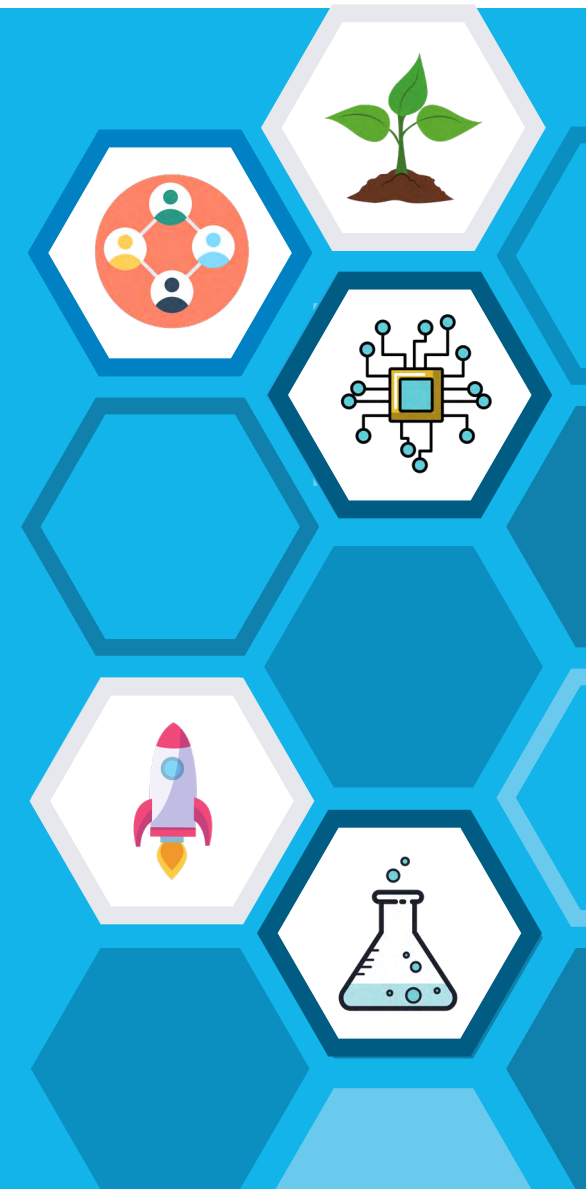# Universities as key drivers of sustainable innovation ecosystems

Results of the EUA survey on universities and innovation

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European University Association asbl

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Foreword

Innovation is one of the core missions of universities. In 2021, EUA published *Universities without Walls: a Vision for Universities in 2030*. It sees universities of the future as institutions that are open, transformative and transnational; sustainable, diverse and engaged; and strong, autonomous and accountable. It recognises that universities are unique in the way that they combine their different missions of research, innovation, learning and teaching and culture, and stresses that the interrelation of these missions will be increasingly important given the need for a holistic approach to the challenges that face society, now and in the future.

The sector's vision for the innovation mission, as set out in 'Universities without Walls', is for human-centred innovation, in which different stakeholders are brought together around a common vision, and where solutions are co-created by a range of different partners. Universities have a crucial role to play in bridging the gap between academia, business, civil society and culture, in optimising the synergies between missions, and in fostering entrepreneurship and innovation in all areas. They already play a leading role within innovation ecosystems, and in the sustainable and digital transitions. This can and should be strengthened going forward.

Many of these elements are reflected in this new report, which provides an invaluable insight into the state of play of innovation activities at Europe's universities, as well as their ambitions in this area. Of course, the situation across Europe is extremely diverse and every university has its unique strategy and solutions, grounded in its own ecosystem; however, from the findings set out in the report we can see clear trends in the direction of travel and, most importantly, a welcome increase in the strategic prioritisation of innovation within the sector.

I hope that this report will provide you with useful information, with inspiration, and with practical advice that you can use in the implementation of your own innovation strategies.

On behalf of EUA, I would like to express my sincere appreciation to EUA's Innovation Ecosystems Expert Group for driving this important work, to my colleagues in the Secretariat for bringing it to reality, and to all those members who took the time to share their policies and experiences through the survey. These collective efforts have resulted in a rich and thought-provoking resource.

Amanda Crowfoot
EUA Secretary General

Preface

Universities and higher education institutions are unquestionably essential innovation drivers, paving the way for Europe's green and digital transitions. We not only educate and train the entrepreneurial talents who shape our common future, we also explore creative, high-impact ideas in numerous joint research and innovation endeavours, provide co-creation spaces to stimulate vibrant innovation ecosystems, and build bridges between actors in our role as "honest brokers"; translating global knowledge into local use and understanding.

Given the multitudinous environmental, social, economic, and transformational challenges ahead, high expectations are placed on the continuous enhancement and effective use of synergies between university research, innovation and education. This responsibility is generally accepted. However, there are no simple or single answers to Europe's very diverse innovation ecosystems.

Following Kurt Tucholsky's insight "*I believe everyone who seeks the truth. I don't believe anyone who has found it.*", EUA performed a thorough assessment of the status, capabilities, perspectives and challenges at Europe's academic institutions, to analyse their ability to fully embrace innovation as a core responsibility. On behalf of the EUA Innovation Ecosystems Expert Group, I am proud to present the results of this first ever large-scale survey on innovation at European universities. I would like to thank everyone at the EUA and the members of the Expert Group for contributing to this milestone.

The results presented in this report provide a comprehensive, Europe-wide picture of the status and role of innovation at and from universities, with particular emphasis on the challenges of sustainability and digitalisation. I invite all readers to draw conclusions for their respective individual setting, and to use the results of this survey as a source of information for evidence-based initiatives and policies.

Professor Peter Haring Bolívar
Chair of the EUA Innovation Ecosystems Expert Group

Acknowledgments

Executive summary

This report provides in-depth analysis of the results of the first-ever Europe-wide survey on universities and innovation. Designed to gather evidence about the state of innovation at European universities, the EUA survey took stock of how these institutions pursue their third mission and help deliver the sustainable and digital transitions. As such, it continues EUA's long-standing work showcasing universities' key contributions to innovation ecosystems, in a context of multiplying societal challenges and the increasing relevance of knowledge to devising new solutions.

The survey results clearly demonstrate that innovation is already a key priority for universities. However, they also reveal a gap between universities' strategic attention to innovation and their innovation capacity. The report pinpoints how to address this mismatch through an analysis of resources and support systems. It notably shows that access to funding, staff and co-creation space play a key role in meeting university ambitions in this area. Beyond specific resource needs, university innovation depends largely on framework conditions whose adequacy was closely measured in the survey. The survey findings demonstrate that efficient institutional governance structures and university autonomy are prerequisites for universities to engage with society. These framework conditions also help institutions fulfil their crucial role as honest brokers, through the development of independent, quality and innovative solutions to current and future challenges. To complement this picture, the report provides evidence of universities' interactions with other innovation stakeholders. It shows that, although collaboration in the innovation ecosystem is important to most universities, partnering with companies remains limited, especially at universities with a lower innovation capacity.

Furthermore, in investigating university contributions to the sustainable and digital transitions, the survey revealed that innovation is also about: integrating research more closely with education, building bridges across sectors, and achieving societal impact through more than just marketable products. It therefore sheds light on a multi-faceted quest requiring the buy-in and alignment of various departments, faculties and services, as well as the facilitation of partnerships in the surrounding innovation ecosystem. Success in this quest will depend on a wide range of conditions, such as support for: curiosity-driven research, improving the transfer of research results into innovations, and upskilling and reskilling. Nevertheless, the survey already captured broad optimism that Europe's research and innovation capabilities will allow it to achieve a sustainable transition and lead the digital transition.

While the survey data will be useful for measuring and comparing different aspects of innovation, the report also provides examples of innovation good practice at universities that can serve as a source of inspiration for policy makers, funding agencies and universities themselves. It concludes with a number of recommendations stemming from the key findings. These are meant to help ensure that the university sector's innovation ambitions can be achieved.

Introduction

Digitalisation and the quest for environmental sustainability are world changing processes for which Europe needs to unleash all the potential of its innovation ecosystems. New solutions can be found for these challenges, but they will only emerge by tapping into the resources and capabilities of all stakeholders, including the university sector.

This report offers a comprehensive picture of innovation at European universities and their role in building vibrant innovation ecosystems to foster a more sustainable and digitally connected society. It also demonstrates the increasing strategic attention paid to innovation at European universities. Finally, it captures the different levels of institutional innovation capacity, as well as how these levels contribute to a wide range of impacts and social outcomes.

Chapter 1 gives an overview of: university innovation capacity, innovation strategies, enabling conditions for innovation, support mechanisms, student entrepreneurship, innovation partnerships, and funding. Chapter 2 describes how universities contribute to innovation for the sustainable transition, the role their research and education missions play in this process, and the indicators institutions use to measure their success as innovators in pursuit of sustainability. Chapter 3 presents the main areas in which universities are implementing the digital transition, the ways in which they support digital technology innovation and train the next generation of digital innovators, and the indicators they use to measure their digital innovation success.

Finally, the report provides recommendations on how to enhance the capacity of universities to innovate and deepen their contributions to European innovation ecosystems, notably in advancing the green and digital transitions. It builds on EUA report "The Role of Universities in Regional Innovation Ecosystems" (March 2019) and EUA position "Innovation ecosystems for a sustainable Europe: How to enhance the contribution of universities" (November 2021).

Methodology and survey respondents

The survey was divided into five sections comprising 32 open-ended, ranking, multiple and single-choice questions covering a wide variety of topics related to innovation at universities (see Annex). Section 1 included general questions about the institution. Section 2 investigated the institution's strategic attention to innovation and its innovation capacity. The following two sections covered the institution's innovation activities for a) the sustainable transition and b) the digital transition. The last section was optional and provided an opportunity to share university innovation success stories.[1]

The survey was open from 4 May to 28 June 2021. It was preceded by a pilot phase involving six institutions of different sizes, profiles and geographical locations. This phase was designed to gather feedback on the questions, answer options and online survey platform (Qualtrics). The results allowed EUA to adjust the survey before its official launch.

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1   All survey answers were anonymised (any information that could be used to directly identify surveyed institutions was removed), except for the institutional success stories provided in the last, optional, section. The report quotes some of the survey responses and only names the institution when their answer was provided in the last section.

Figure 1: Number of survey respondents per country
Number of respondents: 166/166.[2]

Figure 2: Percentage of EUA member respondents per country.
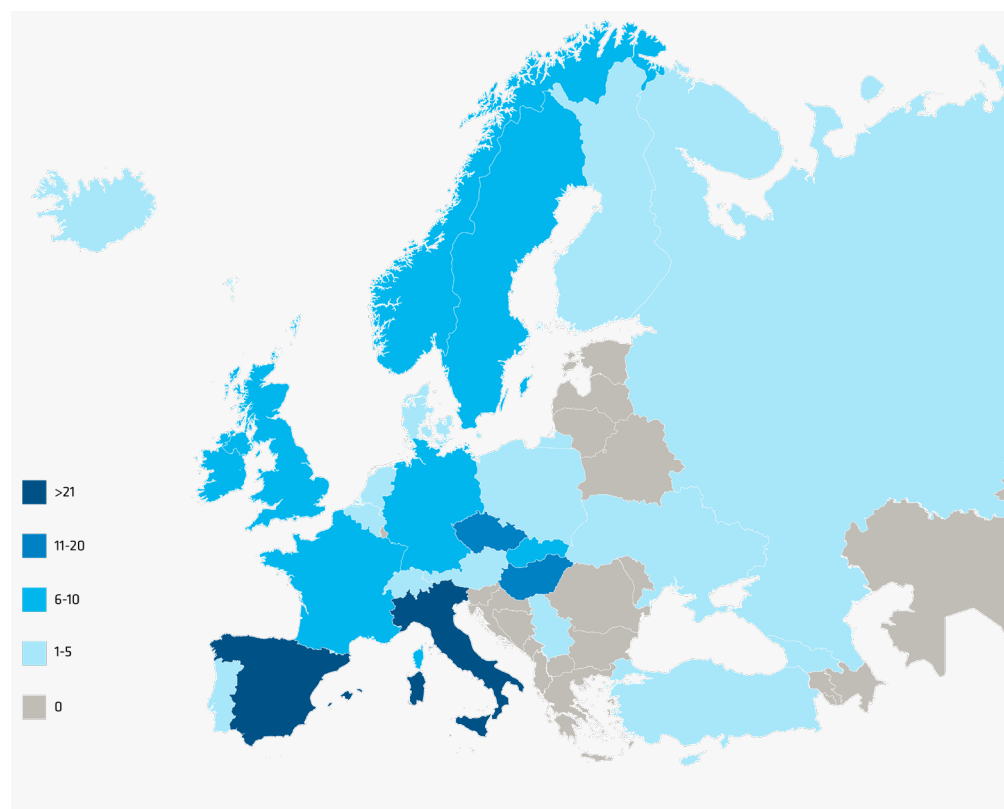
The survey was open to all European higher academic institutions, including non-EUA members. Due to its comprehensive scope, respondents were advised to collect input from a range of departments and services involved in innovation activities before completing the questionnaire. Only one response was accepted per institution.
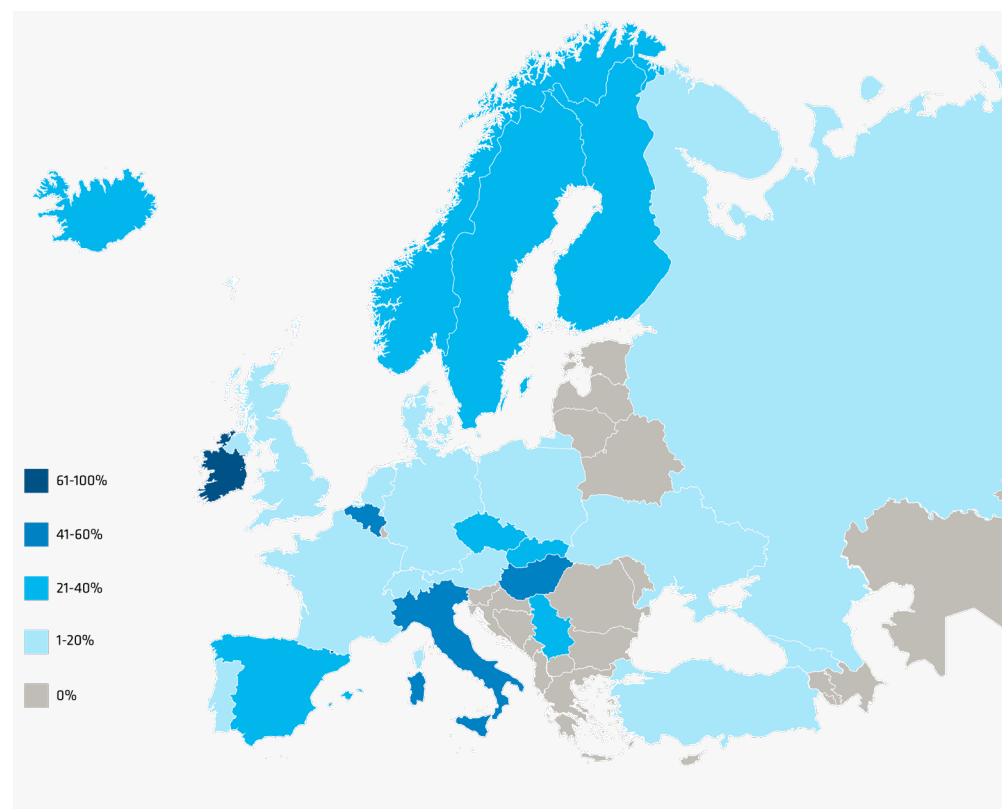
The results included in this report are based on 166 valid responses from institutions in 28 European countries. Of the total 166 responses, 134 are from EUA members, and 32 from non-member institutions. The fully anonymised survey dataset is available in the Zenodo Open Access repository.

The geographical distribution of the responding institutions is presented in Figure 1. Two countries provided over 21 responses, two countries had between 11 and 20 responses, seven countries submitted between 6 and 10 responses, and 17 countries sent between 1 and 5 responses.

2   In this report, the number of respondents is stated as: the number of valid responses/total number of respondents to the question.

In terms of the proportion of EUA members per country, 70% of the Irish EUA members participated in the survey, followed by institutions from Hungary, Italy, Belgium, Finland, Norway and Spain (Figure 2).

Most of the respondents are comprehensive institutions (70%), followed by technical universities/universities of technology (13%) and universities of applied sciences/university colleges (11%). Specialist institutions (e.g., medical science, business, art schools) represent 6% of the sample (Figure 3). Concerning the type of the surveyed institutions, 82% indicated focusing on both research and education, while 12% indicated concentrating on education and 6% were research-intensive (Figure 4).

The university staff who completed the survey hold predominantly managerial positions and are directly involved in coordinating innovation activities. Over 80% of the respondents were university leaders (e.g., Rectors, Vice-Rectors) or high-level managers (e.g., Innovation and Entrepreneurship Directors, Heads of Knowledge and Technology Transfer Offices, Heads of Strategy). The remaining 20% were generally innovation, business development, entrepreneurship and international relations managers or advisors.

It is important to note that the survey sample is made up of institutions that volunteered to participate in the survey. Therefore, due to the nature of the data, although the survey achieved broad coverage, the results reported in the next chapters cannot be used to extrapolate conclusions about innovation at other institutions.

Figure 3: Profile of the surveyed institutions
Number of respondents: 164/166.

- Comprehensive institution
- Technical university/ University of technology
- University of applied sciences or university college
- Specialist institution
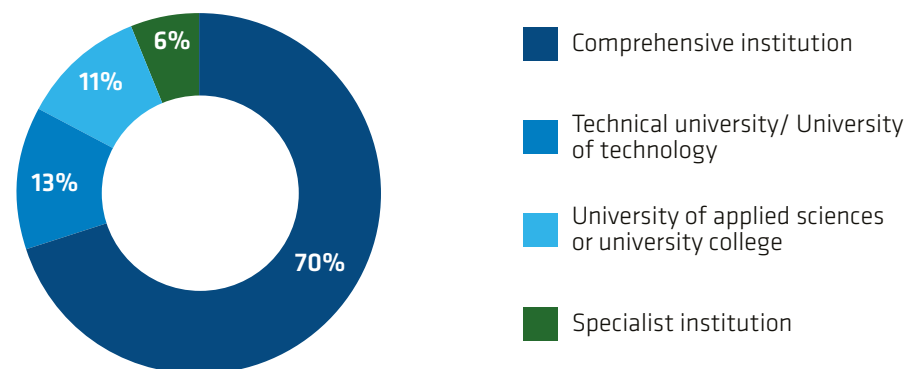
Figure 4: Type of the surveyed institutions
Number of respondents: 165/166.

