*Initiative for Science in Europe*

# Position on precarity of academic careers

**ISE task force on researchers' careers**

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# Introduction

Everywhere, research systems both at national and EU levels have grown in complexity. Mechanisms put in place in the past aiming to make research more efficient and productive have caused unforeseen structural problems that need to be properly addressed to improve on its quality and enhance its positive effects on society and economy.

The Initiative for Science in Europe (ISE) considers that **precarity of academic careers is one of the most pressing issues** of the research system. Funding mechanisms, research assessment methods, and research grant evaluations are inefficient, time-consuming, and might induce bad practices that can lead to research career disruption for promising scientists[1]. Researchers spend increasingly long periods before obtaining a stable position: this has an impact not only on their work-life balance, but on the general attractiveness of academic careers. The situation is aggravated by the fact that policies concerning research careers are fragmented[2]. Our concern about academic precarity is shared by OECD, which has recently started a project to identify policies and procedures to improve management of research careers in the public sector, while increasing both the quality of research output and the well-being of researchers[3,4].

This short report is aimed at member states research ministries, research councils, funders, and EU science policy decision makers. It focuses on the main causes for precarity and on policies that would reduce it and strengthen the quality of the European Research Area as summarized below:

1. **Funding of academic careers**. In recent years, the research system has relied heavily on the increase of short-term and often project-based funding[5]. While this has had the immediate effect of increasing the number of early career researchers (and thus of PhD holders) contributing to research with short term contracts, it has also introduced high job insecurity, the propensity to value quantity over quality, and triggered negative competitive behaviours, some of them resulting in research misconduct. While the latter concerns are being addressed by the recent push towards Open Science and Responsible Research and Innovation, difficulties with academic career progression still remain. To address this problem, we **propose an increase of funding for permanent positions**[6].

[1] Fang F.C., Casadevall A. Competitive Science: Is Competition Ruining Science? Infect Immun 83, 1229 (2015). doi:10.1128/IAI.02939-14

[2] Gaughan, M., & Bozeman, B. (2019). Institutionalized inequity in the USA: The case of postdoctoral researchers. Science and Public Policy, 46(3), 358-368. [**LINK** – last accessed on 11/01/2021]

[3] For detailed and updated information we refer to the OECD Research Precariat page. [**LINK** – last accessed on 11/01/2021]

[4] OECD (2021), "Challenges and new demands on the academic research workforce", in OECD Science, Technology and Innovation Outlook 2021: Times of Crisis and Opportunity, OECD Publishing, Paris. [**LINK** – last accessed on 11/01/2021]

[5] Throughout this paper, we refer to grant based funding for individual researchers/teams/institutions as “soft funding”

[6] Throughout this paper, we refer to long-term contractual funding for research performing organizations as “hard funding”

2. **Research assessment practices**. The current hiring process in Academia relies too heavily on metrics that are obsolete and that do not mirror the actual quality of the candidates. In addition, they only consider one aspect of the impact we expect from research, such as the number of publications and the number of times a scientist's research has been cited by other academics. The Netherlands and Sweden lead the way towards relying less on citation metrics for assessment of researchers. **We encourage a Europe wide reform of research evaluation that considers also societally relevant outputs and assesses the quality of a researcher's contribution to the field, instead of the prestige of the journal where it is published**[7].

3. **Research grant evaluation**. Current research grant evaluation practices based on peer review have become costly and inefficient, mostly because of the escalation of grant applications and the introduction of rigid metrics and evaluation criteria. A few research funders have simplified their processes and consider a broader range of impacts. In parallel to renovating the current method, **we propose the adoption of novel approaches to guarantee more equity: multi-stage evaluation procedures and post peer review randomization**. Both have shown to diminish biases and open the way to more innovative research, as well as lower the financial and time commitment that peer review entails.

Through our literature review, we noticed that only a few and sparse data about academic careers are available for Europe[8]. A deeper description of the issues identified here requires the collection of more data points so that country specific policies may be recommended. To this end, specific **Coordination and Support Actions** would help provide a finer understanding of the problem and draw guidelines and recommendations.

