LMRO Partnership Initiative
Enhancing Labour Market Relevance and Outcomes of Higher Education

Peer-Learning Activities
4th International Policy and Practice Seminar on

Stimulating innovation through inter- and transdisciplinarity in education and research

Country Chair: Hungarian National Research, Development and Innovation Office

Seminar Brochure

3 March 2022 – virtual Zoom meeting

The LMRO Partnership Initiative benefits from the financial assistance of the European Union. The views expressed in this document cannot be taken to reflect the official opinion of the European Union or of the Organisation for Economic Co-operation and Development.

Table of contents

About the LMRO Partnership Initiative

Technological advances, climate change, the digitalisation of the economy and exogenous shocks such as the COVID-19 pandemic are transforming labour markets. Today's students and workers must adapt to changing tasks and jobs, acquiring skills that allow them to perform new jobs and updating their skills throughout their lives. The fast pace and uncertain nature of labour market changes also present challenges for higher education institutions (HEIs): they must anticipate new and emerging jobs and skill needs, create study programmes that are relevant to changing labour markets, and rethink how to communicate with learners on future careers and with employers on graduate skills. Governments, for their part, face the need to re-examine how their portfolio of policies – funding, monitoring and labour market data systems – can better support learners and institutions in responding to these challenges.

To support policy makers and HEIs in their shared commitment to enhance the labour market relevance and outcomes (LMRO) of higher education, the European Commission and the OECD launched the LMRO Partnership Initiative in 2019, a collaborative project with the participation of Austria, Hungary, Portugal, and Slovenia.

Through policy analysis, peer-learning activities and the development of a self-reflection tool for use by HEIs, the project contributed to building national government and higher education institutional capacity to implement future higher education policy reforms. The project informed and supported the European Strategy for Universities, linking its planned aims to national and institutional contexts and encouraging the transformation of the higher education sector.

Peer-learning activities

The five peer-learning events of the LMRO-PI were designed for policy makers and practitioners to review innovative national policies, identify enablers and barriers to innovative institutional practices, and discuss key findings from research. The aim was to (i) facilitate peer learning, (ii) identify key questions relevant for policymaking and the adoption and upscaling of effective institutional practices, and (iii) stimulate and contribute to an international policy debate. The online events gathered an international audience of higher education policy stakeholders, including policy makers, leaders of HEIs, teaching and administrative staff, higher education researchers, and representatives of quality assurance bodies, industry and student unions.

30 November 2020	17 February 2022	24 February 2022	3 March 2022	10 March 2022
Using labour market information to improve learners' choices and curriculum	Widening access and attracting students to fields with high labour market demand	Raising study success through student support and improved career-study linkages	Stimulating innovation through inter- and transdisciplinarity in education and research	Supporting improvement in teaching and learning to address students' needs and labour market demands
	Country chair: Austria	Country chair: Slovenia	Country chair: Hungary	Country chair: Portugal

Download seminar brochures at: https://www.oecd.org/education/higher-education-policy/.

For more information on the LMRO Partnership Initiative, please contact: HigherEducation@oecd.org.

Seminar summary

Harnessing research collaboration to identify emerging demand for inter- and transdisciplinary skills

The session explored the following questions:

- How to identify from research collaboration demand for inter- and transdisciplinary skills?
- What institutional structures for collaboration exist, and who are key actors?

Harnessing research collaboration to identify emerging skill needs

Panel discussion moderated by **András Dinnyés**, Founder and Director of BioTalentum Ltd.

- **Ana Sargento**, Vice-President for Knowledge Transfer and co-operation with Business and Society, Instituto Politecnico de Leiria (RUN-EU initiative)
- **Isabelle Reymen,** Scientific Director of TU/e Innovation Space at the TU Eindhoven, 4 TU Federation in the Netherlands
- **Gerald Schatz**, CEO, Linz Centre for Mechatronics

Key points from the discussion:

- How research units are set up and connected is a key enabler/limitation to harnessing research collaboration for the identification of emerging skill needs. Effective approaches require a strategic orientation, allocation of resources, support for staff and incentives for those who make progress possible.
- This also means opening up curricula to structurally embed inter- and transdisciplinary content, with personalised learning paths for students and clear communication of academic requirements and expected learning outcomes.
- Greater synergies are needed to connect education, research and engagement/third-mission activities. Structural resources and a step-by-step change of the institutional mindset are needed to create and sustain innovation in higher education.
- The involvement of technology transfer centres and knowledge exchange structures in the identification of emerging skills needs should be strengthened. Public funding could stimulate HEIs to pilot new approaches, making effective use of links with firms and public sector organisations to collect information on emerging skills needs and update curricula (e.g. micro-credentials).
- The involvement of students in collaborative research projects is often the “foot-in-the-door” for wider strategic collaboration with firms. Companies are highly interested in project collaboration with students as it gives them access to talent and new ideas. Students might already be working on advanced aspects of technology outside of a company’s radius.

Read more on the RUN-EU initiative, TU/e Innovation Space, 4 TU Federation and the Linz Centre for Mechatronics.

Research flagship initiatives to enhance collaboration across HEIs: An example from Ireland

Interview: **László Nádai**, Obuda University Budapest (Dean of the Kandó Kálmán Faculty of Electrical Engineering) interviewed **Keith Moyes**, Department of Further and Higher Education, Research, Innovation and Science of Ireland (Head of Higher Education Policy Division and Acting Head of Research and Innovation Division)

European co-funded projects and the participation of scientists in international research collaborations have helped, in many countries, to advance research collaboration involving multiple universities and public research organisations.

This can be systematically supported through national flagship research areas. National flagship research areas also provide opportunities for doctoral students to collaborate on related research topics across disciplines and universities. An example of this is the research prioritisation exercise in Ireland which started in 2012, post financial crisis, when a significant focus was on economic recovery and employment growth, and major-scale investment in R&D was relatively recent.

The Irish government has commissioned reports to inform the review of priority areas, including a scan of global markets, a technology futures exercise, and an audit of progress under the current priority areas. The proposed areas are broad enough to involve the full continuum of research – from basic through to applied – and could involve researchers across all disciplines including arts, humanities and the social sciences, as well as STEM fields. Scholarships for doctoral students and postdoc positions are also envisaged. Universities play a leading role in shaping this dialogue.

Read more about Ireland's research prioritisation exercise at: (Department of Enterprise, Trade and Employment of Ireland, 2018[1]).

Creating "spaces" for inter- and transdisciplinarity in doctoral education

Interview: **István Szabo**, Vice-President of the Hungarian National Research, Development and Innovation Office and National Co-ordinator of the LMRO Partnership Initiative interviewed:

- **Corina Balaban**, Honorary Research Associate at the University of Manchester, UK on the mobility of doctoral degree holders between disciplines and sectors
- **István Greiner**, Director of Research and Development, Gedeon Richter Plc. on the importance of inter- and transdisciplinarity for research, development and innovation

Mobility of doctoral degree holders between disciplines and sectors

There are different types of mobility in doctoral degree education and upon graduation: geographic mobility, mobility across disciplines and intersectoral mobility.

Mobility between disciplines can be described through two models: (i) interdisciplinarity through a person's knowledge and skills, and (ii) interdisciplinarity at the team level. The two models have skills implications: skills for team-level interdisciplinarity are different from the skills for individual-level interdisciplinarity. Implementing the first model can be challenging: doctoral degree holders may struggle to find suitable careers in cases where there is a lack of recognition or demand for the combination of knowledge and skills developed. Addressing this requires a systemic approach to create flexible career structures, and information and data on the employment outcomes of doctoral degree holders and skills demand.

To enhance mobility between sectors, doctoral schools offer courses and seminars on innovation and entrepreneurship. Support for mobility between sectors is often focused on collaboration with businesses

and public sector organisations, and less on non-governmental organisations (NGOs). This could lead to low interest as engaging with business is not for everyone.

Mobility and the need to constantly adapt to new contexts can be stressful for individuals, coupled with the need to be grounded in a discipline, an area of expertise, and/or location. The value-added of a doctoral degree is having time to explore a topic in depth.