- Both research-intensive and teaching-led
- Mostly teaching-led
- Mostly research-intensive
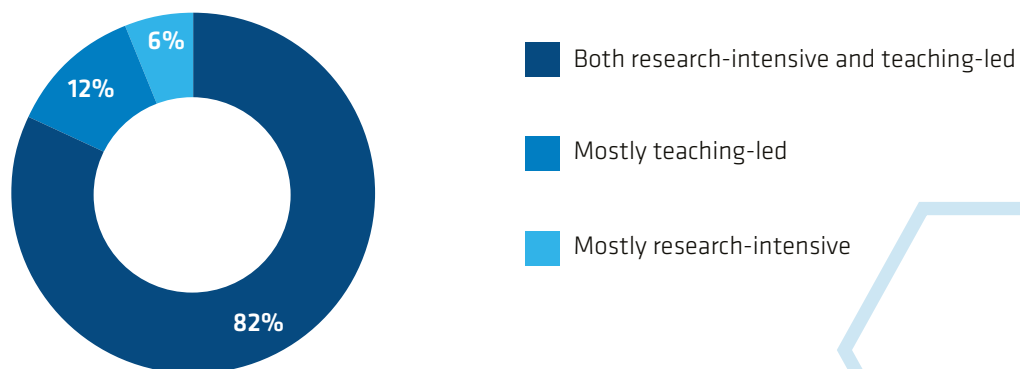
Chapter 1
Innovation capacity

Key findings

◈ **University innovation is strongly embedded in far-reaching institutional goals.** 74% of surveyed institutions have a strategy or mission statement that reflects their innovation agenda.

◈ **Resources, in particular funding, staff and space for co-creation, play a key role in meeting university ambitions in the area of innovation.** Although 75% of surveyed institutions assess their overall strategic attention to innovation as very high or high, only 60% consider their innovation capacity similarly high, explaining this difference by limited resources.

◈ **Collaboration in the innovation ecosystems is seen as very important but partnering with some types of stakeholders remains limited.** Overall, the surveyed institutions collaborate to a larger extent with public sector institutions, other universities in their countries and research organisations in comparison to other partners, including business and civil society organisations.

◈ **There is room for further improvement in the development of student entrepreneurial mindsets.** The results reveal that universities contribute to the development of student entrepreneurial skills in various ways, but currently relatively few students benefit from entrepreneurship training.

This section looks at universities' strategic attention to innovation, how innovation strategies can be implemented, and the enabling conditions for innovation. It further helps build a picture of university innovation capacity, which involves three distinct but closely related aspects: the university's approach to stimulating innovation, the development of student entrepreneurial and innovation mindsets, and the collaboration with partners in the innovation ecosystem.

The survey collected information from a wide variety of higher education institutions with different levels of innovation involvement. The aggregated data allowed us to identify two main respondent profiles. "Leading innovators" are institutions with mature innovation policies and processes. These institutions feature strong collaborations with external partners, high innovation capacity, and have a strong commitment to societal impact. "Emerging innovators" are in the process of developing their innovation capacity. These institutions are strong in one or several innovation areas, and eager to raise their innovation profile, e.g., by learning from others.

University innovation strategies

Respondents were asked if their institution has a strategy or mission statement that reflects its innovation agenda. Over seven out of ten reported having one (Figure 5), and more than 80% of these institutions also have an implementation plan to support that strategy (Figure 6).

Figure 5: University strategies/mission statements reflecting an innovation agenda
Q1. Does your institution have a strategy or mission statement that reflects its innovation agenda?
Number of respondents: 166/166.

- Yes
- No, but we are in the process of developing/updating one
- No
- Don't know
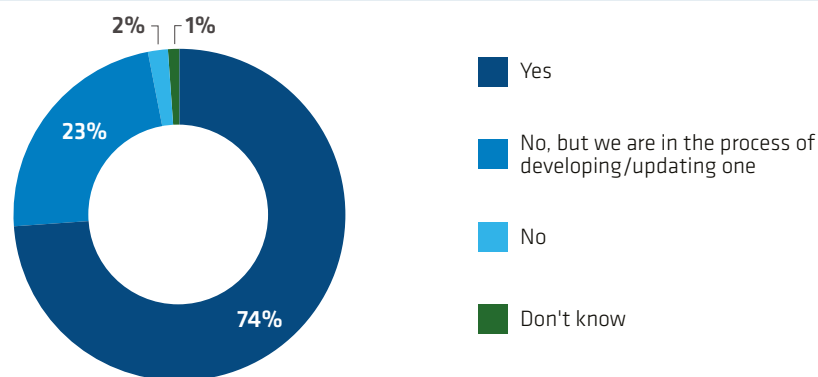
Figure 6: Existence of implementation plans to support strategies
Q1.1. Does your institution have a plan to support implementation of this strategy or mission statement in the area of innovation?
Number of respondents: 123/123.

- Yes
- No, but we are in the process of developing/updating one
- Yes, but the plan is not being implemented (yet)
- Don't know
- No
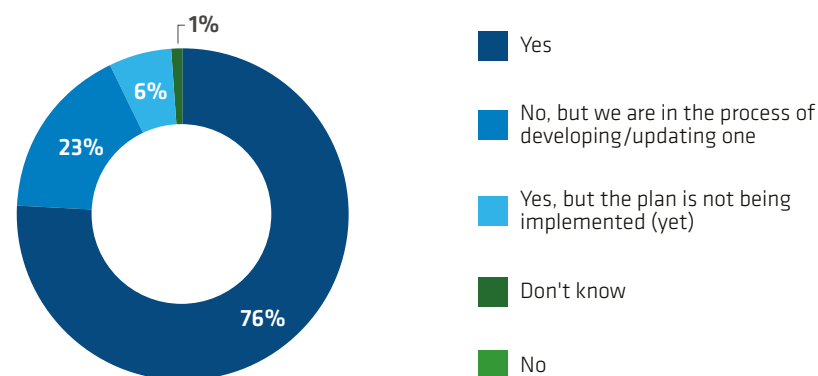
In most cases, the innovation agenda is included in the general institutional strategy, along with other institutional missions. In some cases, the innovation agenda is part of the research strategy or dedicated mission statements, e.g., on knowledge and technology transfer.

Many of these strategies address the broad concept of innovation, including the universities' contributions to building a sustainable society, for example through social innovation.[3]

❝ *Selected responses*

"Innovation is addressed from three mutually interrelated perspectives: 1) Policies and incentives for quality innovation, 2) Interplay between actors in the innovation ecosystem to support flow and collaboration, and 3) Faculty and student entrepreneurial ability to create impact."

"Innovation is one of the core aspects of our strategy. It shapes the transformation of the university into a complex hub of innovation while preserving high standards of research and education. The institution is committed to enhancing its innovation capacity and engaging in its third mission, in addition to technology transfer activities. National and international co-operations with academia, industry and society support these goals."

"Our mission statement commits us to fundamental knowledge-generating research and solution-oriented applications of science, as well as to critical reflection on the effects of application-related innovations. We promote inter- and transdisciplinary research cooperation in order to address current challenges and urgent future questions by combining scientific and practical expertise. We want to shape the social innovation processes these produce in an interdisciplinary manner, based on partnerships, and to reflect on their conditions, constructs and effects."

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3 The most cited areas of innovation strategies/mission statements were: innovation in teaching, research-based innovation, entrepreneurship, knowledge and technology transfer, IP management, collaboration with partners, innovation through multidisciplinarity, staff incentives, infrastructure (for example, for prototype generation), social innovation, contribution to sustainable society, contribution to the regional innovation ecosystem, measuring innovation impact, shared institutional vision of innovation, existence of leadership positions responsible for innovation.

When looking at the specific area of knowledge and technology transfer, respondents reported an increased focus on commercialisation in recent years. Some 86% of the surveyed institutions already have a Technology Transfer Office (TTO), which is either an integral part of the university, or an external subsidiary with substantial university ownership (Figure 7).

Figure 7: Technology transfer offices at universities
Q11. Does your institution have a technology transfer office?
Number of respondents: 165/166.

- Yes, as an integral part of the university
- Yes, as an external subsidiary company with substantial university ownership
- No
- No, but we purchase services from external providers
- Don't know
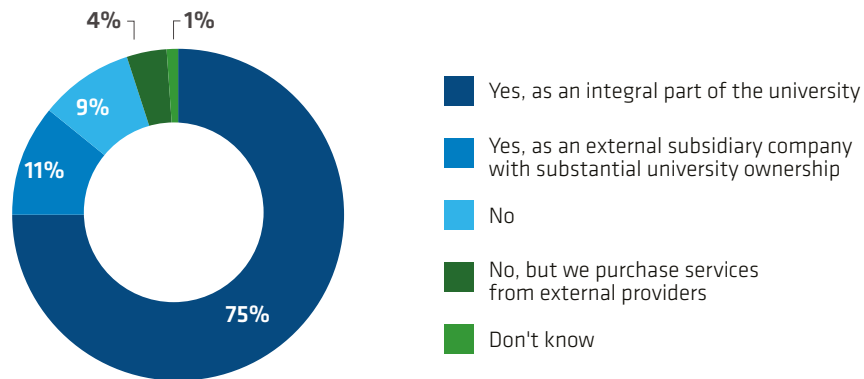
National and regional university innovation capacity assessment systems

The survey investigated whether countries and regions have university innovation capacity assessment systems. It found that nearly 50% of the surveyed institutions are in countries or regions where such systems are in place (Figure 8).

University innovation capacity assessment systems often form part of overall university performance frameworks. In some cases, dedicated systems also assess university innovation, e.g., Knowledge Exchange Framework UK, Italian Third Mission and Societal Impact of Universities and Research Institutes, or Knowledge Transfer Ireland through the Annual Knowledge Transfer Survey. These systems notably assess university knowledge exchange and commercialisation

activities, patent activity, preparing the ground for start-up and spin-off companies, and academic entrepreneurship. In the regional context, they also assess universities' role in smart specialisation, collaborations with partners in the innovation ecosystem, or knowledge transfer to regional companies.

Such frameworks are coordinated by dedicated national or regional agencies. One such example is the Italian National Agency for the Evaluation of Universities and Research Institutes (ANVUR), which runs university assessment in various fields including innovation, and, more broadly, the third mission. ANVUR assesses case studies provided by the institutions it evaluates (illustrating innovation and public engagement activities,) against a set of criteria, notably analysing their economic, social and cultural impact, and relevance to their geographic setting (local, national or international). Other countries and regions also have agencies responsible for assessing university innovation capacity, e.g. Innosuisse, the Swiss innovation agency, the Slovak Innovation and Energy Agency (SIEA), and the Valencian Innovation Agency, Spain.

Figure 8: Existence of national/regional university innovation capacity assessment systems
Q4. Does your country or region have an official university innovation capacity assessment system?
Number of respondents: 166/166.

- Yes
- No
- Don't know
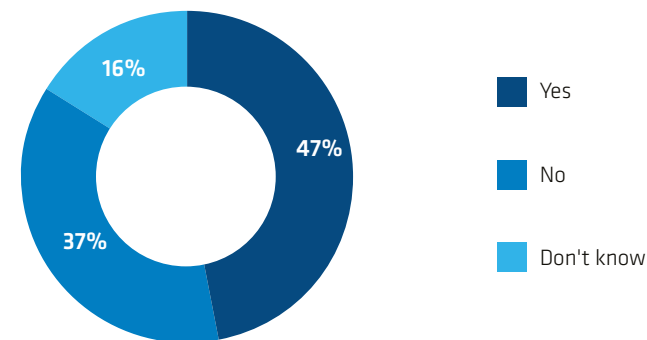
Some systems are designed as self-assessment tools, but there are also cases where assessment frameworks are linked to performance-based funding. For example, in Italy, a share of public university funding is granted based on the institution's capacity to innovate and improve its performance. Universities often use other assessment tools to complement national or regional frameworks, notably the HEInnovate self-assessment system, which is a joint European Commission and Organisation for Economic Co-operation and Development (OECD) initiative.

Strategic attention to innovation vs. innovation capacity

Respondents were asked to assess their institution's strategic attention to innovation[4] and institutional innovation capacity.[5] While 75% answered that their strategic attention to innovation is high or very high, only 60% rated their innovation capacity at a similar level (Figure 9).

Respondents notably attributed this difference to limited resources. University capacity to innovate is hindered by the limited staff resources available to fulfil all university missions, and limited incentives to increase staff motivation to engage in innovation, in particular through career assessment. It also seems that the lack of sufficient funding, especially for long-term oriented research, and the lack of space for researchers, students and other innovation ecosystem actors to engage in co-creation are equally important.

Other frequently cited reasons for a lower innovation capacity score are: the lack of common institutional innovation vision, varying degrees of innovation capacity across departments, faculties and services (often depending on the discipline), and effective coordination between central leadership and other services.

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4   Most respondents view collaboration with partners in the area of innovation, research commercialisation, business creation and strong institutional leadership and individuals (e.g., high-level management positions and bodies dedicated to innovation, individual professors or small groups of staff) as the most important aspects of their institution's strategic attention to innovation.

5   Institutional innovation capacity was most frequently assessed against indicators such as: access to resources, existence of a common institutional innovation culture, variety of innovation activities (e.g., research-based innovation, student-led innovation and entrepreneurial activities, social innovation, innovation in teaching), number of spin-offs, patents and innovation projects, effectiveness of staff incentives, effective and long-term partnership, and existence of innovation and business support services.

Figure 9: Assessment of the overall institutional strategic attention to innovation and innovation capacity

Q2. How would you assess your institution's overall strategic attention to innovation? Number of respondents: 166/166.

Q3. How would you assess your institution's overall innovation capacity? Number of respondents: 166/166.
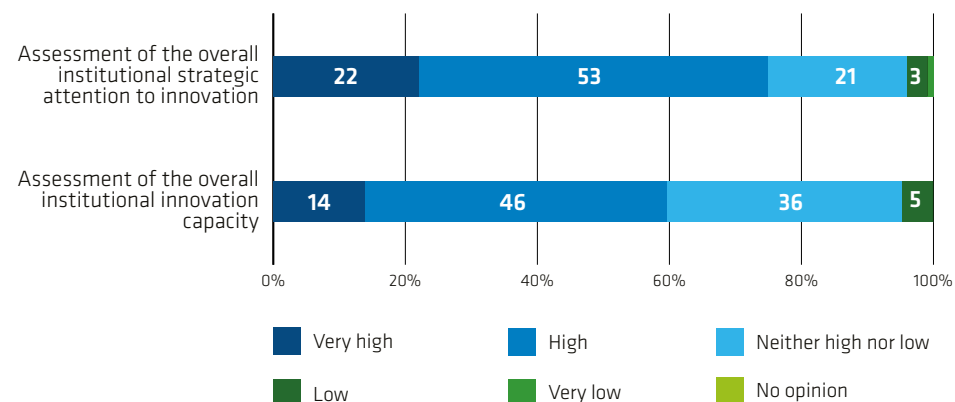
Examples of good practices

The **Hungarian University of Agriculture and Life Sciences** established an Innovation Centre – a dedicated department in charge of innovation-related services and activities. The Innovation Centre has headquarters (HQ) and two regional offices. HQ is responsible for administration and coordination, while regional offices engage with the daily operation of the university's innovation activities. The Innovation Centre established strong cooperation with all units in terms of R&D assessment, administration, analyses, and communication. It also developed the "Single Contact Point" to make corporate-relations processes more transparent.

SPINplace is a centre of creativity and coworking space at the **University of Silesia**, Poland. It is dedicated to group work, lectures, and entrepreneurship and business training. Its public nature and recurrent events foster the exchange of ideas and experiences between students, entrepreneurs, local government, and the local community in an unrestricted and spontaneous manner. SPINplace aims to animate interdisciplinary research and projects by creating partnerships in which applied knowledge is used to solve challenges posed by companies, the local government and citizens.

Framework conditions for university innovation

Respondents were asked about the importance of framework conditions to enhancing their institutional innovation capacity. The top responses again demonstrate that resources (staff and funding) are the precondition that enable universities to innovate (Figure 10). Over 95% of respondents consider qualified teaching, research and administrative staff, as well as sufficient and sustainable funding as either very important or important to their innovation capacity.

Cooperation between the different innovation ecosystem players is considered nearly as important as qualified staff and funding. Relationships with actors outside the innovation ecosystem are also key, with over 80% of respondents considering connections to global innovation communities as very important or important.

Efficient institutional governance structures and institutional autonomy also proved crucial to enhancing university innovation capacity. Over 90% of the respondents view efficient institutional governance structures and institutional autonomy as necessary for the development of innovative and evidence-based solutions to societal challenges, allowing them to act as honest brokers in innovation ecosystems, and to engage with society.

The regulatory framework (tax, procurement, sectorial, environmental and safety regulations) was given less importance, except for IP regulations, which over 80% of the respondents considered very important or important for their innovation capacity. This echoes the results of other questions and reveals the increasing importance of IP at the institutions surveyed.

Figure 10: Level of importance of framework conditions for enhancing institutional innovation capacity
Q5. How important are the following framework conditions for enhancing your institution's innovation capacity?
Number of respondents: 164-166/166.

Framework condition	Very important	Important	Moderately important	Less important	Not important	Not applicable
Qualified teaching, research and administrative staff	73	23	4			
Sufficient and sustainable funding for innovation activities	66	30	4			
Cooperation among different actors in the innovation ecosystems	64	31	4			
Efficient institutional governance structures	48	44	6			
Institutional autonomy	43	48	7			
Intellectual property regulations	42	41	13			
Connections to global innovation communities	39	45	14			
State-aid rules	22	47	21	7		
Procurement regulations	18	33	32	10	3	3
Environmental and safety regulations	17	37	30	9	4	
Sectorial regulations (e.g., energy, health, digital)	16	47	23	6	6	
Tax regulations	15	33	30	16	3	

Development of student entrepreneurial & innovation skills

Respondents were asked to estimate the percentage of students who participate in or take advantage of activities contributing to the development of entrepreneurial and other skills needed in innovation processes. The results reveal that universities contribute to the development of such skills in various ways, but most frequently through collaboration with external actors (Figure 11). The highest proportion of student involvement was achieved through internships at partner organisations/community service; nevertheless, the response pattern was very heterogeneous, suggesting that the proportion of students involved in these internships varies widely depending on the institution. Bachelor's, Master's and Doctoral theses in collaboration with external actors also seem common practice. Additionally, relatively high percentages of students taking courses using innovative methods (e.g., interdisciplinary or challenge-based learning) were reported.

The results show that there is still room for improvement in the development of student entrepreneurial mindsets when it comes to other activities. Currently, relatively few students benefit from entrepreneurial training. Such courses are often not included in the curriculum. In many cases, they are offered as an extracurricular activity, but achieve low participation rates, as students do not consider them relevant for their future careers. Student-led innovation/entrepreneurial initiatives and start-ups seem to be the activities least practiced.

