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SCIENCE EUROPE
Shaping the future of research

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Research Ethics, Integrity and Culture in the Context of Rapid-Results Research

INTRODUCTION AND GENERAL REMARKS FROM THE EUROPE REGION

Ethical and upstanding research behaviours are essential components of excellent research. However, the concepts of ethics and integrity, and the responsible and ethical conducting of research are not easy to define as they cover a large range of practices and can evolve with changing contexts.

The traditional understanding of ethics and integrity condemns behaviours such as plagiarism; fabrication, falsification, or adjustment of data or papers; fraud; conflict of interest; conflict of commitments; and failure to comply with sets of rules related to: personal data; research on animals, on humans, on human cells or tissues; on protecting the environment; on health and safety; etc.

The evolving research ecosystem and practices, and the links with political contexts are broadening the definition of research ethics and integrity to encompass additional issues. Among others are biases in research and research assessment, lack of transparency, and un-reproducibility of experiments or research conclusions. New challenges affecting research ethics and integrity also include various forms of possible interference or pressure such as political, entrepreneurial, societal, or any other practice where a group or an entity tries to restrict the independence of research. The issue of foreign political interference has become more prominent in the past few years.

Linked to the concept of interference is the question of security. As described in the draft discussion paper provided by the hosts of the GRC Annual Meeting 2022, research ethics and research security are distinct but related constructs.

New challenges and new risks have also emerged recently with the increased pressure from political or societal actors for rapid research results or for rapid selection of projects. This can lead to inadequate shortcuts and wrong interpretation - or even misuse - of research results.

This pressure for speed adds to other forms of pressure that can impact on the quality of research and endanger ethical and honourable behaviours. These may include pressures from:

- peers and employers - to publish, especially in prestigious journals,
- employers - to monetise innovation,
- funding agencies - to conform to new standards (Open Science, risk of Greenwashing, Covid-washing, etc.),
- politicians - to increase return on investment ("value for money") and competitiveness,
- the public - demanding research with more societal relevance.

The diversity of issues and situations calls for a diversity of responses. It was not possible to individually address all of the proposed scenarios during the European Regional Meeting. However, participants from European research funding and performing organisations, as well as from the European Institutions, exchanged views on these concepts, and on ways to mitigate the risks and address misconduct. They shared their experiences and good practices in order to inspire individual institutional and collective responses.

The issue of (lack of) public trust in research was also discussed, as this can deteriorate due to unethical behaviours or inappropriate communication. The violation of codes of ethics and integrity can have consequences that reach beyond the researchers involved in misconduct or reputational damage to their host organisations. 'Bad' science can damage the reputation of 'good' science. Taking a recent example, the 190 retracted papers on COVID-19[1] could affect thousands of non-retracted papers and, for some people, further challenge their trust in science.

[1] Retractation Watch, Retracted coronavirus (COVID-19) papers, October 2021.

Moreover, failure to diligently protect proprietary information, personal data, or intellectual property from inappropriate disclosure can also affect the image of research and researchers.

The participants at the GRC Europe Regional Meeting 2021 explored ways to address these challenges. Their discussions and considerations are summarised in the seven sections below hereunder.

1. NO COMPROMISE ON ETHICS AND INTEGRITY REVIEW, NO MATTER THE CONTEXT

Pressure for rapid results can call for rapid selection of projects and/or for shortcuts in research to rapidly achieve results. In both situations, speed can become the enemy of quality. Accordingly, no compromise should be accepted on ethics and integrity checks in research-related processes.

Avoiding double-checks and verifications, or permitting some work to be initiated without the required permission or verification, can have devastating consequences for a research project, its results, the researchers involved, the research performing organisation and, ultimately, society as a whole.

All evaluated or selected research projects must therefore be assessed against ethics and integrity standards, and comply with all applicable norms and regulations.

However, the needs of specific research projects, or specific contexts requiring rapid results, must be acknowledged. In these situations, while it is vital that no step of the ethics evaluation is skipped, accelerating some aspects of the assessment process can be considered. The quality of the review must under no circumstances be sacrificed.

