reaction. This knowledge should be taken into consideration for the application of Ch-Ge films in beverages preservation.

Sustainable chemistry

Design, synthesis and evaluation of novel potential antileishmanial agents

Carlos Silva, Diana C. G. A. Pinto, Pedro A. Fernandes, Artur M. S. Silva

Leishmaniasis is one of the most neglected diseases that affects mainly people from developing countries, with approximately 350 million people considered in risk of contracting and developing leishmaniasis. Therefore, the development of novel antileishmanial treatments is becoming a focus for numerous research groups, with the support of the World Health Organization that hopes to eradicate this disease in a near future.

The currently used medicines for the treatment of the disease have been descrived as promoting several adverse effects and resistance mechanism, which leaves room for the search and development of novel antileishmanial drugs. Thus, several metabolic pathways, selected as the most propitious for the identification of potential molecular targets, have been analysed with the intention of determining the most promising enzyme to be affected for the treatment of Leishmania. This analysis culminated in the selection of the enzyme S-adenosylmethionine decarboxylase, from the polyamine biosynthesis as our molecular target for the development of computational studies. Finally, some of the synthetic routes planned to obtain the desired potential antileishmanial agents, determined from the molecular docking studies, are presented with the corresponding reactional conditions already performed, indicating all the optimization procedures that might be implemented in the future.

Sustainable chemistry

Biopolymeric microneedles: shaping the future of transdermal delivery and diagnostics

Daniela Fonseca, Carmen S. R. Freire, Armando J. D. Silvestre

In its ever-growing scope, the pharmaceutical industry is shaped by the continuous challenges and expectations of the healthcare system, in the pursuit of more efficient therapeutic and diagnostic strategies. Globally, the transdermal route is considered a friendly approach and a desirable alternative to other forms of drug delivery (DD), is one of the most successful and innovative focus of biomedical research. This field has been synergistically energized by the growing exploitation of microneedles (MNs), due to their minimal invasiveness, painless skin penetration, excellent therapeutic efficacy, and relative safety. During the past few decades, noteworthy advancements have been made by taking advantage of biopolymers for the fabrication of MNs. Research has focused on polysaccharides and proteins as the main resources for MNs fabrication due to their biocompatibility, availability, biodegradability, and renewability. Nowadays, there is an increased awareness of the importance of providing sustainable solutions to build a strong and circular economy. Within this framework, the 17 Sustainable Development Goals adopted by the United Nations Member States reflect the commitment to our planet, now and in the future, and recognize the need to ensure healthy lives and sustainable consumption and production, preserving the environment. Therefore, by combining the knowledge over MNs and the principles and practices of green chemistry, we may hold the key to build an environmentally sustainable society. Therefore, this research is aimed at developing MN systems for DD and fluid uptake using biopolymers through sustainable fabrication processes and therefore, evaluate their properties and biological performance. By contributing with a perspective on the usefulness of different biopolymeric MNs we aim at nurture and accelerate the knowledge of these systems, with both economic and environmental benefits.

Sustainable chemistry

A Novel Osteoporosis Treatment with Coordination Systems

Jéssica Barbosa, Filipe A. Almeida Paz, Susana S. Braga

Bio-Metal-Organic Frameworks (bio-MOFs) are highly ordered coordination systems constructed from metallic centres in coordination with organic linkers. This subfamily of MOFs is characterised by the exclusive presence of biocompatible building blocks in their composition. Moreover, it is not unusual that bio-MOFs are designed to have at least one but preferably both building blocks with nutraceutic or therapeutic action; these offer the pharmaceutical efficiency of their components and a high-drug loading, allowing for drug delivery in large quantities. The present work focuses on the development of new bio-MOFs for the treatment of osteoporosis, a disease with a significant impact on today's society. The materials are designed to combine both (i) the anti-osteoporotic properties of a well-known bisphosphonate

drug (alendronate, used as organic linker); with (ii) the beneficial effects of mineral supplements, such as magnesium, calcium and strontium ions (used as metallic centres).

Sustainable chemistry

Thiazolo[5,4-c]isoquinolines: Synthesis, functionalization and photophysical properties

Letícia D. Costa, M. Amparo F. Faustino, Augusto C. Tomé

Thiazolo[5,4-d]thiazoles (TzTzs) are heteroaromatic compounds that result from the double condensation of dithiooxamide with aldehydes [1]. Characterized by a rigid and planar scaffold, an extended π conjugation and a strong π π stacking, TzTzs also exhibit an outstanding charge transfer ability that make them especially attractive to be applied in the optoelectronic field [2].

Recently, we found that depending on the aldehyde chosen, a different family of compounds, the so called thiazolo[5,4-c]isoquinolines, can be obtained under the same reaction conditions usually used to synthesize TzTzs. First described in 1966 by Taurins and co-workers, [3] the route for the synthesis of these compounds is laborious and requires multiple steps, and perhaps that is why they have fallen in the oblivion. Thus, the one-pot single-step route we discovered by chance allowed us to synthesize a library of simple (one aldehyde) or mixed (two aldehydes) derivatives, starting from commercially available reactants. The chemical identity of all new compounds was determined by NMR, mass spectrometry and, whenever possible, by single crystal X-ray diffraction studies.

Aiming to modulate thephotophysical properties of these compounds we performed some post-reactional modifications, including nucleophilic substitutions, coupling reactions and methylations. The structure as well as the photophysical properties of these new derivatives will also be determined.

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Sustainable chemistry

Fucus vesiculosus phlorotannins: structural characterization and effects throught the digestive tract

Marcelo Catarino, Susana Cardoso, Artur Silva, Nuno Mateus

Nowadays, as a consequence of the globalization phenomenon, the demand and consumption of seaweeds has gained more and more popularity among the Western populations. Indeed, these food sources are endowed with a wealthy nutritional value as well as a great abundance in bioactive compounds with multiple health-promoting effects. Among these compounds are phlorotannins, which are phenolic compounds characteristic from brown algae that have drawn much attention during the recent years due to their large spectrum of bioactive properties.

The aim of this work is to characterize and evaluate the bioactivity of phlorotannin-rich extracts from Fucus vesiculosus throughout the digestive tract.

Sustainable chemistry

Development of an improved microextraction method coupled to high-resolution techniques for assessing the atmospheric variability of water-soluble organic matter composition

Pedro Brandão, Regina M. B. O. Duarte, Armando C. Duarte

Atmospheric particulate matter (APM) is a rather complex mixture of compounds with different traits. In the last years, increasing interest has been laid in understanding the role of the organic components of APM on atmospheric chemistry processes and human health, with a special focus on its ubiquitous water-soluble organic matter (WSOM) component. The total content of WSOM found in fine atmospheric aerosols can vary significantly, with the reported values fluctuating between 10 and 80%, depending on the studied location [1]. Despite the importance of aerosol WSOM, there is still a wealth of knowledge to be revealed about its physicochemical properties and structural composition. Indeed, a great deal of effort has been put on profiling the composition of this organic aerosol component, as this information is crucial to better understand the climate and human health effects of aerosol WSOM.

Typical methods for the extraction of WSOM from APM rely on water-based extraction of the filters, usually assisted by ultrasound or mechanical agitation. Generally, large volumes of water are used to guarantee full extraction of the WSOM, which will be further concentrated by means of evaporation or solid-phase extraction (SPE) methods. However, these concentration methods are prone to loss of analytes (for example due to evaporation of the more volatile compounds or the loss of compounds that are permanently retained in the SPE resin, respectively).

To address this problem, in this work, we developed an extraction device for 47mm filters. This Teflon-based device allows us to extract samples using lower volumes of water (from 1 mL up to 18 mL, against the traditional approach of using 20 mL for 47 mm filters) which will evidently improve the WSOM concentration in the aqueous aerosol extracts. This extraction device is also being combined with an in-tube solid-phase microextraction method to improve the extract's WSOM concentration and, therefore, to allow assessing WSOM composition in periods close to atmospheric variability. At a first stage, and to ensure minimal sample variability, a standard air particulate matter sample (NIST®SRM®1648a) was used for the development of this new methodology. Additionally, each WSOM sample was analysed using advanced analytical techniques, including excitation-emission matrix (EEM) fluorescence spectroscopy and two-dimensional comprehensive liquid chromatography [2] online coupled to fluorescence and diode array detectors.

