Researchers of the Month 2016

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1. What are your personal perspectives as a researcher?

A researcher is a person that has the flexibility to work in new, unexplored and interesting areas, but that also has the responsibility to take the most out of its research towards the public, in new services, products, knowledge areas, etc. The research can take a huge impact both in industry, education and the end-user, as it is the basis of innovation in the world. Working and researching in future communication networks, being able to think about the future of the networks, how to connect everyone, every-time and everywhere, working on the services that can be provided through this ubiquitous communication, is very challenging but also very rewarding professionally and personally.

2. In your opinion, what are the biggest challenges in your area of research?

I usually say that I am very lucky to be researching communication networks in an era of revolution of this area. I started my research path when the mobile phones were starting to take place, and after that a great electronic revolution has taken place. At this stage we hear the concept of smart cities and smart places everywhere. To have this concept come true we need to have information about everything and everyone, from the people to the vehicles and sensors around a place, being able to coordinate all the services in a dynamic and autonomous way. The communication networks are very important to provide the knowledge of all the information of the people and things around, being mostly mobile. The research of a communication network that is able to connect people, cars, boats, drones, bicycles, sensors, homes, office, is the main challenge I have been researching in the last years. The services that can be provided through such a network, all the data available and how to use it, is also a big challenge nowadays.

3. Where are the strengths of the UA in your opinion?

UA is very strong in telecommunications since the beginning. The experience we have in UA in this area since the beginning makes us in the forefront of these technologies. From the knowledge and human resources to the lab and real-world experimentation conditions, we have all that we need to be in the cutting edge of the telecommunications research.

4. Could you give one idea to improve research in the UA?

The main aspect that needs to be improved is to provide attractive conditions to maintain our researchers in our departments and research institutes, through good contracts and a clear research evolvement path.

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1. What are your personal perspectives as a researcher?

I feel I have already passed the time in which I was competing for another project, a new idea or source of funding. Therefore, nowadays, I tend to focus my personal objectives in two major directions. The first one is to find practical application for the knowledge I conceive, which means having contracts with major companies in which the research is oriented towards true engineering problems. The second one is to use my knowledge to serve the scientific community, either as a professor or by aiding the younger researchers that work in my team or even by helping the peer review process for major journals and conferences as this is what grants the quality of the scientific knowledge that every day is made available.

2. In your opinion, what are the biggest challenges in your area of research?

The biggest challenge of research in Electrical Engineering is to attract young people. Research consists in studying advanced topics to then propose solutions to unsolved problems. So, it is mostly dependent on brain power, which implies that, without new brains, there can't be any good research. As an example of the lack of new researchers we face, nowadays, I notice that, in my research topic and related fields, there are more offers of research grants than good recently graduated people to absorb them.

3. Where are the strengths of the UA in your opinion?

Using its partnership with the Instituto de Telecomunicações, UA has access to a well--equipped research laboratory on RF electronics. In addition, it already has a group of well-prepared people that offers the necessary critical mass to perform high-level research work on RF electronics. Together, these are the two most import assets of UA in my research field.

4. Could you give one idea to improve research in the UA?

There would be many things I could list to improve research in the UA. But, focusing my attention in only a very practical one, I suggest UA library enters an agreement with IEEE to obtain unlimited access to IEEE Xplore. Having access to papers that were published only after 2005 sounds like electrical engineering has only 10 years of existence or that MSc education provides the whole knowledge developed during the previous 85 years.

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1. What are your personal perspectives as a researcher?

To conduct and disseminate high level research on the impacts of road transportation systems in order to improve the sector (better mobility, less traffic congestion, lower emission levels, less road accidents). Mobility is a need of our daily activities and because it is so close of everyday life, it is an inspiring field. In my research group, I am supervising research on Impacts of transportation systems (Modelling&Analysis); Intelligent Transportation Systems; LCA of alternative materials/ energy vectors for transportation; and Active modes (cycling and walking), with a dynamic group of researchers. In particular, the training / supervision of a new generation of people, is rewarding. Another perspective is the continuous need to foster national synergies and international partnerships in this field; the international experience that I have in institutions outside Portugal (namely in USA), has opened my mind, because I had the opportunity to view the work and organization different groups, experience different methodologies and outlooks that are the basis and requirement for working in an interdisciplinary research field such as transportation.