Importance of inter- and transdisciplinarity for research, development and innovation

Interdisciplinarity is highly important for the pharmaceutical industry, as is transdisciplinary research that combines knowledge from different scientific disciplines with that of public and private sector stakeholders. To stimulate collaboration between businesses and doctoral schools in doctoral degree education, Hungary recently introduced the Co-operative Doctoral Programme, a scholarship programme open to current and prospective doctoral students. Primarily supported fields of study are STEM fields and information technology. A national expert jury, with members from the higher education sector and industry, assesses applications.

There are some challenges related to the co-supervision of a PhD thesis by researchers in the private sector. For example, when the co-supervisor leaves the company the PhD research may no longer fit with the company's priorities, posing difficulties for the doctoral student/candidate.

Intersectoral mobility might be challenged by doctoral schools' (and academia in general) and enterprises' diverging views on doctoral graduate skills. Often, the view of doctoral schools is that the private sector and academia have the same skills requirements of doctoral degree graduates. But this is not the case: businesses expect doctoral graduates to have a range of transferable skills, for example, leadership skills, project management, handling data security and managing diverse teams.

Read more about Corina Balaban's research at: https://www.research.manchester.ac.uk/portal/corina.balaban.html. For more information about the Co-operative Doctoral Programme in Hungary and recent developments in the country's doctoral degree education see (OECD, forthcoming[2]).

Opening research partnerships with industry and between fields to students

The session explored the following questions:

- What institutional environments, structures and mechanisms can increase student exposure to and involvement in inter- and transdisciplinary research?
- What can students learn from these experiences?

Experiencing how researchers think about inter- and transdisciplinarity

Panel discussion moderated by **István Kovács**, National Expert of the LMRO Partnership Initiative in Hungary

- **Cristina Albuquerque**, Vice-Rector for Academic Affairs of the University of Coimbra on the Challenges for Global Sustainability initiative and what students learn
- **Hilda Tellioglu**, Scientific Director of the Centre for Technology and Science Vienna on the benefits for students from involvement in research partnerships
- **Urban Bren**, Vice-Rector for Research of the University of Maribor on the "Innovation Fund" for students to translate knowledge gained in the classroom into ideas with an innovation potential

Key points from the discussion:

- Experiencing research and observing how researchers think about inter- and transdisciplinarity is essential for students to develop analytical competencies, understand decision-making processes and implications of choices.
- Students learn to think differently without being trapped in disciplinary circles that justify a discipline but are disconnected from the real world. In the field of architecture, questions that have a cross-disciplinary dimension are related to the wellbeing of inhabitants, commuters, workers and tourists. Students learn to understand that some problems have transversal solutions.
- Design-thinking approaches and challenge-based learning help to build effective learning inter- and transdisciplinary environments. The aim is to support students to develop critical thinking and abstract thinking, and to deal with different concepts. Students are keen on certain topics, e.g. climate change, and the aim should be to empower students to do their own projects, for example, hackathons with activists, which require students to build their own opinion, articulate and handle reactions, which might be critical.
- The involvement of students in research projects and collaboration with industry can be an effective way to communicate the labour market relevance of skills to students. Students experience (potential) applications of the knowledge and skills they acquire in their studies (i.e. why do we learn XYZ and how can XYZ be used?). Challenge-based learning allows students to work in interdisciplinary teams on real-life problems and challenges of their choice, together with researchers, industry and societal organisations.

Read more on the University of Coimbra's Challenges for Global Sustainability, the Centre for Technology and Science Vienna, and the Innovation Fund at the University of Maribor.

Examples

Panel discussion moderated by **Orsolya Rigó-Ditzendy**, Hungarian National Research, Development and Innovation Office

FabLab Budapest, **David Pap** (Director), ***Vortex CoLab***, **Rodrigo Maia**, (Head of Research & Development | Technology & Innovation), ***I2C Innovation Centre***, TU Vienna, **Birgit Hofreiter** (Director) and **Alexandra Negoescu** (Scientific Programme Manager), ***FIEK***, **Laszlo Lengyel**, Faculty of Electrical Engineering and Informatics of the Budapest University of Technology and Economics (FIEK Co-ordinator)

Key points from the discussion: FabLabs, maker spaces and innovation centres offer students a welcoming environment to test out new ideas and socialise with peers. Because of their inter- and transdisciplinary nature, these spaces are also attractive for (young) researchers with innovative ideas.

Student Project House at the ETH Zürich, **Judith Zimmermann** (Rector's Office, Head of Strategic Projects)

The Student Project House was founded by the ETH Zürich in 2016 as a space where students can learn for their future by following their passion, realising their own ideas and taking full ownership of their extra-curricular projects. The initiative was launched to enable the fostering of social and personal competencies, such as working in interdisciplinary teams, making decisions, learning from failure, exploring innovative technologies and, most importantly, developing the courage and confidence to do so.

Read more on the FabLab Budapest, Vortex CoLab,, and read brief descriptions of the initiatives: Innovation Incubation Center at the TU Vienna (Austria), FIEK - Center for University-Industry Cooperation at BME (Hungary), Student Project House at the ETH Zurich (Switzerland).

Integrating labour market relevant inter- and transdisciplinarity into curricula

The session explored the following questions:

- What processes and actors may facilitate the integration of inter- and transdisciplinarity into curricula?
- How to develop transferable skills in doctoral degree programmes and how to raise doctoral candidates' awareness for research careers outside academia?

FacilitatIng the integration of inter- and transdisciplinarity into curricula

Panel discussion moderated by **Martina Merz**, Vice-Rector for Research at the University of Klagenfurt

- Innorenew research centre, **Andreja Kutnar**, University of Primorska
- EUtopia, **Tanja Dmitrovic**, University of Ljubljana

Key points from the discussion:

- Interdisciplinary research and transdisciplinary research come with the promise that they provide particularly creative and multifaceted research processes which have the potential to generate highly innovative and socially relevant results to the benefit of both science and society as a whole
- Skills related to inter- and transdisciplinary research are around specific expertise in scientific problem solving in important areas of innovation, and are a valuable asset for future employment. While employers may call for more interdisciplinary skills, interdisciplinary study programmes may face difficulties in gaining labour market recognition. This requires careful assessment of graduates' labour market prospects and outcomes.
- Inter- and transdisciplinarity should not become an elite approach. Attention is needed to raise interest among all students, to integrate students that are not among the top performers and students with different levels of previous knowledge.
- PhDs are very important for the sustainability of inter- and transdisciplinarity. They are the future teaching staff in higher education.

Read more on the Innorenew research centre and EUtopia.

Examples

- ***IPVC Inclusive School***, interdisciplinary challenge-based learning in the Instituto Politecnico de Viana do Castelo, **Ana Teresa Ferreira Oliveira** (Gender Equality Commission Co-ordinator, Inclusive School Programme Co-ordinator)
- ***Extension programme "Digital Competence"*** at TU Vienna, **Christian Huemer** (Dean of Academic Affairs of Business Informatics)
- "***Market Project***" in the PhD pharmacy programme at the University of Ljubljana, **Borut Božič**, (Programme Council of the Interdisciplinary Doctoral Degree Programmes in Biomedicine)
- ***Hungarian Startup University Programme***, **Krisztián Kölkedi**, Express Innovation Agency (Deputy CEO)
- Design and implementation of new degree programmes:
    - ***New Master of Law (LLM)*** at the University of Klagenfurt, **Michael Pfeifer** (Programme Director)
    - ***NaWi-Tech BSc programme*** at the Johannes Kepler University Linz, **Oliver Brüggemann** (Programme Co-ordinator)

The **IPVC Inclusive School** organises service learning that involves students through interdisciplinary teams in a participatory research setting. The aim is to bridge theory and practice by solving real-life problems in the local community. Students gain valuable skills in project management, communication and leadership and academic staff receives ideas and inputs for their research and teaching. The project has been very successful in enhancing student engagement and mitigating attrition from study programmes.

The **Extension programme "Digital Competence** allows students in bachelor's and master's programmes to add the "Digital Competence" extension to their study programme irrespective of the subject they are studying. Students can choose what is relevant to their interests (e.g. Fields of Application of Digitalisation (9 ECTS), Fundamentals of Digitalisation (7 ECTS), Fundamentals of Computer science (14 ECTS)). The programme is now in its third cycle (with 150-250 students in each cycle).