Sustainable chemistry

Yeast microcapsules: promising drug delivery carriers made by nature

Rita Bastos, Elisabete Coelho, Manuel A. Coimbra

Brewer's spent yeast (BSY) is a major by-product from beer industry. During industrial fermentation processes, yeast cells are subjected to several physical, chemical, and biological stress that induce yeasts modifications and adaptation. With industrial handling, S. pastorianus yeast modifies the cell wall glucans structure to increase cell strength. Moreover, as BSY three-dimensional structure is preserved as a hollow and resistent glucan microcapsule, even after extensive alkali sequential extraction of polysaccharides. As a result, this PhD intends to opene new perspectives for BSY valuation, exploring the basis for developing BSY microcapsule carriers (BSYM) for drug delivery, as a promising platform for non-invasive treatment of various medical conditions. The work has been focused in BSYM preparation, detailed structural characterization and study of its recognition by murine and human cells receptors. The delivery system will be evaluated by entrapping of Naringin in BSYM, a naturally occurring flavanone that significantly inhibits bone loss, improves bone density and promotes stem cell osteogenic differentiation. Naringin clinical efficacy is limited due to its poor in vivo bioavailability and extensive metabolism upon administration. Yeast microcapsules will overcome these problems, providing a promising, safe, and biodegradable delivery vehicle made by nature.

Sustainable chemistry

Iron: a worthy contender in metal carbene chemistry

Vasco Batista, Diana C. G. A. Pinto

Metal carbene transfer reactions hold a pivotal role in organic synthesis, allowing the prompt construction of complex molecules from accessible reagents. Iron complexes emerged as promising catalysts for this reaction, rivalling the reactivity of noble metals with improved environmental sustainability and lower costs. Within this PhD we have worked on expanding the scope of iron-catalysed carbene transfer reactions by either improving upon current processes or discovering new iron catalysts and chiral ligands.

Sustainable chemistry

Polysaccharides as matrix to develop nanocomposites for active food packaging

Zélia Alves, Paula Ferreira, Cláudia Nunes

The increased use of non-biodegradable plastics as food packaging materials, mostly derived from petroleum-based raw materials, has become a major concern due to their production and waste disposal problems. For this reason, a good alternative to meet the increasing

demand for sustainability is to replace the non-environmental friendship plastics by biopolymers, as polysaccharides, since they are biodegradable and come from renewable resources. However, the properties of materials based on polysaccharides need to be improved for a food packaging application, particularly due to their poor mechanical, thermal and barrier properties. To overcome these disadvantages, the incorporation of fillers into the polysaccharide matrix has demonstrated good results to turn these materials more competitive. The aim of this PhD thesis consists in producing an active food packaging material based on polysaccharides with the incorporation of active inorganic fillers. This provide a composite material with optimal mechanical and barrier properties as well as with antioxidant and antimicrobial activities. Apart from these functionalities, electrical conductive film composites will allow the sterilization via pulsed electrical field technology of packaged food, at low temperature, to preserve and extend the shelf-life of food products. Different polysaccharides, namely alginate, starch and chitosan, were selected to design novel sustainable materials as they are abundant, easily extracted from biomass and have a good film forming ability. A set of fillers based on carbon nanostructures, such as multi-walled carbon nanotubes (MWCNTs), reduced graphene oxide (rGO), zinc oxide-reduced graphene oxide (ZnO-rGO), ZnO-carbon, were selected to increase the functionality of the polysaccharide-based films. Furthermore, the use of different surfactants (SDS, CTAB and sodium cholate) allow to improve the MWCNTs dispersion in the polysaccharide matrix increasing the effectiveness of the antioxidant and electrical properties imparted from MWCNTs to the film. The incorporation of ZnO-rGO composite dispersed with sepiolite into alginate films have similar results of antioxidant and electrical conductivity with respect to rGO filler but has the particularity to add antimicrobial activity to the alginate films. The design of innovative and sustainable packaging materials based on polysaccharides with appropriate active agents have an important role to minimize the packaging pollution but also to increase the safety, quality and shelf-life of food products avoiding the food waste.

Sustainable chemistry

Telecommunications MAP-tele

Flexible Mobile Fronthaul for Next Generation Radio Access Network

Akeem Mufutau, Professor Paulo Pereira Monteiro (DETI / IT-Aveiro), Professor Arnaldo Oliveira (DETI / IT-Aveiro)

As the era of 5G mobile network is fast approaching becoming realistic; the research communities, mobile network operators (MNO) and standardization bodies are directing efforts toward improving on the perceived limitation of the first commercial version, specifically in terms of meeting Ultra Reliable Low Latency Communications (URLLC) and envisaged massive machine type communications (mMTC) use cases. Moreover, 5G and beyond network are foreseen to involve heterogeneous communication systems that can support various innovative wireless technologies, services, and applications inorder to support divers use cases.

Nonetheless, the carriage of high speed wireless channels over the fibers presents significant challenges, especially when low latency and low jitter are required. This work therefore focuses on provisioning of flexible mobile fronthaul that could facilitate optimum reduction in latency. by exploiting combination of advanced signal processing , convergence of Optical and Wireless Communication techniques, radio access network architecture and optical transport solutions.

Telecommunications MAP-tele

Dynamic Multipath Routing with Load Balancing in Software Defined Networking over MQTT.

Ehsan Shahri, Prof. Paulo Bacelar Reis Pedreiras, Prof. Luis Miguel Pinho de Almeida

Internet of Things (IoT) is one of the popular technologies in digital communication systems. Message Queue Telemetry Transport (MQTT) is one of the common transmission protocol that is used in this technology. It is a lightweight pushing transmission protocol to collect and transfer data between IoT devices. MQTT as a publish/subscribe protocol is useful and effective to broadcast short messages when multiple nodes need the same data in a limited bandwidth network. Although this protocol provides three levels of quality of service

(QoS) to support data delivery, it can not fully guarantee timeliness requirements.

In this work, we propose a dynamic multipath routing control system with load balancing in Software Defined Networking (SDN) to maximize network throughput and minimize network latency over MQTT protocol. The proposed controller is developed based on Ryu which provides software components to control and manage the network. The performance of the proposed controller has been validated by a set of simulations using Mininet emulator. Simulation results show that the proposed system can reduce transmission latency and improve the standard deviation of latency in comparison with the standard STP over MQTT protocol

Telecommunications MAP-tele

Energy Efficient Virtual Resource Management for Shared RANs

Fatma Marzouk, Joao Paulo Barraca, Ayman Radwan

To provide effective management of networking resources, mobile stakeholders are widely adopting the cloud service paradigm, which exploits SDN (Software Defined Networking) and Virtualization in synergy to provide a flexible and shared computing platform providing new opportunities for Mobile Virtual Network Operators (MVNOs). The research work aims to fill the current gap in Self Organizing Networks (SON) application with regards to 5G and beyond, by harnessing the future emerging technology trends on network virtualization and SDN to provide a cost-effective solution to resource management within a multi-operator networking environment. The virtual RAN constitutes a plethora of heterogeneous networks, including mobile small cells that provide additional user-centric network resources on demand. The unified target of the resource management schemes is the improvement of energy efficiency of the overall RAN, while meeting the MVNOs slice QoS.

Telecommunications MAP-tele

Enhancing QoS awareness in VE environments

Hadeel Abdah, João Paulo da Silva Barraca , Rui Aguiar

Employing Virtualized Edge environment is becoming the emerging trend in Cloud Computing as 5G Telecom operators promise to provide latency-sensitive services for mobile users and envisioning moving the data centers closer to their client as the mean to enable such services.

However, this near-user deployment directly exposes the services to clients' mobility making mobility management more challenging and calling for careful service management to keep SLA limits preserved.

To facilitate mobility management, numerous techniques were proposed. Some of these techniques address task offloading, optimal service migration, in addition to improved handover mechanisms.

In this thesis, we explore the potential benefits of some of these techniques namely service migration and task offloading. We develop new approaches to implement these mechanisms examining different scenarios and taking into account users', service providers', and infrastructure providers' interests.

