GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES

Ayudas Beatriz Galindo para la atracción del talento investigator. Convocatoria 2020.

Anexo II

PERFILES

ANEXO II

CODE	DISCA-1
MODALITY	Junior
DEPARTMENT	Computer Engineering (DISCA)
STRUCTURE RESEARCH	

TEACHING PROJECT PRESENTED BY THE UNIVERSITY

Quantum computing has been a very promising topic in recent years as quantum computers hold the promise to efficiently solve some kind of hard problems that cannot be inherently solved by even current and future supercomputers. Experts all around the world have been developing quantum devices based on different technologies, such as superconducting qubits, ion traps, silicon quantum dots, and Nitrogen Vacancy (NV) centers in diamond. Main IT companies like Google, Intel, Microsoft, IBM, and Alibaba, and numerous research groups are working on building the first universal quantum computer. This requires contributions from several fields of study, including Physics, Mathematics, Computer Science, and Electrical and Computer Engineering. Since Universities and IT companies demand experts that can interface engineering with quantum devices, the need of training quantum engineers is increasing.

As Quantum Engineering is a relatively young field, just a few universities offer a Master's degree or elective courses on quantum topics (RWTH Aachen University, ETH Zurich, TU Delft). In Spain, there is only one Master's programme on Quantum Science and Technology offered by the University of the Basque Country. In addition, there is a high demand from students to become acquainted with such an emerging topic as well as from companies that want to understand what quantum computing is about and how it can potentially be applied to solve their problems.

This need of training in quantum computing was already identified by the Parallel Architectures Group at Department of Computer Engineering (DISCA), which in 2018 created a new elective course called Quantum Computing. This subject is included in the Bachelor in Informatics Engineering offered by the School of Informatics of Universitat Politècnica de València (UPV) . It introduces students to the basics of quantum computing: qubits, gates, circuits, quantum algorithms, and commonly used routines. The fundamental principles of quantum error correction are also presented. In addition, it includes some labs in which students can have some practice using the QisKit software developed by IBM that allows running simple quantum routines on the IBM quantum processors and/or simulators. The Quantum Computing course is a good starting point but not sufficient given the currently observed demand and the expected growth of this discipline. New courses need to be created for students to be competitive

in the flourishing discipline of quantum computing and more precisely of quantum engineering, encompassing current and future needs in both research and companies. The candidate will help with the creation of quantum courses that will strength the list of courses taught by the DISCA Department and will impact different Bachelor's and Master's programmes offered at UPV.
In the short-term, the successful candidate will:
i) Develop a new course on quantum computer architecture, in order to stablish the connection of quantum computing with the field of computer engineering. This subject will be offered as an elective course in the Master's in Computer and Network Engineering at the School of Informatics, strengthening the programme. Optionally, this course could be transversally offered to electrical and computer science students.
ii) Support academic learning of Bachelor students by introducing lectures on quantum computing within the frame of regular courses such as computer architecture and engineering.
iii) Offer quantum topics for bachelor and masters and P.hD's thesis.
iv) Organise global outreach activities (seminars, workshops) to spread knowledge about quantum computing within the UPV academic community.
In the mid-term the successful candidate will:
i) Create strategic synergies with other programmes, departments and faculties within UPV, and other entities of the Universitat de València, to reach a larger number of students, and reinforce the multidisciplinary nature of quantum computing.
ii) Facilitate opportunities for UPV students to engage in international quantum conferences and workshops.
iii) Coordinate an international network of students and faculty members interested in the development of quantum computing.
A long-term vision comprehends the creation of a master on quantum engineering at UPV as it already exists in other very few top-notch European universities.

RESEARCH AND KNOWLEDGE TRANSFER PROJECT PRESENTED BY THE UNIVERSITY

Quantum computing is an interdisciplinary and emerging field of research. It has become an extremely relevant topic, attracting a lot of attention and financial support from both academia and industry as it will have a remarkable impact on science and society. Different high calibre funding programmes, such as the Quantum Flagship (EU funding), are being launched all around the world.
Quantum computing is now a reality. Small and intermediate-scale quantum processors already exist. Some of them are available through the cloud and in which users can run small quantum algorithms. Furthermore, quantum supremacy has recently been demonstrated by Google Research. It is in the recent years, that the challenges in this field started gravitating from the more physics solutions to the more engineering ones. There is then a need of not only to continue investigating and improving quantum devices but also to look at the higher architectural layers that bridge quantum applications to quantum chips, that is, the development of a quantum computer architecture.

The project will focus on the definition and development of such an architecture or quantum full-stack that will provide architectural solutions and guidelines for some of the challenges that quantum systems are facing nowadays. It will not only target current and near-term quantum devices but also future large-scale quantum systems so that insights into the scalability requirements and related bottlenecks can be identified and hence

potential solutions can be provided. In addition, as the architecture closes the gap between quantum applications and devices, application-specific full-stack solutions will need to be investigated.

Given the intrinsic interdisciplinary nature of such a field of research, this endeavour will require expertise from different more fundamental research areas that already exist within the DISCA department as well as other departments of the UPV such as the Department of Computer Systems and Computations (DSIIC) or the Department of Applied Mathematics. These areas include computer architecture, interconnection networks, programming languages and compilers, reversible computation, and software verification, testing and debugging. Furthermore, it is expected that the project will bridge with more emerging research areas.

Therefore, the research on quantum computer architectures will not only benefit from the existing knowledge and research performed at the DISCA department, and more broadly at UPV, which will contribute to its success. It will also open new research opportunities within the UPV as well as at national and international level.

The candidate will develop a completely new line of research on quantum computer architectures within the DISCA department of UPV and stablish links with existing research activities. He/she will need to provide a research proposal satisfying this scientific- technical context, needs and opportunities within the UPV. The candidate is expected to create and lead a research group, attract national and international funding, and supervise thesis. The results of this research will be transferred to the students in a form of new courses, and Bachelor's, Master's and P.hD. thesis.

Although there is not a universal and large-scale quantum computer yet, researchers and companies already started looking at problems that can be potentially solved by relatively small quantum algorithms in the next years. In addition, there is an increasing interest from companies that want to at least understand and prospect what advantages might quantum computing bring to the sector. The proposal from the candidate should also include examples of some parts of the research that could be mature enough (starting to transitioning TRL levels) for potential knowledge transfer to industry and society.

ANEXO II

CODE	DCOM-iTEAM-2
MODALITY	Junior
DEPARTMENT	Comunications
STRUCTURE RESEARCH	Institute of Telecommunications and Multimedia Applications (iTEAM)

TEACHING PROJECT PRESENTED BY THE UNIVERSITY

The educational planning of Departamento de Comunicaciones (DCOM) aims the enhancement of the degree “Grado en Ingeniería de Sistemas de Telecomunicación, Sonido e Imagen”, the improvement of the internationalization projection of the degrees “Máster Universitario en Ingeniería de Telecomunicación” and “Máster Universitario en Tecnologías, Sistemas y Redes de Comunicaciones” and the creation of new bachelor degrees improving the visibility and the leadership position of DCOM in ICT field, all of that carried out thanks to the existing synergies among the research groups and their professors as well as the network of excellence international research groups.

The proposed researcher should provide excellence and international relations, those should be aligned with the educational planning that DCOM aims to carry out in the following years. In detail, the specific skills of the aforementioned degrees that DCOM would like to enhance, update and improve are:

- Capacity for applying advanced knowledge in the fields of photonics, optoelectronics and high frequency electronics
- Capacity for the integration of the technologies and systems concerning Telecommunication engineering in a general way, in multiple and multidisciplinary contexts like bioengineering, photovoltaic conversion, nanotechnology and telemedicine.
- Knowing the fundamentals and the applicability domain of the different theories concerning the propagation of optical radiation. Applying those theories to the design of photonic devices.
- Knowing the materials and fabrication techniques of nanophotonics and designing nanophotonic devices.
- Evaluating the techniques and architectures concerning optical signal processing in optical network nodes and design optical nodes.

Currently, those skill are developed in the subjects: Comunicaciones Ópticas, Redes Ópticas, Photonic Integrated Circuits, Optical Signal Processing, among others.

The DCOM aims the upgrading of these degrees and the subjects related to optical communications and photonics in general, they are key in the education of qualified personnel with required knowledge for the development of future communication networks in the EU, as it is shown in the book: Mission-Oriented Research & Innovation in the European Union, A problem-solving approach to fuel innovation-led growth, by Mariana Mazzucato” edited by the EU. For those reasons in order to fulfill a successful

planning of the education managed by DCOM it is required to incorporate a candidate with sound knowledge in these areas.
Regarding the positive expected impact on the Campus of Excellence on which UPV participate, the present educational project considers the incorporation of the researcher in the Micro-Cluster “Nanomateriales funcionales y nanodispositivos”. In this sense, the candidate should be an expert on those topics, mainly in the field of photonic devices in Silicon, through him promote not only research on those topics but also courses and talks in coordination with his international network of collaborators.
UPV also participates and leads the Campus of Excellence CEI Habitat 5U. This one has as one of its objectives the internationalization, promoting the social aspects and planning and management of the campus. The “Máster Universitario en Tecnologías, Sistemas y Redes de Comunicaciones” is integrated in this campus, the researcher will participate in it and he will boost it. Thus, he will also participate on the la “Cátedra Telefónica Nuevas Tecnologías para el Medio Ambiente y la Inclusión Social” by the implementation of social applications for photonics, with an scope ranging from talks to the general public and joining also already existing initiatives like the project Hypatia () for divulging and promoting science among secondary students. He will also promote new scientific projects with photonics as a basis and with strong social component.

The candidate should be proactive in starting new initiatives for improving the already high visibility and internationalization of DCOM, UPV and its Campus of Excellence. A highlighted initiative is to benefit from the potential of the research groups of the Valencian community in the field of photonics in order to incorporate a new master degree that could become a new double degree together with already existing master degrees of DCOM. This will be carried out by sharing subjects between the two degrees, so the students could obtain the double degree just with a bit more of effort. This double degree would provide the students a high value excellence education of great value for their future professional career, as it is recommended in the EU reports. Depending on the success of this master degree it could be considered the international expansion of it benefiting from network of the researcher, following an Eramus Mundus approach.
Another initiative is the creation of an international MOOC course about advanced instrumentation and photonics for communications, this will provide a lot of visibility and prestige to DCOM and UPV.
The candidate should provide experience in the individualized education of high level engineers, it is expected that he supervised Bachelor, Master and Doctoral Thesis as well as high impact doctorate activites.
Finally, the candidate should be able to speak and write fluently in English in order to teach in that language and increase the internationalization of DCOM.

RESEARCH AND KNOWLEDGE TRANSFER PROJECT PRESENTED BY THE UNIVERSITY

The present project is based on three interrelated topic in the bigger framework of photonics: Analog optical communications, Silicon photonics and Integrated mode multiplexing.

Analog optical communications

New wireless communications standards, like 5G and its future evolution, are generating a paradigm change in information and communication technologies.

However, high bandwidth demands and the steadily growing number of users is provoking numerous technological difficulties on its deployment.The majority of those difficulties are located on the first aggregation stage that interfaces the radio station and the fiber-based access network (fronthaul). The complexity of generating high frequency radio signals together with the sufficient wide bandwidth are the main difficulties. In order to solve that, the use of analog optical communication based on Radio over fiber has been proposed together with spatial multiplexing. In this sense, the present project will develop novel approaches for the optical generation and transmission of radiofrequency signals. Silicon photonics

Photonics based on silicon is a key technology in the development of future optical communication systems, the fact that leading ICT companies like Huawei or Cisco are importantly investing on it is an example supporting it. Launching this research line will focus first on the design and fabrication of new high performance novel active integrated optical devices for microwave photonics applications and multilevel digital optical communications.
Integrated mode multiplexing
The growth of communication systems is imposing a non-sustainable growing rate of bandwidth on current optical networks based on wavelength division multiplexing (WDM). In order to solve that problematic, modal diversity techniques have been proposed implementing Mode Division multiplexing (MDM). Modal diversity opens the possibility of new kind devices that can be implemented either in integrated technology or in fiber-based technology. This project aims the development of MDM systems and devices based on modal diversity in fiber and integrated technology.