Regarding 'rapid projects for rapid results' it is important to distinguish between what can actually be done rapidly and what must realistically follow the standard route. It must be noted that getting solid results takes time. Accelerating the conducting of research does not always lead to a decrease of quality and rigour, but it does increase the risk.

2. MONITORING AND MUTUAL LEARNING

Better understanding and monitoring of both the risks and also the confirmed cases of misconduct, are crucial. Documenting cases of inappropriate behaviour not only allows a better analysis and mitigation of the risks, but can also guide decisions regarding sanctions or other measures. It also facilitates the development and assessment of research and integrity codes and approaches.

Collaboration and learning from organisations that already have procedures and mechanisms in place is very important, and enhances preparedness of organisations facing misconduct situations.

To this end, the GRC was considered a suitable forum for exchanging good practices. Common criteria for describing, categorising and quantifying cases could also be considered.

3. TRAINING AND GUIDANCE

Many European funders and performers have developed codes of ethics and conduct, and they perform thorough checks to identify risks and misconduct. However, they all agreed that the existence of rules and codes is not sufficient and should be accompanied by training for all involved actors: funders, performers, researchers, reviewers, lab staff, administrators, etc. Training is also important for those in charge of investigating suspicious cases.

Providing regular training is ever more crucial, considering the evolving risks and pressures. The different actors of the research and evaluation processes should be informed of new threats (such as foreign interference) and evolving standards for upright behaviours (such as lack of bias, and promotion of equality, diversity and inclusiveness). The different forms and degrees of misconduct, but also their consequences, should be better understood by all actors, not only to adapt their own behaviour but also to better detect misconduct in others. Due to the variety of possible threats and issues, training should be tailor-made for national and organisational contexts as well as for the role(s) of each actor in the research process.

Regarding foreign interference, international collaboration should still be promoted and encouraged as an important element of the global research culture. Collaboration across organisational and cultural boundaries increases the possibilities of discovery, and can lead to findings beyond those that one team, or even one country, could achieve on their own. Moreover, collaboration contributes to skills development and capacity building for all partners. Mitigating the risk of improper interference should be seen as a way to protect mutually-beneficial collaboration. In this respect, training should shed light on how to identify risks and inappropriate foreign interference without discouraging international collaboration.

4. INCENTIVES AND CHANGE OF CULTURE

The development of institutional policies providing incentives to reduce the temptation of short-cuts and misconduct was considered crucial. Policies should include mechanisms to reward honest and upright ethical behaviours. However, identifying suitable incentives and effective leverage may not be easy.

To guide such an exercise, a reflection on the driving force(s) behind research activity is necessary. Decreasing the pressure to publish, to deliver rapid and positive results in accordance with the project's initial objectives etc., is an important first step. This should then be translated into a modification of the research assessment processes and criteria. Funders and performers should stop relying solely or mainly on indicators such as the Journal Impact Factor (JIF) or h-index, and instead implement more integral quality control processes closely involving the researchers.

For minor misconduct, dialogue and adjustments should be chosen over penalties. Using sanctions may discourage disclosure of minor violations and mistakes made in good faith, and prevent opportunities for correcting behaviours. Instead, research organisations may want to encourage a culture of positive learning.

The development of research integrity promotion plans could be considered. For instance, to address the issue of un-replicability of research or experiments, cross-checking results with other researchers could be fostered and rewarded.

It was also proposed to embed principles of research integrity and ethics in frameworks for international collaboration. Ethics, but also academic freedom and the respect of human rights, should be core aspects of science diplomacy and collaboration.

5. SANCTIONS AND RELATED DIFFICULTIES

Funders and performers may apply different types of sanctions to different cases and behaviours. The range of sanctions includes termination of grants, ineligibility to apply for funding schemes or to review proposals, etc.

However, research organisations, especially small-sized funders and performers, may lack appropriate means to detect and address suspected cases of misconduct. Even when a regulatory framework exists, organisations may lack sufficient, and well-trained human resources to investigate properly and reach undisputable conclusions. Many also prefer to invest efforts in other activities, rather than in the investigation and application of penalties.