Telecommunications MAP-tele

Waveforms and algorithms design for use in dual communication/radar systems

Jessica Sanson, Atílio Manuel da Silva Gameiro, Daniel Filipe Marques Castanheira

Radar systems based on orthogonal frequency division multiplexing (OFDM) are promising candidates for future intelligent transport networks because they combine target-estimation functions with communication network functions in one single system. At the present time many studies have been carried out to jointly use the OFDM signal for communication and radar functions, but other waveforms have shown to be possible candidates for communication applications. Therefore, studies on the evaluation of the application of these same signals to radar functions are necessary. In this research, with the intention of demonstrating that alternative multicarrier waveforms can overcome the OFDM waveform in radar-communication systems, we propose the adaptation of the filter bank multicarrier (FBMC), generalized frequency division multiplexing (GFDM) and universal filtering multicarrier (UFMC) waveforms for radar functions. We have also present techniques to improve the estimation and tracking of targets based on the cooperation of the radar and communication functions of the radar-communication system.

Telecommunications MAP-tele

Visible Light Communication Systems Architectures for the Internet of Things

Luís Rodrigues, Luís Filipe Mesquita Nero Moreira Alves,Mónica Jorge Carvalho Figueiredo

During the last decade, everyday objects have been including Internet connectivity, providing additional features that can offer life comfort and increased performance. For instance, a smart temperature control system for a house may consider additional variables, different from room temperature, such as outside temperature changes and room occupancy routines. Although a single system can include such features,

the required information may be already available in the Internet (weather reports and smartphone location, for example). The ubiquitous information is a consequence of IoT, where every objects are connected to the Internet, providing or acquiring data as required.

Conceptually, IoT is a network between machines, humans and the Internet, allowing new system dynamics to improve productivity, energy efficiency and profit while providing comfort and new technology applications. Future IoT networks will require nodes with progressively smaller sizes, cost, complexity and power consumption. Current IoT systems have been adopting RF technologies such as BLE and ZigBee. However, RF IoT systems can present performance issues concerning lack of spectrum, collisions during data transmission, high power consumption and security issues.

Visible Light Communications (VLC) is a technology that uses visible light to communicate and it has been developed during the last years. It provides advantages over RF such as unregulated spectrum, wide available bandwidth, spacial confinement, electromagnetic interference free, among others.

In the context of IoT systems, VLC can improve power consumption, bandwidth reusage and security when used in small network cells such as individual rooms within a building. This work aims at the development of a VLC based IoT system using a hybrid m-CAP/QAM modulation, to allow multiple-user access. The main advantage is that m-CAP does not require the usage of FFT algorithms, which has high power and resources demand. Such modulation scheme makes use of matched filters, implemented with FIR filters, which generate orthogonal sub-bands. Each band is demodulated by an analog homodyne transceiver, allowing IoT devices to have low power, low cost and low size characteristics, desirable in IoT scenarios. At the end it is expected to have a demonstrator using the proposed architecture including several IoT devices, such as sensors and actuators, using LEDs and photodiodes as optical frontends. The devices are connected to a LED light fixture with acts as a gateway.

Telecommunications MAP-tele

Compensation of Long-Term Memory Effects in GaN HEMTs

Pedro Tomé, Telmo R. Cunha, Filipe M. Barradas

Power amplifiers (PAs) based on gallium nitride (GaN) high-electron-mobility transistors (HEMTs) have emerged as the most compelling technology for the transmission of high-power radio-frequency (RF) signals for cellular mobile communications and radar applications. However, despite their outstanding power capabilities and energy efficiency, the deployment of these PAs in the mobile communications infrastructure is often ruled out in favor of alternative silicon-based technologies. One of the main reasons for this is the pervasiveness of nonlinear long-term memory effects caused by thermal and charge-trapping phenomena in GaN HEMT technology. For this reason, in this work we address the characterization, modeling, and compensation of long-term memory effects in GaN HEMT-based RF PAs.

Telecommunications MAP-tele

Territory, risk and public policies

Incorporating climate change risks into Environmental Impact Assessment (EIA) studies of dams

Ana Rita Loza, Dr. Teresa Fidélis

Climate change is having a variety of impacts on our health, ecosystems, and the economy. Its consequences are increasingly being felt worldwide and its impacts are expected to vary between regions, depending on climate, geographic and socioeconomic conditions and some regions are more at risk than others. It is then important to understand specific vulnerabilities and risks and deal with climate impacts in combination with other environmental, social, and economic factors. Dams may be considered vulnerable to climate change due to its sensitivity to changes in climate and its long lifespan. This vulnerability varies with the type and function of the dam, as well as with the current and foreseen climatic conditions of their geographic location. The environmental and socio-economic importance of these structures as well as the consequences involved in an obsolete design or inadequate maintenance operation due to change in climate scenarios, make the analysis of the climate change risks associated its development a crucial task. However, addressing climate change risks at this scale may be challenging. This problematic is acknowledged by a few international organizations that, in response, suggest the incorporation of climate change risk analysis into an Environmental Impact Assessment (EIA) process. The use of this tool to assess climate change risks is also seconded by several authors that exalt its capacity to enhance the resilience of projects to climate change. In this context, guidelines, and recommendations were published and several national EIA regulations were updated to reflect these international advances. The overall purpose of this research is to understand the main climate change risks associated with a dam project and, considering that an EIA is legally required before its approval, at what stages of the EIA process (scoping, impact assessment, public consultation and permitting) and of a dam's development (design, construction, operation, maintenance), the analysis of these risks could be efficiently addressed by practitioners to enhance its resilience to climate change. Additionally, this research will also allow establishing a conceptual model to effectively analyse

climate change risks associated with dams by an EIA process and a set of best-recommended practices when performing such exercise. The main purpose of this research is to provide a guideline to be applied when performing an EIA for a dam project but also to establish a view on the adequacy of the existent regulatory frameworks and public policies regarding climate change, EIAs and dams.

Territory, risk and public policies

The differential approach in disaster risk transfer: a strategy for reducing vulnerability to climate risks.

Cristian-Camilo Lopera, José Manuel Mendes, Eduardo Jorge Barata

Reducing disaster risk vulnerability and enhancing resilience of vulnerable populations are at the top of the socio-political agenda worldwide. This is due to the increase in recurrence and intensity of climate-related events, but also to rapid population growth and failures in strategies for reducing disaster risk vulnerability. In order to reduce socioeconomic vulnerability to disasters, risk transfer has been widely developed in Europe and USA, but it has not included vulnerability in a differential way. Therefore, the aim of this research is to generate a disaster risk transfer model with a differential approach. The model will be applied to territorial units of the regions Pacífico, Caribe or Insular of Colombia to reduce vulnerability to climate risks. This innovative approach will advance the effectiveness of the risk transfer mechanism by taking into consideration the social differences of vulnerable populations in the study area.

Territory, risk and public policies

As comunidades e territórios tradicionais nas estratégias de adaptação ás alterações climáticas – do direito ao plano

Luciana Iocca, Teresa Fidélis, Alexandra Aragão, Cristiane Derani

As alterações climáticas desafiam o modo como a sociedade se comporta e equaciona suas vulnerabilidades e riscos socioambientais associados. Entretanto, alguns grupos sociais são mais susceptíveis a estes riscos, entre eles as comunidades tradicionais por serem mais dependentes dos recursos naturais e diante da relação de pertencimento com o território. Neste âmbito, devem receber especial atenção por suas especificidades e por poderem figurar como contribuintes no processo de proteção ao ambiente e adaptação às alterações climáticas. Esta pesquisa objetiva avaliar a coerência dos diferentes níveis de decisão referente às alterações climáticas e como contemplam a proteção e participação dos territórios e comunidades tradicionais no processo de governança adaptativa. A metodologia de investigação pauta-se em duas vertentes: (i) análise de conteúdo, dirigida aos instrumentos jurídico-políticos; (ii) casos de estudo, realizando-se entrevistas semiestruturadas com membros de comunidades tradicionais do Brasil e de Portugal. Pretende-se que os resultados da pesquisa forneçam contributos para reforçar a integração das comunidades e territórios tradicionais no processo de governança e para o enriquecimento dos níveis de decisão associados

Territory, risk and public policies

Post-fire impact on the water quality of a reservoir: an integrated watershed-reservoir approch

Marta Basso, Diana Vieira, Jacob Keizer, Marcos Mateus

A complete wildfire risk assessment should consider not only the occurrence of the fire, but also the possible damages of the latter on the ecosystem. Those damages, so-called second-order impacts, can include destructive hydro-geomorphic events and water quality contamination. This PhD project aims to test, calibrate, and validate different hydrological models to simulate post-fire scenarios within burned Portuguese catchment, identifying the most suitable one to serve as a base of a wildfire risk assessment at catchment scale.