As can be seen from the analysis of the presented research project, the foreseen impact on the research structure by the admission of this proposal highly relevant and very positive. Thanks to the strong synergies between the active research lines in the ITEAM and the research project, the inclusion of the proposal within the ITEAM will highly beneficial. Also, considering the high complementary level between the researcher skills and those of the research structure, the integration of the researcher will benefit both parties, as it is exposed in the following. The high complementary level guarantees the viability of the project both in short and medium term through the currently active projects and the available scientific equipment. Nevertheless, the viability of the project in the long term will be assured by attracting new talent as well as both public and private funding. Considering the researcher profile, he will join the ITEAM research group Photonics Research Labs (PRL). Due to the multidisciplinary aspects of the project, fruitful collaborations are expected with the other ITEAM groups, comprised by: Grupo de Comunicaciones Móviles (MCG), Grupo de Aplicaciones de las Microondas (GAM), Grupo de Comunicaciones Multimedia (COMM), Grupo de Radiación Electromagnética (GRE), Grupo de Integración de Sistemas Digitales (GISED), Grupo de Tratamiento de Audio y Comunicaciones (GTAC) and the Grupo de Tratamiento de la Señal (GTS).

It is important to highlight that this project opens the possibility to attracting private funding in the framework of University-Company collaboration contracts. This will contribute to improve the spin-off company ecosystems already existing at UPV. The attraction of new collaboration with companies together with training of specialized technical personnel will strengthen the existing industrial fabric and will increase its international projection.

Currently, the following existing active projects related with the research lines of the present proposal will provide economical viability to development of the research

project: H2020 ICT7-2017-5GPP-762065, COST CA 16220, ERC-ADG-2016-741415, ERC-COG-2016-724663, GVA PROMETEO 2017/103, H2020 MSCA-ITN- 2016-ETN FINESSE, DIMENSION TEC2017-88029- R. Thus, the ITEAM owns the required scientific equipment and know-how that it is available to the researcher.

ANEXO II

CODE	DCOM-NTC-1
MODALITY	Junior
DEPARTMENT STRUCTURE	Comunications
RESEARCH	Nanophotonic

TEACHING PROJECT PRESENTED BY THE UNIVERSITY

The teaching activities will be carried out in the knowledge area of electromagnetic theory and their applications from RF/microwaves to optics. The applicant must drive teaching and learning to the next level by implementing innovative methods and ideas on how to integrate the most recent research results to the educational curriculum. The final goal is to equip students with future competencies to become future-led experts, who can navigate in the ever-changing and complex work life. The department defines two action points to achieve this goal:

First, the latest advances in the research field of metamaterials and metasurfaces and their applications in engineering will be integrated into the curriculum of the programs Degree in Technology Engineering and Telecommunication Systems, Master Degree in Technologies, Systems and Communications Networks (MUTSRC), and Master Degree in Telecommunications Engineering (MUIT). The new content will cover from classical applications such as waveguides, antennas or lenses based on metasurfaces to more recent breakthroughs such as time-modulated materials and novel non-reciprocal devices. This will allow nurturing the contents of subjects such as Electromagnetic Fields, Antennas or Microwaves with scientific hot-topics at the frontier of knowledge.

Second, the teaching project presented by the candidate must also offer curricular alternatives for the deployment of a new master program in Photonics. Within this program, the student will focus on the application of electromagnetic engineering principles and functional systems at the micro- and nanoscale. This multidisciplinary programme complements backgrounds in electronics, materials science, or physics. Photonics engineers are required in industries such as pharmaceutical, energy, consumer products, security, textiles, electronics, and defence. The Polytechnic University of Valencia has a well recognized international prestige in photonics, and therefore it is urgent to improve the teaching capacity in this subject, in order to transform that research capacity also into training capacity that enables the incorporation of graduates to the industry. This master program will encourage the involvement of the student in the research activities of the university.

It is also expected that the candidate will be integrated into the Doctoral Program in Telecommunications, and begin the supervision of doctoral theses on the subject of the proposed research line as quickly as possible. Therefore, a specific seminar on the subject must be prepared, in order to capture students who want to start their research career in this subject.

Additionally, the ability of the candidate to promote the application of the transmitted knowledge to other fields of engineering will be assessed. Undergraduate engineering education today is ineffective in preparing students with the multidisciplinary profile required by companies to become innovative and gain a competitive advantage in this global economy. An optional subject and a seminar devoted to teaching the interaction of matter with waves of different nature - including electromagnetic, mechanical and acoustic waves - will be considered.

RESEARCH AND KNOWLEDGE TRANSFER PROJECT PRESENTED BY THE UNIVERSITY

The new generation of communication systems is expected to allow people and mobile devices more than to communicate with each other. Currently, with the rise of artificial intelligence systems and their integration into communication systems, one can envision new platforms capable of sensing the environment to realize intelligent processing of the information. This new paradigm demands the development of new reconfigurable systems that allow adapting their responses to the environmental conditions and user needs.

Additionally, electromagnetic devices – operating from RF to optical frequencies - for testing and monitoring processes are used in a wide variety of disciplines, including biotechnology, energy engineering or medicine. Here, we could mention optical biosensors, spectroscopy tools, photovoltaic cells or disposable intraorganic monitors, amongst many others. In this sense, the logical trend is to develop more sophisticated electromagnetic structures that enable a higher degree of control of the involved electromagnetic radiation.

Following such demands, this project aims at making use of nanotechnology to create tunable and reconfigurable artificial materials for advanced manipulation of optical waves. It is expected to develop a new generation of artificial thin layers – also called metasurfaces- with the capability to work in different operating modes via high- speed reconfigurability at a subwavelength level. Such devices have potential application as re-focusable lenses, tunable filters, beam steering, and optical modulation. More specifically, the project will make use of the exceptional opportunities provided by nanotechnology to decrease the size of the photonic meta-atoms forming the metasurfaces below the wavelength. Controlling the balance forces at the nanoscale, it is possible to reconfigure the shape of these meta-atoms or even change their mutual arrangement. The two-dimensional nature of metasurfaces will promote integration into compact platforms. During this project, it is expected to produce theoretical breakthroughs and to develop novel modelling tools for reconfigurable and time-dependant metasurfaces. In particular, the realization of reconfigurability via excitation of beyond-GHz mechanical resonances of subwavelength meta- atoms will be addressed. The final goal is to implement and measure all these novel photonic nano-structures making use of the fabrication and characterization facilities available at the Nanophotonics Technology Center of the Polytechnic University of Valencia.

The research proposal must define the specific approaches to achieve the objectives defined in this project. Moreover, the research proposal must include a plan for the establishment of an independent research line and the strategy for rising funding from competitive national and international programs. The applicant must show a scientific

track record showing great promise and excellent research experience in the proposed research field.
The proposal must include a strategic plan to go well beyond the proof of principle stage towards actuals applications and reflect an important technology transfer
activity towards the industry. In this sense, the developed technologies must be attractive and strengthen the Spanish industrial environment.
The main research milestones for the four-year project are the following:
• The candidate will be integrated in the Communications department and the Nanophotonics Technology Center for lecturing and research duties, respectively.
• The distinguished researcher must obtain funding from European, national and regional competitive programs.
• The research results must be published in high-impact peer-reviewed scientific journals in the disciplines of Optics and Electric Engineering.
• The possibility of protecting the intellectual property of certain research results through patents will be assessed.
• The candidate must promote the visibility of the group at an international level and promote collaboration with other prestigious research centres around the world.
• The research results must be applied to actual applications and transfer to industrial partners will be encouraged.
• The creation of spin-off companies to exploit the research results will be considered in collaboration with the appropriate services at UPV.
• The applicant must supervise master and doctoral students.
• At the end of the project, an independent and self-sustained research line led by the candidate must be established in the university.

ANEXO II

CODE	DCOM-iTEAM-1
MODALITY	Junior
DEPARTMENT	Comunications
STRUCTURE RESEARCH	Institute of Telecommunications and Multimedia Applications (iTEAM)

TEACHING PROJECT PRESENTED BY THE UNIVERSITY

In the context of the expansion and consolidation of the Universitat Politècnica de València as an academic centre of reference in Spain and Europe in Information and Communication Technologies (ICT) and to provide training of excellence to new generations of engineers with technical training and able to meet the needs of the digital society to come, this academic year starts the new Degree in Digital and Multimedia Technologies (GTDM) on the campus of Valencia in which the Department of Communications will provide a significant proportion of teaching.

This new degree forms part of an ambitious ecosystem of engineering degrees oriented towards audiovisuals and technologies for the digital society offered by the UPV:

• Degree in Digital and Multimedia Technologies (ETSI Telecommunications)
• Degree in Telecommunications Systems Engineering, Sound and Image (ETSI Telecommunications).
• Degree in Interactive Technologies (EPS Gandía)
• Master in Acoustic Engineering - WAVES (EPS Gandía)

The GTDM represents a fundamental complement given the growing demand for interdisciplinary, technical engineering profiles that specialize and perform well in both basic information and communication technologies and multimedia and digital creation applications. This and the also new Degree in Interactive Technologies offered by EPS Gandía demand a very specific teaching profile that cannot always be covered by another type of ICT teacher more specialized in cable/radio/optical communications and not so necessary in these new degrees. Moreover, the Master of Acoustic Engineering of EPS Gandía starts this year a new experience of internationalization, which supported by the European Union through the Erasmus Mundus program with an important funding, aims to coordinate the studies with other 3 European Universities. The new master's degree will be called WAVES, and it aims to be a reference degree at European level. This new context of educational provision will require highly specialized teachers who are up to the highest European standards in master's degree teaching.

Interactive audio, acoustics and sound synthesis in the new degrees

Due to the general characteristics and subjects that make up this ecosystem of grades, it is obvious that the offer in interactive audio, acoustics, and sound synthesis for application in multimedia and digital environments must be broad and of good quality.

Degree in Digital and Multimedia Technologies (ETSI Telecommunications)

This title focuses on multimedia systems and basic technology in the entire multimedia lifecycle (creation, distribution, operation). Along with image, sound is a fundamental pillar for the degree. Currently, the relevance of audio goes beyond the classic contexts of creation and distribution such as music, television, or cinema, and new digital media applications such as video games, interactive installations, or virtual reality are opening up. Thus, this degree should be able to offer students the opportunity to deepen in aspects of interactive audio, real-time synthesis, and 3D audio resulting from direct application in contexts of creation and operation adapted to the new digital society. Some specialized audio content already appears in the curriculum as core subjects, but others will have to be developed as optional subjects that will be offered progressively.

Degree in Telecommunications Systems Eng., Sound and Image (ETSI Telecommunications)

Within the curriculum defined for the classic degree of Telecommunication Engineering, in the Sound and Image intensification currently must take 6 subjects related to sound and acoustics. In recent years this intensification has been consolidated and the corresponding teaching laboratories have been set up. However, the frenetic pace of change that these technologies are undergoing today makes it necessary to continuously renew subject programs, laboratory practices, and audiovisual equipment. In this direction, the incorporation of teachers who are experts in advanced audio systems and techniques will be very beneficial.

Degree in Interactive Technologies (EPS Gandia)

In this degree, which presents some contents which are closely related to those projected for the GTDM, it is much more oriented to interaction technologies and their application, and not so much to the multimedia lifecycle. In addition to its relevance in creative contexts related to interactive audiovisual installations, auditing and displays to provide synthetic vision of data or design audio interfaces for the visually impaired, the strong push that new generation video games and virtual or augmented reality are currently experiencing as platforms for development and experimentation in the field of human-computer interaction in three-dimensional environments generates basic knowledge needs in interactive sound synthesis and 3D audio that must be reflected in teaching.

Master in Acoustic Engineering - WAVES (EPS Gandía)

The Master in Acoustic Engineering will be internationalised from the 2020/21 academic year onwards in collaboration with 3 other European Universities. Within this program, the EPS of Gandía will be in charge of teaching (in English) in the areas of fundamental knowledge in numerical methods, psycho-acoustics, electro-acoustics, room acoustics, ultrasound, music acoustics, and underwater acoustics. Among these subjects we find "musical acoustics", and this very specific field does not have at this moment specialized teachers at the UPV. This creates a very specific teaching profile at this point.