Investigation and related reactions may be even more difficult in cases of international collaboration where different regulatory regimes may apply.

Collaboration between funders and the host organisations of researchers to jointly address suspicious cases is needed.

6. TOWARDS A HARMONISED FRAMEWORK?

Developing common values and harmonised visions on responsible and ethical conducting of research is essential. Developing common codes and regulatory frameworks is more difficult. In order to enable sufficient autonomy for funders and performers to address misconduct, such codes must remain high-level enough, hence they may not be actionable enough. However, the exchange of good practices, dialogues on methodologies, and mutual learning is key.

As highlighted in the draft discussion paper provided by the hosts of the GRC Annual Meeting 2022, much work has already been done at national, regional, and global level (including GRC level) to define and operationalise principles of research ethics and integrity. As such, there is no need to reinvent the wheel.

Existing good practices and trends at national and European levels, and in other parts of the world, should be studied and taken into account to define global principles, common understanding, and guidelines on ethics and integrity.

7. PUBLIC TRUST AND COMMUNICATION WITH PUBLIC AND POLITICAL AUTHORITIES.

The responsible and ethical conducting of research is critical not only to build excellence, but also to protect public and political trust in science.

The public, however, is not a uniform body with a common set of interests and common reactions. Societal crises continuously show differences between communities, societies, or different population groups. Accordingly, there cannot be one single strategy for engaging with the public, communicating about science and its results, and improving public trust.

Making citizens aware of the characteristics of the research process, or even involving them in some aspects of it, can contribute to enhancing public trust in science. As an example of transparent and open communication, clear explanations should be provided to the public when results require additional verification, further evidence, or complementary research. The danger of creating policies based on opinions on unverified science should be highlighted.

Researchers are not always equipped with the necessary skills to communicate to politicians and to the public. Developing these skills is therefore key, as well as training professional science communicators. Communication must not only focus on research results but also on the characteristics of the research process, and the uncertainty inherent to the development of new knowledge. Researchers and science communicators need to have a range of tools at their disposal (for instance digital tools, or organising lab visits for politicians). Communication activities and skills should be better recognised in the evaluation processes of researchers.

The field of scientific communication could also build on the results of research done on digital culture and communication.

CONCLUSION

As a summary of this session, European GRC participants all agreed that:

- No compromise should be authorised on ethics and integrity checks. Accelerating some aspects of the assessment process can be considered in exceptional cases, such as in high pressure contexts, as long as it is reasonable and does not affect the quality of the checks.
- The existence of research ethics and integrity rules and codes is not sufficient and should be accompanied by training for all actors involved: organisations, researchers, reviewers, lab staff, administrators, etc.
- Regarding foreign interference and issues related to research security in international contexts, training should facilitate the identification of risks and improper interference without discouraging international collaboration.
- The development of institutional policies providing incentives for avoiding methodological and interpretation short-cuts, and misconduct was considered crucial. Policies should include mechanisms for rewarding upstanding ethical and upright behaviours.
- In cases of minor misconduct, replacing penalties with dialogue and adjustments is desirable. Using sanctions by default may discourage disclosure of minor violations, and more generally affect collaboration in good faith between researchers, research organisations and funders.
- Collaboration between funders and the host organisations of researchers in order to jointly address suspicious or confirmed cases is needed.

Fostering ethics and integrity in the conducting and reviewing of research must contribute to a larger movement in order to constantly revisit and improve values in research culture(s). These should not be discussed and addressed in isolation but as part of a broader framework encompassing the correct ways in which science is governed, funded, performed, and communicated.

Due to its global nature, the GRC is an ideal forum for discussing core principles and exchanging on best practices, and demonstrating at global level that responsible and ethical conducting of research is in the interest of all scientists. Ethics and integrity enable excellent science, and they protect researchers and their research activities.

