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Research careers: A critical choice for Europe

Results, insights and recommendations from **CESAER Research Careers Survey 2024**

11 December 2024

Foreword

"The future of Europe's research landscape depends on our ability to unite efforts across all institutions and stakeholders. As an association, CESAER is committed to advocating for stable and rewarding research careers, ensuring that Europe remains a magnet for the world's brightest minds. By fostering collaboration, innovation, and strategic action at the highest levels, we can create an environment where research careers thrive and contribute significantly to societal progress and technological advancement."

Orla Feely, President of CESAER and President of University College Dublin

"Researchers are the backbone of Europe's knowledge economy, yet their careers often face instability and uncertainty. It is imperative that we address these challenges head-on, with robust EU actions to enhance the attractiveness of research careers in Europe, above all for young researchers. By improving working conditions, launching targeted funding instruments, and ensuring clear, sustainable career pathways, we can empower young researchers to reach their full potential, thereby strengthening Europe's position as a global leader in science and technology. It will be the only way to avoid the current brain drain out of Europe (primarily to US) and guarantee brain gain and effective brain circulation in Europe."

Manuel Heitor, CESAER Envoy for Research Careers, Co-Chair of CESAER Task Force Human Resources, and Director of Technology Policy Lab at the Centre for Innovation, Technology and Policy Research, IN+, at *Instituto Superior Técnico, Lisbon.*

"Universities are at the heart of nurturing talent and driving innovation. To fulfil this role effectively, we must ensure that research careers within our institutions are not only viable but highly desirable. This requires a commitment to modernising career structures, embracing inclusivity, and fostering a supportive environment where researchers, particularly early-career professionals, can flourish. Through these efforts, we can contribute to a more dynamic, equitable, and competitive research landscape in Europe."

Tanya Bondarouk, Co-Chair of CESAER Task Force Human Resources, Dean of Faculty of Behavioural, Management and Social Sciences, and Professor of Human Resources Management and Technology at University of Twente

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Rooted in advanced engineering education and research, CESAER is an international association of leading specialised and comprehensive universities with a strong science and technology profile that advocate, learn from each other and inspire debates. Our Members champion excellence in higher education, training, research, and innovation, contribute to knowledge societies for a sustainable future and deliver significant scientific, economic, social, and societal impact.

To support its advocacy efforts, CESAER Members produce many publications such as white papers and positions, to be found on cesaer.org.

Executive summary

Enhancing research careers in Europe: A strategic imperative

In an era where science and technology are reshaping societies, Europe's future depends on its ability to attract and retain top talent in science and technology. Letta (2024)[1] notes that "Retaining talents is critical for Europe's economic resilience, innovation capacity, strategic independence, and societal welfare and should be one of the most urgent priorities." Despite efforts, Europe faces a concerning outflow of researchers, particularly in high-demand fields, threatening its global leadership and strategic ambitions.

The challenge: Reversing Europe's brain drain

Europe's Choice[2], as put forward by European Commission President Ursula von der Leyen, includes reversing this trend. First, Europe needs to turn the current European brain drain into a brain gain. As Heitor (2024) explains, Europe is losing many of its brightest minds, particularly to the U.S.[3] Europe's competitiveness suffers significantly when talented and well-educated early-career and young people leave.[4]

This self-reinforcing cycle of brain drain can only be disrupted if Europe adopts a strategic policy shift to foster high-quality careers, especially for early-career and young researchers.[5] This requires effective collaborative effort among the European Commission and EU member states and requires action at both the EU and national level.

Draghi (2024)[6] stresses the need for "a new EU framework for private funding to enable public universities and research centres to design more competitive compensation policies for top talents and to provide additional support for research." To counter this, Europe must offer stable, attractive research careers and foster an environment that acts as a magnet for global talent.

Key dimensions for action

In 2023, CESAER outlined[7] five essential dimensions to support modern and stable research careers in Europe:

- Unlocking stability: ensure sustainable institutional funding to provide researchers with secure career paths.
- Balancing funding: achieve suitable balance between temporary and permanent contracts.
- Strengthening evidence: establish an effective 'Research & Innovation Careers Observatory' to monitor and enhance the evidence base of data on research careers.
- Modernising frameworks: update legal and employment frameworks to reflect current realities.

[1] See Letta (2024), pg 21.
[2] See Ursula von der Leyen (2024), "Europe´s Choice".
[3] See Heitor (2024), pg. 25, 76.
[4] See Heitor (2024), pg. 25, 76- 77; and Draghi (2024), part B pg. 240-241.
[5] See Heitor (2024), pg. 77.
[6] See Draghi (2024), part B pg. 252..
[7] See CESAER. (2023). Supporting modern and stable research careers in Europe. https://doi.org/10.5281/zenodo.8099049

- Fostering institutional support: elevate institutional support for early-career researchers.

Survey insights and recommendations

The 2024 CESAER Research careers survey, conducted among 24 Member universities and one external university, highlights success stories and shows that universities in Europe are ready to expand these if provided with adequate funding and conditions. However, varying conditions across Europe—such as labour laws and funding challenges—often hinder universities' ability to offer stable research careers, limiting Europe's talent retention. The survey demonstrates that progress is possible and informs the recommendations in this report. Survey insights are elaborated in chapter 2, and these are complemented by an analysis of the European, national, and university landscape in chapters 3, 4, and 5.

Strategic innovations to strengthen Europe's research landscape

The 2024 CESAER survey underscores three strategic innovations necessary for Europe to attract and retain research talent:

- Research careers observatory: Europe must monitor research careers and researcher mobility better. Data collection should differentiate between temporary and non-temporary contracts and between long-term and short-term funding sources. The current methodologies (e.g. from EU and OECD) fall short in some of these aspects. To truly address the issue of research careers, we need to develop an observatory on research career development on a European level, with adequate data.
- Research assessment methodologies: Future assessments must balance research output quality with job quality, emphasising non-temporary roles for early-career researchers. Simplified processes and access to stable funding are critical.
- Improved funding mechanisms: Reforms should focus on stabilising researcher careers in public and private sectors. An improved balance between temporary and non-temporary contracts, especially for early-career researchers and professionals, will help retain talent and increase the resilience of Europe's research ecosystem.

Key stakeholders and actions

- European Commission: The Commission must lead the charge in reversing brain drain out of Europe by implementing a '**Choose Europe for a research career**' programme and enforcing the free circulation of researchers and scientific knowledge across Europe (i.e. Letta's 'fifth freedom').[8] The Commission should accelerate the development of a **research careers observatory** and should take the lead to ensure simplified immigration processes and enhance the attractiveness of Europe as a destination for global talent.
- Member states: National governments should strengthen research ecosystems by improving the competitiveness of salaries, reducing visa barriers, and supporting new co-funding schemes to boost research career prospects. This is vital to meet the 3% GDP target for R&D and ensure a balanced distribution of researchers across Europe.

[8] Letta (2024)

- Universities and research organisations: Employers of researchers should seek to enhance transparency in career pathways for researchers, explore strategies towards delinking contracts from project-based duration, and innovate in responsible recruitment practices. A focus on cooperation over competition and the adoption of the Coalition on Reforming Research Assessment (COARA) principles will foster a more inclusive and sustainable research environment. Collaboration with industry and the public sector should be prioritised to create high-quality research jobs. To help facilitate a European approach and transform European brain drain into a collaborative effort benefiting all of Europe, European university alliances could play an important role. One could envision that university alliances transcend joint degrees and student mobility and moves towards facilitating the joint recruitment of researchers to add a truly European level to the labour market for researchers.

A vision for the future

Europe must act decisively to reverse brain drain, turning it into brain gain and circulation in a period of up to ten years, the latest by 2035. Bold actions by the European Commission, national governments, and employers of researchers will ensure that Europe remains a global leader in science and technology. Implementing the recommendations outlined in this report will secure Europe's future as a magnet for the brightest research minds worldwide.

Recommendations

A - For European Commission

1. Set **targets to ensure a positive inflow of early-career researchers in Europe** within five to ten years, by 2030 and 2035, aiming to transform the current European brain drain (primarily to the United States) into brain gain and brain circulation in Europe.
2. Establish and develop a **research careers observatory**, as planned since 2021 but not yet implemented, to monitor research careers, **working conditions** (including the proportion of temporary versus non-temporary contracts), **funding environments** (including the proportion of long-term versus short-term funding available), and **researcher mobility** within Europe and between Europe and other regions.
3. **Expand the Marie Skłodowska-Curie Actions** to enhance support for early-career researchers, including by boosting its capacity to be a trendsetter for advancing high-quality research jobs (see CESAER's May 2024 position[9] for details):
    - Launch **'Choose Europe for a Research Career'** under the MSCA programme, a new co-funding mechanism within the European framework programme for research and innovation, to boost and co-fund long-term career prospects for early-career researchers, particularly those two to three years after earning their doctoral degree. Experiment with a **pilot in 2025** aimed at **MSCA COFUND** projects hosting postdoctoral fellowships. The pilot would offer an extension of 2–3 years to these fellowships (resulting in a total duration of 4–6 years) under MSCA conditions and rates. This extension would be **contingent on institutions committing to provide longer-term job opportunities**.
        - Focus on outstanding **early-career researchers** and provide them with early opportunities to pursue their creative ideas. In this way, Europe will enhance its international appeal, benefit from their presence and contributions, and boost its competitiveness.[10]
        - Develop the initiative to be **inclusive**, seeking over time to involve all types of employers of researchers across Europe.
        - To maximise the chances of attracting and retaining talent, hosting institutions should commit to providing **longer-term job opportunities**, such as advertising employment positions in the successful applicant's field towards the end of the Choose Europe funding period.[11]
4. Lead efforts to **simplify immigration processes** across member states, ensuring that Europe is an attractive destination for global talent.[12]
5. Establish and enforce Letta's 'fifth freedom'[13] across Europe to facilitate the unimpeded **circulation of scientific knowledge** and its bearers such as researchers, learners and teachers.

[9] CESAER. (2024). Unleash full potential of Marie Skłodowska-Curie Actions. https://doi.org/10.5281/zenodo.11191328
[10] See Heitor (2024), pg. 54.
[11] See Heitor (2024), pg. 54.
[12] See *The Economist*, 15 August 2024, 'Talent is scarce. Yet many countries spurn it', https://www.economist.com/briefing/2024/08/15/talent-is-scarce-yet-many-countries-spurn-it
[13] See Letta (2024), pgs. 19-21.

B - For national and regional governments, and funding agencies

1. **Boost researcher employment** by enhancing salary competitiveness, ensuring **stable funding conditions** enabling employers of researchers to effectively share and manage risks, and advancing career development.
2. **Simplify visa and residency processes**,[14] including automatic work permits for graduates from local universities, to attract and retain global top talent in science & technology.
3. **Foster new co-funding schemes** that stimulate cultural changes at the institutional level, aiming to meet the 3% GDP target for R&D, including **promoting the Seal of Excellence** and **supporting ecosystems** that provide stable career opportunities.

C - For universities and other organisations employing researchers

1. **Promote stable researcher employment** and adopt clear, transparent, and internationally comparable **career pathways** for researchers and professional staff.
2. Explore and consider strategies for **decoupling researcher contracts from project-specific durations**. This may include adopting innovative and experimental approaches to **responsible recruitment practices**, as well as collaborating with governments and funding agencies to ensure that **early-career researchers are not disproportionately burdened by the risks associated with temporary contracts and funding conditions**.
3. **Collaborate between public and private institutions** to create new high-quality research jobs and diversify the research landscapes:
    - Guarantee **freedom of thought** and promote the creativity of particularly early-career researchers.
    - **Adopt COARA principles**,[15] including avoiding the undue use of quantitative indicators for individual career development.
    - **Combat biases** and promote cooperation over individual competition, particularly in academic work.
    - Adopt Draghi's recommendation of designing and implementing **more competitive compensation policies for top talents** and to provide additional support for research.[16]
    - **Innovate in the recruitment and career development** of researchers, particularly early-career professionals, to ensure a robust pipeline of talent.
    - Facilitate easier **sectoral transitions** including between academia and industry (both ways), and efficiently recognise and validate qualifications from outside the sector.
    - Promote new institutions and employers, notably through **collaborative arrangements** between academia, industry, and other private and public organisations.

[14] See *The Economist*, 15 August 2024, 'Talent is scarce. Yet many countries spurn it', https://www.economist.com/briefing/2024/08/15/talent-is-scarce-yet-many-countries-spurn-it
[15] See https://coara.eu/
[16] See Draghi (2024), part B pg. 252.

1) Background: A wake-up call for Europe - Strengthening research careers to retain and attract talent

Introduction, rationale, and background

Political momentum is intensifying across Europe to bolster competitiveness in the global landscape, particularly in the realms of research, innovation, science and technology. President Ursula von der Leyen's political guidelines for the new European Commission, '**Europe's Choice'**, emphasise the urgent need to advance Europe's position in the clean and digital economy by launching **a new age of invention and ingenuity,** and the need of **putting research and innovation, science and technology, at the centre of our economy**[17]. Central to this ambition is the focus on science and technology, which are vital for **attracting and retaining top-tier talent in Europe**. As part of this strategy, significant investments should be directed towards groundbreaking fundamental research, disruptive innovations, and scientific excellence.

To achieve this, the guidelines propose several strategic priorities, including the establishment of new public-private partnerships, the development of necessary infrastructure, and the creation of innovative labs that enhance collaboration between research institutions, universities, and businesses. Moreover, the introduction of a "European Competitiveness Fund" aims to channel investments into critical technologies such as artificial intelligence, space exploration, clean technology, and biotechnology, underpinned by cutting-edge scientific developments.

However, while member states like France have taken steps to attract major foreign investments—demonstrated by the 'Choose France' summit, which attempted to secure €15 billion in investment commitments in 2024. However, these efforts have largely overlooked the **crucial aspect of talent retention**. Attracting substantial foreign direct investment is important, but without parallel efforts to retain and nurture top research talent, long-term competitiveness cannot be sustained. This issue was highlighted by Roberta Metsola, President of the European Parliament, in her 2024 re-election address, where she emphasised the importance of investing in research, education, and the youth to enhance Europe's competitiveness[18].

As **Europe navigates an era of 'polycrisis',** it must strengthen its collective resilience, particularly in research and innovation. The European Commission's expert group on the economic and societal impact of research and innovation (ESIR) recently underscored the need for Europe to leverage its technological capabilities and secure first-mover advantages to dominate global markets.[19] This calls for an **urgent focus on attracting and retaining top talent**, which is central to Europe's future in science and technology.

In this context, the European Commission has identified ten critical technology areas vital for the EU's economic security, ranging from advanced semiconductors and quantum technologies to biotechnologies and energy innovations. However, despite these strategic

[17] See Ursula von der Leyen (2024), pg 10.
[18] See Metsola (2024).
[19] See ESIR (2024), pg. 7-11.

identifications, Europe continues to struggle with significant challenges in retaining its research talent. The Science Research and Innovation Performance (SRIP) report of the EU (2024) highlights these challenges, noting an "underutilised R&I ecosystem" and a "technological gap with respect to other global regions."[20]

A critical element in overcoming these challenges is **the ability to harness and nurture talent**. As highlighted in a 2024 study by the Migration Partnership Facility, bottlenecks such as insufficient investments and difficulties in attracting and retaining talent need to be addressed to fully exploit Europe's research and innovation potential.[21] The **competition for talent is intensifying globally**, and Europe must act swiftly to secure its future in science and technology.

The talent challenge: Addressing brain drain and fostering brain gain

The race for talent is not just a matter of securing economic growth; it is about ensuring **Europe's autonomy and leadership** in key scientific and technological domains. As a recent study by the Migration Partnership Facility highlights,the EU stands at a crucial juncture in redefining its approach to talent attraction, with growing demographic challenges and labour shortages amplifying the need for a robust strategy.[22]

Early-career researchers (ECRs) are particularly vulnerable in this landscape. They are often required to navigate uncertain career paths, seek out emerging opportunities, and adapt to a rapidly changing research environment. Without adequate support, the long-term sustainability of Europe's research base is at risk, along with the ability of future research leaders to deliver significant and impactful research outcomes.

To counter this, Europe needs a comprehensive human resources strategy that repositions research careers as attractive and sustainable options[23] within both the public and private sectors. This strategy should aim to transform the current brain drain away from Europe into brain gain and brain circulation, leveraging Europe's extensive talent pool to enhance the continent's competitiveness. This report argues that a bold initiative—'Choose Europe for a research career'—should be launched, **reversing the outflow of top talent from Europe** by 2035, with a particular **focus on attracting and retaining early-career researchers**.

An evolving landscape: trends in researcher mobility

The landscape of research careers in Europe is undergoing profound changes. The transformation of higher education, combined with increasing pressures on universities to meet productivity targets, has led to greater competition and instability in research careers. Public investment in research has not increased at the pace it should have,[24] forcing institutions to rely more on external and short-term funding sources, which further exacerbates the precariousness of research careers.

[20] See SRIP (2024), pg. 14.
[21] See ICMPD (2024), pg. 4-6.
[22] Ibid.
[23] See CESAER. (2023). Supporting modern and stable research careers in Europe. https://doi.org/10.5281/zenodo.8099049
[24] See https://efficiency.eua.eu/public-funding-observatory

According to Eurostat, in 2022[25], **Europe hosted over 2 million researchers**, including 670,000 doctoral candidates. This represents **a 45% increase since 2012**.[26] **They represent 1% of the European labour force**. The number of full-time equivalent (FTE) researchers more than doubled in Poland, Sweden and Greece between 2012 and 2022.[27] Most researchers (57%) are employed in the business sector, about one third of them (32%) in the academic sector, and 10% in the government sector.[28] In comparison, in 2021, South Korea had the largest number of scientists and researchers with 17.3 people working in research or science field per 1,000 FTE's. Sweden was second, with 16.6. The European average was 9.4.[29]

However, it should be noted that the increase in numbers of researchers in Europe coincides with **an explosive brain drain from Europe**. This is because the growth in numbers of researchers in Europe has **not** been matched by an increase in the quality of research jobs which has in turn driven brain drain out of Europe. In addition, many European countries are experiencing a net outflow of researchers, contributing to a persistent brain drain. This phenomenon is particularly pronounced in large countries in the south and the east, where the loss of talent to the United States poses a significant challenge to the sustainability of the EU's research and innovation sector.

The need to address the **precarity many researchers now face** was explicitly addressed in the European Council conclusions of May 2021[30] on research careers and in the 'Pact for Research and Innovation' agreed in November 2021.[31] The **Manifesto on early research careers**, published in September 2022 by the *Initiative for Science in Europe*, also calls for urgent action.[32] In addition, two research projects and consortia funded by the European Commission provide evidence on the evolving situation in Europe[33], underlining the **need for better data and for monitoring the quality of research careers**.

It should be noted that almost ten years ago, an analysis by Science Europe showed that Europe often relies on an **unacceptable coupling between project duration and contractual schemes**,[34] exacerbating **precarity for young and early-career researchers**. Addressing this issue critically depends on governments, funding agencies, and employers of researchers collaborating to achieve a better balance between short-term and long-term funding conditions, thereby enabling greater stability in employment conditions.

The primary challenge today does not lie anymore in attracting talented people to become researchers, but in retaining them in a research career by offering appealing career opportunities. While the issue of attracting researchers has been successfully addressed over the past two decades, as demonstrated by the increasing total number of researchers in

[25] See Eurostat (2022).
[26] See Eurostat (2023)
[27] Ibid.
[28] Ibid.
[29] See Heitor (2024), pg 77.
[30] See details in Council conclusions, https://www.consilium.europa.eu/en/press/press-releases/2021/05/28/improving-conditions-for-research-careers-in-europe-council-adopts-conclusions/
[31] See Council of the EU (2021).
[32] See Initiative for Science in Europe (2022).
[33] See details in RISIS, https://www.risis2.eu/2023/05/22/monitoring-and-analyzing-research-careers-for-informed-policy-making-in-the-era/; and SECURE, https://secureproject.eu/.
[34] See details in Science Europe (2016), pg 76-86

Europe, **effective talent retention strategies have yet to be fully and broadly implemented**.

A key part of this challenge is that many researchers in Europe depart from the continent 2-3 years after completing their PhDs, and that the influx of researchers to Europe is much lower than the outflux, thus resulting in **a net brain drain for Europe**.

Today we recognise that all those **reports and actions were not enough**. Europe at large needs to better understand the issue because it is well recognised that it **requires complex and "whole-of-government" strategic policy changes that makes Europe stronger, by enhancing the attractiveness of research careers within Europe**. While researcher mobility can be beneficial, it is crucial to ensure that Europe offers competitive wages, cutting-edge infrastructures, and fair recruitment and promotion processes to retain its talents.

Figure 1.1 illustrates brain drain trends for EU member states and globally. This was created by the Chief Economist Unit in the European Commission's Research and Innovation Directorate-General based on ScienceMetrix data using the Scopus database.[35] Figure 1.2 presents a map depicting the inflow and outflow ratios of researchers from 2001 to 2020, broken down by country, with the data source indicated within the figure.[36]

We recognise that intra-European brain circulation is a crucial issue, and various instruments have been trialled at the European level to address it. As Heitor (2024) elaborates, some of these approaches have proven highly effective and should be strengthened going forward.[37] In this CESAER Research Careers Report, we build on previous efforts related to intra-European brain circulation by adopting a European-wide perspective. This aligns with recent initiatives by Letta (2024) and Draghi (2024), which have highlighted the urgent need for a coordinated European approach to enhance competitiveness. While global mobility and career advancement should remain standard for researchers, Europe must improve its ability to attract top talent to balance or even reverse the current net outflow of talent from the continent.

Based on the CESAER research careers survey documented in this report, we argue that the **European Commission must take the lead in creating a conducive environment for research excellence**, leveraging EU-wide initiatives like the Marie Skłodowska-Curie Actions (MSCA) and boost its capacities[38] to attract and retain top researchers. To address this, it is crucial for the European Commission to **launch a new co-funding instrument**, for example in relation to the MSCA, involving substantial co-funding and collaboration with national and institutional levels. This collective issue requires coordinated efforts and shared responsibility across European, national, and institutional levels. See, for example, for international comparison, the recently published analysis of the US National Academies.[39]

[35] See Heitor (2024), pg. 78 and SRIP (2024), pg. 201.
[36] See European Commission (2022).
[37] See Heitor (2024), pg. 39.
[38] See CESAER. (2024). Unleash full potential of Marie Skłodowska-Curie Actions. https://doi.org/10.5281/zenodo.11191328
[39] National Academies (2024).

Figure 1.1: Evolution of **brain drain trends** for EU member states and across the world for two periods: 2001-2010 and 2011-2020

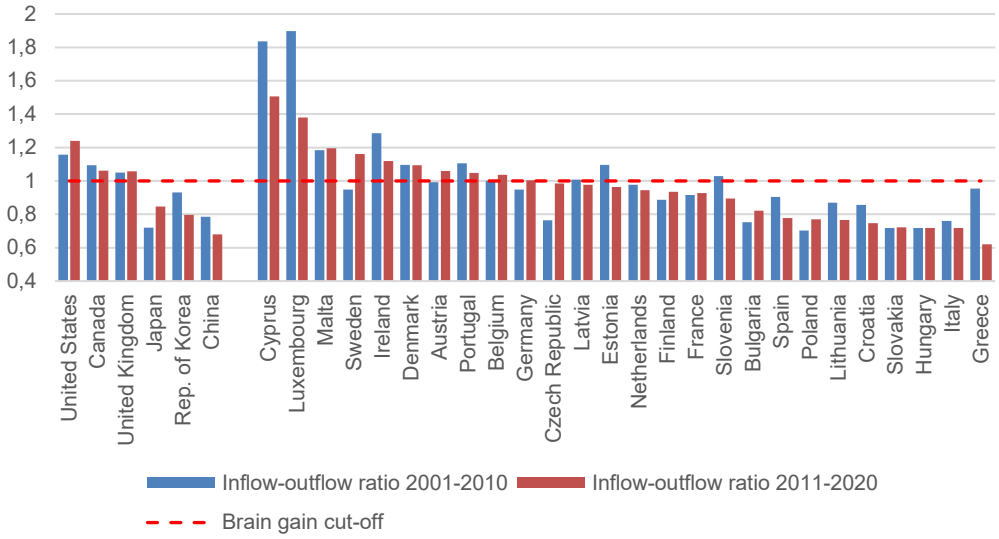
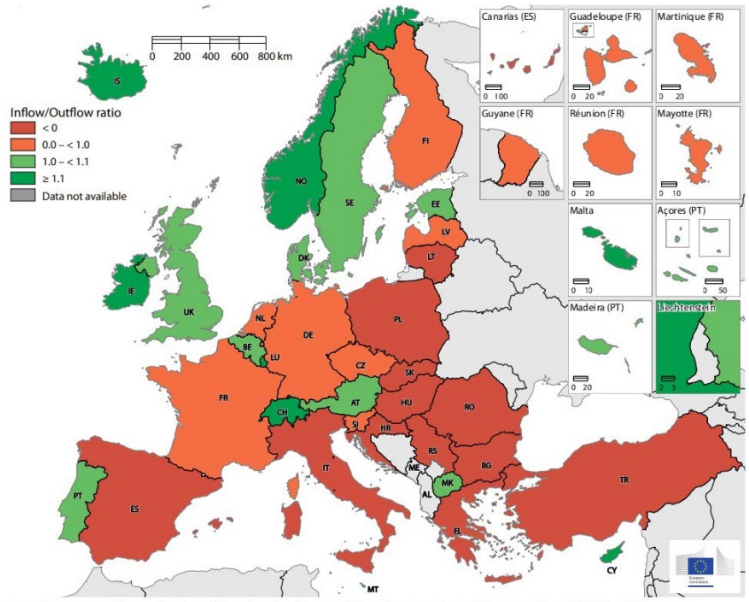


Figure 1.2 Brain drain trends for EU member states, 2022



Source: European Commission, Directorate-General for Research and Innovation (2022), *Science, research and innovation performance of the EU 2022 – Building a sustainable future in uncertain times*, Publications Office of the European Union, Luxembourg, https://data.europa.eu/doi/10.2777/78826.

A call to action

Europe needs a **collective strategy** to promote talent retention across the continent. This strategy should be anchored in a **European-wide perspective**, focusing on **Europe's ability to attract and retain top talent in the face of global competition**. Mario Draghi's observation that Europe has been too inward-looking in its approach to competitiveness and

that “public spending on R&I in Europe lacks scale and is insufficiently focused on breakthrough innovation” applies equally to its strategy for attracting talent.[40] Europe must broaden its perspective, seeing other global regions as the primary competition and stop the inappropriate focus on competition for research talent between EU member states. It is time to adopt a fully continental and European view, moving firmly beyond the outdated view focused on individual member states.

To achieve this, we **propose setting a target to ensure that in a period of up to ten years (by 2035), Europe has reversed the trend of brain drain among post-doctoral researchers**, with Europe as a whole achieving a balanced or positive inflow of talent. This will require dedicated actions from both the European Union and its member states, with the European Commission playing a central role in leading and ensuring co-funding of these efforts.

By adopting these measures, Europe can secure its future as a global leader in research and innovation, transforming its research landscape into a magnet for the world’s brightest minds. **The time to act is now**: **Europe must choose to invest in its research careers to ensure its long-term competitiveness and prosperity**.

Recommendation

- Europe should set ambitious targets to ensure a positive inflow of early-career researchers for Europe as a whole by 2035.

[40] See Draghi (2024), Part A, pg. 25.

2) CESAER Research careers survey 2024: a dual approach – overall data and case studies

This chapter incorporates both survey results and three case studies, to augment the existing evidence pool for policy dialogues on research careers. It aims to **provide evidence of the need to promote new observation methods and monitoring initiatives in Europe**. In particular, this report is clear evidence that the methodologies previously presented by DG RTD and OECD in 2023/2024 need to be adjusted, including to incorporate lessons learned from the 2024 survey conducted within CESAER membership.

Our survey builds on the experience and results of a Science Europe (2016) report, but **our distinct feature is an institutional perspective**, which concentrates on examining the quality of research jobs within a chosen set of volunteer university institutions.

While the research career survey focuses solely on the career development of researchers with R2, R3, or R4 profiles[41], or a combination thereof, the case studies showcase best practices for the career development of researchers with R1 to R4 profiles. Therefore, we **expand the analysis of Science Europe (2016)**, which is concentrated on public funding schemes in Europe, covering 109 different schemes for the period 2012-2014. Although that analysis is still valid, we **concentrate on institutional practices** to expand the existing understanding of **conditions for research careers to thrive in Europe**.

2.1) Overall data survey

As one of the main challenges in improving research careers is the lack of adequate data available about the **type and quality of research jobs**, CESAER surveyed its Members to provide a snapshot of differing situations across Europe. The survey's results do not aim to give an exhaustive nor fully comprehensive description of research careers in all European universities. Instead, it serves as **an example** of the contemporary status of research careers at 24 CESAER universities across Europe, and at one external university. It clearly shows the need for observation initiatives to enquire institutions about data that help understanding the quality of research work, beyond the traditional enquiries of numbers of researchers and support staff.

The questions in the survey focused on three parts:

A. Balance between temporary and non-temporary contracts for researchers:
    - Percentage of R2-R4 researchers that were employed under temporary contracts.
    - Typical length of temporary contracts (0-1, 2-4, 5-7 or 7+ years).
B. Universities' assessment of the current balance between temporary and non-temporary contracts, recent trends and current trajectory.