Nonetheless, many universities reported programmes aiming to develop strong student entrepreneurial skills, which indicates that the issue is gaining ground. A good example is the **University of Cagliari**'s "Contamination Lab" (CLab UniCa), an action-oriented training programme for students. Students join entrepreneurial teams made up of four members with different backgrounds and start a real business, tapping into the technological know-how available at the university. Ultimately, students experience the entire entrepreneurial process, from planning to launch and then manage a real business. None of the steps are simulated, because they all take place in a real business environment. CLab UniCa fosters collaboration between students across all academic disciplines, and faculty members, entrepreneurs and members of the innovation community,

Figure 11: Student participation in activities contributing to the development of entrepreneurial and other skills needed in innovation processes
Q7. Which activities at your institution contribute to the development of student entrepreneurial or other skills needed in innovation processes? Please provide an approximate percentage of the student body that participates or takes advantage of these activities.
Number of respondents: 135-151/166.
Note: The blue bars show the 25th to the 75th quartiles; the black line inside the blue bar is the median.
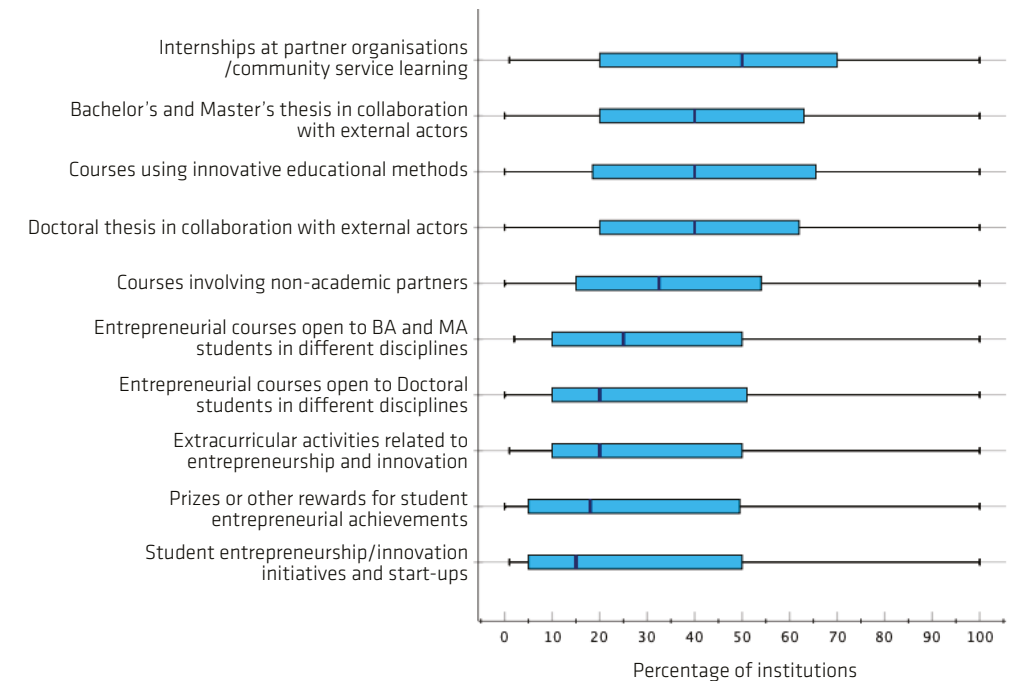
seeking to foster an entrepreneurial ecosystem. To support its efforts, CLab UniCa maintains strong ties and partnerships with business incubators, accelerators, research centres and other important local innovation actors.

The GROWTHhub project, which is a **Technological University Dublin** initiative, is another good example. The project is designed to encourage an entrepreneurial mindset to achieve new ways of thinking, education, research, and engagement. It aims to achieve this by creating a supporting environment that stimulates a culture of idea generation, exploration and implementation. The initiative is open to all students, from apprenticeships through to doctoral students, in all disciplines. The project includes "Entrepreneurship Education Bursaries" – a competition which supports the design and development of educational resources in any discipline. It aims to support the different stages of student entrepreneurial learning and development, the development of entrepreneurial mindsets and capabilities, and the reinforcement of qualities that support entrepreneurial effectiveness, such as independent self-management.

The challenges of promoting student entrepreneurial mindsets

To delve deeper into the topic of student entrepreneurship, an open-ended question asked survey participants to list the challenges of promoting entrepreneurial and innovation mindsets among students at their institutions. Their answers fell into three categories: student motivation, institutional obstacles, and the organisation of national systems.

1. Student motivation

A key challenge to promoting student entrepreneurship and innovation mindsets seems to be the lack of student awareness that these skills can also be beneficial in non-business career paths. Some respondents see achieving early-stage student engagement and motivation as particularly challenging (among those who have not considered self-employment).

Respondents also mentioned that it is easier to engage students in entrepreneurship when this is part of the curriculum or a student incubator programme, rather than an extra-curricular activity. Yet entrepreneurship courses are not embedded in the curriculum at many institutions.

❝

Selected responses

"The biggest challenges concern student motivation. Students polarise between those gravitating towards entrepreneurship and those who want to concentrate on their chosen field of study and do not see how entrepreneurial and innovation mindsets are relevant to this path. We believe making entrepreneurship courses mandatory would only aggravate this situation. So we built initiatives integrating entrepreneurial themes and content into non-business courses. We aim to reach all our students in this way."

"Many students are under increasing pressure to perform well during their degree studies, lots take a part-time job, and also need to engage in other social activities. So they have little time left to explore activities such as entrepreneurship and setting-up a business, which can be time consuming and entail the real risk(s) of venture failure."

2. Institutional obstacles

The main institutional obstacle respondents listed are: difficulties in teaching entrepreneurship in a way which appeals to students from different disciplines, and that does not convey a pure "start-up, for profit" message. Such training rarely focuses on developing transversal skills, e.g., risk taking, networking, or creative thinking, which could make it more attractive to a larger cohort.

Survey participants also mentioned a lack of coordination and lack of agreement on the right strategy to enhance student entrepreneurship between departments/faculties. Other frequently mentioned institutional obstacles include the limited resources available to recruit staff to deliver entrepreneurial courses, and a lack of appropriate incentives for staff to engage in promoting student entrepreneurship as part of their respective curricula. The absence of dedicated infrastructure, e.g., co-working spaces or incubators, is also mentioned as a key challenge. Some respondents also emphasized that insufficient cooperation with external partners limits their ability to identify role models who could take part in entrepreneurial courses. Such cooperation often relies heavily on the personal contacts of individual staff members, rather than institutional partnerships with external organisations.

3. Organisation of national systems

Some respondents noted that primary and secondary schools provide few opportunities for students to acquire entrepreneurial knowledge and develop entrepreneurial mindsets, e.g., through project learning or challenge-based learning. As a result, higher education students often lack the interest and motivation to engage in entrepreneurial activities.

Availability of staff with innovation skills and competencies

Survey participants were asked to indicate the availability of staff with the skills and competencies needed to enhance their institutional innovation capacity. Most respondents indicated partial staff availability in all five categories of skills and competencies (Figure 12).

The results revealed that skills in partnership/project development with external actors are important. More than a third of respondents had complete access to such skills, whereas most of the remaining institutions indicated that, while available, further access to these skills is needed.

Figure 12: Availability of staff with different skills and competencies needed to enhance institutional innovation capacity
Q8. Please indicate the availability of staff with different skills and competencies needed to enhance your institution's innovation capacity.
Number of respondents: 166/166.
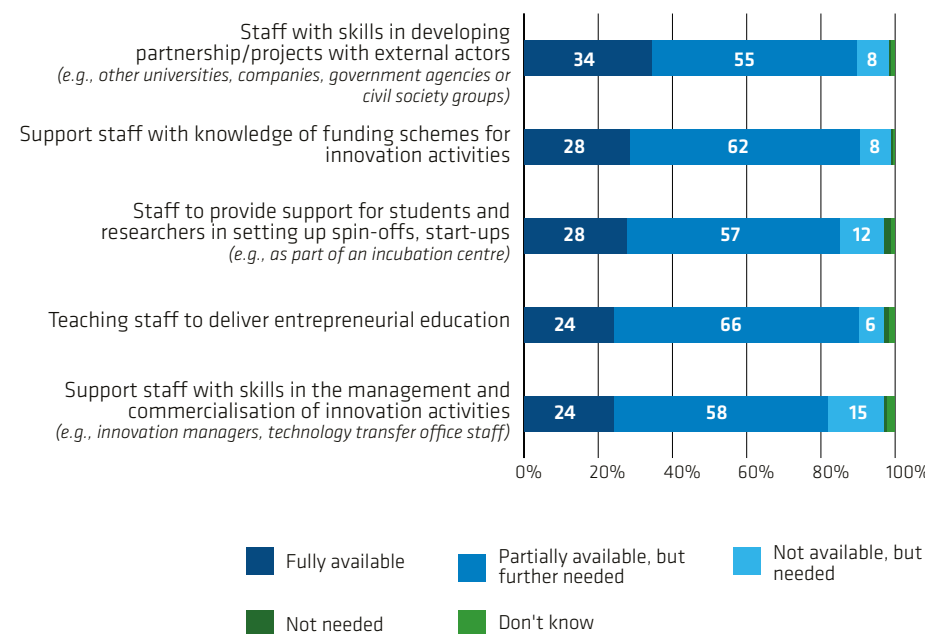
Some 76% of universities feel they require more staff with entrepreneurial experience, or the capability to deliver business-skills education, which echoes the results of previous questions. Aside from this category, management and commercialisation of innovation activities, and the ability to help students and researchers set up companies are the other most needed skills.

Support for staff

Respondents were asked to list the support mechanisms, incentives and rewards aiming to enhance institutional innovation capacity available. Their answers placed support for the commercialisation processes and dedicated support services (such as for setting up a company,) in the top two positions (Figure 13).

Building motivation and the individual capacity to innovate seem less common at the institutions surveyed. For example, developing staff entrepreneurial and innovation skills is observed at only 50% of institutions, which is consistent with responses to the previous questions acknowledging the need for an increased focus on career development.

Recognising staff innovation activities as part of career assessment is not yet common practice at many institutions, in particular when innovation is considered in the broader sense, beyond IP commercialisation and establishing innovative businesses.

Figure 13: Support for academic staff to enhance institutional innovation capacity
Q9. What support does your institution give (research, teaching, and management) staff to enhance institutional innovation capacity? Multiple-choice question.
Number of respondents: 165/166.

Category	Value
Support for the commercialisation of ideas/research results	73
Dedicated support services (e.g., facilitating engagement with business or setting up spin-offs)	72
Informal incentives (e.g., prizes or awards)	50
Career development (e.g., skills development plans, training, or development sabbaticals)	50
Dedicated funding for staff innovation activities	46
Flexible contract arrangements allowing for temporary/part-time positions at non-academic organisations	38
Career assessment	33
Financial incentives (e.g., salary increases)	27
Other	5
Don't know	3
None of the above	1

Innovation partners

The survey also investigated the profiles and structure of university innovation partners. The results reveal that the institutions surveyed are well connected to other stakeholders (Figure 14). They collaborate with all types of actors at local, national and international levels.

Figure 14: Partnerships in the area of innovation
Q10. Which partners does your institution work with in the area of innovation?
Number of respondents: 157-165/166.

Partner	To a large extent	To a moderate extent	To a small extent	Not at all	Don't know
Local/regional public sector institutions	55	35	8		
Other universities in your country	52	35	10		
Research organisations	46	40	11		
National public sector institutions	43	37	17		
Large companies	38	36	21	3	
Technology and business support organisations	36	33	25	4	
Universities in other European countries	35	41	21		
Small and medium enterprises	34	47	16		
Start-ups	24	41	29	5	
European Institutions	23	33	37	4	3
Universities outside Europe	17	35	37	8	3
Civil society organisations	17	37	37	6	3
Private higher education institutions	8	18	39	22	12
Other education institutions	7	33	42	11	6

Looking at the breakdown of partners shows that the most important innovation partners for universities are local/regional public institutions. This is due to their substantial role in orchestrating regional innovation ecosystems, particularly in coordinating local/regional innovation strategies, for example in smart specialisation. Interestingly, levels of collaboration with local/regional public sector institutions varies with the institutional profile. Further analysis shows that comprehensive institutions tend to partner with local/regional public sector institutions to a larger extent than technical universities and specialist institutions[6] (Figure 15).

Figure 15: Partnerships with local/regional public sector institutions according to institutional profile
*Note: * indicates that the percentages between the bars are statistically significant.*

Institution	To a large extent	To a moderate extent
Comprehensive institution	69%	31%
Specialist institution	30%	70%
Technical university	41%	59%

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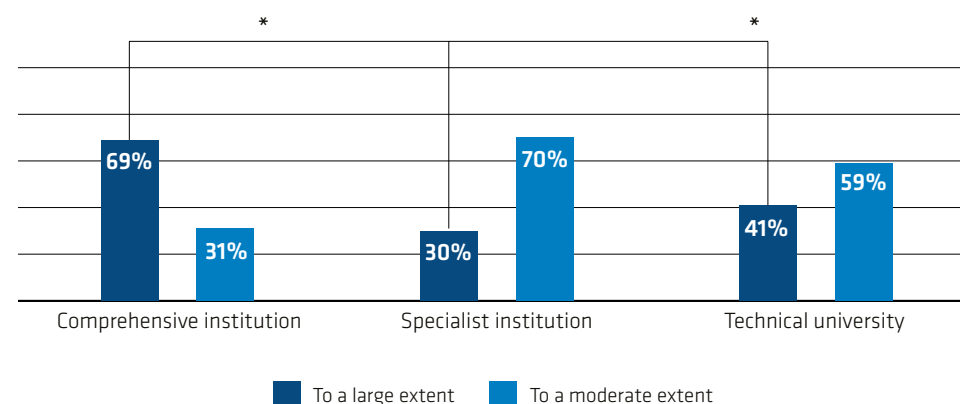
6   A chi-square test of independence was performed: $\chi^2(3, N= 147)= 10.488$, *p*= <.05, *V*= .27.

Most of the surveyed institutions collaborate with large companies, small and medium enterprises (SMEs) and start-ups to an either large or moderate extent, which is a positive result. However, universities work with business to a smaller extent than with public authorities, other national universities in their countries and research organisations. Additional analysis shows that partnership structures also depend on the strategic attention given to innovation: institutions that rate their strategic attention to innovation more highly (see Figure 9) tend to work more with companies (in particular large businesses and start-ups). These same institutions also generally engage in more regular partnerships with civil society organisations.[7]

>> *Examples of good practices*

CORIMAV is a **University of Milano-Bicocca** and Pirelli &C. Spa consortium. Established in 2001, the consortium between the institution and the leading high-end tyre company is an example of successful academic-industry cooperation to: develop new technologies in the field of new materials, support research and technological innovation, and to promote initiatives for early-stage researcher training and professional development. The consortium funds three annual scholarships for the industrial doctorate programme in Materials Science – and has granted over 46 PhD scholarships so far. Doctoral candidates are given both an academic and industrial supervisor during their studies. Inputs from both sides have been important sources of inspiration and guidance. Pirelli experts give lectures and seminars on various topics, such as R&D management and intellectual property. Since its foundation, the consortium has given rise to over 40 scientific publications and 16 patent applications, some of which are of great utility in the field of high-performance tyres. CORIMAV joint research activities have involved researchers from various university departments, including Materials Sciences, Biotechnology and Biosciences, Physics, Earth and Environmental Sciences, Statistics and IT, Systems and Communication.

CONVENE is a collaborative project between the **Technological University Dublin** (TU Dublin) and the **University College Dublin** (UCD). This major initiative aims to "Transform university-enterprise engagement for a new co-learning ecosystem in Dublin". It unites 34 enterprise partners, the UCD Innovation Academy, and 12 schools, 3 innovation centres and 5 research units from TU Dublin. CONVENE will deliver the skills and innovation needed to rebuild Irish enterprise for sustainability and resilience in the wake of COVID-19.

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7   Using the Spearman rank-order correlation: large companies $r_s(150)= 0.329$, $p<0.001$; start-ups rs(148)= 0.300, p<0.001; civil society organisations $r_s(143)= 0.294$, $p<0.001$.

Sources of university innovation funding

The survey also investigated the relative importance of the funding sources for university innovation activities. National competitive funding is revealed as the most important source of university innovation funding (Figure 16). Nearly 90% of respondents consider it very important or important to financing university innovation activities.

When it comes to European funding sources, Erasmus+ is widely used for university innovation. This resonates with other survey results, in which respondents indicated the high priority given to innovation in learning and teaching, and where innovation partnerships with other organisations were high on their strategic agendas. These priorities are supported by Erasmus+, which may explain the high importance attributed to the programme.

Figure 16: Funding sources for innovation activities at universities
Q12. Please specify how important the following different funding sources used by your institution are for innovation activities.
Number of respondents: 158-164/166.
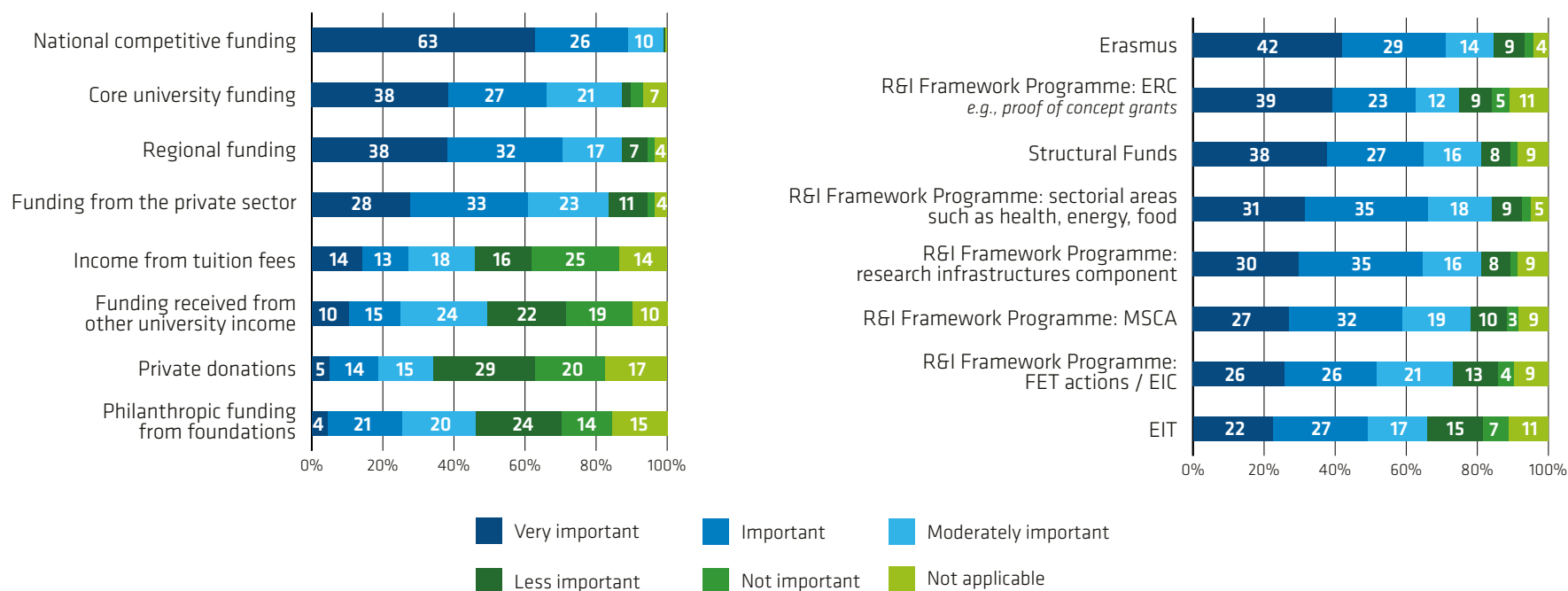
Structural Funds and Horizon 2020 are also important sources of university innovation funding, but with some differences between the components of the latter programme. The European Institute of Innovation and Technology (EIT) and Future and Emerging Technologies (FET) actions, currently supported through the European Innovation Council (EIC), are not yet seen as very important sources of university innovation funding. However, further analysis revealed that institutions with higher innovation capacity scores, tend to consider EIT and EIC funding more important,[8] which may mean that further innovation capacity building is needed at the other universities. The relationship between the institution's innovation capacity and the importance ascribed to EIT and EIC funding is illustrated in Table 1 and Table 2, respectively.