Needs of the Department of Communications

The Department of Communications (DCOM) will have to address many of the teaching needs that appear in the four titles discussed. It is a department that covers practically all telecommunications, but in view of the teaching requirements of these titles, a need will arise for profiles related to multimedia and especially sound. These profiles are needed, especially, to face the gap between basic technology and its application in creation and interactivity, and very specifically in virtual reality, which is called to become the new great digital platform of the future of communications, interaction, and business. The ITEAM audio group, with experience in the field of sound for over 25 years and a national reference in 3D audio, can serve as a host for a new teacher who would support the existing ones. This is a group that, despite being a

national leader, is for now reduced in size and may be overwhelmed by the new teaching needs that are coming. A new teacher and researcher to be integrated into the ITEAM could lead the mission of successfully tackling some of the more specific teaching issues demanded by the qualifications of this new ecosystem.

By incorporating the teacher into the ITEAM audio research group, subjects taught could be focused on topics close to the research being carried out, putting students in contact with living problems. Especially for final years of Bachelor or Master courses, it is ideal that there is not a very clear dividing line between research and teaching: suitable teachers should be at the forefront of research in those fields related to the subject matter they teach in their courses. Given the current context of teaching needs in interactive sound, 3D audio for virtual reality, and musical acoustics, a research profile of these characteristics would be ideal: students could be incorporated into the university's R+D or into the audio companies with which the teacher

incorporated into DCOM-ITEAM is already collaborating, which could perfectly be the case in the province of Valencia with e.g. DAS Audio, Beyma, Equipson, etc. or on a more international scale if the research teacher can attract external collaborations.

National context

The teaching of basic technologies for sound and acoustics is little represented in the Spanish Universities as a whole. If we attend to more avant-garde topics such as 3D audio and interactive sound for virtual reality, we find practically no related university studies. The closest is in the field of music computing, where the Universitat Pompeu Fabra and its degrees in interactive systems, multimedia, and Sound and Music Computing are a reference and attract many international students. Although they do offer 3D audio as an elective subject in some of their intensifications, this teaching is disconnected from the audio research carried out there, which is today far from acoustics by physical principles for sound synthesis and more oriented to the use of spectral techniques of sound analysis and big data for classification and music recommendation. Thus, the strengthening of the UPV's teaching in the fields of interactive sound, musical acoustics and 3D audio for virtual reality can place it at the forefront of the country. The launch of the WGDM and its fit into the new ecosystem of degrees oriented towards technologies for digital creation in new audiovisual media represent an excellent opportunity to attract teachers who can begin training in real-time sound synthesis and 3D audio for virtual reality applications and thus distinguish the UPV in this field. Profile of the candidate

The teaching candidate, who is also expected to be at the forefront of research in digital signal processing techniques for application in interactive sound synthesis in digital and music creation environments with a focus on 3D audio and virtual reality, must have international experience in this type of teaching at prestigious universities, have supervised students who have completed bachelor's or master's theses in this field, and be able to teach in English.

Beyond having the capacity to teach basic technologies for audio, such as those already planned for the WGDM and the other degrees (for example, musical acoustics), it would be interesting for the teacher to lead the implementation of a subject on interactive audio that is oriented towards synthesis and programming in real time, with 3D audio and virtual reality components, allowing to bring the audio and sound synthesis technologies closer to their application for digital creation and interactivity. The course should be eminently practical and oriented to the acquisition of technical skills through the early application of concepts in the development of group and multidisciplinary projects, so that in turn enhances the acquisition of transversal skills such as self-learning, teamwork, and achievement of objectives.

The ideal candidate will join the faculty of the DCOM, and must meet the following requirements:

• Have advanced knowledge in digital signal processing, musical acoustics, and its applications for real-time sound synthesis and 3D audio.
• To have experience in interactive sound research and practical applications of sound creation by digital means (e.g. sound synthesis by gesture control).
• To have taught on topics related to digital signal processing applied to interactive audio and/or sound synthesis at prestigious universities.
• Be willing to implement a practical course on sound synthesis and 3D audio with a view to interactive applications, real time, and virtual reality.
• Be able to create teaching materials and teach in English.

RESEARCH AND KNOWLEDGE TRANSFER PROJECT PRESENTED BY THE UNIVERSITY

The Universitat Politècnica de València is considered in international rankings as the best Polytechnic University in Spain. In its half century of existence, it has become a pole of attraction for Information and Communication Technologies (ICT) within the context of the digital society. The beginning of the Telecommunication Engineering studies in 1987 and the exit of the first promotion in 1992 meant an important relaunch of the UPV and an optimal preparation of it for the entrance in the 21st century.
ICTs, and with them telecommunications engineering, have evolved prodigiously over the past decade. If cable transmission and radio communications were the fundamental pillars in previous years, new digital technologies centered around the user and around information, or supported by the Internet such virtual reality, mobile devices, the study of human-computer interaction, or artificial intelligence, will monopolize a large part of the challenges that the so-called "information age" invites us to face in the coming decades. Virtual reality as the new big digital platform
Among these technologies, virtual reality (VR) has the potential to become the next great digital platform for communication, entertainment, and business. As with the PC and smartphone, RV is expected to lead to the creation of new markets and radically transform some of the existing ones. Beyond its use for video games, it is easy to find examples of how RV can change many other everyday contexts and activities such as visiting and buying a house, attending a concert or a sports event, distance learning, interviewing and remote teamwork, or medical rehabilitation treatment. Not only that, but new opportunities for human interaction, expression, and collaboration will be created that we cannot imagine today. Although RV is young and still in its early stages of development, the advances in computing power over the last decade and the increasing affordability of Head Mounted Displays (HMDs) and other dedicated mobile devices are triggering a groundswell of interest in the marketplace, and it is no wonder that major technology companies are committing massive resources to take the lead.
The importance of 3D audio and sound synthesis in the coming virtual reality Currently, and perhaps due to the efforts in computer graphics that the film and video game industry has made in the last 20 years, the visual component of VR is much more developed and closer to maturity than the sound component. And it is becoming clear that, in order to make the leap, realism in RV cannot be limited to images alone: in three-dimensional interactive contexts, if what is being heard does not convincingly match the images, the RV experience suffers severe

degradation and the sense of immersion and realism worsens considerably. To give a simple example, the importance of the sound component of RV becomes obvious when we consider how people orient themselves in space: in contrast to vision, hearing allows

us to perceive instantly from all angles, and that plays a crucial role because it gives us clues about what we don't see but is happening in our environment. In order to create a credible real-time virtual acoustic reality, it is now imperative to simulate in real time the directional sound emission (acoustic radiator models), the means of propagation (room models and material absorption), and the human perception of sound (models of the ear and head) in 3 dimensions, dynamic conditions, and in an efficient manner.
Thus, VR has recently generated a renewed interest in applying digital signal processing techniques to develop efficient and flexible methods of interactive sound synthesis by physical principles, directional 3D audio, and virtual room simulation. In fact, companies such as Facebook/Oculus, Google, or Microsoft are significantly increasing their investment in creating laboratories and opening up lines of research on virtual acoustics and 3D spatial sound, subjects that a few years ago were much more restricted to the academic environment.
The UPV and the future of 3D audio for virtual reality in Spain
In Spain, research groups focusing on 3D sound and virtual reality are rare, and especially small in size. This is a handicap when it comes to competing with much larger and better-endowed groups from other European countries. However, among the national groups, the Institute of Telecommunications and Multimedia Applications (ITEAM) hosts the best 3D sound laboratory in Spain, and the next few years will be key in the introduction of 3D sound in VR. In the context of the UPV and in conjunction with other laboratories such as LabLENI that are already working on the visual component of VR, ITEAM is today presented with an excellent opportunity to take a further step in 3D audio and launch into interactive sound in VR, thus helping to make the UPV a national reference in base technologies for VR applications.
ITEAM offers the best natural context at a national level to lead the interactive 3D audio for the coming VR, which will undoubtedly require working on sound synthesis by efficient real time physical modeling and flexible methods to simulate virtual spaces under dynamic conditions. There are other Spanish universities working on acoustic and sound issues, but none of them meet the conditions offered by the UPV for the convergence of acoustics, digital signal processing, 3D audio, and VR applications. For example, both the Technical University of

Catalonia and the Technical University of Madrid work mainly on acoustics and vibrations for noise analysis and industrial safety, without direct applications in 3D audio synthesis or VR; on the other hand, at the Pompeu Fabra University research is done on sound analysis and processing for music classification and interactive applications, but they are not interested in virtual acoustics, 3D audio, or sound synthesis by physical principles; Finally, although the University of Málaga does research on user interaction in 3D environments and has recently incorporated an audio component, it does not have spaces or equipment for recording or reproducing 3D audio, nor does it have the know-how that has been generated at the UPV on 3D audio over the last two decades.

Even so, to make the definitive leap to interactive VR audio and to be competitive nationally and internationally, the ITEAM 3D sound group is going to require a large human investment. On the one hand, the theoretical and practical know-how acquired during the last years in 3D audio will have to be transferred to advanced VR applications, and this will require multimedia and interaction profiles that include advanced applications as case studies. On the other hand, given the calculation limitations imposed by HMDs and other mobile devices, it will be necessary to work on efficient methods that allow low-cost interactive 3D sound synthesis. Profile of the research candidate

The incorporation in this call of a multimedia-oriented researcher, but with an interest in real-time sound synthesis and interactive 3D audio may be key to the advancement and consolidation of ITEAM in this field. Furthermore, the integration of the researcher's teaching in the new Degree in Digital Technologies and Multimedia in the ETSI of Telecommunication of the UPV can be of great help and create synergies by having students trained in this line that can be incorporated into R&D in the near future.
The research project will focus on the study of signal processing techniques to process and synthesize spatial sound and 3D audio efficiently and in real time, with a focus on interactive multimodal applications for the creation or dissemination of VR content, such as music creation and/or practice with musical instruments in VR. In this direction, aspects related to the perception of directional sound in VR under movement conditions, sound propagation and reverberation in virtual spaces, and sound synthesis by physical principles that facilitate interaction by motion capture and/or gesture control are of interest. The research should have a practical and experimental component involving usability evaluations with HMD and motion control.
In particular, the candidate should work in some of the following areas:

● Modeling, simulation, customization of HRTF through machine learning.
● Simulation of sound propagation in interactive environments, intelligent wavefront prioritization systems to reduce computational cost.
● Flexible and efficient acoustic room models, e.g. based on dynamically adjustable recursive digital filter structures, for integration into VR space design and incorporating acoustic coupling between virtual rooms in complex spatial environments.
● Sound synthesis by physical principles for the simulation of directional sound sources in interactive 3D audio environments.
● Advanced applications and new interfaces for interactive creation and expression with VR sound, emphasis on music or virtual musical instruments. The
general requirements for the candidate profile are as follows:
● Fulfill the requirements that the call imposes to the category "Junior".
● To have the intention of contributing to research excellence at the UPV and to show commitment to permanence.
● To have acquired international research experience in prestigious centres in the field of interactive sound synthesis and virtual acoustics.
● To propose work in harmony with the lines of research set out above, which can be carried out in the initial 4 years of the call's contract, and which also allows interaction with other ITEAM researchers and synergies with other departments.
● Have a good record of scientific publications, suitable for the "Junior" category.
● Have experience in supervising graduate students who have done research work.
● To have experience in public and private funded research, and previous contact with the audio and/or sound synthesis industry.
● It should aim to obtain public funding to support its research.
● Be willing or oriented to attract contracts with prestigious international companies in sound technologies and/or interactive music and/or VR applications.
● Have experience and/or intention of general intellectual property.

ANEXO II

CODE	DTA-1
MODALITY	Junior
DEPARTMENT	Deparment of Food Technology
STRUCTURE RESEARCH	

TEACHING PROJECT PRESENTED BY THE UNIVERSITY

The candidate will enrich the teaching offer of the Department of Food Technology (DTA), in the area of food chemistry and biochemistry, by complementing the contents of the chemical subjects, such as chemical transformations in food processing, chemical composition of food, food technology bioprocesses, integrated laboratory, ... with expert knowledge in the field of reformulation and innovation, involving other areas such as consumer science, sensory perception , business planning and market analysis. The candidate's profile is adapted to the real needs of the DTA and will contribute to improve and implement the program both in theory and laboratory lessons in the Bachelor's Degree in Food Science and Technology, in the Master's Degree in Management and Food Safety, and in the Master's Degree in Food Science and Engineering. The candidate will contribute to the subjects taught in the aforementioned areas an innovative and practical approach oriented to study and meet the current industrial and consumption needs of society, and will help to meet the growing demand for foreign language teaching requested by both national and international students.