An integrated watershed-reservoir approach was implemented to assess the impacts of wildfires on the water quality of a reservoir. The study area considered was the river Zezêre watershed and the downstream Castelo de Bode reservoir, area hit by the 2017 fires. Outputs of the watershed model were used as inputs for the reservoir one in order to ensure continuity of the simulation. Results confirm the possibility of a coupled use of the two distinct models. Simulations showed a high deterioration of the water quality at the entrance of the reservoir, overstepping the water quality standards limits, while in at the reservoir wall the contamination does not appear worrisome likely due to the capability of a reservoir of this size to attenuate inflow concentrations.

Territory, risk and public policies

Tourism

Hospitalidade e hostilidade no turismo urbano: Proposta de um novo modelo de turismofobia

Alan Guizi, Zélia Breda, Rui Costa

Por ser uma atividade de considerável importância econômica para cidades e países, o turismo tem apresentado uma série de desafios para os destinos urbanos onde se desenvolve, na medida que o fluxo de turistas e visitantes crescem de modo desordenado ou sem o devido balanceamento sustentável, possíveis impactos negativos merecem atenção, sobretudo àqueles que apresentam desafios à qualidade de vida nos destinos. Neste sentido, Doxey (1975) alerta que, ao passo que o fluxo de turistas crescem em uma cidade, existe a possibilidade da aceitação e apoio ao turismo por seus anfitriões transformarem-se em antagonismo, ocasionando a perda da disposição do anfitrião em receber novos turistas e, em alguns casos, gerando hostilidades e agressividade, o que a mídia de massa tem chamado de 'turismofobia'. Desse modo, o presente estudo possui como objetivo geral de investigação, 'desenvolver um novo modelo de turismofobia em áreas funcionais turísticas (do inglês, precinct)', o qual buscará perceber o momento e/ou condições em que os residentes das áreas turística selecionadas, passarão da aceitação e da hospitalidade ao turista, a um contexto de rejeição, inospitalidade, hostilidades e/ou antagonismo. Para isso o presente modelo em fase de desenvolvimento conta, até o presente momento, com três etapas de análise baseadas nos três contextos de hospitalidade descritos por Lashley (2000), sendo eles: 1) Contexto comercial de hospitalidade: Capacidade de carga dos serviços de hospitalidade do espaço analisado; 2) Contexto social de hospitalidade: Relações ocorridas entre pessoas no dia a dia na cidade e em espaços públicos; 3) Contexto privado de hospitalidade: O limite de aceitação da população aos níveis turísticos do espaço analisado. Para que o modelo seja observado optou-se, até o presente momento, pela seleção das cidades de Lisboa (Portugal) e São Paulo (Brasil), tidas como as principais cidades indutoras do turismo em seus respectivos países o que, desse modo, permitirá análises em dois territórios e dois contextos ou fases de desenvolvimento turísticos diferentes. No entanto, vale destacar que, imprevistos relacionados à pandemia de Covid-19 deverá alterar alguns pontos que outrora seriam analisados, seja no modelo ou na metodologia, sendo estes contextos analisados com atenção em conjunto com os orientadores deste estudo.

Palavras-chave: Overtourism; Hospitalidade; Turismofobia; Precinct; Modelo

Tourism

Tourism and maritime, coastal cultural heritage: a new approach and opportunity

Ana Silva, Filomena Martins, Cristina Pita, Carlos Costa

This research proposal draws attention to a relatively neglected field within tourism research, the duality between the risks coastal and maritime cultural heritage (CMCH) face in the new tourism context and its relevance for destination image. A pragmatic methodological approach, using qualitative and quantitative methods, will be used to study this duality. Based on literature review and data from two projects (an H2020 project on Coastal and Maritime heritage and an FCT project on urban sustainable tourism) a sustainable destination image model will be developed and applied to a Portuguese coastal region (Aveiro) as a case study, allowing a new approach to CMCH that contributes for its sustainability. Interviews will be conducted with key stakeholders, a survey will be applied to tourists´ and to residents in peak season, and two participatory workshops will be held to prepare the proposed model. The proposal addresses the 11th and 17th Sustainable Development Goals (SDGs).

Tourism

Consumo Turístico dos Festivaleiros: Estudo de Caso em Festival de Música

Anaïs Kovaleski, Armando Luís Vieira, Celeste Eusébio

Os festivais vêm crescendo e se adaptando à diversidade cultural evidente de um mundo globalizado e com isso, trazendo impactos diversos. Verificou-se que há poucos estudos sobre os festivaleiros, direcionando as seguintes problemáticas: Quais são suas motivações ao ir/escolher um festival de música? Qual seu consumo no destino e festival? Portanto, o objeto de estudo consiste nas motivações dos festivaleiros ao escolherem/irem a um festival, quais são seus consumos no festival e no destino inserido, para desta forma, obtermos resultados determinantes para os organizadores de eventos e contribuindo para a economia local. Assim, esta pesquisa foi estruturada com o objetivo geral de analisar quais são motivações dos festivaleiros através de suas experiências. Especificadamente, pretende-se: Concretizar

o conceito de festival de música; Identificar e analisar a caracterização das motivações através dos festivaleiros; Identificar o consumo do festivaleiro no destino e festival; Realizar um modelo de motivações turísticas dos festivais de música.

Tourism

Critical success factors for the development of cultural routes in tourism

André Pedrosa, Filomena Martins, Zélia Breda

Cultural routes have been implemented all over the world in the last decades and the Way of Saint James is one of the most well-known examples. However, there is still a lack of research about cultural routes governance. This research proposes to clarify the concept of cultural routes in tourism, as well as their uses and typologies, and to identify their critical success factors. A framework model for routes governance will be proposed based on the literature review and in the analysis of the performance of the Way of Saint James, the European Route of Industrial Heritage (ERIH), and the Traditional Saltmaking: The Atlantic Route (TSAR). The model will be applied to the TSAR in order to be validated and to evaluate the route performance, which has been inoperative since its foundation. Finally, concrete proposals will be made to enhance the performance of the Portuguese section of the mentioned route.

Tourism

O Impacto do Alojamento Local no mercado imobiliário, na cidade do Porto.

António Franco, Zélia Breda

O objectivo do estudo é evidenciar o contributo que o AL, com o seu modelo de negócios inovador, tem no crescimento dos preços dos terrenos e imóveis na cidade do Porto. Esta abordagem ajudará a compreender a importância da componente do turismo no desenvolvimento sustentado das cidades, reflectindo-se no impacto que tem o aumento do número de AL no mercado imobiliário. Comprova-se a relevância dos fluxos turísticos, durante o período de análise, que induz ao aumento da capacidade turística nos AL e que influência o preço do imobilizado dado o aumento da procura deste tipo de bens.

Tourism

Covid-19 impacts on teaching approaches in tourism studies: The case of public higher education in Portugal

Augusto Neves, Orientador Prof. Dr. Carlos Costa (DEGEIT-UA), Co-Orientadora Profa. Dra. Zélia Breda

The Covid-19 pandemic caused significant changes in human behavior and life in society. Among the changes observed, the one related to higher education stands out, where emergency needs and decisions were adopted, in order to avoid the total paralysis of this sector. Considering this scenario, this paper aims to determine how the effects of Covid-19 impacted teaching in accredited undergraduate tourism degrees in Portuguese public institutions. To this end, it is expected to carry out a qualitative-quantitative research, with an exploratory and descriptive character. Through the use of literature review, content analysis and the application of questionnaires, it is expected: to determine whether Covid-19 anticipated/accelerated the process of adopting new approaches, methods and strategies in the teaching of accredited undergraduate tourism degrees in Portuguese public institutions; to identify the short and long term impacts that occurred in the routines, opinions and perceptions of students and teachers, caused by these changes; and, to promote sustainability, innovation and updating in Portugal's tourism public higher education.

Tourism

Determinantes da escolha de meios de transportes por turistas dentro de um destino

Brenno Costa, Armando Luís Russell Vieira

Os impactos do turismo nos destinos tem sua origem no deslocamento de enormes quantidades de pessoas, através dos mais variados meios de transporte. No que diz respeito às pesquisas acadêmicas, há uma razoável quantidade artigos tratando dos deslocamentos origem-destino, mas poucos sobre o deslocamento dentro do destino. O presente trabalho tem como objetivo caracterizar e avaliar os

determinantes de escolha de meios de transporte pelos turistas em deslocamento dentro de um destino, e compreender as razões de uso e não-uso dos transportes públicos neste destino.