2. In your opinion, what are the biggest challenges in your area of research?

There are several challenges, I will outline 4:
1) the trade-off among the negative impacts of transportation. For instance, we can implement a technology (on the road or in the vehicles themselves) with the main objective to reduce traffic accidents, but maybe this implementation will negatively affect pollutant emissions (if this change increases accelerations in driving patterns), or will increase traffic congestion;
2) I must emphasize the dichotomy between alternative vehicles / new technologies and human behavior. For example, there are electric vehicles or hydrogen vehicles, but what should be the focus of energy and transportation policies in order to influence consumer behavior. This balance is also present in the "hot-topic" of automated vehicles: where is the line that splits technology and human responsibilities in case of an accident involving these vehicles;
3) big data and transportation. In an era where our personal mobility data can be collected, what can (and should) researchers and decision makers do with this huge amount of data;
4) the challenge brought by the interest on active modes (e.g cycling): the interaction between the different users of the road has still to be explored, namely to decrease the number of accidents involving vulnerable road users.

3. Where are the strengths of the UA in your opinion?

I am fortunate to be associated to UA. UA is very dynamic and has made a great evolution towards becoming a top research and education university.
Involving different areas is essential for a multidisciplinary field as Transportation. In practical terms, since UA is divided in Departments I feel it is easier to reach the people I want to contact. There are many young faculty and researchers motivated and I feel that the bonds between different Departments / Research Units have been increasing in these last few years. In terms of work environment, once I graduated from a "pure" Engineering school (IST of Lisbon), I also felt "fresh air" to be in a University that has several areas of expertise.

4. Could you give one idea to improve research in the UA?

In Portugal there was a relevant reduction in the funding for science in the last years, which caused the end of some consolidated research activities and stopped the career of many young researchers. I think there should be a compromise in Portugal to implement a long-term research policy. So, in order to proceed with the high level performance of the research in Portugal and in the UA, there is the need to protect research, namely with funding to recruit people. Equipment and facilities are important, but nothing is made without human support, so we need more researchers, more PhD students and technicians and administrative personnel (e.g. to give assistance to the development of international proposals).

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1. What are your personal perspectives as a researcher?

To be able to sustain a long term research plan integrated within a dynamic research group/department is one of the most important aspects in my personal view. Well-established structures/laboratories with implemented transfer of knowledge, this within communication and collaboration with a targeted but vast network, are some of the keys towards excellence in research. This is what we tried to do in the stress biology group in CESAM (Dep. Biology). The ecotoxicogenomics lab, for which I am responsible, has currently a well-equipped lab and a team of core 9 researchers (3 post-doc, 6 PhD), all started from scratch in 2006. This is possible in a context of continuous search for funding and active research involving a network of researchers from various complimentary areas (genomics, bioinformatics, ecotoxicology, chemistry, etc.). Presently, the FP7-SUN and FCT NM-OREO contains resources for both a 4 year PhD and 6 year Post-Doc grants, contributing also to the UA human resources flow. The networking will be further developed and support future projects and students exchange, all contributing to the future consolidation and leadership in this particular area of knowledge – ecotoxicogenomics. Last, the consolidation of this area at University of Aveiro is an aim, less than 10 labs exist in the world. A systems biology approach is considered one of the top achievements and covers a wide range of applications, and e.g. clearly envisaged by the EU 2020 horizon.

2. In your opinion, what are the biggest challenges in your area of research?

One of the biggest challenges is to be able to communicate efficiently with the various areas of knowledge. Ecotoxicogenomics is highly interdisciplinary and the languages of each area offer a specificity that is often not easy to process, e.g. bioinformatics with genetics with ecotoxicology. Within nanotoxicology, which is also covered in the group, the involved disciplines include physics, materials science, chemists, toxicologists, image analysis experts, and besides this, various industry and regulators stakeholders. Here one of the challenges lays in providing the right scientific knowledge to industry, promoting safe(r)-by--design technologies and materials, helping a sustainable use of resources while ensuring known environmental risks, bringing the science onto regulation.