This will contribute to the training of technologists capable of detecting the current problems and challenges facing society and finding new solutions and approaches. Due to the characteristics of the profile, the attraction of students will be promoted in order to carry out a relevant research and impact on the DTA (through the development of bachelor's degree, Master's, and Doctoral thesis), as well as to train Future University teachers. In addition, the recruitment of foreign students will also be enhanced through programs funded by the European Union, so that they can carry out TFG and TFM in collaboration with the department, thus promoting international competencies.

ADDITIONAL INFORMATION

The candidate must demonstrate:

Leadership, independence, creativity, adaptability and experience in the development of teaching material.
Participation as Principal Researcher in research projects of national scope. Participation in European projects will be also valued.

Ability to transfer knowledge to the companies. Participation in contracts or projects with companies.
Management and supervision of bachelor’s degree, Master's, and Doctoral thesis.

RESEARCH AND KNOWLEDGE TRANSFER PROJECT PRESENTED BY THE UNIVERSITY

Research in the Department of Food Technology (DTA) includes all aspects related to agrifood processes and products, from design to quality assessment using conventional techniques and innovative non-destructive techniques. Environmental aspects are also addressed by DTA researchers. Therefore, it is an interdisciplinary group of researchers, who study from the design and development of new foods, using different ingredients and raw materials to obtain healthier foods, until in vitro digestion in order to evaluate the bioaccessibility of different active compounds present or incorporated into new foods. However, a crucial aspect in the design of new foods, which is not addressed in the DTA, is food oral processing. Oral processing is essential for consumers' appreciation of the texture and taste of food, which determines their acceptance and purchase intention. The consumption of a food inside mouth involves various oral operations, including first bite, chewing and mastication, transportation, bolus formation, swallowing, etc. Exact mechanisms and governing principles of these oral operations are still not fully understood, despite of continuous efforts made by scientists from food, psychology, physiology, dental and clinical studies, and other disciplines. The complexity of oral processing must be analyzed in relation to the structure, rheology and mechanical properties of food. Oral food processing is one of the hottest topics in food science and its development in recent years has been enormous involving multiple disciplines through in vivo, in vitro and in silico approaches.

The study of oral processing along with consumer studies would reinforce the transfer of knowledge and the university-companies relationship, since it would allow to know the appreciation that consumers have of certain reformulated foods and their purchase intention.

In this context, there is a need for a specialized researcher focused on the development of a suitable set of tools (oral processing, rheology, texture, sensory perception and consumer acceptability) to collaborate with companies and food organizations in food reformulation projects. This will have a positive impact on public health by changing consumer options to healthier options, and also in the food industry improving their market position.

The new researcher will complement DTA research in the areas of food oral processing and consumer studies, which will allow additional marketing studies for the implementation of business plans in the food industry.

ANEXO II

CODE	DFA-CBIT-1
MODALITY	Senior
DEPARTMENT	Deparment of Applied Physics
STRUCTURE RESEARCH	Centre for Biomaterials and Tissue Engineering

TEACHING PROJECT PRESENTED BY THE UNIVERSITY

The University Polytechnic of Valencia (UPV) it is a public prestigious institution, as reflected by the latest national and international rankings [1]. This is due to the hard work of the professors and researchers that are part of the university community. In the last years, UPV has being able to support professors and researchers to achieve highest international recognition, as was able to appeal talented professors and researchers from international research centers and universities. The last one has been possible only to specific programs installed to attract accomplished researchers to UPV, namely, UPV programs [2], the GenT plan from Generalitat Valenciana [3], the Marie Sklodowska-Curie actions [4], or the previous Beatriz Galindo calls [5], among other initiatives.

In this way, to maintain the highest level of teaching and research at the UPV, first it is required to ensure the teaching and researcher career for the personnel trained in the University itself, creating opportunities to carry out teaching and research internships in recognized international institutions, articulating mechanisms that allow the return of the knowledge gather during these internships, as well as appeal distinctive and internationally recognized researchers and professors. The latter is what is intended with this proposal for the call for Beatriz Galindo grants del Ministerio de Educación y Formación Profesional.

Specifically, this proposal aims to attract teaching talent in the field of applications of smart materials to be imparted in the Department of Applied Physics of the UPV. As previous stated in the teaching project of this proposal, smart materials are material with one of more properties that can be modified in a controlled fashion by external stimuli, such as mechanical stress, temperature, humidity, pH, electric fields or magnetic, light, etc. This is not a new research field of knowledge, but we can assure that it has experienced great advances in the last years; developing an important research work that has given rise to new knowledge and multiple and new technological applications. In this way, this is an area of teaching knowledge that must be intimately linked to research, to ensure a direct transfer of this new knowledge and discoveries to students of engineering, so that they can acquire training in this advanced field of knowledge, and thus enhance the translation of the results of the investigation into society.

This is a multidisciplinary research field, where engineering, chemists, physicists and mathematicians work complementary, but in particular, it is a very appropriate area of knowledge for its incorporation into the physics subjects programs that are given in the

different UPV titles, and also for the development of new courses by the Department of Applied Physics that incorporate this theme as the central core of its content.
Further, to carry suitable teaching in this area, it is necessary to incorporate personnel with extensive research experience in this field subject, and may be able to generate a critical nucleus from which emerges the synergies appropriate for the development of new knowledge and high-level research in this area, being the University a source of knowledge rather than only transmitting it.
In any case, it should be remembered that the major part of the teaching duties of the Department of Applied Physics of the UPV is framed in the basic physics signatures of the first courses, from which impart knowledge of mechanics, waves, thermodynamics, electromagnetism, etc. , so it is desirable that the teacher who joins this Department also has a broad experience in teaching this type of knowledge of physics.
On the other hand, it is important to mention that the UPV in general, and the Department of Applied Physics of the UPV in particular, must face a generational renovation due to the high number of academics who are close to the retirement, and there is a need to ensure that this transition occurs smoothly and in the most appropriate way, incorporating academics who are capable of developing a broad teaching and research career, and who can guarantee the future development of the UPV. References

[1] La UPV en los rankings. https://www.upv.es/estudios/grado/upv-rankings-es.html
[2] Convocatoria contratos Post-doctorales UPV. http://www.upv.es/entidades/VIIT/info/1072593normalc.html
[3] Subvenciones del Programa para el apoyo a personas investigadoras con talento - Plan GenT, http://www.dogv.gva.es/datos/2019/12/27/pdf/2019_12370.pdf
[4] Marie Skłodowska-Curie actions, https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/msca-if-2019;freeTextSearchKeyword=;typeCodes=1;statusCodes=31094501,31094502,31094503;programCode=H2020;programDivisionCode=31047830;focusAreaCode=null;crosCuttingPriorityCode=null;callCode=Default;sortQuery=openingDate;orderBy=asc;onlyTenders=false;topicListKey=topicSearchTablePageState
[5] Convocatoria Beatriz Galindo de ayudas para la atracción del talento investigador 2018. http://www.ciencia.gob.es/portal/site/MICINN/menuitem.dbc68b34d11ccbd5d52ffeb801432ea0/?vgnextoid=24d171aa3d9c6610VgnVCM1000001d04140aRCRD&vgnextchannel=86fe407933f47610VgnVCM1000001d04140aRCRD

RESEARCH AND KNOWLEDGE TRANSFER PROJECT PRESENTED BY THE UNIVERSITY

The Center for Biomaterials and Tissue Engineering (CBIT) was created in May 1999 to merge efforts of researchers from several university departments working together in biomedical science, engineering of biomaterials and its translation to clinical application. Nowadays we are 33 people: 19 professors (10 of them from the Department of Applied Physics), 4 Postdoctoral Research Associates, 7 PhD Students, 2 Lab Managers and 1 R&D Manager.
Research in our labs is focused on the engineering of the cell-material interface. We develop and manufacture new material-based systems of biomedical interest, from

hydrogel-based matrices and polymer scaffolds to recombinant protein fragments and microparticles.

Our work looks to develop materials with specific functional properties and to understand their interactions with cells in vitro and in vivo, with the guiding principle that we can engineer the combined use of materials, cells, proteins and other molecules, and physical stimuli, to guide cell behavior and stem cell differentiation. We develop most of our systems towards future applications related to tissue engineering and regenerative medicine concepts and to the in vitro modelling of healthy and pathological tissues [1].

In the last years, the use of smart materials in biomedical and tissue engineering is increasing [2-5]. One of the CBIT research lines seeks to design stimulation systems for mesenchymal stem cells to induce osteogenic differentiation during in vitro culture (Piezoelectric Biomaterials for cell differentiation in electrically active interfaces, MAT2016-76039-C4-1-R [6]), in which, porous membranes and microparticles capable of generating an electromechanical stimulus by application of an external magnetic field are being developed.

In this research field, new electroactive materials are being developed through combinations of a piezoelectric polymer and different ionic liquids [7-9]. Thus, the incorporation of a researcher with great experience in smart materials can be extraordinarily valuable for obtaining new scientific achievements and to transfer to industry the latest developments.

On the other hand, the CBIT is promoting a research line for the development of in vitro disease models for the development of drugs and the customization of hematological cancer treatments such as multiple myeloma (project: Médula édula ósea artificial para personalizar el tratamiento de pacientes de cánceres de sangre. Programa de la Conselleria de Educación, Investigación, Cultura y Deporte de la Generalitat Valenciana de ayudas para grupos de investigación de excelencia – Programa Prometeo 2016. Proyecto PROMETEO/2016/063). The automation of these systems in view of their swift transfer to the clinic, the collaboration with an expert in sensors and actuators based on smart materials would be an extraordinary help to this line of investigation.

Ultimately, the incorporation of a researcher with expertise and extended network of collaborators in this research field, will allow the development of this research field in CBIT. In addition, is important to remark that the author of this proposal already has established collaborations with CBIT researchers in several research lines, in particular with professor J.L. Gómez Ribelles. As a result of this collaboration, several scientific articles have been published on topics such as the design and validation of a bioreactor for the study of cell behavior under repeated mechanical stimulation [10,11], properties, development of three-dimensional scaffolds and biological response of poly(vinylidene fluoride), PVDF [12-14], fabrication of electrospinning membranes [15] or thermal degradation of chitosan with varying deacetylation degree [16]. References

1. Centre for Biomaterials and Tissue Engineering. http://www.upv.es/cb/
2. Hydrogels. Smart Materials for Biomedical Applications. Edited by L. Popa. https://doi.org/10.5772/intechopen.78482. ISBN: 978-1-78985-876-1
3. Zaszczynska, A., P. Sajkiewicz and A. Gradys. Piezoelectric Scaffolds as Smart Materials for Neural Tissue Engineering. Polymers, 2020. 12(1): p. 161. https://doi.org/10.3390/polym12010161
4. Smart Polymers and their applications. R. Aguilar and J. San Román (2019). Woodhead Publishing. ISBN: 978-0-08-102416-4.
5. Zhang, Z., K. G. Demir and G. X. Gu. Developments in 4D-printing: a review on current smart materials, technologies, and applications. International Journal of Smart

and Nano Materials, 2019. 10(3): p. 205-224. https://doi.org/10.1080/19475411.2019.1591541
6. Morales-Román, R. M., et al. Freeze-extraction microporous electroactive supports for cell culture. European Polymer Journal, 2019. 119: p. 531-540. https://doi.org/10.1016/j.eurpolymj.2019.07.011.
7. Correia, D.M., et al. Molecular relaxation and ionic conductivity of ionic liquids confined in a poly(vinylidene fluoride) polymer matrix: Influence of anion and cation type. Polymer, 2019. 171: p. 58 - 69. https://doi.org/10.1016/j.polymer.2019.03.032
8. Correia, D.M. et al. Influence of Cation and Anion Type on the Formation of the Electroactive β-Phase and Thermal and Dynamic Mechanical Properties of Poly(vinylidene fluoride)/Ionic Liquids Blends. The Journal of Physical Chemistry C, 2019. 45(123): p. 27917 - 27926. https://doi.org/10.1021/acs.jpcc.9b07986
9. Shin, D.-M., S.W. Hong and Y.-H. Hwang. Recent Advances in Organic Piezoelectric Biomaterials for Energy and Biomedical Applications. Nanomaterials, 2020.
10. Panadero, J.A., et al. Mechanical fatigue performance of PCL-chondroprogenitor10(1):p.123.https://doi.org/10.3390/hano10010123 constructs after cell culture under bioreactor mechanical stimulus. Journal of Biomedical Materials Research B, Applied Biomaterials, 2016. 104(2): p. 330-338. https://doi.org/10.1002/jbm.b.33386.
11. Correia, V., et al. Design and validation of a biomechanical bioreactor for cartilage tissue culture. Biomechanics and Modeling in Mechanobiology, 2016. 15: p. 471-478. https://doi.org/10.1007/s10237-015-0698-5
12. Ribeiro, C., et al. Enhanced proliferation of pre-osteoblastic cells by dynamic piezoelectric stimulation. RSC Advances, 2012. 2: p. 11504-11509. https://doi.org/10.1039/C2RA21841K
13. D. M. Correia et al. Strategies for the development of three dimensional scaffolds from piezoelectric poly(vinylidene fluoride). Materials & Design, 2016. 92: p. 674-681. https://doi.org/10.1016/j.matdes.2015.12.043
14. Sencadas, V., et al. Influence of Ferrite Nanoparticle Type and Content on the Crystallization Kinetics and Electroactive Phase Nucleation of Poly(vinylidene fluoride). Langmuir, 2011. 27(11): 7241-7249. https://doi.org/10.1021/la2008864
15. Ribeiro, C., et al. Tailoring the morphology and crystallinity of poly(L-lactide acid) electrospun membranes. Science and Technology of Advanced Materials, 2011. 12(1): p. 015001. https://doi.org/10.1088/1468-6996/12/1/015001
16. Gámiz-González, M.A., et al. Kinetic study of thermal degradation of chitosan as a function of deacetylation degree. Carbohydrate Polymers, 2017. 167(1): 52-58. https://doi.org/10.1016/j.carbpol.2017.03.020