[41] This reports uses established European nomenclature: **R1** - First Stage Researcher: Researchers doing research under supervision up to the point of a PhD; **R2** - Recognised Researcher: Researchers with a PhD who are not yet fully independent in their ability to develop their own research, attract funding, or lead a research group; **R3** - Established Researcher: Researchers with a PhD who have achieved a level of independence in their ability to develop their own research, attract funding, or lead a research group. **R4** - Leading Researcher: Researchers with a PhD who are recognised as leading their research field by their peers. For full details, see: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2023:0436:FIN

C. Number of employed researchers at each level, and recent evolution between 2019 and 2024.

2.1.1 Scope and method

The CESAER research career survey is a combination of **preliminary data-driven analysis** and expert (self-) assessment by CESAER Member universities.

The **goal of the survey is to help designing future observation initiatives,** by analysing a quantitative balance between temporary and non-temporary contracts for R2-R4 researchers, and the institutional career support structures guiding researchers towards high-quality jobs. R1 profiles were excluded from the scope as researchers at this level (e.g. PhD candidates) are typically undertaking research training and are then, by design, on a temporary and time-limited trajectory.

The analysis of the survey findings gives an **initial and preliminary overview of the recent trends** and contemporary situation of research careers in 24 prominent science and technology (S&T) universities in Europe. A majority of the respondents (17) have a **technical focus**, while a minority of seven respondents are comprehensive universities with a strong S&T profile. Universities in the analysis are **anonymised**, but the numbering is consistent throughout. This means that University 4 will always refer to the same institution across all graphs. If certain universities are missing from specific graphs, it is because data for those institutions was unavailable or incomplete for that analysis.

2.1.2. Summary of survey findings

Main conclusions from the survey results

The data presented in this chapter illustrate the following key points about the employment of R2-R4 researchers across universities:

- There is significant variation among universities in the proportion of R2-R4 researchers on temporary contracts. During the discussion and elaboration of a recent European Council Recommendation[42], it was suggested that **temporary contracts should not exceed one-third of the total**. It is relevant to note that **this threshold is exceeded in many universities**.
- **Temporary contract durations vary widely**. The **majority are either 0-1 years or 2-4 years**, with longer durations (5-7 years) being less common and contracts exceeding 7 years being rare. Legal restrictions in countries like Germany limit the duration of temporary contracts, influencing the prevalence of short-term contracts there.

Most respondents indicated that the current balance between temporary and permanent contracts for R2-R4 researchers seem appropriate, some responded that there are too many temporary contracts, and one responded that there are too few.

In the survey, the main **factors identified driving the use of temporary contracts** are the **lack of longer-term funding** and, in some cases, **legislative frameworks**, which are seen

[42] EC (2023), Council Recommendation on a European framework for research careers.

as significant influences on hiring practices. In most European countries, university employment follows normal **public employment rules and labour regulations**, which are not necessarily adequate to research activities.

The survey data shows growth in all researcher categories from 2019 to 2024. The R2 category grew by 8%, the R3 category by 9%, and the R4 category by 12%, reflecting an overall expansion in the research workforce, with a notable increase in senior-level positions.

While the data reflect the institutional view of some CESAER Members, another critically important perspective is the **researcher's perspective**. A recent study has shown that postdocs, who fall into the R2 researcher category, experience many challenges globally[43]. There is a clear need to improve their working conditions.[44] Postdocs have described their situation as 'trapped in a treadmill of short-term or temporary contracts', leading to job insecurity, stress, and mental health issues.[45] Postdocs report that the necessity for them to move around for new jobs is detrimental to their personal life. And, it has become more difficult for them to get a permanent contract, as the budget cuts in many universities lead to fewer permanent contracts being available.[46] This job insecurity, along with other challenges, leads to many researchers leaving academia.[47]

As outlined in the European charter for researchers, employers and funders should take concrete actions to (i) counter the phenomenon of research career precarity among all researcher categories and (ii) to support researcher job security and stability.[48] The recommendations in the European charter include the establishment of a maximum threshold for the number of fixed-term contracts per organisation in the overall researcher's human resources.[49]

Main specific findings

A. Balance between temporary and non-temporary contracts for researchers

Figure 5.A.1 highlights a **disparity between universities** in terms of the share of temporary contracts between R2-R4 researchers. While some universities keep the proportion of temporary contracts low, others have considerably higher rates, potentially indicating a reliance on short-term hiring practices. Nearly all university respondents only employed a minority (less than 50%) of R2-R4 profile researchers under temporary contracts, ranging from 11% to 47%. Only three universities stand out with temporary contract rates above 50%, respectively 77%, 57% and 63%. This means that most of the respondents employed their R2-R4 researchers under permanent contracts. Following the discussions around the European Council Recommendation of 18 December 2023[50] a proposal for a threshold of maximum one-third temporary contracts was elaborated. While the threshold did not make it

[43] See Fisher pg 321-332(2024).
[44] Ibid.
[45] Ibid.
[46] Ibid.
[47] Ibid., 323.
[48] Council of the EU (2023). Annexes to Council Recommendation on a European framework to attract and retain research, innovation and entrepreneurial talents in Europe. European Charter for Researchers pg. 21. pdf (europa.eu)
[49] Ibid.
[50] See EC (2023), Council recommendation on a European framework for research careers.

into the adopted text, it provides a useful benchmark aligned with current policy discussions at the European level. This threshold is included as a red line in the figure below. It is important to highlight (and will be further emphasised in other figures below) that the share of researchers employed under temporary or permanent contracts varies significantly depending on the category of employment (R2 to R4). It is also important to note that our data do not include R1 contracts, which are typically temporary.

Figure 5.A.1. Fraction of R2-R4 profile researchers employed.

**This threshold was discussed during negotiations of Council Recommendation COM/2023/436 final.*

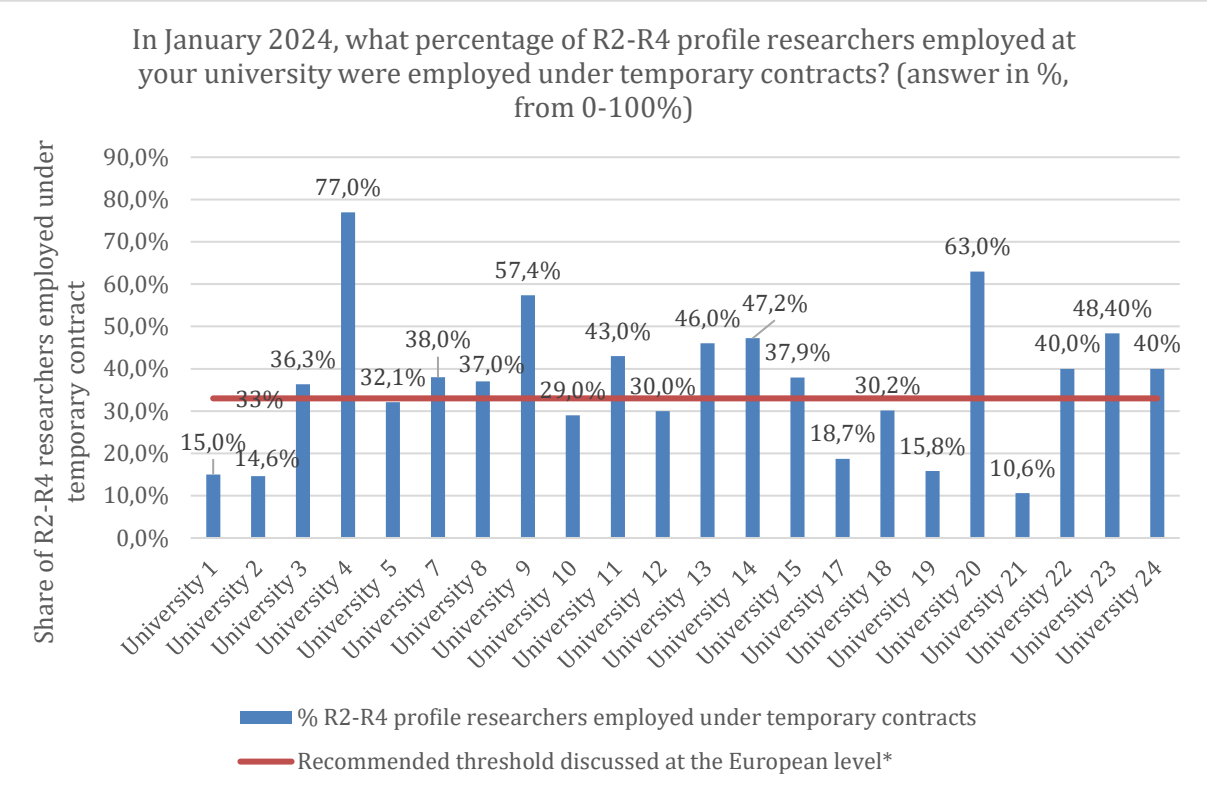
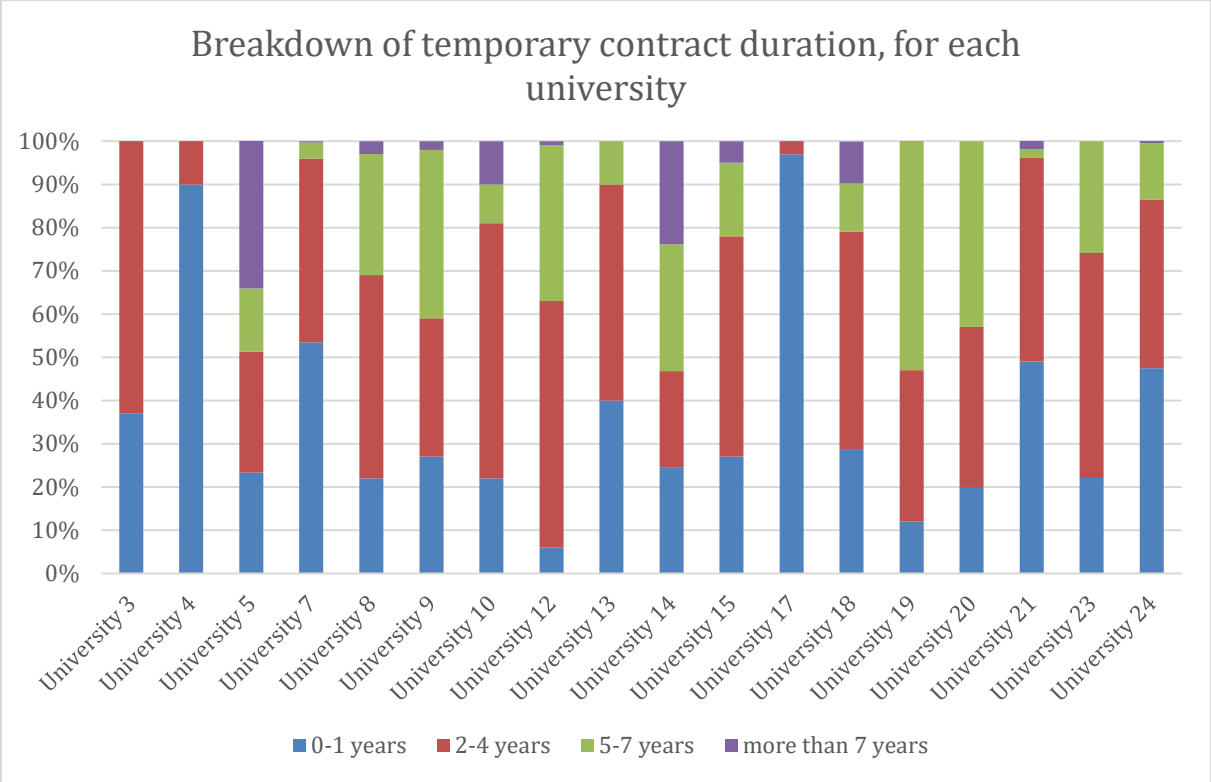


Figure 5.A.2 illustrates the breakdown of temporary contract durations for researchers at 14 different universities. The contract durations are categorised into four groups: 0-1 year, 2-4 years, 5-7 years, and more than 7 years. Each category is represented by a different colour. The X-axis lists 18 universities, while the Y-axis represents the percentage of temporary contracts at each institution, summing up to 100% for each university. There is again **significant variability in the distribution of temporary contract durations across the universities**. It is interesting to note that University 4, which employs 77% of its researchers on temporary contracts, also has a significant number of short-term temporary contracts. Survey results show that the length of temporary contracts is dependent on various factors. From the data we gathered, we can conclude that the majority of temporary contracts are either 0-1 years, or 2-4 years in length. Contracts of 5-7 years are also not uncommon. A temporary contract which lasts longer than 7 years is rare and is even limited by legal

frameworks in countries such as Germany. In some countries, national legal frameworks limit the maximum duration for temporary contracts. Overall, we note that some institutions heavily rely on short-term contracts, which typically reflect funding uncertainties. Meanwhile, other universities offer longer contract durations, providing more job stability even for temporary staff.

Figure 5.A.2. Breakdown of temporary contract duration



B. Universities' assessment of the current balance between temporary and non-temporary contracts, recent trends and current trajectory

Respondents were asked to assess the current balance and trajectory between temporary and non-temporary contracts. Figure 5.B.1 showcases that a large majority of institutions (17 out of 22) thought that the percentage of R2-R4 researchers employed under temporary contracts is currently the **right balance**. Only a few (4 out of 22) think currently there are too many temporary contracts for R2-4 researchers. One respondent thought that the number of temporary contracts for this researcher profile was too low.

Figure 5.B.1 Institutional understanding of the role of temporary/non-temporary contracts

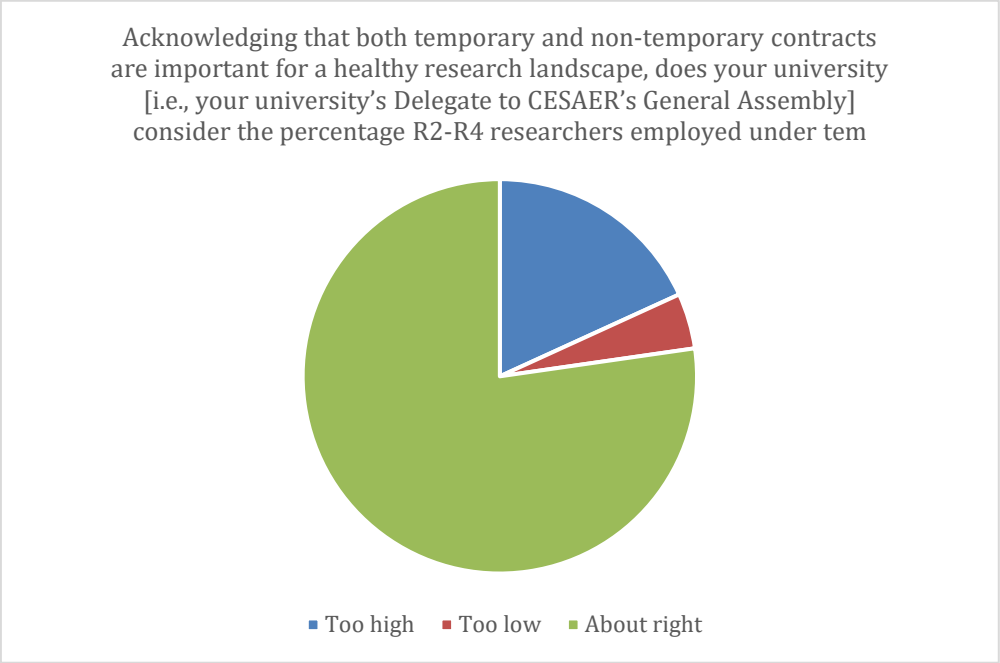
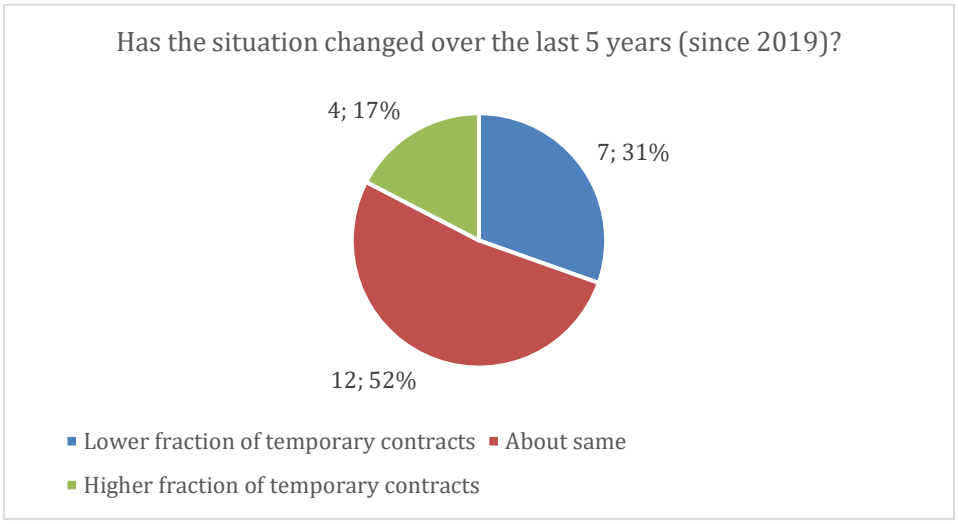


Figure 5.B.2 (below) illustrates that many respondents note that in the last five years (2019-2024), either the situation of R2-R4 researchers being employed under temporary contracts has stayed the same (52%) or has decreased (31%). This reflects earlier trends (2012-2016) as well, as the average share of permanent contracts increased, and the share of temporary contracts decreased during this period[51]. Currently, most of the researchers in the EU28 countries either have a permanent or open-ended contract[52].

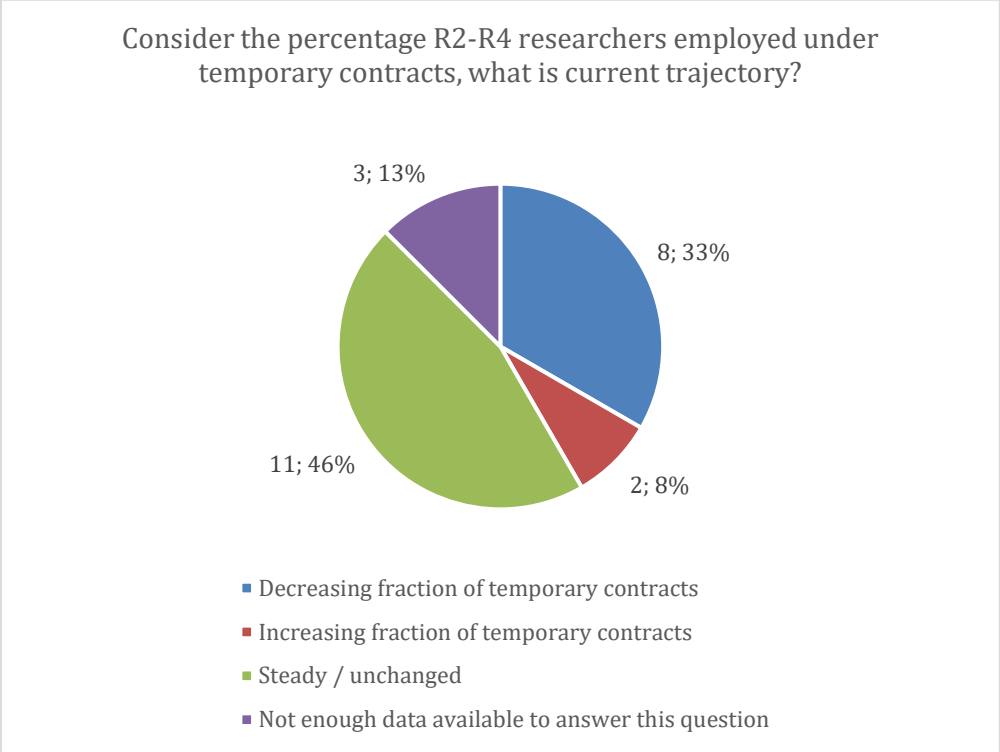
Figure 5.B.2 Institutional understanding of the dynamics of temporary/non-temporary contracts



[51] See PPMI, IDEA Consult and WIFO pg 84. (2021).
[52] Ibid.

Similarly, figure 5.B.3 (below) shows that for a majority of universities the current trajectory is steady, even if some respondents note that the share of temporary contracts is decreasing.

Figure 5.B.3 Institutional understanding of the current trend about temporary/non-temporary contracts



Considering the percentage of R2-R4 researchers employed under temporary contracts, most respondents (46%) believe that this trajectory is steady/unchanged. Another large group (33%) believe that temporary contracts is becoming a decreasing fraction of the R2-R4 researcher's workforce. 8% believe the contrary, an increasing fraction of R2-R4 researchers under permanent contracts, while 13% did not have sufficient data available to answer the question.

To contextualise: **large differences exist amongst the categories of researchers** according to a 2021 study.[53] Early-stage researchers (R1 and R2) tend to be younger, with 87% of R1 and 68% of R2 under 44 years old.[54] Early-stage researchers are more likely to be on fixed-term contracts, with only 17% of R1 and 52% of R2 on permanent contracts, and they have less research autonomy. In contrast, R3 and R4 researchers are more likely to have permanent contracts (86% in R3 and 95% in R4), are predominantly male (51% female

[53] PPMI, IDEA Consult and WIFO (2021). "MORE4 study - Support data collection and analysis concerning mobility patterns and career paths of researchers." https://doi.org/10.2777/645537
[54] Ibid., 84.

in R1 compared to 28% in R4) and enjoy greater research autonomy but face higher teaching workloads.[55]

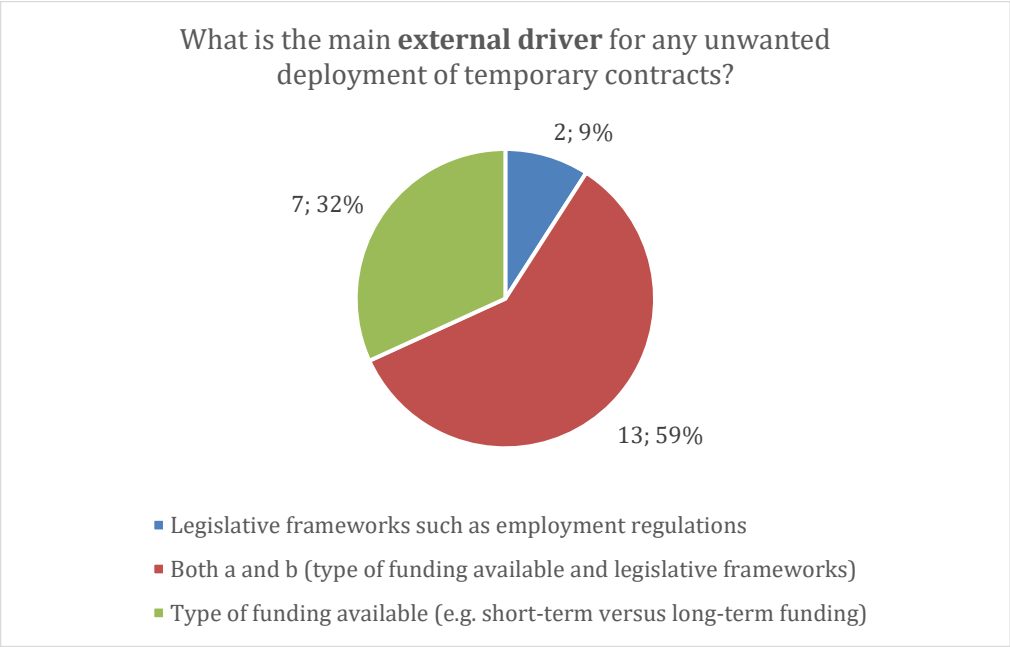
A 2022 study affirms that large differences exist amongst male and female researchers.[56] This study also showed that in most EU countries, **male researchers are more frequently employed on permanent contracts compared to female researchers**.[57] Exceptions to this trend includes Slovakia, Sweden, and Latvia. In Italy, Bulgaria, and in the Czech Republic, the gender difference is minimal.[58] In non-widening countries, the disparity is generally more pronounced, with Austria, Denmark, Belgium, the Netherlands, and Germany exhibiting particularly large differences, ranging from approximately 15 to over 25 percentage points.[59] The EU average in difference in percentage points between male and female contracts in share of permanent contracts in the academic sector was 10%.

Additionally, the aforementioned 2022 study shows that there are significant **variations between countries in the proportion of permanent versus fixed-term contracts** among researchers in PhD-granting higher education institutions.[60] Consistent with earlier data, **widening countries generally have a higher share of permanent contracts compared to non-widening countries**, with exceptions such as Latvia, Lithuania, and Slovakia.[61] This disparity may be due to differing career structures within higher education systems and varying job markets for researchers, with more junior researchers often involved in research projects in non-widening countries.[62]

Data from our survey (figure 5.B.4, below) shows that a majority of respondents (60%) thought that the main external driver for unwanted deployment of temporary contracts is twofold: both (i) the type of funding available, which is the most-mentioned external driver, and (ii) the legislative frameworks such as employment regulations.

[55] Ibid., 23, 84.
[56] See Janger et al. pg. 57 (2022).
[57] Ibid, 56-7
[58] Ibid.
[59] Ibid.
[60] Ibid., 50.
[61] Ibid.
[62] Ibid.

Figure 5.B.4. Institutional understanding of drivers of temporary/non-temporary contracts



It is noted that the respondents highlighted three main issues:

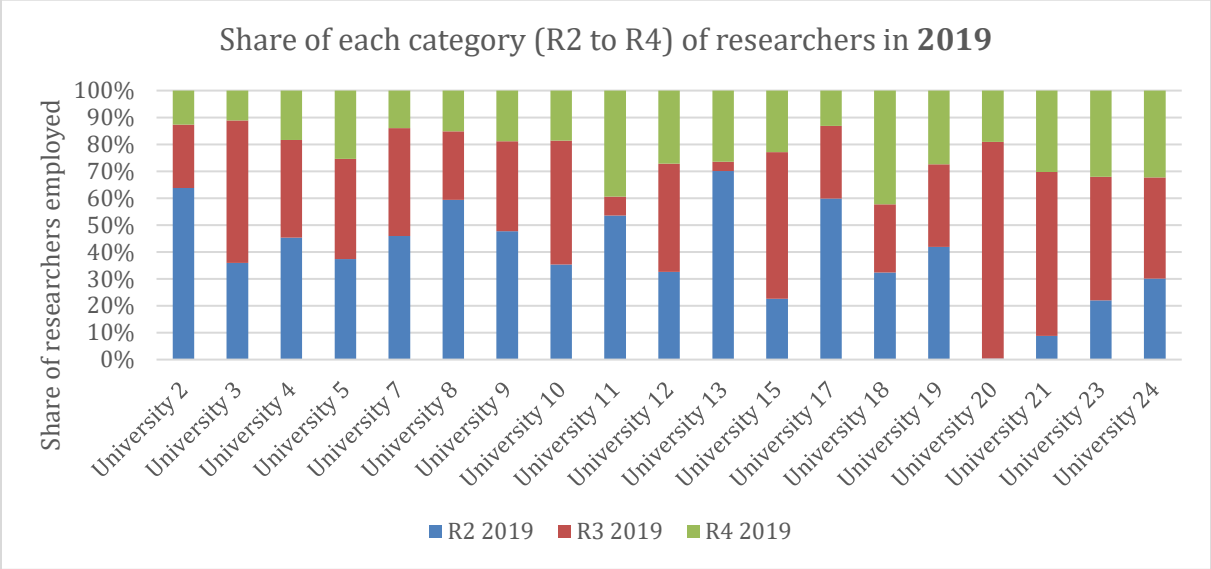
- Many **projects are funded temporarily**, leading to unstable staff positions and complications with employment.
- **Regulatory constraints in national labour legislation**, as many national laws limit staff tenure to around a maximum of eight years, causing dissatisfaction and frequent staff changes.
- **Limited university longer-term funding from public funding agencies** covers only higher-level positions, leaving lower-level staff to self-finance and placing a heavy workload on the few permanent, higher-level staff.

C. Number of employed researchers at each level, and recent evolution between 2019 and 2024

Figure 5.C.1 and 5.C.2 (below) illustrate the share of researchers in each category (R2 to R4): one representing the data from 2019 and another showing the updated distribution in 2024. These figures provide a comparative view of how the research workforce has evolved across different universities. Overall, in sum, the R2 category across respondents grew in 2019-2024 from 10,950 to 12,113, reflecting an 9.6% increase. This indicates a moderate expansion in early-career researchers. The R3 category across respondents increased from 9,757 to 10,661, showing an 8.48% increase, signifying steady recruitment or advancement in mid-career researchers. The R4 category for respondents saw the largest percentage growth, increasing from 5,685 to 6,464, representing a 12% rise, emphasising a strong focus on expanding senior leadership roles within institutions.

Additionally, the data has revealed that, in engineering faculties, there is a higher proportion of researchers in the R2 category, with financial resources often tied to specific projects, particularly when third-party funding is involved. This highlights the reliance on project-specific funding common for early-stage researchers in technical fields.