The "**Market Project**" in the PhD pharmacy programme allows doctoral students to develop business skills. Participating have four mentors for the project: two in the company (many of whom are alumni) and two in the university. There are two mentors in the company as the head of department is always involved. This has also been important for management buy-in to the project which has been running for several years. For doctoral students the double mentoring helps them to observe and experience project management and leadership perspectives at the same time.

The **Hungarian Startup University Programme** is a two-semester e-learning course designed to promote entrepreneurship. During the first semester, students will master the theoretical curriculum. If they have a successful idea or are part of a successful project team, they will participate in a practice-oriented, experience-based second semester, benefitting from a scholarship that allows them to focus on their project while studying.

The **new Master of Law** is a co-operation between the University of Klagenfurt and the University of Vienna, to enable graduates to work in all classical legal professions (lawyers, notaries, judges, public prosecutors etc). Graduates of the previous programme, a degree in business administration and law, did not have the requirements to work in classical legal professions. Many bachelor's graduates left Klagenfurt to study law at other Austrian universities.

The **NaWi-Tec BSc programme** (Fundamentals of Natural Sciences for Technology) consists of courses in chemistry, mathematics and physics, allowing students to build a solid foundation in these three subject areas. The first four semesters will give students an opportunity to explore these disciplines in detail before they specialise in one area during the fifth and sixth semesters of the programme. Graduates are well-educated and highly qualified to pursue a variety of professional careers, particularly those requiring interdisciplinary skills.

Read brief descriptions of the initiatives: IPVC Inclusive School (Portugal); Extension programme "Digital Competence" at the TU Vienna (Austria); "Market project" in the PhD in Pharmacy, University of Ljubljana (Slovenia); Hungarian Startup University Programme (Hungary); New Master of Law (LLM) at the University of Klagenfurt (Austria); NaWi-Tec BSc programme at the Johannes Kepler University Linz (Austria):

Raising awareness of doctoral candidates for research careers outside academia

Interview: **Haneen Atallah**, European Council of Doctoral Candidates and Junior Researchers (External Communication Co-ordinator and member of the Association of Hungarian PhD and DLA Candidates, DOSZ) interviewed **Lucas Zinner**, University of Vienna (Head of Research Services, Technology Transfer and Career Development including Doctoral Education, Founder of PRIDE Network Association for Professionals in Doctoral Education)

Key points:

- Transferable skills training has become increasingly demanded by doctoral students and accepted by supervisors as a necessary component of doctoral degree education. The challenge is to identify skills demand outside of academia and public sector research as there is a lack of information on the non-academic labour market for doctoral degree holders.
- PhD candidates must be trained to articulate and signal their skills. For example, 'teaching' is not a high-demand skill, but communication and coaching are, and both are developed through teaching. Part of this is also for students to understand how their skills match with the skills required in a job vacancy and 'translate' accordingly.

Examples

- **DocEnhance project**
- ***Transferable skills programme for doctoral students*** at the University of Graz, **Corinne von der Hellen** (Programme Co-ordinator)
- ***PDEng Bootcamp*** at the TU Eindhoven, **Gert Guri**, (Coordinator of Entrepreneurial Learning)

DocEnhance is a project funded by the European Commission for the period 2020-22 that seeks to achieve the development of courses for transferable skills, and their integration into doctoral degree programmes. The DocEnhance career tracking survey includes 60-70 questions divided into eight sections (doctoral education, skills, transition to first/next employment, employment and career-related experience, inter-sectoral and geographical mobility, and demographic details). The international consortium includes 18 universities across Europe and one African university.

The **transferable skills programme for doctoral students at the University of Graz** was designed based on the Salzburg II recommendations for doctoral education. The programme is constantly evaluated by the participants and adapted to new requirements. The programme has made doctoral training more visible both inside and outside the University of Graz: the staff is involved in strategic decisions and doctoral candidates are more aware of the importance of transferable skills development.

The **PDEng Bootcamp** involves no lectures, but studio-style group work and personal and team development. The set-up is in the form of a "pressure cooker", where students will learn to deal with all kinds of uncertainties that are related to working with real-life challenges in an interdisciplinary team. Several workshops are offered to help students with their hands-on activity rather than providing an overall theoretical overview. Students reflect daily on their development. Teams present and discuss their intermediary results and get feedback from peers and the coach. In coaching sessions, teams also receive individual feedback to help them direct and structure their own development and achievements. Participants are stimulated to take responsibility for their own learning path.

Read more on the career tracking survey and the survey results on Docenhance.eu; and brief descriptions of the initiatives: Transferable skills programme for PhD candidates, University of Graz (Austria); PDEng Bootcamp TU/e Eindhoven (Netherlands).

Brief description of the initiatives

The brief descriptions of the initiatives have been provided and drafted by the relevant organisations themselves and have not been edited or amended by the OECD. Any questions relating to the initiatives should be addressed to the contact provided.

Innovation Incubation Center at the TU Vienna (Austria)

Key facts about the initiative	
Country	Austria
Name of the initiative (in English/in the local language)	Innovation Incubation Center
Website (if available)	https://i2c.tuwien.ac.at/
Name of organisation implementing the initiative	TU Vienna
Year it started and ended/is expected to end	2012 – to date
Contact	office@i2c.tuwien.ac.at

Short summary of the initiative

The TU Wien Innovation Incubation Center (i²c) is the Competence Center for Entrepreneurship and Innovation at TU Wien. Together with the Research and Transfer Support Service Unit, we aim for a visible and sustainable support of university spin-offs, empowering breakthroughs developed at TU Wien reach society. Our mission is to create tomorrow's high performers by instilling an entrepreneurial mindset among TU Wien students and scientists. i²c facilitates an entrepreneurial ecosystem by offering top-quality lifelong education and coaching for acquiring business competencies to students and the scientific personnel of the university. Our various programs aim to support not only intertwining technical and entrepreneurial education but also supporting innovative founder teams along the whole value chain: from ideation to implementation and market entry.

Why was the initiative launched?

The initiative was launched in 2012 starting with the implementation of a supplementary curriculum on innovation on top of regular studies with the aim to equip students and scientists from the Faculty of Informatics with a different set of skills needed in today´s society. By complementing their technical expertise with an entrepreneurial education, we arm our students, scientists, and engineers with the skillsets needed to tackle big problems that require new approaches to problem-solving along scientific approaches. This Extended Study on Innovation has been introduced also as a means to attract global talent. The program was not only introducing entrepreneurial education on top of technical education, but as well through its interdisciplinarity approach was bringing together bachelor, master, and Ph.D. students from various programs under the umbrella of the Faculty of Informatics.

Since then, our program portfolio has expanded extensively and the initiative has been rolled out cross-faculty-wide. In 2015 the Innovation Incubation Center was implemented as an organizational unit of the vice rectorate on research and innovation.

What are key achievements?

The TUW Innovation Incubation Center has been the first university in Austria to develop a trans-disciplinary, selection-based supplementary curriculum on innovation for students, positioning TUW as a role model educational program not only locally but as well internationally. 178 students underwent the Extended Studies on Innovation since its creation, generating 41 start-ups and 56 innovation-management and product development-related professionals. 43% of the participants in the program have an international background and some of them have opted to study at TU Wien due to this curriculum. From an early stage, we realized that our academic personnel required as well access to entrepreneurial education and initiated for the first time in Austria the 'Entrepreneurship for scientists' workshops series for our scientific personnel.

In 2015, i²c´s outstanding activities in building up an entrepreneurial ecosystem at TU Wien were recognized at the local level through the Chamber of Commerce Award.

Although initially designed for the Faculty of Informatics, the center rolled out its programs cross-university in 2015 becoming a service unit within the RTI Support (Research, Technology, Innovation) directly assigned to the Vice-rector for Research and Innovation. Today, the center offers a curriculum on innovation for students and 8 additional programs for the scientific personnel ranging from workshops and bootcamps to mentoring and coaching, a scholarship for PhDs with high potential research results and an incubation program. We have been invited for presenting our formats and learnings at various universities both locally, at the European level as well as internationally.