ANEXO II

CODE	DTA-2
MODALITY	Junior
DEPARTMENT	Deparment of Food Technology
STRUCTURE RESEARCH	

TEACHING PROJECT PRESENTED BY THE UNIVERSITY

The University of Valencia (UPV), which is part of the International Campus of Excellence VLC/Campus, aims at the attraction and retention of talent in order to improve and promote programs of excellence in teaching, research and knowledge transfer. The Department of Food Technology (DTA) follows the same line of action as the UPV and, therefore, demands an academic with an extensive international experience that fits the area of specialization of Food Science, Technology and Engineering.

It is requested the incorporation in the DTA of an academic with a recognised expertise in the utilisation of functional food ingredients, New Product Development (NPD) orientated towards products such as “free from”, “fresh like” and/or “clean label” products, the application of alternative preservation technologies and the impact of all this on the physical and chemical properties of food. Moreover, the candidate will demonstrate leadership skills and experience in pedagogical innovation. DTA considers that a candidate with a profile specialized in the above subject areas, and highly oriented to collaboration with industry in teaching environments could encourage the implementation of innovative teaching approaches and teaching in foreign language. All this will contribute to enrich the curriculum of BSc Food Science and Technology programme, MSc in Quality Management and Food Safety and MSc in Food Science and Engineering, by enhancing the technological and industry focus of these programmes and contributing to promote the transferal skill of the students, which will lead to potential graduates who are able to compete in a highly demanding, specialised and globalised work sector, where innovation is prioritised when addressing production, processing and development challenges.

More specifically, it is expected that the incorporation of an academic with the profile previously described will contribute in adding value to the contents of modules such as Food Processing I (11204), Food Processing II (11205), Innovation and Safety in the Food Industry (33277), Launch of New Products and Marketing Decisions in the Food Company (33289), Engineering aspects of the development of functional foods (33227), Interaction of Ingredients and their Implications in the Bio-accessibility and Bio-availability of Nutrients (33226), New Technologies in Food Processing (33242), Food Powder Technology (33246), Evaluation of Food Industry By- products (33248) and Physical Properties of Food (10830). It is also expected that the candidate will be integrated into the doctoral programme, and participate in the supervision or co-supervision of doctoral thesis in the subject of their research line and in collaboration

with other lecturers and researchers of DTA-UPV, enhancing a multidisciplinary environment and training at a doctoral level. In this regard, the collaborations that, at international level, the candidate can provide, from the point of view of possible stays of research for the doctoral students, in order to obtain the PhDs with international mention/experience, and the participation of these contacts as evaluator/court members of the Doctoral Theses carried out at the UPV, will be of great value. In addition, the attraction of students to carry out their final year projects (FYPs) and master's dissertations (MDs) will be encouraged. The objective, therefore, is that the participation of the candidate in all these activities promotes the development of multidisciplinary, relevant and impactful research in the department, which can also enhance the recruitment of foreign students through the different programs financed by the European Union, thus promoting the competitiveness of the programme at the international level. The proposed teaching development project to be conducted by the candidate should therefore include:
(i) A review of the teaching methods currently used, particularly applicable to the subjects mentioned above.
(ii) A proposal for improvement, aimed at promoting the technological and application approach in the food industry of subjects 11204 and 11205.
(ii) Proposal of contents related to the use of functional food ingredients in the development of new products in subjects 33227, 33289, 33224 and 33226, 33246.
(ii) Proposal for multidisciplinary topics for FYPs and MDs.

RESEARCH AND KNOWLEDGE TRANSFER PROJECT PRESENTED BY THE UNIVERSITY

The study of biopolymers, or polymers produced from different biological sources, which have applications in food systems, is an area of great technological impact, given the relevant role it plays on the development of a great variety of foods, acting as functional ingredients with emulsifying and/or stabilizing properties, or as encapsulating agents. Most recently, a great industrial interest has also been aroused by the development of edible coatings and biodegradable packaging produced from biopolymers.
However, the structural heterogeneity of these compounds and the cost associated with their recovery and/or production, greatly limits the efficiency of their use on the possible applications to the field of Food Science and Technology. Therefore, the project to be carried out by the candidate will focus on the characterization, at a molecular level, of biopolymers with a potential use in food applications. Polymers that are recognised their versatility, functionality and industrial interest, such as alginates for example, or that can be recovered from a more sustainable source, such as those extracted from food waste and/or by-products, will be the priority of the investigation. The purpose of this project, therefore, will be to improve the understanding of the functionality of these components in different matrices of interest to the food industry and their behaviour during the processing, storage and consumption stages throughout the product's life cycle.
The proposed project represents a multidisciplinary challenge, since it seeks to combine chemistry and food science and technology, allowing, on the one hand, to explore the structure of components of interest at a molecular level through the use of analytical techniques, such as Nuclear Magnetic Resonance (NMR), Infrared Spectroscopy (FTIR), Size Exclusion Chromatography (SEC) and Differential Scanning Calorimetry (DSC), in order to ensure a more efficient application thereof in the food field. On the other hand, it is expected that this project leads to a better understanding of the functionality of these

components in the product, from the initial stages of production to its intake by the consumer. The knowledge on biopolymers of relevance in food applications and their functionality as structuring elements in food matrices, as well as, the proven experience in food processing, characterization of physical food properties and chemistry and other aspects related to the bio-accessibility of nutrients, which will be brought by the requested teaching and research profile, will enable the development and successful completion of a project of this nature. The research activities will be conducted within the Food Research and Innovation Group (CUINA) of the Department of Food Technology (DTA) of the Polytechnic University of Valencia (UPV).

Therefore, another crucial aspect that will ensure the development of the project efficiently and successfully will be, on the one hand, the knowledge already established in this area within the research unit to which the candidate will be integrated, who already works in the characterization, at the level of bioactive components, and use of biopolymers to add value to the by-product of the citrus industry, as well as, in the use of these and other biopolymers for the encapsulation of bioactive compounds from plant matrices. On the other hand, the expertise on the characterisation of the compositional structure and functionality brought by the candidate, along with their national and international network of investigators will allow establishing interdisciplinary collaborations that are key to ensure the success of any investigation.

The research project presented should define the basic lines of work to achieve the objectives set out here. The main goals during the four years of the contract will be as follows:

i) In the first year, the candidate must propose and implement an internal research project, in the aforementioned field, relying, for this, on the direction of some TFG and / or TFM.

ii) In the second year and beyond, the progress of the project should be reflected in publications with a high impact factor and other dissemination activities.

iii) Between the second and third year, the candidate will try to obtain their own resources through competitive national or international grants and will contribute to the direction of doctoral thesis in the department.

iv) By the end of the fourth year, the candidate will be expected to consolidate and be able to lead a line of research in DTA, a research structure that will be incorporated into the CUINA, group of international reference.

It is expected that the execution and the results derived from this research will be transferred directly to the students through the realization of TFG and TFM, as well as through the future recruitment of doctoral students, in order to promote and expand knowledge and their experience in the field of research in general and, in particular, in the proposed line of research, as well as contributing to their academic development.

ADDITIONAL INFORMATION

A candidate will require to demonstrate project leadership skills and in the academic field in general, proving that they have acted or are acting as PI of a project and as supervisor and / or co-supervisor of FYPs, MDs and Doctoral Thesis.

It will be taken into consideration if the candidate is able to demonstrate independence by having initiated a different research line from the one in which they completed their PhD project, as well as, having a network of national and international collaborators, that combines several disciplines and that includes scientists not related to the group in which they carried out their doctoral studies.

The candidate is expected to have made educational contributions (in the form of teaching articles and participation in educational congresses) that show an interest in teaching development.

ANEXO II

CODE	DTA-IIAD-1
MODALITY	Junior
DEPARTMENT	Deparment of Food Technology
STRUCTURE RESEARCH	Institute of Food Engineering for Development

TEACHING PROJECT PRESENTED BY THE UNIVERSITY

Universitat Politècnica de València (UPV) as part of to the International Excellence Campus VLC / Campus, aims to boost talent attraction and retention in order to improve and promote programs of excellence in teaching, research and knowledge transfer. Among the main axes of specialization of the VLC / Campus, they are basic sciences, engineering, health sciences and biotechnology, promoted by the UPV both in teaching and in I + D fields. The Food Technology Department (DTA) and The Institute of Food Engineering for Development (IIAD) are aligned with UPV, demanding a teacher and researcher who fits into this axis of specialization.

The new food technology requires new professionals who understand the relevance of biotechnology and genetics together with their interactions with other knowledge areas, such as pharmacology, nutrition, automatic control systems or nanotechnologies. Further development of food products and processes based on biotechnology depends upon the improvement of existing processes, such as fermentation, immobilized biocatalyst technology, and production of additives and processing aids, as well as the development of new opportunities for food biotechnology such as waste microbial conversion in added-value ingredients.

The required profile will be framed in the knowledge area of Food Technology, with proven experience in areas such as biotechnology, genetics and nanotechnology. This profile fits perfectly with the current needs of DTA and IIAD, and will clearly contribute to improving the program, both theoretical and laboratory practices, of subjects currently taught in different Masters of Specialization and Bachelor's Degrees at UPV. Besides, this profile can also promote the implementation of new electives related to cutting-edge biotechnological applications and developments of interest for the food industry. These degrees include:

- Master's Degree in Food Science and Engineering (MUCIA),
- Master's Degree in Food Safety and Quality Management (MGSCA),
- Master's Degree in Agronomic Engineering (MUIAGRO),
- Bachelor's Degree in Food Science and Technology (GCTA),
- Bachelor's Degree in Biotechnology (GBIO),
- Bachelor's Degree in Agrifood Engineering (GIA) and
- Double Bachelor's Degree in Agrifood Engineering and Biotechnology (DGIA-BIO).

Among subjects, they may be cited: Biotechnological products and processes (GBIO), Biotechnological transformations in Food Processes (MIA), Biotecnological processes in Food Technology (MUCIA), Valorization of industrial-food waste (MUCIA),

Food biotechnology (GCTA), Innovation and Development of New Food Products (GIA), Innovation and Development of New Biotechnological Products (GBIO), Nutrigenetics and Nutrigenomics (GBIO), Biotechnological Processes and Food Safety (MGSCA) or Environmental Management in Food Processing Industry (GCTA).
Although it is expected that the candidate collaborates in teaching activities of these subjects, this teaching needs project refers more specifically to the subject "Biotechnological Products and Processes (BPP)" (4th academic year, 7.5 ECTS) of Bachelor's Degree in Biotechnology. BPP belongs to the curricular block "Biotechnological applications and developments" (regulation 7457 of the Official State Gazette, number 99 (2011)), together with: Bioprocesses Engineering (2nd academic year, 9 ECTS), Industrial Microbiology and Microbial Biotechnology (3º academic year, 9 ECTS) and Bioreactors (3rd academic year, 6 ECTS). In this context, the main formative objective of BPP is to bring, to the student, the latest biotechnological advances related to the industrial production of biotechnological products, goods and services. It is important to highlight the high demand of Bachelor's Degree in Biotechnology, as reflected in their access note (12.47 for students of the LOGSE Baccalaureate in the 2019/20 academic year). Thus, students enrolled in these studies are highly motivated, but at the same time very demanding as regards the training level received. It is important to highlight the increasing demand for learning in a foreign language by both national and international students. Therefore, the required teaching profile must provide competences in this regard and thus be able to increase the percentage of teaching taught in English, which is essential for strengthen teaching competencies at European level.