Figure 5.C.1a Relative share of categories, R2-R4, 2019



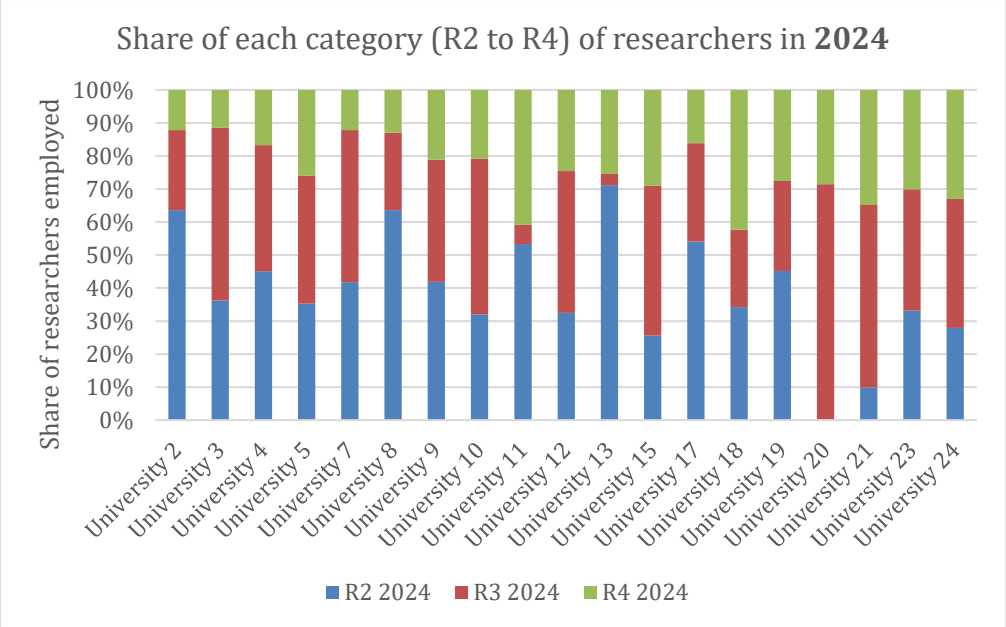


Figure 5.C.1b Relative share of categories, R2-R4, 2024

2.2) In-depth case studies

In addition to all of the examples provided throughout the report from a range of CESAER Member universities, three in-depth case studies were elaborated for the report: IST Lisbon (in Portugal), the University of Twente (in the Netherlands) and the University of Bergen (in Norway). University of Bergen is not a CESAER Member and was invited to participate in order to enrich the analysis by a perspective from a non-science and technology university. These case studies are intended to lead to substantive policy discussions at both national and EU levels, including the development of new and targeted funding instruments that enhance the careers of early-career researchers.

The case studies are included in full in Annex 2.

2.2.1 Recruitment and career development at *Instituto Superior Técnico*: a case study, (2014-2023) - Summary

IST Lisbon actively promoted research careers in the last decade and this case study reports a **portfolio of four different initiatives** making use of a diversified set of instruments and funding mechanisms, which could be expanded and further leveraged if additional funds (national and European) are provided to address the complex task of promoting research careers in Europe. Main results are as follows.

The use of IST's own internal financial resources was used to promote the "IST Strategic Recruitment and Career Development Programme", representing about 3,2% of the total annual financial execution of the school for Human Resources. The programme was launched in 2014 and it allowed for a total of 218 faculty openings and career progression in the period 2016-2023. Different departments leveraged this programme in quite diversified ways to accelerate growth in strategic areas, with particular relevance for bioengineering, Informatics, and chemical engineering.

The use of competitive public funds (i.e., national funds and European structural funds) since 2017 has allowed the implementation of the "IST's Deployment of the National programme on Scientific Employment". It has facilitated new research contracts in affiliated research institutions (private non-profit) allocated to specific research centres following a national competitive process. A total of 124 new recruitments and 202 career progressions were effectively implemented in the period 2016-2023, with most of the impact on researchers between 30 and 40 years old. Annual figures represent about 6% of the total number of permanent researchers at IST.

The use of IST's funds to enable merit-based promotion following the review of the Portuguese legal system in terms of decoupling recruitments and career progression regarding the need of international competitive processes. This has allowed IST to better balance categories along career progression and enabled gender balance at the top-level categories.

The use of competitive public funds (i.e., national funds, European structural funds and European Recovery funds) has facilitated the co-creation of nine new collaborative research institutions with industry since 2018, with industry co-funding. It has facilitated the creation of nearly 200 new quality jobs, including about 60 doctorate researchers in the period 2019-

2024, in private non-profit institutions, independent of IST but in close collaboration between IST and industry.

2.2.2. University of Twente's approach to researcher development and career progression amongst PhD researchers in 2022 case study – summary

For this case study, the University of Twente (UT) collected data for the 2022 calendar year, categorising researchers from R1 to R4 in FTE terms. The data reveals that R1 is the largest category with 1052.7 FTE, followed by R2 with 554.9 FTE, R4 with 362.7 FTE, and R3 with 168.4 FTE. Notably, at the technical-oriented faculties (EEMCS, ET, ITC, and S&T), the number of researchers in category R2 declines by more than half compared to R1. On the contrary, at the Faculty of Behavioural, Management, and Social Sciences (BMS), R2 exceeds R1, which contrasts with other faculties.

Across all faculties at UT, there are relatively low numbers in category R3 compared to higher numbers in R4. This reflects a highly dynamic academic job market where staff frequently advance to senior roles,move to positions at other institutions or outside academia. Research indicates that 40% of new assistant and associate professors appointed are coming from outside the university system. Consequently, career paths in Dutch academia do not always follow a straightforward progression from R1 to R4 through R2 and R3.

The UT is committed to enhancing the recruitment and development of young researchers through various initiatives overseen by its Human Resources department and faculty-driven ideas. These practices are organised into three main areas: Attract, Develop, and Lead.

In the 'Attract' category, one example is the startup packages provided to new assistant professors. These packages offer financial support for establishing their research lines, although future availability may be uncertain due to potential budget constraints.

For the 'Develop' category, one example is the use of the Talent Motivation Analysis (TMA) tool. This tool assists young academics in identifying their talents and career development opportunities through a structured assessment process. There are recent concerns about unclear expectations under the new reward and recognition system, emphasising the need for improved training for younger staff to be fully aware and part of these new career movements.

In the 'Lead' category, one example is the Leadership Framework, which defines expectations for leaders to create a supportive environment and promote talent development. This includes specific training for new supervisors and academic leaders to ensure effective leadership and career progression for young researchers.

2.2.3 University of Bergen's strategic support of an inverted pyramid, together with a long-term collaboration with a private foundation case study – summary

The University of Bergen (UiB) is committed to ensuring good framework conditions and career development opportunities for academic staff at all career levels and has for several years paid special attention to the needs of early career researchers. A range of activities and programmes have been established to provide support to researchers at different career stages and for different career paths. In addition to providing information on types of research

positions at UiB and development in ratio between types of position over the last decade, this case study will give a brief overview of the range of activities aimed at supporting researchers' career development at UiB, and will detail selected best practice examples:

- **The Trond Mohn Research Foundation (TMF) Starting Grant and the TMF-UiB Career Program**: This is an example of long-term collaboration and co-funding between the university and a private foundation, aimed at recruiting and retaining excellent young researchers at UiB. These instruments give opportunities to talented early career researchers to develop their careers through leading a four-year research project and following a career development programme, and thus to qualify for a permanent position within the university.

- **The Momentum Career Development Programme**: This is an example of an institution-wide programme funded by the university to support early career researchers to become positioned to pursue academic careers at UiB or at other academic institutions.

- **The inverted pyramid of permanent positions**: Permanent combined positions, with both research and teaching responsibilities, form the core of the European university tradition, and likewise form the core of the University of Bergen. It is vital to keep this position structure to ensure that the university remain an attractive employer with high-quality academic positions giving researchers the opportunity to engage in excellent research and both develop and draw on their research in teaching, with the great benefit this entails for our students. The development at UiB over the last decade indicates that the combination of strategic investment into research career support, training and positions, together with changes in national legislation, have led to a positive development in our position structure. Positions at UiB do not follow the traditional pyramid pattern (with most employees at the lowest, typically temporary level), and **a large proportion of the academic staff are employed in permanent combined positions in the two highest categories**, R3 and R4.

Highlights from the development in research careers at UiB:

- UiB increased its relative share of highly qualified, permanent academic positions over the past 10 years. The researcher career structure developed from R1 : R2 : R3 : R4 = 1,00 : 0,52 : 0,71 : 0,89 in 2014, to R1 : R2 : R3 : R4 = 1,00 : 0,55 : 0,84 : 0,97 in 2023.
- The administrative and technical support of researchers also increased in the same time period; from 0,64 support positions per 1,00 researcher position in 2014, to 0,68 in 2023.
- Targeted programs at UiB in support of researcher careers have aided this positive development:
    - TMF Starting Grant: Of 37 grantees that have completed the program, 100% are in permanent academic positions, of which 78% are at UiB.
    - Momentum Program: Of 60 "delegates" that completed the program between 2019 and 2022, 100 % have permanent positions in jobs relevant to their research, of which 92% are in academia.

3) Analysis 1: European initiatives supporting research careers - Current landscape and future directions

Monitoring research careers in Europe

Over the last decades, the OECD and the European Commission's Policy Support Facility (PSF) attempted to assist EU member states and Horizon Europe-associated countries to develop, implement, and evaluate reforms in their research and innovation systems. However, a critical need still exists for comprehensive data collection on "good jobs" and the **quality of research jobs**, in particular, which would enable institutions to shift towards more sustainable employment models.[63] Progress in policy initiatives and assessment has indeed been hampered by the **lack of comprehensive data on research careers**.

The anticipated establishment of the Research and Innovation Careers Observatory (ReICO)[64] (data envisioned to be available in 'second half of 2025')[65], in collaboration with the OECD and the European Commission, aims to address this gap. However, the **slow progress of this initiative** (likely due to concerns about the originally presented methodology) has left a significant void in the evidence necessary for effective policymaking, impeding advancements in research careers.

Two EU-funded projects, RISIS and SECURE, attempted to shed light on the evolving landscape of research careers in Europe.[66] While these efforts provide some insight, they underscore the need for a more systematic approach to data collection and monitoring to ensure a robust evidence base for future policies.

The European Commission should prioritise the effective establishment, development, and implementation of the **Research Careers Observatory**. This observatory should follow lessons learned by this report and monitor key indicators, particularly including job quality, working conditions, contract types (especially temporary and non-temporary contracts), funding levels and conditions (with a particular focus on the balance between competitive and non-competitive funding streams), mobility in and out of Europe, mobility within Europe, and career paths for researchers across the continent. In addition, it should include the analysis of support staff.

It is essential that the observatory provides detailed, **longitudinal and institutional data** at the EU, national, and regional levels to enable meaningful comparisons over time and across different geographic areas. Additionally, institutional data—such as the proportion of researchers on temporary versus non-temporary contracts—should be systematically integrated to inform policy decisions effectively. As much of **this type of information only exists at the institutional level and have never been acquired by the national statistical**

[63] See details at EC (2023) "Industry 5.0 and the future of work – Making Europe the centre of gravity for future good-quality jobs". Following Rodrik and Stancheva (2019), "good jobs" are meant as "jobs that provide an middle-class living standard, an sufficiently high wage, good benefits, reasonable levels of personal autonomy, adequate economic security, and career ladders". See also Rodrik (2022).
[64] Research and Innovation Careers Observatory (2024). https://ec.europa.eu/era-talent-platform/reico/
[65] Several years after the European Council conclusions of May 2021[65].
[66] See details in RISIS, https://www.risis2.eu/2023/05/22/monitoring-and-analyzing-research-careers-for-informed-policy-making-in-the-era/; and SECURE, https://secureproject.eu/

offices and the OECD[67], it is vital that universities and other employers of researchers are an integral part of the development and launch of the observatory.

Recommendation

- Establish and develop effectively the Research Careers Observatory to monitor research job quality, working conditions, funding environments, and researcher mobility within Europe and between Europe and other regions, working closely with employers of researchers.

Strengthening existing support mechanisms

Europe has made considerable strides in supporting research careers through flagship programmes like the Marie Skłodowska-Curie Actions (MSCA) and the European Research Council (ERC), which have been instrumental in promoting mobility and excellence among researchers. These initiatives have set a foundation for enhancing institutional frameworks to support modern research excellence and **need to be substantially expanded** to better address the emerging issues of research careers in Europe.

As the research landscape evolves, there is an urgent need to boost these programmes to address the current challenges. The success of the MSCA, despite its limited budget and low success rates due to oversubscription, highlights the need for increased funding and broader application of its best practices.

Recommendations

- Unleash the full potential of MSCA:[68] **expand the Marie Skłodowska-Curie Actions to enhance support for early-career researchers**, including by boosting its capacity to be a trendsetter for advancing high-quality research jobs.
- Leverage existing programmes: **promote greater use of existing tools like the MSCA COFUND programme**, which successfully co-finances doctoral and postdoctoral research programmes, spreading MSCA's best practices across Europe. For example, experiment with a **pilot in 2025** aimed at **MSCA COFUND** projects hosting postdoctoral fellowships. The pilot would offer an extension of 2–3 years to these fellowships (resulting in a total duration of 4–6 years) under MSCA conditions and rates. This extension would be contingent on institutions committing to **provide longer-term job opportunities**.
- Expand support for early-career researchers: introduce **new funding instruments specifically designed to support early-career researchers**.

Enhancing institutional and sectoral collaboration

The future of research careers in Europe hinges on establishing strong partnerships between academic institutions, businesses, and other sectors. While a range of initiatives have helped

[67] See details in the OECD's Frascati Manual, the internationally recognised methodology for collecting and using R&D statistics since 1964, with its sixth revision in 2015, as in https://www.oecd.org/en/publications/2015/10/frascati-manual-2015_g1g57dcb.html.
[68] CESAER. (2024). Unleash full potential of Marie Skłodowska-Curie Actions. https://doi.org/10.5281/zenodo.11191328

to lay a foundation for such collaborations, further efforts are necessary to translate these partnerships into meaningful career opportunities for researchers.

In some universities in Europe, it can take 15-20 years for an excellent researcher to become a full professor. To remain competitive, European institutions should aim to promote top researchers within 7-10 years. Accelerating career development is crucial, particularly for researchers with families. As an example, some institutions in the US exemplify this approach by recruiting excellent young researchers from Europe and facilitating their career advancement within 5-10 years.

Pilot projects under the European Research Area Policy Agenda, such as "Talent Ecosystems for Attractive Early Research Careers," have shown potential in creating supportive environments for early-stage researchers. These initiatives should be expanded, adhering to the principles provided under the heading "Foster excellent institutional support of (early-career) researchers".[69]

Recommendations

- Enhance institutional support: strengthen institutional frameworks and support systems to improve the career trajectories of early-career researchers. Ensure that these **support systems continuously evolve to create an environment where early-career researchers can thrive**. Such support systems are to be supported by sustainable and long-term funding.
- Promote collaborative arrangements and laboratories, as new employers of young researchers in Europe: expand successful initiatives like Portugal's 'Collaborative Laboratories', oriented towards generating new research jobs and fostered public-private partnerships among universities, RPOs/RTOs and industry with the capacity to foster the quality of research jobs and diversify the employment landscape beyond universities.
- Enhancing university alliances could be an important tool to explore the joint recruitment of researchers: this could help facilitate a European approach and transform brain drain into a collaborative effort benefiting all of Europe. In a stepwise approach, university alliances could in the future transcend joint degrees and student mobility by facilitating the joint recruitment of researchers to add a truly European dimension to the labour market for researchers, which could create new opportunities for career advancement.

Empowering research careers for Europe's future

To secure Europe's leadership in global research and innovation, a radical rethinking of how research careers are supported is required. If Europe wants to enhance its competitiveness long-term, it will need to be able to retain its research talent long-term.

This includes moving away from undue reliance on short-term project-based funding towards more stable and sustainable career paths. The undue **coupling of project duration with short-term employment contracts must be changed to ensure that Europe retains its**

[69] CESAER. (2023). Supporting modern and stable research careers in Europe. https://doi.org/10.5281/zenodo.8099049

brightest minds, and this crucially depends on governments, funding agencies and employers of researchers working together.

The establishment of a new initiative, '**Choose Europe for a research career**' as suggested in this report, could serve as a flagship programme under the European framework programme for research and innovation, aimed at reversing European brain drain and instead promoting brain gain to Europe. This initiative would focus on providing long-term career stability for researchers, particularly at the R2 and R3 levels, with a pathway towards non-temporary positions. While acknowledging that addressing brain drain among early-career and young researchers is a complex issue, and that these recommendations will not solve all aspects of it, the Marie Skłodowska-Curie Actions (MSCA) is one targeted approach to contribute to tackling the most pressing issue: the loss of researchers two to three years after earning their PhDs. Our survey, case studies and analysis of the broader landscape all indicate that this period is when brain drain away from Europe is the most prevalent.

Recommendations

- Launch 'Choose Europe for a research career' under the MSCA programme: develop and implement a new co-funding mechanism under the European framework programme for research and innovation to boost and co-fund long-term career prospects for early-career and young researchers, particularly those two to three years post-doctoral degree. This is closely aligned with the 'Choose Europe' initiative proposed by Heitor (2024).[70] It could be experimented **in 2025 with a pilot** under **MSCA COFUND**.
- Foster stability in research careers: ensure that new funding instruments seek to guarantee long-term employment contracts for researchers, for example by providing a clear career trajectory from R2 to R4 levels within ten years of completing a PhD, and equivalent career trajectories towards non-temporary employment conditions.
- Promote the Seal of Excellence: **Expand the 'Seal of Excellence' initiative to more fully leverage national and regional programmes**, ensuring that high-quality projects, even if unfunded by EU programmes, receive recognition and support at the national level.

By implementing these strategic recommendations, Europe can transform its research landscape into a global magnet for talent, ensuring long-term competitiveness and innovation leadership. The 'Choose Europe for a research career' is one approach, and our analysis underlines that a broad approach, including a range of funding mechanisms, is needed to stimulate the needed public and private investment at European, national and regional levels.

Lowering barriers and increasing attractiveness

To attract and retain top global talent, European countries and the European Union – with the European Commission taking the lead – must implement concrete actions that lower barriers and increase the attractiveness of Europe as a destination for researchers and professionals in science and technology.

Recommendations

[70] See Heitor (2024), pg. 54.

- Lead efforts to simplify immigration processes: streamline visa and residency application processes for immigrating research professionals and talents in science & technology, including reducing paperwork and speeding up processing times.
- Facilitate easy access to work permits for graduates: ensure graduates who studied in European universities can easily transition to the workforce by granting automatic work permits (including for non-EU nationals).
- Create attractive visa options: introduce long-term visas for immigrating research professionals and talents in science & technology.
- Improve quality of life: enhance integration services and address the needs of families of immigrating research professionals and talents in science & technology, including easy access to work permits for spouses.
- Promote an inclusive and respectful environment: foster a welcoming atmosphere, ensuring that immigrating research professionals and talents in science & technology are treated with respect and are not subjected to excessive scrutiny nor discrimination.
- Adopt policies that retain talent: design policies that encourage research professionals and talents in science & technology to stay, such as offering clear paths to permanent residency or citizenship.

By implementing these strategies, Europe can better compete globally for top talent, ensuring that it attracts and retains the skilled individuals needed to drive innovation and prosperity. The European Commission must take the lead in this endeavour, ensuring swift progress to fulfil the treaty obligation to establish a relevant European ecosystem for research, innovation and advanced training. The legal establishment and mandatory enforcement of Letta's "fifth freedom"[71]—the free circulation of scientific knowledge and its bearers such as researchers, learners and teachers—across all of Europe is essential for Europe's success[72].

[71] See Letta (2024), pg 19-21.
[72] CESAER. (2024). Competitiveness, reindustrialisation and strategic autonomy through leadership in science & technology. https://doi.org/10.5281/zenodo.11202410

4) Analysis 2: National initiatives supporting research careers - Current landscape and future directions

Member states play an essential role in creating an environment that attracts and retains top research talent, which is crucial for Europe's competitive edge in science and technology. However, the current landscape presents significant challenges, particularly in co-funding mechanisms, securing visas and ensuring affordable living conditions for researchers. These barriers must be addressed urgently to make Europe a more appealing destination for global talents.

Streamlining entry processes and infrastructure development

Governments must commit to adapting framework conditions to lower these barriers effectively. As emphasised in a recent briefing by *The Economist*, "lowering barriers is more effective than offering carrots" in attracting talent.[73] Member states can simplify the entry process for highly skilled workers and create easier pathways for non-EU citizens' graduates from European universities to enter the workforce. This includes the development of infrastructure to accommodate newcomers, as also recently acknowledge by the National Academies for US.[74]

Recommendation

- Simplify legal and bureaucratic barriers: streamline visa and residency processes and reduce legal barriers at national and regional levels to facilitate the free movement research professionals and talents in science & technology.

Advancing research careers through strategic frameworks

EU member states have committed to advancing research careers via the Council Recommendation of December 2023 on a European framework for attracting and retaining research, innovation, and entrepreneurial talents.[75] The revised **Charter for Researchers**, annexed to that recommendation, outlines essential principles for enhancing research careers in Europe. This framework attempts to serve as a foundation for future investments in research careers, addressing job stability, working conditions, gender balance, and more. However, the analysis of the impact of previous versions of the European Charter for Researchers shows **the limited impact of this approach.**

National initiatives, like the Dutch 'Recognition and Rewards Programme', highlight the importance of **modernising research assessment.** This programme, which broadens the recognition criteria for academic talent, aims to foster a collaborative research culture and align career development with broader academic goals. Such initiatives demonstrate the **potential for national programmes to drive effective changes** that reflect career objectives and working conditions, ultimately leading to new funding opportunities. Such approaches could be more impactful.

[73] See *The Economist*, 15 August 2024, 'Talent is scarce. Yet many countries spurn it', https://www.economist.com/briefing/2024/08/15/talent-is-scarce-yet-many-countries-spurn-it
[74] See National Academies (2024).
[75] See EC (2023).

Recommendation

- Modernise research assessment: **strengthen independent peer review processes** to evaluate the **quality of research jobs alongside research outcomes**, expanding the founding principles launched by COARA and DORA in the last few years and progressively adopted in Europe.

Tackling precarity and promoting job security

Addressing the issue of precarious employment is critical. The European Council Recommendation of December 2023[76] urges member states to limit the number of fixed-term contracts per organisation and to support career continuity measures. For example, Austria's Minister for Education, Science and Research has recently committed to making 25% of postdoc temporary contracts permanent by 2027, converting around 450 positions. Similarly, Portugal's National Programme on Scientific Employment, which leverages national and European funds to create new research positions, offers a successful model for how public and private funding can be used to foster research careers and rejuvenate scientific institutions. We emphasise that while such national initiates are critical, a target cannot be unilaterally reached by employers of researchers (such as universities or RPOs/RTOs). It **critically depends on a substantial increase in sustainable and long-term funding provided**.

Recommendation

- Promote new co-funding schemes: encourage cultural changes at the institutional level through **new co-funding schemes**, fostering collaboration with public and private institutions to **create and promote high-quality research jobs**, especially for early-career researchers.
- Ensure suitable balance between short-term and long-term funding: such a balance, and particularly the availability of **substantial long-term and stable funding sources** for public employers of researchers, enables them to assume the financial commitments that come with offering long-term and stable contracts.

Creating synergies and strengthening funding mechanisms

There is a pressing need for coordinated efforts at the EU level to adjust current funding instruments and better integrate them with national schemes. The use of '**Seals of Excellence'**, awarded for high-quality projects that cannot be funded due to budget constraints, offers a mechanism for encouraging investment in research careers. Moreover, member states must consider structural reforms to boost public and private investments in research and innovation, ensuring that these investments have long-term socio-economic impacts. However, the **'Seals of Excellence' remain underutilised by most member states.**

In addition, the successful integration of Horizon Europe with Cohesion Policy programmes, and the fostering of synergies between regional, national, and European initiatives, are crucial. However, **these synergies remain also underutilised**. For example, financial

[76] See European Commission (2023).

transfers from the European Regional Development Fund (ERDF) to Horizon Europe and cumulative funding approaches have proven beneficial but are not yet widely adopted.

Recommendation

- Leverage the 'Seal of Excellence': utilise the 'Seal of Excellence' to incentivise investments in high-quality research projects and MSCA funding, promoting the establishment of new research careers to strengthen the European research landscape.
- Boost cohesion efforts: increase transfers from the ERDF to Horizon Europe, and from other funding sources to Horizon Europe when and where possible.

A joint effort

Our analysis clearly suggests that member states and the European Commission must **work collaboratively** to foster the European added value, by lowering barriers, promoting job security, and enhancing research career pathways in Europe. By addressing these critical areas, Europe can ensure it remains a magnet for the world's brightest minds, securing its future as a leader in science and technology. Coordinated and ambitious efforts are required to transform Europe's research landscape to increase research funding and reverse the current brain drain out of Europe. The proposal for a **European Research Area Act**, as announced by European Commission President Ursula von der Leyen,[77] can be instrumental for realising the fifth freedom needed to enable Europe to assume a globally leading role in science & technology, [78] particularly by considering the role of the ERA as a trailblazer[79] in key areas such as research careers.[80]

It should be noted that, following the OECD and Eurostat well-established methodologies over the last 60 years, **research expenditure is mainly characterised by human resources related expenditures**, which account for about 90% of total expenditure[81]. Therefore, increasing the expenditure in research, development and innovation (RD&I) in most European member states and regions in the next coming years and attaining the target of 3% of GDP is associated with **attracting and retaining adequate concentrations of researchers**, together with **three other critical issues**: i) adequacy of **salary levels** throughout the labour force; ii) modernising **research careers**; and iii) considerable expansion, structuring and modernisation of **technical careers supporting RD&I activities**.

It is recognised this is a highly complex target for Europe and member states because Europe is characterised by **large disparities** in the evolution of the **number of researchers** and the evolution of **RD&I expenditure per researcher** in member states over the last three decades.

[77] See von der Leyen's mission letter to Commissioner-designate Zaharieva (2024), pg 5.
[78] CESAER. (2024). Competitiveness, reindustrialisation and strategic autonomy through leadership in science & technology. https://doi.org/10.5281/zenodo.11202410
[79] CESAER. (2023). European Research Area as a trailblazer. https://doi.org/10.5281/zenodo.8108330
[80] CESAER. (2023). Supporting modern and stable research careers in Europe. https://doi.org/10.5281/zenodo.8096603
[81] See details in the OECD's Frascati Manual, the internationally recognised methodology for collecting and using R&D statistics since 1964, with its sixth revision in 2015, as in https://www.oecd.org/en/publications/2015/10/frascati-manual-2015_g1g57dcb.html.

Recommendation

- Ensure structural reforms in labour regimes and R&I investments: Implement budgetary reforms to ensure stable R&D investment, ensuring attaining the target of 3% of GDP for all member states by 2030. This should include **significant reforms at national levels in labour regimes** to foster adequate **salary levels** throughout the researcher labour force, **adequate careers** and considerable expansion, structuring and modernisation of **technical careers supporting research and innovation activities** (all types of professionals contributing to research).

Good practice examples

Example 1 – The Netherlands: Recognition and rewards programme

In 2019, Dutch public knowledge institutions and research funders, including VSNU, NFU, KNAW, NWO, and ZonMw, published a paper titled 'Room for Everyone's Talent'. This document called for a new approach to recognising and rewarding academics, leading to the launch of a Recognition & Rewards programme in 2020. The programme aims to modernise the academic talent assessment system by broadening recognition criteria beyond traditional metrics such as publication counts. It emphasises the necessity to acknowledge diverse career paths, to reduce pressure on academics, and to foster a collaborative culture. Through a common roadmap, Dutch public knowledge institutions are outlining how they will implement the five priorities from the position paper over the long term. As a result, political discussions on recognition and rewards policies in the Netherlands are expected to lead to practical changes that create new incentives for researchers. This example illustrates how connecting political commitments to tangible opportunities, such as a renewed recognition and reward policy, effectively aligns career objectives with working conditions and ultimately opens new funding opportunities.

Example 2 – Portugal: National programme on scientific employment

The Scientific Employment Stimulus is an initiative designed to encourage the hiring of researchers and the development of scientific employment plans by both public and private institutions. This financial support strengthens Portugal's national scientific and technological system, promoting employment opportunities for PhD holders, facilitating the formalisation of scientific employment, and making the country more attractive to highly qualified young professionals. Additionally, it contributes to rejuvenating scientific institutions by attracting top-tier scientists and fostering an environment that encourages researcher mobility.

In November 2023, the Foundation for Science and Technology (FCT) announced the provisional results of the sixth Edition of the CEEC Individual programme, awarding 400 new employment contracts to PhD researchers, with an investment of approximately 126 million euros. Over six editions, the programme has awarded 2,300 contracts. This year, 2,746 applications were evaluated, resulting in 193 Junior, 158 Assistant, and 49 Principal contracts. Of the selected applicants, 56% are women, and 30% are international researchers. The seventh edition of the CEEC is ongoing at the time of writing.

A detailed case study at IST (included in the annex) shows that the use of competitive public funds (including national, European structural funds, and European Recovery funds) has

facilitated the creation of nine new collaborative research institutions with industry since 2018. This initiative has generated nearly 200 new quality jobs, including about 60 for doctorate researchers, in private non-profit institutions that operate independently of IST but maintain close collaboration with both IST and industry.

Example 3 – Germany: Junior professorship programme

In 2002, the German Framework Act for Higher Education (HRG) was reformed to introduce the position of junior professor as an alternative pathway to qualifying for a tenured professorship. This reform aimed to provide young scholars with opportunities for independent research and teaching earlier in their careers. The model was designed to achieve early independence for young researchers, increase the attractiveness and predictability of academic careers in Germany, and better align universities with criteria for outstanding performance and excellence. By 2022, almost 1,800 academics were working as junior professors, according to the German Federal Statistical Office. Of these, 85% were granted full professorships, while the remaining 15% secured promising positions. The model has also been successful in increasing the number of women professors in Germany, with the share of women junior professors rising from 29% in 2005 to 51% by 2023. This means that the proportion of junior professorships held by women now mirrors the proportion of doctorates earned by women.