[7] This is very much in line with current developments in "recognition and rewarding" as outlined in the position paper "Room for everyone's talent -towards a new balance in the recognition and rewards of academics", VSNU, NFU, KNAW, NWO and ZonMw, The Netherlands, 2019, of which the implementation is currently being addressed [**LINK** – last accessed on 17/12/2020]

[8] One of ISE members, the European Association of Social Anthropologists has recently published the results of a large survey about existing academic research on changes to the academic profession and the casualisation of labour in Europe and beyond. [**LINK** – last accessed on 11/01/2021]

# 1. Funding of academic careers

We acknowledge that most PhD holders support value creation in Europe, and we maintain that their role in the EU economy is fundamental. We also consider that **academic careers** are the engine of the research and education sector[9]. ISE's main concern is the negative and long-term impact of depleting opportunities of tenure positions. An increased share of funding for tenure positions will lead to a sounder basis to develop the research and education sectors, and hence innovation.

Adversity in academic career progression stems principally from competition for grant funding, and its prioritisation over other purposes, such as funding permanent researcher contracts (also referred to as "hard funding"). Gross domestic R&D expenditure by the top 10 nations worldwide increased four-fold between 1980 and 2013 and is projected to increase nearly thirteen times by 2050[10]. Different countries typically distribute their research budgets in competitive grants - by opposition to institutional funding - in different proportions. There is, however, no indication that disbursing a larger fraction of their research budget this way increases their international competitiveness[11], with high-performing nations distributing a relatively small portion of their research funding through grants by international comparison[12].

Increasing 'soft' funding, such as project grants, coincides with a remarkable increase in researchers on temporary employment. As this increase is not balanced by a reasonable increase of ('hard' funding for) tenure positions, we witness the closing of a career bottleneck in academia. According to a 2017 JRC study, most countries have largely increased the proportion of soft over hard funding from 2000 to 2014[10]. The National Institutes of Health reported nearly 60% more researchers in the life sciences below the age of 35 in 2001, compared with figures in 1993, yet the number of tenure-track positions grew by only 6.7% in that time[13]. A study in Belgium shows a similar trend, arriving at a ratio of 3.2 doctoral candidates for every faculty position across a 25-year period[14].

This system lacks sustainable career options within academia as the increased demand for doctoral and postdoctoral staff to execute grant projects is not at par with tenured positions

[9] In some disciplines, a PhD is (currently) also a requirement for an industrial (research) career, but this is not included in the discussion here. Please note that the numbers mentioned here (e.g., ratios PhDs and postdocs vs. available staff positions) should ideally be corrected for this. But because of the lack of data, this cannot be done at this stage.
[10] Dehmer SP, Pardey PG, Beddow JM, Chai Y. Reshuffling the global R&D deck, 1980-2050. PLoS One. 2019;14(3):e0213801.
[11] Statistics made available online by the UNESCO Institute of Statistics [**LINK** – last accessed on 17/12/2020]
[12] Reale E. Analysis of National Public Research Funding-PREF. Final Report. doi:10.2760/19140; 2017.
[13] National Research Council (US). Bridges to Independence: Fostering the Independence of New Investigators in Biomedical Research. 2005.
[14] Levecque K, Anseel F, De Beuckalaer A, Van der Heyden J, Gisle L. Work organization and mental health problems in PhD students. Research Policy. 2017;46(4):868-79.

available. This increasingly narrow bottleneck is a considerable source of anguish for researchers, with more than half attributing poor mental health and general anxiety to poor academic career prospects[15]. Given that nearly 70% of doctoral graduates leave the academic career path[16,10], any return on the investment on **training researchers for an academic future** is therefore partially negated if few positions actually await them[17]. Those who stay in academia after graduation as postdocs experience more distress due to a worse work/life balance, negative career outlook and, at times, the onset of toxic power dynamics[18]. A number of studies have suggested that the current model offers diminishing returns with the amount of competitive funding per principal investigator and with the size of the group under each principal investigator[19] (although the training itself is of course beneficial to young researchers, as well as to society).