Tourism

The power of government policy in Tourism.

Cezar Bittencourt, Carlos Costa

These studies explore the literature that deals with economic analysis in the segment of the Tourism industry, presenting the existence of links between conditioning factors and the performance results of this economic segment. Such analyzes lead to the determination that Tourism as a segment of economic activity, bring real influences such as relevant historical facts in tourist destinations, national and international economic moments, governmental political ideology, interventions by public and / or legal policies, among others.

This exploration highlights important gaps in the literature on how these conditioning factors contribute to the performance of Tourism in the economy of a given location, in particular and which will be the focus of this study, the Interventions by public and / or legal policies that the State can provide to long term, aiming at the final objective the effects of economic development.

The literature review presented in this study on State interventions for public and / or legal policies, are generated predominantly in the legal and public administration areas, but lacking in the tourism area, becoming very useful due to the focus on the economic analysis of the tourism segment, as it is relevant to evaluate investment and the financing system in the tourism sector, in order to understand the philosophy and objectives that guide the entire political system involving tourism.

Tourism

The influence of the Local Accommodation networks on the experience, satisfaction and future behaviour of the tourist.

Diogo Moleiro, Prof. Dra. Maria João Carneiro e Prof. Dra. Zélia Breda

This doctoral thesis project aims to analyze the influence of informal Local Accommodation networks on the experience, satisfaction and future behavior of the tourist. To this end, the following starting question has been elaborated: What is the influence of the network organisation of local accommodation establishments, at destination level, on the experience, satisfaction and future behaviour of the tourist? In order to answer this question a set of objectives has been elaborated, of which we highlight, as main objective: to analyse the existence of a network system of cooperation between the local accommodation establishments and the other stakeholders of the destination, through the creation of a theoretical model that represents the network of the local accommodation and the territory and of a set of research hypotheses, which at the end of the research, it is hoped to validate, according to the results obtained.

Tourism

Crise e Resiliência na cidade do Rio de Janeiro pós olimpíada

eduardo vilela, Carlos Costa, Zelia Breda

O turismo pode ser considerado como uma atividade econômica de alta sensibilidade às mudanças situacionais, motivo pelo qual é percebido como vulnerável a diversos tipos de eventos e crises. Embora estudos recentes confirmem a redução das taxas de violência em diversos países do mundo, constata-se a existência de um processo inverso no Brasil, face aos altos índices de criminalidade, com possíveis impactos negativos na imagem e no desempenho do turismo na cidade do Rio de Janeiro (RJ), objeto de análise do presente estudo. Fundamentado no amadurecimento da proposta do trabalho, se fez necessario estabelecer um alargamento do enquadramento teórico do presente estudo, focado em 6 grandes eixos, a saber: 1 - Análise do desenvolvimento da cidade do RJ, 2 – Fundamentação teórica das crises (estruturante e conjuntural), 3 - Relevancia do turismo no contexto do desenvolvimento economico e social da cidade, 4 – Estratégia de resiliencia aplicada ao turismo no destino RJ fundamentada nos mega eventos, a partir do ano de 2007, 5 – Análise da percepção da imagem do destino face aos investimentos dos mega eventos, 6 - Gestão e comunicação de crise, atrelado as questões da cidade e do turismo, 7 – A crise e possiveis impactos do Corona Virus no destino e no turismo.

Tourism

Tourism and Community Development in Coastal Areas: The Case Study of Lautem Municipality, Timor-Leste

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Tourism and Community Development in Coastal Areas:

The Case Study of Lautem Municipality, Timor-Leste

Abstract:

Coastal areas are considered potential areas for the livelihood of local communities and as a tourism destination for national and international tourists. Because "sun, sea, and sand" have motivated tourists to visit coastal areas, tourism can contribute to the economic performance on the local to the national level. However, often there are also negative impacts that tarnish the authenticity of the destination and the attractions, which can, in turn, reduce the value of tourism. The factors causing the negative impacts on the coastal areas are very complex. However, community development can be an appropriate approach to address these negative impacts and improve sustainability tourism in coastal areas. The success of community development depends on the partnership between all tourism stakeholders and the community itself. Therefore, this study aims to know the tourism and community development in coastal areas through the involvement of community leaders, government, and NGOs in Lautem Municipality, Timor-Leste. The base of community development can be understood through the knowledge, participation, empowerment, ability to be independent, and innovate. To obtain credible results, this study uses qualitative methods, with grounded theory techniques to gather data. The results of the study illustrate that the presence of tourism in the community, with the eco-tourism approach, has a significant benefit in being able to change the community character from subsistence towards more active and maturity forms, creating community awareness to improve their lives through the (i) economy: income generation; (ii) environment: local knowledge for conservation (TARA-BANDU), and traditional fishing for marine protection; and (iii) social-culture: community can access education and health, improving traditional events (Meci-Me), and innovate local gastronomy. Finally, the community can make decisions based on existing knowledge.

Keywords: Coastal, Community Development, Tourism, Lautem Municipality

Tourism

Designing an innovative visitor experience: Story-telling and Portuguese tiles

Ivana Stevic, Zélia Breda

The purpose of this communication is to inform a socio-cultural, liminal tourism innovation case, resulting from an exploratory approach to tourism research that combines various research methods. The research initially adopted the ethnographic approach, consisting in a three-month long presence at an interdisciplinary idea lab. It included direct observation, project pitch, informal conversations and brainstorming sessions with its members. This approach then led to identifying the design thinking methodology, which was adopted thenceforth. Findings suggest that trans-disciplinary constructs and collaborative engagements are powerful tools of transformation, both of and through tourism research, and can result in sustainable innovation practices. The presentation demonstrates how appliance of a multifaceted approach to research can result in a sustainable empirical project that brings visitors, experience story-telling, creative industries, cultural heritage and technology together.

Tourism

O Turismo como indutor de desenvolvimento sustentável: Um modelo de posicionamento, alinhamento e de gestão estratégica de destinos turísticos

Joaquim Pereira, Carlos Costa, Filipa Brandão

A Agenda 2030 é um marco no desenvolvimento global, reservando ao Turismo um papel ativo na construção do nosso futuro comum… agente indutor do desenvolvimento e evolução, tido como "motor" das economias, agregando princípios base de genuinidade… Permite ou tem a capacidade de permitir que as populações conheçam a sua história, as suas origens e que possam reinventar-se e transcender-se (Ramos e Costa, 2017).

O turismo como paradigma moderno de gestão e planeamento…, permite a afirmação dos territórios pela "construção" da sua identidade… com uma visão holística, materializada numa estratégia integrada, permite o planeamento alinhado dos diferentes atores, numa conjugação de esforços com vista a uma maior eficiência e eficácia coletiva… para o desenvolvimento dos povos, para a educação, para a cidadania, para a redução da pobreza, para o aumento das taxas de emprego, para a promoção do desenvolvimento… A ausência de uma política

coordenada e coerente poderá comprometer a capacidade de ajustamento e de resposta… (Costa, C., Brandão, F., Costa, R., & Breda, Z., 2014).