ANNEX: SELECTION OF INITIATIVES MENTIONED DURING THE GRC REGIONAL MEETING:

- Code of conduct for scientific integrity developed by the Swiss Academy of Arts and Sciences, 2021. The Code was intended to express a common understanding of what constitutes scientific integrity. It described the types of behaviour that are unacceptable (different degrees of violations of scientific integrity with examples), and the standards expected for investigation of potential violations of scientific integrity.
- The Embassy of Good Sciences is a wiki platform that capture policies, good practices, misconduct cases, guidelines, educational materials, and other information to promote research integrity among all those involved in research. It focuses on researchers' daily practice and facilitates knowledge sharing to foster understanding and awareness around 'Good Science'. It also supports educators in developing training on research integrity and ethics.
- The Spanish National Research Council (CSIC) has developed several documents related to research integrity, including a Manual on Conflict of Interest and a Code of Good Scientific Practices. On its website, it has also compiled all applicable regulations and documents of interest related to ethics in research for researchers.
- Ethics and integrity is an important part of the Pact for R&I in Europe, which will guide the developments of the new European Research Area. Revised versions of the European Charter for Researchers, and of the Code of Conduct for the Recruitment of Researchers will be published in the upcoming years. Moreover, the European Commission is promoting the European Code of Conduct for Research Integrity, developed by the European Federation of Academies of Sciences and Humanities in 2017.

  The European Commission also funds dedicated projects related to research ethics and integrity and has developed educational and training tools, including IT tools for evaluators.

  In order to embed ethics and integrity in science diplomacy and ensure reciprocal conditions in international cooperation, the European Commission is now including these considerations in its dialogues with non-EU countries, and especially with those interested in associating to Horizon Europe. In addition, the Commission intends to present guidelines on dealing with foreign interference targeting EU research organisations and higher education institutions.
- According to article 22.5 of the Horizon Europe Regulation (Regulation (EU) 2021/695 of the European Parliament and of the Council of 28 April 2021 establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination), for actions related to the European Union strategic assets, interests, autonomy or security, participation can be limited to legal entities established only in Member States or to legal entities established in other specified countries in addition to Member States. For duly justified and exceptional reasons, in order to guarantee the protection of the strategic interests of the Union and its Member States, participation of legal entities directly or indirectly controlled by third countries or by legal entities of third countries can also be limited.
- 'Responsible internationalisation: Guidelines for reflection on international academic collaboration', The Swedish Foundation for International Cooperation in Research and Higher Education (STINT), 2020.

  The document is intended to serve as support for reflection and as the basis for discussion of strategic decisions on internationalisation. The purpose is to aid researchers, research directors, department heads, and university administration in assessing collaborations and structuring discussions on how the higher education institution, department, or research group should approach international collaboration.

Science and Technology Workforce

INTRODUCTION AND GENERAL REMARKS FROM THE EUROPE REGION

Developing and supporting the science and technology workforce is a core mission of Research Funding Organisations and Research Performing Organisations.

According to the GRC European participants, 'Science' must be understood in a broad sense and encompass all scholarly disciplines. Research and education in social sciences and humanities disciplines are central to healthy democracies and knowledgeable societies. They encourage critical thinking and contribute to a better understanding of the challenges humanity is facing. The title of the discussion topic 'Science and Technology Workforce' could therefore be broadened to cover these disciplines. A suggested new title could be 'Research and Innovation Workforce'.

All research organisations strive to develop a robust and sustainable research and innovation (R&I) workforce. More specifically they aim to train, attract, retain, and further support, talented researchers and other categories of workforce that are instrumental to high quality R&I.

However, several challenges may affect the development of a robust and sustainable R&I workforce:

- Scarcity of R&I and education budgets (with large differences among countries), which limit career opportunities for the R&I workforce, R&I capacity, and the quality of training.
- Occupational stress and pressure on the R&I workforce.
- Large inequalities in access to R&I equipment, information, documentation, etc.
- Strong pressure on academic researchers to publish in certain types of journals.
- Discriminations and other inequalities based on gender, sexual orientation, age, religion, disabilities, ethnic origin, or social background.
- Precarious careers and uncertainty on career opportunities and trajectories.
- Change of culture and expectations in academia with pressure to produce knowledge and products that can be bought and sold on global markets.
- Increased international competition.