Table 1: Institution's overall innovation capacity (Q3) and level of importance of EIT funding
Number of respondents: 143/166.
Notes: in importance of EIT funding the following categories were aggregated: less important and not important; very important and important. In importance of the institution's overall innovation capacity the following categories were aggregated: very low and low; high and very high. Percentages are based on the total number of institutions that replied to both questions.

		Level of importance of EIT funding		
		low importance	moderate importance	high importance
Institution's overall innovation capacity	very low/low	2.8%	0.7%	1.4%
	neither high nor low	13.3%	7.7%	14.7%
	high/very high	9.8%	10.5%	39.2%

Table 2: Institution's overall innovation capacity (Q3) and level of importance of EIC funding
Number of respondents: 147/166.
Notes: in importance of EIC funding the following categories were aggregated: less important and not important; very important and important. In importance of the institution's overall innovation capacity the following categories were aggregated: very low and low; high and very high. Percentages are based on the total number of institutions that replied to both questions.

		Level of importance of EIC funding		
		low importance	moderate importance	high importance
Institution's overall innovation capacity	very low/low	0.7%	2.7%	1.4%
	neither high nor low	12.2%	6.8%	16.3%
	high/very high	6.1%	14.3%	39.5%

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8   Using the Spearman rank-order correlation: EIT $r_s(136)= 0.293$, $p<0.05$; EIC $r_s(140)= 0.321$, $p<0.001$.

Existence of frameworks for handling innovation conflicts of interest

The survey also investigated the existence of frameworks for handling innovation conflicts of interest, which is an important aspect of enhancing the university's role as an honest broker. The results revealed that 43% of surveyed institutions have this kind of framework (either as part of internal or external/national policies, codes of conduct, guidelines, etc.), whereas 56% are yet to establish one or are unaware of its existence (Figure 17).

Analysis of these frameworks reveals that they generally establish principles and practices, in particular for research-related engagement with industry, IP and research commercialisation activities, the formation of spin-off companies, and secondary employment.

Figure 17: Existence of frameworks for handling conflicts of interest in innovation
Q6. Is your institution's role as an honest broker embedded in a framework (e.g., code of practice, policy, set of guidelines) for handling conflicts of interest in innovation?
Number of respondents: 166/166.

- Yes — 43%
- No, but we are developing one — 27%
- No — 15%
- Don't know — 15%
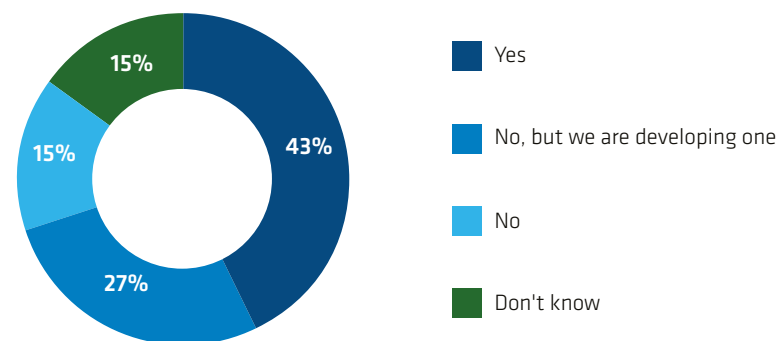
Chapter 2
Sustainable transition

Key findings

◈ **There is widely shared optimism that Europe's research and innovation capabilities will allow it to achieve a sustainable transition.** 77% of respondents agree that Europe is capable of disruptive innovation that could achieve the major changes necessary for sustainability.

◈ **Universities' innovation activities for the sustainable transition are equally reliant on their research and education missions.** Among the ways they contribute to innovation for the sustainable transition, 88% of respondents list the development of new technologies based on research, followed by improving student and staff understanding of sustainability (85%).

◈ **Universities pay particular attention to interdisciplinarity in accelerating the sustainable transition.** More than 70% of respondents regard the creation of interdisciplinary institutes as either very important or important for innovation in the sustainable transition.

◈ **The number of partnerships is the most widely used indicator by which universities measure their innovation success.** 68% of respondents use it to a large or to a moderate extent for innovation in the sustainable transition.

Universities are working to improve environmental sustainability through both their scientific contributions to, and their institutional alignment with, national or international agendas to achieve climate neutrality. This chapter explores how universities' innovation mission and capacity translate into concrete activities that help deliver a sustainable transition. The following sections address various relevant aspects, such as: the myriad ways in which universities contribute to the transition, the respective role played by their research and education missions, as well as the indicators by which universities measure their success as innovators. This chapter also captures the respondents' level of agreement on whether decision-makers and other stakeholders perceive them as honest brokers in the context of the sustainable transition.

Contributions and paths to innovation for a sustainable transition

In order to build an overview of the ways in which universities innovate for a sustainable transition, the survey investigated a selection of activities through which they contribute to this area (Figure 18). While it is particularly encouraging that each answer option scored above 40%, the top three responses show that research and education are the leading ways through which universities contribute to innovation for a sustainable transition: developing new technologies through university research activity (88%), improving student and staff understanding of sustainability (85%) and their competence to innovate (78%).

Figure 18 reveals two noteworthy contrasts between the top and lower-ranking responses. Firstly, the gap between developing new technologies through university research activity (88%) and university contributions to changing consumer behaviours in society (46%) shows an imbalance between how technological innovations and socially targeted interventions are pursued. Secondly, there is a distinct gap between university contributions to reducing the environmental impact of existing infrastructures (70%), and to improving the resilience of infrastructures to the effects of climate change (50%). This reveals a contrast in the way universities contribute to climate change mitigation versus adaptation, which are both key pillars of a sustainable transition.

Figure 18: University contributions to innovation for a sustainable transition
Q13. How does your institution contribute to innovation for a sustainable transition? Multiple-choice question.
Number of respondents: 165/166.
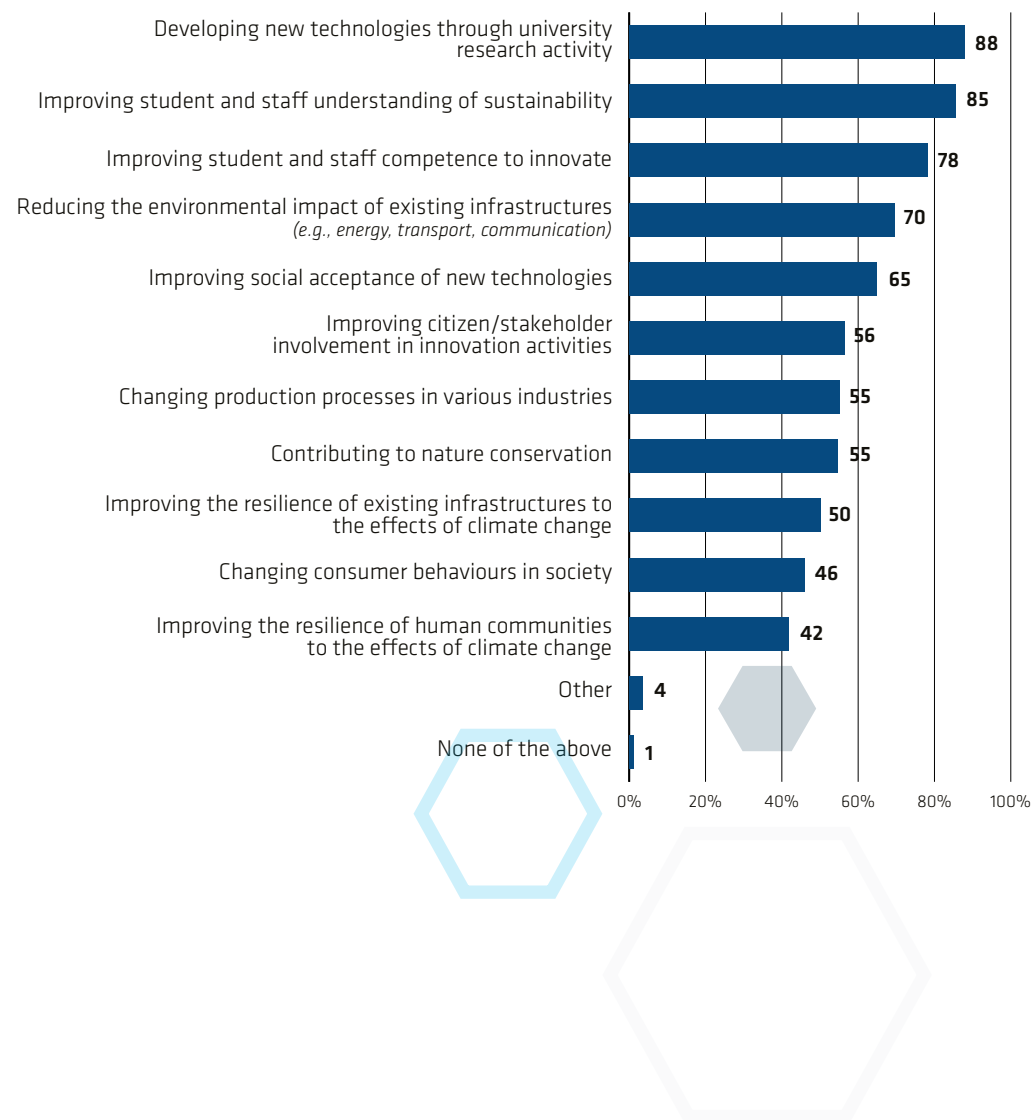
The initial overview of university contributions to the sustainable transition was complemented by a question asking about the main pathways leading to innovation in this area (Figure 19). This showed that blue-sky research and nurturing innovative talent via skills uptake can both, equally, lead to new solutions. Most universities see both as relevant, underlining how research, education, and innovation missions are pursued in unison to achieve the sustainable transition.

>> *Examples of good practices*

The **University of St Andrews** is developing a new innovation campus (Eden Campus) on a former industrial site, which will be home to start-up and spin-out activity, as well as collaborative R&D with external companies. The site will include facilities for the development and testing of low-carbon technologies, such as fuel cells and new forms of batteries. It will also include demonstration facilities for carbon capture and utilisation activities and an additive manufacturing space for rapid prototyping. The campus has been designed with user companies and is based on the successful translation of research from academia to commercialisation.

The Department of Chemical Engineering at the **University of Almería** coordinated the Horizon 2020 SABANA project to implement a world reference centre for the research and development of microalgae biotechnology in Almería. The university also participates in the "Scientific Infrastructures for Global Change Monitoring and Adaptation in Andalusia (INDALO)" research project to study the biodiversity of the representative ecosystems of Andalusia and analyse their evolution in order to detect and understand the consequences of climate change, changes in land use, demographic and productive changes in ecosystems, and contributions to human well-being.

Figure 19: Pathways towards innovation for a sustainable transition
Q14. Which of the following pathways best describes how your institution delivers innovation for a sustainable transition?
Number of respondents: 165/166.

From research to innovation: prioritising blue-sky research has led to applied solutions — 17
From education to innovation: prioritising skills uptake for sustainable development has nurtured innovative talent — 19
Both — 54
Other — 1
None of the above — 9
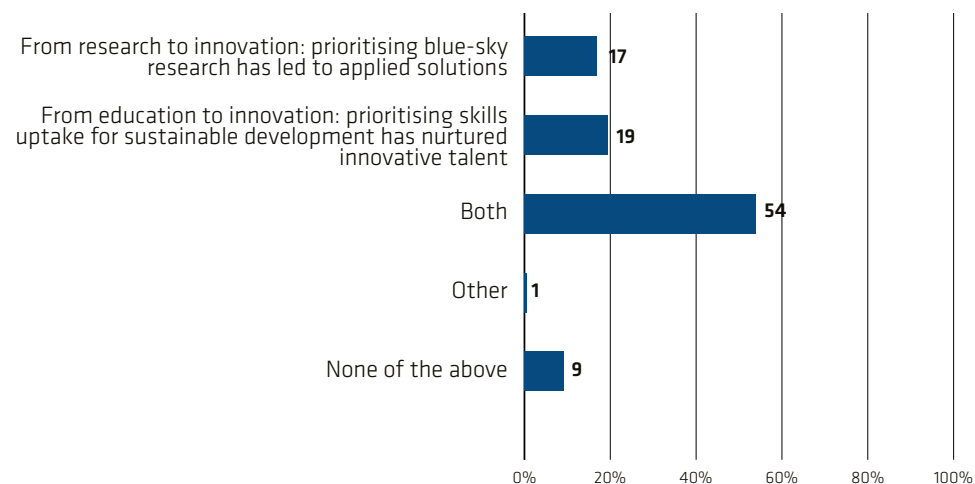
Leading sources of innovation for a sustainable transition

In order to delve deeper into how universities contribute to the sustainable transition, the survey explored where these innovations originate within the institutions. Specifically, it enquired about the departments, faculties, or services leading innovation for a sustainable transition.

Survey participants indicated a wide range of sources, of which the most common were: engineering, life sciences, physics and computer science. Some also mentioned their law, business administration, economics, political science, arts and humanities faculties. Despite their direct relevance to the sustainable transition, few institutions cited architecture, agriculture or medicine, although it is worth remembering that not all universities have these faculties. At the same time, several institutions already have dedicated chairs for sustainability and/or energy, graduate schools for environmental studies, or renewable energy institutes.

Respondents also referred to general innovation services such as TTOs, centres for student entrepreneurship, or business development centres focusing on research valorisation and societal impact. The role of vice-rectors for innovation and knowledge/technology transfer is acknowledged by many respondents, and some also mentioned dedicated positions such as vice-rectors for sustainability or sustainable development, and vice-deans for sustainability at several faculties.

The survey also sought to capture the extent of interdisciplinary collaboration between the various sources of sustainable transition (Figure 20). The responses show that such collaboration is common at the vast majority of universities. Several respondents explained that this stems from their institutional alignment with the Sustainable Development Goals (SDGs).

>> *Examples of good practices*

The Czech Advanced Technology and Research Institute at **Palacký University Olomouc** is committed to the development of new technologies for clean energy and a sustainable environment, thus promoting the health and well-being of society. The Institute's mission is to carry out interdisciplinary research into emerging nanotechnologies, biotechnologies and biomedicine, along with their further advancement and application at the highest international level. It was established in 2020, and integrates the scientific teams belonging to the Centre of the Region Haná for Biotechnological and Agricultural Research (CRH), the Regional Centre of Advanced Technologies and Materials (RCPTM) and the Institute of Molecular and Translational Medicine (IMTM). These three research centres were built between 2010 and 2013 and their research teams have been substantially expanded and internationalised since then.

Figure 20: Existence of plans/strategies for interdisciplinary collaboration between departments, faculties, or services leading innovation for a sustainable transition

Q15.1 Are there plans/strategies for interdisciplinary collaboration between the departments, faculties, or services leading innovation for a sustainable transition?
Number of respondents: 164/166.
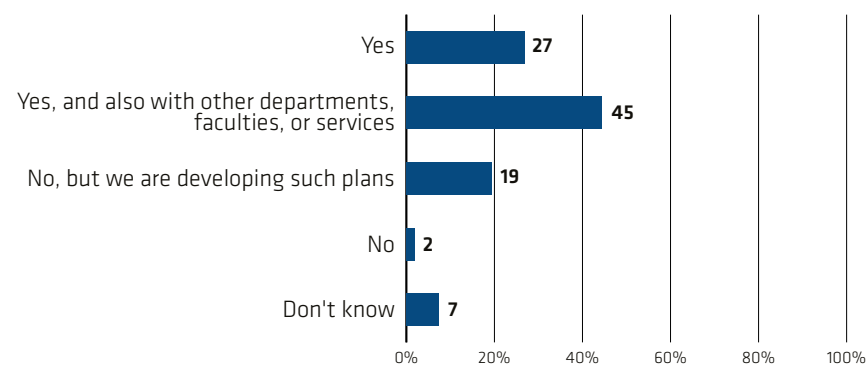
Research and education activities contributing to innovation for a sustainable transition

In addition to providing an overview of the leading departments, faculties, or services that develop innovations for the sustainable transition, the survey focused on specific research and education activities that contribute to this. In line with the previous findings, notably the relevance of developing new technologies based on research, Figure 21 shows the importance of transferring research results to innovations. Improving students' and researchers' awareness of innovation for sustainability is also consistent with the relevance of improving the two groups' understanding of sustainability and their competence to innovate. Moreover, the high level of importance attributed to the creation of interdisciplinary institutes is noteworthy, and echoes the findings shown in Figure 20. Education activities therefore clearly enable universities to fulfil their innovation mission.

≫ *Examples of good practices*

The **University of Szeged** is part of the Hungarian Startup University Programme, a two-semester e-learning course to introduce young people to the world of innovation and to enhance their entrepreneurial mindset and solution-oriented thinking, supported by the Ministry for Innovation and Technology. Additionally, the University's Virtus Enterprise Catalyst Programme aims to catalyse the local start-up ecosystem and innovation milieu to generate cooperation with the capital market and industry players, and to strengthen entrepreneurship among students and researchers. The long-term goal is to boost the establishment of university knowledge-intensive businesses and projects and to increase the influx of venture capital and industrial capital. Within Virtus, SZTE also joined the Demola network, an international innovation challenge platform in which global and local organisations work on solving real business challenges with students, while participating in entrepreneurial events, such as workshops, training sessions, pitching days, and idea challenges.

However, the results also point to a rather limited use of citizen science as a research and teaching tool to help deliver the sustainable transition. Moreover, although entrepreneurial training matters to nearly three quarters of the respondents, only slightly more than a quarter regard it as very important.

Figure 21: Research and education activities contributing to innovation for a sustainable transition
Q16. At your institution, how important are the following research and education activities in delivering innovation for a sustainable transition?
Number of respondents: 160-164/166.