Example 4 – Switzerland: SNSF Ambizione programme

The four-year Junior principal investigator Programme is designed for postdoctoral researchers aiming to lead and manage an independent project at a Swiss higher education institution. This scheme supports young researchers from both Switzerland and abroad, including those holding non-professorial academic positions at higher education institutions. In 2024, the Swiss National Science Foundation (SNSF) allocated 75.7 million Swiss francs to 92 early-career scientists, with each recipient receiving an average of 820,000 francs to independently manage a project at a Swiss higher education institution. The programme offers significant advantages, such as allowing researchers to begin a position based solely on scientific merit, without the constraints of teaching or administrative duties. Additionally, it often leads to a permanent job upon the completion of the funding period. However, a notable downside is the lack of a predefined career trajectory, which necessitates individual negotiation to secure future prospects.

Example 5 – Examples in ISE report

The Initiative for Science in Europe (ISE) has compiled a list[82] of national programmes that support research careers across Europe.

[82] Initiative for Science in Europe (2024) “Towards establishing funding schemes that promote academic job security for early career researchers”

5) Analysis 3: Initiatives by universities of science & technology supporting research careers - current landscape and future directions

Universities of science & technology, alongside other research performing and research and technology organisations, are pivotal in shaping research careers in Europe. They create ecosystems where talent can thrive by bridging education with advanced research, thereby fostering environments conducive to both academic excellence and innovation. These institutions play a critical role in addressing brain drain, which threatens Europe's position as a global leader in research and innovation. In this analysis, we outline several initiatives by universities of science and technology supporting research careers.

Strategic commitment to research excellence

Universities across Europe are demonstrating a steadfast commitment to advancing the research landscape. This is evident through their endorsement of frameworks like the Agreement on Reforming Research Assessment (CoARA) and DORA initiatives. A key example is the University of Twente's Talent Development Map 2.0, which sets impact-driven performance criteria for academic roles, aligning with evolving research needs and contributing to a more equitable and robust research environment.

However, despite these efforts, **challenges remain**. The implementation of recognition and reward systems, influenced by CoARA and DORA principles, introduced **uncertainties, particularly for early-career researchers**. These systems, while well-intentioned, need to be refined to ensure clarity and alignment with the goals of researchers at different stages of their careers. Universities must ensure that new initiatives are effectively communicated and that feedback mechanisms are robust, enabling researchers to actively participate in shaping their career trajectories.

Recommendations

- Modernise career development: align career development practices with the quality and impact of research jobs, regularly evaluating and adjusting assessment and reward systems in line with CoARA and DORA principles.
- Empower early-career researchers:[83] involve early-career researchers in academic leadership and governance to ensure their perspectives help shape the strategic direction of universities in Europe.

Enhancing research opportunities

Support for research careers within universities and RPOs/RTOs is increasingly comprehensive, encompassing various programmes aimed at improving the quality of research jobs and fostering inclusivity. For instance, the Collaborative Laboratories (CoLABs) initiative in Portugal, co-created by IST Lisbon, exemplifies how public-private partnerships can create new employment opportunities and advance technological and social innovation

[83] See CESAER (2022) Enacting transformative change to academic careers? Ask an Early Career Researcher

(see annex 2). These laboratories stimulate the co-design of research activities that enhance the value of academic output and ensure its social relevance.

In addition, university incubation hubs such as NovaUCD at University College Dublin provide vital support for researchers transitioning into entrepreneurship. By fostering collaborations with public and private sectors, these hubs create ecosystems that enable researchers to translate academic innovations into marketable products and services. NovaUCD's success, reflected in over €1.3 billion in equity funding secured by its entrepreneurial community, highlights the importance of continuous improvement and real-time feedback in these programmes.

Universities must also prioritise the development of mentorship and coaching programmes, such as KU Leuven's YouReCa initiative, which supports early-career researchers through individualised career development plans and open dialogue with supervisors. These programmes are crucial for maintaining a high-quality research environment, addressing career uncertainties, and enhancing professional development.

Recommendations

- Enhance collaboration with public and private sectors: leverage institutional resources, coupled with public and private funds, to create new employment opportunities, particularly through initiatives like collaborative laboratories and diverse research and technology organisations that enrich the research and innovation landscape.
- Facilitate smooth transitions between sectors: provide tailored career guidance, skill development opportunities, and networking support to help researchers transition between academic and non-academic sectors.

Reduce uncertainty and promote paths towards tenure

To reduce uncertainty, there should be a certain consistency in the topics put forward in calls for funding, as frequent changes make it difficult to secure extensions or continuations for promising postdoc projects. Additionally, progress towards tenure needs to be more transparent to remove uncertainty. TU Delft addressed these issues by reviewing its tenure track policy. One key objective was to provide a permanent contract after 12 months for current employees or 18 months for new employees, allowing for quicker attainment of tenure and a more compelling development trajectory from Assistant Professor to Associate Professor, with clearer expectations and higher-quality guidance.

Recommendations

- Foster radical institutional engagement: promote open recruitments and transparent career development pathways for early-career researchers, ensuring that career criteria are internationally comparable and adapted as researchers progress towards tenure.

Addressing gender disparities and promoting equity

Gender equality remains a critical issue within the research landscape, especially within universities of science and technology. **Women are disproportionately affected by precarious working conditions and limited opportunities for career advancement**.

Universities are increasingly adopting policies such as gender-related initiatives that focus on combating discrimination, promoting unconscious bias awareness, and setting clear targets for gender equality in recruitment and career progression to address these disparities, in line with the requirements of Horizon Europe's Gender Equality Plans (GEPs).

Recommendations

- Combat gender biases: value the diverse dimensions of academic work, promote cooperation over competition, and assess research based on its contribution to the public good rather than its profitability.

Universities and RPOs/RTOs are at the forefront of efforts to reverse Europe's brain drain by creating environments that attract and retain top research talent. By implementing these recommendations, they can ensure that Europe remains a competitive and attractive destination for researchers worldwide, thereby securing its future as a leader in global research and innovation.

Good practice examples

Example 1 – Talent Development Map 2.0 at the University of Twente

The Talent Development Map 2.0 at the University of Twente outlines impact-driven performance criteria for various academic roles, aligning with the Universities of the Netherlands (UNL) University Job Classification Profiles (UFO), the Twente Manifesto, Graham's model, and the principles of the CoARA and DORA agreements. This map serves as a comprehensive guideline for the talent development of scientific staff, offering performance criteria for different academic profiles, such as Researcher, Teacher, Assistant Professor, and Associate Professor. Each profile is detailed on a separate page within the UFO framework. The primary objective of this map is to facilitate discussions on the career development of young scientists. Currently, the University of Twente is developing a new edition of the Talent Development Map, which will include guidelines for PhD candidates and Full Professors.

However, the University has observed that the current recognition and rewards systems, based on DORA and CoARA agreements, have led to confusion and uncertainty among early career researchers regarding their goals and career prospects. It is crucial for these initiatives to be effectively implemented and for feedback to be actively sought from researchers, ensuring their voices are heard in shaping these new career pathways.

Example 2 – Collaborative Laboratories co-created by IST Lisbon

Launched by the Portuguese Government in 2017 and co-funded through public and European structural funds, Collaborative Laboratories have played a pivotal role in fostering new research jobs and careers in Portugal through "Public-Private Partnerships." These laboratories emphasise the dynamic, non-linear interaction between research, innovation, and socio-economic development. They promote co-design and co-accountability among participating institutions for the transfer and diffusion of knowledge, which enhances the value of products and services offered by companies and bolsters the societal relevance of academic research. Though their numbers are relatively small, these laboratories represent a

significant breakthrough in creating new employment opportunities in emerging economic sectors through research and innovation.

Example 3 – NovaUCD at University College Dublin

NovaUCD, the incubation hub of University College Dublin, offers a comprehensive suite of business support services, including advice, seminars, workshops, and access to a network of researchers, business leaders, and investors. The VentureLaunch programme at NovaUCD supports later-stage researchers in launching deep tech start-ups based on UCD intellectual property. This programme equips participants with the necessary skills and partnerships to develop commercially viable ventures, preparing them either for further academic careers or for leading their start-ups.

Since 2003, NovaUCD has supported over 550 companies and early-stage ventures, with the entrepreneurial community securing over €1.3 billion in equity funding. Continuous improvement of all programs, driven by client feedback through surveys and interviews, has been a key factor in this success. The Mentors and Business Partners Network at NovaUCD plays a crucial role in bringing technologies and innovations to market by fostering collaboration between entrepreneurs, professionals, industry leaders, and research teams. This network supports the smooth transition of young researchers to and from non-academic sectors through tailored networking support, offering mentors early access to emerging inventions and creating new investment opportunities.

Example 4 – YouReCa Programme at KU Leuven

KU Leuven's Young Researchers' Careers (YouReCa) programme offers career-stage-specific support tailored to individual needs, encouraging researchers to create personalised training and career development plans. Key initiatives include individual career development plans (IDPs), the 'Charter of the PhD Researcher and the Supervisor', the 'Charter of the Postdoc', and the mandatory 'iSupervise' master class for supervisors. Launched in 2015, the YouReCa Career Centre encourages young researchers to engage in timely reflection on their career paths, with guidance from in-house career coaches and trainers. The Centre's offerings are further enhanced by targeted actions promoting entrepreneurship, teaching careers, and internal job mobility.

Supporting around 6,000 researchers, primarily in R1, R2, and R3 career stages, the YouReCa programme is funded by the Flemish government and internal resources. A 2024 internal review highlighted the programme's positive impact, with young researchers appreciating the open dialogue with supervisors about future prospects and the increased training opportunities. However, postdocs still face significant uncertainty regarding employment prospects due to their temporary status, although policy initiatives have improved timely discussions of career prospects. The programme has seen a positive trend in satisfaction, with 70% of early career researchers reporting that their supervisors are considerate of their well-being and regularly discuss performance and future expectations.

Example 5 – Women's networks at TU Wien faculties

In recent years, women's networks have been established in seven out of eight faculties, with the eighth one currently being set up. These networks, consisting of junior female scientists and female professors. They operate independently and organise activities such as scientific

symposia, workshops, specialised trainings, and awareness-raising initiatives. Despite their autonomy, they maintain direct connections with the respective dean and receive financial support from faculty budgets. A regular meeting with the dean ensures that the concerns raised by the networks are communicated effectively. The women's networks at TU Wien have proven to be a success. While there are no specific numerical indicators to measure their impact, the mutual empowerment they foster among women has visibly strengthened them on an individual level. These networks have played a key role in helping women remain in doctoral programs and retain academic positions, preventing premature dropout.

Example 6 – Tenure Track at TU Delft

The TU Delft Tenure Track (TT) policy, introduced in 2012, significantly enhanced the recruitment of talented individuals driven by ambition and high scientific standards. The track provided development opportunities through structured guidance, support, and well-defined feedback and decision points. It encouraged personal initiative while offering transparency regarding risks and rewards. Over 70% of participants achieved tenure, while more than 20% opted for career changes.

In 2020, the TT policy was reviewed, and in 2024, it was rebranded as the Academic Career Track (ACT) to introduce improvements and optimise elements of the original TT policy. One key change was the introduction of a permanent contract after 12 months for existing employees, or 18 months for new hires, to reduce employment uncertainty. The employment contract was separated from the development pathway, enabling quicker achievement of tenure and creating a more dynamic progression from Assistant to Associate Professor, with clearer expectations and improved guidance. As of April 2023, TU Delft employed 432 tenure trackers.

Example 7 – University of Strathclyde's Industry-Facing Centres and Knowledge Exchange (KE) Staff

The University of Strathclyde has successfully developed career support structures that enhance job stability and progression for researchers, particularly through its Industry-Facing Centres and the Knowledge Exchange (KE) job family. This case addresses two critical dimensions: fostering new collaborations between academia and industry and improving internal research career structures. The KE family provides a viable career path for R2, R3, and R4 researchers, with significantly higher proportions of KE staff employed on non-temporary contracts compared to their peers in the Research Staff family.

Career stability through Knowledge Exchange (KE) roles: Strathclyde's Industry-Facing Centres, such as the National Manufacturing Institute Scotland (NMIS) and the Power Networks Distribution Centre (PNDC), play a central role in bridging the gap between academia and industry. These centres focus on collaborative projects with industry partners, creating employment opportunities for KE staff. Notably, 71% of R2 KE staff are employed on non-temporary contracts, compared to just 11% of R2 Research Staff. This model demonstrates how industry collaboration can enhance job stability and create sustainable career paths for researchers.

KE staff within these centres are primarily funded through a combination of public sector investments, private industry partnerships, and internal university resources. The blend of

external and internal funding ensures the sustainability of the KE roles and supports long-term career development for researchers. At R2 level, KE staff make up 21% of the total 444 researchers across both the Research and KE families. The KE job family, with a balanced distribution of R2 (40%), R3 (49%), and R4 (11%) staff, provides clear career progression routes.

The success of this programme is underpinned by Strathclyde's institutional commitment to Knowledge Exchange, Innovation, and Impact, as embedded in its strategy and KPIs. The establishment of Industry-Facing Centres and the availability of dedicated training and development opportunities for KE staff have further strengthened career progression. Strong institutional support and effective stakeholder engagement have been essential in fostering these industry partnerships and ensuring the long-term viability of the KE job family.

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Annex 1: Survey

The methodology of the research career report has two separate components that complement each other. The quantitative data captured in the **survey** intends to give a clear outline of the situation in CESAER Member universities in key areas such as in terms of the balance of the temporary and non-temporary contracts.

As an addition to the survey, the **case studies** focus on the identification of good practices in terms of recruiting early-career researchers and fostering stable research careers, serving as a separate but complementary aspect in the research career report. The case studies were identified through written and verbal communication with various CESAER Members, to learn about their good practice examples.

Survey questions

Details of person submitting the survey:

Your email [short answer text]

Your name [short answer text]

A. University descriptors

1. Name of your university [short answer text]
2. Country [short answer text]
3. Type of university (more technical focus or more comprehensive) [short answer text]
4. Founding year of your university [date in year]
5. Number of students, including Bachelor, Master and PhD students (in FTE) [Numerical answer]
6. Number of faculty/academic staff (in FTE) [Numerical answer]

B. Balance between temporary and non-temporary contracts for researchers

The terminology R1, R2, R3 and R4 profile researchers are defined at the European level through a Council Recommendation dated 18 December 2023.

Here, each question will include the possibility of answering "I don't know" or "other". Subquestions are noted a., b., etc., while options for answers are indicated with bullet points.

7. In January 2024, what **percentage of R2-R4 profile** researchers employed at your university were employed under temporary contracts? [answer in %, from 0-100%]
8. What was the **number and share of each type of temporary contracts** (we consider four types, with length varying from 0-1 year, 2-4 years, 5-7 years, more than 7 years)? [Absolute number and share in percentage]
    a. How many temporary contracts of 0-1 years in length were there? What share of temporary contracts did it represent? [Absolute number and share in % of 0-1 years contracts out of a total of 100% of temporary contracts]
    b. How many temporary contracts of 2-4 years in length were there? What share of temporary contracts did it represent? [Absolute number and share in % of 2-4 years contracts out of a total of 100% of temporary contracts]
    c. How many temporary contracts of 5-7 years in length were there? What share of temporary contracts did it represent? [Absolute number and share in % of 5-7 years contracts out of a total of 100% of temporary contracts]
    d. How many temporary contracts of more than 7 years in length were there? What share of temporary contracts did it represent? [Absolute number and share in % of more than 7 years contracts out of a total of 100% of temporary contracts]
9. Acknowledging that both temporary and non-temporary contracts are important for a healthy research landscape, **does your university consider the percentage R2-R4 researchers** employed under temporary contracts [to get the institutional view, you may wish to consult your university's Delegate to CESAER's General Assembly]:
    - too low
    - about right
    - too high
10. Has the **situation changed over the last 5 years** (since 2019)?
    - Higher fraction of temporary contracts
    - About same
    - Lower fraction of temporary contracts
11. What is **current trajectory**?
    - Increasing fraction of temporary contracts
    - Steady / unchanged
    - Decreasing fraction of temporary contracts
12. What is the number of employed researchers (temporary + non-temporary contracts) at **R2 level** [FTEs]
    a. Beginning of 2024

   b. Beginning of 2019

13. What is the number of employed researchers (temporary + non-temporary contracts) at **R3 level** [FTEs]
    a. Beginning of 2024
    b. Beginning of 2019
14. What is the number of employed researchers (temporary + non-temporary contracts) at **R4 level** [FTEs]
    a. Beginning of 2024
    b. Beginning of 2019
15. Are there substantial **differences across departments** at your university?
    a. [free text answer]
    b. Why do you think that is? [free text answer]
16. What is the main **external driver** for any unwanted deployment of temporary contracts?
    a. Type of funding available (e.g. short-term versus long-term funding)
    b. Legislative frameworks such as employment regulations
    c. Both a and b (type of funding available and legislative frameworks)
    d. Other (specify)

C. Expressions of interest to contribute good practice examples during 2025

We are inviting expressions of interest to contribute good practice examples for research careers along three dimensions. The collection process for good practice examples will take place after summer and during autumn and winter 2024 and will be coordinated by the Secretariat.

Each good practice example should be able to provide data or indicators to showcase how it has contributed to positive career outcomes for the researchers involved.

17. Dimension 1: Good practice examples to **equip researchers with competences and skills** (research specific and non-specific) that help lead to good career outcomes. Example include YouReCa at KU Leuven.
    a. Does your university have such a good practice example you want to contribute to the final report to be published in 2025?
       i. Yes
       ii. No

iii. Don't know but I will inform Secretariat if something comes up

18. Dimension 2: Good practice examples to **foster new 'collaborative ventures'** between universities, industry, government and other sectors to foster the creation of new high-quality research & innovation jobs with well-defined careers, also beyond university careers. This includes researchers creating new jobs, for instance through entrepreneurship. Examples include NovaUCD (Ireland) and ETH Student Project House (Switzerland) and collaborative labs (Portugal). But, it also includes industry collaboration: embedding industry engagement as part of research, for instance through MSCA industrial doctorates.
    a. Does your university have such a good practice example you want to contribute to the final report to be published in 2025?
        i. Yes
        ii. No
        iii. Don't know but I will inform Secretariat if something comes up
19. Dimension 3: Good practice examples for **new, improved and diverse research career structures inside the university** beyond the traditional professorial career trajectory. One example is the Talent Development Map at University of Twente. Other example could include usage of non-temporary positions such as 'staff scientist', 'senior scientist' and other equivalent commonly existing permanent positions that exist in many research-intensive companies and industries.
    a. Does your university have such a good practice example you want to contribute to the final report to be published in 2025?
        i. Yes
        ii. No
        iii. Don't know but I will inform Secretariat if something comes up

D. Ending

20. Is there anything else you would like to add to act as additional input for the drafting of the report? [free text answer]

Annex 2: Results from survey

Anonymised results from the survey can be found in this annex.

Although the survey was filled in by 24 CESAER Members, not all graphs will include this number, as some questions could not answered by all respondents.

Figure 5.A.1. Fraction of R2-R4 profile researchers employed (question 7 survey)

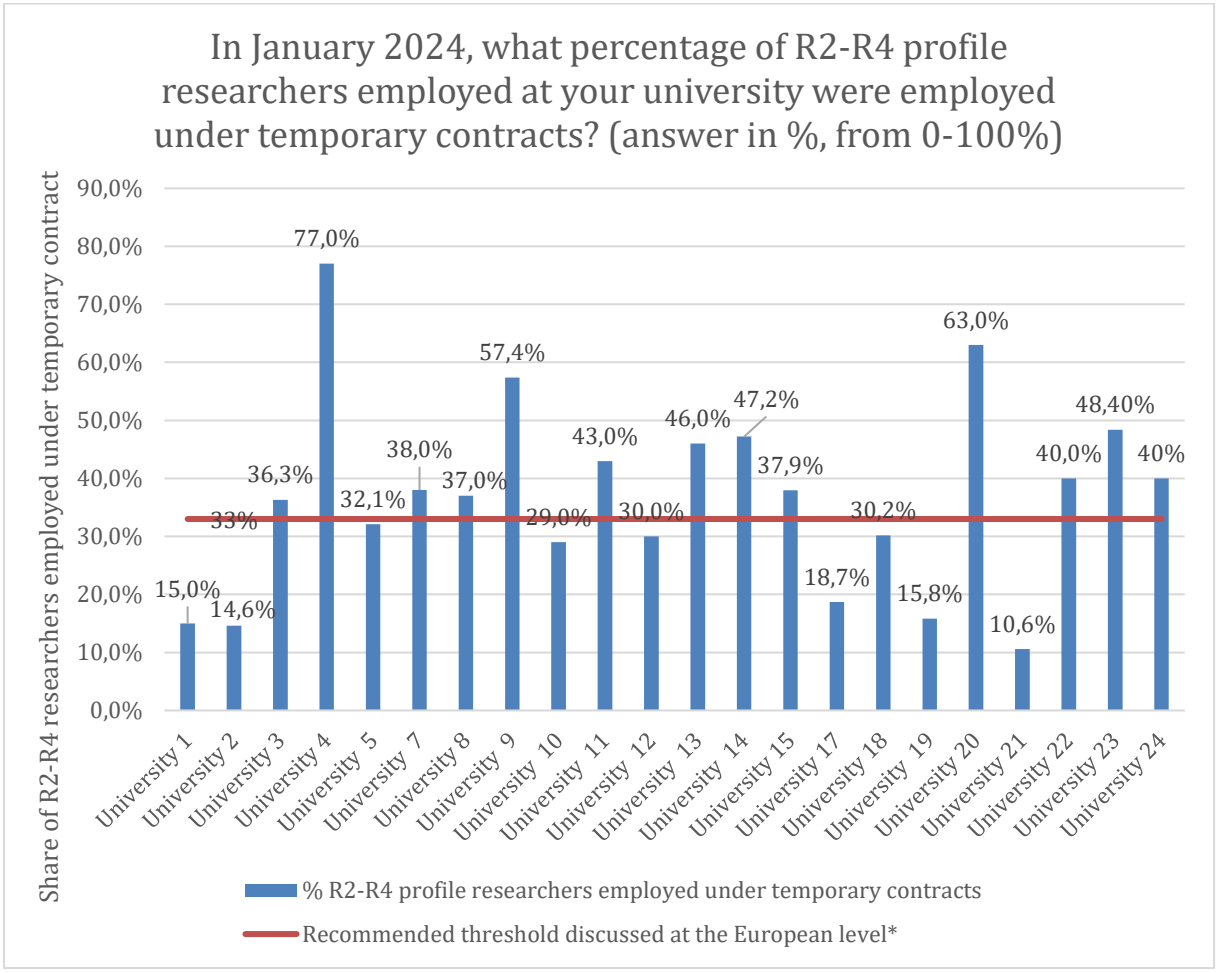


Figure 5.A.2. Breakdown of temporary contract duration (question 8 survey)

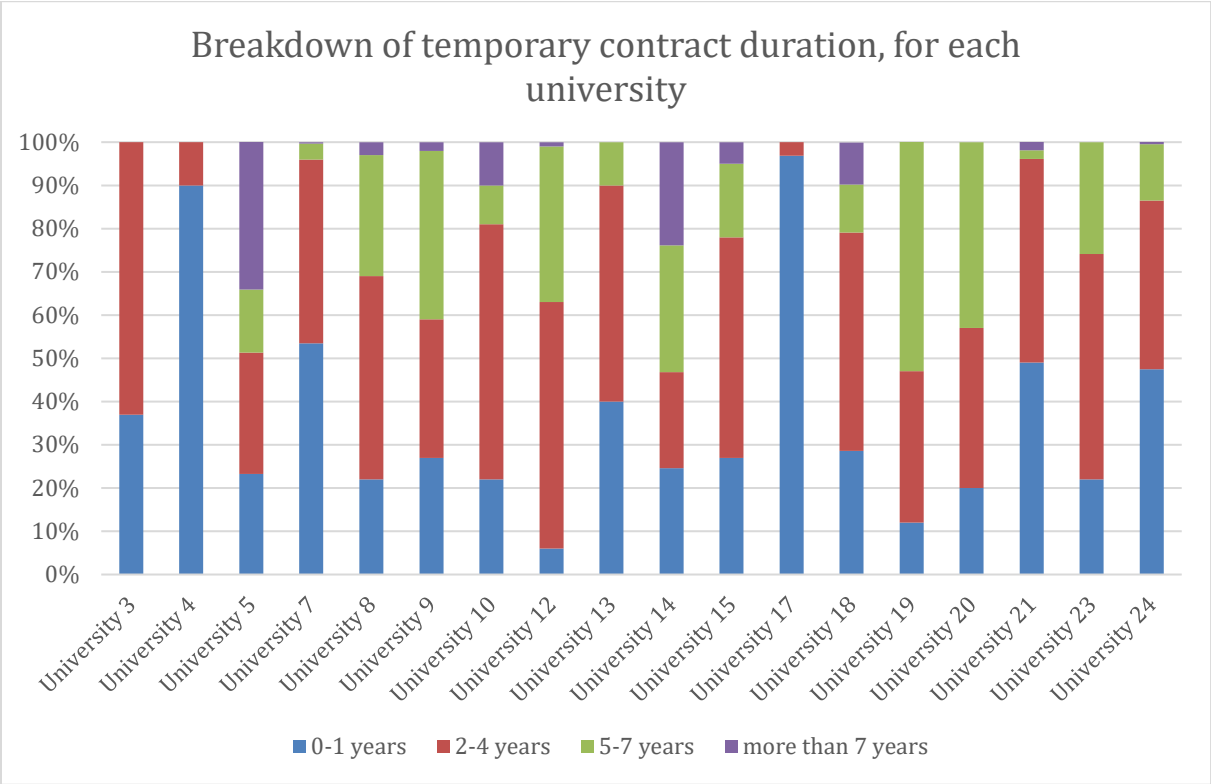


Figure 5.B.1 Institutional understanding of the role of temporary/non-temporary contracts (question 9 survey)

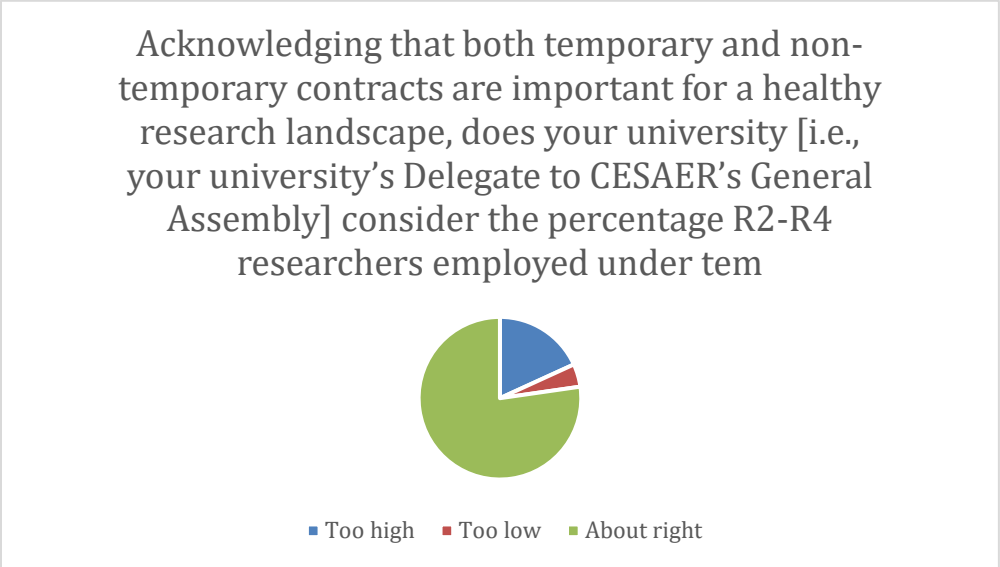


Figure 5.B.2 Institutional understanding of the dynamics of temporary/non-temporary contracts (question 10 survey)

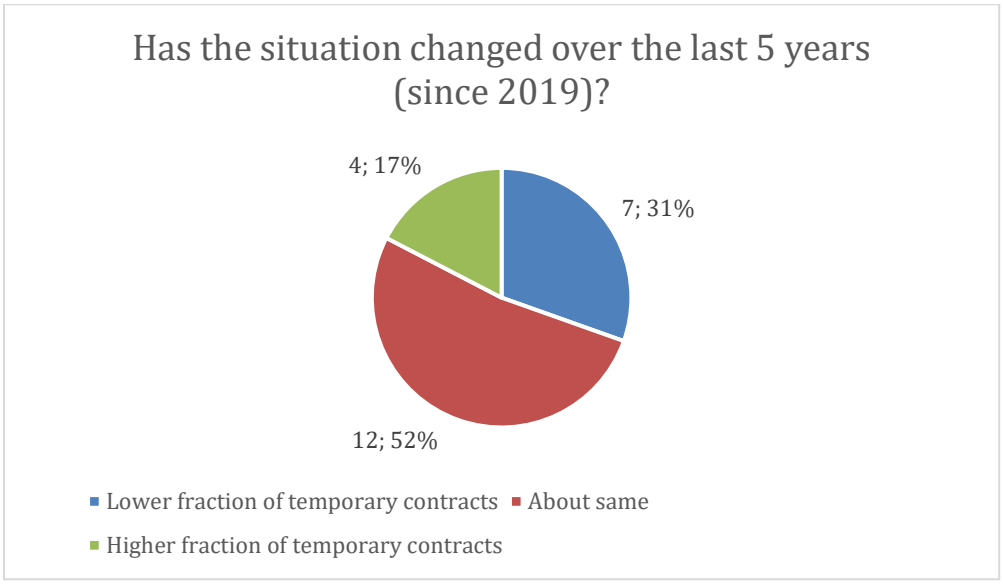


Figure 5.B.3 Institutional understanding of the current trend about temporary/non-temporary contracts (question 11 survey)

