Monograph: Professional development in the framework of the Human Resources Strategy for Researchers (HRS4R) at Catalan public universities

The European Framework for Researcher Careers and Mobility

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European policies have focused on creating the conditions in which the European Union (EU) can prosper. Hence, the Europe 2020 Strategy[1] defined innovation as one of the main vectors of growth, in collaboration with research and education in a more intelligent, sustainable and inclusive manner. There is a clear need to keep building the European Research Area (ERA) and to further the Lisbon Agenda[2] (2000), and for the freedom of movement of people and knowledge to be extended throughout the full geographic scope of the EU's economic sectors, thus making research and innovation one of the key factors for Europe's progress.

As for physical mobility, the groundwork was quickly done to align EU treaties with the Directive on Third-Countries[3] (2005) and the Directive on Students and Researchers[4] (2016), which facilitated the mobility of researchers from around the world to Europe.

In order to attract talent, the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers[5] (2005) (Charter and Code), were also established, setting out the rights of researchers and the principles that contractors and financers must observe and incorporate in a transparent, merit-based manner. Later, the Human Resources Strategy for Researchers (HRS4R)[6] was created, an internal procedure of making continuous improvements to research institutions aimed at achieving the principles of the Charter and the Code, by means of a five-stage strategy evaluated by the European Commission and recognised by the HR Excellence in Research seal of approval.

Through extensive freedom of movement and an indicator of the quality of institutions, efforts have been made to make the European research system more attractive in order to encourage the incorporation of international talent.

The researcher plays a central role in this process, and as early as the first decade of the 20th century there was, on the one hand, an increase in doctoral students and, on the other, insufficient transfer of research to the productive world, a phenomenon that still holds very strongly indeed today, as shown both by the insufficient data on private investment in R&D and the scarcity of innovative regions in much of the EU, as shown by the Regional Innovation Scoreboard.[7]

1 https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf
2 https://www.europarl.europa.eu/summits/lis1_en.htm
3 https://eur-lex.europa.eu/legal-content/en/TXT/?uri=celex%3A32005L0071
4 https://eur-lex.europa.eu/legal-content/ES/TXT/?uri=OJ:JOL_2016_132_R_0002
5 https://euraxess.ec.europa.eu/euraxess/charter-code-researchers
6 https://euraxess.ec.europa.eu/jobs/hrs4r
7 https://ec.europa.eu/growth/industry/policy/innovation/regional_en

The policies of that era were focused on permeating the academic and business worlds, as reflected in the different documents reviewing the doctoral courses promoted by the European Commission (EC): "Mobility of Researchers between Academia and Industry. 12 Practical Recommendations"[8], and in employability studies, such as "Transferable Skills and Employability for Doctoral Graduates: Survey of the Current Landscape"[9], in which the links with industry and training in transferable skills were already patent.

At the same time, in 2002, the "SET for Success"[10] report was published in the United Kingdom, which examined and gave recommendations for modifications to training policies. Eight years later, the Research Council followed up the implementation of those recommendations[11] and noted the investment of £120 million in transferable skills training programmes for pre-doctoral and post-doctoral students at British universities.

In the following decade, the EC published its "Principles for Innovative Doctoral Training"[12] (2011), which further encouraged the transformation of doctoral programs to promote skills that allow for intersectoral mobility and created the Expert Group on Intersectoral Mobility. It published a report "On the Intersectoral Mobility of Researchers, their Conditions and their Competences" (2016)[13], which highlighted the recurring need to provide and improve suitable training and development for researchers, particularly at the initial stages, with special attention given to adaptation to the needs of the non-academic labour market.

These recommendations were later summarised graphically by the ERA Steering Group Human Resources and Mobility (ERA SGHRM)[14] in a report titled "Using the Principles for Innovative Doctoral Training as a Tool for Guiding Reforms of Doctoral Education in Europe", which defines the seven Innovative Doctoral Training Principles (IDTP): research excellence; an attractive institutional environment; quality assurance; exposure to industry and other relevant labour sectors; interdisciplinary research options; international networking and transferable skills training.

8 http://ec.europa.eu/euraxess/pdf/research_policies/mobility_of_researchers_light.pdf

9 http://www.docentproject.eu/doc/Report_DEF_EN.pdf

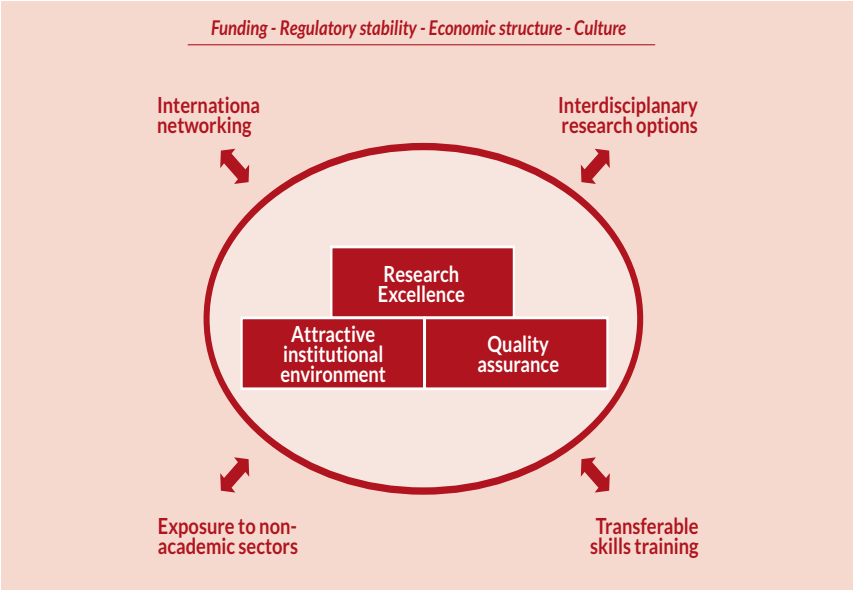
10 https://dera.ioe.ac.uk/4511/

11 https://publications.aston.ac.uk/id/eprint/16899/1/RobertReport2011.pdf

12 https://euraxess.ec.europa.eu/sites/default/files/policy_library/principles_for_innovative_doctoral_training.pdf

13 https://cdn2.euraxess.org/sites/default/files/policy_library/final_report_sghrm_intersectoral_mobility_final_report_0.pdf

14 https://cdn4.euraxess.org/sites/default/files/policy_library/sghrm_idtp_report_final.pdf



In this context, numerous initiatives have emerged in different associations around the world, such as the Association Bernard Gregory[15] (ABG) in France that works to train doctors, and VITAE[16] in the United Kingdom, in a shift from an academic system based solely on excellence to a model that also fosters transferable skills through career development centres at universities. These centres have set up transformative projects for cross-sectoral mobility in the EC, such as the EURAXIND project[17], a part of the EURAXESS network[18] that was created to encourage mobility. Today, it has more than 500 points in the world and the world's largest job search website for research (EURAXESS Jobs).

Finally, knowledge mobility has also been driven by the European R&I framework programme, Horizon 2020 (2014-2020), which is so strongly committed to Responsible Research & Innovation[19] (RRI) in its six dimensions (gender equality, engagement, ethics, governance, open access and science education), an umbrella concept and a guiding principle for the ERA. Thus, the concept of "open science"[20], which partially overlaps with the dimensions of RRI, will become a firm commitment for all participants in Horizon Europe (2021-2027), the new R&I framework programme.