Very important | Important | Moderately important
Less important | Not important | Not applicable
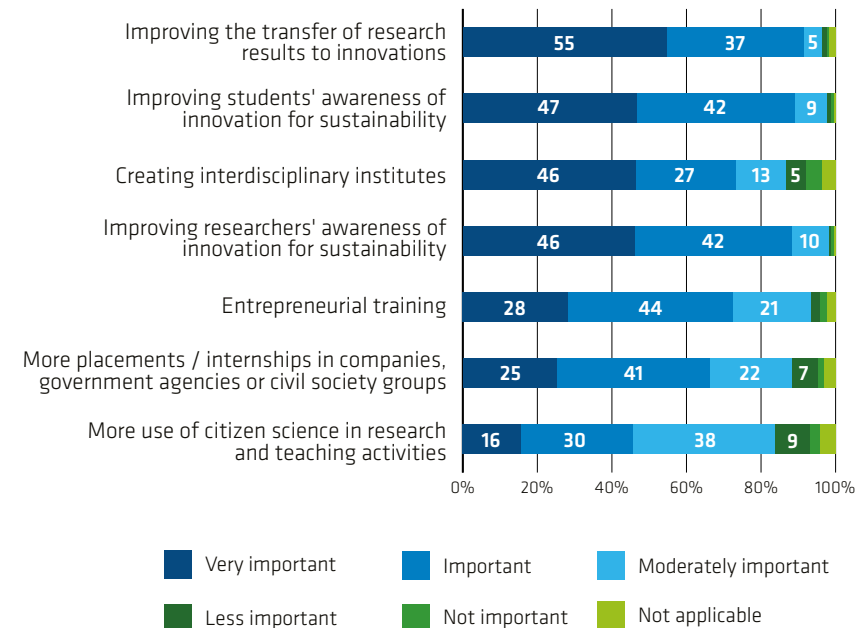
Measures of success used for innovation in the sustainable transition

Figure 22: Measures of success used for innovation in the sustainable transition
Q17. Which measures of success does your institution use for innovation in the area of sustainable transition?
Number of respondents: 159-163/166.
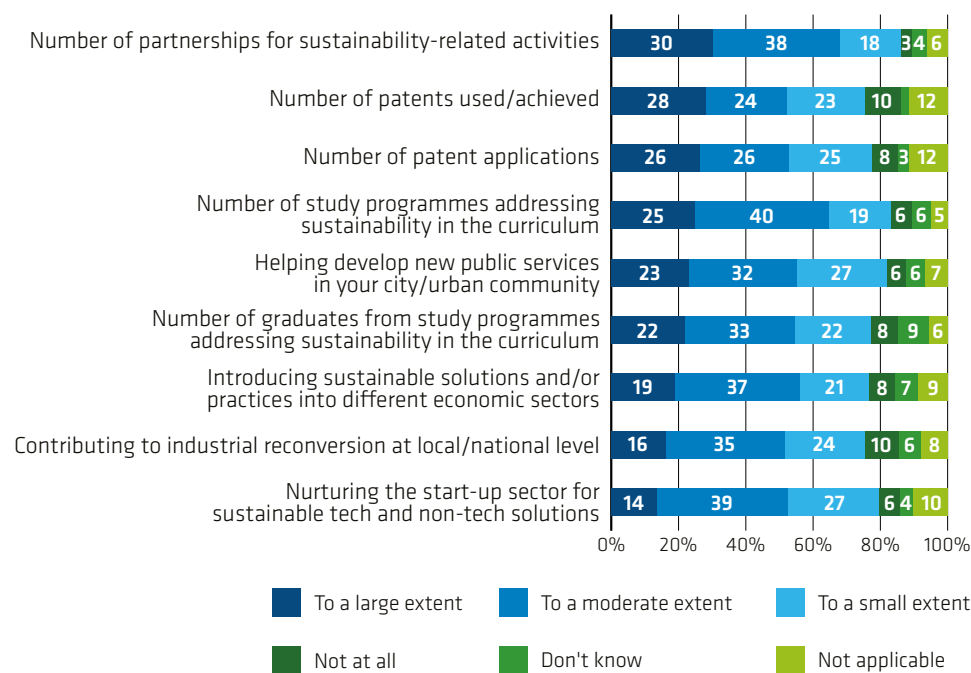
An adequate understanding of why universities contribute to the sustainable transition in the ways outlined requires knowing how they measure their own success as innovators. Institutions' preferred indicators of success are shown in Figure 22. Although all success measures are used by at least 70% of universities, some fine-grained conclusions could be drawn. The fact that the number of partnerships is the top-ranking measure indicates that green innovation depends on collaboration with other actors. More established success measures, such

as patent applications and patents used, are still highly ranked, but these are followed by education-related indicators, like the number of study programmes addressing sustainability and the number of graduates from such programmes. Respondents who chose "Other" mentioned addressing SDGs, as well as the amount of funding secured by R&D projects related to sustainability.

The relationship between the number of partnerships as a measure of success and the specific innovation partners that universities work with (cf. Figure 14) was explored. The results revealed that those institutions which use the number of partnerships as a measure of success to a larger extent tend to work more closely with similar actors from within the R&I community, such as other universities in their own country, research organisations, or universities in other European countries.[9]

>> *Examples of good practices*

Since 2017, the **University of Cagliari** has launched a series of initiatives to study military landscapes, which led to the signature of a dedicated agreement with the Italian Ministry of Defence and related government agencies in 2018. The agreement is based on a particularly virtuous process of knowledge co-creation and transfer, since it provides for the sharing of research, teaching and training programs in the field of engineering and architecture, with a particular interest in technological innovation. It entails transdisciplinary and multi-scalar actions (scientific research, inter-institutional agreements, training internships, conferences and public events) around the theme of the protection, sustainable redevelopment, performance improvement, maintenance and management of historical military settlements (castles, coastal towers, forts, world war defences, barracks, lighthouses, seaplanes and airports etc). This heritage can play a significant role in the development of local territories, especially from the perspective of their reuse for social purposes, and support for local entrepreneurship linked to the artisan supply chain and the tourism sector.

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9   Using the Spearman rank-order correlation: other universities in own country $r_s(136)= 0.291$, $p<0.05$; research organisations $r_s(125)= 0.227$, $p<0.05$; universities in other European countries $r_s(135)= 0.225$, $p<0.05$; civil society organisations $r_s(125)= 0.218$, $p<0.05$; technology and business support organisations $r_s(132)= 0.212$, $p<0.05$; national public sector institutions $r_s(135)= 0.194$, $p<0.05$; and universities outside Europe $r_s(124)= 0.177$, $p<0.05$.

The results also point to limits in universities' use of entrepreneurship to measure their innovation success for the sustainable transition. Only 13% of the respondents indicated that their institutions use nurturing the start-up sector as a measure of success to a large extent, while 27% use this to a small extent. The analysis further reveals that respondents in the former group have higher numbers of students involved in entrepreneurship and start-ups (cf. Figure 11) than those from the latter group.[10]

>> *Examples of good practices*

e-biom is a spin-off that emerged at the **University of Namur**. It was founded with the support of the Walloon Region, and is committed to offering reliable and efficient tools for biological monitoring and ecological assessment. Combining 40 years' experience in applied ecology and 10 years' experience in molecular ecology, e-biom is a genetic research laboratory and environmental consulting firm specialising in biological conservation, species inventories and ecological assessment. It is supported by several economic development agencies, incubators and investors. It also collaborates with numerous national and international scientific organisations to provide high quality services.

Environmental impact studies for innovation activities

The survey objectives included the identification of newly emerging innovation trends at universities. This question investigated the extent to which environmental impact studies are carried out for innovation activities. While universities that do not perform such studies or which are not aware of doing so account for almost half of the answers received, it must be said that the mainstreaming of environmental concerns across different university departments and activities is still a relatively recent practice. It is therefore to be expected that different institutional profiles and resources may entail various degrees of fragmentation in the extent of environmental impact analysis and knowledge. Nevertheless, it is encouraging to see that nearly 18% of the respondents conduct such impact studies for all innovation activities, and that in total, 52% conduct studies for some or all innovation activities (Figure 23).

Figure 23: Environmental impact studies for innovation activities
Q18. Does your institution conduct environmental impact studies as part of its innovation activities?
Number of respondents: 165/166.

34%   26%
18%   22%
Total
100%

- Yes, for most innovation activities
- Yes, but only for innovation activities directly related to climate and the environment
- No
- Don't know

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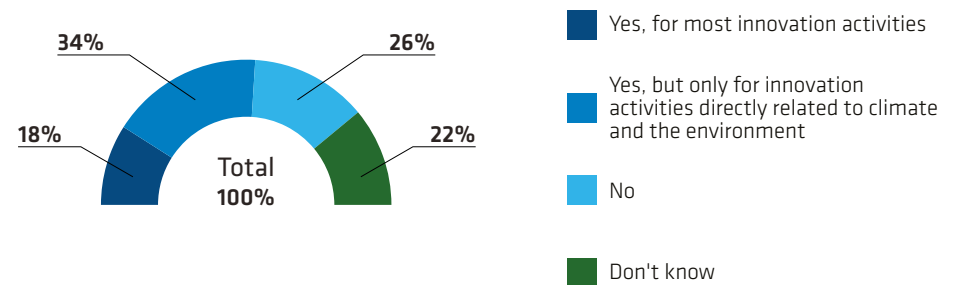
10   An analysis of variance (ANOVA) was conducted $F_{(2,116)}= 4.324$, $p<.05$. Games-Howell tests for multiple comparisons were used, nurturing of the start-up sector to a large extent ($M_{students\ involved\ in\ entrepreneurship}= 51.76$) *vs.* nurturing of the start-up sector to a small extent ($M_{students\ involved\ in\ entrepreneurship}= 26.75$), $p<.05$. There were no statistically significant differences in the remaining comparisons.

External perception of institutions' role as an honest broker in the sustainable transition

As one of the survey's central concepts, universities' role as honest brokers was the topic of a dedicated question on perceptions they encounter as they contribute to the sustainable transition through innovation. The findings show that, overall, respondents share an optimistic view of how their independence is perceived by decision-makers and other stakeholders (Figure 24). Universities do not seem to encounter misconceptions of their scientific activity, through which they typically interact and collaborate with a wide variety of stakeholders.

>> *Examples of good practices*

The **University of Salford** Low Traffic Neighbourhoods project centred on in-depth qualitative research involving residents in neighbourhoods where active travel has been enabled through physical changes. It will add value to a nascent evidence base on experimental urbanism in the UK and will directly inform policy in Greater Manchester. The Sustainable Transport Futures seminar series ran 18 events over three years and helped position the University as a leader in active and sustainable mobility research. Covering a range of topics (e.g., air quality, social inclusion, mobility as a service, self-driving cars, school streets and cargo bikes), the events have attracted an audience from research, policy and practice, including local authorities, business and the voluntary and community sector, and featured presenters from across these sectors. The team regularly contributes to external events with partners such as the Royal Town Planning Institute, the Active Travel Academy, and the festival of road safety. It also provided expertise at the UK Government Transport Select Committee enquiry into e-scooters.

Figure 24: External perception of institutions' role as an honest broker in the sustainable transition
Q19. Based on your experience, please rate the following statements regarding the possible external perception of your institution's role as an honest broker in the sustainable transition.
Number of respondents: 163-165/166.
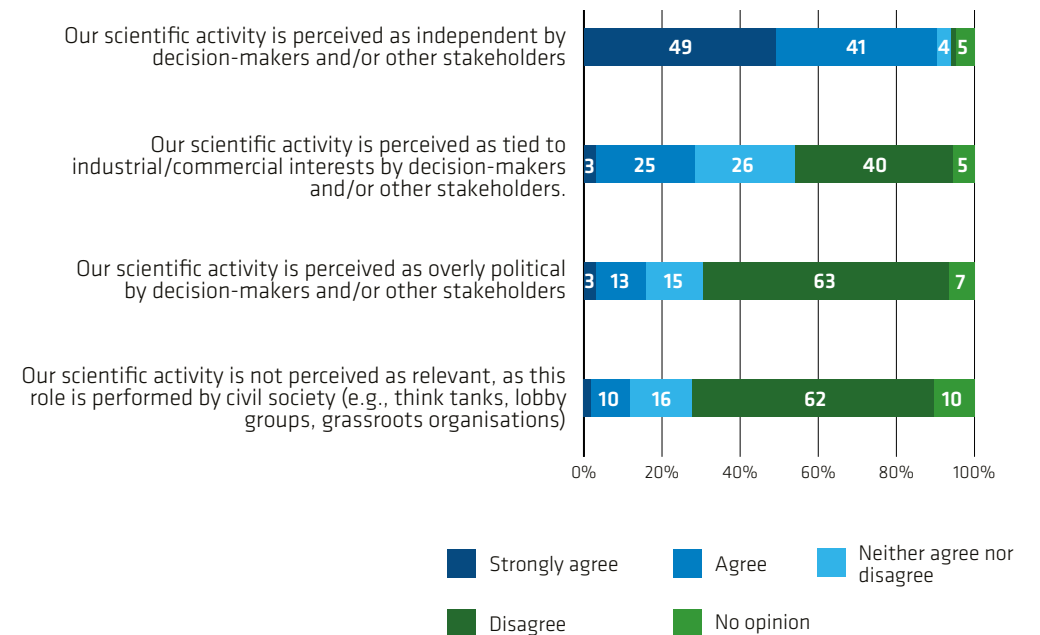
Opinions about Europe's research and innovation capabilities to achieve a sustainable transition

Survey participants were asked whether they thought Europe's research and innovation capabilities will allow it to achieve a sustainable transition. The results demonstrate that the vast majority of respondents are optimistic about Europe's ability to trigger disruptive innovation and achieve the major changes necessary for the sustainable transition (Figure 25). Overall, Europe's research and innovation capabilities are perceived as strong. Further analysis revealed that universities which believe that Europe is capable of disruptive innovation have a slightly higher innovation capacity (see Figure 9, Q3) than the few that believe Europe is only capable of incremental innovation.[11] There is hence a need for national and European frameworks to mobilise the latter institutions, whose innovation capacity needs boosting to allow them to join the pursuit of sustainability via innovation.

Figure 25: Opinions on Europe's R&I capabilities to achieve a sustainable transition
Q20. In your opinion, will Europe's research and innovation capabilities allow it to achieve a sustainable transition?
Number of respondents: 163/166.

77%

8%
3%
12%

Total 100%

Yes: Europe is capable of disruptive innovation necessary for major changes.

No: Europe is only capable of incremental innovation necessary for minor changes

Other

Don't know

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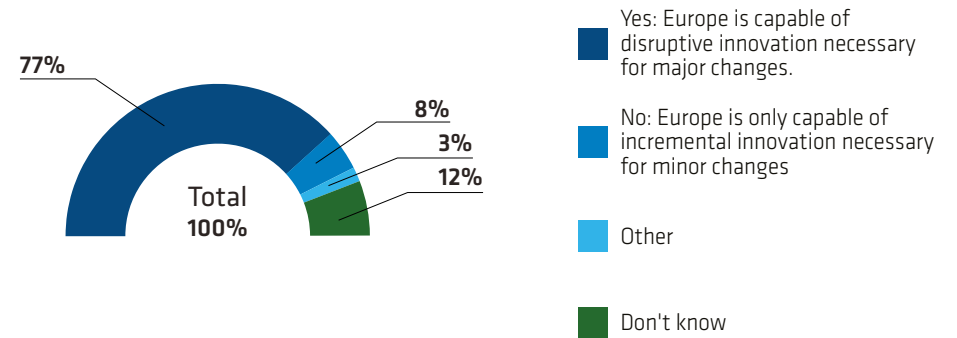
11   An independent t-test was performed, $t(137)= 2.735$, $p<.05$; Europe is capable of disruptive innovation ($M_{innovation\ capacity} = 3.79$) *vs.* Europe is only capable of incremental innovation ($M_{innovation\ capacity} = 3.21$).

Chapter 3
Digital transition
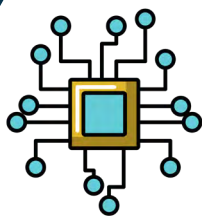
Key findings

◈ **There is widely shared optimism that Europe's research and innovation capabilities will allow it to achieve a leadership position in the digital transition.** 68% of respondents agree that European R&I can attain digital leadership.

◈ **The specific fields of the digital transition where universities believe that Europe has global leadership potential generally overlap with those prioritised by the EU digital policy agenda.** Among them are artificial intelligence and machine learning (68%), cybersecurity technologies (60%), big data (50%), and high performance and quantum computing (45%).

◈ **Universities' innovation activities for the digital transition are equally reliant on their research and education missions.** Among the ways they support digital technology innovation, 81% rate innovation-focused education and training as very high or high, followed by applied research (79%).

◈ **Universities pay particular attention to interdisciplinarity in accelerating the digital transition.** More than 90% of respondents consider interdisciplinarity to be either very important or important as an enabler of digital innovation.

Development and uptake of digital technologies is one of the key drivers of innovation ecosystems, along with enabling the transversal use of such technologies, fostering start-ups, or contributing to upskilling and reskilling. This chapter explores how universities' innovation mission and capacity translate into concrete activities that help deliver the digital transition. The following sections investigate the main areas of institutional implementation of the digital transition, the ways in which universities support digital technology innovation and train the next generation of digital innovators, as well as the challenges encountered and the concerns that emerged in pursuit of this transition. It also captures institutions' opinions about Europe's digital leadership potential, while also giving an overview of the main indicators by which they measure their own innovation success.

Areas of institutional implementation of the digital transition

Given the need for data on where the digital transition is being implemented at universities, the survey sought to provide an initial indication of whether and how the institutions are aligned with the pursuit of innovation in this area. The results show that presently, the digital transition at universities is implemented primarily in education and research activities (Figure 26). Notwithstanding the COVID-19 pandemic and its impact on higher education, the results may be due to different understandings of what the digital transition entails for learning and teaching. For instance, some universities may see this primarily as using digital tools in the classroom, while others may understand it as designing their curriculum for in-depth teaching of digital innovation. It is therefore good that institutional strategies and mission statements feature among the top results, as they are prime tools for clarifying which facets of the digital transition are tied to a university's innovation mission, and which to learning and teaching.

»» *Examples of good practices*

The European multi-campus **ESCP Business School** provides an innovation laboratory ("Phygital Factory") for students and professors to exchange and co-create new learning path ideas. The innovation hub allows students and professors to experiment and learn digital tool management, and how to adapt learning paths. It comprises three adjacent spaces with specific facilities. The first is a 'design' space, which allows the use of innovative tools such as a digital flipchart or a smart projector from a start-up to turn any surface (table, desk, wall etc.) into a touch screen in a design thinking approach. The second 'share' space allows students to follow immersive experience modules using high-level virtual reality, and to collaborate in the digital twin of the "Phygital Factory". There are also opportunities for training in communication skills in front of a virtual amphitheatre. Finally, the third 'make' space allows users to create educational and original digital content in microlearning or augmented reality mode. ESCP has built a quality standard for active and experiential learning, integrating technology and the latest pedagogical trends.

