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From fragmentation to synergy and impact: A review of the knowledge transfer system in Czechia

Final report

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Report

Research and Innovation

From fragmentation to synergy and impact: A review of the knowledge transfer system in Czechia

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From fragmentation to synergy and impact: A review of the knowledge transfer system in Czechia

Final report

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Research and Innovation
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List of abbreviations

ASTP	Association of European Science and Technology Transfer Professionals
BIC	Business and Innovation Centre
CAS	Czech Academy of Sciences
CIS	Community Innovation Survey
EC	European Commission
EIB	European Investment Bank
EIS	European Innovation Scoreboard
EPO	European Patent Office
ERA	European Research Area
ERC	European Research Council
ERDF	European Regional Development Fund
ESA	European Space Agency
ESIF	European Structural and Investment Fund
EU	European Union
GAMA	GAMA 1&2 Programmes of TA CR (2014-2019/2020-2022)
GDP	Gross Domestic Product
GERD	Gross Expenditure on Research and Development
GII	Global Innovation Index
GOVERD	Government Intramural Expenditure on Research and Development
HEI	Higher Education Institutions
HEI2025+	Methodology for the Evaluation in the Higher Education Institutions Segment 2025+
HERD	Higher Education Expenditure of Research and Development
ICT	Information and Communication Technology
IP	Intellectual Property
IPR	Intellectual Property Rights
KPI	Key Performance Indicators
KT	Knowledge Transfer
KTO	Knowledge Transfer Office
M17+	Metodika 17+ (research evaluation methodology)
MEYS	Ministry of Education, Youth and Sports
MIT	Ministry of Industry and Trade

MSCA	Marie Skłodowska-Curie Actions
NPOV	National Priorities for Oriented Research, Development and Innovation
OECD	Organisation for Economic Cooperation and Development
OECD MSTI	OECD Main Science and Technology Indicators
OP JAC	Operational Programme Johannes Amos Comenius 2021-2027
OP RDE	Operational Programme Research, Development and Education (2014-2020)
OP RDI	Operational Programme Research and Development for Innovation (2007-2013)
PCT	The Patent Cooperation Treaty
PSF	Policy Support Facility
PRO	Public Research Organisation
RIC	Regional Innovation Centre
R&D	Research and Development
R&I	Research and Innovation
RDI	Research, Development and Innovation
RTTP	Registered Technology Transfer Professional
S3	Smart Specialisation Strategy
SIGMA	SIGMA (Proof of concept) Programme of TA CR 2024-2028
SME	Small and Medium-sized Enterprise
SRI	Science, Research and Innovation
SWOT	Strengths, Weaknesses, Opportunities and Threats
TA CR	Technology Agency of Czechia
TT	Technology Transfer
TTO	Technology Transfer Office
VC	Venture Capital

Executive Summary

The Office of the Minister of Science, Research and Innovation (SRI) of Czechia requested the support of the PSF in December 2023 with a focus on the reform of the 'technology transfer offices' (TTOs) sector. The Czech Minister of SRI plans to implement a set of legislative and non-legislative measures in order to reform technology transfer (TT) and knowledge valorisation practices in the Czech research, development and innovation (RDI) environment. The central challenge lies in establishing an effective institutional framework for TTOs and aligning their operations with the needs of the Czech technology transfer ecosystem.

Czech authorities specifically requested the Policy Support Facility (PSF) panel to provide advice and practical recommendations on the following:

- Analysis and pinpointing weaknesses of the current TTOs to support the Czech TT environment, considering the focus areas and capacities of local research institutions and regional innovation ecosystems.
- Identifying tools policymakers can use to enhance the functions and performance of TTOs, as well as to strengthen their local and international networks.
- Defining the appropriate institutional structures, roles, and functions of TTOs within different types of organisations in the Czech TT system.
- If deemed relevant, providing recommendations on the potential establishment of a central TT authority, including its role and responsibilities.
- Identifying areas and mechanisms for collaboration between TTOs and regional innovation centres in the TT process.

To respond to the request, the PSF expert panel has compiled evidence over an eight-month period, from June 2024 to January 2025, using a number of sources and methods.

Having formed an initial impression of the Czech research and innovation (R&I) system – and TTO sector in particular – based on the kick-off discussions, desk research as well as a detailed PSF background report, the panel formulated the agenda and questions for the first country mission, which took place between 18 and 20 September 2024 in Prague and Olomouc. A mission report was prepared and further background documents were collected and consulted. The panel discussed initial findings, first/preliminary recommendations, and policy options during the mid-term online working meeting with the European Commission. A first draft outline report was finalised and summarised in a PowerPoint presentation for a discussion with Czech stakeholders during the second mission. The PSF expert panel presented and discussed the preliminary policy recommendations with the national authorities and relevant stakeholders. The panel prepared this final report based on the documents, information and feedback gathered from various Czech R&I stakeholders (especially in the TTO sector). They also drew on the in-depth discussions with the consulted stakeholders and experts as well as comments received during the two country missions.