Open Science and Open Innovation will be core factors for the circulation of knowledge, and researchers will need to acquire skills in these areas. The working group on education and skills of the ERA SGHRM presented the study "Providing Researchers with the Skills and Competencies they Need to Practise Open Science"[21] (2017). In a similar vein, the working group's study on "Evaluation of Research Careers fully Acknowledging Open Science

15 https://www.abg.asso.fr/en/
16 https://www.vitae.ac.uk/
17 https://www.vitae.ac.uk/researcher-careers/euraxess-uk-career-development-centre/euraxind
18 https://euraxess.ec.europa.eu/
19 https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation
20 https://ec.europa.eu/research/openscience/index.cfm
21 https://ec.europa.eu/research/openscience/pdf/os_skills_wgreport_final.pdf

Practices Rewards, Incentives and/or Recognition for Researchers Practicing Open Science"[22] (2017) proposes a new career development paradigm and a change of practice in an open science environment.

Global challenges have evidenced the need to put knowledge at the heart of economic and social change, for example, in the fight against the current COVID-19 pandemic, which has required governments, financers, information and data repositories and research communities to join forces, and where public participation is key for ensuring transparent access to information.

As we have seen, the EU's efforts are at a three-way intersection between the physical mobility of talent, intersectoral mobility and knowledge exchange. Therefore, only by investing in the next generation of science and innovation leaders, who need to be professionals with transferable skills and that are more interdisciplinary, intersectoral and international, will we Europeans be able to face the future challenges that lie ahead.

The Human Resources Strategy for Researchers (HRS4R) in Catalonia

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In recent times, Catalonia has reasserted its commitment to improving the quality of employment of doctoral students, as well as to increasing the number of doctoral students who have a labour contract and the number of industrial doctorates (with greater commitment from the private sector). This commitment is exemplified both through political resolutions and programmes with public calls for grants, both by universities and other institutions that are part of the Catalan R&I system.

It should be noted that more than a thousand researchers have joined Catalan institutions through the Marie Skłodwska Curie (MSCA) COFUND programme[23]. With 36 projects awarded in Catalonia, these European grants to co-finance predoctoral and postdoctoral programmes have been major drivers for attracting talent and align the policies of the different participating institutions with the Human Resources Strategy for Researchers (HRS4R)[24], by promoting personalised plans for the professional development of their beneficiaries. Of the plans Catalan knowledge system, the Beatriu de Pinós[25] and Tecniospring[26] postdoctoral grants have incorporated specific resources to foster the development of skills and to facilitate training programmes and internships at public and private institutions, depending on the participants' professional interests. Likewise, based on this commitment to continuous improvement, they reflect the paradigm shift that open research and innovation entails.

The study "Labour Insertion of Male and Female Doctors at Catalan Universities" (La inserció laboral dels doctors i doctores des les universitats catalanes) (2020)[27], published by the Catalan University Quality Assurance Agency (Agència per a la Qualitat del Sistema Universitari de Catalunya [AQU Catalunya]), indicates the importance of

22 https://ec.europa.eu/research/openscience/pdf/os_rewards_wgreport_final.pdf

23 http://agaur.gencat.cat/ca/internacionalitzacio/projectes-europeus-drdi-00001/projectes-msca-cofund-a-catalunya/

24 https://www.euraxess.es/spain/services/human-resources-strategy-researchers-hrs4r

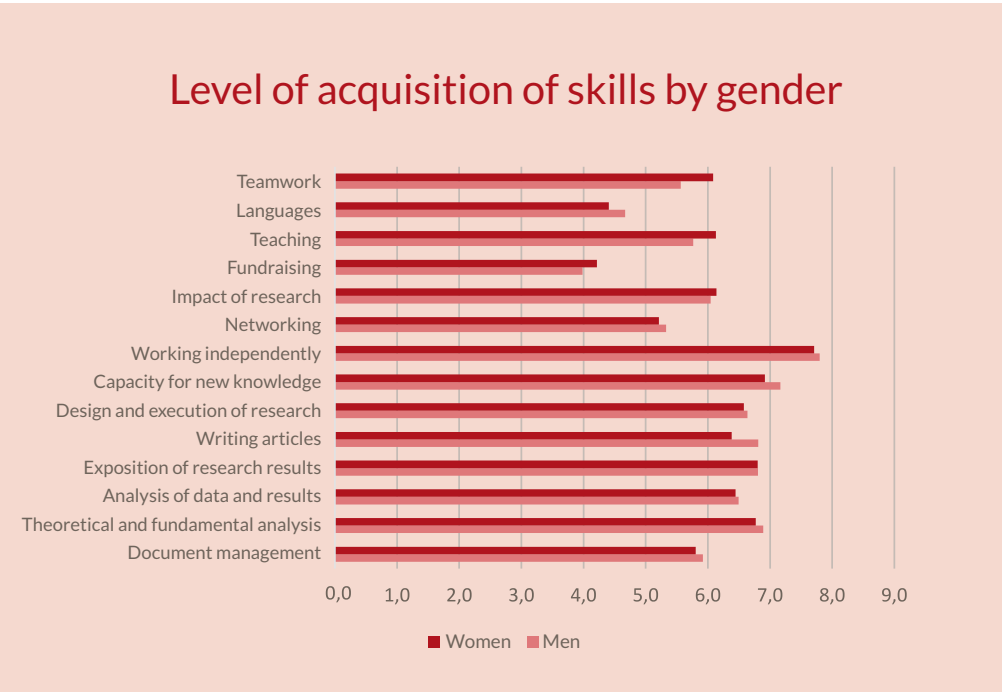
25 http://agaur.gencat.cat/es/Beatriu-de-Pinos/

26 http://catalonia.com/innovate-in-catalonia/tecniospringplus/tecniospringcall.jsp

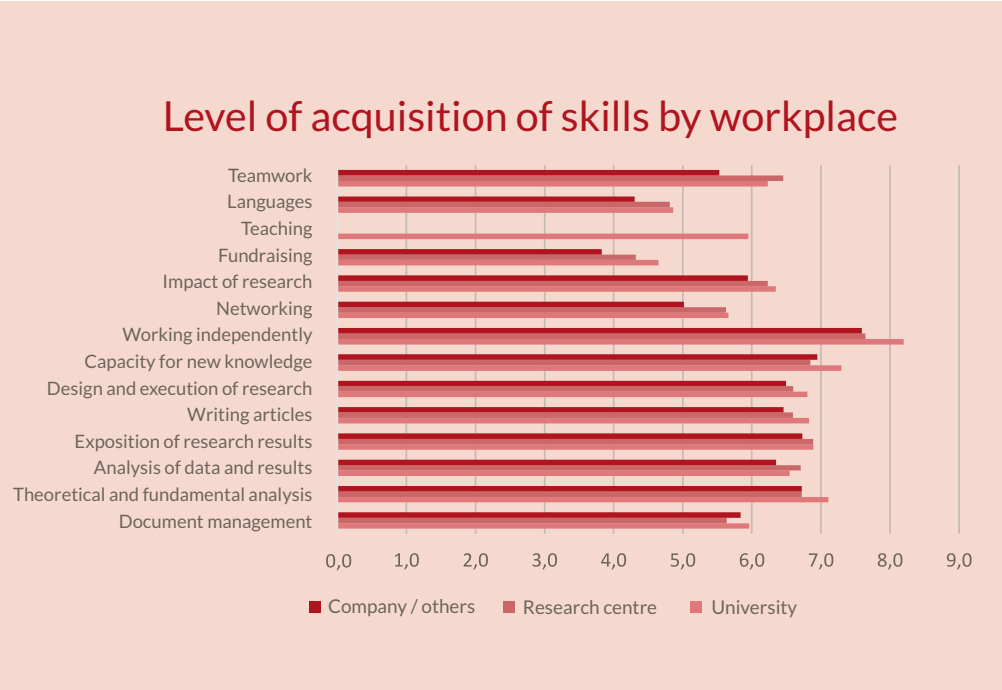
27 http://www.aqu.cat/doc/doc_69542234_1.pdf

acquiring more modern skills as an aspect that needs to be improved in doctoral training, given that these have a lower degree of achievement than traditional skills.