Figure 26: Areas of institutional implementation of the digital transition
Q22. In which areas is your institution implementing the digital transition?
Number of respondents: 154-163/166.
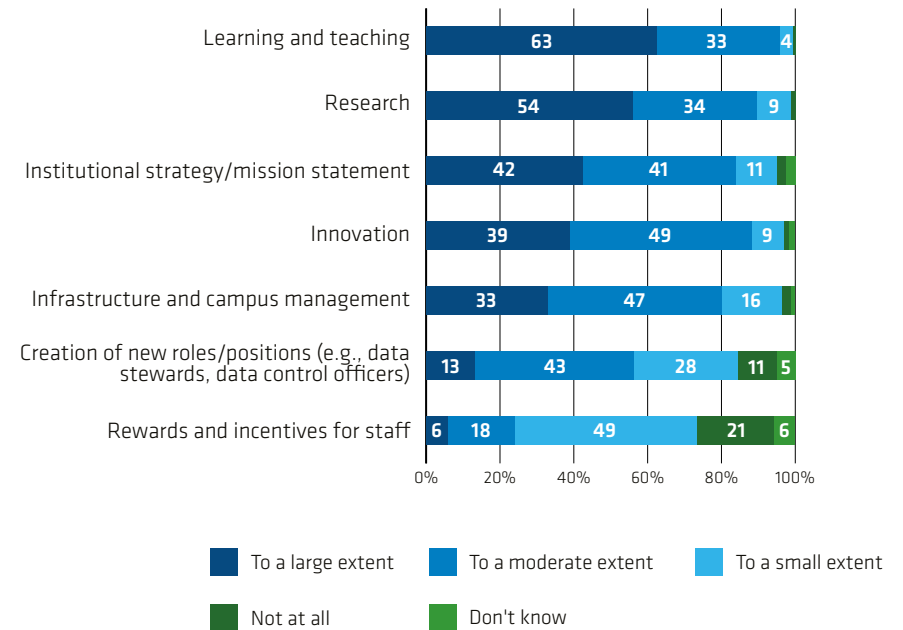
Ways to support digital technology innovation

As contributors to the digital transition, universities can support the development of technological innovation in multiple ways. The survey set out to measure the relevance of a broad range of activities covering basic to applied research, education and training, as well as the institutions' role as partners and honest brokers (Figure 27).

The results show that universities' innovation activities for the digital transition are equally reliant on their research and education missions. This underscores that the transition is not a purely research and development endeavour, but that it also relies extensively on integrating innovation into university curricula. This signals that covering the full breadth of university expertise and missions is essential to delivering the innovations necessary for a successful digital transition.

⟫ *Examples of good practices*

The **University of Siena** established the V.I.T.A. joint laboratory ("Virtual Interaction for Training and Analysis Lab") in 2020, together with the VITA Foundation and the Toscana Life Sciences Foundation. This stems from the University's three-year strategic plan to increase the number of laboratories founded jointly with companies. The V.I.T.A. Lab intends to be a Virtual and Augmented Reality (VR) Lab dedicated mainly but not exclusively to the exploration and application of Industry 4.0 technologies in the field of life sciences. Using the potential of an open, local, teaching laboratory that is fully equipped with immersive education and training devices allows people to experience in VR the activities that they implement in real life and to undertake an efficient process of learning by doing through using interactive and immersive software applications.

Figure 27: Ways to support digital technology innovation
Q25. Please rate the following ways of supporting digital technology innovation according to their relevance at your institution.
Number of respondents: 158-162/166.
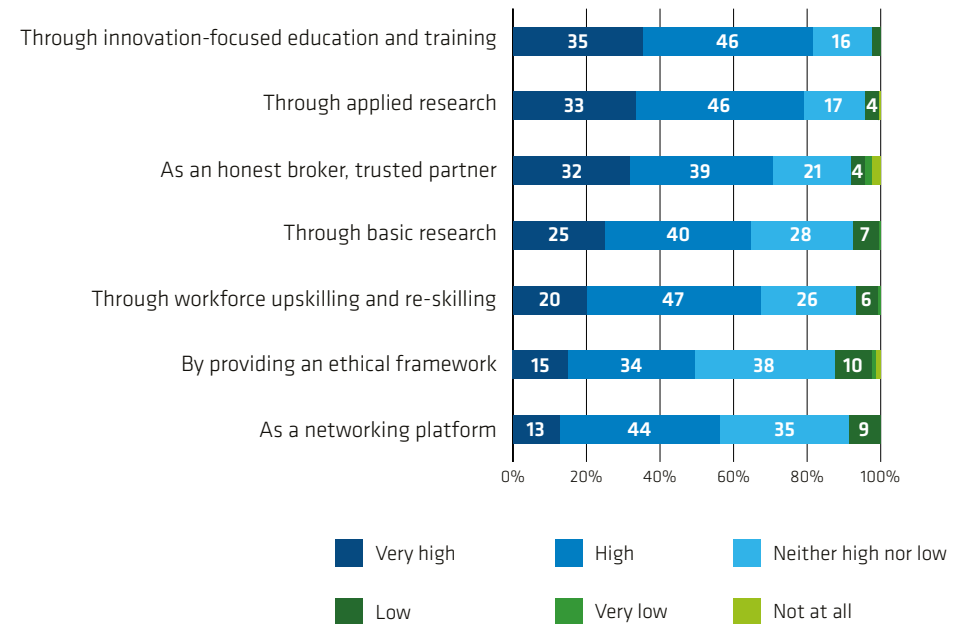
Preparing the next generation of digital innovators

Having touched on the role of education and training, the survey sought to explore exactly how universities prepare the next generation of digital innovators. This question therefore provided a broad outline of common ways to perform the education and training mission in the context of the digital transition (Figure 28).

In light of this mission's strong role in delivering innovation, reported in the previous questions, it is not surprising that embedding digital tools into the learning environment and delivering the curriculum are highly ranked. These responses were closely followed by lifelong learning and the establishment of new professorships in cutting-edge digital fields like Artificial Intelligence. Figure 28 also indicates room for improvement in upskilling and/or reskilling, although this is steadily being addressed through new EU programmes and support schemes such as the Digital Europe Programme.

>> *Examples of good practices*

The **University of Limerick**'s new UL@Work programme will enable upskilling and reskilling through lifelong learning. UL@Work is a state-of-the-art programme that will allow students to prepare for the world of work in the digital age. It will build resilience and future-proof graduates with industry relevant skills, based on close cooperation with employers. It will offer training in areas such as ICT, AI, data analytics, industry 4.0, robotics, digital leadership, global trade, law and technology and future studies. UL@Work programmes are for undergraduate, postgraduate, and work-based learners, and are designed to be flexible to the needs of students and employers. Some of the new courses will be delivered online, while others will be based at the UL campus. UL@Work includes: top-up degrees aimed at non degree holders, new challenge-based/embedded engineering degrees, 10 professional diplomas, short professional development modules, and new master's degrees.

Figure 28: Preparation of the next generation of digital innovators
Q27. How is your institution preparing the next generation of digital innovators?
Number of respondents: 162-164/166.
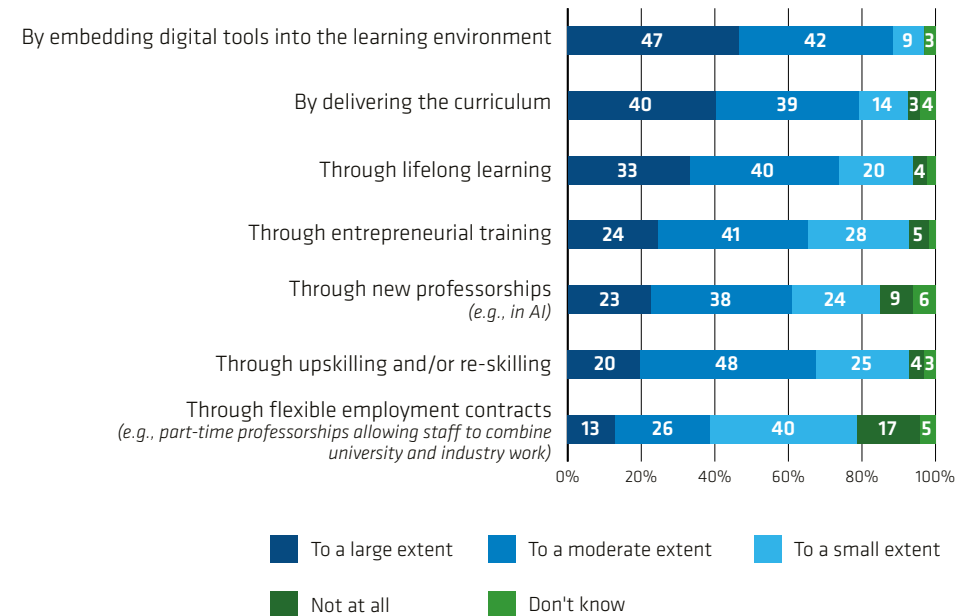
Measures of success used for innovation in the digital transition

As for the sustainable transition, the survey sought to develop an overview of the main indicators which universities use to measure their success as innovators for the digital transition (Figure 29). Respondents indicated a considerable degree of similarity between these pillars of the twin transition.

The results show that at least 70% of institutions use all the measures included in Figure 29 to some extent. As in the previous chapter, the number of partnerships is still the most widely used indicator, with 57% of institutions noting that they use it to a large or moderate extent (versus 68% for the sustainable transition). The collaborative basis of digital innovation success is therefore apparent. Further analysis investigated whether universities using to a larger extent the number of partnerships as a success indicator for innovation in the digital transition tend to work more closely with specific innovation partners (see Figure 14). Unlike the sustainable transition, where universities worked closely with similar actors from within the R&I community, universities work more closely with SMEs for the digital transition.[12] This is a welcome sign of a possibly more outward, cross-sectoral approach.

>> **Examples of good practices**

University College Dublin has partnered with leading agribusiness company, Origin Enterprises plc, on the CONSUS programme to develop the next generation of digital tools for the farmer and agronomist. CONSUS is a €17.6 million 5-year programme jointly funded by Science Foundation Ireland and Origin Enterprises. It encompasses a strong multi- and inter-disciplinary approach, combining UCD's leading expertise in data science and agricultural science with Origin's integrated crop management research, systems capabilities and extensive on-farm knowledge exchange networks.

Figure 29: Measures of success used for innovation in the digital transition
Q26. How does your institution measure digital innovation success?
Number of respondents: 161-163/166.

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12   Using the Spearman rank order correlation, $r_s(126)= 0.212$, $p<0.05$.
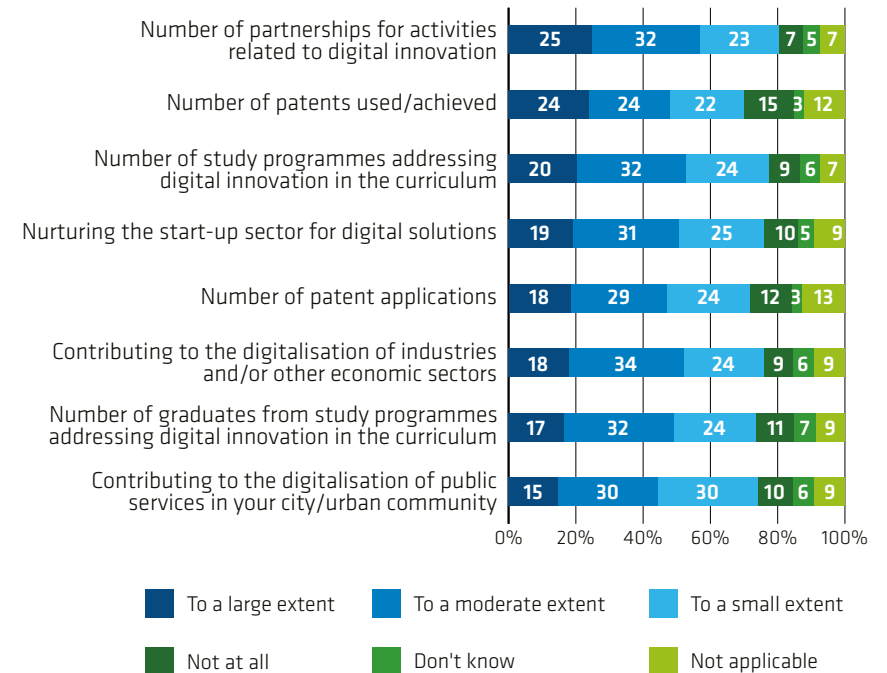
Regarding how universities measure their digital innovation success in terms of entrepreneurship, the extent to which nurturing the start-up sector is used as an indicator is nearly the same as for the sustainable transition: 50% of the respondents use it to a large or moderate extent for the digital transition, compared to 52% for the sustainable transition. This similarity also extends to the relationship between extent of use and the number of students participating in entrepreneurship activities and start-ups (cf. Figure 11). Universities using to a larger extent the nurturing of the start-up sector as a success measure for the digital transition have a higher number of students involved in entrepreneurship and start-ups than those using this measure to a moderate extent.[13]

Challenges for innovation in the digital transition

Pursuing the digital transition through innovation activities will inevitably present its own set of particular challenges. The survey sought to capture their nature and urgency at universities, based on a list of common prerequisites for achieving the digital transition (Figure 30).

The results render a familiar picture of universities being hampered by limited funding for technology adoption or upgrades, the hiring of digitally skilled staff, and the uptake of digital skills among current staff. This suggests the need for a more nuanced understanding of the digital transition, comprising not just the goal of technological leadership, but also the imperative of digital capacity-building at all institutional levels. These challenges seem to outweigh issues related to the composition of universities' surrounding innovation ecosystem, as the respondents indicated fewer difficulties in identifying or collaborating with digital partners.

>> *Examples of good practices*

CyberOwl Ltd is a spin out of **Coventry University**, formed in 2016 by using university-instigated intellectual property to create a portfolio of cyber security products, initially focusing on the maritime sector. CyberOwl builds on cutting-edge research started at the Defence Academy of the United Kingdom and completed at Coventry University. Its mission is to leverage data and analytics to shift organisations towards an active cyber posture. The founding team combines decades of experience in developing, securing and operating large distributed systems.

Figure 30: Challenges for innovation in the digital transition
Q23. Please rate the following factors in terms of the challenges they pose for your institution's capacity to innovate in the area of digital transition.
Number of respondents: 161-163/166.

13 An analysis of variance (ANOVA) was conducted $F(2,109)= 4.567$, $p<.05$. Games-Howell tests for multiple comparisons were used, nurturing of the start-up sector for the digital transition to a large extent ($M_{students\ involved\ in\ entrepreneurship}= 48.23$) *vs.* nurturing of the start-up sector for the digital transition to a moderate extent ($M_{students\ involved\ in\ entrepreneurship}= 27.81$), $p<.05$.
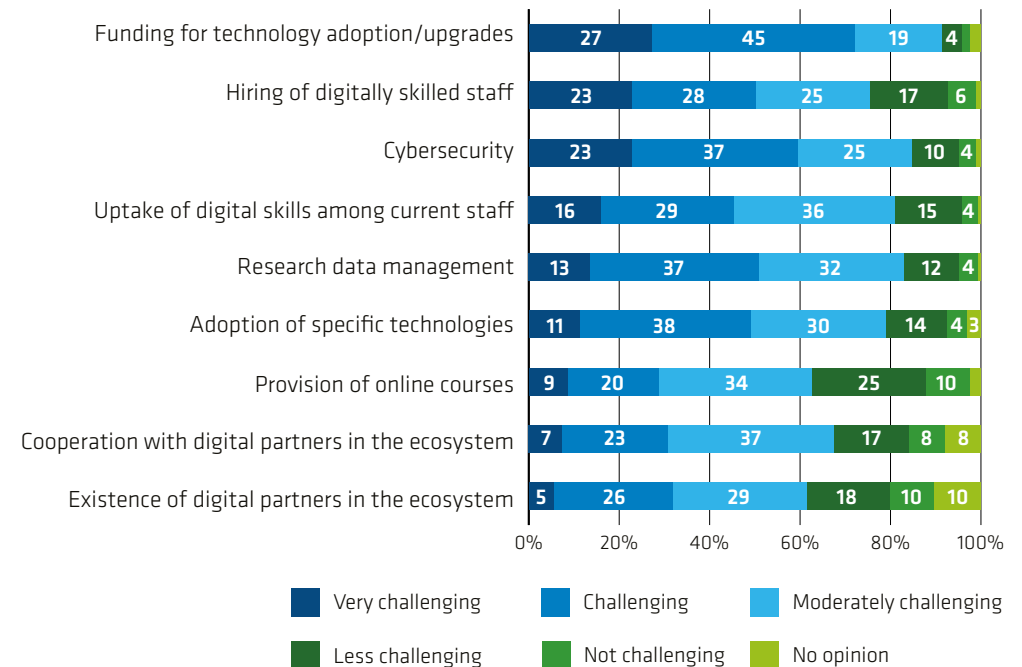
Enablers of innovation for the digital transition

After building an overview of the main university contributions to innovation for the digital transition, the survey turned to the different factors that enable this. The answer options in this question featured both general, transversal enablers, pertaining to funding and human resources, as well as digitally-specific factors related to technology and data (Figure 31).

Echoing the findings of the previous sections, the following results emphasise the primary importance of general enabling factors like qualified staff and sufficient, sustainable funding over more technical aspects like computing capacity or access to big data. The high position of interdisciplinarity in these results mirrors the importance of interdisciplinary institutes noted earlier under innovation for the sustainable transition (see Figure 21). The transversal nature of challenges in the twin transition is therefore empirically confirmed by a large number of survey respondents, and shows that universities are well-positioned to pursue the transition, because they bring many different fields together.

>> *Examples of good practices*

The **Lodz University of Technology** (TUL) built a virtual campus system, WIKAMP, to complement its existing computer systems and support education through hybrid teaching, e-learning and group communication. It also provides opportunities for further education and self-study by academic staff. More than 500 TUL employees participated in various training courses, including on digital tools for learning, e-learning for staff and students, Problem-Based Learning with Maastricht University in the Netherlands, Design Thinking with the Hasso-Plattner-Institut in Germany etc. Consequently over 90% of teachers use the WIKAMP tools in some faculties. Moreover, integrating this system with the university's other information services, databases, and email system allows WIKAMP to concentrate 90% of the information flow within TUL.