The ''European Enterprise Award for Investing in Entrepreneurial Skills'' was awarded in 2018 to the TU Wien Innovation Incubation Center for its outstanding results with the i²c STARTacademy program. Th format was launched in 2015 being the first initiative of this kind in Austria. The format consists of a boot camp that offers three days of intensive training and support for scientists to assess the market potential of their research results. 10 teams are assisted by 65+ domain-specific mentors and 10+ lecturers to evaluate the teams' projects market opportunities. At the end of the bootcamp, the teams have the chance to present their technology and business concept to representatives from the industry and investors at the TU Wien Innovation Summit. Since 2015, 62 projects (139 scientists) took part in the bootcamp generating 37 Spin-offs (founded and in founding) that brought 130+ employment places in the local ecosystem.

The TU Wien Innovation Incubation Center has also developed a very successful and unique incubation program focusing on transitioning research results to the market capable of supporting projects coming from all departments of the university using a personalized and individualized approach. The program has supported already 23 alumni and currently actively supporting 8 spin-offs and start-ups in the program. These spin-offs have brought to the market over 34 products and raised in 2021 alone € 39M+ in public funding and investments, receiving as well 27 awards and nominations. 8 additional teams have joined our program in September 2021. Among all the i²c founders from our incubation program, we have a share of female founders of 21% (above the Austrian average of 18%) and 46% of our start-ups have at least one female co-founder (way above the Austrian average of 35%). 58% of our start-ups have at least one non-Austrian co-founder and all our programs are in English to embrace the multiculturality of the founders and students we are working with.

What do you think were the key success factors?

Our core asset is our dedicated female-led team. Our visionary team members possess a good understanding of both the university and the local entrepreneurial ecosystem and are able to design and run formats that allow the engagement of a wide array of stakeholders. The supportive local ecosystem has had as well an important role in the success of our programs. Due to this, we were able to implement an entrepreneurial ecosystem within the university focusing on the early stages of transferring breakthrough technologies into the market that were complemented by public funding support and additional programs for the later stages of spin-off growth from the ecosystem.

All programs run by the i²c are subject to an intensive feedback loop with the participants engaged in the formats, allowing us a very good understanding of the challenges technical people face in the first years of running their start-ups. Fast, incremental changes in our programs allowed us to develop formats that provide a structured approach to building the business side to scientists from TU Wien.

Another important success factor is our network of alumni. The TUW i²ncubator alumni are actively involved in the programs offered to the founders at the beginning of the road through mentoring and coaching. The possibility to exchange knowledge with people who have been where you are now has become one of many cornerstones of our incubation program.

What do you think were the barriers?
Misconceptions about the usefulness and applicability of an entrepreneurial mindset in the context of a university have been an important barrier we had to overcome. Changing mindsets is a lengthy and challenging process and we are constantly raising awareness about the power and benefits of open innovation and the importance of bringing breakthroughs to society. Our small but very efficient team has done an extraordinary job at maximizing impact considering the limited resources at our disposal.
If you were to start again, what would you do differently?
Our initial approach was to understand the needs of the students and scientists, implement pilot projects and generate programs that focus on lifelong entrepreneurial learning to complement technical education. Our learning is that this bottom-up approach requires strong support from top levels from an early stage and sometimes even requires educating the ecosystem about the different needs founders bringing research to the market have. A research outcome is not a product and the time to market can be lengthy.
Did national policies/programmes/funding support the initiation/implementation/development of the initiative? If so, how?
The TU Wien Innovation Incubation Center was initially funded through a MINT grant and has received additional financial support through grants given by local initiatives like the Vienna Business Agency and the Austria Wirtschaftsservice. The aws Jump STARTgrant received in 2015 enabled us to set up our incubation program so we can establish innovative and technology-focused companies or businesses ideas faster on the market.
Do you have plans to further develop the initiative? If so, what are they?
We are constantly working on improving and developing formats for the students and employees of TU Wien. We plan to launch in the winter semester a series of courses for Ph.D. students on innovation management and how to transfer innovations into products. We believe it is important that we not only further support the skillset development of our students and make sure we have well-prepared CTOs, product and innovation managers in the ecosystem but as well present alternative career paths for them. We are also working on new formats to actively engage citizens, the industry, start-ups, and spin-offs to work together on tackling society´s challenges. The need for TU Wien´s Innovation Campus is stronger than ever in order to tackle the full potential 26 000 + students and 4 000+ scientific personnel bring. There is a dire need for access to lab spaces and a maker space for facilitating collaboration among stakeholders and strengthening the innovative ecosystem of TU Wien.

FIEK - Center for University-Industry Cooperation at BME (Hungary)

Key facts about the initiative	
Country	Hungary
Name of the initiative (in English/in the local language)	Center for University-Industry Cooperation / Felsőoktatási és Ipari Együttműködési Központ
Website (if available)	www.fiek.bme.hu
Name of organisation implementing the initiative	Budapest University of Technology and Economics
Year it started and ended/is expected to end	2017
Contact	fiek@bme.hu
Short summary of the initiative	
The Center for University-Industry Cooperation and Industrial Cooperation (BME FIEK) organizes, coordinates and strengthens the University's innovation activities. It manages the various areas of industry-university relations: • Research and development	

- Knowledge transfer
- Intellectual property management
- Incubation
- Developing the partner network
- International relations

Why was the initiative launched?

BME FIEK is a faculty-level organization of the University.

We work on to

1. Strengthen the uniformity of the university.
2. Strengthen the culture of cooperative activities between the faculties.
3. Directly connect the industrial needs and university capabilities.

WHY we do it?, what motivates/inspires us?: to provide the framework (service, administration, team) to build TRUST between the faculties and between the industry (companies, SMEs) and university.

We believe in a win-win model, where projects involve industrial engineers, university researchers and students to work together

We develop the cooperation of the industry and university and speed up the utilization of research results

What are key achievements?

Short-term impacts:

1. Daily cooperation between the University and industrial partners
2. Good understanding and up to date map of industrial needs
3. Proactive behavior of R&D teams
4. Proof of Concept projects established based on industrial needs and realized in a cooperative way
5. Patents, use cases for intellectual property utilization, new startup and spin-off companies
6. IMPACT to strengthen practical education
7. flexible incubation services

Long-term impacts:

1. Novel culture and quality in the university-industry cooperation
2. The vision is to offer R&D Competence and Capacity as a Service

What do you think were the key success factors?

What do you think were the barriers?

If you were to start again, what would you do differently?

Did national policies/programmes/funding support the initiation/implementation/development of the initiative? If so, how?

Do you have plans to further develop the initiative? If so, what are they?

Student Project House at the ETH Zurich (Switzerland)

Key facts about the initiative	
Country	Switzerland
Name of the initiative (in English/in the local language)	Student Project House
Website (if available)	www.sph.ethz.ch
Name of organisation implementing the initiative	ETH Zurich
Year it started and ended/is expected to end	2016
Contact	Judith Zimmermann judith.zimmermann@sl.ethz.ch

Short summary of the initiative

At ETH Zurich we aim at preparing our students for a world in which the pace of change is accelerating, a world in which technology is evolving radically, and a world that needs innovative solutions to today's challenges. Future-ready graduates must not only have acquired excellent subject-specific competencies from lectures, but they must also have developed a broad set of additional competencies. Both, method-specific as well as social and personal competencies are crucial for our students to be successful professionally and for their personal wellbeing.

Such competencies must be practised early and through-out life, and what better way is there than to do so in a safe environment during one's studies? This is why ETH has founded the Student Project House in 2016. A space where students can learn for their future by following their passion, realising their own ideas, and taking full ownership of their extra-curricular projects. By turning an idea into a project, students get to know and go through the various stages of an innovation process. They start by identifying a problem that they deeply care about, develop innovative ideas to tackle the problem, and then prototype, test, and adapt their ideas based on user feedback. At the same time, they practise working in interdisciplinary teams, make decisions, learn from their failures, explore innovative technologies and, most importantly, develop the courage and confidence to do so.

Why was the initiative launched?

The initiative was launched to enable the fostering of social and personal competencies such as working in interdisciplinary teams, make decisions, learn from their failures, explore innovative technologies and, most importantly, develop the courage and confidence to do so.

What are key achievements?

Students report that they have improved various social and personal skills by turning their idea into a project. We also hosted 120 active projects in spring 2022.

What do you think were the key success factors?

Enough freedom to develop the initiative and a highly motivated team.