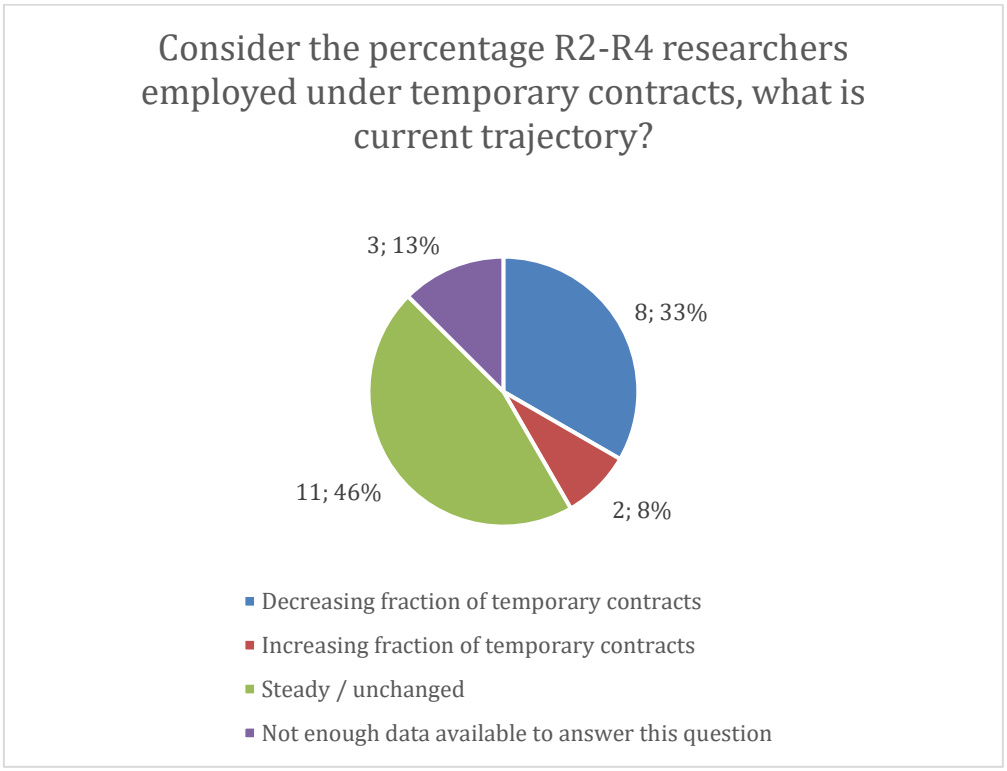


Figure 5.C.1a Relative share of categories, R2-R4, 2019 (questions 12b, 13b, 14b survey)

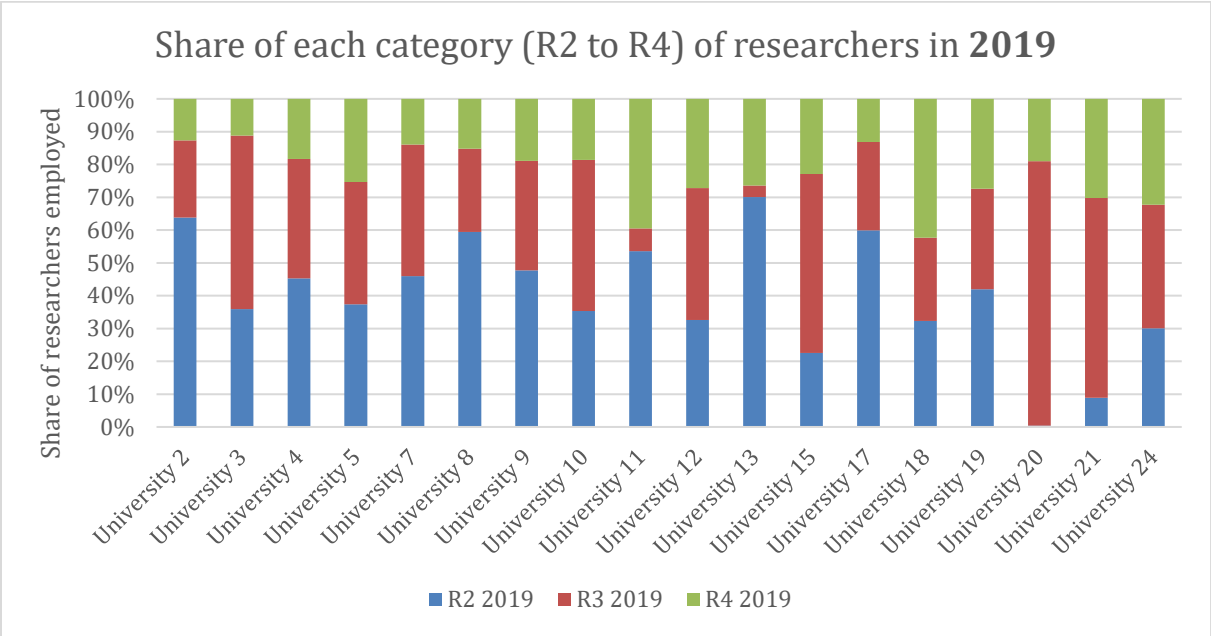


Figure 5.C.1b Relative share of categories, R2-R4, 2024 (questions 12a, 13a, 14a survey)

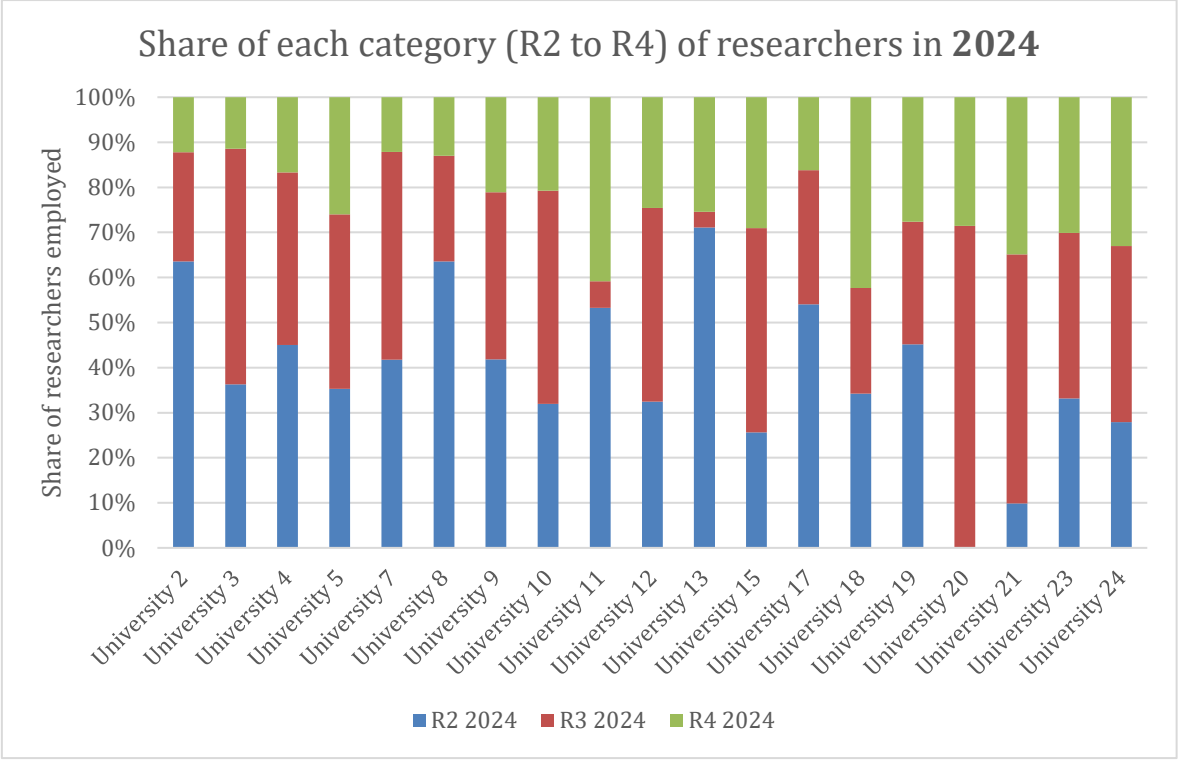


Figure A1: Evolution of the relative share of categories, R2-R4, per university, 2019- 2024 (questions 12-14 survey)

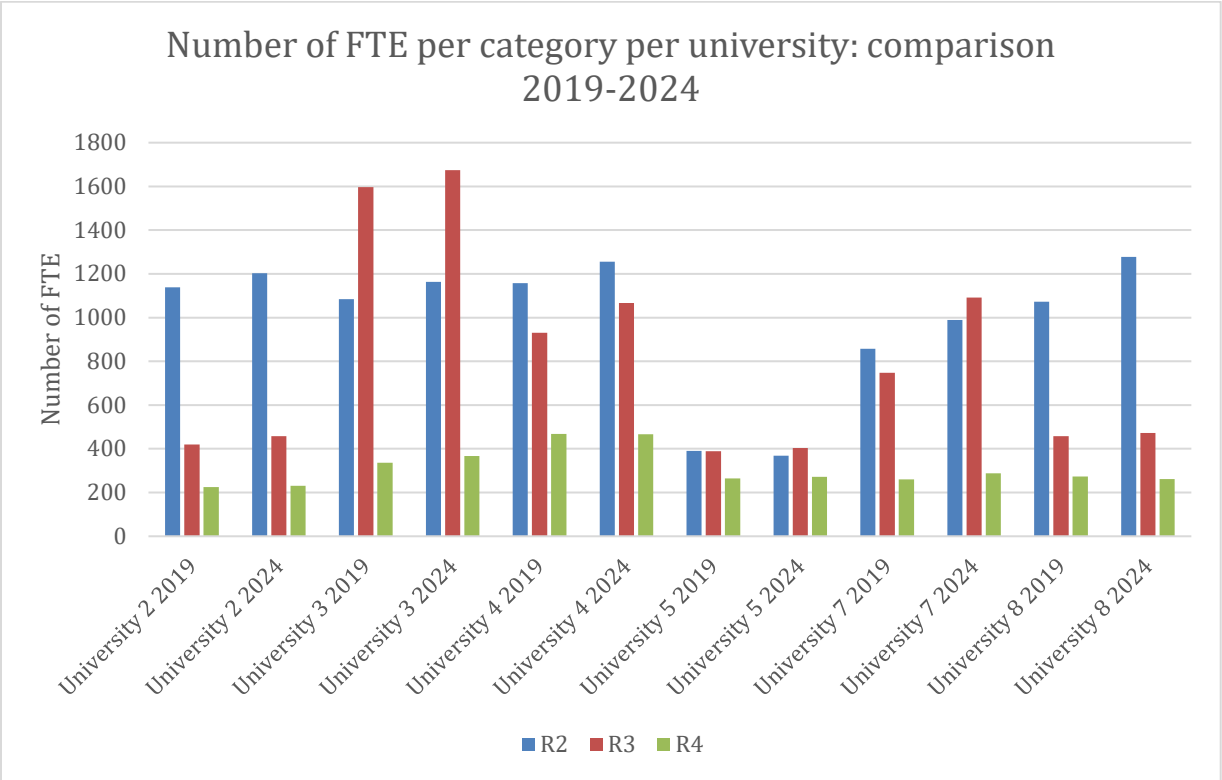
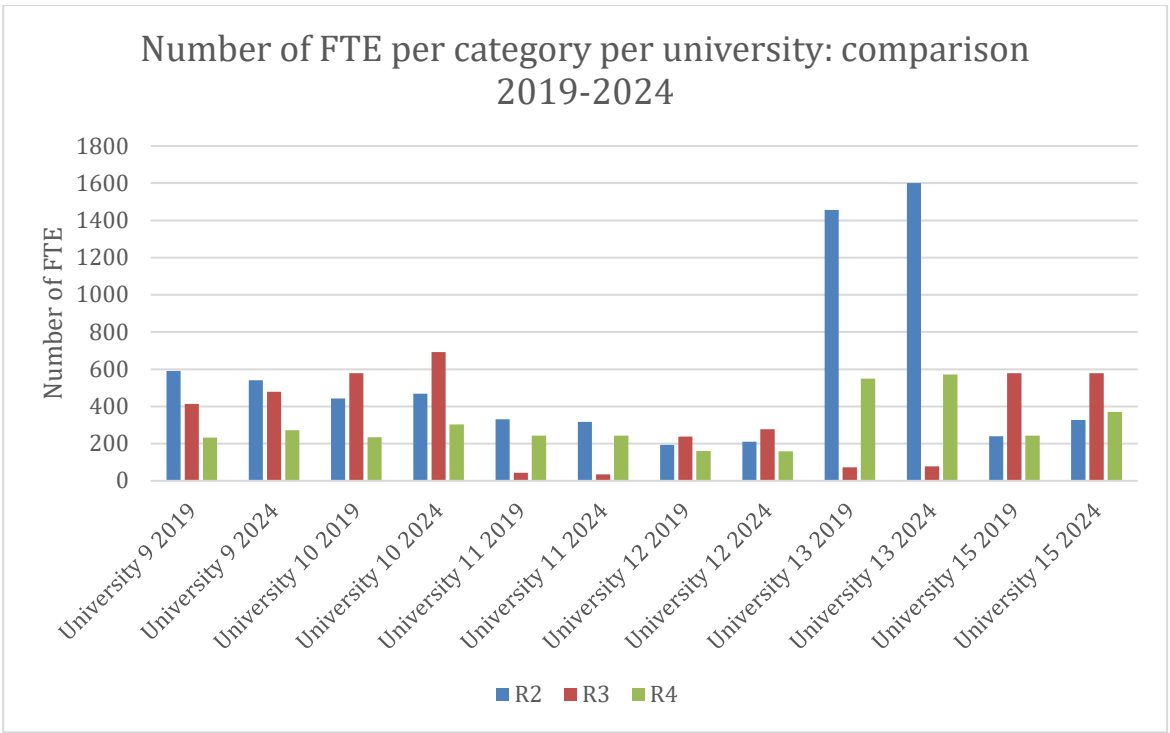


Figure A2. Evolution of the relative share of categories, R2-R4, per university, 2019- 2024 (questions 12-14 survey)



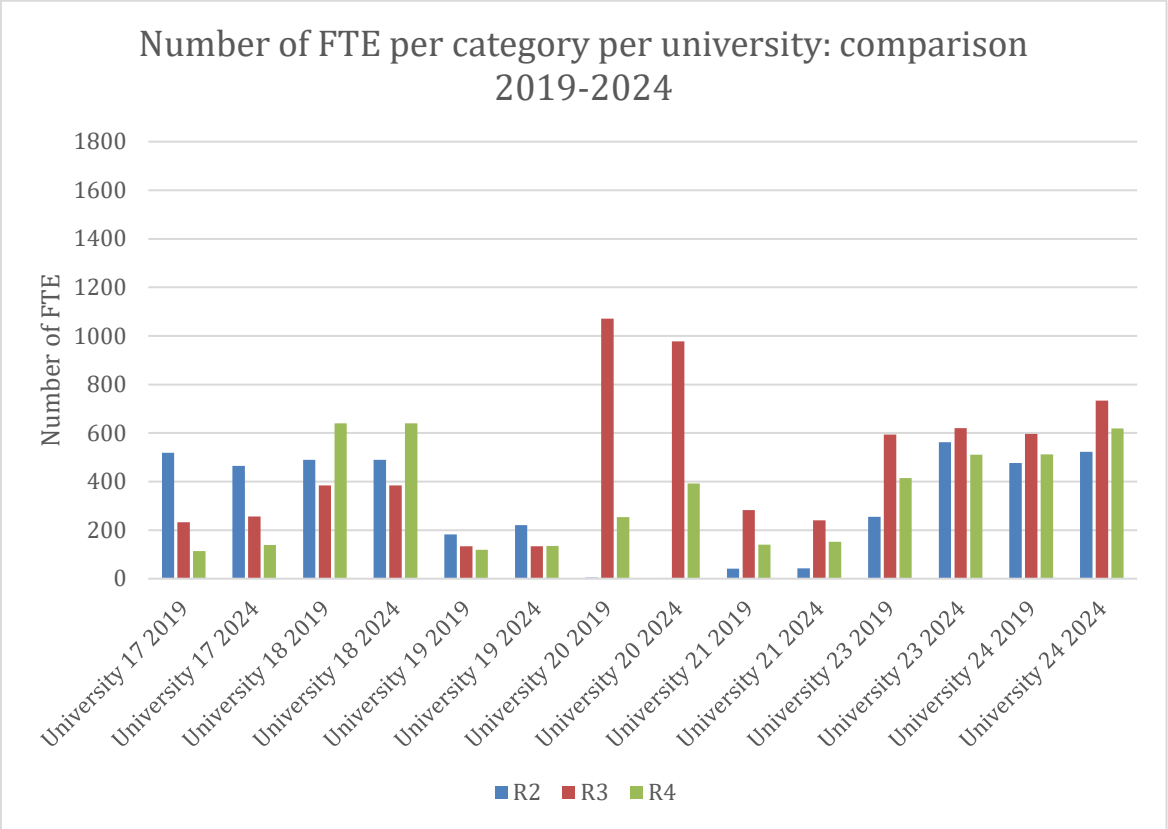
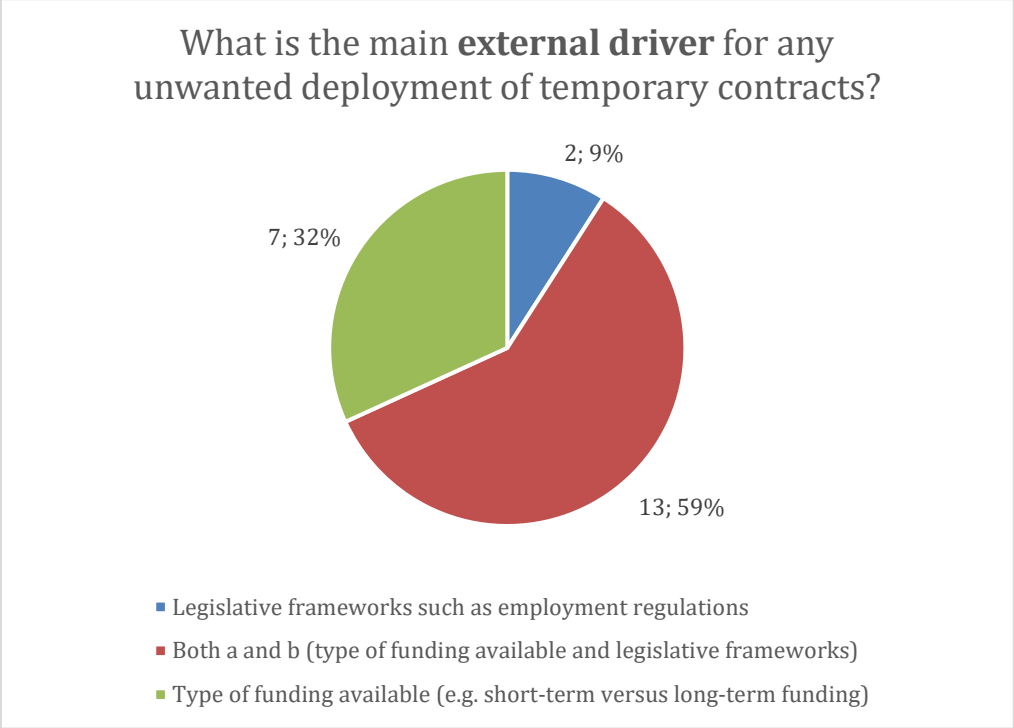


Figure A3. Evolution of the relative share of categories, R2-R4, per university, 2019- 2024 (questions 12-14 survey)

Figure 5.B.4. Institutional understanding of external drivers of temporary/non-temporary contracts (question 16 survey)



Annex 3: Detailed case studies

The following case studies are included on the following pages:

- University of Twente, The Netherlands
- *Instituto Superior Técnico*, Portugal
- University of Bergen, Norway (invited case study from a non-CESAER Member)

A **UNIVERSITY OF TWENTE** CASE STUDY FOR THE HUMAN RESOURCES TASK FORCE OF CESAER

1. Data-general description of numbers and related statistics of the evolution of researchers/teachers/support staff in the institution (1-2 pages)

At the UT, data was gathered for the calendar year 2022. We have collected the data of the various types of Researchers from R1 to R4, at the end of this calendar year in full time equivalent (FTE). We have limited ourselves to these types of researchers. There was some mapping needed to categorize the various function types into the EU researcher categories.

EU	UT categories:
R1	employee-PhD, scholarship/contract-PhD, Engineering Doctorate.
R2	Postdocs, Assistant professors 2, Researcher 3 and Researcher 4
R3	Assistant professors 1, Researcher 1 and Researcher 2
R4	Professors, Associate professors, deans/scientific directors of institutes.

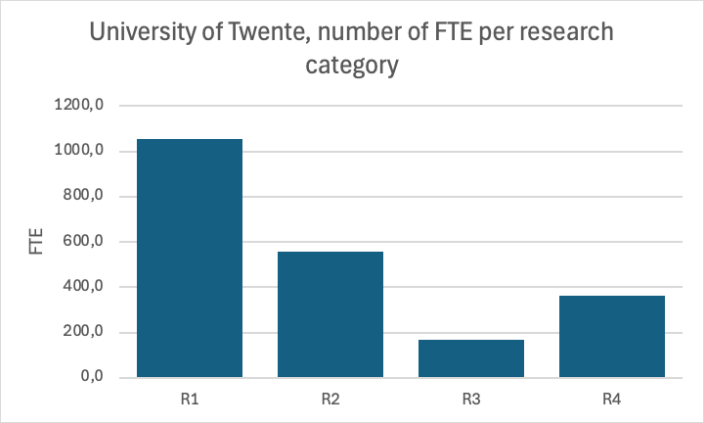
Clarification needs to be provided with regard to the position of PhDs within Dutch universities. In the Netherlands, a considerable part of the PhDs are considered to be employees with temporary contracts for the duration of their PhD[84]. They receive salary payment and are part of the collective labor agreement (thus being part of R1). The Dutch law for Higher Education and Scientific Research (WHW)[85] secures academic freedom for PhDs. Besides, this also remains a topic that is high on the UT agenda and included in the multiannual plan[86]. To ensure a complete overview from a Dutch research perspective, PhD development initiatives have been included in this case study as well.

We have made overviews for the entire university as well as for the 5 faculties: the faculty of Behavioural Management and Social sciences (BMS), the faculty of Electrical Engineering, Mathematics and Computer Science (EEMCS, the faculty of Engineering Technology (ET) , the faculty of Geo-information Science and Earth Observation (ITC), and the faculty of Science & Technology (S&T). Please find an overview of the researchers per category at university level below.

[84] According to the Rathenau institute: in 2022 55% of the total amount of PhD's was employed by their university and for the UT this was 60%. See: www.rathenau.nl

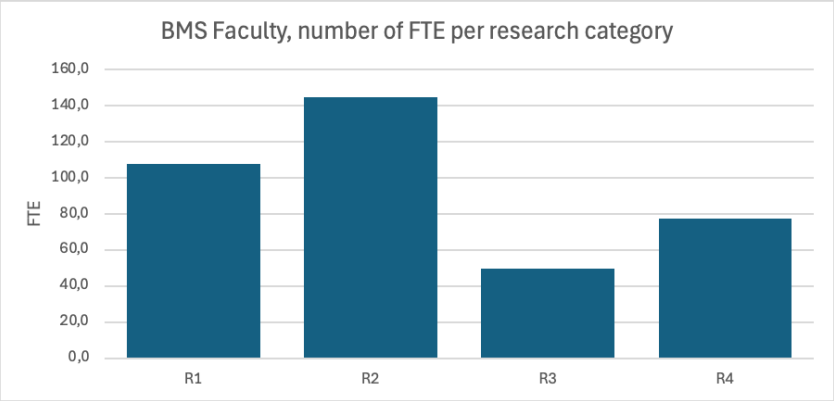
[85] wetten.nl - Regeling - Wet op het hoger onderwijs en wetenschappelijk onderzoek - BWBR0005682 (overheid.nl)

[86] multiannual-plan-bms-february-2024-final.pdf (utwente.nl)



The figure above shows that category R1 is by far the largest, with a total of 1052,7 FTE[87]. The second largest category is R2, with 554,9 FTE. In category R3 we see the lowest representation, with 168,4 FTE. In category R4, we see a total of 362,7 FTE. Please note that for the UT this division is not entirely pyramid shaped.

Further zooming into the faculties, starts with the faculty of Behavioural, Management and Social Sciences (BMS), the social sciences faculty at the technical university.

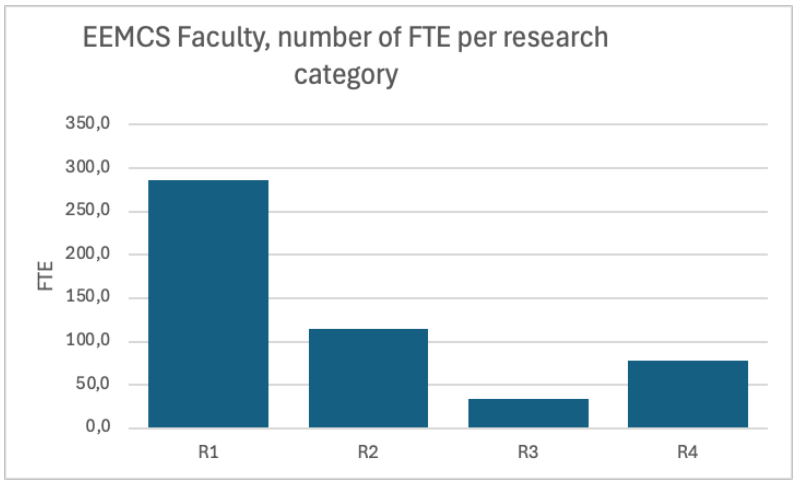


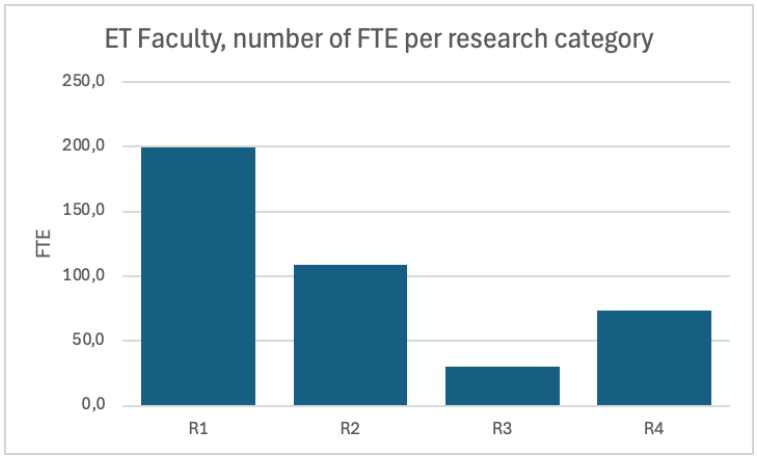
Most striking here is that the number of FTE in category R1 is smaller than the number of FTE in R2 at BMS. In the other faculties at UT, we see that the number of FTE in category R1 is larger (sometimes more than double) than the number of FTE R2. Within the faculty of BMS recent research into the duration of PhD projects has shown that there is a difference in the length of the PhD trajectory between Dutch and international PhD's: normally the international PhD's finish their PhD within a shorter amount of time than the Dutch PhD's. Regarding the career paths of young researchers, including PhD's, we make two further remarks: Firstly, the way recognition and rewarding are currently organized (based on DORA and COARA

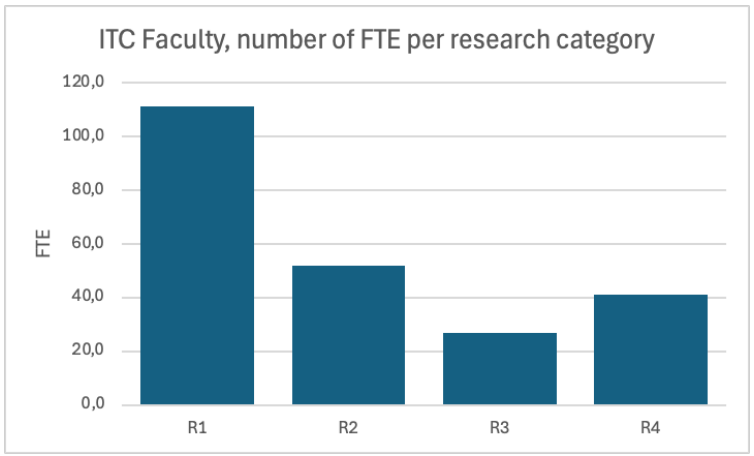
[87] UT has various types of PhDs. Rathenau numbers regarding 2022 show that: *57%* percent of UT PhD's were *employee-PhD's*, having a labor appointment with UT focused on a PhD trajectory, *3,5%* of UT's PhD's had a labor agreement with UT not focused on a PhD trajectory but with arrangements to pursuit a PhD, 10,1% of UT's PhD's were *Scholarship PhD's*, not employed at the University receiving funding from an external scholarship provider, 15,2% of UT's PhD's were *externally financed PhD's,* receiving finance in another way for their PhD or getting extra time from their employer to pursuit a PhD during work time, 14,2% of UT's PhD's are *"buitenpromovendi"*: PhD's that pursue their PhD in their own (spare) time, and finance that by themselves.