According to the information supplied by AQU Catalunya, taken from a survey conducted in preparation for this study, regarding the acquisition of skills by gender, we observe in the following graph that men have a higher level of self-assessment in almost all research-specific competencies, while the perception among women is greater with regard to the acquisition of more transversal skills, such as teamwork, teaching, research impact and fundraising, although the differences are not especially significant.



With regard to the skills acquired while studying according to the current workplace, the graph below shows that, in all areas, these are higher in the case of male or female doctors that are currently working at a university, except for data and results analysis and teamwork, which are higher for male and female doctors currently working at research centres. Male and female doctors working for companies have reported a lower level of acquisition of almost all skills, except for document management and the capacity to acquire new knowledge, which they score higher than their peers working at research centres.



In order to boost the development of researchers, Resolution 111/XI25 by the Parliament of Catalonia, of 6 May 2016, states that "the Parliament of Catalonia, with the aim of coming more in line with the European model, urges the Government to promote over the course of the coming year, through the corresponding governing bodies, the proposed application for HR Excellence in Research[28] accreditation for all Catalan research entities that have not yet received it, and to get the respective governing bodies to monitor the implementation of the proposal."

The Government of Catalonia, by supporting the National Pact for the Knowledge Society (Pacte Nacional per a la Societat del Coneixement [PN@SC])[29] (passed in 2020), is clearly committed to a strategy shared between the fields of higher education, research and innovation and the productive economy to build the Catalonia of the future. In order to converge with the highest European standards, it recognises the need to increase the number of researchers and to encourage the emergence and attraction of talent, which includes the need to define the criteria that particularly need to be evaluated for each profile, always on the basis of European human resource selection standards, such as the Human Resources Strategy for Researchers (HRS4R). It has also presented the Preliminary Draft of the Law on Science in Catalonia as the core coordinating factor for the strategy for open science in Catalonia.

In this context, 55 Catalan institutions have been awarded the European seal HR Excellence in Research for the development of the HRS4R action plan, and these include all public universities. This recognition is the outcome of an institutional action plan derived from a needs analysis and the result of the participation of the different interest groups made up of researchers and administration and services staff. The seal focuses on the revision of

28 http://agaur.gencat.cat/ca/detalls/noticia/Les-institucions-catalanes-reben-el-segell-HR-Excellence-in-Research

29 http://empresa.gencat.cat/ca/intern/pnsc

practices used in research and for recruiting research staff, the observance of ethical and professional aspects that affect research practice, the processes for selecting and hiring research staff, working conditions and the different stages of training and professional development. All of this reflects the commitment of a good number of universities and research institutions in Catalonia to reappraising the training addressed at their research staff and to making it more attractive to the outside world.

The seminar on support programmes for the professional development of researchers, organised in 2016 by the Agency for Management of University and Research Grants (Agència de Gestió d'Ajuts Universitaris i de Recerca [AGAUR]), discussed international trends and success stories in the design of policies to support the training and career progress of research staff in Catalonia. Dr Janet Metcalfe, head of the highly renowned British institution Vitae, noted at this session that "policies to support the development of cross-disciplinary skills among research staff have a direct impact on the optimisation of scientific capabilities, inter-sector mobility, the obtainment of competitive funding and the professional placement of these staff members."

Furthermore, at the Developing the next generation of research leaders[30] event organised by Alison Mitchell, Head of Development at Vitae, together with Nature, notes that: "As they progress in their career, researchers will be expected to take on increasing leadership responsibilities through, for example, supervision and line management, engaging the public with their research, working in an open research environment, and influencing policy. Researchers are also the innovation powerhouse of universities and are taking that innovation into business through knowledge transfer partnerships, spin-outs, catapults, consulting, and entrepreneurship. Therefore, enabling researchers to realise their leadership potential through continuing professional development is key to sustaining and growing the quality, output and impact of research, creating benefit for institutions, research, economy and society."

The good practices shared by Catalan universities in this report present innovative approaches and programs to foster skills and competencies, especially at the initial stages of doctoral training. These good practices include a commitment to interdisciplinarity in research projects, and greater adaptation of doctoral training to the needs of companies, not only taking academic aspects into account but also such skills as leadership, fundraising, team and project management, communication, personal effectiveness, and so on.

Other efforts by the Catalan R&I system include strategic training programmes that can engender changes to better adapt to the new environment of open science and open innovation. We could highlight the Barcelona Institute of Science and Technology (BIST)[31] project that features several professional development programmes for its researchers, mainly through training in the postdoctoral stage, both during their time at research centres and during their preparation for professional transition to other sectors such as education, industry, public policy and research management. Every year it holds courses such as those on "Leadership in Action" based on the Vitae model and run with in-house staff, "Leading for Success in Science" organised in conjunction with the PRBB and HFP, and "From Science to Business" in association with ESADE. Likewise, the Barcelona Supercomputing Centre[32] (BSC) runs a training programme based on a personalised itinerary for each researcher that develops cross-disciplinary skills that are not directly linked to the classical scientific part (mainly leadership, project management, flexible methodologies, personal management, interpersonal skills and communication), at the end of which the training

30 https://www.vitae.ac.uk/events/past-events/Developing-the-next-generation-of-leaders

31 https://bist.eu/

32 https://www.bsc.es/education

that the researcher has received is recognised with a certificate. In Spain, the ODISEA group is working to present more simplified competency models that are adapted to the reality of the system.

The central role of the scientific and academic field in the current COVID-19 pandemic should also be highlighted, where new opportunities and challenges are being generated, with an increase in international collaboration, the promotion of open access to publications and data, more industry-academia partnerships, a direct influence on public policies and major reassessment of the communication of science and its results and the role of citizen science. As a whole, it will clearly lead to an adaptation of the skills required of researchers to responsible research and innovation developed with and by society.

EURAXESS Catalonia Working Group for the professional development of researchers, made up of representatives of different Catalan universities and research institutions (Universitat Autònoma de Barcelona, Universitat Rovira i Virgili, Universitat Oberta de Catalunya, Barcelona Institute of Science and Technology, Parc de Recerca Biomèdica and Barcelona Supercomputer Center) and coordinated by AGAUR[33], is a working forum designed for sharing good practices to advance towards an open competence model and an innovative environment of excellence to enable students and researchers to receive adequate training in keeping with their professional prospects and needs.

This group has identified a series of key needs, based on its experience in the application of external reference models, such as the Vitae Researcher Development Framework (RDF)[34] and the Eurodoc report titled Identifying Transferable Skills and Competences to Enhance Early-Career Researchers' Employability and Competitiveness»[35] (2018), which identify a range of competences that researchers can acquire from different angles and at the same time provide tools to implement them.