What do you think were the barriers?

Sometimes the needs of the initiative were not understood within the university.

If you were to start again, what would you do differently?

No

Did national policies/programmes/funding support the initiation/implementation/development of the initiative? If so, how?

No

Do you have plans to further develop the initiative? If so, what are they?

Our aim is to expand the Student Project House and offer more inspiring thematic workshops.

Any additional information
We are also working on a new project called the Collaborative Learning Platfrom, which will be located between the regular curricula and the Student Project House.

IPVC Inclusive School (Portugal)

Key facts about the initiative	
Country	Portugal
Name of the initiative (in English/in the local language)	IPVC Inclusive School – interdisciplinary challenge-based learning in the Instituto Politecnico de Viana do Castelo
Website (if available)	http://escolainclusiva.estg.ipvc.pt/
Name of organisation implementing the initiative	Instituto Politécnico de Viana do Castelo
Year it started and ended/is expected to end	9/2015 - and to be continued
Contact	Ana Teresa Oliveira escolainclusiva@estg.ipvc.pt

Short summary of the initiative

The project aims to involve students and teachers in community service-learning projects. These projects are developed within courses and they intend to enhance students' motivation, engagement and reduce abandonment.

Also the project expanded IPVCs´ social ecosystem, collaboration and knowledge exchange with NGO´s, municipalities and SME´s.

The project:

1. identifies the partners social needs;
2. promotes the development of service-learning projects with teachers and students.
3. Delivers solutions to NGO´s, SME´s and Municipalities.

This project is particularly important given the IPVC student profile, generally with low incomes, from a mainly rural area, and it has been promoting educational success, engagement, fighting dropout and promoting employability.

Why was the initiative launched?

The project has begun in 2015 with small initiatives, but through the years it has become deeply integrated within the organization strategy, values and management processes. The activities organised within the Erasmus+ project BeyondScale https://www.beyondscale.eu/ were relevant for the development of the initiative.

What are key achievements?

The project has produced about 60 solutions to social projects developed with 30 external social organizational stake-holders and about more than 400 students involved.

The project also won three awards on national competitions, two with funding associated that enabled to develop a formal brand and a website to disseminate the project. http://escolainclusiva.estg.ipvc.pt/sobre/

The initiative was integrated into the Erasmus+ project BeyondScale and has since undergone several conceptual and practical development steps for further improvement.

What do you think were the key success factors?

- Develop trust between stakeholders with transparency and communication
- Team working
- Understanding the needs of social institutions
- Monitoring social projects and community involvement

- Institutional value recognition;
- Management processes: definition of an organizational structure and a modus operandi
- Internal and external benchmarking
- Problem-solving & design thinking methodologies
- IPVC Values and culture
- Presidency and School Directors formal and informal support

What do you think were the barriers?

The limited time to contact the stakeholders

- Teacher's overload
- Understanding the complexity of problems
- Receiving information in a timely manner from the NGO´s

If you were to start again, what would you do differently?

The development of trust and communication would be the first thing to develop.

Do you have plans to further develop the initiative? If so, what are they?

Yes! A community of practice towards service-learning, social challenges and solutions with a very active role from academia.

The project is implemented and it will continue, however we need to further expand the project, integrating courses, students, continue to develop team training, applied research.

Given the success of the project we would like to build a community of practice that can be probably implemented in another HEIS. We integrated the European Observatory of Service-Learning in Higher Education and the BeyondScale project was helpful to determine activities that can help sustain and develop this community of practice. We have lessons to share and to learn.

Extension programme "Digital Competence" at the TU Vienna (Austria)

Key facts about the initiative	
Country	Austria
Name of the initiative (in English/in the local language)	Extension programme "Digital Competence"
Website (if available)	https://informatics.tuwien.ac.at/bachelor/digital-skills/
Name of organisation implementing the initiative	TU Wien (TU Vienna)
Year it started and ended/is expected to end	Start: 2020 and to be continued
Contact	Christian Huemer (christian.huemer@tuwien.ac.at)

Short summary of the initiative

Students at TU Wien should not only apply digital technologies, but should also be able to shape them for the future. Therefore, they should acquire all skills and competencies required by the digital transformation. This means that TU Wien offers not only digital learning, but also learning about the digital. A key enabler of this vision is the extension program Digital Competences. Since March 2020 this dedicated program is offered as an add-on to all regular bachelor studies of TU Wien.

The extension program Digital Competences consists of three compulsory modules with a total of 30 ECTS. As a prerequisite for registering this program students have to prove the positive completion of the entrance phase in the Bachelor program underlying the admission to the extension program Digital Competences or the completion of a Bachelor program at the TU Wien.

The first module (7 ECTS) - the fundamentals of digitalization - is dedicated to the definition of digitalization and digital transformation as well as its characteristics and consequences for science, technology and society. The second module (14

ECTS) teaches fundamental concepts of computer science that serve as drivers of innovations in the field of digitalization. Students learn to (i) design and program simple algorithms, (ii) describe information systems using selected models, (iii) describe and explain the technical foundations of information systems, and (iv) analyze and visualize data. In the third module (9 ECTS), students deal with digitalization in the domain of their main studies. They should recognize the potentials of digitalization in their application area and apply the concepts of the digitalization in this area.

Why was the initiative launched?

The Austrian University Development Plan (GUEP) is a technical-strategic planning instrument of the Federal Ministry of Education, Science and Research (BMBWF) that serves the overall design of the Austrian university landscape. This plan mandates that students should not only use digital technologies as consumers, but also develop a basic understanding of how to use them creatively in a design-oriented way, how to change and develop them, and how to actively participate in corresponding innovation processes. Accordingly, each university has to develop a digital strategy on how to meet these expectations.

The digital strategy of TU Wien recognizes that students must have extensive competencies in the area of digitalization, regardless of their chosen field of study and, if necessary, the academic program has to be expanded accordingly. As a result, TU Wien added the extension program on digital competencies to its academic program.

An understanding of digitalization that addresses all types of use of computer science for the various application areas is a prerequisite for all graduates to be able to succeed in the job market. They acquire this understanding in the three modules of the extension program Digital Competencies.

What are key achievements?

The extension program complements the job profile that is pursued as a main subject in the bachelor's study. It supplements this job profile with those skills and competencies that are necessary for advancing digitalization in different domains. Graduates are thus able to assess the potential of digital transformation in their field of application. They are also able to design new future-proof systems through digital transformation in their field of application. Given these prospects, bout 200 students did start in each of the two first cycles of the extension program and the first bunch of students completed their program in summer 2021.

What do you think were the key success factors?

The importance of digitalization became more and more evident in recent years. There is a general awareness of this importance in public in general and amongst students in specific. Accordingly, there is not much need convincing students that education on digitalization increases their chances on the labor market. Accordingly, the growing importance of digitalization may be seen as both a trigger and a success factor for our initiative.

An alternative to the new extension program would have been to extend the education in digitalization in each curriculum of TU Wien. However, increasing the ECTS in one subject implicitly means decreasing the ECTS in other subjects. Experience shows that discussions on which topics will be decreased most commonly result in Irresolvable conflicts. By using the concept of an extension curriculum none of the extended curricula had to be changed and at the same time, that topic of digitalization is addressed in a reasonable scope and not only as a little add-on with very limited ECTS. Consequently, the concept of extension curricula was a key success factor to reach acceptance by the various faculties of TU Wien.

What do you think were the barriers?

Surprisingly, there were hardly any barriers in establishing the extension curriculum digital competences. There are some regulations in the Austrian university law that have a negative impact on the tuition fee of students taking the curriculum. However, this is specific to Austria and as such not worth to be discussed it in more detail in an international event.

If you were to start again, what would you do differently?

The idea of our initiative was so well received by the university management, that it only took 6 months from the idea to the official announcement of the curriculum. Needless to say, it would have been better to take a bit more time for designing the curriculum, but everyone involved was eager to start with the curriculum as soon as possible.