These challenges are more or less critical in different countries, and affect differently the various research funding and research performing organisations.

Despite these challenges, R&I careers remain attractive in Europe. The possibility of learning and advancing state-of-the-art in research fields, the frequent collaborative nature of R&I activities and the intellectual exchanges that are at the core of the knowledge creation, are some of the factors that explain the interest people have in R&I careers.

The issue of the R&I workforce is a broad and multidimensional topic. It relates to individual situations, and the deployment of fulfilling opportunities for individuals. However, it also has a collective and societal dimension. Interested stakeholders – research organisations, governments, schools, universities, companies - should think systemically and reflect on the kinds of workforces that are needed.

In order to address these challenges, the following considerations[2] were discussed during the GRC Europe Regional Meeting 2021.

[2] Participants highlighted that education in elementary and secondary schools is key to the development of the R&I workforce. Nevertheless, these levels of education are normally not in the remit of most of the research funding and performing organisations. For this reason, this topic was not addressed during the meeting.

1. RETHINKING R&I CAREERS

R&I career paths are too often seen as linear. PhD holders are either expected to pursue an academic career, or leave academia for a career in the private sector. However, only a small minority of early career researchers will have a full academic career.

The endemic limited long-term employment opportunities in academia are a major issue. Researchers are often offered short-term contracts (2-5 years), with no clear perspectives for future employment. Research budgets and funding allocation (often project-based) should be adapted to offer more stable job opportunities.

Supporting the diversification of researcher careers and encouraging intersectoral mobility is, moreover, essential. Mobility in careers also contributes to R&I skills development and better cooperation between research organisations, enterprises, and other organisations. Career moves from academia to the private sector and vice-versa should therefore be supported and not be seen as an anomaly or a gap in one's career.

An evolution in research focus or disciplines, and interdisciplinary approaches should also be supported.

More flexibility in R&I career paths would contribute to the resilience and adaptability of the R&I workforce. This evolution towards more diverse career opportunities and paths should be accompanied by appropriate information and mentoring for researchers.

Beyond researchers, other categories of R&I contributors such as support staff, technicians, etc., should be included in reflections regarding the R&I workforce. They are fully part of the R&I processes and should equally be offered diverse and fulfilling career paths.

2. EDUCATION, TRAINING AND RE-SKILLING

The R&I landscape is rapidly evolving, and stakeholders must rethink the skills that the R&I workforce will need in the future. The identification of new skills must take into account the specificities of the research fields, but also the broad set of functions that researchers need to perform. Societal challenges and the constant evolution of technologies such as Artificial Intelligence, robotics, digital revolution, climate change, etc., should also be taken into consideration. As highlighted in the introduction, social sciences and humanities, and skills deriving from these disciplines should be fully integrated in these reflections.

In a 2020 report, the World Economic Forum highlighted the technologies that will be adopted by 2025,[3] and the jobs that will be in increasing or decreasing demand in industries. The report also described the skills that will be in demanded by 2025. It is interesting to note that most of these are not technical skills, but societal and behavioural skills, such as critical thinking, problem solving, and active learning.

(Re-)skilling of researchers will be key to ensuring the R&I workforce remains excellent and competitive on the global landscape. Studies such as the one mentioned here above should therefore guide the development of (re-)skilling plans and competence frameworks, both in academia and the private sector. (Re-)skilling programmes should include transferable skills training, and not only discipline-specific training.

Training should also be adapted to the various career stages such as doctoral training, change of career path, R&I support functions, and up-skilling for more experienced researchers. Training should also be offered to supervisors of younger researchers. It should include behavioural skills such as detecting and addressing discrimination, harassment, etc.

It is advisable to develop mentoring programmes that could, moreover, involve actors from non-academic sectors.