Figure 31: Enablers of innovation for the digital transition
Q28. How important are the following elements in allowing your institution to support innovation for the digital transition?
Number of respondents: 159-163/166.
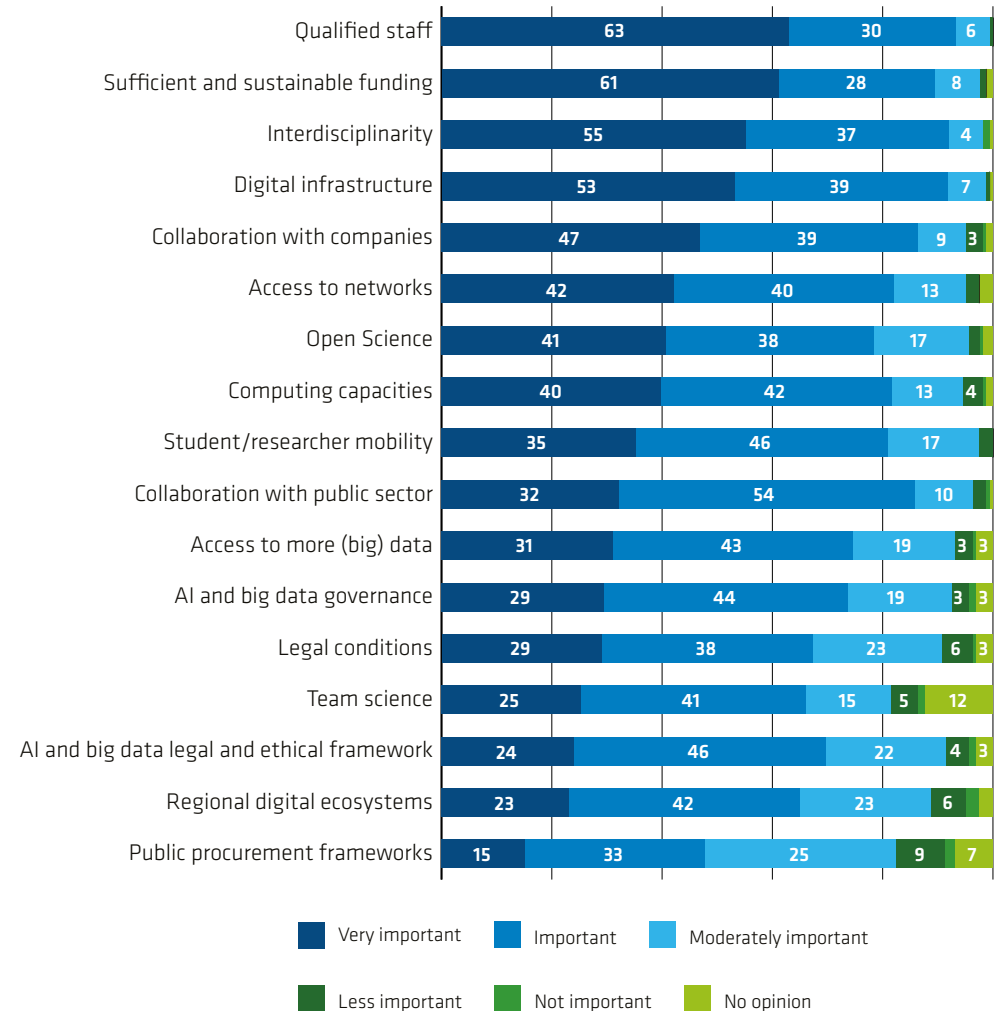
Opinions about European research and innovation leadership in the digital transition

Survey respondents were asked to give their opinions about whether the enabling factors listed in Figure 31 can give European research and innovation a leading position in the digital transition. The pervasive sense of optimism identified in the section on the sustainable transition is echoed here, although the percentage of agreement is lower by 9 percentage points for the latter (Figure 32). Further analysis revealed that institutions which regard Europe as a potential leader in the digital transition have a slightly higher overall innovation capacity (cf. Figure 9, Q3) than those which do not.[14] This underlines the need for national and European frameworks to mobilise the 9% of institutions in the latter group (similar to the 8% for the sustainable transition in Figure 25), whose innovation capacity needs boosting to join the European pursuit of the digital transition.

Figure 32: Opinions about European research and innovation leadership in the digital transition
Q28.1. In your opinion, will the above elements give European research and innovation a leadership position in the digital transition?
Number of respondents: 159/166.

68%

9%

23%

Total
100%

Enablers of innovation presented in the previous question will give European research and innovation a leadership position in the digital transition

Enablers of innovation presented in the previous question will not give European research and innovation a leadership position in the digital transition

Don't know

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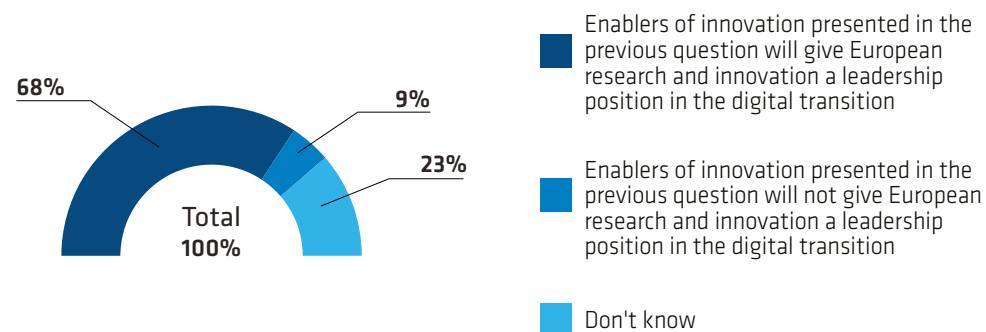
14 An independent t-test was performed, $t(121)= 2.960$, $p<.05$; Europe as future leader in the digital transition ($M_{innovation\ capacity}$ = 3.83) *vs.* Europe not being the future leader in the digital transition ($M_{innovation\ capacity}$= 3.21).

Areas of the digital transition where Europe has the potential to be a global leader

In view of the many different priorities covered by the digital transition, it was important to assess the extent to which the political discourse on Europe's global leadership resonates with universities' in-depth knowledge of specific areas of digital innovation. The survey therefore sought to capture the areas in which the university sector believes European research and innovation can produce global leadership (Figure 33).

The results point to a broad overlap with the priorities of the EU digital policy agenda, as indicated for instance in the Digital Europe Programme. The university sector is therefore attuned to global digital innovation trends, although its ranking of priority areas suggests some divergence with the EU agenda's emphasis on the very cutting edge of digital technology innovation. Indeed, the selected fields include software development (43%) and microelectronics (23%), which play an established role in the digital transition in comparison with some of the more blue-sky fields at the top.

» *Examples of good practices*

Ruhr University Bochum founded the Horst Goertz Institute (HGI) for IT-Security in 2002. It has continuously grown to its current 26 professorships with over 200 scientists now performing research into cybersecurity, cryptography, and privacy. HGI has been designated a Cluster of Excellence in Germany, and has received ERC and Humboldt Grants. With over 1,000 students currently educated in this field in Bochum, the institute holds its own careers fair with large global and small regional companies needing to improve their IT security systems. From the very beginning, HGI led to the foundation of start-ups, with a first wave successfully transitioning into larger companies, now followed by a second wave. HGI has its own start-up incubator: Cube5, which is funded by the Federal Ministry of Education and Research. The Max Planck Society also founded its own cybersecurity institute next to the HGI in Bochum.

Figure 33: Areas of the digital transition where Europe has the potential to be a global leader
Q21. In your opinion, in which digital transition areas do Europe's research and innovation capabilities allow it to take global leadership? Multiple-choice question.
Number of respondents: 165/166.
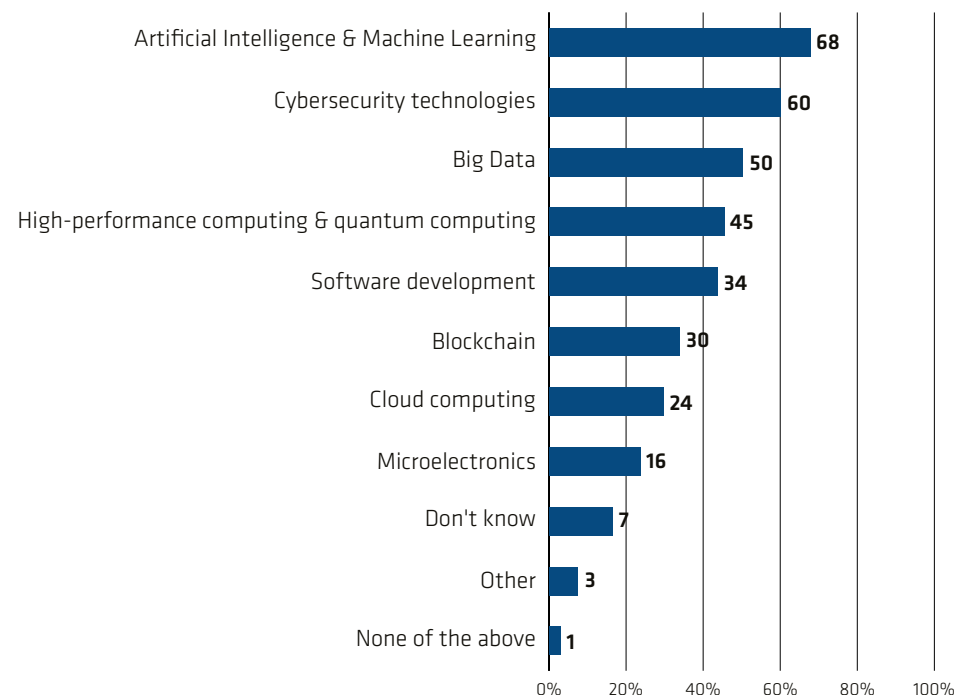
Concerns regarding the digital transition

Finally, to determine whether the digital transition causes preoccupation at universities, the survey produced an overview of potential concerns regarding the different impacts of the transition (Figure 34). This stems from universities' multi-faceted nature as actors that both influence and are influenced by the development of digital innovation.

The results show that universities are socially aware, and attuned to their staff and students' well-being in the context of the digital transition. In fact, most of the major concerns involved are ranked as high or very high by over half of the respondents, underlining universities' holistic perspective, which goes beyond economic impact or maintaining their leadership position.

Figure 34: Concerns regarding the digital transition
Q24. What are your institution's concerns regarding the digital transition?
Number of respondents: 158-161/166.
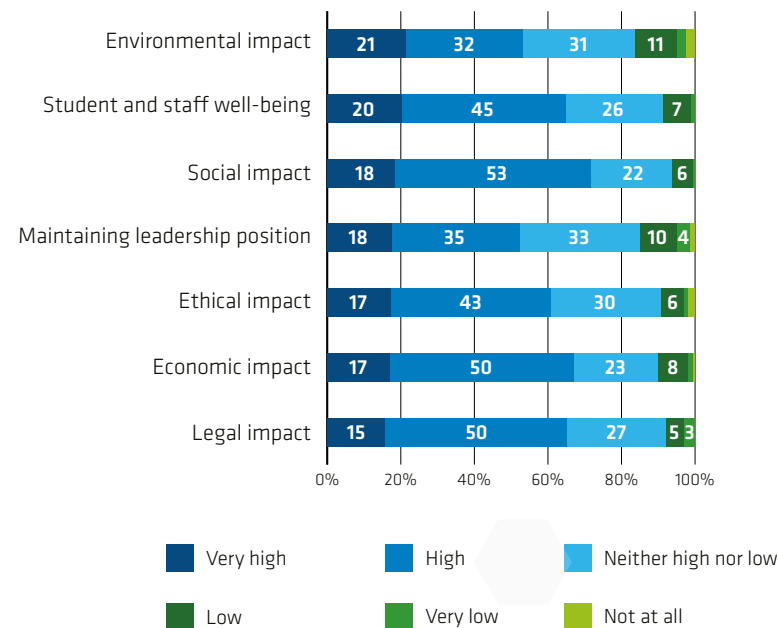
Conclusions and recommendations

A strong institutional commitment to innovation and the sustained pursuit of solutions to societal challenges are established features of the European university landscape. This first EUA innovation survey provides an empirical overview of their current state. It highlights the many aspects of university innovation and fosters a deeper understanding of what drives that commitment, as well as of the factors that enable such innovation.

Boosting universities' innovation capacity and contributions to European leadership in the twin transition will undoubtedly be a prolonged quest, requiring consistency and vision across many policy-making fields. EUA is nonetheless hopeful that its survey can start a new phase of strategic thinking among decision makers and university leaders about what kinds of European innovation ecosystems are needed for success. It is now abundantly clear that success is at hand when universities are drivers and facilitators of these ecosystems. Ensuring that they can play this important role adequately will depend, among others, on the implementation of EUA recommendations for national and European policy makers and funding agencies, as well as for universities themselves.

Recommendations for national and European policy makers and funding agencies

How to enhance universities' innovation capacity:

◈ **Support the development of efficient institutional governance structures and promote university autonomy as a fundamental value.** They are prerequisites for universities to engage with society and fulfil their role as honest brokers through the development of independent, high-quality and innovative solutions to current and future challenges.

◈ **Support long-term oriented research, including curiosity-driven research, as one of the fundamental ways to improve the innovation capacity of universities and of the ecosystems in which they are situated.** Support for research on mRNA technology, which led to the development of the Covid-19 vaccines, is one of many examples of investment in curiosity-driven research that brought about societally impactful scientific breakthroughs with significant pay off in the long run.

◈ **Support universities in interacting with companies and other actors of the innovation ecosystem**, especially universities with lower innovation capacity, for example through a reduction of the regulatory burden, skills development, networking opportunities, funding, incentives and advice.

◈ **Support universities in reforming their academic career assessment approaches with the aim of recognising a wide range of academic staff contributions, including innovation activities.** In addition, encourage universities to consider staff innovation in a broader sense, including its economic, social, cultural, ethical and environmental impacts.

How to enhance universities' contribution to the sustainable transition:

◈ **Pursue a holistic approach to the sustainable transition in which innovation activities contribute equally to climate change mitigation and adaptation.** The potential for closer collaboration between universities, civil society organisations and local public sector institutions should also be explored as a means to acquire a better understanding of societal and non-technological concerns in the transition.

◈ **Support a more widespread use of citizen science in innovation for the sustainable transition.** Citizen science is a relatively little used research and education activity; its potential to contribute to the transition needs to be better understood and translated into concrete methodologies for university application, as well as into legal and financial support.

How to enhance universities' contribution to the digital transition:

◈ **Ensure that funding programmes and policies for the digital transition reflect the precedence of digital capacity building over pursuing technological leadership.** Support needs to prioritise the adoption or upgrading of one's technologies, the hiring of digitally skilled staff, and the uptake of digital skills among current staff. Without this, universities' capacity to innovate will be hampered and so will the EU's pursuit of technological leadership.

◈ **Develop digital policies that acknowledge the various impacts of digitalisation on society.** While the adoption of digital tools is proceeding apace, universities share concerns over the environmental, ethical and social impacts of the digital transition. Achieving the effective buy-in of universities in the EU digital agenda, as well as the ultimate success of the digital transition, depends on addressing such concerns and the wider impact on student and staff wellbeing.

Recommendations for universities

How to enhance your institution's innovation capacity:

◈ **Strengthen strategic attention to innovation across all departments, faculties and services.** A common institutional innovation vision and strategy, as well as effective coordination, will contribute to enhancing the institution's innovation capacity.

◈ **Provide incentives, rewards and support mechanisms for academic staff innovation activities.** Notably, expand career development and recognise a wide range of academic staff contributions in career assessment, including innovation activities. Such activities should be considered in a broader sense, including its economic, social, cultural, ethical and environmental impacts.

◈ **Engage with other stakeholders of the European innovation ecosystem and global network.** Notably, strengthen links with companies and civil society organisations as part of long-term partnerships to better respond to societal challenges.

◈ **Increase integration of entrepreneurship training into all study programmes.** This should address a broad range of entrepreneurial and transversal skills, including in interdisciplinary contexts. Such training will contribute to the development of innovative mindsets, thus bringing added value for a wide range of career paths.

How to enhance your institution's contribution to the sustainable transition:

◈ **Deepen commitment to interdisciplinarity as a driver of research, education and innovation for the sustainable transition.** Closer alignment with comprehensive frameworks like the UN Sustainable Development Goals could mobilise fields which, according to the survey, are less often in the lead in terms of innovation for the sustainable transition (e.g., agriculture, architecture, medicine).

◈ **Streamline internal processes to deliver on the institution's environmental commitments.** The current division of roles and responsibilities among central university administration and other staff members risks causing a fragmentation of knowledge regarding these commitments. For instance, environmental impact studies are conducted for some or all innovation activities at more than half of surveyed universities, yet more than a fifth indicated not knowing if their institutions do so.

How to enhance your institution's contribution to the digital transition:

◈ **Foresee a clearer role for the digital transition when defining the institution's innovation mission.** At present, the digital transition at universities is implemented primarily in learning and teaching and research activities. In the future, institutional strategies and mission statements should also explicitly relate the digital transition with universities' innovation mission.

◈ **Boost the preparation of the next generation of digital innovators.** Universities should enhance digital knowledge and skills in the high priority areas of the digital transition for the benefit of students, research and teaching staff, as well as for lifelong learners. Beyond using digital tools in the learning environment, universities should also tap into national and European support schemes, such as the Digital Europe Programme, to devise specialised training and promote upskilling.

Glossary

For the purposes of this report:

Entrepreneurship is a transversal skill that applies to many spheres: from nurturing personal development, to active participation in society, to innovating as an employee, to start-up ventures in any sector. Entrepreneurship creates cultural, environmental, social or economic value. It thus embraces different types, including: intrapreneurship, social entrepreneurship, green entrepreneurship and digital entrepreneurship (based on the definition developed by the Joint Research Centre, 2016).

Innovation is a process of knowledge co-creation and transfer that generates social, economic, and environmental benefits by means of novel ideas, approaches, technologies, or ways of organising. It is based on open and systematic interactions between academia, government, the private sector, and the general public. It draws on the entire research and development chain from curiosity-driven fundamental research to applied research and development activities, on the sphere of education and training as well as on capabilities and resources for innovation uptake which are determined by political, cultural, and economic systems. It entails close, strategic collaboration between key stakeholders from these different spheres, and is usually rooted in local/regional nodes often known as innovation ecosystems. The following examples are a non-exhaustive list of innovation achievements:

◈ Specific infrastructures, such as: start-up hubs, technology clusters, science parks.
◈ Strategic partnerships with companies, government agencies or civil society groups.
◈ Joint university-industry laboratories/institutes, industrial doctorates.
◈ Patenting and IP, technology transfer offices.
◈ Promoting entrepreneurial and innovation mindsets among students and staff.
◈ Educational approaches that enable more flexible learning paths, project and challenge based learning, flipped and international classrooms, etc.

Innovation ecosystem is the total sum of organisations in a region that contribute to the creation, dissemination, absorption and application of economically and socially relevant knowledge and their interconnection (based on Cooke, 2004).

Innovation capacity is an organisation's ability to transform knowledge and ideas into new products, processes, and systems with beneficial outcomes (Lawson & Samson, 2001).

Honest broker is a trusted provider of advice based on independent, neutral evidence, who enables the connection and mediation between different stakeholders' interests and perspectives.

Annex: Survey questionnaire

EUA survey on universities and innovation

Context and objectives

In recent years, universities have become more focused on innovation. Many are also now in the process of stepping up their innovation capacity. It therefore seems timely to develop an evidence base to help build a wider picture of university innovation activities.

The European University Association (EUA) is launching a consultation to investigate how universities act as honest brokers in innovation ecosystems while delivering on two of the European Union's strategic priorities: the broader goals of the sustainable and digital transitions. The results will allow EUA to provide a rich account of how varying university innovation capacities contribute to a wide range of impact and social outcomes. It will also provide evidence of the different levels of innovation capacity at European universities. Furthermore, this study will seek to show how different facets of innovation have varying degrees of relevance to higher education institutions.

This survey outcomes will support a broader perspective on universities and innovation, support the identification of new and existing innovation trends in the university sector, and provide an evidence base for national and European advocacy. The resulting report will be published alongside recommendations for universities and European and national public institutions.