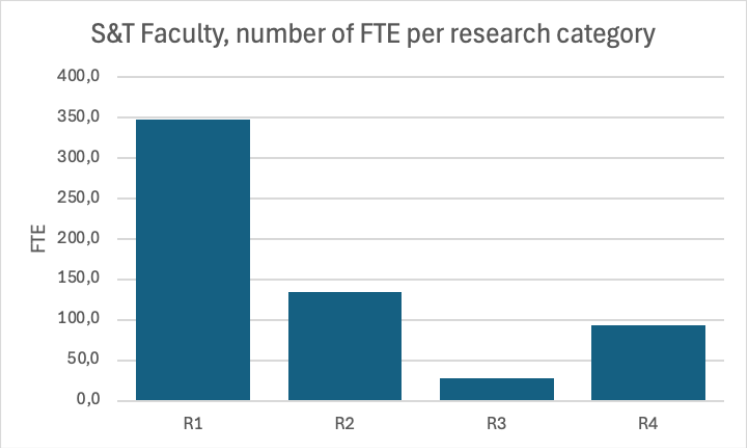
agreements), causes unclarity and uncertainty for early career researchers regarding their aims and goals, and their career prospects, since it has become more unclear what is expected from them (i.e. writing a certain amount of publications) and this causes unrest. Universities need to invest more in training young academics to become a part of these new career movements. A second remark is that, when it comes to grants for individual researchers, a shift of culture is needed and not only the pursuit of prestigious individual grants should be the main focus of attention.

The overviews of the faculties EEMCS, ET, ITC and S&T are given below.









We can see that at the technical oriented faculties (EEMCS, ET, ITC and S&T), we see more researchers in category R1. In category R2 we see a decline (compared to R1), of more than half. In R3 this decline (compared to R2) keeps on going, also here somewhere between a third a half. When it comes to category R4 we see an increase (compared to R3) between a third a half.

2. Description of the 'career pyramid' in terms of the evolution of the various types of researchers and teachers (R2, R3, R4) incl. specific cases at department or institute level The description of potential cases of 'inverted pyramids' at department level should be analyzed and discussed if adequate. (1-2 pages)

Following from research from the Rathenau institute[88], Dutch academic job structure resembles a pyramid, with at the base two large groups of employees, PhD students as starting positions and researchers (postdocs) and lectures as transfer positions. This can also be concluded from the numbers at the University of Twente. However, for UT, we see relatively low numbers in category R3. In category R4, we see higher numbers than in category R3. As the Rathenau institute concludes, and UT figures underline, the job market for academic staff is highly dynamic. Staff is regularly moving to more senior positions, but also to similar positions at other universities or outside academia. In case of assistant professors and associate professors, according to research by the Institute, 40% of all new appointees are not from within the university system[89]. These findings also show that in Dutch academia career paths are not simply represented by a routing from R1 to R4 via R2 and R3.

[88] Source:UNL/ WOPI; Reworking: Rathenau Instituut
[89] https://www.rathenau.nl/en/science-figures/personnel/university-staff/academic-careers-researchers

3. *Description of specific good practices and/or initiatives for the recruitment and/or career development of researchers/teachers with the emphasis on young researchers (2-3 pages)*

The University of Twente recognizes and emphasizes the importance of the recruitment and development of young researchers. Various practices and activities, often initiated and streamlined by the central UT Human Resources department, but also bottom-up ideas from within the faculties, are being adopted and implemented to enhance the careers of young academics within the UT community. For this report, the UT best practices have been divided into three categories: **Attract, Develop**, and **Lead**.

Attract young researchers

1. *PhD Campaign*

The University of Twente developed the PhD campaign as a response to notifying that few UT students show an interest in PhD vacancies. Even though former master students are in demand by research groups, the preconceptions that UT Master's students have about completing a doctoral degree prevent them from applying for one of the many PhD vacancies the UT has. To generate more interest among UT Master's students for taking a PhD, a PhD campaign including stories and experiences of current doctoral candidates was set-up. Through these stories and experiences they provide a counter-narrative towards controversial assertions and misconceptions about doing a PhD. Some alumni also present the stories about career moves after a PhD.

2. *Honours course research*

One of the honours programmes of the UT is the Master Research Honours. This program is an individually tailored, extra-curricular track that offers master students the opportunity to develop their additional knowledge and skills in the areas of research management, research publishment, and (PhD) research proposal development. One of the goals is to get participating students acquainted with a PhD as a follow-up option. Throughout the programme, the students participate with different workshops and courses. When students continue with a PhD, and if they passed previous mentioned courses successfully, they may receive exemption for some PhD courses.

3. *Startup packages*

Starting assistant professors at UT receive a so-called startup package to support them in the development of their own line of research. There are several forms of startup packages, depending on when the staff member entered the service of the University and possible specific programmes under which they started (such as the Dutch Sector Plans). These start up packages can be spent on hiring staff to further strengthen the research line-, infrastructure, equipment and materials, start-up costs for the research line-development budget- travel budget -etc. In general, these budgets range between €120k and € 265k. Given current political developments and the available budgets for universities it is not sure if these packages remain in the near future.

Develop young researchers

At the University of Twente, we stimulate talent development throughout the entire career of an academia, a phenomenon we refer to as '*life-long learning'*[90]. Next to the concept of learning, we also unite with the call of UNL (Universities of the Netherlands) to aim for more specified '*Recognising and Rewarding'* [91] of scientific talent and career paths. With this, we modernise the assessment system for talent so that there is room for everybody's talent. Emerging from the pillars of life-long learning and recognising and rewarding talent, we identify the following best practices for the development of young researchers:

Life-long learning community

1. *Development interviews*

The UT Career Development Centre provides (CDC) personal advisory meetings for young researchers to discuss the possible steps to move their career forward.

2. *Trainings*

The UT Career Development Centre offers training courses for PhD students to enhance their career development. The most popular courses for PhD students were analytic storytelling, project management for PhDs, and professional effectiveness.

3. *Mentoring programs*

The one-year mentoring program offers the young academia the opportunity to reflect/work on their career in sessions with a senior academia. The mentor program has proven to be a success with 61 young researchers participating.

4. *Talent Motivation Analysis (TMA)*

Since 2022, young academics can make use of the TMA tool. In order to continue developing in a position or make the next step in a career, it is important to have insights into your own talents and motivations. In three steps (personal intake interview, online questionnaire, and a personal feedback meeting) the TMA tool maps motivations and talents to eventually yield a competence profile and provide insight into development opportunities.

Recognition and Rewards

1. *BMS Teaching Academy*

The BMS Teaching Academy supports and facilitates educational innovations, talent development of teachers by connecting teachers to, amongst others:

[90] Lifelong Learning | Service Portal | University of Twente (utwente.nl)

[91] Programme plan - Recognition & Rewards (recognitionrewards.nl)

- Connecting teachers to co-operate in educational innovations
- Facilitating a teacher's community for exchange of experiences and best practices in teaching and learning
- Stimulating recognition and rewarding of teaching
- Support for advanced professional development

In broader sense, at UT all staff involved in teaching needs to obtain the University Teaching Qualification (UTQ) within 3 years after their employment, to facilitate them in obtaining the right pedagogical competences needed for university teaching.

2. Young Academy

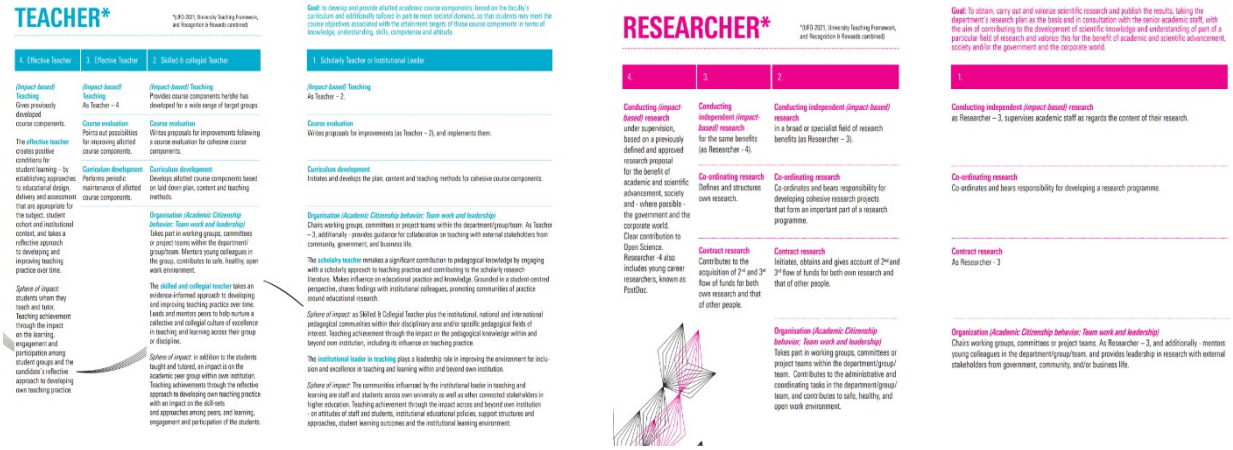
The Young Academy Talent (YAT) was established in 2011. The mission of the academy is to create a community of early career researchers and facilitate a learning platform for academic leadership. The activities for 2023-2024 have been centred around four themes:

1. Team science: Organising events for the UT young academic community | supported by all five faculties.
2. Talent recognition and development: Working on implementation of Ius Promovendi position paper advice |Think along with R&R team on career paths Participation in the UT Prizes and Awards committee| Participation in the working group on starters- and incentive grants.
3. Education: Join discussion on implementation of new Educational Vision | Think along with R&R team on education career paths | Building and maintaining an education community for young talent by installing new lunch series.
4. Internal and external networks: Coordinating implementation of our work plan| engaging with other Dutch local Young Academies including organising a local YA meeting | reaching out to internal and external stakeholders to strengthen our contribution and story.

3. Talent Development Map 2.0

The Talent Development Map 2.0, concerning academic talents, provides impact-driven performance criteria for different scholarly positions. It integrates UFO (UNL University Job Classification Profiles)[92], Twente Manifesto[93], the model of Graham[94] and ideas of COARA[95] and DORA[96] agreements. The map introduces the overall conditions and the subsequent scheme that serves as a guideline for Talent Development of scientific staff, as well as the performance criteria for different academic profiles (one per page) within the UFO Researcher, Teacher, Assistant Professor and Associate Professor. The goal of the overview is to support the dialogue about the talent development and career of a young scientist. Currently, the University of Twente is working on a next edition of the Talent Development Map that includes guidelines for PhD candidates and for Full Professors.

[92] Job classification system (UFO) | Universiteiten van Nederland
[93] SEG Individuals and Teams | Shaping Individuals and Teams | Organisation (utwente.nl)
[94] R H Graham | Rewarding teaching
[95] CoARA - Coalition for Advancing Research Assessment
[96] Home | DORA (sfdora.org)



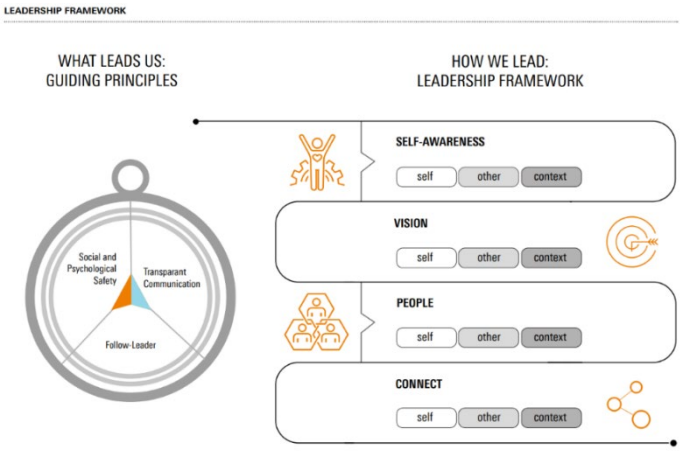
4. *Experiment Impact Narrative*

Staff from various sections of the UT have actively contributed ideas in working groups for the practical implementation of rewarding and recognising education as part of career development. From this, the experiment 'Impact Narrative' arises for promotions in education. Impact Narrative is a description of your impact on education at several levels (from student-level to university-level). In the Impact Narrative, the candidate describes his or her plans for future impact in education related to the promotion criteria, with the objective of being promoted in a timeframe of 2-3 years. The Impact Narrative can be the basis for a constructive discussion between the candidate and the evaluation committee about this impact, complementary to the (regular) quantitative measures of educational output.

Leading young researchers

Leadership Framework

The UT aims to promote a culture that is driven by talent, where there is room for everyone's talent. In achieving this, leaders and the behaviour they show play a specific role. To create a collective definition of leadership, the Leadership Framework has been developed. The Leadership Framework acts as a guideline to offer clarification about expectations and responsibilities of leaders in promoting well-being, creating a safe environment and in stimulating growth and development of the talents of employees. With the Leadership framework, the UT introduced a collective language when talking about leadership, a dialogue instrument for talent talks and annual reviews, and input for recruitment, training, and assessment tools. When it comes to training, there is a special training offer for starting supervisors of PhD's and also dedicated courses on academic leadership.


LEADERSHIP FRAMEWORK
WHAT LEADS US:
GUIDING PRINCIPLES
HOW WE LEAD:
LEADERSHIP FRAMEWORK
Social and Psychological Safety
Transparant Communication
Follow-Leader
SELF-AWARENESS
self
other
context
VISION
self
other
context
PEOPLE
self
other
context
CONNECT
self
other
context

CESAER Research Career Survey 2024

Recruitment and Career Development at IST Lisbon[97]: a case study, 2014-2023

João Patrício[98], Miguel Coimbra[99], Luís Oliveira e Silva[100], Rodrigo Rodrigues[101] and Manuel Heitor[102]

Instituto Superior Técnico, University of Lisbon

Executive summary

IST Lisbon has actively promoted research careers[103] in the last decade and this note reports **four different initiatives** making use of a diversified set of instruments and funding mechanisms, which could be expanded and further leveraged if additional funds (national and European) are provided to address the complex task of promoting research careers in Europe. Main results are as follows:

i. The use of IST´s own internal financial resources was used to promote the "IST Strategic Recruitment and Career Development Programme", representing about 3,2% of the total annual financial execution of the school for Human Resources. The program was launched in 2014 and it allowed for a total of 218 faculty openings and career progression in the period 2016-2023. Departments leveraged this programme in quite diversified ways to accelerate growth in strategic areas, with particular relevance for Bioengineering, Informatics, and Chemical Engineering.
ii. The use of competitive public funds (i.e., national funds and European structural funds) since 2017 has allowed the implementation of the "IST´s Deployment of the National Program on Scientific Employment". It has facilitated new research contracts in affiliated research institutions (private non-profit) allocated to specific research centres following a national competitive process. A total of 124 new recruitments and 202 career progressions were effectively implemented in the period 2016-2023, with most of the impact on researchers between 30 and 40 years old. Annual figures represent about 6% of the total number of permanent researchers at IST.
iii. The use of IST's funds to enable merit-based promotion following the review of the Portuguese legal system in terms of decoupling recruitments and career progression regarding the need of international competitive processes. This has allowed IST to better

[97] Instituto Superior Técnico (IST) is the School of Engineering and Technology of the University of Lisbon.

[98] Program Manager, IST´s Studies, Planning and Quality Area.

[99] Program Manager, IST´s Studies, Planning and Quality Area.

[100] Full Professor, Department of Physics, IPFN – Plasma and Nuclear Physics Institute; President of IST´s Scientific Council in 2013-2020.

[101] Full Professor, Department of Computer Science and Engineering; INESC ID – Engineering Systems and Computation; Vice-President and President of IST´s Scientific Council in 2017-2020 and 2021-2022, respectively.

[102] Full Professor, Department of Mechanical Engineering; IN+ - Centre for Innovation, Technology and Policy Research.

[103] This note follows the adoption by the European Union in 2023 of the R1 to R4 career terminology (see https://data.consilium.europa.eu/doc/document/ST-15135-2023-ADD-1/en/pdf): R1: doctoral candidates ("first stage" or "early stage"); R2: Recognised Researchers, including Assistant Professors; R3: Established Researchers, including Associate Professors; R4: Leading Researchers, including Full Professors.

balance categories along career progression and enabled gender balance at the top-level categories.

iv. The use of competitive public funds (i.e., national funds, European structural funds and European Recovery funds) has facilitated the co-creation of 9 new collaborative research institutions with industry since 2018, with industry co-funding. It has facilitated the creation of near 200 new quality jobs, including about 60 doctorate researchers in the period 2019-2024, in private non-profit institutions, independent of IST but in close collaboration between IST and industry.

1. IST Lisbon, at a Glance

IST operates with two parallel streams of **11 academic departments** and **24 independent research centres**, within a broad ecosystem that spans **three campi**: the Alameda Campus in central Lisbon, the Taguspark Campus in Oeiras (20 km west of Lisbon), and the Technological and Nuclear Campus in Loures (10 km north of Lisbon). The school operates together with a group of **affiliated research institutions** (private non-profit), which comprise research and innovation centres where the vast majority of IST permanent faculty (either professors or researchers) conduct their research work and/or execute financially their projects. They include IST-ID (with 19 research centers), INESC-ID, INESC-MN, IT, IDMEC, and LIP. In addition, **since 2018 IST has co-created with industry 9 new Collaborative Laboratories**, which has stimulated new research jobs (see below, section 6).

Table 1 summarizes the overall permanent and non-permanent academic/research staff and technical staff at IST (IST only, without affiliated research institutions) in the period 2014 – 2023. Academic professor positions have been allocated exclusively through IST departments, while researcher positions are mostly allocated through research centers. The main exception is IST's department of Nuclear Sciences and Engineering, whose faculty body consists almost exclusively of researchers, for historic reasons. Typical academic staff have, therefore, two distinct allocations (i.e., to a department and to a research center), while research staff is normally allocated only to a research center.

Table 1: IST Permanent and non-permanent staff 2014-2023

		2014	2019	2023
Permanent	Academic/Research staff	717	727	692
	Technical staff	526	547	666
Non-Permanent	Academic/Research staff	135	171	396
	Technical staff	0	2	5

IST affiliated research institutions (IST-ID, INESC-ID, INESC-MN, IT, IDMEC, and LIP) host 24 research centers and around 2000 researchers. From those, around 38,3% have a

contract with IST (31% have a permanent contract), with the remaining workforce holding contracts with the affiliated institution, other universities or organisations. Table 2 includes the overall figures of the IST affiliated research institutions (IST-ID, INESC-ID, INESC-MN, IT, IDMEC, and LIP).

Table 2: Overall figures for the IST Affiliated Research Institutions (IST)

Affiliated Research Institution (Private non-profit)	Contract with IST		Contract with other institution
	Permanent	Non-permanent	
IDMEC – Institute of Mechanical engineering	70	8	51
INESC ID – Institute of Engineering and Computer Systems	103	5	71
INESC MN - Institute of Engineering and Computer Systems – Nanomanufacturing	6	2	6
IST ID - Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento	416	119	741
IT – Telecommunications Institute	42	3	263
LIP – Instrumentation and Particle Physics Laboratory	8	2	75

As of 2023, IST (only) employed over 1,750 individuals, 38% female, with academic and research staff (i.e., professors and researchers) representing 61% of the workforce. The number of employees has significantly increased from 2019 to 2023, with a marked rise in the number of female researchers, indicating progress towards gender balance (although the majority of researchers remain male). This increase of academic staff has been accompanied by new policies for recruitment, including a specific program of “strategic recruitments and career development”, as discussed in this note.

By 2023, 78% of IST employees had permanent contracts, with 65% of professors and researchers holding permanent positions, corresponding to 699 FTE (full-time equivalent) professors and researchers with permanent contracts. In terms of full-time equivalents, the dedication of academic staff in 2023 is approximately of 782 FTE. This breakdown includes 696.5 FTE for professors and 86 FTE researchers. Adds up 673.7 FTE for non-academic staff. The following dynamics should be noted:

- faculty hiring, for permanent staff, increased from 9 in 2016 to 25 in 2023, representing 4% of total faculty;
- faculty promotions reached 51 in 2023, representing 9% of the set of permanent faculty;

- Overall, there has been a noticeable increase in non-permanent contracts for teachers and researchers over the years, largely due to the institution's policy of hiring young “Teaching Assistants” (typically master’s or PhD students) for teaching laboratory classes. This follows current international best practices and has allowed students to gain experience with teaching activities, while allowed faculty to focus on research activities, teaching lectures and overall course guidance.

The evolution of faculty and researchers by category indicates a **general increase in full professors and coordinating researchers** (i.e., category R4), alongside a modest rise in associate professors and principal researchers (i.e., R3). Conversely, there has been a decline in assistant professors and researchers (i.e., R2). This trend reflects the effects of the policies that were put in place to enable merit based promotion, and a general empowerment of younger faculty.

In 2022, around **1,300 researchers worked at IST-ID, 40.4% of whom had a contract**. Of these, only 7.6% were on non-permanent contracts. Of the 59.6% without an IST contract, approximately 36% were affiliated with other higher education institutions. This interconnected research network underscores IST's significant role in national and international research landscapes, promoting collaboration and innovation across various disciplines.

2. The program of “IST Strategic Recruitment and Career Development”

An innovative program of “IST Strategic Recruitment and Career Development” was launched in 2014, making use of **IST´s internal financial resources**. This program revolves around two key elements: i) **recruitment of young researchers**; and ii) **early-stage career development for junior faculty** (namely professors and researchers still in their probation period). Recruitment aims to bring in new faculty and researchers to rejuvenate and strengthen the institution. In addition, early-stage career development was designed to give junior faculty the best possible conditions to strive in their research work, achieving high impact results, and competing at a global level by creating strong international connections for collaborations, while also meeting top international standards.

2.1. Rationale and overview

The “IST Strategic Recruitment and Career Development” program was formally launched with the joint approval by the Management Council (MC) and the Scientific Council (SC) through a "Long to Medium Term Vision for Permanent and Tenure-Track Faculty Members at IST”, describing the perspectives of IST for the development of faculty resources.

The main innovation of this initiative is that it has allowed for a medium-term planning for openings of faculty career positions at the different categories for a period of several years. Due to a specificity of the Portuguese Law governing public employment (including in

universities), the positions served for both hiring and promotions, except at the base level of the career (assistant professor), which only correspond to new hires.

Another key innovation was that the number of faculty positions per department that would open in each year are not merely meant to cover teaching needs. In other words, only a fraction of the positions would be assigned to departments in proportion to their difference between the target faculty to cover the teaching needs and the current number of faculty in the department. The remaining fraction were called "**strategic openings**" and they were assigned through **a competitive process among departments**, where the proposal for such strategic openings had to be supported by a strong case for the strategic importance of the area and the existence of a strong pool of possible candidates for the opening. Furthermore, such strategic openings would be prioritized in case they were co-funded by a research unit, leading to a more synergistic strategic development between departments and research units

Very importantly, positions to cover teaching needs had to be approved by the SC and the ranking of the strategic positions was also determined by the collegial vote of all its members. The fact that all these proposals were analyzed and voted by the by the members of SC allowed IST to set a high standard for both the research strategy and the pool of possible candidates associated with each position. It has also incentivized a **strong alignment between the strategies of the academic departments and major research units** of IST.

2.2. Sample Results

In the period 2014-2018, including the initial prototyping year 2013, 20 strategic hires at the Assistant Professor/Assistant Researcher level were approved, with the following distribution (per department): Department of Bioengineering 5, Physics: 5, Mechanical Engineering 3, Nuclear Sciences and Engineering 3, Chemical Engineering 2, Electrical Engineering 1, Mathematics 1. It should be noted that the Department of Bioengineering, the second smallest department at IST, took a very strong advantage of this programme, by attracting high quality faculty hires, accelerating the renewal of its faculty roster, strengthening the department's core scientific competences and opening new areas in the R&D portfolio of the department (e.g. Stem Cell Engineering and Regenerative Medicine, Neuro-engineering, Continuous Biomanufacturing). This has occurred in close interplay with affiliated R&D Units, and anticipating the faculty hires, thus adjusting to the strategic direction of the Department.

From 2019 to 2023, there has been an increase in the percentage of top-level category for teacher and researchers across most departments, with the overall proportion rising from 15.6% to 17.4% (a 1.8% increase rate). The implementation of these policies has varied across the various departments of IST. In particular, the Departments of Chemical Engineering (from 13.9% to 17.5%) and Informatics (from 14.6% to 18.8%) have shown an particular focus on strengthening experienced faculty presence in these areas.

Associate Professors (i.e., R3) increase overall at IST from 31.0% to 34.3% (a 3.3% increase), with the department of Informatics increasing from 32.9% to 43.5% and Chemical Engineering from 27.8% to 38.1%.

\On the other hand, the proportion of Assistant professors (i.e., R2) decreased from 53.5% to 48.3% (i.e., 5.1% decrease), with Departments such as Informatics (with a decrease from 52.4% to 37.6%) and Chemical Engineering (from 58.3% to 44.4%) indicating the focus on reducing turnover and ensuring sustained academic quality towards permanent contracts.

The pressures leading to this dynamic differ from department to department. The Chemical Engineering Department, which has an older structure, has taken advantage of these policies to renew its staff. On the other hand, the Informatics Department faces significant pressures from highly attractive business firms and benefited from a proactive scouting method that the department pioneered at IST, meant to identify top talent worldwide that could apply to future positions. This scouting process is aligned with the careful and strategic vetting of the SC before positions are open, since it strengthens the case for the department opening positions in areas where there are strong pools of possible candidates.

3. IST´s Deployment of the National Program on Scientific Employment

3.1 Overall context

The Portuguese Government launched in 2016/17 a new competitive program to stimulate scientific employment at a national level. It was implemented through the Portuguese Science and Technology Foundation, FCT, making use of national public funds and European structural funds (only outside the region of Lisbon), including two distinct components: i) Individual contracts; and ii) Institutional contracts.

It was implemented in association with the introduction in Portugal of **a new legal regime for hiring PhDs in Portugal**, which achieved an important political and social purpose. Around 7,400 new contracts for doctoral researchers were established between 2017 and 2021, with the number of researchers in academic and scientific institutions increasing to around 28,846 researchers (quantified in “Full-Time Equivalent – FTE”, when they were 25,043 FTEs in 2015), representing around 51% of the total number of researchers in Portugal.

The program considered a new vision in the labour relations established in the scientific community, which have **adopted the employment contract as the rule regime for hiring PhD researchers** by the institutions in which they are integrated. In fact, today's panorama of labour relations in scientific activity is substantially **different** today from that in force until

2017, when employment contracts were an exception and the award of post-doctoral scholarships was completely normalized.

Despite all these mechanisms and the steps taken, it is recognized that strengthening of scientific and academic institutions through the promotion of scientific employment and the development of scientific and academic careers continues to require new collective efforts. It is noted, in particular, that the growth rate of highly qualified human resources in Portugal with career positions are still moderate when compared to other European countries and North American states.

3.2 The implementation at IST of the National Program on Scientific Employment

The deployment at IST of the National Program on Scientific Employment funded by the Portuguese Science and Technology Foundation (FCT) considered 343 researchers (6 IST; 320 IST-ID; and 7 IDMEC). It represents about 13% of the total number of research contracts supported by FCT (a total of 2552). For IST, it includes 20 different Research Units and 3 support structures.

4. IST's initiative for enabling merit-based promotions

The legal regime for promotions of public academic and research careers in Portugal[104] was determined until 2019 by a compulsory international recruitment competition. It could lead to either a promotion or an external hire, depending on the winner of the competitive process. Historically, the combination of this uncertainty in whether such competition lead to external hires (with financial impact), along with a tradition of some departments not requesting the opening of such competition on a regular basis, led to most departments having a smaller number of faculty members being at the upper levels of their career when compared to the number of faculty at the base levels (assistant professor/researcher).

The review in 2019 of that legal regime[105] allowed for opening promotion competitions, enabling only internal candidates within each higher education institution to apply for associate or full professor positions. At IST, the Scientific Council (SC) took this opportunity to develop a systematic method for deciding the areas where to open internal promotions or public competitions. Departments where required to demonstrate the existence of a set of possible candidates that not only were in sufficient number to fulfil the conditions of the law, but also with sufficient merit to warrant such promotion (evaluated thoroughly by the Sientific Council), including the opinion of international experts, who were often some of the most well-known researchers in the field. This led in 2019 to the promotion of 30 faculty to the level of associate professor, and 21 to full professor.

[104] i.e., access to upper levels of academic careers, including associate and full professor, or principal and coordinator researcher.
[105] Through a governmental proposal included in the national budget execution law approved in the parliament.