## ISE proposal: reinstate the balance between hard and soft funding

We suggest repurposing a proportion of national and Europe-wide grant funding, as a 'soft' source, towards financing more permanent research positions, with a comparatively 'harder' focus. Funding agencies have the capacity to provide a more favourable labour market for researchers in Europe, and reforming current grant funding systems can make additional funds available to enable this. Redirecting grant funding towards supporting research careers could have two effects that have to be taken into careful consideration:

1. It would limit the number of precarious positions available on an annual basis. We reason that this does not pose a considerable threat to the research system for two principal reasons. Firstly, the quantity of young researchers does not provide any assurances for the quality of their scientific output. Secondly, a considerable number of universities grant PhDs in Europe. Not all of them possess the infrastructure for providing doctoral candidates with contemporary skills development or jobs after graduation. A proper balance must be found between quantity and quality of doctoral schools to guarantee an effective use of the resources.
2. By increasing the ratio of permanent to non-permanent staff, it would trigger an evolution away from the single PI structure which has become the dominant organisational model in many sciences, to a model of distributed responsibility among the senior staff. We see this as positive change, provided the opportune structures are put in place.

[15] Nature Graduate Survey 2017 [**LINK** - last accessed on 17/12/2020]
[16] Woolston C. "Science PhDs lead to enjoyable jobs" Nature (2018). [**LINK** - last accessed on 17/12/2020]
[17] We are aware that many PhDs will end up adding value to other sectors of the economy; nonetheless, we consider that the depletion of tenure positions has a long-term negative impact on the quality of the research system and eventually to the economy itself.
[18] Nature's postdoc survey article series: "Uncertain prospects for postdoctoral researchers" [**LINK** - last accessed on 17/12/2020]. "Postdoc survey reveals disenchantment with working life" [**LINK** - last accessed on 17/12/2020]. "Postdocs under pressure: Can I even do this anymore?" [**LINK** - last accessed on 17/12/2020].
[19] Cook, I., Grange, S. & Eyre-Walker, A. Peer J Pre. 3, e812v1 (2015).

## 2. Research assessment practices

Research outputs are numerous and varied and, as stated by the San Francisco Declaration on Research Assessment[20] (DORA), include the training of talented researchers. In spite of this, the heightened value of scholarly publishing sets a precedent for the dominance of publication metrics in most research evaluations. European universities place the highest importance on research publications and attracting external research funding during their processes of assessment and evaluation[15]. Importantly, the outlet where an academic paper is published does not represent a metric for success or longevity in a research career. Furthermore, the academic lifetime of article authors has gradually diminished over the last fifty years, and increased publication rate does not provide an accurate measure for long-term career progression either. The academic lifetime of supporting authors is also comparatively shorter than lead authors, fueling difficulties in establishing author order prior to manuscript submission. Most crucially, the need to publish frequently and in prestigious journals can force researchers to commit their careers' work to fulfilling arbitrary assessment criteria that do not sufficiently benefit their host institution's strategic priorities or society at large.

### ISE proposal: promote qualitative judgement and consider also various research activities and societally relevant outputs

We encourage evaluation practices that acknowledge other activities[4] (e.g., practicing open science[21], collaboration with industry, citizen science, open education resources based on research, data and software, etc.), beyond the publication as a chief deliverable, including recommendations defined in DORA, the Leiden Manifesto[22], and the Hong Kong principles[23]. A system of recognizing the non-academic career experience of researchers has long been sought[24] but current approaches of assessment contradict this ideology[25]. **We recommend assessors in the EU follow recent moves to reform research evaluation away from publication metrics[26], and to**