Recommendations of the EURAXESS Catalonia Working Group for the professional development of researchers

In institutional terms

- *Introduce and evaluate training in transversal and transferable competencies on predoctoral and postdoctoral programmes.*
- *Raise awareness among the research community of the need, importance and added value of cross-disciplinary skills.*
- *Create activities and contents that include a systemic and relational approach to deal with changing, discontinuous and uncertain contexts to thereby improve the ability of research staff to create their own storyboards and ensure transferable career paths.*

33 http://agaur.gencat.cat/es/internacionalitzacio/suport-a-linvestigador/

34 www.vitae.ac.uk/rdf

35 http://www.eurodoc.net/news/2018/press-release-eurodoc-report-on-transferable-skills-and-competences

- *Offer a set of training modules that meet the requirements of programmes for attracting and developing talent (training scholarships, grants, MSCA COFUND fellowships, knowledge industries, joint training on the Industrial Doctorates Program, FUNDAE).*
- *Integrate lifelong learning into organisations' strategies, and at all stages of a professional career (supervisor, principal investigator, junior and senior investigator, etc.).*
- *Foster the creation of a recognised community of in-house professionals dedicated to the training and career development of researchers (programme managers, trainers, careers advisors, professional support).*

In terms of the knowledge system

- *Encourage the recognition of training in cross-disciplinary skills, both in curricular terms and in the criteria for professional assessment.*
- *Promote a skills development framework for research staff in Catalonia, with a catalogue of propaedeutic areas to be developed with dynamic content that is adaptable to all doctoral programs and areas of knowledge in order to foster reskilling and upskilling of the research community.*
- *Identify system indicators to analyse the benefits of training in transferable skills and their impact on professional development (building partnerships, career opportunities, external publications and fundraising, awards and special mentions, international recognition, etc.).*
- *Introduce visibility mechanisms that recognise competencies and can make the system more attractive (e.g. certificates of achievement, seals, awards, 4MT type competitions, FameLab[36]).*
- *Provide a website with tools and good practices for local, national and international institutional training programmes, and optimise the range of courses so that all researchers in the system can benefit.*
- *Bring different research support and hosting programmes in line and offer guidance with the development of professional careers.*
- *Share good practices in training policies with the HRS4R) and facilitate European accreditation for all Catalan research organisations.*
- *Hold an annual system conference, with presentations by leading international institutions in the field of researcher training (Vitae, European Research Council, international representatives) to promote innovation in the strategies of each institution.*
- *Work with a view to putting the so-called 'soft skills revolution' among the research community at the forefront of the contents and activities in order to meet the labour needs of the present and future (Future of Work)[37] by aiming more at employability.*

36 https://www.fecyt.es/es/tematica/famelab

37 https://www.oecd.org/future-of-work/

Conclusion

The Catalan university and research system is making a huge effort to equip its research staff with skills to help them to broaden their career horizons. European policies have provided an indispensable impetus, both in economic terms and by making programmes more attractive, and there is a clear commitment to continuous improvement in the training of research staff, especially through the HRS4R and COFUND activities.

We face the challenge of seeking career options for an increasing number of doctoral students and postdoctoral researchers in a changing research environment, with the new paradigm of open science and the need to quickly transfer knowledge to the production sector. As other leading international models have highlighted, we need to facilitate the acquisition of transversal skills, with special emphasis on those that favour better inter-sector mobility of doctors towards different career paths and those that facilitate social interaction and ethical commitment. We therefore need to increase the range of training of modern day research professionals in key cross-disciplinary competencies and ensure that these are properly identified and recognised on curricula.

Although academic and research institutions are making exceptional progress with their internal strategies, the working group that produced this article has proposed a series of recommendations and measures for collaboration both in organisational terms and with regard to the Catalan knowledge system. These recommendations will help to develop and implement a common framework, which will help to make the Catalan knowledge system more attractive, more responsible and better recognised by society.

Universitat de Barcelona

The Human Resources Strategy for Researchers at the Universitat de Barcelona

The Universitat de Barcelona (UB) is promoting the European Commission (EC)'s programme to improve the working conditions of research staff in order to contribute to the development of the European Research Area. Since 2013, the UB has supported the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers, and does so in a structured manner following the recommendations of the EC to definí its Human Resources Strategy for Researchers (HRS4R). Given the cross-disciplinary nature of its goals, the HRS4R Working Group at the UB was created, which includes the directors of six different management units and researchers of all levels (R1-R4), and is jointly promoted by the Vice-Rectors for Research and teaching and research staff. The identification of strengths and weaknesses is based on consultations with the research community, which means that improvements made by the rectors can be aligned with the interests of research staff, it specifically being this working group that oversees the performance of these actions.

The last consultation took place in late 2018 and was continued in the form of small group meetings at which independent experts were able to make qualitative assessments that complement and expand on the quantitative assessment made via the survey. The four main blocks included in the Charter and the Code (Ethical and Professional Aspects, Selection and Recruitment, Working Conditions and Social Security, Training) are treated with similar importance (3.5/4), but it is the third block (Working Conditions and Social Security) where the lowest degree of achievement is observed. It should be noted that of the 40 aspects consulted, the lowest rated are contractual instability and working and funding conditions, which are rated as insufficient (1.7/4). Without wishing to shirk responsibilities, and from the conviction that the university has a wide margin for improvement, there is no denying that these are aspects that go beyond the regulatory and economic framework of the university itself.

With regard to the Training block, two of the questions make explicit reference to cross-disciplinary training and professional development activities. The answers indicate that these activities are considered as important as other aspects of training (3.5/4), and have a higher level of achievement (2.6/4).

Training activities offered to researchers in cross-disciplinary competencies and skills

The cross-disciplinary training activities that the UB makes available to its researchers are offered in a decentralised manner from the university's different units and structures, mainly the Doctoral School (EDUB), the Institute for Professional Development (IDP-ICE) and the Bosch i Gimpera Foundation (Fundació Bosch i Gimpera [FBG]) (the organ responsible for knowledge transfer at the UB). It is also worth mentioning that as an integral part of their cross-disciplinary training, researchers can receive Catalan language courses, and make use of the linguistic guidance and resources offered by the UB Language Services, and courses at the UB School of Modern Languages.

- **Doctoral School (EDUB):** *During the completion of their doctoral theses, young researchers must also receive both specific and cross-disciplinary training activities. Each doctoral program has specific training requirements and courses that are complemented by cross-disciplinary training activities promoted and organised by the EDUB. Of particular note are the welcome sessions, which provide practical information about the doctorate programme, and the 'training capsules', which are free, accredited activities for all doctoral students. These are offered in Catalan, Spanish and English. They generally last four hours and*

cover such diverse aspects as ethics, stress management, research dissemination and the learning of cross-disciplinary techniques (statistics, graphic representations, audiovisual material).

- **Institute for Professional Development (IDP-ICE):** *This offers teacher training (including a master's degree in university teaching for novice teachers), as well as training in the areas of management, research and knowledge transfer. The latter include aspects such as scientific refreshment, leadership and teamwork, the preparation and management of contracts and research projects, the communication of research results and scientific assessment. Another key aspect is the training course for young researchers, which is structured as three modules lasting between 12 and 16 hours each.*

- **Bosch i Gimpera Foundation (Fundació Bosch i Gimpera [FBG]):** *This is the university structure responsible for the transfer of knowledge and technology that is generated at the UB, which connects the university with business and society. The FBG provides mentoring and support to researchers, companies and investors to promote this partnership. Since 2018, the FBG has launched a specific line of training and personalised guidance aimed at researchers joining the UB, and which is particularly focused on projects with potential for transfer or translational impact. This personalised guidance is complemented with group training and orientation days to address such issues as intellectual property, valorisation and licences and the creation of spin-off companies.*

Universitat Autònoma de Barcelona

The Professional Development Programme for Researchers at the Universitat Autònoma de Barcelona

In 2016, the Universitat Autònoma de Barcelona (UAB) began to design its Professional Development Programme for Researchers, promoted by the Strategic Projects Unit in the Office of the Deputy Executive Administrator for Research and very closely linked to the recently created Doctoral School. One of the triggers for this initiative was the UAB's commitment to the EURAXESS Human Resources Strategy for Researchers (HRS4R) and the adoption of the Principles for Innovative Doctoral Training (IDTP) that the European Commission published in 2011. The aim of the programme was to support researchers in their professional careers by scheduling courses aimed at strengthening the cross-disciplinary skills required in each of the stages of their professional development. It was aimed primarily at trainee researchers, although activities also began to be scheduled that are aimed at postdoctoral and permanent staff.

Some pilot experiences had been carried out previously, but it was not until the 2016-2017 academic year that the training programme began to take shape with the definition of the Professional Competence Model for UAB Researchers, which became the conceptual framework of reference (https://ddd.uab.cat/record/203083).