Two years later, in 2021, the Scientific Council started an initiative that was meant to enable merit-based promotions to take place on a regular basis, with yearly opportunities for faculty members to present their case for the existence of sufficient merit to enable the opening of a competition that could allow for such a promotion. This initiative is based on a well-defined calendar, as follows:

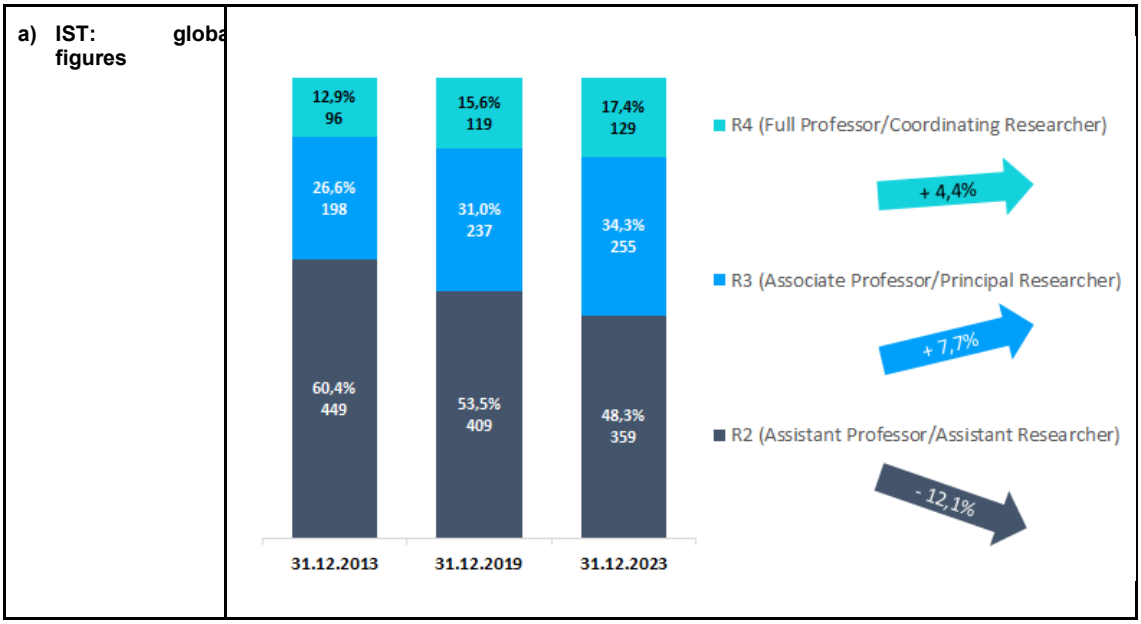
- It starts with individual faculty members submitting a "promotion folder" in the beginning of the year, which is first analyzed by the respective department for determining whether it should proceed for the next phase of requesting letters from experts, inquiring their opinion about the merit for opening a competition for promotion.
- Then, the department issues a final assessment regarding the merit for opening the public competition, which is then sent to the Scientific Council for final decision, normally taken April-June. If a competition is to be open, it needs to be approved by the Rector of the University of Lisbon, a process that can take a few months, with the actual publication of the edict for the competition appearing towards the end of the year.

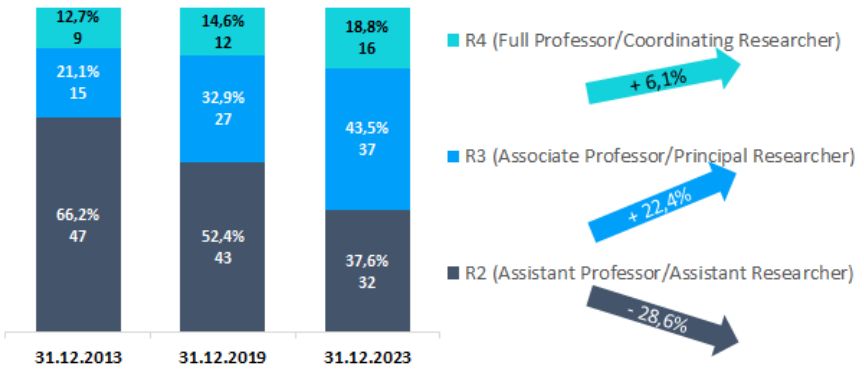
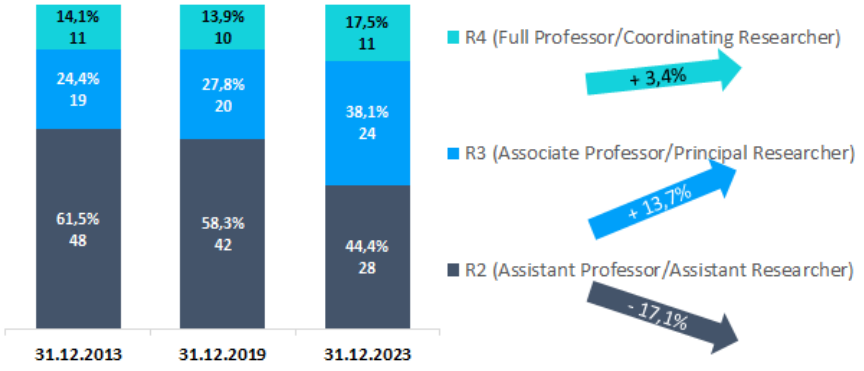
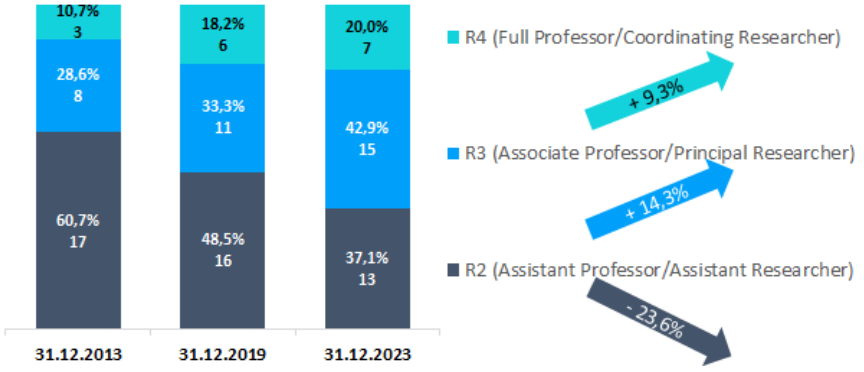
This initiative is now in its third year of existence, and has reshaped the balance between faculty at different categories over the last decade, moving from 449 assistant professors, 198 associate professors and 96 full professors at the end of 2013, to 359 assistant professors, 255 associate professors, and 129 full professors in 2023.

5. Sample evolution of academic and research careers at IST

Figure 1 shows the evolution of teachers and researchers by category at IST for 2014-2023 (i.e., the career´s pyramid), together with that for 3 of the most dynamic departments in using changes in the regulatory regime to foster career development processes (i.e., Informatics, Chemical Engineering and Bioengineering).

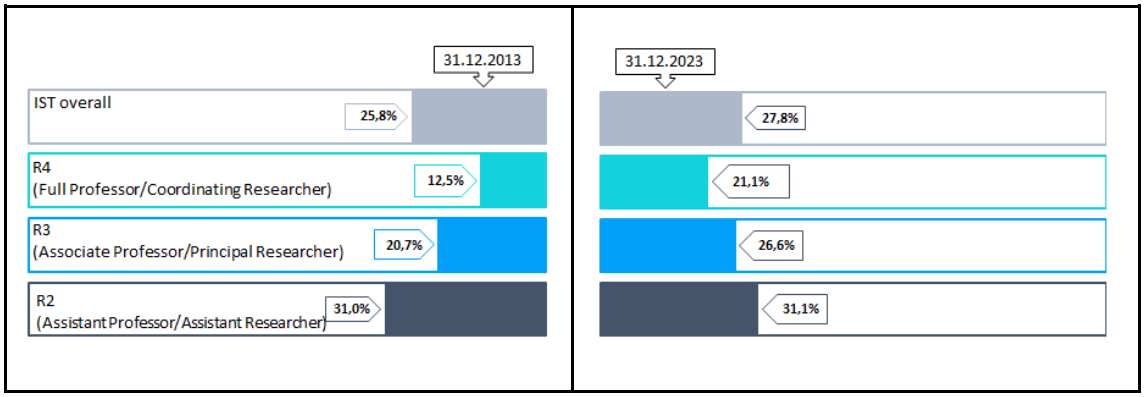
Figure 1: Evolution of the career´s pyramid: teachers and researchers by category, IST, 2014-2023



b) Specific figures for the Department of Informatics Engineering	
c) Specific figures for the Department of Chemical Engineering	
d) Specific figures for the Department of Bioengineering	

Analysis clearly shows that the process contributed directly to enable and improve an process of gender balance, increasing the ratio of female faculty at the upper categories (figure 2). The faction of female faculty at the top category (i..e, R4 or full professor or coordinating researcher) went from 12.5% to 21.1% over the last decade, making this ratio similar to the overall ratio of full professors and coordinating researchers across both genders.

Figure 2: Evolution of the gender balance: female teachers and researchers ratio by category, IST, 2014-2023



6. IST´s co-creation of new collaborative research institutions with industry, promoting new research jobs

6.1 Overall context

The Collaborative Laboratories described in this note have been implemented through the **competitive selection** of mission programs through research and innovation agendas developed by IST´s research and academic staff in close collaboration with industry, after evaluation by international experts. The process was launched by the Portuguese Government in 2017 and **co-funded with public funds** (national, funds European structural funds and European Recovery funds) through the Portuguese Science and Technology Foundation (FCT) and the Portuguese Innovation Agency (ANI) since 2018.

The national program was launched with 4 laboratories in 2018 and reached 35 laboratories operating at the beginning of 2022. The use of co-funding from the European Recovery and Resilience funds (i.e., “Next Generation EU”, 2021-2026) has allowed to expand the program until 2026.

Analysis shows that the role of the Collaborative Laboratories has been especially important to stimulate **new research jobs and careers through “Public-Private Partnerships”** focused on the interaction between academia and industry and establishment of a synergistic relationship between research, innovation and social and economic development activities. They stimulated the co-design and co-accountability of participating institutions for knowledge transfer and dissemination processes to help improve the value of products and services provided by companies, as well as facilitating the social relevance of academic research activity and its appropriation by society.

6.2 The participation of IST in the national program to create new Collaborative Laboratories with industry

Table 3 lists the 9 new collaborative laboratories co-created by IST and industry (i.e., about 25% of the total number created in Portugal) and summarizes the main intervention areas and thematic issues covered by these collaborative laboratories. They have facilitated the creation of nearly **200 new quality jobs, including about 60 doctorate researchers**, in private non-profit institutions, independent of IST but **in close collaboration between IST and industry**, following a national competitive process. Although they represent relatively small numbers, it considers an effective breakthrough in the **establishment of new employers** acting in **emerging economic sectors** through research and innovation.

Table 3. Collaborative Laboratories co-created by IST and industry since 2018, with related areas of intervention and jobs created in the period 2018-2024.

Collaborative Laboratory (date of creation)	**Area**	**June themes / areas of intervention**	**Total jobs created** (June 2024)	**Doctorate researchers employed** (June 2024)
AccelBio Since 2021	Health	https://accelbio.pt/the-colab-accelbio/ Includes pharma companies and the integration of data science and artificial intelligence approach in drug discovery and integration and collaboration of the multiple actors in the sector's value-chain;	11	9
+Atlantic Since 2018	Climate, Space and Ocean	https://colabatlantic.com/ Created in 2018 fostering innovative practices in association with the development of new global markets, as well as ecosystem services and practices in the area of blue economy;	30	4
BIOREF Since 2019	Energy and Sustainability	https://www.bioref-colab.pt/pt Includes large oil and gas companies with emphasis on circular economy, bioenergy and bioproducts.	16	7
Net4CO2 Since 2019	Energy and Sustainability	https://www.net4co2.pt/ Includes large oil and gas companies with emphasis on bioenergy and bioproducts.	11	4
Smart Energy Lab Since 2019	Energy and Sustainability	https://www.smartenergylab.pt/ Includes large gas companies with emphasis on smart energy solutions	34	5
VG CoLab Since 2019	Energy and Sustainability	https://www.vgcolab.com/ Includes large gas companies with emphasis on energy storage and smart energy solutions	25	4

HyLab Since 2021	Energy and Sustainability	https://www.hylab.pt/ Includes large oil and gas companies with emphasis on green hydrogen technology and economy	18	12
Built CoLab Since 2020	Construction	https://builtcolab.pt/en/ Includes collaboration with large construction firms, with emphasis on innovative techniques in the construction sector and the development of services oriented to sustainable urban ecosystems	24	6
C5Lab Since 2019	Materials	https://c5lab.pt/ Includes collaboration with large cement firms, with emphasis on sustainable cementitious materials	25	8
Total employment created (2019- 2024)			194	59

Source: Portuguese Innovation Agency[106]

In other words, the national initiative for the creation of Collaborative Laboratories was leveraged by IST to create **autonomous institutions** able to internalize ***good-jobs externalities*** in their choices, both in terms of labour practices and technology and social investments. Those externalities are not focused on any single area of activity, but have arisen in laboratories operating in areas as diverse as **agribusiness, ecosystems services, space, energy, health, social care** and **digital systems**, through collaborative dialogues among public and private actors.

7. Summary, discussion and main recommendations

Attract and promote talent is a critical component of the strategy of higher education institutions (HEIs). Recognizing the challenges and opportunities facing Portuguese HEIs, IST implemented a "Master Plan"[107] to address these challenges with three key goals: i) implementation of a medium to long term planning and vision promoting talent; ii) alignment of talent recruitment, career development and promotion with the best international practices, within the legal context of Portugal; and iii) strengthening the alignment of talent strategies with R&D activities and institutions within the IST ecosystem and beyond academic activities.

7.1. Brief summary

The Master Plan included the analysis of the expected evolution of the faculty members across departments, defined targets for each department, and provided a medium to long term vision of faculty hiring for all departments. This then laid the ground for several

[106] https://www.ani.pt/en/knowledge-valorization/interface/collaborative-laboratories-colabs/

[107] which stems from a vision outlined in a document entitled "Long to Medium Term Vision for Permanent and Tenure-Track Faculty Members at IST'', IST Scientific Council, 2014.

initiatives, addressing the key goals of IST's talent strategy. This note briefly describes **four key initiatives** aligned with this Master Plan in the period 2014-2023, as follows:

a) Implementation of the "**IST Strategic Recruitment and Career Development Programme**". Formally launched in 2014 (with a first prototype in 2013), the programme implemented an internal, yearly open, call/competition for departments to propose new faculty openings based on strategic options/plans. It has required a close connection with R&D units, including co-financed positions during probation periods. The decisions on whether to open these positions or not was taken collegially by the IST's Scientific Council. The programme **triggered a (cultural) transition on proposals for faculty openings at IST**, from one based exclusively on teaching needs to modern multidimensional dimensions where the R&D strategy (of the department and the R&D units in the ecosystem) takes centre stage. It has fostered joint departmental appoints, financial supporting/co-financing from the R&D units, and strategic hiring of ERC grant holders.

   As a result, all faculty openings at IST are now based on equivalent processes: for all positions (hiring or promotion), the academic departments must provide a rationale that takes into account the R&D portfolio and links with the strategy of R&D units. The program was initiated with **30% of faculty positions assigned to strategic openings**, with the remainder distributed directly to the departments based on convergence to the departmental targets (determined by the number of students/teaching load) .

   A total of 80 strategic positions were open in the period 2013-2020, with 20 at the Assistant Professor level (i.e., R2). **A total of 78 new recruitments and 140 career progressions were effectively implemented in the period 2016-2023** (for R2, R3 and R4), with most of the impact on professors between 35 and 50 years old and more than 10 years after their doctoral graduation.

   This programme allowed for: i) small departments (e.g. Department of Bioengineering) to aggressively hire high quality faculty members at the Assistant Professor level; ii) larger departments (e.g. Department of Chemical Engineering, and Department of Computer Science and Engineering) to fast-track merit-based promotions to Associate and Full Professor, overcoming the limitations that an assignment of faculty position opening based on teaching needs was creating; and iii) prototype a merit-based promotion system and a strategic evaluation, with the oversight of the Scientific Council, of a significant fraction of the faculty hires. In 2024, all faculty openings undergo an equivalent process/analysis (even for positions automatically assigned to the departments, namely faculty hires).

b) **"IST´s Deployment of the National Program on Scientific Employment",** funded with public funds (i.e., national funds and European structural funds) through the Portuguese Science and Technology Foundation (FCT), since 2017. This program has supported the IST's Master Plan by allowing for several new faculty (professor and/or researcher)

contracts for 6 years in both IST and its affiliated research institutions (private non-profit) following a national competitive process.

The programme created **a "stairway to excellence" in the IST ecosystem**, whereby highly prestigious R&D positions in R&D units (financed through this programme) are used to attract talent to the ecosystem. This flow of talent can then apply and move to tenure-track faculty positions (also partially funded through this programme). This is leveraged by a career development programme for newly hired tenure-track faculty members that includes reduced teaching load/administrative duties, mentoring during the probation period, sabbatical in a foreign institution and start-up funds. A total of **98 new recruitments were effectively implemented in the period 2018-2023**, with most of the impact on researchers between 30 and 40 years old. Average annual figures represent about 2,3% of the total number of permanent researchers at IST.

c) **IST's initiative for enabling merit-based promotions**, with an initial iteration in 2019 aligned with a governmental legislative initiative to overcome a limitation of the Portuguese legal system[108], which has **enabled internal competitions for promotions in public HEIs**[109]. IST leveraged the internal processes associated with the analysis/decision of strategic openings (see a) above), to prototype a merit-based promotion process. This then evolved to a sustainable program of "Career advancement process", approved by the Scientific Council in 2021, which enabled the conditions for the existence of merit-based promotions. This program then leveraged another governmental legislative initiative fostering internal public competitions for promotions[110], through which IST further refined a set of qualitative and quantitative criteria for promotions, that are now in place, and thus provide new career development opportunities/perspectives with high standards for all faculty members.

In association with this process, the number of full professors (i.e., R4) increased by 34% to 129 in 2023 (from 96 in 2013) and associate professors (i.e., R3) increased by 29% to 255 (from 198 in 2013), while assistant professors (i.e., R2) decreased by 20% to 359 (from 449 in 2013).

d) **IST´s participation in the creation of new collaborative research institutions with Industry**, co-funded with public funds (national funds, European structural funds and European Recovery funds) through the Portuguese Science and Technology Foundation (FCT) and the Portuguese Innovation Agency (ANI) since 2018. It has facilitated the creation of new quality jobs, including contracts for postdoctoral researchers in **9 new "Collaborative Laboratories"** (private non-profit), independent of IST but **in close collaboration between IST and industry,** following a national competitive process. This initiative is aligned with the "Stairway to Excellence" described in b), whereby the talent inflow in the IST R&D ecosystem sustains and promotes high quality faculty hires at IST.

[108] Law on budget execution of 2019 (Article 77).
[109] It has decoupled the procedures of recruitments from promotions in public HEIs, with the need for international open calls remaining only for recruitments.
[110] Decree-Law 112/2021.

It has facilitated the creation of nearly **200 new quality jobs, including about 60 doctorate researchers** (R2 and R3) in the period 2019-2024.

In summary, the development of a “Long to Medium Term Vision for Permanent and Tenure-Track Faculty Members at IST" has allowed IST to promote a strategic transition on talent attraction and retention of faculty members leveraging internal programmes and processes (strategic faculty hiring/promotion), together with external opportunities (governmental led legislative changes, competitive institutional funding, new institutions of the R&D ecosystem). The initiatives undertaken promoted a tighter integration of R&D strategy of the IST ecosystem and a stronger alignment with best international practices, leading to enhanced attraction and retaining of high quality faculty members and researchers in the IST ecosystem.

7.2 Brief analysis and recommendations

Analysis suggests that the complexity of addressing academic/research career development requires various **diversified tools**, together with a clear **cultural change at institutional level**, as well as the **evolution of funding mechanism** by public and private institutions.

Analysis at IST shows that the most important aspect of this **(cultural) change** is the evolution from a model of distributing resources exclusively based on teaching needs to a **model based mainly in research portfolios (and their quality)**, in which teaching needs are still important but do not (exclusively) determine the distribution of resources. This change is becoming decisive to strengthen modern academic institutions in Europe, who need to compete worldwide for the best talent.

The experience of IST has shown that the process was clearly accelerated by **promoting internal competition** among different departments and research centers. The process can easily be further optimized with **mentoring** during trial periods of young academics/researchers, **avoiding excessive teaching service** during the trial period, as well as **encouraging sabbaticals abroad** during the trial period. **Start-up funds** (even if small) and **class observation** during the trial period are also transforming the quality of the new academics and researchers recruited by IST.

Future steps may regard the need to further **decrease endogamy** and **further increase the internationalization of the teaching/research staff**, which will require an expanded and more robust funding process, making use of national and European, public and private resources, together with international search processes following best international practices. In addition, our analysis shows that the gradual adoption of a fully “tenure track” concept requires a stepwise process. In other words, "**when there is a will there is a way**"...

It should also be clear that, for the specific case of IST, most of the advances reported in this note are **challenged by the relatively low level of salaries in Portugal**, when compared internationally. In addition, the recruitment of women and other **underrepresented groups** in the permanent faculty require **adequate incentives/instruments** to facilitate a fair international competition among universities worldwide.

Our case study at IST suggests the absolute need of future European funding schemes to foster research careers in Europe, including internationally competitive “tenure tracks” in European Universities. It requires **adequate co-funding levels, with a long term target,** to be **competitively allocated to institutions as a function of their experience** of allocating their own funds to promote cultural shifts in recruitment and career development, as well as have experience in making use of public and private funds to foster research careers.

UNIVERSITY OF BERGEN

CASE STUDY FOR THE HUMAN RESOURCES TASK FORCE OF CESAER

Research Careers and the Quality of Research Jobs in Europe

Building evidence to help strengthening European research

October 2024

Executive Summary

The University of Bergen is committed to ensuring good framework conditions and career development opportunities for our academic staff at all career levels and has for several years paid special attention to the needs of early career researchers. A range of activities and programmes have been established to provide support to researchers at different career stages and for different career paths. In addition to providing information on types of research positions at UiB and development in ratio between types of position over the last decade, this case study will give a brief overview of the range of activities aimed at supporting researchers' career development at UiB, and will detail selected examples of best practice:

- **The Trond Mohn Research Foundation (TMF) Starting Grant and the TMF-UiB Career Program**: This is an example of long-term collaboration and co-funding between the university and a private foundation, aimed at recruiting and retaining excellent young researchers at UiB. These instruments give opportunities to talented early career researchers to develop their careers through leading a four-year research project and following a career development programme, and thus to qualify for a permanent position at the university.

- **The Momentum Career Development Programme**: This is an example of an institution-wide programme funded by the university to support early career researchers to become positioned to pursue academic careers at UiB or at other academic institutions.

Permanent combined positions, with both research and teaching responsibilities, form the core of the European university tradition, and likewise form the core of the University of Bergen. We see it as vital to keep this position structure to ensure that we remain an attractive university employer with high-quality academic positions giving researchers the opportunity to engage in excellent research and both develop and draw on their research in teaching, with the great benefit this entails for our students. The development at UiB over the last decade indicates that the combination of strategic investment into research career support, training and positions, together with changes in national legislation, have led to a positive development in our position structure. Positions at UiB do not follow the traditional pyramid pattern, and a large proportion of the academic staff are employed in permanent combined positions in the two highest categories, R3 and R4.

Highlights from the development in research careers at UiB:

- UiB increased its relative share of highly qualified, permanent academic positions over the past 10 years. The researcher career structure developed from R1 : R2 : R3 : R4 = 1,00 : 0,52 : 0,71 : 0,89 in 2014, to R1 : R2 : R3 : R4 = 1,00 : 0,55 : 0,84 : 0,97 in 2023.

- The administrative and technical support of researchers was also increased in the same time period; from 0,64 support positions per 1,00 researcher position in 2014, to 0,68 in 2023.
- Targeted programs at UiB in support of researcher careers have aided this positive development:
    - TMF Starting Grant: Of 37 grantees that have completed the program, 100% are in permanent academic positions, of which 78% are at UiB.
    - Momentum Program: Of 60 “delegates” that completed the program between 20192022, 100 % have permanent positions in jobs relevant to their research, of which 92% are in academia.

About the University of Bergen

The University of Bergen (UiB) is a modern, international research university with seven faculties, a university museum, and several research centres within and across organizational units. We are a classical knowledge- and culture-bearing institution founded on European democratic values, with academic freedom as a guiding principle. Long-term and fundamental research of high international quality and research-based education form the foundation of all our activities.

UiB was founded in 1946 as a central part of the effort to strengthen Norway as a knowledge nation. The university is shaped by academic traditions from the founding of the Bergen Museum in 1825 and by the history of the city of Bergen as an international meeting place, dating back as far as to the Medieval Age. UiB is located in the centre of Bergen, and is an integrated part of the city, the culture, and the business sector. UiB makes targeted efforts to promote and develop both the city of Bergen and the region as an international centre of gravity for science, art, and culture. Since its founding, the university has been leading in Norway, and, in time, in the world, within marine and climate research and was from an early stage recognised within medicine and the humanities. Later, the social sciences found their place, now holding a solid academic position.

In order to provide good framework conditions for the interaction of research and education with society, UiB has established six knowledge clusters. Through infrastructure, innovation activities, and recruitment of research talents, we interact with external partners in thematically defined areas:

- The Media Cluster
- The Healthcare Cluster
- The Marine Research Cluster
- The Climate Research Cluster
- The Energy and Technology Cluster
- The Medieval Research Cluster

UiB presently hosts four Centres of Excellence and coordinates two Centres of Research-based Innovation funded by the Research Council of Norway, and has previously hosted five Centres of Excellence that have been continued as research centres or as part of knowledge clusters at UiB.

In 2023 UiB counted 20 120 students, 2 600 academic staff, 1 600 administrative and technical staff, and 4 225 work years. 111 nationalities are represented on campus, and 35 % of UiB staff are recruited internationally.

UiB is a public university, the third largest by academic staff out of ten universities in Norway. Approximately 75 % of the university’s budget comes from government funding. The

Research Council of Norway is the main source of external funding at UiB, followed by the public sector and EU programmes.

Data - general description of numbers and related statistics of the evolution of researchers/teachers/support staff in the institution

Some notes on academic positions at UiB:

- Regarding classification of positions in the European Framework for Research Careers (EFRC) levels R1-R4, we follow a Norwegian template.[1] There is some ambiguity regarding teaching/lecturer positions ("Lektor") and the lower EFRC categories. These positions do not require research competence (PhD) in the national regulations, but assistant professors normally have research and development as a part of their contracts. Therefore, they are classified as R2 Recognized researcher in the framework. These are mainly temporary positions. Teaching positions without research obligations are not considered for the framework. These are very few in numbers at UiB.
- PhDs in this report are employed as research fellows for the duration of their funding. Most positions are four years, with a year allocated to work for the university, normally teaching. UiB also enrolls externally employed candidates in the PhD-programmes, typically hospital doctors, researchers in the institute sector, or at university colleges without PhD-programmes. These make up about half of the number of the enrolled candidates, but are not counted here unless they have a research position at UiB.
- The "standard" career path consists of combined positions with teaching and research obligations, from PhD to full professorships. However, due to increased emphasis on externally funded research with shorter time frames, the use of temporary positions as researchers/scientists (position code 1108/1109) has expanded over the past 15 years. Historically, these positions have been more prevalent in the institute sector in Norway.
- The government has over a long period had a goal of reducing the proportion of temporary positions in academia, and this has been a clear priority for the current cabinet since 2021. Institutions are required to report on progress yearly. To meet the goals, a number of researcher positions (code 1108/1109) have been made permanent, but are still dependent on continuous external funding. UiB has established an internal policy that all externally funded positions exceeding two years are to be permanent positions. When funding is about to expire, both the researcher and UiB are obliged to seek new funding or other relevant project positions at UiB for the researcher. The researcher has preferential right to other relevant positions. If nothing is found, these researcher positions will be terminated. Even if these positions in this sense have less stability than ordinary combined positions, they are permanent positions, and consequently regulations apply that secure more rights to the employed researcher than provided by a temporary researcher position.
- Researchers in academic positions may request assessment for individual promotion based on documented competences. A relatively high proportion of positions with both teaching and research obligations in Norway and at UiB are full professorships.
- Norwegian regulations opened for recruitment by tenure track in 2015. At UiB, 20 researchers have been recruited in tenure track positions since then, all at the level of associate professor, with an aim of full professorship.

A full list of groups of positions is given in table 1. Over a ten-year period, the ratio of full-time equivalents in education and research positions to administrative and technical positions has decreased from 1,6 to 1,5. The number of education and research positions and support

positions has increased by 12%, whereas administrative positions have increased by 25%. This number is however affected by a change in practice for part-time paid per hour positions in the past two years. These positions (student assistants, exam invigilators etc.) have not previously been considered as employment and have therefore not been counted in the statistics, but they have been redefined as administrative positions ("fagkonsulent"), in the "Other technical and administrative" category. This amounts to a total of 90 FTE in 2023. The drop in research assistant positions (and therefore also low growth in R1 positions) may also have been affected by this. Another striking development is the increase in engineer/data steward positions. This may partly be due to high investment in advanced research infrastructures, digital and otherwise.

Table 1 UiB staff categories 2014 and 2023, FTE (DBH).

	Category	**2014**	**2023**	
Administration	Managers	109	125	15%
	Administration	703	852	21%
	Other technical and administrative	130	201	54%
Total, administration		942	1178	25%
Support for education and research	Librarians	27	24	-12%
	Engineers/data stewards	376	450	20%
	Other technical positions for education and research	83	70	-16%
Total, support positions		486	544	12%
Education and research	Teaching and research positions	1197	1402	17%
	Education- and recruitment positions (includes research assistants, PhD candidates and postdocs)	921	977	6%
	Academic leadership	46	47	3%
	Other	61	77	25%
Total, education and research		2225	2503	12%
Total		**3653**	**4225**	**16%**

A detailed count of academic staff per 1.10.2023 is given in table 2. The "other" category in table 1 does not count as academic staff in this context (dentist, nurses, doctors in clinical education).