[20] DORA, the San Francisco declaration on research assessment, recognizes the need to improve the ways in which researchers and the outputs of scholarly research are evaluated. [**LINK** - last accessed on 17/12/2020]
[21] We stress that we envision the reward of such practices as an addition to and not a substitute of commonly rewarded activities. Therefore rewarding also other activities does not entail any disadvantage to those researchers who were not enabled to practice them (either for lack of resources or other limitations out of their control).
[22] Five experts led by Diana Hicks, professor in the School of Public Policy at Georgia Institute of Technology, and Paul Wouters, director of CWTS at Leiden University, have proposed 10 principles for the measurement of research performance: the Leiden Manifesto for Research Metrics. [**LINK** - last accessed on 11/01/2021]
[23] The Hong Kong Principles for assessing researchers were formulated and endorsed at the 6th World Conference on Research Integrity, June 2019 in Hong Kong. These principles will help research institutions that adopt them to minimise perverse incentives that invite to engage in questionable research practices or worse. [**LINK** – last accessed on 11/01/2021]
[24] European Parliament Researchers in the European Research Area: One Profession, Multiple Careers 2003. [**LINK** - last accessed on 17/12/2020]
[25] Research Assessment in the Transition to Open Science 2019, EUA Open Science and Access Survey Results. [**LINK** - last accessed on 17/12/2020]
[26] Zhang L, Sivertsen G. The New Research Assessment Reform in China and Its Implementation. Scholarly Assessment Reports. 2020;2(1):3.

**combine improved metrics with more qualitative judgement**[27]**.** Although themes of novelty, rigour, feasibility and impact are generally considered facets of a successful application, explicit descriptions of criteria used in such assessment need improvement. A survey of European research institutions suggests that without clear definitions, considerable subjectivity arises from different sources, such as the external reviewers involved or the discipline of the research in question[28]. Improved robustness and transparency of evaluation procedures is therefore needed to facilitate research career progression and ensure that valuable research fellows are not ignored through superficial, inconsistent or even biased judgement.

To solve societal problems, governmental agencies employ the knowledge from both programs concerned with knowledge-building and those applying existing and emerging knowledge to address specific technical problems. Since the '60s, it has become clear that what is called user-inspired research[29] plays a fundamental role in modern economies. This is the approach encompassed in Horizon Europe's societal challenges and missions, and in the UN's Sustainable Development Goals[30], where research is best placed to answer societally relevant questions. A small number of research agencies have re-shaped funding policy to add societal impact as one important objective. One of the most notable examples was the introduction of doctorates awarded through 'Innovative Training Networks' and also postdoctoral fellowships in the 'Society and Enterprise' panel of the European Commission's Marie Skłodowska Curie Actions (MSCA). The interdisciplinary nature of these positions allows candidates to diversify their competencies and experiences, expand their professional network and gain wider labour market awareness. Furthermore, inclusion of training modules provides a contemporary skillset, of which innovation and entrepreneurship may help researchers implement their research findings more readily. Finally, considerable emphasis is placed on mentorship and career guidance, which is provided by both academic and non-academic individuals.

Adopting principles such as these should not solely be restricted to the academic institutions involved in MSCA; **any research performing institution can contribute similarly to a knowledge-based economy**. United declarations between funders, agencies and governance provide the ideal encouragement for doing so, particularly if co-signatories to these declarations inform or decide future funding targets. In Sweden, the Lund Declaration 2009[31], and its follow-up in 2015[32], represent key examples of how to produce and support future researchers with a focus on both global and local challenges.

[27] Wellcome Trust. Guidance for research organisations on how to implement responsible and fair approaches for research assessment. [**LINK** - last accessed on 17/12/2020]
[28] Science Europe Study on Research Assessment Practices. [**LINK** - last accessed on 17/12/2020]
[29] Stokes, Donald E. (1997). Pasteur's Quadrant – Basic Science and Technological Innovation. Brookings Institution Press. p. 196. ISBN 9780815781776
[30] UN Sustainable Development Goals. [**LINK** - last accessed on 17/12/2020]
[31] The Lund Declaration 2009. [**LINK** - last accessed on 17/12/2020]
[32] The Lund Declaration 2015. [**LINK** - last accessed on 17/12/2020]

Research assessment practices should also value non-academic impact to foster career progression. The involvement of Sweden's largest research funding agency, Vetenskapsrådet, in the Lund Declaration shows a willingness to mold funding strategy around societally relevant goals and to promote research careers that pursue them. In the Netherlands, new assessment procedures called "Recognition and Rewarding" are actively under development in collaboration between universities and funding agencies. In addition, the Dutch funding agency (NWO) no longer allows the use of citation metrics (e.g., impact factor, H index, etc.) in research grant evaluation and, for personal grants, has introduced the use of a narrative CV[33].