Finally, it is worth mentioning that one of the professors responsible for teaching this subject and others related, will reach retirement age in the coming years.

Since the specialization of the demanded profile in such a multidisciplinary area and with applications in Food Biotechnology, Nanotechnology and Nutrition industries, it is expected to encourage the attraction of students to perform final Bachelor's (TFG), Master's (TFM) and Doctoral thesis to develop relevant research of impact on the DTA and IIAD, as well as train future university lecturers. In addition, the recruitment of foreign students will also be enhanced through the different programs founded by the European Union, so that they can develop their TFG and TFM projects in collaboration with the department and the institute, thus promoting and promoting international competencies

RESEARCH AND KNOWLEDGE TRANSFER PROJECT PRESENTED BY THE UNIVERSITY

At the Institute of Food Engineering for Development (IIAD) we seek to incorporate a researcher with the objective that he / she, complements both the different existing research lines establishing synergistic relationships with current research groups, and on the other side drive new strategic research lines for the IIAD.
The new food technology requires new professionals who understand the importance of biotechnology and genetics and who can also discuss knowledge of other fields of knowledge, such as pharmacology, nutrition, automatic systems control or nanotechnologies. In this context, the beneficiary is required to be a researcher with research experience at the interface of the sciences of biotechnology, microbiology, biochemistry, toxicology, food and materials.

It is expected that the incorporation of a researcher with this profile will contribute to increase the production and quality of scientific results in different current lines of research developed at the IIAD, such as:

Encapsulation of bioactive compounds (supporting activities related to the physicochemical characterization of nanostructures and tasks associated with microbiology and enzymology),

Development of active food packaging (polymer film characterization, biodegradability characterization, determination of biofilm formation and additional tasks related to microbiology and biochemistry of active compounds),

Food Digestion and Health: in vitro studies (characterization of the microbiota associated at different levels (genomic, transcriptomic, proteomic)),

Development of New Processes and Products (selection and characterization of new bioactive ingredients and their biochemical products characterization, selection and characterization of new microbial strains for fermentation processes, characterization of fermentation products, determination of bioactive enzymes, organic acid profile, etc. .). Additionally, it is strategic for IIAD to promote new lines of research related to:

(i) the use of microorganisms as cellular factories for the production of nutraceuticals of high added value and their functionalization through new nanoformulations applied to the food industry.

(ii) use of microorganisms as models of (eco) toxicology to assess the safety of new materials and nanoparticles, as well as to determine the efficiency of functional additives. They are in all cases of lines of research with a great projection of the future that can have a positive impact on development both regionally and nationally.

It should be noted that these lines of research are aligned with the main challenges identified by the European Strategy Food2030 around the axis of Nutrition for sustainable and healthy diets, and with Research and Innovation Challenges 2 (Providing the Basis for a More Personalized and Customized Food Supply) and 3 (Developing a More Flexible, Dynamic and Sustainable Food System) of the Strategic Research Agenda of the European Technology Platform Food for Life; therefore, they are postulated as an opportunity to increase IIAD's participation in international R&D projects.

In the same way, these research lines are aligned with the objectives of the RIS3 of the Valencian Community in its axis of Quality of Life and the hypersectorial environment Agrifood, cosmetics and household products.

On the other hand, the binomials Food& Health or Food& Sustainability, among others, are fully aligned with the majority of the SDGs, so multidisciplinary research oriented in this sense undoubtedly represents a research of future.
The development of these lines requires the candidate to master specific techniques of microbiology, molecular biology, bioinformatics and biochemistry techniques (for example, small and large-scale single-cell, filamentous and bacterial fungal cultures, global gene expression analysis techniques (transcriptomic) and proteins (proteomics), gene cloning, genetic transformation of bacteria and fungi, purification and analysis of proteins and metabolites through the use of FPLC, HPLC and gas chromatography,

etc.), as well as microscopic and spectroscopic techniques (atomic force microscopy, electron microscopy, fluorescence microscopy, ATR-FTIR, RAMAN, ICP-MS).

AVAILABLE INFRAESTRUCTURES

For the promotion of this research line, the IIAD has a microbiology laboratory, equipped with: laminar flow hood, incubator (s), orbital agitator for the cultivation of microorganisms, dry block incubator, microcentrifuge, centrifuge, reader of microplates Also, in the framework of joint projects with researchers from the Advanced Center for Food Microbiology at the UPV, the distinguished researcher will have access to the necessary infrastructure for the realization of specific molecular biology work: PCR

apparatus, source of electrophoresis, nanodrop, bioanalyzer and electrophoresis gels documentation system.

KNOWLEDGE TRANSFER

The lines of research to be addressed and reinforced with the incorporation of talent at the IIAD of the Polytechnic University of Valencia are lines that respond to a need and innovation contrasted with the business sector.

As indicated above, these areas are marked as priorities in two of the three challenges identified by the European Technology Platform Food for Life, which is the official interlocutor of the food companies in front of the European Commission to boost innovation, knowledge transfer and European competitiveness. These lines of research are also contemplated in the innovation demands identified by the FIAB (Spanish Federation of Food and Beverage Industries) and by the Spanish Food for Life Technology Platform.

At the Valencian Community level, there is also a need to solve the R&D needs of companies in this area. In fact, in the Strategic Committee of Innovation of the Agrifood Sector of the Valencian Agency of Innovation, the production of healthier foods is marked as a priority challenge.

But the simple fact that the research project to be addressed respond to business needs is not enough. The transfer of knowledge generated through research activities requires skills that the new researcher must prove, such as leadership, merits of fundraising, dissemination and organization of national and international events, identification of forums, work groups, etc. ., in which he/she participate or have participated.

In this task the new researcher will not be alone. The University Institute of Food Engineering for Development has a manager with more than fifteen years of experience in the transfer of technology in the agri-food sector and with whom he/she will train in tandem to be able to arrive more quickly and efficiently to transform the knowledge generated into business Innovation.

ANEXO II

CODE	DTA-IIAD-2
MODALITY	Junior
DEPARTMENT	Deparment of Food Technology
STRUCTURE RESEARCH	Institute of Food Engineering for Development

TEACHING PROJECT PRESENTED BY THE UNIVERSITY

This teaching proposal aims at incorporating international experience in the Bachelor's and Master's programs of the ETSIAMN. Subjects in the field of Oenology, implementation of new technologies to the winemaking process, impact of phenolic compounds in grapes and wines or the use of spectroscopy with chemometrics are topics that will benefit from this proposal. Moreover, the need of this teaching experience is even more critical if it is taken into account the fact that two of the four academics at the Unidad Docente de Enología from the Departamento de Tecnología de Alimentos are retiring in the academic year 2020-2021. The Master's programs that will require teaching capacity will be the Master Internacional Vintage (Erasmus Mundus) and the Master Universitario en Enología. Moreover, the modules Vinos y Bebidas Alcohólicas (4786) part of the Grado de Ingeniería Agroalimentaria and Industrias de las Bebidas (30389) part of the Grado de Tecnología de Alimentos will also benefit from this teaching support. New knowledge and expertise in analysis and evaluation of phenolic compounds during the winemaking process, use of sensors and efficient measuring tools of oenological parameters during the fermentation process, spectroscopic analysis of grapes and wines as well was chemometrics and multivariate data analysis to build prediction calibrations will be of special relevance in the modules of Tecnología e Ingeniería Enológica I and II (34774 and 34775). Regarding the wine sensory evaluation module (Análisis Sensorial (34776)), the wine sensorial properties of national as well as international wines will be evaluated with novel expertise provided by the candidate. This knowledge and expertise could potentially be incorporated in other Bachelor's and Master's degrees, specially the knowledge related with spectroscopy application applied to the monitoring, optimization and control of different agro food processes. Lecturing capacity in English language will be also beneficial to the UPV in order to maintain a high standard of organizational, communicative and education quality. Moreover, it will be possible to teach the above mentioned modules in both English and Spanish, with the potential increase in the number of students enrolled. The students will be able to improve the ability to proficiently use a foreign language and to obtain a more international perspective of the different fields of study. The expertise gained by the applicant during his work in foreign institutions will lead to the improvement of the curriculum with the inclusion of novel and innovative teaching approaches. This will undoubtedly improve the quality standards of the education programs offered at the UPV. Thanks to the collaboration network of the candidate the international collaboration will

be also increased with academics from other foreign institutions, which positively contributes to the internationalization of the teaching portfolio as well as the quality of the provided content by academic leaders in a varying areas of knowledge and expertise.

RESEARCH AND KNOWLEDGE TRANSFER PROJECT PRESENTED BY THE UNIVERSITY

The quantification and understanding of the phenolic composition in red grape and wines appears as a very relevant topic with critical influence on the commercial outputs of the industry partners. The application of process control strategies to the wine industry is behind other food industries, with very limited applications for the winemaking process being available. Recent developments in the combined use of spectroscopy and chemometrics to quantify phenolic compounds in real time has been observed over the past years. However, the absence of a research group with the required knowledge and expertise in the different required disciplines is delaying the implementation of this technology. In order to develop such a project, the following partial objectives have been identified: (1) establishment of an optimized system for the acquisition of high quality wine spectral data, (2) application of design of experiments and batch statistical process control techniques to the winemaking process, (3) investigation of the extraction kinetics of the phenolic compounds both theoretically and empirically, (4) evaluation of process simulation models to finally implement an integrated control system. At the Instituto de Ingeniería de Alimentos para el Desarrollo (IIAD) there is currently a research group in the Oenology field, however the use of spectroscopy applications for the monitoring, optimization and control of the winemaking process through the use of sensors is not currently part of its research activities. It will therefore be of great benefit to incorporate research capacity on the the fields of quantification of phenolic compounds through alternative techniques (spectroscopy and the use of sensors), multivariate data analysis (batch statistical process control) as well as advanced techniques for the quantification of phenolic compounds and their impact in wine quality. Moreover, the wine industry plays a crucial role on the national economy. Wine exports to third countries greatly contribute to the gross domestic product (GDP). Due to the intense competence currently taking pace in the international scenario, innovation as well as technology transfer are even more relevant to the national economy. The efforts will therefore be orientated to the identification of industry needs through active interactions with wine industry partners, joint project application as well as establishing and commercialization of the obtained technology.

ANEXO II

CODE	DIT-1
MODALITY	Senior
DEPARTMENT	Department of Geotechinical and Geotechnical Engineering
STRUCTURE RESEARCH	

TEACHING PROJECT PRESENTED BY THE UNIVERSITY

One of the main axis of the strategy of the Departamento de Ingeniería del Terreno (DIT) and the Escuela Técnica Superior de Ingenieros de Caminos, Canales y Puertos (ETSICCP), is the creation of an official multidisciplinary Master degree in the area of Ingenieria del terreno, with International aspirations and projection.
This will be taught in English and will be developed through strategic partnerships with World-class universities. At the moment, conversations are being held with Tongji University in China, although other possibilities exist, such as with one of the institutions with whom UPV has partnered to create a European network. Among these are RWTH Aachen in Germany, Politecnico di Milano in Italy and Chalmers in Sweden. Prof. Fuentes, who recently joined DIT has a working relationship with colleagues in all of them.

This initiative will, at the same time, allow channelling and directing potential PhD candidates to doctoral programmes at UPV alone, or in collaboration with the above mentioned universities. Hence, this will contribute greatly to research and not only teaching and learning.

The success of this Enterprise though relies on the need to hire someone that can help sustain and improve the international projection. A Senior candidate would fulfil all of these requirements and, his absence would compromise the possibilities of success as, in general, the international collaborators will appreciate having well-known members at UPV to justify these collaborations.