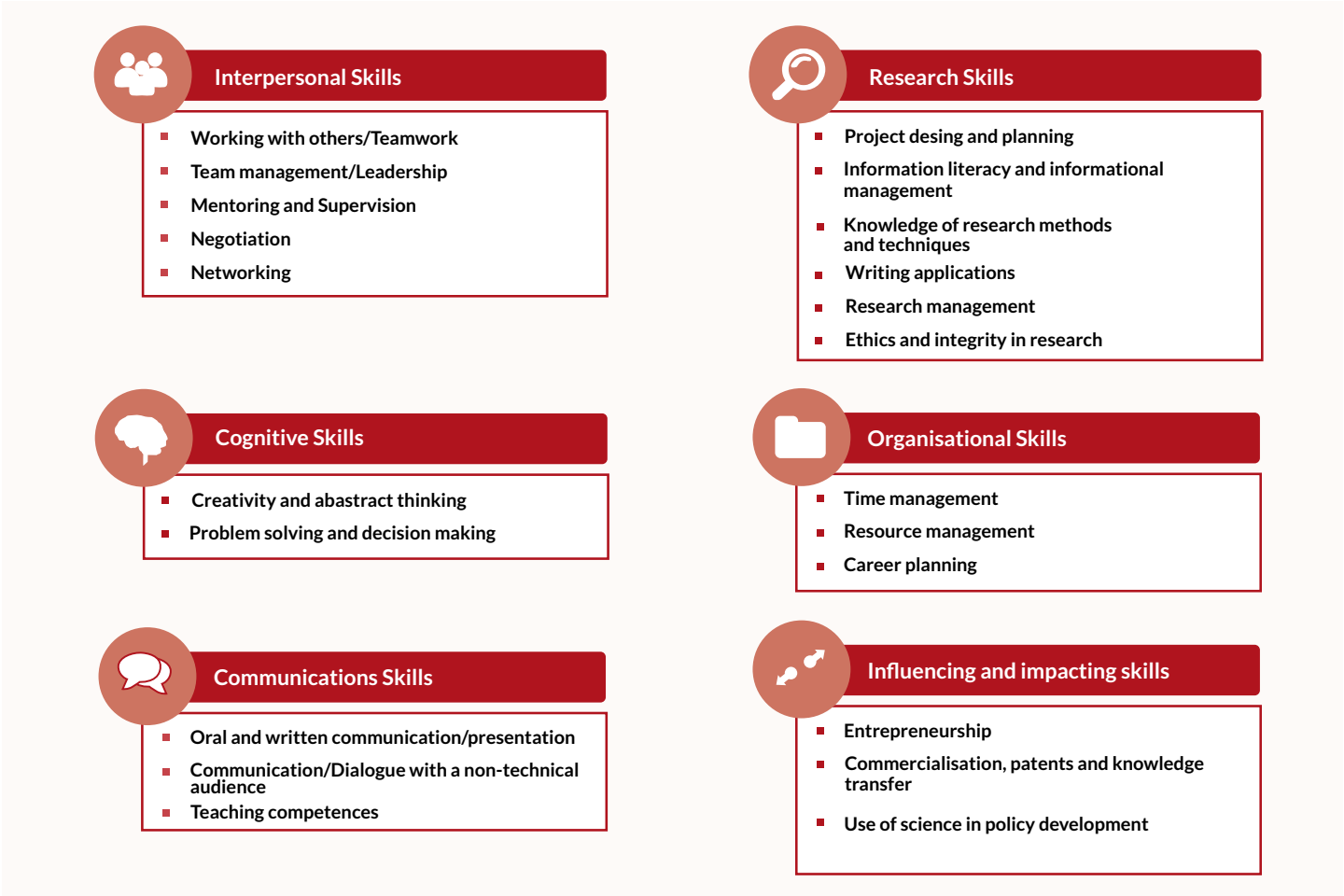
In the process of defining and drafting this programme, interviews were held with the main stakeholders:

- *Coordinators of doctoral programmes.*
- *Institutions that incorporate doctors outside of the academic field.*
- *Trainee researchers, both first-year and those who were about to complete their training.*

The collected data was critical for designing the programme. At the same time, other proposals were analysed, such as the list of 17 transferable skills proposed by the European Science Foundation in 2009 (which the OECD assembled into 6 categories in 2012), and the Researcher Development Framework (proposed by VITAE in 2011). With all these elements, we established the Professional Competence Model for UAB Researchers, which groups 22 descriptors in 6 domains of competence.

The definition of this model aims for researchers to acquire transferable skills that will enable them to perform the following functions:

- *Establish effective professional relationships and links with different people and groups.*
- *Identify, pose and solve problems effectively.*
- *Transmit clear and understandable information to all types of audiences.*
- *Develop valid, useful and quality projects.*
- *Efficiently manage their own work and that of the staff in their charge.*
- *Influence and impact the academic, social, cultural and economic context.*
- *Promote responsible research and innovation.*



The planned activities are conceived as independent training modules that are each designed for working on one or several of the skills included in the model. They can take the form of discussions, workshops, seminars and courses designed to address a variety of contents of interest to researchers in any field of knowledge. In addition, the inclusion of these cross-disciplinary activities is considered to not only broaden their education, but also to promote association and interaction between research staff in various fields of knowledge.

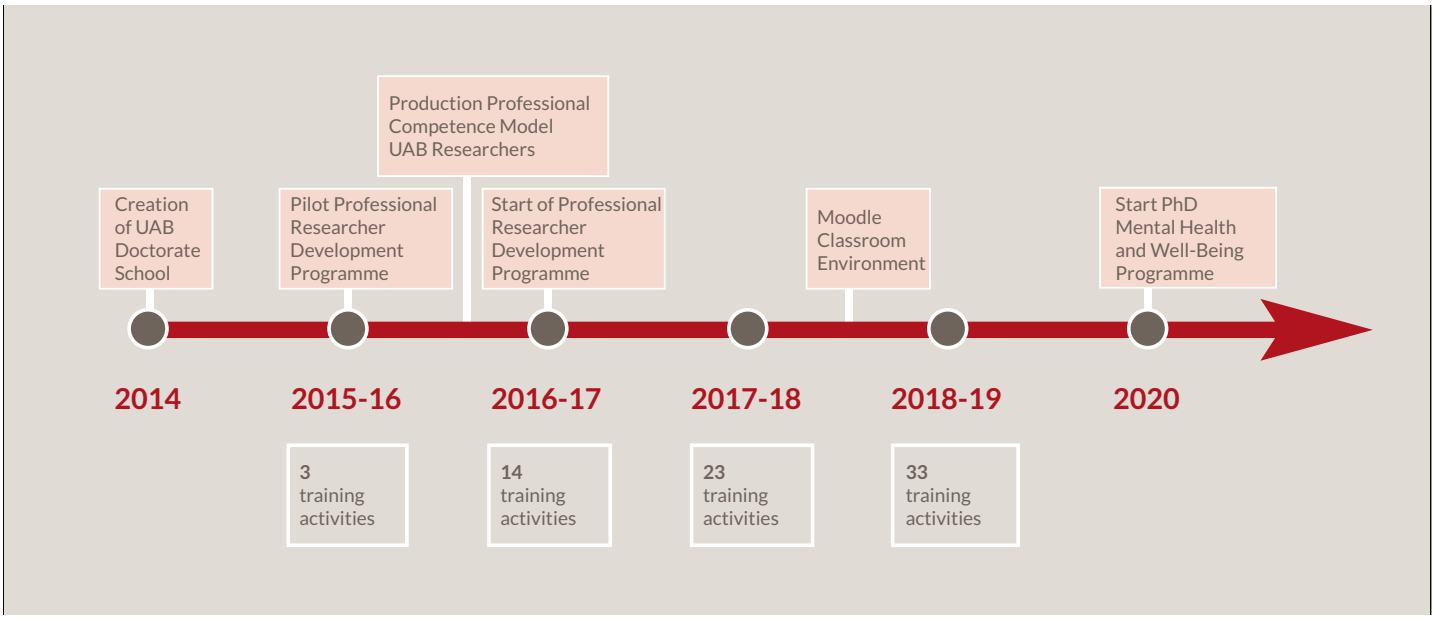
The design of the activities is based on the following aspects:

- *They are offered free of charge to the UAB research community (including all trainee research staff enrolled on UAB doctoral programmes).*
- *They are aimed at providing transferable skills for research, not for teaching (an area in which the UAB already has a long history).*
- *They make increasingly greater use of shorter formats, in small groups and with a participatory methodology.*

Implementation of the programme

The Professional Competence Model for UAB Researchers was launched in the 2016-2017 academic year together with a first package of training activities. During the 2017-2018 academic year, the programme was expanded and transferred to the Moodle Classroom environment.