3. Where are the strengths of the UA in your opinion?

Here the strengths are in line with the challenges because the UA holds a strong interdisciplinary suite of research areas. For instance the collaboration between various departments of e.g. CESAM and CICECO has been very important in this field of research. Obviously it is also a strength of UA to hold one of few ecotoxicogenomic research groups in the world. UA is also in an appealing geographical location, both in terms of life quality and research growth. Moreover, the possibility I have had to make independent research shows the maturity level achieved and has been not only attractive but also promoting responsible progress.

4. Could you give one idea to improve research in the UA?

Despite the referred strengths I believe that further collaboration should be facilitated and promoted. There is still room for improvement in terms of work conditions (facilities, office rooms, laboratories) which would better attract and keep good resources. Last but maybe ultimately important, the implementation of the announced researcher career in full will be a keystone to improve, maintain and avoid loss of good research in UA. Hence, an implementation of the research career will give the structure and the required support for a successful line.

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1. What are your personal perspectives as a researcher?

Our society depends on how we manage our soils, more than many people realise. Many civilisations in the past have fallen due to mismanagement of soils. Soil (aka the pedosphere) is central in physical geography and has been the 'red thread' in my research. My primary research interest is the interaction between vegetation – soil organic matter – and soil hydrology dynamics. My motivations for doing research are i) scientific curiosity, and ii) usefulness to society. My previous positions tended to focus on either one or the other. I was lucky to have had both motivations during my PhD work, which results were immediately used by the Ministry of Agriculture. Also my various current research activities have both the element of satisfying my scientific curiosity, and the link to society. I have moved around a bit, both physically and regarding research, and I have enjoyed the experiences. Now I'm looking to consolidate and develop my research over a longer time period in Aveiro. Of course, this will depend on the available career opportunities here.

2. In your opinion, what are the biggest challenges in your area of research?

Looking broadly, it is still a challenge to study soils holistically. This is in part because soils form the most complex ecosystems on Earth, but also because relevant time scales are often too long to experimentally observe. Soil scientists come from separate backgrounds, either geography/geology or chemistry or biology or engineering. A degree where all relevant disciplines are integrated does not exist in most countries, including Portugal as far as I know. We study soils by putting experts from different disciplines together in projects, multi-disciplinarily, which is useful, but for true inter-disciplinarily we need more broadly trained scientists as well. The UA is one of the places where this could be realised.

Looking specifically at biochar, the holistic challenge applies here too. In addition, the challenge of relevant scales of space and time is pressing. Biochar's long residence time in soil is of interest for climate change mitigation and adaptation, but it poses real challenges studying the long term effects of a biochar on a soil, and where in the environment biochar moves to and accumulates. This understanding will be essential to develop a sustainable biochar application system.

3. Where are the strengths of the UA in your opinion?

Besides the excellent location of the campus, a real selling point, I think the strengths of the UA are in its open culture that enables collaborations. I have not experienced the 'empire building' of research groups here as much as is often the case in older universities. This is really positive as these 'empires' can really obstruct inter-group collaborations and scientific progress. Another strength is simply the people at the UA. Having dedicated, competent, and friendly professionals in research support positions, makes all the difference.

4. Could you give one idea to improve research in the UA?

I think that the one improvement that would have the biggest impact is to create a more stable career path, beyond temporary contracts and fellowships, for researchers at the UA. A happy researcher with career stability is a more productive researcher, and one that is more likely to publish higher quality works. Uncertainty about career prospects also hinders researchers from investing in building new research lines 'from the bottom up', thereby decreasing the capacity of the UA to respond quickly to new developments in tackling societal and environmental challenges.

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1. What are your personal perspectives as a researcher?

Research is clearly among the top motivations of academics. Research is about analyzing and understanding the world, finding optimal and nice solutions for problems and to contribute to a better world and better societies. For an academic, research is yet the leitmotiv for the other activities.