Tourism

EDUCAÇÃO PROFISSIONAL NO SETOR DO TURISMO, HOSPITALIDADE & LAZER no BRASIL: competências dos organizadores de eventos pré e pós pandemia

Juliana Viégas Santos, Ana Dias Daniel, Carlos Costa

Este estudo surgiu a partir de um conjunto de reflexões, durante o percurso como professora do eixo Turismo, Hospitalidade e Lazer, no Instituto Federal de Educação, Ciência e Tecnologia de Brasília – IFB, quando atuei na elaboração e implantação de planos e currículos dos cursos Técnico e Tecnólogo. Ao longo da minha trajetória docente busco compreender os conhecimentos, habilidades e atitudes trabalhadas pelos professores, aprendidas pelos alunos e desejadas pelo mercado de trabalho. O contexto atual, em que o planeta foi acometido por um vírus, chamado coronavírus (SARS-CoV-2), o qual possui um altíssimo índice de contaminação e por isso independente de classe, nacionalidade, raça, credo, ou qualquer outra diferença, toda a humanidade precisou se isolar para se proteger. E o Turismo e os Eventos? Esses foram um dos principais setores atingidos, visto que há relação direta entre fazer turismo e participar de eventos com aglomeração de pessoas, que neste caso significa contaminação, por isso, só ocorriam viagens essenciais e provavelmente o setor de eventos será um dos últimos a retornar a normalidade. Contudo a relação entre a educação, o turismo e o setor de eventos, mesmo na atual conjuntura, precisa ser estudada, analisada, interpretada e atualizada, para que se possa incorporar os aprendizados deste momento histórico e transformá-los em mudanças de paradigmas, que servirão como um divisor de águas. Compreendendo a formação profissional como uma das responsáveis pela construção de competências nos estudantes, e entendendo a relevância da atividade de eventos na cadeia produtiva do Turismo, a pesquisa tem por objetivo geral investigar o desenvolvimento dos conhecimentos, habilidades e atitudes nos futuros profissionais de eventos, pelas lentes dos alunos, professores e empregadores, considerando os momentos pré e pós pandemia. A pesquisa teve como sujeitos de análise três grupos imprescindíveis no processo de formação profissional, o professor, o aluno e o empresário do setor de eventos, ou seja, quem ensina, quem aprende e quem emprega, e utilizou como base a NBR 16513:2016, normativa publicada pela (Associação Brasileira de Normas Técnicas ABNT, 2016) que estabelece no Brasil, as competências necessárias para que os organizadores de eventos atuem com êxito na prestação de serviços do setor.

Tourism

Contributo do storytelling para o reforço do place attachment nos turistas: O caso do Porto

Manuel de Sousa, Rui Costa

Nos últimos anos, assistimos a um vertiginoso crescimento do turismo no Porto, ao ponto de alguns setores sentirem que a cidade estava a perder a sua identidade. Precisamente o Porto que foi sempre conhecido pelo forte bairrismo das suas gentes, tidas como frontais e autênticas, e de um amor inexcedível pela sua cidade. Será interessante apurar se esse apego ao lugar que os portuenses sentem (place attachment) poderá, de alguma forma, ser passado para os turistas. O envolvimento dos turistas em experiências marcantes, nas quais a narrativa da história e das estórias (storytelling) tem um papel central, poderá ser a chave para a concretização desse desiderato. Daí o projeto de tese: Contributo do storytelling para o reforço do place attachment nos turistas: O caso do Porto.

Tourism

Marketing/demarketing em distritos industriais: o caso de estudo de Guimarães

Maria José Magalhães, Carlos Rodrigues, Susana Marques

Este estudo pretende demonstrar que existem medidas específicas de marketing/demarketing relevantes para a construção de planos de marketing no turismo baseado na natureza que ocorra em territórios industriais, resultantes da coexistência de duas atividades económicas frequentemente antagónicas, indústria e turismo, num mesmo território que, sendo um distrito industrial "vivo", tem como atratividades turísticas produtos de turismo baseado na natureza.

O trabalho recorre ao caso de estudo, numa abordagem sistémico-cibernética com uma metodologia mista, sendo o caso em estudo o município de Guimarães.

Da identificação dos pontos de pressão que existem, ou podem vir a existir no futuro, entre os vários sistemas em análise (sistema turístico, sistema industrial, sistema político e social e ecossistema), resulta a identificação dos pontos de possível desequilíbrio do sistema distrito industrial de Guimarães. A adoção de um conjunto de medidas específicas para a elaboração de planos de marketing/demarketing para

destinos turísticos com estas caraterísticas, apresenta-se, portanto, como uma ferramenta essencial para o desenvolvimento sustentado do turismo e da indústria no território.

Tourism

Dynamics and processes of scientific knowledge management for open innovation in the tourism sector: the case of gastronomic tourism

Maria Raquel Antunes, Professora Doutora Zélia Maria de Jesus Breda

Resumo

O turismo gastronómico afirma-se cada vez mais como uma atividade fulcral para a atratividade e competitividade dos destinos turísticos. Sendo os territórios distintos não existe um modelo único aplicável para o desenvolvimento do turismo gastronómico. Torna-se imprescindível inovar, gerindo oferta e procura no sentido da criação de propostas de valor adequadas ao contexto de cada região e que contribuam para o seu desenvolvimento sustentável.

Apesar de estar estabelecida a relevância do criação e transferência de conhecimento no contexto dos sistemas de inovação regional de turismo, na intersecção entre estes e os sistemas de turismo gastronómico as dinâmicas da gestão do conhecimento são um tema sub-estudado, particularmente no que concerne ao conhecimento resultante da investigação científica.

Integrando abordagens das áreas disciplinares de gestão do conhecimento e inovação aberta, o presente estudo propõe-se a explorar as dinâmicas e processos de gestão do conhecimento resultante da investigação científica, procurando analisar como influenciam a performance da inovação aberta em turismo gastronómico.

Abstract

Gastronomic tourism is increasingly relevant for the attractiveness and competitiveness of tourist destinations. Since all territories are different, there is no single model applicable to the development of gastronomic tourism. It is essential to innovate, managing supply and demand in order to create adequate value propositions that contribute to each region's sustainable development.

Although the relevance of knowledge creation and transfer in the context of regional tourism innovation systems is established, at the intersection between these and gastronomic tourism systems, knowledge management dynamics are an under-studied theme, particularly with regard to the knowledge resulting from scientific research.

Integrating approaches from the disciplinary areas of knowledge management and open innovation, the present study aims to explore the dynamics and processes of scientific knowledge management, seeking to analyze how they influence the performance of open innovation in gastronomic tourism.

Tourism

Decisões estratégicas na gestão de marketing de destinos no centro de Portugal - o impacto dos comentários online na escolha dos turistas

Mariana Marques, Professor Carlos Costa (orientador) e professor Eduardo Moraes Sarmento (co-orientador)

The investigation theme is related to destination management and the impact that online comments can have on the establishment of municipal strategies for destination. In fact, there is a gap in the literature, since it refers to the importance of online comments in tourists choices, but there is no clear relationship between online comments and the adaptation of destination management strategies.

Thus, the proposed work is based on surveys of the 100 municipalities that constitute the Portuguese central zone and content analysis of online comments.

Tourism

The importance of training tourism professionals in the development of accessible tourism

Nuno Leal, Maria Celeste de Aguiar Eusébio, Maria João da Rosa

Resumo | O turismo acessível é uma das áreas de investigação que desperta mais interesse por parte dos autores. Porém, grande parte dos estudos efetuados foca a acessibilidade física, sendo poucos aqueles que abordam o tema das relações interpessoais, mais concretamente das atitudes dos estudantes e profissionais de turismo face às pessoas com incapacidade (PCI). Os objetivos desta tese são: i) reportar as práticas e metodologias utilizadas noutras áreas científicas cujas atividades envolvam o contacto com PCI, ii) identificar as competências que os estudantes de turismo devem possuir para lidar com as PCI, iii) avaliar o grau de importância com que as competências são promovidas nos estudantes, iv) validar as competências identificadas baseadas na sua importância relativa para as PCI, v) desenvolver uma unidade curricular de "Turismo acessível e inclusívo".

Abstract | Accessible tourism is one of the research areas that arouses more interest on authors. However, most of the studies that have been carried out focus on physical accessibility, while few addresses the subject of interpersonal relationships, more specifically the attitudes of students and tourism professionals who face people with disabilities (PwDs). The objectives are: i) to report practices and methods used in other scientific areas with activities involving contact with PwDs, ii) to identify competences and skills that tourism students should possess to deal with PwDs, iii) to assess the degree of importance attached to the promotion of these competences/skills in students' education, iv) to validate the competences/skills previously identified, based on their relative importance for PwDs, v) to build an "Accessible tourism" curricular unit.