The reference website (https://www.uab.cat/carrera-professional/) includes different initiatives related to the professional career, as well as the training programme and follow-up reports of all the activities.



The number of scheduled activities has gradually increased over time, and activities related to the management of emotions, well-being and coping with stress, as well as aspects related to research and responsible innovation (RRI) have also been incorporated.

The programme is therefore dynamic in nature, the intention being to continue to meet training needs in order to interact more and better with society and to face the future challenges of research and innovation.

Universitat Politècnica de Catalunya

The Human Resources Strategy for Researchers at the Universitat Politècnica de Catalunya: training in transversal competences

In 2013, the Universitat Politècnica de Catalunya (UPC) adopted the commitments outlined in the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers. It thus embarked on a process of analysing and launching actions to put its principles into action, which would culminate in 2017 with the granting of the HR Excellence in Research seal of approval. Since then, two action plans have been developed that have allowed the UPC to strengthen its strategy of excellence in the selection and management of human resources for research.

As well as ethical and professional aspects, recruitment and working conditions, the Charter and the Code focus on policies for the lifelong training of researchers, and promote actions that guarantee their continuous professional development and access to training at any stage of their career in aspects that might improve their employability and the development of skills and competencies.

Universities must strive to ensure that their researchers acquire knowledge and must assist them with innovation and research quality processes so that they can make advances in their academic and professional fields.

The UPC Institute of Education Sciences (ICE) runs training activities that are designed to support researchers with their careers and ensure their proper professional development.

The Training Plan in Cross-Disciplinary Skills for Researchers

This training completes skills areas and covers the expectations and needs of both trainee and postdoctoral researchers. It aims to offer the kind of cross-disciplinary training that is necessary for the correct production of a doctoral thesis and also for the subsequent research career.

The kinds of training activities include courses, seminars and workshops. For young researchers there are the following:

- ***Teacher training:** teaching innovation and communication, social skills of university lecturers, etc.*
- ***Training for research and transfer of results:** research methodologies, information processing, drafting of technical reports, etc.*
- ***University extension:** equal opportunities regarding gender, disability, etc.*

The Library Service runs courses on the writing of doctoral theses, publication and evaluation of research, information searches, etc., and also on producing research data management plan and applying for patents.

The Language and Terminology Service offers a full catalogue of language resources, courses on communication skills and such resources as 'Arguing' and 'How to Communicate'. It also has a Linguistic and Cultural Reception Service for new researchers, which includes the SALSA'M mentoring programme.

In association with the Research and Innovation Support Service, the ICE also offers courses on research opportunities, research project management and idea development.

Regarding transfer to the market, the Innovation Management Service offers training in the protection and marketing of results.

There is also the Emprèn UPC programme for the pre-incubation of initial phase technology-based projects, which supports students with the development of innovative projects, and the 'From Science to the Market' scientific entrepreneurship programme aimed at doctoral students and postgraduates.

Training in teaching skills for FPU contracts

Beneficiaries of grants for university teacher training (FPU) must receive training from the university to support their insertion as teaching staff. Thus, courses are offered on the postgraduate programme University Education in Science, Technology, Engineering and Mathematics (STEM). These courses are also available to any doctoral student with a contract at the UPC.

Multidisciplinary training

This is training in related or complementary disciplines to improve research capacity, thus permitting access to subjects on MA courses that are of interest to visiting students.

ICE Research Group

The Barcelona Science and Engineering Education Research (BCN-SEER) group addresses a wide range of lines of research: academic erudition in teaching and learning at university, training for sustainable development in engineering, training of university lecturers in teaching and learning, professional skills as part of the learning outcomes of university degrees and student commitment and engagement.

ICE Doctoral Programme

The UPC doctoral programme in Education in Engineering, Science and Technology was approved by the Governing Council for the 2020-2021 period. It is cross-disciplinary in all areas of knowledge at the UPC and is designed to integrate teaching and research staff with an interest in participating in it.

Universitat Pompeu Fabra

Professional development in the framework of the Human Resources Strategy for Researchers at the Universitat Pompeu Fabra

Universitat Pompeu Fabra (UPF) signed the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers in 2010. In 2012, UPF joined a working group led by the European Commission to promote the Human Research Strategy for Researchers (HRS4R) and in March 2014 it obtained the HR Excellence in Research award. Continuing professional development is an integral aspect of UPF's human resources strategy for researchers, and training in soft, transversal skills to improve competencies and employability is at the core of such development. This training is offered above all to first-stage researchers (R1), although it is often also open to later-stage researchers.

Cícliks is UPF's university-wide training programme for R1 researchers. It is run jointly by UPF's PhD School and the Center for Learning Innovation and Knowledge (CLIK). It includes training in a number of soft skills, including specific oral communication skills for the Research in 4 minutes (Rin4') competition, which has been successfully held at UPF since 2015. Further training for researchers in all stages is available through CLIK in areas such as academic writing, statistics for research, project design, publishing strategies, the gender dimension in research, and teaching skills. Individual PhD programmes at UPF choose which training modules should be mandatory for particular subsets of R1 researchers.

In addition, training on personal data protection in research and ethical compliance in research projects involving human participants is provided by UPF's Institutional Committee for Ethical Review of Projects (CIREP-UPF) through a number of online modules. The training is now offered to all R1 researchers and a pilot is being run to define the exact scope of the training to be made available, perhaps as a mandatory component, to the wider research community.

Two pioneering initiatives in the area of professional development for researchers in the UPF Group were developed in the context of the Campus del Mar: Science in Action, which focuses on scientific integrity and was set up in the Department of Health and Experimental Sciences (CEXS-UPF) in 2000, and PRBB Intervals, an interdisciplinary training and development programme that has been running since 2007 at the Barcelona Biomedical Research Park (Parc de Recerca Biomèdica de Barcelona [PRBB]).

Science in Action familiarises R1 researchers on CEXS-UPF's PhD programme in Biomedicine with current ideas in good scientific practice. The contents of the course are based on the PRBB Code of Good Scientific Practice, first published in 2000. The Science in Action methodology includes group discussions, role plays and other interactive activities.

PRBB Intervals provides training in areas that are often ignored by conventional science education, thus covering the intervals or gaps between discipline-based training. Intervals is open to the PRBB community as a whole, scientists and support staff alike. The PRBB houses about 1,500 scientists and related professionals, from six different centres, including CEXS-UPF.

The aim of Intervals is to help science professionals become adept leaders and change-makers both in science and in the wider world. The programme consists of short courses organised into one of three learning areas: (1) Self-mastery – including critical thinking and mindfulness, (2) Interpersonal –including management and negotiation skills, (3) Systems – including public communication skills like writing and oral presentations.