Table 2 Academic staff at UiB october 2023 (DBH)

Position code	**Position**	**Type**	**EFRC code**	**FTE**	**Headcount**	**FTE 2014-2023**
1018-1020	Research assistant	Assistant	R1	44	121	-12%
1017, 1476	Research fellow/PhD candidate	Combined	R1	676	698	8%
	Total R1			**720**	**819**	**5%**
1009, 1010	Assistant teaching professor/assistant professor	Teaching	R2	101	255	24%

	(universitetslektor/ amanuensis)					
1352	Postdoctoral Fellow	Combined	R2	256	262	5%
1108	Researcher/Scientist (Researcher I)	Research	R2	39	48	47%
	Total R2			**396**	**583**	**12%**
1198	Associate teaching professor (Førstelektor)	Teaching	R3	8	18	-22%
1011	Associate Professor	Combined	R3	390	609	11%
1109, 1110	Senior Researcher (Researcher II)	Research	R3	204	235	55%
	Total R3			**602**	**833**	**23%**
1013, 1404	Professor	Combined	R4	639	833	11%
1183	Research Professor (Researcher III)	Research	R4	8	10	100%
1532	Teaching Professor (dosent)	Teaching	R4	2	2	0%
214	Rector	Administration	R4	1	1	0%
1474	Dean	Administration	R4	8	8	0%
1475	Head of Department	Administration	R4	38	38	0%
	Total R4			**696**	**892**	**14%**
	Total			**2414**	**3138**	**12%**

Over a 10-year period, academic FTE has increased by 12%, taking into account the acquisition of Bergen Academy of Art and Design in 2017.[2]

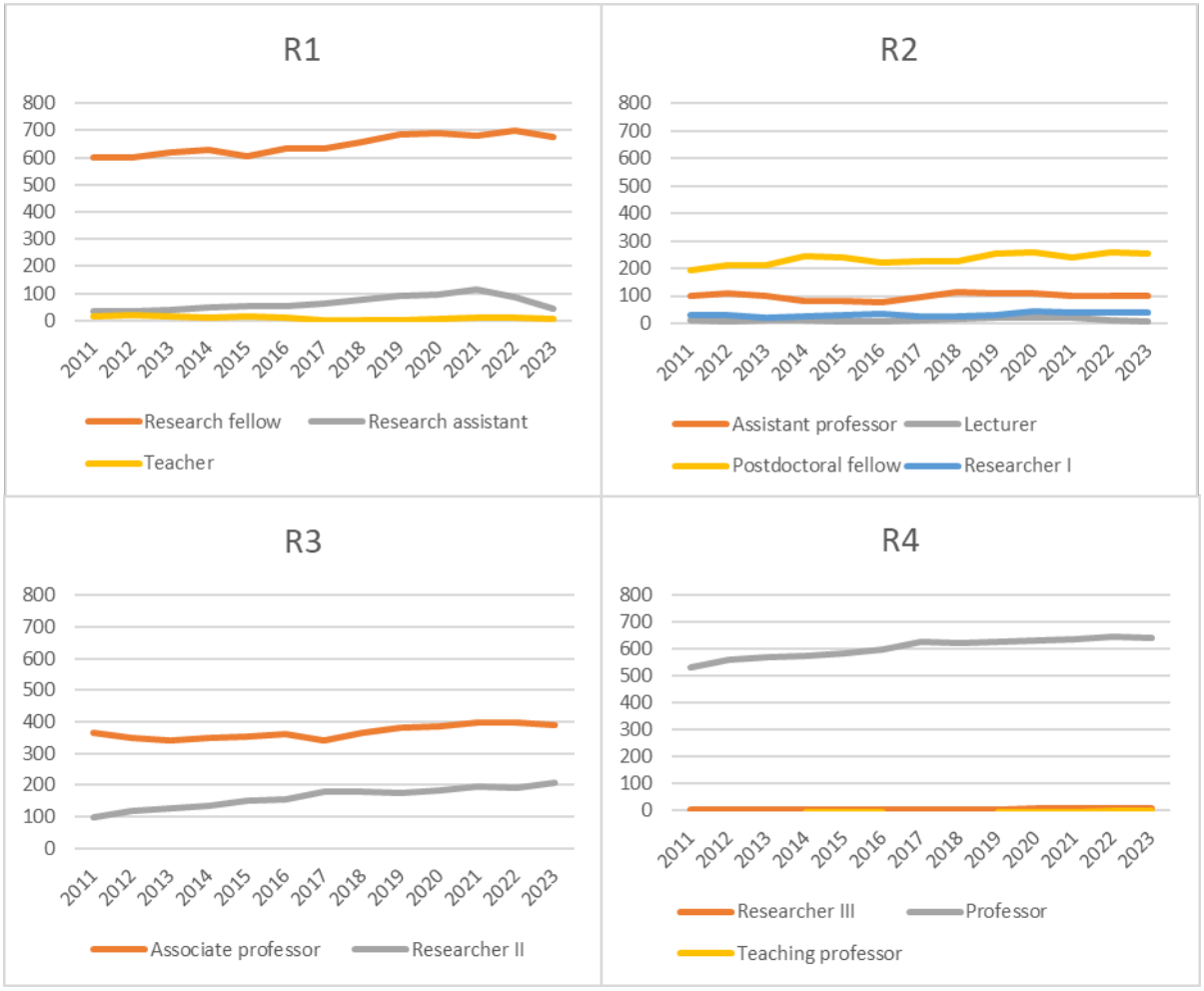


Figure 1 FTE in levels of academic positions 2014-2023 (DBH)

"High-quality positions" in academia might be defined as positions that fulfill employees' career goals at various stages, i.e., full time, permanent positions that qualify for further advancement by covering both teaching and research obligations. We here assume that a typical career goal in academia is full time, full professor positions. At an individual level, employees may of course be interested only in research work, or in focusing solely on teaching.

Positions that have teaching obligations only are a very low proportion of the academic staff. Assistant teaching professors will normally have teaching duties at 75-90% of the workload, and research and development duties at 10-25%. Large discrepancies between headcount and full-time equivalents (FTE) indicate a relatively high number of professors at all levels employed in reduced positions, having their main position at an external institution (hospital, university, research institute, culture or private sector). About 25% of all academic staff have positions ranging from 10-25% of full time.

Table 2 shows that researcher positions (Researcher I-III) have had a significant growth in the period, at a total of 55% increase in FTE for all levels combined. Assistant professors, with mainly teaching duties, have also had a considerable growth, at 24%.

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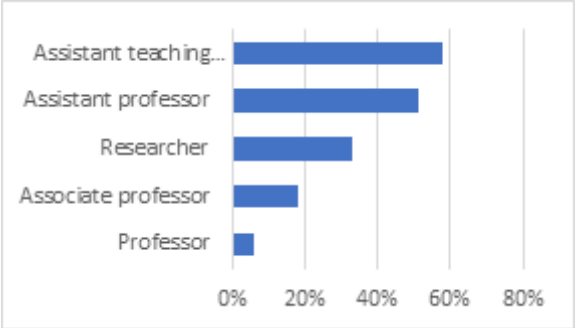


Figure 3 Percentage FTE in temporary positions, non-recruitment positions, 2023 (DBH)

Reducing the number of temporary positions has been a priority over time, both for UiB and the Norwegian government. Many positions are temporary by nature, e.g. recruitment positions such as research fellows, postdoctoral fellows, and research assistants, and a limited number of such positions are an intentional part of UiB's academic landscape.

Overall, the proportion of FTE in temporary academic positions has actually decreased over time, from 58% in 2014 to 53% in 2023. Again, the most significant change has been in researcher positions, going from 92% temporary positions in 2014, to 33% in 2023. For the other large group, assistant teaching professors, the change has been less significant. 58% of FTE of assistant teaching professor positions were temporary in 2014, and 51% in 2023.

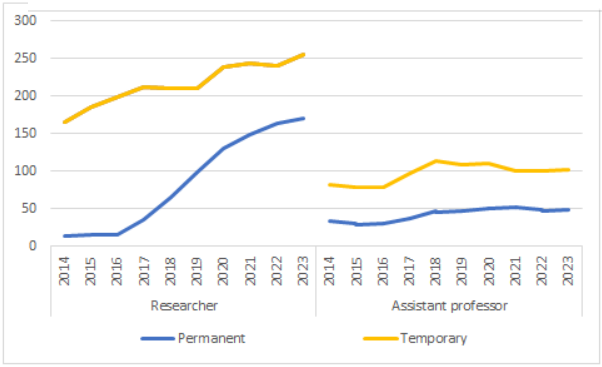


Figure 4 Researcher and assistant professor FTE 2014-2023 (cumulative)

The growth in researcher and assistant teaching professor positions may to a large degree be caused by an increase in externally funded research. In an international perspective, external funding is a quite small part of universities' total income in Norway (approx. 75% comes from government financing), but over ten years, FTE funded by government allocations has increased by 8%, whereas externally funded FTE has increased by 24%. While funding from the Research Council of Norway (RCN) has had a moderate growth (13%), other sources (EU, private sector etc.) has seen a 30% growth.

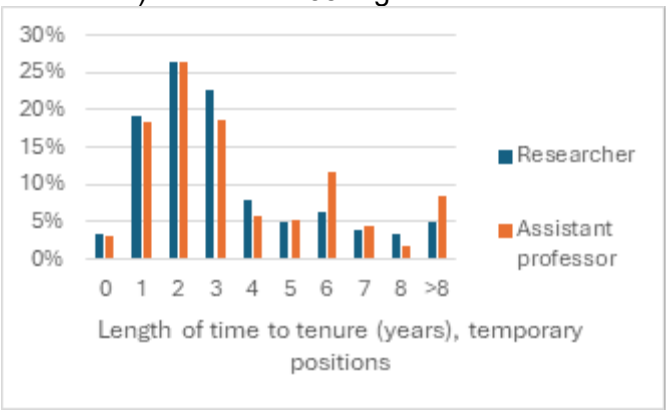


Figure 2

Brief description of the "career pyramid" in terms of the evolution of the various types of researchers and teachers (R1, R2, R3, R4), with specific cases at department level.

As measured by EFRC levels, first stage researchers (R1) make up the largest category in 2023, totaling 30% of all academic FTE.

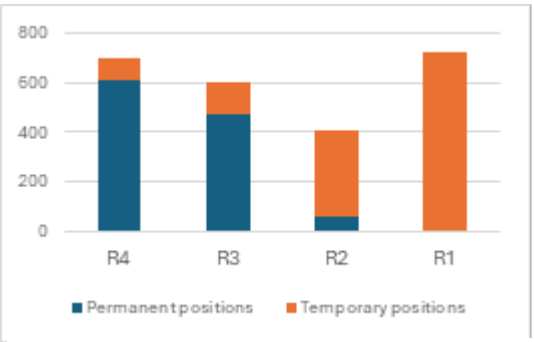


Figure 5 Academic staff (FTE) by level and type of position, UiB 2023 (DBH)

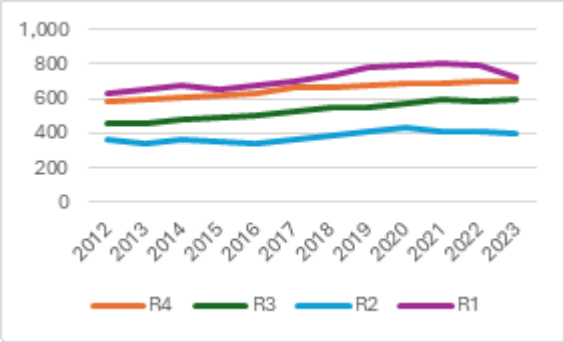
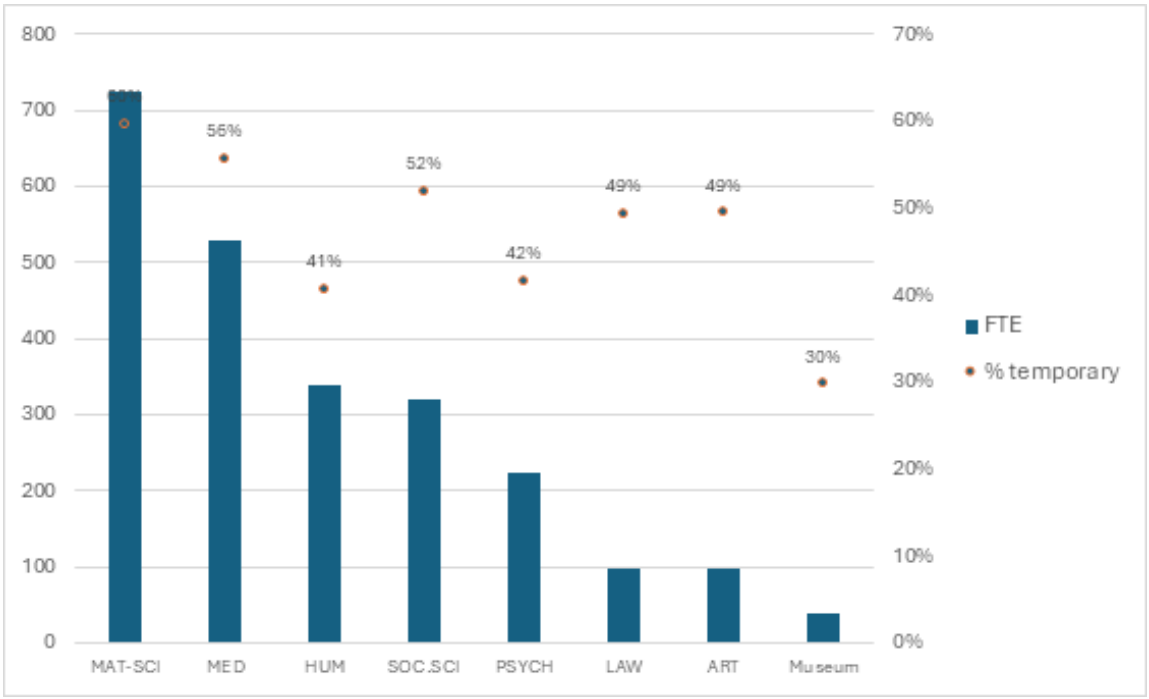


Figure 6 Academic staff (FTE) 2011-2023 (DBH)

However, an almost equal number of staff is in the most senior group, where almost all positions are full professorships or professorships in part time (20%), permanent positions.

UiB is organized into seven faculties and the University Museum. Over half of UiB's academic positions are in the two largest faculties – the Faculty of Natural Science and Technology and the Faculty of Medicine, which also have the largest shares of staff in temporary positions since they have the largest number of externally funded projects.



Distributions of academic staff according to researcher category in the faculties:

Brief description of specific practices and of specific initiatives for the recruitment and/or career development of researchers/ teachers with emphasis on young researchers

Research careers at the University of Bergen – overview of activities and programmes

UiB is committed to ensuring good framework conditions and career development opportunities for all our academic staff at all careers levels, and has for several years paid special attention to the needs of early career researchers. A range of activities and programmes have been established to provide support to researchers at different career stages and for different career paths, of which some are more narrow and target talents, while others are open for larger groups or for all. All courses and programmes are evaluated on a regular basis, and, if needed, adjusted to take account of feedback from the participants.

A) UiB has a long-standing collaboration with the Trond Mohn Research Foundation (TMF), a private foundation funding research at Norwegian research institutions, primarily at the University of Bergen and the Haukeland University Hospital. Since 2005 UiB and TMF have collaborated on and co-funded the *TMF Starting Grant programme*, which is a recruitment programme aimed at recruiting and retaining excellent early career researchers at UiB.

Further details about the programme, the connected TMF-UiB Career Program and results will be presented in the section on specific examples below.

B) In 2017 the *Momentum programme*, a centrally administered and funded career development programme designed to support the career development of early career researchers at UiB, was established, starting up activities for the first cohort in 2018. Further details on and results of this programme will also be presented in the section on examples below.

C) In 2019 UiB attained the *HR Excellence in Research award (HREiR)*, and we are continuously working to follow up the Guidelines of the Human Resources Strategy for Researchers (HRS4R) to be able to receive renewal of the award every third year (next in 2025). The results include promotion courses to scientific top positions for women, modernisation of appraisal interviews in connection with career development and arenas for development of the supervisor role. UiB is currently working on establishing a new Action plan for HR in Research for 2025-2028.

In 2020, the board of UiB established a policy for younger researchers,[3] in which the importance of career guidance and support for career development relevant to career level is emphasized. Some key points in the policy are that all postdocs at UiB should have career development plans, that all researchers should receive guidance about career development opportunities, and that associate professors should be given guidance about the possibilities of merit-based promotion to full professor.[4] The policy underlines that department leaders bear a responsibility for supporting researchers' career development and for facilitating their researchers' attaining relevant experience in education, supervision or other activities that allows them to increase their competence and qualify for career advances or promotion. New national regulations in 2024 now requires that both postdocs and PhD candidates have career development plans.

D) As part of the follow-up of the career policy for younger researchers, and anchored in the HRS4R, *UiB Ferd Career Centre* opened at UiB in February 2022. UiB Ferd aims to give career advice and support career development for PhDs, postdocs, researchers and assistant professors at UiB, for careers both within and outside of academia. The centre offers courses in academic and transferable skills (50 courses each year), e-courses on CV-building and individual career guidance. The centre also publishes a monthly newsletter and sets up externships – job shadowing secondments in industry – for postdocs that are part of MSCA COFUND projects at UiB.

E) In 2021 UiB launched the long-term development project *UiB FRAM* aimed at securing good framework conditions for high quality research for researchers at UiB. The project has gathered recommendations from the researchers themselves through surveys, in-depth interviews and dialogue meetings. In the follow-up phase, measures to improve the working conditions for researchers are tailor-made for specific departments and piloted in collaboration with the department heads. A key recommendation from researchers has been to facilitate more uninterrupted time for research. Even if the project is not specifically aimed at early career researchers, its implementation will be of benefit to this group since they are often among those most pressed for time between family commitments, teaching responsibilities, and work on publications and project applications.

F) In 2024 UiB has established a new *programme for research leadership*, aimed at researchers leading research groups or research projects in any field at UiB. The programme has 24 places each year, and provides training and advice to promote strategic research leadership competence, giving increased knowledge of how to build well-functioning

research teams and establish cross-disciplinary networks. The programme directly supports career development for more established researchers,
but will also benefit early career researchers participating in research groups by increasing the awareness of the importance of career support for younger researchers in research groups or teams.

G) UiB acknowledges the importance of solid and competent research support and management for research careers. During the last years we have seen increasing numbers of applications for external funding and increasing numbers of externally funded projects, and thus an increased demand for support both in pre-award and post-award phases. In response, the external financing team at the central administration has developed a portfolio of courses based on a “train the trainer”-model, *UiB Opp*, to enhance the sharing of knowledge and experience across the organization. Courses are designed to respond to the needs of research advisers and researchers, and cover topics such as research application support for national and European programmes, building a competitive academic CV, legal support for externally funded projects, HR, innovation in research projects, communication and dissemination, open science, positioning, risk management, and use of AI. The use of in-house expertise and the flexible structure of the course series makes it a highly efficient way of disseminating knowledge and experience and providing high quality support to researchers both at central and faculty level.

At UiB positions as research and innovation advisers and managers moreover represent an alternative career path for researchers. Research and innovation support and management are highly professionalized and experience from research is a relevant and valued competence for many positions in the administration. UiB focuses on ensuring that positions as research and innovation advisers and managers are attractive, with salaries comparable to those of permanent researcher positions, and a large part of the research and innovation advisers and managers at the UiB have a background in research.

Academic spin-offs

Norwegian law allows universities to invest in private enterprises that are relevant to their mission. Therefore, UiB has worked to establish several research and innovation companies to facilitate externally funded research, development and industrial growth, improving the job market for researchers outside of the university. Three examples are:

NORCE Norwegian Research Centre AS (NORCE): UiB established the predecessor of NORCE, Unifob AS, in 2003 to enhance externally funded research and collaboration with industry. In 2017, NORCE was formed as a non-profit company through a merger with research institutes nationally, and by 2023, the institute employed over 700 people, including in research positions representing more than 450 FTE. Today, NORCE is the second largest research institute in Norway, and focuses on critical areas such as energy, health, climate, environment, society, and technology, working closely with UiB to promote innovation and development. This collaboration helps create attractive and stable jobs for researchers while delivering research-based solutions to complex societal challenges.

SIMULA UIB AS is a small, but strategically important collaborative research company owned by the research institute Simula Research Laboratory and UiB. The purpose of the company is to perform advanced research in cryptography, cyber security, machine learning and post-quantum computing. The company is financed through a combination of public funding, research grants, and private investments. As of 2023, SIMULA UIB AS employs around 30 people. The company focuses on key areas such as software engineering, communication systems, and computational science. By leveraging the strengths of both Simula and UiB, SIMULA UIB AS aims to drive innovation and excellence in research,

contributing to advancements in technology and providing valuable insights into complex scientific challenges.

VIS AS (Vestlandets Innovasjonsselskap) is a leading innovation company in Western Norway, dedicated to promoting innovation and entrepreneurship in the region with 38 employees. Most Norwegian universities, including UiB, organize technology and knowledge transfer through external companies like VIS AS rather than handling such functions internally. This approach allows universities to leverage the specialized expertise and resources that external innovation companies can offer, thereby increasing the commercialization of research results and strengthening collaboration between academia and industry. In addition to typical TTO activities, VIS AS also supports university spin-offs and offers incubator and accelerator facilities and programmes.

Examples of successful recruitment and career development programmes at UiB:

The Trond Mohn Research Foundation Starting Grant

The Trond Mohn Research Foundation (TMF) Starting Grants and the connected TMF-UiB Career Program are examples of successful long-term collaboration between a private foundation and UiB, securing external funding to the university and supporting the recruitment of promising early career researchers to UiB through co-funded instruments.

The Trond Mohn Research Foundation (TMF) was established in 2004 by means of a donation by the Norwegian billionaire businessman and philanthropist Trond Mohn. The general objective of the foundation is to support research and initiatives that promote research at the University of Bergen and in Helse Bergen Health Trust. The foundation can also support research and initiatives that promote research at other research institutions in Norway, preferably in cooperation with institutions based in Bergen. TMF is the largest foundation in Norway that has support of research as its main purpose. In December 2023 the foundation's capital was €253 mill.; the foundation has since its establishment donated €156 mill. to research, and annually allocates between €8 mill. and €17 mill. to research in co-funded programmes where the host institution contributes an amount matching the foundation's contribution.

TMF has from the beginning aimed to promote recruitment of outstanding young researchers to UiB, and to this end a 4-year recruitment programme, TMF Starting Grants, was established in collaboration with UiB in 2005. The programme has a call for nominations each year, and normally 3-4 grants are awarded. The aim of the programme is twofold:

- It gives excellent young researchers the chance to develop into successful research leaders by providing long-term funding.
- It aids UiB in attracting and retaining excellent young scholars in research areas in line with UiB's strategic priorities and where the university foresees recruitment needs within the next four years.

The University of Bergen is required to announce a permanent faculty position within the grantees' field of research before the end of the 4-year project period.[5]

The grantees are provided funding for a research project for up to 4 years; up to 10 MNOK (approx. €850.000) from TMF and the same from UiB (i.e., the funding is comparable to that of ERC Starting Grants).

All faculties at UiB have the opportunity to nominate candidates for the programme, and candidates can be researchers already at UiB in temporary positions or from other institutions. TMF encourages UiB to nominate candidates with an international background

and to nominate a proportionate number of female relative to male research talents. Candidates need to be younger than 40 years by
the application deadline. TMF evaluates the applications through a peer review process where scientific excellence is the main criterium. The candidates are usually at postdoc level.

Since 2005, 51 researchers have been awarded the TMF Starting Grant. The results in terms of career advancement are as follows (status by September 2024):

- 37 grantees have finished their projects
- 29 of these (78%) have permanent positions at UiB, of which:
  - 22 (59%) are full professors at UiB
  - 7 (19%) are associate professors at UiB
  - 1 is director of research at Helse Bergen
  - 7 hold permanent academic positions in other institutions (UK, USA, Belgium, South- Africa, Australia, Norway)

Of all grantees, 15 have participated in 24 EU projects, either as PI, partner or mentor for MSCA PF. Of these 4 have been awarded ERC Starting Grants, 5 have been awarded ERC Consolidator Grants, and 1 has been awarded a FET Open grant and a subsequent EIC Transition grant to her FET Open-derived spin-off company.

The TMF-UiB Career Program

In 2019 the TMF-UiB Career Program was established to provide career support designed especially for the TMF Starting Grant holders. This programme is also a cofounded collaboration between TMF and UiB. The aims of the programme are to support the TMF Grant holders in their career development and in their development as research group leaders, to promote cross-disciplinary networks between researchers at UiB and to help getting more ERC grants to UiB.

The TMF-UiB Career Program consists of a common part and an individual part. The common part takes the form of an annual seminar centred on a relevant theme, an annual alumni meeting and 1-3 events on various themes such as leadership, innovation or the external funding landscape. The individual part consists of a mentor scheme: each grantee is matched with two mentors (one of them is their closest research leader and one of them an experienced colleague from the same faculty as the grantee), and the mentors help the mentee develop a Career Development Plan. An evaluation of the career programme conducted in 2023 shows that the participants regard the programme as valuable, both the individual and the common part. Seminars on research leadership, supervision, and building research teams were particularly welcome, and the participants also highlighted the benefit of becoming part of a network of researchers in similar career situations and having the opportunity to have informal discussions, sharing experiences and discussing challenges with fellow researchers working on the same type of project.

The outcome with regard to ERC applications is very positive:

Since the start of the TMF-UiB Career Program in 2019, 12 TMF StG candidates and -alumni have applied for ERC Grants. By September 2024, 4 have been awarded grants: 1 ERC Starting Grant (2022) and 3 ERC Consolidator Grants (2020 and 2022). This gives a success rate of 25%, much higher than the average of 14%, and even if no causal connection can be established, it seems clear that the TMF Starting Grant, including the TMF-UiB Career Program, will give the foundation for excellent career development, for example in the form of winning an ERC Grant.

Momentum Career Development Programme for early career researchers

Momentum is UiB's flagship development programme for early career researchers who wish to pursue an academic career at a research university. The programme has an annual call, normally for 15 places. The places are distributed among all UiB's faculties, and each faculty is responsible for choosing its Momentum delegates. Candidates must be employed at UiB, normally in a minimum 80% FTE position. They should have obtained their PhD-degree less than six years before the start of the programme and should have plans to apply for external funding. Candidates who are employed on temporary fixed-termed contracts must have at least one year left of their contract at the start of the programme.

The programme has four main goals:

1. Career planning and development toward research independence/leadership.
2. Competitive applications to both national and international funding sources.
3. Develop professional networks.
4. Interdisciplinary connections and networks within UiB.

The programme includes five seminars structured around the key categories career development and external funding, and cover the following topics: excellence, impact, research leadership and implementation, internationalisation, and grant writing. In addition to the seminar series, Momentum delegates receive a stipend of approx. € 8600 to spend on mentoring, travel, networking, research stays, conferences and other activities directly related to their career development.

The results of the programme regarding career development are very positive (status September 2024):

Table 3: Position held by Momentum delegates (90 in all) when they started the programme.

Cohort	Postdoctoral positions	Researcher positions	Associate professor
M 1 (2018/19)*	31%	0%	38%
M 2 (2019/20)	31%	38%	31%
M 3 (2020/21)*	38%	19%	38%
M 4 (2021/22)	21%	21%	57%
M 5 (2023)	33%	0%	67%
M 6 (204/15	41%	24%	35%

*We lack complete information on employment at the start of the programme for these cohorts, therefore the numbers do not add up to 100%. Percentages are per cohort (each cohort counts 15 delegates except for M 6, which counts 17 delegates.)

Table 4: Employment status in September 2024 of all 90 delegates; none of the delegates are without employment or in non-relevant positions, and a high percentage – 84% in all – are still at UiB.

Cohort	Temporary position, academia	Permanent position, academia	Relevant permanent position outside academia
M 1 (2018/19)	0%	93%	7%
M 2 (2019/20)	0%	100%	0%
M 3 (2020/21)	0%	75%	25%
M 4 (2021/22)	0%	100%	0%

M 5 (2023)	33%	67%	0%
M 6 (204/25)	41%	59%	0%

The programme has also succeeded with regard to the aim of preparing the delegates for applying for and attracting external funding:

- 52% of the delegates who have completed the programme (Cohorts 1-5) have applied for research grants from the Research Council of Norway, against the UiB average of 20%.
- The Momentum delegates have a higher success rate (14%) than the UiB average (7,5%) for applications for external funding.
- 8 Momentum delegates (11% of the delegates who have completed the programme) have been awarded the TMF Starting Grant and moved on to the TMF-UiB Career Program.
- 1 delegate has been awarded the ERC Starting Grant.

Momentum underwent an evaluation after three cycles to measure its success against the core objectives. The findings were overall very positive, with over 90% of the respondents reporting that the programme had helped them to think more strategically about their careers, and close to 90% reporting that Momentum had helped them to identify and take steps to develop specific areas further after completing the programme. 2/3 of the respondents reported that they had used the tools and training provided during the programme to write stronger applications. The stipend was reported to be especially valuable in supporting their career development, by nearly all respondents (96%).