3. RESEARCH ASSESSMENT

Evaluation criteria define what is valuable and what is not valuable in science. For the past ten years, the predominant assessment processes for research and researchers, which are often based on bibliometric

[3] The Future of Jobs Report 2020, World Economic Forum, October 2020

indicators, have been increasingly questioned and criticised. New assessment processes and methodologies are called for in order to identify and support the best research and researchers, while encouraging a broader diversity of researcher profiles and careers (experiences in academia and in the private sector, etc.). The new assessment processes should foster and reward a broader range of skills (entrepreneurship, education, communication, etc.) and take into account the specificities of research practices across disciplines, as well as the types of research. New assessment systems should also facilitate intersectoral mobility by not focusing only on academic evaluation criteria.

Changes in applications forms and CVs, and new assessment methodologies are being tested or put in place in many European countries by research funders and performers.

4. BRAIN CIRCULATION

National research funders and performers strive to build and reinforce national capacity. A key question is how to do so while balancing the need to build global research collaboration and limiting the 'brain drain' of highly-skilled R&I professionals.

'Return grants' offered by research organisations to (re)attract highly-skilled people are often not sufficient as returning researchers often face the same job precarity issues that they faced when they left their country. Research funders and performers should understand why researchers leave, and take appropriate measures to address the identified reasons. The lack of continuity and stability in research careers, be it in academia or other sectors, usually plays a decisive role in the decision to move abroad.

Collaboration to develop the R&I workforce in every region of the world was deemed key. Supporting less advanced countries to develop their own capacities benefit the entire R&I ecosystem. Moreover, countries considered as R&I leaders should not only attract foreign talents, they should also facilitate mobility of their own workforce. The mobility of talent at global scale fosters exposure to new ideas, new teams, new cultures, etc. Therefore, a fruitful and well-distributed circulation of the R&I workforce should be developed in all regions of the world. Official development assistance (ODA) funding can contribute to such development.

Dedicated grant schemes for scholars who are refugees are also to be considered.

5. DIALOGUE BETWEEN R&I FUNDERS, PERFORMERS, PUBLIC AUTHORITIES, AND ENTERPRISES

Progress towards a more sustainable R&I workforce requires collaboration between R&I funders, performers, public authorities and enterprises. Such collaboration would enable a better understanding of the major challenges and changes taking place in the R&I ecosystem. It would also enable a better coordination of policies, and new approaches to researcher roles and expectations.

Research funding organisations influence the R&I landscape and the working conditions in research performing institutions via their granting decisions, budget allocation, and policies. More collaboration between research funders and performers is therefore needed to ensure improved working conditions for the R&I workforce. Public-private partnerships involving companies should also be encouraged in order to develop positive working environments that foster excellent research.

International collaboration between research stakeholders is also needed to coordinate and improve working conditions across the globe.

6. TEAM APPROACH

The expectations on the R&I workforce have grown in the past decades. Individuals are often expected to fulfil a broader range of activities beyond those related to the conducting of research, for instance teaching, managing projects, partnering with businesses or developing entrepreneurial activities, communicating science, etc. Instead of increasing the demands on individual researchers, a team approach - where different individuals play different expert roles in a team - should be encouraged.

Building effective research teams and pooling skills and knowledge are key to performing excellent research. This should be accompanied by rewarding mechanisms for all functions that contribute to the research endeavour.

7. MONITORING THE IMPACT OF POLICIES

Monitoring R&I career paths, and the impact of policies on the R&I workforce are very important. However, these types of monitoring exercises are difficult to conduct systematically. Moreover, assessing what is a direct result of a policy or a funding instrument is often challenging.

Preparing the future R&I workforce is a mid- to long-term process. Educating new generations of researchers, technicians, or engineers can take more than 20 years starting from elementary education. Forward-looking, long-term strategies are therefore crucial.