Additionally, the expertise area of the candidate on risk and resilience analysis of critical infrastructure and cities, does not exist currently at this International level neither in DIT, nor in ETSICCP nor UPV, and hence, this enriches the teaching offer. This is of particular importance in the strategy of ETSICCP which, among other initiatives, is launching a joint degree programme in Civil Engineering and Mathematics. A Senior candidate would match this initiative clearly and could contribute to its success in what is one the main current developments of ETSICCP.

This is important because the current situation where the student numbers are decreasing continuously in Spain in the last few years. This trend is not the same in other countries around us, especially in northern Europe, China or Latin America, to name but a few. This means that the international outlook is probably, together with diversification,

one of the few strategies left to guarantee the sustainability of these degrees within UPV with the current Faculty.
In order to contribute to the above goals, the candidate will develop and deliver new courses for the new Master degree in accordance with any other teaching plans at the moment.

RESEARCH AND KNOWLEDGE TRANSFER PROJECT PRESENTED BY THE UNIVERSITY

There are two main objectives with the addition of a candidate to the Departamento de Ingeniería del Terreno (DIT): Increase the international recognition of DIT, and revitalise all of its teaching and research activities.
The international recognition will be a natural consequence of the research activities of the candidate and other members of DIT. The revitalisation of the activities will be realised by adding a new research area.
DIT has a pressing need to increase its research production and outputs. This is for instance reflected in the research activity index (VAIP) which is well below the university's average. Considering that soil engineering is a fundamental area of civil engineering, it should be improved to bring it closer to those within the School and University, but also others around.
The department believes that the research area of vulnerability, risk and resilience assessment of cities and infrastructure assets (transport, utilities) exposed to multiple hazards (natural and man-made) and climate change effects e.g. floods, earthquakes, landslides, tsunami, wildfires, extreme temperatures, is a novel area that would provide a distinctive identity compared to other universities and where DIT could have an impact. This area is also complementary to the research efforts of other investigators within DIT and, in particular, the research interest of Prof. Fuentes, who joined recently. A new Senior researcher would help the department achieve its own objectives.

Besides the internal impact, the research area is of clear interest to many researchers within ETSICCP and UPV as a whole, and hence, it would increase the opportunities for collaboration significantly.
It is also an area with clear international importance and projection, as it is now recognised around the world that climate change is having a direct impact on the number of natural disasters. The recent Gloria storm in Spain is a painful reminder. Hence, this area will continue to be of interest to national and international bodies in the future, therefore guaranteeing possibilities to obtain funding and achieve impact.
2. Knowledge transfer
The area of focus is vulnerability, risk and resilience assessment of cities and infrastructure assets (transport, utilities) exposed to multiple hazards (natural and man-made) and climate change effects e.g. floods, earthquakes, landslides, tsunami, wildfires, extreme temperatures, etc.
The nature of the proposed Research topic means that many of the activities are of immediate applicability in real-life situations in multiple sectors, from engineers to politicians and stakeholders that must make decisions regarding specific events at a given moment, or in the long-term based on predictions, for efficient allocation of their resources to mitigate risks and improve the provided services.

Hence, the strategy for knowledge transfer will be based on the development of software tools and applications with licenses that will be provided for use in real cases. Also, other traditional knowledge transfer routes will be followed, such as invited conferences, articles in science promotion publications or participation in international and national congresses.

In particular, DIT is planning the organisation of an international workshop in Valencia in 2021 on risk and resilience of infrastructure and cities is envisaged.

Finally, opportunities for continuous professional development courses will be investigated and used as appropriate, focussing on practising professionals in various sectors.

ANEXO II

CODE	DQ-IDM-1
MODALITY	Junior
DEPARTMENT	Chemistry Department
STRUCTURE RESEARCH	Interuniversity Research Institute for Molecular Recognition and Technological Development

TEACHING PROJECT PRESENTED BY THE UNIVERSITY

Needed Teaching project at the University and project to be performed by the teacher and / or researcher to be selected with the award decision.
This teaching project is presented for the application Beatriz Galindo in the area of knowledge of Inorganic Chemistry, within the Chemistry Department. This knowledge area consists of six teachers, two of whom are planning to apply for retirement in the next three years. In addition, this knowledge area supports a significant credits reduction that can be taught by the teachers concerned, because of the very high involvement of its members in research and research management bodies. Moreover, the area of knowledge of Inorganic Chemistry is directly involved in the teaching that the Chemistry Department teaches at the School of Engineering Design (ETSID). This teaching unit is living a very significant decrease in teachers in recent years, example three teachers (from seven involved into teaching unit until last month) have been just retire. Therefore, we propose in this project the educational needs of Inorganic Chemistry area that could be covered by the grant Beatriz Galindo. Thus, it is expected that the incorporation of an expert in Inorganic Chemistry, who has developed much of his/her career teaching outside Spain, to be able to teach in English, who has experience in teaching the subjects that the Chemistry Department teaches in the ETSID and in the area of Inorganic Chemistry, would be a very important reinforcement both for this area of knowledge and for the Chemistry Department as a whole.
Teaching profile requested for Inorganic Chemistry area fits and is consistent with the list of subjects currently taught in the Chemistry Department in the Inorganic Chemistry area.

This project is developed for the area of knowledge of Inorganic Chemistry, inside the teaching units Higher Technical School of Engineering Design (ETSID) and Higher Technical School of Engineering Design (ETSII).

The subjects described below are the subjects that the teaching project is based:

"Chemistry" compulsory, first course of the degrees of "Degree in Aerospace Engineering", "Degree in Electrical Engineering", "Engineering Degree Industrial Electronics and Automation", "Degree in Mechanical Engineering," the ETSID, first semester . The subject has 3.3 theoretical credits and 2.7 practical credits, of which 1.5 are laboratory practices. Total 6 credits.
The subject of Chemistry is included in the module "Basic Training" in all grades in which it is included and is offered as a semester course in the first semester of the first course,

except in the "Degree in Engineering Industrial Electronics and Automation" that it is taught in the second semester. Chemistry subject, together with other subjects of this module (Mathematics, Physics, Graphic Expression, Information Technology and Business), form the basis for more specialized courses in higher grades. In addition, two of the degrees to which imparts (GIA and GIEIA) have an ARA group in the Chemistry Department (Inorganic Chemistry area) classes taught in English. For this, the reinforcement of this area of knowledge with a candidate who has experience teaching in English has also been judged very interesting.

Chemistry subject is a basic subject where the contents correspond to a General Chemistry. Chemistry is a fundamental matter in the formation of an engineer because it gives them a basic understanding of the laws of chemical transformation of matter, useful for understanding the behavior of materials and their transformations. Basic concepts are discussed referring chemical atomic structure, chemical bonds, the energy in chemical reactions, the chemical equilibria and ionic and redox processes: batteries, electrolysis and corrosion. Knowledge at the undergraduate level is recommended, both in chemistry, in physics and mathematics for this subject.

2. "Materials Science Development" is compulsory, in the third grade course for the title of "Degree in Chemical Engineering", ETSII. The subject has 6 credits (4.5 theoretical and 1.5 laboratory practice).

Materials Science Development subject is included in the matter MECHANICS AND MATERIALS. It is taught together (50% -50%) by the Chemical Engineering and Nuclear Department (DIQN) and the Chemistry Department (DQ). DIQN imparts the UD 1-4 (PART I) in the first part of the semester and the DQ imparts the UD 5-8 (PART II) in the second part of the semester.

In Materials Science Development, it deepens and expands certain topics already introduced in the subject Materials Science, and new concepts and content of materials commonly used in engineering are introduced. Due to the progress of research and development programs, new materials are being created continuously whose production and processing are an important part of today's economy. It is important that future Chemical Engineers know the structure and properties of materials, so that they are able to select the most suitable for each application in industry. Part of the theoretical contents exposed in theoretical classes will be implemented by students in laboratory practice sessions.

3. "Nanostructured Materials and Nanotechnology" is taught in the second year of the master "Master in Chemical Engineering", ETSII, and is optional. It has 4.5 credits 2.25 2.25 theory and laboratory practice. The course contains basic concepts of nanotechnology, nanofabrication and nanoassembly. The design and synthesis of nanomaterials and characterization techniques are also studied. The final part is dedicated to technological applications of nanomaterials for example bioapplications, catalysis, in optical, magnetic and electrical and nanocomposites applications.

4. "Nanodiagnostics and nanotherapy" is taught in the second year of the “Master in Biomedical Biotechnology ". It is optional and has 4, 5 credits, 3 theoretical and 1.5 practical laboratory. This course covers basic concepts of nanomedicine such as nanodevices for fast and multiplexed diagnostics for molecular diagnostics such as imaging probes, as systems improve drug delivery, and also address the issue of controlled release strategies.

Achieving the educational objectives in all subjects arises through conducting lectures and practical classes, practical classes including practical classroom and laboratory practical classes.

The lectures will mainly develop as participatory lectures in which the student intervenes by asking questions to the teacher or answering the teacher raises, over the delivery of content.
Practical classroom classes taught primarily as a problem sessions and seminars, and consist in solving exercises and case studies previously prepared by the student or raised during the class. Some of these seminars can be used to investigate into concepts of particular difficulty, emphasizing its practical aspects. These classes and independent work of students to prepare them are essential to develop specific skills related to skills and abilities.
The laboratory practical classes are planned to carry out various laboratory experiments in which students, usually working in pairs, implement selected aspects of relevant subject that allow traversals seating concepts and develop skills.
Students will participate in mentoring sessions with teachers or responsible for the subjects. There, they will be working on the specific difficulties each student.
The evaluation of the students will be carried out through continuous monitoring using periodic tests or evaluation of problems, homework, or other activities, including open-answer tests and objective tests, both about theory and laboratory sessions, and an academic work.
This teaching project fits perfectly inside the Department because it contains subjects from several degrees offered in ETSID and the ETSII. The teaching project also includes other teaching assignments as they are structuring the subjects in teaching units, the description of the teaching methodologies used for the delivery of each subject, the development of teaching guides, selection of skills and establishing systems monitoring and evaluation

RESEARCH AND KNOWLEDGE TRANSFER PROJECT PRESENTED BY THE UNIVERSITY

This research project generates results at the frontier of knowledge by developing cutting -edge technologies from a multidisciplinary perspective, addressing both basic issues and clear practical application. The research project presented in this call Beatriz Galindo gives the opportunity to address long-term/high risk interdisciplinary studies, resulting in a clear improvement of the quality of research and application of results, in full accordance with the main lines and innovative research structure, as reflected in publications of the research group in which the candidate granted with the Beatriz Galido would be incorporated.
PROJECT:
This research project focuses on the development of new sensor systems and new intelligent materials for controlled release of species of interest, and its application in the food industry and biomedicine. Specifically this research and transfer of knowledge project is organized along two main lines of research developed in the IDM and that have a great capacity of innovation and transferability of results: (i) development of new mesoporous silica materials for natural antimicrobial agents controlled release; (ii) development of new clinical strategies for the detection and treatment of aging related diseases.
Subproject 1: Development of new mesoporous silica materials for natural antimicrobial agents controlled release.
This part of the research project focuses on the development of new silica mesoporous materials for controlled release of natural antimicrobial agents (eg, essential oil

components from medicinal plants). These materials are applied against microorganisms, either fungi or bacteria. The project presented brings quality and new strategies in the field of the development of new natural antimicrobial agents and their application in the field of agro-food.

Earlier studies have shown that the functional activity of an active molecule in "in vitro" trials does not guarantee the same performance in real applications. This fact has increased the interest in protecting certain molecules with proven "in vitro" activity that, after protection, are released in the presence of microorganisms. The two main features of the active compounds used in agriculture and in the food industry are its antimicrobial and antioxidant properties. However, there is a huge need for new alternatives to present non-natural agents. Currently, many of these drugs used have very serious side effects. Based on this, the idea of the use of active natural compounds instead of those used so far has been rised.

With regard to the aforementioned, there is no doubt that the plants remain one of the most valuable sources of natural bioactive molecules, but the conventional formulation of an antimicrobial or antioxidant agent may lead to limited activity, to an unacceptable adverse toxicity and, besides, to some limitations associated with the use of certain natural molecules such as low solubility, partition

coefficient, pH and high volatility. In this context, the design of controlled release systems for bioactive natural compounds can significantly contribute to its applicability, as controlled release devices may improve the release of bioactive molecules at the site of action, thus decreasing the side effects associated with their use.