Did national policies/programmes/funding support the initiation/implementation/development of the initiative? If so, how?
As mentioned above, the Austrian University Development Plan (GUEP) defined digitalization in general and educating students in digitalization of highest priority. Accordingly, the university management had to take corresponding actions. Thus, this plan may be considered as a fertilizer to our initiative. Furthermore, it should be mentioned that the general concept of extension curricula was introduced in the Austrian University law in 2017 and the first two extension curricula started in Austria in the academic year 2018/19. The concept of extension curricula is in particular useful to teach students in cross-cutting concerns. Accordingly, this relatively new concept was a perfect match for the need to educate students of different main subjects in the field of digitalization.
Do you have plans to further develop the initiative? If so, what are they?
Given the success of the extension curriculum digital competencies extending the bachelor programs of TU Wien, we are in a very early stage of discussing a similar extension for the master programs. This extension may focus on data literacy, since it became evident that students in any subject apply more and more data-driven research methods.

New Master of Law (LLM) at the University of Klagenfurt (Austria)

Key facts about the initiative	
Country	Austria
Name of the initiative (in English/in the local language)	New Master of Law (LLM) at the University of Klagenfurt
Website (if available)	https://www.aau.at/studien/master-wirtschaftsrecht/
Name of organisation implementing the initiative	Universität Klagenfurt und Univeristät Wien
Year it started and ended/is expected to end	Oktober 2018 -
Contact	Michael Pfeifer (michael.pfeifer@aau.at)
Short summary of the initiative	
The Master programme for business law is a new LLM-Master-degree by the University Klagenfurt in cooperation with the University Vienna, to enable graduates to work in all classical legal professions (lawyers, notaries, judges, public prosecutors etc)	
Why was the initiative launched?	
The Bachelor and Master degree in business administration and law gave graduates not the requirements to work in classical legal professions. Bachelor graduates left Klagenfurt to study law at other Austrian faculties (eg Graz, Vienna, Linz, Salzburg, Innsbruck) or went there in the first place.	
What are key achievements?	
The key achievements are at that this programme could start in the first place as well as it did.	
What do you think were the key success factors?	
Close and productive cooperation (I) within the economics faculty at the University Klagenfurt (the institute of law in Klagenfurt is part of the economics faculty); (ii) with local stakeholders (Carinthian Bar Association, Carinthian Legal Association, Carinthian Courts etc); (iii) with the Faculty of Law at the university Vienna	
What do you think were the barriers?	
There were hardly any barriers, as all persons involved were actively and productively working to adopt this masters programme.	
If you were to start again, what would you do differently?	

Did national policies/programmes/funding support the initiation/implementation/development of the initiative? If so, how?
The program was supported by the university of Klagenfurt and University of Vienna from the very start.
Do you have plans to further develop the initiative? If so, what are they?
Current plans are to increase the number of students and graduates; everything start with dissemination efforts on a local and regional level; especially dissemination on a regional level can be still improved.

NaWi-Tec BSc programme at the Johannes Kepler University Linz (Austria)

Key facts about the initiative	
Country	Austria
Name of the initiative (in English/in the local language)	NAWI-TEC BSc programme
Website (if available)	https://www.jku.at/en/degree-programs/types-of-degree-programs/bachelors-and-diploma-degree-programs/ba-nascitech/
Name of organisation implementing the initiative	Johannes Kepler University Linz, Austria
Year it started and ended/is expected to end	Start: October 2018, open end.
Contact	Oliver.brüggemann@jku.at
Short summary of the initiative	
The curriculum NaWi-Tec (Fundamentals of Natural Sciences for Technology) consists of courses in chemistry, mathematics and physics, allowing to build a solid foundation in these three subject areas. The first four semesters will give students an opportunity to explore these subject areas in detail – they then specialize in one particular area during the fifth and sixth semester of the program. Graduates of this program might then continue with a Master's program in chemistry, mathematics or physics, depending on their choice of specialization in this Bachelor's program. The Bachelor's degree program NaWi-Tec is not only for new students at the JKU who wish to pursue an academic degree but have not yet decided on a particular subject area. Even if they wish to consciously acquire broader, scientific knowledge, NaWi-Tec is the right program for them. Graduates are well-educated and highly qualified to pursue a variety of professional careers, particularly those requiring interdisciplinary skills and the ability to think critically and assess problems. Beyond it, it is addressing pupils of high schools in their final two school years offering them to join the introductory lectures of this study program, and by that means get involved with academic thinking and life.	
Why was the initiative launched?	
The idea was to get more young people interested in STEM subjects, to motivate them to study at our university, and to connect to them with the university while still being at school.	
What are key achievements?	
1. Offering Austria's first broad bachelor's program in Fundamentals of Natural Sciences for Technology, training students in natural sciences based on a wholistic approach and preparing them for technological master's programs and technological jobs. 2. Establishing strong links with schools and attracting future students	

What do you think were the key success factors?
Openness of the key figures for interdepartmental collaborations leading to the establishment of a curriculum offered by the three department of chemistry, mathematics and physics.
What do you think were the barriers?
Convincing other players in- and outside the university of the value of the NaWi-Tec program and the chances it offers.
If you were to start again, what would you do differently?
Speeding up the process of developing the curriculum and integrating schools in the plannings at an earlier stage of the process.
Did national policies/programmes/funding support the initiation/implementation/development of the initiative? If so, how?
The program was intiated and supported by the rectorate of the Johannes Kepler University and also supported by the ministry of education.
Do you have plans to further develop the initiative? If so, what are they?
Current plans are, to involve far more schools in Austria than before, and by this means, to offer the introductory program to a much higher number of pupils. Furthermore, a more effective advertising of this program is desired and planned.
Any additional information
It is to be further discussed whether a consecutive Master's program in Natural Sciences for Technology would make sense.

"Market project" in the PhD in Pharmacy, University of Ljubljana (Slovenia)

Key facts about the initiative	
Country	Slovenia
Name of the initiative (in English/in the local language)	"Market project" in the PhD programme Pharmacy
Website (if available)	
Name of organisation implementing the initiative	University of Ljubljana, Faculty of Pharmacy AND Novartis in Slovenia
Year it started and ended/is expected to end	2014-2017, 2017-2020, 2020-2024
Contact	Borut.bozic@ffa.uni-lj.si
Short summary of the initiative	
Industrial researchers showed interest in solving some challenges or problems in collaboration with researchers at Faculty. Management of both institutions agreed to prepare and sign an umbrella contract about collaboration, so more individual projects from different departments were possible to perform in the same way. So, we talk about umbrella project Human resources development and individual research projects e.g., in vivo in vitro correlations, dissolutions, analytical development, quality by design etc. Researchers are employed at the faculty (in public sector) on public salary from the market money. They work most of the time in industry, partially at faculty. 95% of work is research, 5% educational work**:** laboratory practicum at the faculty, seminars, lecturing, laboratory and production visits in industry partner for students. They are enrolled in PhD study, but finished doctoral thesis is not required conditions (but it is in the interest of all three parties). They have two mentors on the side of industry and two mentors on the side of faculty. On yearly meetings, results, the progress and possible obstacles are discussed among researchers, mentors, coordinators and management of both institutions.	
Why was the initiative launched?	

We (ULFFA and NiS) strongly believe that academia and industry are natural partners in developing new ways of thinking and working, from research to operations, from young talents to senior opinion leaders. Together we foster open innovation ecosystem, talent development and contribute to social wealth and health. The project long lasting, sustainable partnership between University in Ljubljana Faculty of Pharmacy and Novartis in Slovenia, which is extremely valuable in many aspects of talent developing and launching innovative solutions for actual challenges in pharmaceutical industry:

- Facilitates cooperation between industry and academia, innovation, connecting science and business: development of new knowledge, products, services, as defined in each individual project.
- Enhances progress of profession and people development, social responsibility: the industrial PhD studies, mentoring, research and pedagogical work in two different surroundings as defined in umbrella contract.
- Attracts most talented students to pursue an exciting cross-disciplinary career path.

Fosters knowledge and best practice sharing in both technical expertise and soft skills for personal growth: cooperation between industry and academia with transfer of knowledge, skills and mutual acquaintance.

What are key achievements?