Based on this assumption I welcome policies that emerge from research, that create new forms of teaching based on the results arising from research, and also that find new developments and innovations with the industry through findings and achievement coming from research.

2. In your opinion, what are the biggest challenges in your area of research?

My main research is centered on Management and in particular on Tourism. Tourism has evolved from a 'mere' social phenomenon and from a minor activity to one of the most prominent research areas. Since the 1960s tourism expanded so rapidly that nowadays it has become the world's largest economic sector, well ahead of the two traditional economic giants: oil production and car industry. Not surprisingly, the academy has directed attention to this emerging area. Over the last 3 decades, and in addition to this economic growth, publications and research projects in the area have mushroomed all around the world. Tourism has clearly become fashionable and growing number of academics from all scientific areas are directing their projects to this field.

3. Where are the strengths of the UA in your opinion?

The UA is clearly amongst the most attractive campus in Portugal and, despite being relatively small, it is one of the best places to conduct research in the world. Notably the architecture, the design, the location and the nearby city are amongst the most important features of our campus. Academics are human beings, whenever they decide where to live, they give particular attention to the living conditions and the individual and family comfort. Therefore, the quality of the infrastructure and its location play a critical role to decide where to live.

Also, and in addition to its physical plant, the campus is well advanced from a technological point of view. Nowadays, the concept of geographical centrality is losing ground to the idea of knowledge centrality... and it is undeniable that the UA has gained ground from a technological and scientific point of view.

The close networking developed with the business and organizations outside the campus is also amongst the most distinctive features of the UA. This pushes academics into some of the most critical challenges they are faced at present: they have to innovate in close cooperation with the 'outside' world, and also they have to re-orient their research to activities that support their research and teaching activities but also that are also responsible for raising new sources of funding.

4. Could you give one idea to improve research in the UA?

One of the main advantages of the UA is its integrated campus. Right from the beginning the UA has expanded its plant and based its teaching and research under the umbrella of a very simple governance: departments that interact horizontally with each other. And there is no doubt that this organization is one of the cornerstones of the UA success.

However, the university of the 1970s and 1980s, with less than 5 thousand students, has given stage to a city of knowledge with more than 15 thousand students, and with worldwide connections.

While it seems undeniable that its horizontal structure should be maintained in the future, and new tiers of government and bureaucratic structures should be avoided, the UA has to strengthen its internal connections and take advantage of the physical and scientific 'proximities' and accelerate forms of internal networking to densify and optimize all its potential. The evolution of research and the emergence of new ways of teaching will clearly depend on the capacity of the UA to innovate and to rediscover itself.

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1. What are your personal perspectives as a researcher?

I´m committed to be and to do excellent research in the field of Materials Science.

I see myself, now and in the future, as contributing to the field by creating and disseminating new knowledge.

I´m committed to contribute to the transformation of some industrial areas within Materials and transfer some of the knowledge generated at the laboratory to the industry.

I would like to see myself as a contributor to break the established and seeding the transformation and inspiring some youngest to be committed to excel themselves in the field of Materials.

2. In your opinion, what are the biggest challenges in your area of research?

My research field lies within Materials Science and I´m engaged in applied research on functional materials for electronics, microelectronics and related applications (memories, sensors and actuators, thermoelectric devices, tunable dielectrics) and more recently for biomedical microelectromechanical systems BioMEMs and BioSensors for diagnosis and tissue engineering. While developing and understanding materials properties is central in many of my R&D activities, transferring knowledge to the industry is becoming increasingly important in my research activities.

In my opinion, a major challenge in this area is related with "size", as size impacts critical mass, funding, excellence and technology transfer, but also with its "intrinsic multidisciplinarity" nature, in the sense that Materials Science though "practiced" by many is not always credit as Materials Science.

This becomes even a major one in Portugal, when "functional materials for electronics, microelectronics and related applications" do not have a significant industrial expression in Portugal.

I also feel that the absence of a long-term research funding and research policy, (that includes priorities and funding opportunities) challenges markedly research in this field and research in general. In some way excellence is attained defining strategy and guarantying continuity.

Last but not the least, being part of a system that lacks incentives and rewards for excellent performers has always been a key challenge.