This survey was developed by the EUA Secretariat in collaboration with the EUA Expert Group on Innovation Ecosystems. It builds on EUA's expertise in the area of regional innovation ecosystems and smart specialisation.

Survey structure

This survey is structured into five sections:

◈ **Section 1** includes general questions about your institution.
◈ **Section 2** focuses on your institution's strategic attention to innovation and its innovation capacity.
◈ **Section 3** focuses on your institution's innovation activities for the sustainable transition.
◈ **Section 4** focuses on your institution's innovation activities for the digital transition.
◈ **Section 5** (optional) is an opportunity to share university innovation success stories.

Guidelines for completing the survey

The survey is open to all European universities and other higher education institutions.

◈ The survey is best completed by university managers directly involved in coordinating innovation activities. Due to its comprehensive scope, input from different departments and services may be needed. **Nevertheless, please note, that only one response per institution should be submitted.**

◈ To facilitate such inter-departmental collaboration, please find a printable PDF- version of the survey [here]. We recommend reviewing this version before completing the survey online if you need to consult with other people at your institution. Please note that final answers can **only be submitted using the online version**.

◈ The survey saves the answers on each page when you click the *Next* button and move to the following page. You can exit the survey and come back to it by copying the link you received into the **same browser on the same device** where you first accessed it. Completed pages will be saved on exiting. Please note that you will also be able to go back and refine your answers before submitting them.

◈ Please remember to click the *Submit* button at the end of the survey. Otherwise your answers will not be recorded. After submitting the survey, you will automatically be redirected to a summary of your answers, which you can save in PDF format.

Technical assistance

If you have any questions or encounter technical problems while filling out this survey, please contact the EUA Research & Innovation Unit at research@eua.eu.

Confidentiality and privacy policy

Answers provided in Sections 1-4 of this survey will be anonymised (any information that could be used to directly identify an individual (personal information) or the institution will be removed) and made available in open access via a trusted repository. Neither you nor your institution will be identified in any publication referring to data collected in Sections 1-4. Your participation in Sections 1-4 of this survey is confidential.

If you decide to share your institution's innovation success stories in Section 5 (optional), your institution name will be disclosed in relation to the information provided in that Section.

Personal data gathered during the survey will be processed according to the EUA privacy policy.

Do you agree with the Confidentiality and Privacy Policy?

☐ Yes

Section 1: About you

Please indicate the country and name of your institution (in English):

This information is for internal use only; your institution name will not be disclosed unless you wish to share success stories in Section 5. In which case, your institution name will only be disclosed in relation to your responses in Section 5.

How would you describe your institution's profile?

Comprehensive institution
(a comprehensive institution awards degrees in all three cycles and is multidisciplinary (i.e., offers programmes in more than two subject areas/fields of science)

Specialist institution
(a specialist institution awards degrees in all three cycles and specialises in a particular subject area/field of science, e.g., medical science, business, music or arts school)

University of applied sciences or university college
(a university of applied science or university college offers more career-orientated studies, usually in the first and second degree cycles)

Technical university/university of technology
(a technical university/university of technology awards degrees in all three cycles, and specialises in technology, engineering, and natural sciences)

Open university
(an open university mainly offers distance learning, and is accessible to students who lack the formal entry requirements required by conventional universities, i.e., high school leaving certificates, academic degrees)

How would you define your institution?

Mostly research-intensive

Mostly teaching-led

Both research-intensive and teaching-led

Please indicate the name, position and contact of the person answering the survey on behalf of the institution: This information is for internal use only and will not be disclosed.

First name

Last name

E-mail

Position

Can EUA contact you to follow-up on your responses?

Yes

No

Do you want to receive email updates about the survey results and EUA innovation activities? Your contact information will be processed by EUA (privacy policy). Newsletter subscriptions can be cancelled at any time. (Tick all that apply)

I want to receive information about the survey results

I want to stay informed of EUA innovation activities

None of the above

Section 2: Innovation capacity

University innovation is becoming increasingly embedded in far-reaching institutional goals and transformation agendas. This Section aims to investigate universities' strategic attention to innovation, how innovation strategies can be implemented, and the enabling conditions for innovation. It further aims to build a picture of university innovation capacity, which involves three distinct but closely related aspects: the university's approach to innovation stimulation, support and quality assurance, the development of student and staff entrepreneurial and innovation mindsets, and collaboration within the innovation ecosystem.

Q1. Does your institution have a strategy or mission statement that reflects its innovation agenda?

Yes
No, but we are in the process of developing/updating one
No
Don't know

If yes and available publicly, please provide link.

Q1.1 If yes, does your institution have a plan to support implementation of this strategy or mission statement in the area of innovation?

Yes, the plan is being implemented
Yes, but the plan is not being implemented (yet)
No, but we are in the process of developing an implementation plan
No
Don't know

Q2. How would you assess your institution's overall strategic attention to innovation?

Very high
High
Neither high nor low
Low
Very low
No opinion

Please elaborate.

Q3. How would you assess your institution's overall innovation capacity?

Very high
High
Neither high nor low
Low
Very low
No opinion

Please elaborate.

Q4. Does your country or region have an official university innovation capacity assessment system?

Yes
No
Don't know

If yes, please elaborate and provide a link, if available.

Q5. How important are the following framework conditions for enhancing your institution's innovation capacity?

	Very important	Important	Moderately important	Less important	Not important	No opinion
Institutional autonomy						
Efficient institutional governance structures						
Favourable regulatory framework, including:						
Intellectual property regulations						
Procurement regulations						
Environmental and safety regulations						
Sectorial regulations (e.g., energy, health, digital)						
Qualified teaching, research and administrative staff						
Cooperation among different actors in the innovation ecosystems						
Connections to global innovation communities						
Sufficient and sustainable funding for innovation activities						
Other *(please specify):*						

Q6. Is your institution's role as an honest broker embedded in a framework (e.g., code of practice, policy, set of guidelines) for handling conflicts of interest in innovation?

Yes
No, but we are developing one
No
Don't know

If yes, please specify and include link, if available.

Q7. Which activities at your institution contribute to the development of student entrepreneurial or other skills needed in innovation processes? Please provide an approximate percentage of the student body that participates or takes advantage of these activities.

	0% -100%	Not applicable
Entrepreneurial courses open to Bachelor's and Master's students in different disciplines		
Entrepreneurial courses open to Doctoral students in different disciplines		
Courses using innovative educational methods (e.g., interdisciplinary or challenge based learning)		
Courses involving non-academic partners (e.g., practicing entrepreneurs)		
Internships at partner organisations /community service learning		
Bachelor's and Master's thesis in collaboration with external actors (e.g., companies, government agencies or civil society groups)		
Doctoral thesis in collaboration with external actors (e.g., companies, government agencies or civil society groups)		
Extracurricular activities (e.g., student led activities (societies, clubs) related to entrepreneurship and innovation)		
Prizes or other rewards for student entrepreneurial achievements (e.g., for projects, prototypes)		
Other *(please specify):*		

Q7.1 What challenges to promoting entrepreneurial and innovation mindsets among students have you encountered at your institution?
Open question

Q8. Please indicate the availability of staff with different skills and competencies needed to enhance your institution's innovation capacity.

	Fully available	Partially available, but further needed	Not available, but needed	Not needed	Don't know
Teaching staff to deliver entrepreneurial education					
Staff to provide support for students and researchers in setting up spin-offs, start-ups (e.g., as part of an incubation centre)					
Staff with skills in developing partnerships/projects with external actors (e.g., other universities, companies, government agencies or civil society groups)					
Support staff with knowledge of funding schemes for innovation activities					
Support staff with skills in the management and commercialisation of innovation activities (e.g., innovation managers, technology transfer office staff)					
Other (please specify):					

Q9. What support does your institution give (research, teaching, and management) staff to enhance institutional innovation capacity? (Tick all that apply)

Financial incentives (e.g., salary increases)	Support for the commercialisation of ideas/research results
Dedicated funding for staff innovation activities	Other (please specify):
Career assessment	Don't know
Informal incentives (e.g., prizes or awards)	None of the above
Dedicated support services (e.g., facilitating engagement with business or setting up spin-offs)	
Flexible contract arrangements allowing for temporary/ part-time positions at non-academic organisations	

Q10. Which partners does your institution work with in the area of innovation?

	Fully available	Partially available, but further needed	Not available, but needed	Not needed	Don't know
Local/regional public sector institutions					
National public sector institutions					
European institutions					
Civil society organisations (e.g., social partners, NGOs, grassroots organisations)					
Large companies					
Small and medium companies					
Start-ups					
Technology and business support organisations (e.g., incubators, technology transfer centres)					
Research organisations					
Other universities in your country					
Universities in other European countries					
Universities outside Europe					
Private higher education institutions					
Other education institutions (e.g., schools, vocational education and training providers)					
Other (please specify):					

Q11. Does your institution have a technology transfer office?

Yes, as an integral part of the university
Yes, as an external subsidiary company with substantial university ownership
No, but we purchase services from external providers
No
Don't know

Q12. Please specify how important the following different funding sources used by your institution are for innovation activities.

European funding	Very important	Important	Moderately important	Less important	Not important	No opinion
Framework Programmes for Research and Innovation (e.g., FP7, H2020), including:						
• European Research Council (ERC), e.g., proof of concept grants						
• Future and Emerging Technologies (FET) actions / European Innovation Council						
• Marie Skłodowska-Curie actions (MSCA)						
• Research infrastructures						
• Sectorial areas, such as health, energy, food (i.e. Cooperation pillar in FP7, Societal Challenges pillar in H2020)						
• European Institute of Innovation and Technology						
EU Structural Funds						
Erasmus +						
Other European funding (please specify):						

Other funding	Very important	Important	Moderately important	Less important	Not important	No opinion
Core university funding (allocated through block grants or other forms)						
National competitive funding						
Regional funding						
Income from tuition fees (e.g., to involve students in innovation activities)						
Funding from the private sector (e.g., contractual research)						
Funding received from other university income such as services						
Philanthropic funding from foundations						
Private donations						
Other *(please specify):*						

Section 3: Sustainable transition

Universities and other higher education institutions are working to improve environmental sustainability through both their scientific contributions and institutional alignment with national or international agendas to achieve climate neutrality. This section aims to investigate their innovation activities for delivering a sustainable transition in terms of: the specific applied solutions for sustainability and resilience, the prerequisites for success, and the obstacles encountered.

Q13. How does your institution contribute to innovation for a sustainable transition? (Tick all that apply)

Developing new technologies through university research activity

Improving social acceptance of new technologies

Changing production processes in various industries

Changing consumer behaviours in society

Reducing the environmental impact of existing infrastructures (e.g., energy, transport, communication)

Improving the resilience of existing infrastructures to the effects of climate change

Improving the resilience of human communities to the effects of climate change

Improving citizen/stakeholder involvement in innovation activities

Improving student and staff understanding of sustainability

Improving student and staff competence to innovate

Contributing to nature conservation

Other *(please specify):*

None of the above

Q14. Which of the following pathways best describes how your institution delivers innovation for a sustainable transition?

From research to innovation: prioritising blue-sky research has led to applied solutions.

From education to innovation: prioritising skills uptake for sustainable development has nurtured innovative talent.

Both

Other

None

If option 1, please provide details on the research and the solutions developed.
If option 2, please indicate which skills you regard as essential.
If option 3, please indicate if and how the two are combined.
If option 4, please explain.

Q15. Which of your institution's departments, faculties, or services are the leading sources of innovation for a sustainable transition?

Q15.1 Are there plans/strategies for interdisciplinary collaboration between these departments, faculties, or services?

Yes

Yes, and also with other departments, faculties, or services

No, but we are developing such plans/strategies

No

Don't know

If option 1, please provide details about these plans/strategies and, if possible, about what has already been achieved.
If option 2, please provide details about these plans/strategies and, if possible, about what has already been achieved.

Q16. At your institution, how important are the following research and education activities in delivering innovation for a sustainable transition?

	Very important	Important	Moderately important	Less important	Not important	No opinion
Creating interdisciplinary institutes						
More use of citizen science in research and teaching activities						
Improving students' awareness of innovation for sustainability						
Improving researchers' awareness of innovation for sustainability						
Improving the transfer of research results to innovations (e.g., through closer connections between researchers and start-ups or industry)						
Entrepreneurial training						
More placements / internships in companies, government agencies or civil society groups						
Other (please specify):						

Q17. Which measures of success does your institution use for innovation in the area of sustainable transition?

	To a large extent	To a moderate extent	To a small extent	Not at all	Don't know	Not applicable
Number of patent applications						
Number of patents used/achieved						
Number of study programmes addressing sustainability in the curriculum						
Number of graduates from study programmes addressing sustainability in the curriculum						
Nurturing the start-up sector for sustainable tech and non-tech solutions						
Contributing to industrial reconversion at local/national level						
Introducing sustainable solutions and/or practices into different economic sectors						
Helping develop new public services in your city/urban community (e.g., waste collection, recycling, shared mobility)						
Number of partnerships (regional, national or international) for sustainability-related activities						
Other (please specify):						

Q18. Does your institution conduct environmental impact studies as part of its innovation activities?

Yes, for most innovation activities
Yes, but only for innovation activities directly related to climate and the environment
No
Don't know

If option 1, how do you integrate sustainability criteria into innovation?

If option 2, are there plans to do this for other areas?

If option 3, please elaborate.

Q19. Based on your experience, please rate the following statements regarding the possible external perception of your institution's role as an honest broker in the sustainable transition.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	No opinion
Our scientific activity is perceived as independent by decision-makers and/or other stakeholders.						
Our scientific activity is perceived as overly political by decision-makers and/or other stakeholders.						
Our scientific activity is perceived as tied to industrial/ commercial interests by decision-makers and/or other stakeholders.						
Our scientific activity is not perceived as relevant, as this role is performed by civil society (e.g., think tanks, lobby groups, grassroots organisations).						

Q20. In your opinion, will Europe's research and innovation capabilities allow it to achieve a sustainable transition?

Yes: Europe is capable of disruptive innovation necessary for major changes.
No: Europe is only capable of incremental innovation necessary for minor changes.
Other
Don't know

Please elaborate.

Section 4: Digital transition

The development and uptake of digital technologies is one of the key drivers of innovation ecosystems. Universities and other higher education institutions make multiple contributions to this process through open innovation: enabling the flow of ideas between ecosystem actors, fostering start-ups, promoting the use of transversal technologies like AI etc. In the light of these varied dimensions, this section will investigate how institutions respond to ongoing digitalisation, as well how they ensure digital literacy.

Q21. In your opinion, in which digital transition areas do Europe's research and innovation capabilities allow it to take global leadership? (Tick all that apply)

Microelectronics
Software development
Big Data
Artificial Intelligence & Machine Learning
Blockchain
Cloud computing
High-performance computing & quantum computing
Cybersecurity technologies
Other *(please specify):*
Don't know
None of the above

Q22. In which areas is your institution implementing the digital transition?

	To a large extent	To a moderate extent	To a small extent	Not at all	Don't know
Institutional strategy/mission statement					
Learning and teaching					
Research					
Innovation					
Rewards and incentives for staff					
Infrastructure and campus management					
Creation of new roles/positions (e.g., data stewards, data control officers)					
Other *(please specify):*					

Q23. Please rate the following factors in terms of the challenges they pose for your institution's capacity to innovate.

	Very challenging	Challenging	Moderately challenging	Less challenging	Not challenging	No opinion
Adoption of specific technologies						
Funding for technology adoption/upgrades						
Provision of online courses						
Hiring of digitally skilled staff						
Uptake of digital skills among staff						
Research data management						
Cybersecurity						
Existence of digital partners in the ecosystem						
Cooperation with digital partners in the ecosystem						
Other *(please specify):*						

Q24. What are your institution's concerns regarding the digital transition?

	Very high	High	Neither high nor low	Low	Very low	Not at all
Ethical impact						
Environmental impact						
Social impact						
Legal impact						
Economic impact						
Student and staff well-being						
Maintaining leadership position						
Other *(please specify):*						

Q25. Please rate the following ways of supporting digital technology innovation according to their relevance at your institution.

	Very high	High	Neither high nor low	Low	Very low	Not at all
As an honest broker, trusted partner						
Through innovation-focused education and training						
Through workforce upskilling and re-skilling						
As a networking platform						
Through basic research						
Through applied research						
By providing an ethical framework						
Other *(please specify):*						

Q26. How does your institution measure digital innovation success?

	To a large extent	To a moderate extent	To a small extent	Not at all	Don't know	Not applicable
Number of patent applications						
Number of patents used/achieved						
Number of study programmes addressing digital innovation in the curriculum						
Number of graduates from study programmes addressing digital innovation in the curriculum						
Nurturing the start-up sector for digital solutions						
Contributing to the digitalisation of industries and/or other economic sectors						
Contributing to the digitalisation of public services in your city/urban community (e.g., waste collection, recycling, shared mobility)						
Number of partnerships (regional, national or international) for activities related to digital innovation						
Other (please specify):						

Q27. How is your institution preparing the next generation of digital innovators?

	To a large extent	To a moderate extent	To a small extent	Not at all	Don't know
By delivering the curriculum					
By embedding digital tools into the learning environment					
Through lifelong learning					
Through upskilling and/or re-skilling (e.g., anticipating how AI will affect the job market)					
Through entrepreneurial training					
Through new professorships (e.g., in AI)					
Through flexible employment contracts (e.g., part-time professorships allowing staff to combine university and industry work)					
Other (please specify):					

Q28. How important are the following elements in allowing your institution to support innovation for the digital transition?

	Very important	Important	Moderately important	Less important	Not important	No opinion
Access to more (big) data						
Digital infrastructure						
Regional digital ecosystems						
Sufficient and sustainable funding						
Access to networks (e.g., European University Alliances)						
Collaboration with public sector (national/local/regional institutions)						

	Very important	Important	Moderately important	Less important	Not important	No opinion
Collaboration with companies (large, SMEs, start-ups)						
Public procurement frameworks						
Open Science						
Team science						
Interdisciplinarity						
AI and big data governance						
AI and big data legal and ethical framework						
Legal conditions (e.g., GDPR)						
Computing capacities						
Qualified staff						
Other (please specify):						

Q28.1 In your opinion, will the above elements give European research and innovation a leadership position in the digital transition?

Yes
No
Don't know

If no, please explain and specify what you believe to be missing.

Section 5: Success stories (optional)

This section is designed for you to share your institution's innovation success stories. Answers provided in this section will not be anonymised (the name of your institution will be disclosed).

The following examples are a non-exhaustive list of innovation achievements:

- ◈ Specific infrastructures such as start-up hubs, technology clusters, science parks
- ◈ Strategic partnerships with companies, government agencies or civil society groups
- ◈ Joint university-industry laboratories/institutes, industrial doctorates
- ◈ Patenting and IP, technology transfer offices
- ◈ Promoting entrepreneurial and innovation mindsets among students and staff
- ◈ Educational approaches enabling more flexible learning paths, project and challenge based learning, flipped and international classrooms, etc.

Please provide your input in the box below.

End of questionnaire

Would you like to give EUA any feedback? If yes, please provide your input in the box below.

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