Successfully finished individual research projects for industry (useful results for drug development), employed researchers with PhD after 3 or 4-years project work, professional development of workers in both institutions:

Researchers (17 researchers involved in three generations):

- Integral research-professional-pedagogical work
- Research in the current field of the industry partner
- Getting to know the pedagogical work at the Faculty
- Organized and paid doctoral study
- Skills in demarcation of publicly available and confidential information and in communication with several mentors and coordinators (which can be sometimes obstacles needed more effort)

Mentors (more than 40 mentors from both side involved)

- Skills in mentoring research work on a project and on a doctoral program (formally or as working mentors)
- Skills in communication and coordination with candidates and between partners
- Experience with another type of environment, different from employment:
- Mentor in industry with academic sphere
- Mentor at university with industrial sphere
- Weakness is greater scope of work than in classic mentoring of researchers or doctoral students.

Coordinators of the whole project

- Skills/ expertise in coordination of work among individual projects and in solving complications.
- Skills in clarification and agreement in individual new or unforeseen situations.
- Concern for the "red thread" of the project which is actual staff development for both partners: continuous professional development.

What do you think were the key success factors?

Mandatory conditions were met.

1.Two levels of collaboration and affections were (are) needed:

a/ high top management should recognize such collaboration as strategic benefit on material basis, on human resources, on research results, on reputation, public image or other. There are no universal recipes. And then they should make a decision to start activities, define financial structure (amount of money) and they should support such collaboration even after beginning.

b/ researchers / middle management levels (head of departments) should see the possibility to solve some real problems / challenges together with colleagues from academia. Earlier collaboration on a one-to-one basis with personal contacts is more than useful. There should be an appropriate level of trust due to earlier collaborations or personal contacts and definitely clear support from top management.

2. There should be enough top expertise on the academic side

What do you think were the barriers?
There are two types of barriers. One type is legislative matters e.g., contract, employment, work safety responsibility, data ownership/intellectual properties. Another type is relationships. On several points of performing such an agreement, it can be expected distrust (from both sides), restraints, even amazement due to different conditions of work. Demarcation of publicly available and confidential information is very critical and involves both types of barriers. Should be agreed in advance (foreseen different situations)
If you were to start again, what would you do differently?
We have already started again – twice. We made modifications to the selection of candidates and on given information (public sector employment). Post doc position was excluded. More rigorous definition about research work – more integrated project work and PhD study (demarcation of data inside of the same project). We found a solution for possible prematurely abandoning an individual project and at the same time for prolongation of the projects from 3 times 1 year (in 2014) to 3-years projects /employment (social safety). We included specific situation e.g., maternity leave.
Did national policies/programmes/funding support the initiation/implementation/development of the initiative? If so, how?
There was no special support. Sometimes, it is not clear what do public authorities expect from the university: to work only on public finance, or to be active in searching for additional collaborations with knowledge transfer, financed from the market.
Do you have plans to further develop the initiative? If so, what are they?
We wish to include more different departments of the industry partner and to cover more fields of research at the faculty.

Transferable skills programme for PhD candidates, University of Graz (Austria)

Key facts about the initiative	
Country	Austria
Name of the initiative (in English/in the local language)	Transferable skills programme for doctoral candidates at the University of Graz
Website (if available)	https://docservice.uni-graz.at/en/course-programme/
Name of organisation implementing the initiative	University of Graz, DocService and Doctoral Academy Graz
Year it started and ended/is expected to end	DocService started 2012, Doctoral Academy started 2016
Contact	Corinne Von der Hellen, doktorat@uni-graz.at
Short summary of the initiative	
With this initiative, the university's already wide range of supplemental skills training offers was expanded specifically for the target group of doctoral candidates. Doctoral candidates benefit from acquiring transferable skills during their studies, as these help them complete their PhD projects successfully and develop their future careers. The University of Graz offers a course program with a focus on transferable skills, such as time management, writing skills, oral presentations skills, research skills (data gathering), teaching skills, interpersonal skills, computer skills, which is available to all doctoral candidates at the university. In addition, there is also the course program of the Doctoral Academy Graz, which is more geared towards an academic career. If there are free places, the group of participants can be expanded to include all doctoral candidates at the university. The course program is constantly evaluated by the participants and, based on this, changed or adapted to new requirements. The Doctoral Academy (currently consisting of 18 third-party funded research consortia providing structured doctoral education) is regularly informed about the courses on offer and faculty members as well as doctoral candidates can also make their own	

requests. For example, a seminar on "Finding and Using Archives and Archival Records on the Balkans" specifically designed for a group of young researchers in South East European Studies took place this January.

The course program started small with 10-12 workshops per academic year and now the offer includes around 35 workshops, divided between DocService (for all doctoral candidates) and Doctoral Academy (for members of the aforementioned consortia). In addition, doctoral candidates can also book individual coaching sessions. The topics range from career development, conflict management, making decisions to academic resilience. Our coaches have research experience themselves.

The Academy workshops are all in English, as are some of the DocService workshops. Some workshops are held by the coordinators of the DocService/the Doctoral Academy, speaking to their expertise, such as secrets of academia, good scientific practice, publishing in the humanities, project and time management, and wellbeing in academia. We also hire trainers/experts employed at the University of Graz for some workshops. These are experts from science management or research. The other workshops are held by external national and international trainers.

Why was the initiative launched?

Following the Salzburg II Recommendations, the DocService - established at the University of Graz in 2011 – started offering transferable skills courses. The university assumes responsibility for good PhD training.

What are key achievements?

The offer can be flexibly designed according to demand. The feedback from the participants is often very positive and full of gratitude and enthusiasm. An evaluation of the Academy Consortia, which is taking place since 2020, also shows that the doctoral candidates are familiar with the course program and are happy to accept it.

The initiative has also contributed to the fact that the DocService has become more visible both inside and outside the University of Graz. Many stakeholders at the University of Graz see the team members as experts in doctoral training and involve them in strategic decisions. Furthermore, the team members are also requested as trainers by external educational institutions. Doctoral candidates are becoming more and more aware that they are investing in themselves, in their professional future. They can acquire skills at the university for free or very cheaply, attend courses that cost a lot of money outside of the university.

What do you think were the key success factors?

Knowledge of international trends in the field of transferable skills is just as important here as recognizing needs at one's own university. The team regularly takes part in specific events of the EUA-CDE, PRIDE association, UniWiND and Arqus network, which enables them to be at the cutting edge of developments in terms of international quality standards in doctoral training, contacts to great trainers, etc.

What do you think were the barriers?

The initial difficulties were that not everyone at the university saw the relevance of the initiative. It also took some time for the new DocService facility to become known with all its service offerings.

Limiting factors are money and working hours. The limited budget and also the limited available human resources represent the barriers for the course program. This also applies to doctoral candidates. For them it is an additional offer and often difficult to reconcile with their teaching and research activities and other activities at their institutes.

If you were to start again, what would you do differently?

Did national policies/programmes/funding support the initiation/implementation/development of the initiative? If so, how?

Yes, the performance agreements between the ministry and the university always had and still have the aim of promoting structured doctoral training. Since a well-structured doctoral education also requires the offer of transferable skills, this policy supported the initiative in any case.

Do you have plans to further develop the initiative? If so, what are they?
The switch to online workshops in the past two years has shown that many workshops also work well online and that there are definitely advantages. For example, doctoral candidates can also participate during their research stay abroad. Many workshops have recently been opened to Master's students due to demand. This will be continued. With the PostDoc Initiative now established at the University of Graz, the course program is now also being extended to the group of PostDocs. In terms of content, the course program will increasingly focus on digital skills.]