3. Where are the strengths of the UA in your opinion?

Dimension or size. In this case I see dimension as an important strength. In principle, being a relative small university makes it easier to change and to adapt. Thinking about the University of the Future, in which, interdisciplinarity, adaptability, problem solving approaches, internationalization, will be the "distinctive and survival skills", I feel that we should maximize this unique advantage of UA. Of course this requires strategic thinking, nurturing excellence and the creation of a culture of excellence.

The other strength of UA is the proximity to the industrial tissue and in particular to the one related with materials. Within some of the activities we have undergoing at the Portuguese Society of Materials (SPM) our studies on the impact of materials on the social and economic Portuguese tissue, clearly demonstrate the importance of the Central Region of Portugal in this field. To me UA is ideally positioned.

4. Could you give one idea to improve research in the UA?

One just one... selecting just one is pretty difficult because visible improvements require concerted actions.

However and somehow related to what I´ve said above, and thinking in what I feel will be the University of the Future, leveraging the internationalization of the research at UA will definitely have a strong impact on our R&D activities. I´m referring in particular to foster international partnerships.

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1. What are your personal perspectives as a researcher?

Essentially, research is all about curiosity. Someone can have a great mind for learning or understanding, but if you don't have that basic curiosity to know why, and maybe then make it better, then research is not for you. I am very glad that I have a job where I actually enjoy what I do, and I generally find it extremely rewarding intellectually, creatively and emotionally (definitely not financially!). Problem solving is also an important part of research. I also hope that in some way my research may eventually make the world a slightly better place, and I like addressing issues that I care about politically and personally in my research.

2. In your opinion, what are the biggest challenges in your area of research?

I feel that sustainability and recycling / re-use of materials is a key element, of both our society and our technology. Regarding recycling and re-use, we must really begin obtaining more raw materials from used products and wastes, instead of having a ridiculous system where we are damaging our environment and incurring ever increasing costs extracting raw materials from nature, while we are just throwing away those same raw materials, burying them or burning them.Sustainability means minimising pollution and harmful side effects of our technology on human health and the environment, such as using less toxic reactions and solvents to produce materials, or developing new processes and technologies with less harmful emissions. But this also means minimising waste, encouraging energy and materials efficiency and exploiting sustainable natural products and resources, which can be easily replaced or recovered. Nanotechnology is one area in particular where these issues are currently ignored, and for nanotech to become viable for everyday use in simple applications, it must become affordable, easy and where possible based on aqueous processes. For this reason, I focus on Sustainable Chemistry (SusChem) and Green Nanosynthesis methods.
Also, one major challenge is the ever increasing competition for funding. When I tell someone in industry how much time we spend chasing relatively small amounts of money, they are amazed at how unproductive the whole system is, and say that for a big company the cost of the time spent doing this would make it instantly uneconomic and unfeasible.

3. Where are the strengths of the UA in your opinion?

UA is a top university, especially in my area (Materials Science). It is also one of the best Universities under 50 years old in the world. It has really good analysis facilities and personally I have had a great deal of support from the Department, CICECO and the Research Support Office. We also have really capable, efficient and charming secretarial/admin staff and scientific technicians, which makes a massive difference, and contrasts greatly with some of my former institutions.
It may not be a good thing for the country overall, but the fact that Portugal is a relatively poor EU country makes us more competitive financially and able to supply better value for money for the same level of funding compared to many richer countries.

4. Could you give one idea to improve research in the UA?

I feel that the lack of any clear career progression for researchers in UA is a problem, as in the rest of Portugal. There are almost no new professor posts that open, so that avenue seems non-existent, and yet there are also very few equivalent Researcher positions with any degree of long term prospects beyond a five year contract. It seems that the national bureaucracy and antiquated regulations make it impossible to create teaching or senior researcher positions, and there is very little flexibility on the part of individual institutions. I fear that the recent decisions to change post-doc contracts, along with the end of the excellent Investigador programme, will only make this worse, especially because at the moment nobody seems to know exactly what will happen. A clear, realistic and accessible career structure is required.