Due to the characteristics described above, specifically the high volatility of most natural bioactive compounds, the encapsulation and controlled release processes become interesting to protect these compounds and thus prevent them from being volatile before reaching the target point, increasing therefore the effectiveness and effectiveness of its action. The encapsulation of volatile compounds in silica mesoporous materials would significantly facilitate their application and provide long-term efficacy of controlled release without affecting their antimicrobial activity.

For all the reasons mentioned above, this project aims at the development, synthesis, characterization and operation of mesoporous materials as natural phytosanitary products. For this, natural antimicrobial molecules will be used, such as the essential oil components (EOCs), encapsulated inside functionalized mesoporous silica materials with molecular gates, thus allowing to avoid their high volatility, increase their water solubility and increase their antimicrobial properties. Thus, it is intended to use as porous for the EOCs porous materials of siliceous base, type MCM-41, functionalized with proteins or sugars of natural origin, which will act as “molecular nanoscopic gate”, which will allow the release of EOCs in the presence of enzymes excreted by different microorganisms.

The hypothesis of these systems is that the presence of an enzyme of the proteases or amylases type excreted by different microorganisms, whether fungi and/or bacteria, should be able to hydrolyze the molecular gate, giving rise to monosaccharides and/or smaller peptides, allowing the release of essential oils with antimicrobial activity against said microorganisms.

Specifically, the components of essential oils will be used as natural bioactive molecules: thymol, carvacrol, eugenol, cinnamaldehyde, geraniol, thimoquinone, diallyldisulfite and allyl isothiocyanate. Componentes that will be used as molecular gates will be: (i) natural proteins (type soy protein, corn protein, nisin , polylysine….) and/or (ii) glucose-derived

sugars (eg maltose, maltodextrin of 5 to 20 units, starch hydrolysates,…). There will also be a broad characterization of the systems obtained and the antimicrobial potential of the final solids will be validated against Listeria monocytogenes, Escherichia coli,

Staphylococcus aureus bacteria, and Aspergillus niger and Botrytis cinerea fungi, among others.
Subproject 2: Development of new clinical strategies for the detection and treatment of aging related diseases.
Within the framework of this project the candidate will work on the development of sensors and new therapeutic strategies to detect and attack senescent cells, focusing on diseases related to aging. A project is presented that brings quality and new strategies in the field of detection and treatment of diseases related to aging.
Cellular senescence can be defined as an irreversible stop of cell proliferation that arises in response to various stress signals to prevent the spread of damaged cells. Cellular senescence has been described both in physiological situations and in certain pathological processes in different tissues, exerting effects

on processes as differentiated as embryogenesis, tissue repair and remodeling, cancer, aging or tissue fibrosis processes. In addition, it has been shown that the accumulation of senescent cells is related to the development of some pathologies, to aging and to the contribution of the development of cancer and other age-related diseases. In this scenario, it is reflected that the detection and elimination of senescent cells can have a positive impact on the delay of diseases associated with aging, and on the initiation and progression of cancer, that is, their elimination can be therapeutic. Therefore, it is of great interest to develop new strategies aimed at detecting and eliminating senescent cells with the aim of combating aging and diseases associated with cellular senescence.

Taking into account the aforementioned, this project aims to develop and validate in vitro and in vivo new sensors and therapeutic agents such as (i) nanoparticles functionalized with molecular gates and loaded with cytotoxic or senolytic, (ii) prodrugs and (iii) new senolytic compounds (small molecules of low molecular weight, intended for the detection and selective elimination of senescent cells).
The functioning of molecular probes is based on the fact that the concentration and activity of the β-galactosidase and α-fucosidase enzymes is very high in senescent cells. Thus, molecular sensors will be designed through the union of two units anchored by glycosidic covalent bonds: one is the recognition unit (galactose or fucose) and the other is an indicator unit (a chromophore or a fluorophore). The sensors will be designed in such a way that their fluorescence remains off until the enzymes hydrolyze the glycosidic bond generating the free fluorophore. Within the fluorophores, phthalimides, functionalized perilenediimides with histidine or bodipys will be used, especially the so-called “two-photon” which allow a better visualization of this type of cells in the affected tissues thanks to their ability to work at closer wavelengths to the infrared region.

In the development of therapeutic agents, nanoparticles functionalized with molecular gates and loaded with cytotoxic or senolytic gates will be synthesized, and oligosaccharides will be used as molecular gates, directly or by self-immolants. Thanks to the high concentration of the β-galactosidase (SA-β-gal) and α-fucosidase (SA-α-fuc) enzymes present in senescent cells, hydrolysis of oligosaccharides acting as molecular gate would be induced, releasing the cytotoxic or the senolytic exclusively in senescent cells. In a second approach to the development of therapeutic agents, prodrugs will be synthesized, where oligosaccharides or simple sugars will bind to conventional cytotoxics or senolithics to obtain prodrugs. As in the previous case, the high concentration of the β-galactosidase (SA-β-gal) and α-fucosidase (SA-α-fuc)

enzymes present in senescent cells, would induce the hydrolysis of oligosaccharides that are directly linked to the active drug, protecting from side effects caused by the direct taking of it. Initially, it is intended to use cytotoxics with a tetracycline and senolytic structure of type ABT (such as navitoclax) that will be loaded inside the pores of porous or

functionalized materials with different types of oligosaccharides formed by the union of several galactose and/or Fucous.
On the other hand, it is also planned to perform a search (screening) of new senolithic compounds. New senolytics obtained by molecular modeling, derived from the structures of A-1155463 and A-1331852, and not protected by patent will be chemically synthesized. Likewise, new targets associated with cellular senescence will be sought, which will provide new senolithics.
These sensors and therapeutic agents will be synthesized, characterized and validated in in vitro and in vivo models. The mechanism of action of this type of derivatives is intended to be more selective and specific than that of current drugs, since they will remain inactive until they reach the senescent cells in which they will be activated and will perform their function, thus helping to reduce side effects and toxicity associated with many of them.
At the end of this project, it is expected to have a family of new sensors and new therapeutic agents, mesoporous materials, prodrugs and senolithics, tested in cells and in vivo that can be used in therapy for the prevention/cure of cancer (through the detection and selective elimination of senescent cells) and/or diseases related to aging.
The part of research related to obtaining new materials as well as the organic synthesis of new sensors, prodrugs and senolithics will be carried out within the Interuniversity Institute of Molecular Recognition and Technological Development of the Polytechnic University of Valencia and University of Valencia. In vitro and in vivo studies will be carried out at the Prince Felipe Research Center (CIPF) in the context of the Joint Unit in which the IDM-UPV participates.
In summary, the objective of this research and transfer project is to promote the most relevant areas of the research structure and define new and innovative areas with their own personality that identify the Research Group as an international reference in the field of sensors and materials hybrids for “state of the art” applications.
The candidate to lead this research and transfer of knowledge project must be expert in the field of Materials Science and Materials Functional Hybrid applied to nanotechnology, biomedicine and Agro-Food, with international teaching and research experience in this field.

ANEXO II

CODE	DEIOAC-1
MODALITY	Junior
DEPARTMENT	Department of Applied Statistics and Operational Research, and Quality (DEIOAC)
STRUCTURE RESEARCH	

TEACHING PROJECT PRESENTED BY THE UNIVERSITY

In the modern era of Big Data, Industry 4.0 and Internet of Things (IoT), both research institutions and manufacturing companies active in various fields of interest collect routinely massive amounts of data in a very short time and, usually, via a great variety of sensors and analytical instrumentation. If on the one hand, the computational power of commercially available workstations allows such data to be rapidly loaded and treated, on the other hand a more complex task is the selection of the most appropriate tools to be exploited for their pre-processing and analysis, and the rational interpretation of the outcomes resulting from the latter stage. In order to prepare the new generations of engineers, scientists and technologists to these tasks, the Universitat Politècnica de València and, specifically, its Department of Applied Statistics and Operational Research, and Quality (DEIOAC) have recently extended their educational offer with the Master Degree in Data Analysis, Process Improvement and Decision Support Engineering, aimed at providing students with a global overview of the most popular statistical data analytics approaches suitable for the assessment of data of disparate nature. In this regard, an aspect that needs to be reinforced for further strengthening their confidence in the usefulness of statistical thinking and data analytics in daily life is filling in the gap between theoretical statistical foundations and real- world applications. To this end, we propose the introduction of an optional new course (4,5 ECTS) in the cited DEIOAC master degree mainly devoted to the treatment of complex data generated, e.g., in an analytical chemistry, biomedical or bioprocess control laboratory with advanced instrumentation. As an example, it is well known that nowadays innovative magnetic resonance, spectroscopic and hyperspectral imaging devices are largely resorted to for producing high-dimensional spatiotemporal recordings and characterising specific systems under study. The proposed master's degree course will provide an integral vision of the different data analysis strategies most suitable for the treatment of each particular type of signals, as well as the tools necessary to perform data fusion and to extract the maximum amount of information.

Additionally, the selected candidate will contribute to the teaching activity of the following subjects of the aforementioned DEIOAC Master's Degree: Analysis, Monitoring and Diagnosis of Multivariate Processes, Image Analysis, Data Analysis in Medical Research, Data Mining, and Multivariate Image Analysis. He will also participate in the subjects Quality Control, and Design of Experiments for Process Optimization of the

Master in Chemical Engineering, and will give support to the rest of the subjects taught in the different university degrees in which the DEIOAC is involved.
Here, a suited candidate, potentially guaranteeing a very important short- and long-term impact, is expected to combine a significant expertise in data analytics, statistical thinking and programming with a sounded knowledge in life and applied sciences, like chemistry, biology, biochemistry and/or biomedicine. Such profile will be capable of boosting a crucial shift in the way statistical methods and concepts, and statistical thinking are approached and perceived: from merely notional formulations to high-impact tools and strategies for complex problem solving.

RESEARCH AND KNOWLEDGE TRANSFER PROJECT PRESENTED BY THE UNIVERSITY

Nowadays, the state-of-the-art of the design of industrial bioprocesses is still governed by trial-and-error approaches and traditional manufacturing approaches, which commonly lead to significant start-up delays and failures, and, thus, to relevant financial losses. In this regard, the Systems Biology and Synthetic Biology research areas have been recently developed in the attempt of eliminating such a bottleneck through the implementation and exploitation of three fundamental methodologies: mathematical modelling, computational optimisation, and analysis and interpretation of large amounts of complex data by statistical analytics tools. Especially this last aspect has become crucial in recent years, as modern Big Data environments, characteristic of Industry 4.0, usually generate intriguing challenges in the bioprocess field, which can be successfully coped with only combining a more theoretical knowledge of biology, biochemistry and bioengineering with a technical expertise in data analytics, optimisation tools and programming. These challenges primarily encompass:
- multi-criteria optimization of bioprocess operational conditions based on happenstance data (i.e. non-experimentally designed routine production data);
- optical spectroscopy- and microscopy-based bioprocess characterisation;
- “grey” bioprocess monitoring by deterministic (first principles) /empirical (data-driven) hybrid modelling;
- bioprocess monitoring model updating to minimise false alarm rate;
- bioprocess scale-up from laboratory to pilot/full plant scale;
- competence and technology transfer by the implementation of technological solutions into a Graphical User Interface (GUI) open-source software. For this, the Transfer, Innovation and Research Promotion and Support Service (I2T-UPV) will be supported, as well as the UPV IDEAS Program with the following plan: protection of the intellectual property generated, acquisition of financing to produce a business plan and search for investors to create a spin-off or to license technology.
In order to tackle them, the integration of machine/deep learning and latent variables-based multivariate statistical methods is fundamental and of paramount importance. Coupling, in fact, the predictive power of the former with the unique interpretability properties of empirical models yielded by latent variable-based techniques (like Principal Component Analysis – PCA – and Partial Least Squares regression – PLS) will allow the aforementioned tasks to be easily and rapidly addressed while rendering useful and meaningful insights for bioprocess mechanism understanding. It is, therefore, inevitable, not to say strictly necessary (also in the light of future funding calls at a regional, national and European level), that the candidate responsible for this particular research line is

capable of simultaneously analysing/processing and comprehending instrumental measurements collected on real- world samples. This will also undoubtedly favour the generation of a new figure of data scientist, radically different from a classical statistician/mathematician or a classical bioengineer/chemist/biochemist, but embodying both types of expertise towards a combination between purely inductive and purely deductive scientific methods.