Hungarian Startup University Programme (Hungary)

Key facts about the initiative	
Country	Hungary
Name of the initiative (in English/in the local language)	Hungarian Startup University Programme
Website (if available)	https://xiagency.hu/
Name of organisation implementing the initiative	Express Innovation Agency
Year it started and ended/is expected to end	Started at 2020
Contact	suba.attila@xiagency.hu

Short summary of the initiative
The Hungarian Startup University Program is Hungary's first unified, complex startup program at the higher education level, a common platform, a community that brings together the actors of the ecosystem, be they financial investors, universities, students, mentors, entrepreneurs, professional partners, governmental organizations, who can support each other in a special way. The program is a two-semester e-learning course designed to promote problem-solving thinking and to open up a whole new world for the young generation, using a new self-developed methodology that allows the elective course to be taken without contact hours, even with a smartphone. During the first semester of the program, students will master the theoretical curriculum. If they have a winning idea or are part of a winning project team, they will participate in a practice-oriented, experience-based second semester with a special scholarship to focus only on their project while studying. At the end of the academic year, the finished project works will be presented to investors, business angels and incubators as part of Demo Day, who will provide useful feedback and professional offers to the best ones to continue their project after the program.
Why was the initiative launched?
The main goal of the Hungarian Startup University Program is to acquaint domestic university students with the world of innovation, modern entrepreneurial knowledge and the way startups work – all this within a new self-developed e-learning platform that is available to all universities. HSUP is a two-semester course. During the first semester, focus is on understanding the innovative mindset and the world of startups, while in the second semester, students master the practical knowledge required to build an innovative business. HSUP is also aimed at incentivizing and supporting the development of ideas through fostering individual inventiveness and creativity, providing a platform for shared work and an environment for continual development. The Program was launched by the National Research, Development and Innovation Office in 2020 and now it is operated by the Express Innovation Agency, subsidiary of the NRDI Office.
What are key achievements?
In the pilot year of the HSUP (academic year 2020/2021) 2095 students from 21 universities across the country decided to participate in the Hungarian Startup University Program and 100 startup ideas were given the opportunity to get launched. Building on the success of the HSUP's pilot year, number of students has nearly doubled in the 2021/2022 academic year, to 3,990 students, now in 27 universities, and with the support of a civil organization. The number of projects launched has also increased in proportion to the number of participating students, so that in 2022 200+7 ideas are supported. Another new feature

of the program this academic year is that students can now develop project ideas for challenges announced by large companies.

What do you think were the key success factors?

At the end of the first semester, in addition to the exams, students prepare an onepager about their business idea, on which they can work during the second semester with the financial support of the NRDI Office. During the second semester, students working in a project team receive a scholarship of HUF 150.000 per month, which will help them prepare for entering the real market environment and allow them to focus on their dreams. Also, students in their second semester can take part in the mentor program as long as they either have a winning project idea after the conclusion of their first semester that they have built a team around or have joined a team with a winning project idea.

What do you think were the barriers?

It was challenging to find the way how to communicate with students effectively and the lack of proficiency in working in a team has also proved difficulty among students.

If you were to start again, what would you do differently?

Overall, the pilot year of the Hungarian Startup University Program was a great success. The main aim is to develop constantly, therefore deficiencies identified in the pilot year will be addressed and based on students' feedbacks new elements will be implemented to the program.

Did national policies/programmes/funding support the initiation/implementation/development of the initiative? If so, how?

The implementation and development of the Hungarian Startup University Program receives wide national support. HSUP is committed to increase the engagement between the players of Hungarian ecosystem and bring the university and market sectors closer together.

Do you have plans to further develop the initiative? If so, what are they?

The Hungarian Startup University Program is under permanent development, with the aim to improve the curriculum and to achieve higher rate of student satisfaction.

Any additional information

In addition to providing opportunity for HSUP teams to present themselves in front of the players of the Hungarian ecosystem, Express Innovation Agency helps them to enter foreign markets, by giving them chance to participate in conferences and trades globally.

PDEng Bootcamp TU/e Eindhoven (Netherlands)

Key facts about the initiative	
Country	Netherlands
Name of the initiative (in English/in the local language)	PDEng Bootcamp
Website (if available)	https://educationguide.tue.nl/programs/innovation-space/entrepreneurship/wide-entrepreneurship-aiming-at-knowledge-value-creation/entrepreneurial-mindset/
Name of organisation implementing the initiative	TU/e
Year it started and ended/is expected to end	Continuing
Contact	g.guri@tue.nl

Short summary of the initiative

This course involves no lectures, but studio style group work, and personal and team development. The set-up is in the form of a pressure cooker, where students will learn to deal with all kinds of uncertainties that are related to working with real-life challenges in an interdisciplinary team. Several out-of-the-box workshops are offered to help students in the hands-on activity and not in providing an overall theoretical overview. Students reflect daily on their development. Teams present and discuss their intermediary results and get feedback from peers and the coach. In coaching sessions, teams get also individual feedback to help them direct and structure their own development and achievements. Participants are stimulated to take responsibility for their own learning path

Why was the initiative launched?

To develop an entrepreneurial mindset of PDEng students so to enable them to deal with uncertainty in the innovation processes

What are key achievements?

In one intensive week, students further develop their skills in an interactive way, get to know how to validate your idea and how to start working on a real problem. During the project, they interact with the relevant industrial/institutional stakeholders. Interaction with business and societal organizations as well as involvement of real users, constitute an important element of the course. The project includes the process of defining and refining (i.e. co-evolution of) a problem and ideas for a solution simultaneously and iteratively through analysis, synthesis and reflection processes. Great results stand on the iterative experimentation of ideas through visualization, prototyping and testing until a feasible problem-solution fit emerges. Hence students balance in their projects, customer desirability, technology feasibility, and business viability because innovation takes place in this three-dimensional space. Particular attention is paid to aspects related to sustainability, teamwork and management of risks and uncertainty.

What do you think were the key success factors?

We offer to students the opportunity to:

- Select and apply appropriate approaches for creating an innovative and science-based solution to a real-life challenge.
- Develop a profound interpretation of a highly complex, real-life problem and the systems around it. Consider the desirability, feasibility and viability perspective.
- Develop a problem-driven, creative and integrative design, resulting in an original and validated prototype that balances desirability, feasibility and viability.
- Identify, envision and promote the role and contributions of engineering disciplines in solving problems in business, industrial and societal environments; integrate those diverse contributions in the form of a validated prototype.
- Interact with challenge owners to realize the current market needs for technological expertise and innovation skills.

- Develop leadership and project management skills to organize and perform an interdisciplinary, hands-on, and team-based innovation project.
- Communicate a message at different levels of elaboration to all kind of relevant parties, orally (pitching) and in writing.
- Work and learn independently in a proactive approach to develop an entrepreneurial mindset.

What do you think were the barriers?

There is still limited support from the technical academic staff to support students to enhance their entrepreneurial component in particular and soft skills in general

If you were to start again, what would you do differently?

This approach has been refined in various editions and is well-integrated in the innovation ecosystem thanks to a long-term cooperation with the key stakeholders. Hence, it's not a written in stone approach but a process of continuing development.

Did national policies/programmes/funding support the initiation/implementation/development of the initiative? If so, how?

PDEng is a nation-wide programme in the Netherlands in the technical universities. However, the implementation of the entrepreneurial component in harmony with the Challenge Based Approach is enhanced by national activities such as 4TUs, in which participate the technical universities.

Do you have plans to further develop the initiative? If so, what are they?

This course is in constant development based in a co-creation process in which participate all stakeholders including students and industrial partners. Therefore, the development continues in order to appropriately address the needs and expectations of our stakeholders.

References

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116 participants registered from 23 countries: Albania, Argentina, Austria, Belgium, Colombia, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Lithuania, Netherlands, Portugal, Romania, Russia, Slovenia, Sweden, Switzerland, the United Kingdom and the United States. The aim of the seminar was to create room for exchange and peer learning, and – with this seminar brochure – a resource for policy makers and practitioners to support new and further develop existing initiatives that have the potential to widen access to higher education, guide learners in their choices, and support study success, particularly during the first year.

The Hungarian National Research, Development and Innovation Office chaired the seminar with István Szabó and Orsolya Rigó-Ditzendy. István Vilmos Kovács, in-country consultant to the LMRO Partnership Initiative, moderated the seminar and facilitated the discussions. This seminar brochure was prepared with input from WPZ Research (summary of panel discussions), and copy-edited by Kay Olbison. The LMRO-PI seminar series was designed by Andrea-Rosalinde Hofer and Nora Brüning (OECD), and implemented in collaboration with Monika Weymann, Paul Tzimas, and Maria Palladino (European Commission). WPZ Research (Brigitte Ecker, Susanne Fröhlich and Verena Regent) supported the organisation of the seminars. Several OECD colleagues contributed to the seminar series: Paulo Santiago, Tia Loukkola, Thomas Weko, Antony Mann, Margarita Kalamova, Simon Roy, Cassie Hague, Natalie Lächelt, Anne Rimmer, and Shizuka Kato contributed as presenters, and Cassie Morley and Marika Prince helped with the organisation and logistics.