Tourism

The quadruple helix as an innovation instrument in tourism

Paola Lohmann, Filipa Brandão, Carlos Rodrigues, Deborah Zouain

The quadruple helix has as its presupposition the strengthening of interactions between academia, the market, public management and civil society in favor of the territorial innovation of a destination. The present study aims to investigate the extent to which the collaborative networks of the quadruple helix are triggered as an instrument of innovation in tourism, taking as a case of study the city of Rio de Janeiro, after the realization of the Olympic Games. To this end, a quantitative survey was conducted with 248 representatives of these ecosystem, three years after the megaevent. The results indicate that in tourism there is a significant gap between these different actors for innovation and for the solution of local problems, justified in particular by the excess of bureaucratic processes and lack of vision for the development of projects together. The results show also that the resident has a key role in activating this whole tourism chain, but few actions are directed to him, even today, at a time when tourism should not only be for outsiders, but for everyone. Finally, it is worth remembering that at a time when the world is increasingly connected and the population most active in social networks, by consuming local tourism products and services, the resident gets to know more about the territory where he lives and become an ambassador. He is a natural and publicist of his locality, besides being a potential consumer of tourist products and services in the city, with greater possibility of repurchase, including. In the midst of the economic and political crisis that the city is experiencing, this would be opportune, even if it is necessary to work hard on security in the destination and also the change of mind set, by both businessmen and residents. The article contributes to cover an empirical research gap about this theme and to point out that it is urgent to stimulate stronger integration of innovation ecosystems in order to increase the competitiveness of tourism at a destination, especially after hosting a megaevent. It is also suggested to bring the private sector closer to the Universities, to develop projects and research together.

Tourism

Advancing Sustainability-Oriented Innovation in Tourism: The Contribution of Futures Thinking and Experiential Service Designing

Parisa Behmanesh, Prof. Susana Marques, Prof. Carlos Costa

The tourism industry has been labeled the world's largest service industry. However, it has been long criticized for lagging regarding finding new business logic and approaches with a long-term focus to address sustainability challenges in service innovation processes compared to other industries, as it requires collaboration between various stakeholders and long-term strategies.

While the benefits of foresight for innovation are well established in the literature, research focusing on futures thinking and service innovation in relation to sustainability is scarce and, ultimately, scattered across different research fields. In fact, only limited clues are available that indirectly link futures thinking and SOI. Also, Yet, to date, no theoretical and empirical research focusing on experiential services designing in favor of SOI can be found in the literature.

The current article reviewed the available literature across two fields of experiential services designing and futures thinking with their effects on SOI and establishes a direct synergy between experiential services designing and futures thinking to improve SOI. This synergy creates

stronger improvement in SOI than those two dimensions in isolation. Moreover, this paper develops a framework and fourteen premises that demonstrate the suitability of experiential services designing and futures thinking, individually and in conjunction, for improving SOI.

Tourism

DIASPORA TOURISM - Emigrants as actors in the development of tourism and increase in tourist visits in their home territories in Portugal

Paulo Costa, Carlos Costa

In recent years, increasing attention has been given to tourism practiced by emigrants in their territories of origin, which in the literature assumes several definitions. However, despite the relevance of this market niche, especially in the case of countries with significant emigration, as in the case of Portugal, the same is not yet taken into account in the tourism development strategies.

In fact, Portugal has a long history of emigration, with the period of the financial rescue program (2011 - 2014), led by the International Monetary Fund, the European Central Bank and the European Commission, commonly known as the "Troika", being a particularly special moment. It is estimated that in these years the annual number of departures was more than 100,000, above what happened in previous years, with the particularity of having assumed very different characteristics from those that occurred previously, of which stands out the departure of a relevant number of people with higher academic qualifications, as well as of whole families, including a significant number of school-age children.

Thus, the main objective of this study is to identify the present and especially future potential of these emigrants, with regard to tourism development and in particular the increase in tourist visits in their territories of origin, thus contributing to the adaptation of the policies of these territories to this opportunity, identifying gaps and pointing out solutions that allow them to maximize the positive effects of this segment at various levels.

To this end, a special attention will be given to the characterization, analysis and understanding of Portuguese emigration to different countries in the world, in particular to Europe, during the period in which the country was the target of the planned measures in the financial rescue program (2011 - 2014) , the characterization of these emigrants with regard to their motivations, behavior and preferences as tourists, but also as citizens of their territories of origin, as well as the current tourism development policies of a region of Portugal, namely with regard to the role delivered to their emigrants.

To this end, a literature review will be carried out, focusing on the themes of Diaspora Tourism, Management of Tourist Territories and Portuguese Emigration.

Two studies will also be carried out. One will focus on the Portuguese emigrant community residing in European countries, preferred destinations during the analyzed period, with the aim of perceiving on the one hand the characteristics of this segment as tourists (geographic, demographic, social, economic and cultural characteristics, behaviors and preferences of travel), but also their willingness to participate actively in the development of tourism in these territories. Another qualitative study will aim to analyze the various tourism development plans and political public policies of given region of Portugal, with the aim of understanding the role currently assigned to its emigrants, as well as the availability to be able to give them a different role, as stakeholder of that territory.

KEY WORDS: Tourism Development; Tourism Planning; Tourist Destination; Tourism Marketing; Territorial Marketing; Migration; Diaspora; Emigrants; Influencers; Portugal

Tourism

Proposal for the Development of Slow Tourism in Destinations: a systemic approach

Rafael Bauer, Zélia Breda, Filipa Brandão

BACKGROUND:

This Doctoral Thesis, linked to the phenomenon of Tourism, has as its premise a deep, unprecedented and relevant assessment of a fundamental element, in terms of marketing for the sector, and in philosophical terms for the phenomenon: Time. That said, it should be noted that among the most emblematic modalities with regard to travel, the so-called Slow Tourism (a term used internationally that literally means "Slow Tourism") has emerged in recent years. It is, in general, a proposal to take advantage of travel that challenges the frantic, utilitarian and shallow model of life that prevails in today's society, especially in more developed urban environments. It differs, therefore, from most of the proposals for tourism development and enjoyment applied throughout the history of travel, precisely because it contemplates the central idea of seeking a broader sustainability and competitiveness in terms of tourism supply and demand, contemplating, in parallel such, different dimensions of development, with emphasis on the temporal scope.

RESEARCH QUESTION: Is it possible to develop Slow Tourism in destinations more appropriately from a systemic approach?

GENERAL AIMS: Present a proposal for systemic development of Slow Tourism in destinations

SPECIFIC AIMS:

a) Contextualize the relevance of temporalities to the establishment of new behavioral, marketing and tourism paradigms inherent in contemporary society;

b) Relate in a systematic way concepts of destination, sustainability, competitiveness and tourism governance from the primary perspective of temporalities;

c) Identify the conceptual and market potentialities and weaknesses of Slow Tourism;

d) Propose a new theoretical-conceptual paradigm for Slow Tourism.

THEORETICAL CONTRIBUTION

A more systematic, pragmatic, tangible and holistic discussion of the relationship between human beings, time and travel is sought, essentially within the scope of Slow Tourism.

PRACTICAL CONTRIBUTION

There is a proposal for a more sustainable and competitive development of tourist destinations, which considers the time factor and the systemic approach as fundamental elements.

RESEARCH METHODOLOGY:

The work has as a guideline the adoption of a comprehensive paradigm and a pragmatic execution method. In addition, it was decided to use a triangular methodological approach, also called the Multiple Method.

It is important to note that the present work is mainly based on qualitative research methods, although some elements associated with quantitative methods are also used.

The reference methodological model is divided into 03 main blocks: Break, Observation and Verification.

RESEARCH TECHNIQUES

Literature Review; Exploratory Research; Delphi Technique; Participant Research; Ethnographic Research; Focus Group

MAIN ASSUMPTIONS / HYPOTHESES:

There is a mismatch between social and biological rhythms that affects the quality of life and influences the dimension and dynamics of tourism;

Among the alternative and, supposedly, more sustainable and competitive modalities of Tourism is Slow Tourism;

Slow Tourism needs to be better discussed in theoretical terms and used in marketing terms, so that it represents, in fact, the possibility of a new and relevant paradigm of travel in global terms;

d) There is a spatial and institutional concentration of the Slow Movement that hinders its dissemination in conceptual and practical terms.

AVAIABLE RELEVANT RESULTS:

a) Tourism, as a predominantly widespread phenomenon, has not been able to develop many development proposals based on the sustainability and temporal competitiveness of its destinations and products, making this perspective increasingly relevant in theoretical and practical terms;

b) Slow Tourism is poorly used by official entities linked to the Slow Movement (Slow Food and Cittàslow), which makes its systematization a fundamental condition for its development.

Tourism

Big Data as a source of information for tourism management

Rayane Ruas, Rui Costa, Armando Vieira

Picht of the thesis project whose theme is big data and tourism management. It presents the project's challenges, objectives, and development status.