CONCLUSION

As a summary of this session, European GRC participants all agreed that:

- The endemic limited long-term employment opportunities in academia are a major issue. Supporting the diversification of careers, and encouraging intersectoral mobility is essential.
- Beyond researchers, other categories of R&I contributors such as support staff, technicians, etc., should be included in the reflections regarding the R&I workforce.
- (Re-)skilling and (up-)skilling will be key to ensuring the R&I workforce remains excellent and competitive on the global landscape.
- New research assessment processes and methodologies are called for to identify and support the best research(ers) while encouraging a broader diversity of research profiles and careers. They should reward a broader range of skills (entrepreneurship, education, communication, etc.,) and take into account the specificities of research practices across disciplines and types of research.
- Collaboration to develop the R&I workforce in every region of the world is crucial. Supporting less advanced countries to develop their own capacities benefits the entire R&I ecosystem, and prevents brain drain.
- Progress towards a more sustainable R&I workforce requires collaboration between R&I funders, performers, public authorities, and enterprises. Such collaboration would enable a better understanding of the major changes taking place at all levels of the ecosystem. It will also enable a better coordination of the policies, and new approaches to researcher roles and expectations.
- A team approach as well as pooling skills and knowledge from team members should be encouraged, instead of increasing the demands on individual researchers.

Research funders and performers, and enterprises have a central role in developing and supporting the R&I workforce. To get the adequate support they need from public authorities, they should also demonstrate the positive impact that investing in the R&I workforce and in education has on a country.

ANNEX: SELECTION OF INITIATIVES MENTIONED DURING THE GRC REGIONAL MEETING:

- 'Identifying Transferable Skills and Competences to Enhance Early-Career Researchers Employability and Competitiveness', EURODOC The European Council of Doctoral candidates and Junior Researchers, 2018.
  This report identifies transferable skills and competences relevant for Early Career Researchers to gather during their doctoral training program and beyond, in order to increase their employability in multiple work sectors. A skills matrix and infographic with nine different categories, containing a total of 66 transferable skills and competences, is presented. Advice on how to acquire and document these skills and competences is also provided.
- 'Reducing the precarity of academic research careers', OECD Science, Technology and Industry Policy Papers, 2021, OECD Publishing, Paris.

This report analyses academic research careers, with a focus on the 'research precariat', defined as postdoctoral researchers holding fixed-term positions without permanent or continuous employment prospects. It identifies policies and practices that aim to improve researchers' well-being, develop more diverse, equitable and inclusive research systems, attract and retain the best talent in academia, and ultimately improve the quality of science.

- FNRS Observatory of Research and Scientific Careers, Fund for Scientific Research, Federation Wallonia-Brussels, Belgium.

  The observatory was created in 2018. Its objective is to monitor researchers' careers in collaboration with the universities of the Federation Wallonia-Brussels, and to develop knowledge related to doctoral, and post-doctoral paths. It includes a set of recommendations to facilitate occupational integration of PhD holders and adapt doctoral training to researchers' and society's expectations.

  The observatory website hosts the following reports: 'The Future of PhD Holders: Their suggestions for improving job transition after the doctorate', 2021, and 'The hidden side of the doctoral degree: Testimonies on the interruption of the doctoral process in the Federation Wallonia-Brussels', 2021.

- Zagreb Call for Action on Brain Circulation 2020, Croatian Presidency of the Council of the EU, 2020.

  The "Zagreb call for Action on brain Circulation 2020" calls on all EU members to jointly address the problem of unbalanced mobility of researchers, and offers a wide range of concrete measures that enable a fairer and inclusive circulation of brains.

- The MORE4 Project on Mobility Patterns and Career Paths of EU Researchers, funded by the European Commission under the programme Horizon 2020, and ongoing study to identify pathways for balanced talent circulation in the EU.

- Marie Skłodowska-Curie Actions (MSCA) guidelines on supervision, 2021.

  These MSCA Guidelines on Supervision constitute a set of recommendations to be adopted on a best-effort basis by participants in the programme – both individuals and institutions – in order to help institutions and supervisors in guiding MSCA researchers.

- Scholars at Risk

  Scholars at Risk protects scholars suffering grave threats to their lives, liberty and well-being by arranging temporary research and teaching positions at institutions of the initiative's network as well as by providing advisory and referral services.