[33] NWO News: "NWO introduces narrative CV format in the 2020 Vici round". [**LINK** - last accessed on 17/12/2020]

# 3. Research grant evaluation

Current funding formats centre primarily around a ranking-based evaluation of grant proposals, with the principal assumption that successful applications will address progressive research questions. Yet, contemporary grant funding systems are plagued by inefficiencies that undermine the actual output of the scientific community, ignore or undervalue potentially valuable proposals through rejection, and crucially, do not adequately ensure career progression for successful applicants.

Expanding research programs on a national and global scale has intensified competition for funding, forcing researchers to commit great amounts of time to submitting applications with scarce odds for success. This, in turn, makes the process more competitive, thus leading to a toxic escalation: as competition increases for the same funding streams, the success rate of proposals subsequently decreases in parallel. Thus, a larger number of working hours is collectively wasted by unsuccessful applicants and grant panel members on national and EU grant proposals. Furthermore, successful proposals often originate from the same applicants, biasing funds towards 'safe' projects. In contrast, funding is then directed away from applicants with less prominent track records in research funding, as well as basic science, which cannot always ensure solid and exploitable results but are still fundamental for ensuring R&I competitiveness in a mid-term time range.

## ISE proposal: alternative and more efficient research funding practices

We suggest a gradual adoption of novel practices to fund research in parallel to the improvement of current approaches. **Multi-stage evaluation procedures** can, for example, mitigate issues with committing excessive time to unsuccessful applications. The adoption of pre-proposals for calls at French[34], Dutch[35], Irish[36], and German[37] research agencies can help screening for potentially fundable projects and researchers prior to a detailed proposal submission. This approach can also lessen the burden of assessment, with ultimately fewer 'full' applications to review for evaluation committees.

Furthermore, contest theory modelling indicates that **post peer review randomization** (sometimes erroneously called "grant lottery") offers better returns on the investment of time from

[34] ANR Work Programme 2020. [**LINK** - last accessed on 17/12/2020]
[35] NWO News: "Pre-proposals Veni Scheme Social Sciences and Humanities, Applied and Engineering Sciences open for application". [**LINK** - last accessed on 17/12/2020]
[36] SI Frontiers for the future programme. [**LINK** - last accessed on 17/12/2020]
[37] DFG research funding information [**LINK** - last accessed on 17/12/2020]

applicants[38], where qualification for such randomization is dependent upon a rigorous methodology as the key prerequisite[39]. Furthermore, post peer review randomization may encourage perceivably riskier proposals, thus ensuring more equal distribution of grants across the community[40]. By considerably reducing the opportunity for subjectivity during peer review, with more grant funding awarded through randomization, less experienced researchers may be more inclined to apply to a perceivably fairer competition. This may ultimately support exploratory research questions, as well as the careers of researchers who conceive them, simultaneously enabling career progression and disruptive R&D[41]. Furthermore, a side benefit of this approach is to lessen the financial commitments on grant review panels[42] without affecting the quality.

[38] Gross K, Bergstrom CT. Contest models highlight inherent inefficiencies of scientific funding competitions. PLoS Biol. 2019;17(1): e3000065.
[39] Smaldino PE, Turner MA, Contreras Kallens PA. Open science and modified funding lotteries can impede the natural selection of bad science. R Soc Open Sci. 2019;6(7):190194.
[40] Ballabeni A, Hemenway D, Scita G. Time to tackle the incumbency advantage in science: A survey of scientists shows strong support for funding policies that would distribute funds more evenly among laboratories and thereby benefit new and smaller research groups. EMBO Rep. 2016;17(9):1254-6.
[41] Roumbanis L. Peer Review or Lottery? A Critical Analysis of Two Different Forms of Decision-making Mechanisms for Allocation of Research Grants. Science, Technology, & Human Values. 2019;44(6):994-1019. doi:10.1177/0162243918822744
[42] Marco Bieri, Katharina Roser, Rachel Heyard, Matthias Egger, Biorxiv, November 2020 - doi: 10.1101/2020.11.26.400028: "How to best evaluate applications for junior fellowships? Remote evaluation and face-to-face panel meetings compared". [**LINK** - last accessed on 17/12/2020]

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## Endorsements

This paper has been endorsed by the following organisations:

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