Tourism

Capacity Development for Destination Communities

Rogelio Flores Jr., Professor Doutor Carlos Manuel Martins da Costa

Capacity Development for Destination Communities

Keywords: capacity development, knowledge networks, partnerships, sustainable tourism

Abstract

Destinations are capitalizing on tourism to reap its benefits and become more competitive. Even though tourism is viewed as a community and economic development tool, stakeholders must understand the significance of developing tourism that is pro-poor, inclusive and sustainable since sustainability is the key to long-term progress and development. Unfortunately, weak organizations, lack of resources, absence of relevant institutions, socio-political constraints and power imbalances between governments and institutions, are some of the key issues or problems that confront several destinations, particularly in the developing world. Capacity development (CD) serves as a tool in bridging human capital gaps and channels the dispersion of development from urban centres to rural or peripheral areas. Furthermore, several studies have shown that strengthening capacities of local people and institutions leads to community empowerment.

This research adopts a 'pragmatic' approach, not committed to any one system of philosophy and reality, while 'mixed' methods, a research approach that bridges the gaps between quantitative and qualitative methodologies is applied, in examining on how knowledge networks and partnerships can be utilized as a core foundation of CD in destination communities; and the roles it play in creating innovation, building capacity and empowering individuals, organizations and institutions, which are vital in developing a practical CD framework for tourism destinations especially in the less developed regions and contribute in supporting the achievement of key 2030 UN Sustainable development goals (SDGs).

Tourism

O papel da educação no desenvolvimento das redes de inovação no ecossistema empreendedor do turismo

Sandra Soares, Professora Doutora Filipa Brandão; Professora Doutora Celeste Eusébio

O papel da educação no desenvolvimento das redes de inovação no ecossistema empreendedor do turismo

Este projeto pretende estudar o papel da educação no desenvolvimento das redes de inovação no ecossistema empreendedor do turismo. Tem como principal objetivo desenvolver um modelo de ensino empreendedor para o setor do turismo.

Esta análise resultou da identificação da importância das redes de inovação no ecossistema empreendedor do turismo e da inspiração para analisar de que forma o sistema de ensino pode contribuir para o seu fortalecimento e consequentemente para o aumento da competitividade das empresas do turismo.

Terá como suporte uma revisão de literatura sobre ecossistemas empreendedores, inovação e desenvolvimento territorial, evolução dos papeis assumidos pelas universidades e outras instituições de ensino: modelos, implicações no desenvolvimento regional e global e educação empreendedora.

Serão desenvolvidos estudos empíricos com base em análise sociométrica, questionários e entrevistas a aplicar na Região de Coimbra.

Contribuirá para a os seguintes objetivos de desenvolvimento sustentável das Nações Unidas: 4 – Qualidade da educação; 8 - Trabalho digno e crescimento económico; Indústria, inovação e infraestruturas; 17 – Parcerias para a implementação dos objetivos.

Tourism

The importance of co-creation of experiences, in museums, for PwD

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Abstract

Museums should be “all inclusive”. This perspective gained importance in the 1990s when museums became linked through social policy agendas (Kinsley, 2016). Disability is considered a minor issue by many people (Shakespeare, 2018; 2016), however, PwD already represent 15 per cent of the world population, which means that there are more than 1 billion of PwD in the world (WHO, 2018). Visual disability is one disability affecting a very large amount of people worldwide. According to the World Health Organization (2016), 285 million people are visually impaired while 39 million are blind.

“Accessible tourism” is a process that allows people with disabilities and the elderly to act independently with fairness and dignity in the enjoyment of goods, services and universal tourist environments” [Darcy & Dickson, 2009, p.34].

The co-creation of experiences is considered a key factor for future growth. Literature highlights the need to involve consumers in the service experience (Baron & Harris, 2010) and remarks that consumers are value co-creators (Vargo & Lusch, 2004). Researchers agree that co-creation requires consumers to be active in the creation of their experiences (Prahalad & Ramaswamy, 2004) not leaving this task solely “in the hands” of suppliers. Therefore, co-creation is a process involving a network of actors where the consumer assumes a crucial role. Some researchers remark the importance of offering co-creative experiences that promote involvement and active participation of consumers in general, and of visitors in museums, and learning is seen as a process greatly stimulated by active participation (Baron & Harris, 2010). Literature also reveals strategies that PWVI adopt to cope with constraints (Vargo & Lusch, 2004) and strategies implemented by museum managers to decrease barriers of accessibility to museums (to sites and exhibitions) and to improve the museums’ appeal – e.g. providing information in Braille, audioguides, sensory experiences.

Despites there is a growing interest on co-creation in tourism, it is centered on some topics and contexts. No study was found that deeply analyses the co-creation in museums, especially in the case of PWVI. Literature on co-creation suggests that the co-creation experience can be influenced by the characteristics of consumers and that different kinds of co-creation generate different benefits (Pine & Gilmore, 1998). This research aims to analyze the importance of co-creative museum experiences for people with visual impairments contribute to generate co-creative museum experiences and maximize the benefits of these experiences, namely regarding social and educational inclusion of these people. The theoretical contributions are: (i) identifying dimensions of co-creative museum experiences to people with visual impairments; and (ii) developing and testing a conceptual model the determinants and consequences of the previously mentioned experiences, which will help to improve them.

Keywords: accessible tourism, disability, visual impaired visitors, museums.

Tourism

A influência dos digital influencers na promoção dos destinos turísticos

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Numa sociedade cada vez mais presente nos meios digitais, as entidades que gerem os destinos, intituladas DMO, investem nas redes sociais e reinventam as suas estratégias de marketing e promoção, focando-se cada vez mais na divulgação do destino turístico através dos influenciadores digitais. No entanto, o termo “influenciador” de um destino turístico é recente, estando o mesmo associado muitas vezes associada a figuras públicas ou a uma determinada rede social. A investigação científica na área do marketing de influência, onde se integram os influenciadores digitais é notoriamente escassa. Deste modo, a tese que se foca nesta temática pretendendo contribuir para a literatura na área do marketing de influência e marketing turístico, podendo ser considerada pela comunidade académica como valor acrescentado.

A presente questão de investigação da tese é: "como é que a parceria entre um influenciador digital e uma entidade pública de turismo poderá dinamizar e desenvolver determinado destino turístico?". O principal objetivo da presente investigação é compreender a evolução e interesse do setor do turismo pela temática do marketing de influência e dos influenciadores digitais, bem como conhecer a forma como este conceito está a ser utilizado na promoção dos destinos turísticos em Portugal. Para tal, foca-se na área da oferta/promoção, procedendo-se a uma análise das estratégias das DMO portuguesas para desenvolvimento sustentável dos destinos turísticos que gerem, a entrevistas tanto aos responsáveis pelas DMO bem como a influenciadores digitais que atuam na área do turismo. E investe-se também no âmbito da procura turística, analisando através de inquéritos online e presenciais aos turistas que visitam os destinos turísticos, a influência dos influenciadores digitais na promoção dos destinos turísticos.

Através da recolha e análise dos dados, analisar-se-á a importância desta estratégia de marketing e a articulação entre os objetivos da estratégia do destino turístico e a comunicação do influenciador digital, e medir o impacto desta parceria no desenvolvimento do turismo sustentável.

Tourism

Translation and terminology

An integral approach to translation and interpretation for collaborative knowledge transfer and specialist capacity building

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Safety and security of people and the environment are global concerns. Global concerns are represented by international organizations and international membership for global responses. Global response requires global connection. Connection requires language. This research applies the lens of translation and interpretation to international organizations with responsibilities for multilingual global response in crisis and emergency situations. Evidence of the gap in multilingual emergency and crisis preparedness is provided and impacts on efficiency of response demonstrated. This work aims to contribute with an integration-based model to assist international technical and scientific organizations in developing multilingual response capabilities. This model is also a contribution to the theoretical and conceptual gap on crisis translation within Translation and Interpretation Studies. The case-study presented focuses on the field of radiological and nuclear risk and emergency communication in Brazil, Mozambique and Portugal and illustrates how profiting from findings from translation and interpretation has the potential to enable connections between technical and scientific and general public expertise and perceptions, bringing to light innovative paths for national and international transformative co-constructed knowledge and specialist capacity-building

Translation and terminology