Small group sizes and trainer quality ensure a high level of interaction. Most courses are open to all staff, so a senior principal investigator, an R1 researcher, and a science manager may share a small learning group in an environment which is free of the barriers that exist in day-to-day activity. Intervals recognises that supporting today's leaders is as important as preparing those of tomorrow and encourages participation from professionals at all stages of their careers, including the most senior.

For lifelong development of transversal skills to be effective it must be integrated into the human resources strategy of research organizations. At PRBB and CEXS-UPF training in soft skills and subject-based learning operate side by side. The Intervals programme is thus fully incorporated in the PRBB and CEXS-UPF training strategy.

In conclusion, training in soft skills and continuing professional development is a key element of UPF's human resources strategy for researchers. Researchers from CEXS-UPF and the PhD in Biomedicine have benefited from the pioneering, successful Science in Action and PRBB Intervals programmes since 2000 and 2007, respectively. At present, fortunately, these programmes are accompanied by other university-wide training initiatives run by other units within UPF, affording diverse competencies and improved employability for both R1 and later-stage researchers.

Universitat de Girona

Training programme in competencies and professional development of the research community at the Universitat de Girona

It surely goes without saying that we are living in exceptional times. All universities have had to adapt to a new kind of existence, both with regard to students and society. This adaptation has also affected an essential factor of the Universitat de Girona's (UdG) policy in recent years of supporting both trainee researchers and those who are already established and are seeking new expectations for professional development. The modification of this raison d'être implies, above all, the need for constant (previous and continuous) work, which we have based on the person's ability to acquire skills that combine their own resources with those of the environment around them.

The UdG is responding to the European Commission's Human Resources Strategy for Researchers (HRS4R) by fostering support for research at the university, making improvements to the conditions in which our researchers conduct their activities and increasing the visibility of and confidence in our university as a hub for attracting talent.

That is why it is working to establish a development framework for researchers, redefining their professional careers, skills and abilities as a key part of the adoption of the European Union's Charter for Researchers and the Code of Conduct for the Recruitment of Researchers. By defining competencies in accordance with the conceptual development plan, the UdG is seeking to identify and define the skills and development phases involved in research careers, thus enabling researchers to maximise their opportunities and pursue a broader professional career.

At the same time, the Training Plan, in accordance with the skills map drafted within the framework, has been established as a continuum, in the sense that it provides at all times the best tools for obtaining defined and implemented competencies in order to boost employability and entrepreneurship.

The training capsules

Since the 2018-2019 academic year, the UdG has been offering the Skills School's training capsules via the University-Company Office (OUE) with the idea of promoting the professional development of all groups. In 2018-2019, fifteen completely free training capsules were offered, which worked on seven of the most important multi-disciplinary skills: communication, leadership, motivation, networking, self-confidence, negotiation and entrepreneurship. The capsules have proven extremely popular, precisely because of their flexible, independent nature, which is adapted to users, who can choose their own training programmes and adapt them to their work or study schedules. This approach, together with the attractive range of options, meant 765 people participated in the first edition.

The excellent reception of this programme encouraged us to devise an expanded version for 2019-2020, with the inclusion of two additional skills: New Technologies (with capsules on the creation of applications with Google Inventor, Artificial Intelligence and Machine Learning, Business Intelligence and Mass Data, Blockchain and Digital Marketing. In the 2019-2020 academic year, there were 42 capsules, which worked on 9 transversal competencies.

The pandemic, as we were saying, has forced us to reinvent, but it has also presented an opportunity to face new challenges: since mid-March, the range of courses on offer at the School of Competencies was adapted to include virtual-format capsules, which were a huge success in terms of attendance. The 30 face-to-face sessions were attended by 920 people, and the 12 online sessions had as many as 1,250 participants; a highly positive balance indeed, for in total there were 2,135 attendees and 810 participants. We have scheduled the third edition for this 2020-2021 academic year, working on the same 9 skills, but with the added value of significantly increasing the number of capsules and workshops to promote entrepreneurship and self-employment, as we particularly view these as basic tools for the economic development of a region, in special awareness of the difficult future we have ahead of us. In the first semester, we scheduled 24 online capsules, 22 of which have already been successfully held.

About the doctoral students

Courses

The Doctoral School offers a series of cross-disciplinary training courses (social skills) to provide the doctoral student with complementary training to gain the tools required to help produce and present a doctoral thesis and prepare for the professional future. The UdG coordinates 27 of its own courses and interuniversity doctoral programmes, which are grouped into four main blocks: (1) Good research practices (ethics, open science); (2) Research data management and analysis; (3) Communication and dissemination of research, and (4) Leadership and professional development. Of particular importance for the professional development of doctoral students is the course on Business Model Generation, aimed at marketing the product or service they can offer.

Meanwhile, since the 2018-2019 academic year, the Doctoral School, together with the Chair of Scientific Culture and Digital Communication (C4D) and the Institute of Education Sciences, has been offering a course on the management of research groups and doctoral theses. It consists of seven sessions that are aimed especially, but not only, at young (potential) directors of doctoral theses at the UdG. Topics covered include: Leadership of the research group; Tutoring and management of doctoral theses; Time management; Public and private funding (technology transfer); Research project management; Publication and dissemination of research and visibility of researchers; Administration of doctorates at the UdG.

Workshops

Every year since 2012, the UdG has attended the Cross-Border Doctoral Workshops that are jointly promoted by universities and higher education institutions in the Pyrenees-Mediterranean Euroregion. The last edition in 2019 was held at the UdG with the aim of increasing the employability of young doctoral students, both in the public and private sectors, including entrepreneurship, activities in companies and research centres, and setting up start-up companies.

Universitat de Lleida

Training in transversal competencies and skills at the Universitat de Lleida

In 2017, the Universitat de Lleida (UdL) obtained the HR Excellence in Research seal of approval. This distinction shows that the university is committed to implementing a series of actions aligned with the Human Resources Strategy for Researchers (HRS4R). One of the core areas of this strategy is to guarantee continuous professional development and access to cross-disciplinary training for researchers at all levels of professional development (R1 to R4). Hence the 2017 Action Plan includes a specific action to expand the offer of training on key topics of research and transfer (protection and treatment of results, intellectual property, open science, new programs and calls, etc.). In 2019, with the partial evaluation of the HR Excellence in Research award, a new action plan was drawn up that includes the need to continuously improve cross-disciplinary training. The aim of this new period is to maintain the courses that are most popular among researchers and to incorporate new ones that are adapted to new legislation, new calls and new resources for the communication and publication of scientific results. There are also plans to run workshops to raise awareness among researchers of the 2030 Agenda for Sustainable Development.

The university has been committed for years to complementary training for teaching and research staff that is offered through the Annual Training Plan. This plan is divided into three modules, one of which focuses on training in the field of research and transfer, and which includes courses taught by internationally renowned UdL researchers who have enjoyed major success in competitive calls. Some examples of these courses are How to write and publish a scientific article, European Projects. Funding, Horizon 2020 programme and administrative and financial aspects for beginners and How to write a Horizon 2020 proposal.

Library and Documentation (BiD) also has a user training plan with numerous activities aimed at researchers, such as open science training, which includes a massive open online microcourse involving eighteen universities, courses on open access to scientific publications, training on indicators and methods for evaluating scientific production, both in science and humanities, or a course on the Mendeley reference manager. The BiD unit is also currently offering 19 research support libraries that all researchers can access via its website.

The UdL is also especially looking to increase the cross-disciplinary training offered to researchers at the beginning of their professional career (R1). The Doctoral School tells predoctoral researchers what courses are available to them, with the activities organised with Campus Iberus being of special relevance. In this network of excellence to which the UdL belongs, researchers attend Doctoral Workshops every year with the aim of promoting the communication of research in a multidisciplinary environment, as well as the Thesis in 3 minutes, designed to develop communication and dissemination skills, in a similar format to the Present your thesis in 4 minutes competition run by the Catalan Foundation for Research and Innovation (Fundació Catalana per a la Recerca i la Innovació [FCRI]), in which our researchers also participate. Campus Iberus also offers courses on the use of bibliographic tools and an annual entrepreneurship course.

In order to complement the range of courses and adapt them to the needs of the times, courses and discussions have been run in the field of the protection of technologies and research results. The Doctoral School has also run a course on improving doctoral supervision skills, and a new course is being defined on awareness of data protection issues. A workshop is has also been held on the UdL's commitment to the Sustainable Development

Goals (SDGs), 2030 Agenda: a decade for action, with a working group dedicated specifically to research. In this context of cross-disciplinary training, researchers were encouraged to take part in the Idea-UdL-ODS competition for innovative business ideas for achieving the SDGs.

In addition to the activities organised by the university and by associated parties, the UdL also promotes external activities, seminars, conferences and training courses, so that our researchers can complement their training by gaining a comprehensive, up-to-date view of research and transfer.

Universitat Rovira i Virgili

How Universitat Rovira i Virgili deploys its human resources strategy for researchers

It was in 2008 when the Universitat Rovira i Virgili (URV) formally undertook to adhere to the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers, and in November 2013 it officially applied for the certification launched by the European Commission to help European institutions to comply with the principles that we had all set ourselves.

So, since then, we have run two action plans, with the corresponding analyses of the weaknesses that we have been facing in terms of our possibilities and priorities at any given time. We are currently beginning a new internal analysis and the definition of a new action plan (2020-2022) that should lead to new actions to help us continue to improve.

Of these different action plans, we should highlight a couple that we believe are especially good practices that should be shared with other universities: (a) the Cross-Curricular Skills Training Plan and (b) the Researcher Welcome Pack.

The Cross-Curricular Skills Training Plan

The URV's doctoral Cross-curricular Training Program (CTP) meets the training requirements of trainee doctors to help them to acquire competences in the areas of:

- *Research methodology*
- *Bibliography resources and cite managers*
- *Scientific communication, both written and oral*
- *Science dissemination to the specialized public and the general audience*
- *National and European research policies, the funding of research*
- *Research management, knowledge and innovation transference*
- *Technology-based entrepreneurship and start-ups*

The need for cross-curricular training in transferable skills is a consequence of the improved training associated to the European framework, where it is not only development in academic research that matters, but also the preparation of researchers for maximum success. The training plan is therefore grouped into six blocks:

- ***Institutional presentation.** The aim is to guarantee the proper incorporation of knowledge at the URV and to provide the necessary information to guide the activity of new researchers.*
- ***Training in teaching innovation.** The aim is to promote the acquisition of teaching skills in terms of planning, designing, managing and evaluating training activities, as well to provide digital tools and resources focused on teaching.*

- ***Training in research and knowledge transfer.*** *Aimed at providing knowledge and the capacity to use research management processes (funding, patents, agreements, resources, etc.), guidance with innovation and knowledge transfer processes, tools and resources for the design and development of research projects, introduction to good practices and the gender dimension in research and awareness about intellectual rights and data protection.*

- ***Personal and collaborative skills.*** *It is very important to raise awareness of the need to continuously train for a professional career and to acquire personal and collaborative skills, such as those for planning work, group work, leadership skills, communication skills, etc.*

- ***Tools and resources for research.*** *These are explained in sufficient detail to help conduct research, as well as to encourage critical thinking and the use of qualitative and quantitative data analysis techniques. The idea is also to teach the use of bibliographic management tools, which are constantly evolving.*

- ***Publication, communication and networking.*** *Guidance on the different levels of specialised written and oral scientific communication (articles, reports at congresses, doctoral theses) and, on a more general level (scientific dissemination), as well as to foster good practices and ethical aspects in the publication of results and provide tools to improve the quality of doctoral theses.*

Researcher Welcome Pack

One of the most eagerly awaited actions has been the preparation of the URV Researcher Welcome Pack. We are aware that our institution is complex, with a number of specialised services and units, so it is important for researchers joining the URV to be given a document containing all the information they need, presented schematically and concisely, about what the URV is, who is who and who does what and, above all, what services and what units are available to help them in certain situations. The pack, which serves as an excellent complement to the International Centre's Survival Guide for international students joining the URV, offers very specific indications and key points of contact regarding anything that researchers might need during their time at the URV, either for a few months or for a longer period.

Universitat Oberta de Catalunya

Professional development plan of the research community of the Universitat Oberta de Catalunya

The human resources strategy at the Universitat Oberta de Catalunya (UOC) to contribute to the professional development of researchers is part of the European Research Area. Specifically, it responds to the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers that the European Commission (EC) adopted as key elements of the European Union's policy to promote research careers.

In February 2017, the UOC took the first step in promoting the Human Resources Strategy for Researchers (HRS4R) by adhering to the principles set out in the Charter and Code of Conduct. This led on to a preliminary internal analysis and a collaborative work process that adopted an inclusive, active-participatory approach that included the whole research community, governing bodies and the management and services departments. The culmination was the award by the EC in August 2018 of the HR Excellence in Research seal of approval that recognises the UOC's capacity to attract talent, generate a favourable working environment, foster research and enhance the careers of researchers in the European framework.

In order to implement its strategy for obtaining the distinction, the UOC defined an Action Plan (2018-2020) that prioritised actions for the coming years, including those aimed at developing a catalogue of research and innovation (R&I) services and a training plan for research staff, which will be explained below.

The training of the professionals who take part in the university's R&I activity is aimed at the continuous improvement of both generic and instrumental research skills, as well as the achievement of more cross-disciplinary skills. The catalogue of R&I services is thus adapted to the different stages of the research cycle and to different researcher profiles (from doctoral students to lecturers and senior researchers). It offers a wide range of face-to-face, online and self-learning courses based on the search for specialised information, the management of bibliographic and data references, the publication and dissemination of research results, the management of digital identity (in the form of hackathons) and the evaluation of scientific production (taking into account bibliometric analysis and other qualitative indicators).

On another level, and as a basis for the previous one, there is training in research methodologies and academic communication. Of course, the training catalogue also covers aspects related to the promotion and development of R&I projects, the regulations for research calls, open access publication and open science in general.

Other issues addressed are of an instrumental nature, such as the Integral Research Management Tool (GIR), the OpenCMS content management platforms and the O2 UOC Repository, which help to share university research, make it more visible and enable the exchange of knowledge with society.

At the same time, the UOC encourages collaboration between researchers by holding research, lobbying and networking events, seminars and conferences. One example of these are the Meetings Days, aimed at the exchange of knowledge, which at the same time keep attendees refreshed on current issues. It also promotes the mobility of researchers, through grants to strengthen links with other research institutions, and fosters participation in joint ventures. An example of this is the Research Connections, internal call, which consists of two modalities:

incoming (aimed at research staff from other institutions to fund their stays at the UOC) and outgoing (aimed at UOC research staff for to foster collaborative research by funding stays at other non-Catalan institutions).

Finally, the training plan for UOC research staff also covers more cross-disciplinary skills that are increasingly more essential for carrying out any R&I project, as are Responsible Research and Innovation (RRI), and the acquisition of ethical and global commitments, while also considering the gender perspective. It also includes certifications for the development of basic skills for online teaching (eLC License) and leadership management.

Training is a key element of universities, and is part of their vital mission to contribute to the progress of society. With this social commitment in mind, the UOC's Professional Development Plan aims to act as a node of knowledge within the ecosystem of Catalan universities and contribute to the challenges posed by the 2030 Agenda.