From 'technology transfer ' to 'knowledge valorisation'

In the past two decades, in both academic literature and European policy circles, a gradual shift is observable from traditional notions of technology transfer to a broader understanding of 'knowledge transfer' (KT) and ultimately knowledge valorisation. On a European policy-making level, several key policy documents between 2000 and 2022 addressed the evolving role of knowledge transfer and valorisation, most recently the EU Guiding Principles for Knowledge Valorisation and the four Codes of Practice.

The PSF expert panel note that the broader interpretation of the concept of knowledge transfer is visible in the current policy agenda in Czechia. The proposed Act on Research, Development, Innovation, and Knowledge Transfer, which aims to create a more effective and supportive environment for R&D and knowledge transfer, puts a much greater emphasis on the promotion of innovation, knowledge transfer, the principles of open science, and the popularisation of R&I activities in society. The definition used in the draft law aligns very well with the broader concept of knowledge valorisation as previously defined in the EU Guiding Principles on Knowledge Valorisation.

The PSF expert panel, therefore, has used the terms 'knowledge transfer' and 'knowledge transfer offices' (KTO) in this work, and took a broader approach of transferring not only technologies from the research institutions but knowledge in general. It did not change the scope of the PSF assignment as such but allowed the team to bring recommendations and guidance better aligned with the developments at European level and, while offering useful input into the ongoing reform in Czechia.

This broader concept of knowledge valorisation is employed by the expert panel as a general framework to specifically examine the role of KTOs. It is by no means intended to cover all aspects of knowledge valorisation and related policies in this PSF, as these fall outside its scope (for example open science).

The national R&I system and policy-making in Czechia

The Czech R&I system underwent major changes in the early 1990s. The restructuring of the Czech Academy of Sciences (CAS) through the closure of about 25 research institutes and the privatisation of institutes performing industrial research (formerly controlled by sectoral ministries) notably took place. The business sector – at that time largely consisting of public enterprises – underwent large-scale privatisation and in the process lost much of its R&I capacity. Since the 1990s, the system has evolved slowly without major disruptions or changes until 2008, when a reform of the R&D system was launched that significantly changed the governance of R&I policy and the responsibilities of the main bodies.

Currently, there are 54 public research institutes under the CAS, numerous higher education institutions (HEI) (26 public, two state and 26 private), and 22 sectoral research institutes set up and overseen by relevant ministries and other national authorities or regions. The quality of the public science base is increasing but needs further strengthening. Despite solid and continuous support for the publicly funded research sector, the largest research performer in the country remains the business sector.

The structure of R&I governance in Czechia has three levels: strategic (i.e. setting direction and priorities for the national innovation system), funding (i.e. involving organisations in the financing of R&I activities nationally and regionally), and implementation (i.e. covering all organisations carrying out R&I activities). Knowledge transfer offices are located at the implementation level of the R&I system within the universities, CAS research institutes, as well as some other research organisations.

As of writing there are 39 KTOs in Czechia and this development can be traced back to the EU's Phare pre-accession assistance programme in the 1990s. One of the activities was a pilot project that led to the establishment of a technology innovation centre at the Czech Technical University Prague. Other KTOs were set up much later with the support of European Structural and Investment Funds (ESIF).

Another important national player in the Czech R&I system are the 14 regional innovation centres. Set up by regional authorities or associations, cities and universities they are key actors in the implementation of the national smart specialisation strategy (S3) and the regional S3 strategies. The nature and role of the centres differs: some are solely focused on the development of the regional innovation ecosystem; others focus more on regional

economic transformation; or on spatial planning, transport, environment and cultural development.

Knowledge transfer within the national goal setting

Strategic governance of knowledge transfer in Czechia is shared by three government offices. The main body responsible for formulating and coordinating R&I policy is the Research, Development and Innovation Council (RDI Council). Knowledge transfer is very much on the agenda of the RDI Council. The RDI Council is chaired by the Minister of SRI, with the support of the Science, Research and Innovation Section of the Office of the Government. The Ministry of Education, Youth and Sports (MEYS) is responsible for R&D except for the areas falling under the responsibility of the RDI Council. Regarding knowledge transfer, important responsibilities of MEYS are, among others, institutional support for research in universities and other public research organisations, support to international cooperation in research, support for research infrastructures, and researcher mobility. The Ministry of Industry and Trade (MIT) is the owner of the national S3 strategy and responsible for the operation of the entrepreneurial discovery process at national level.

The PSF expert panel observations regarding the R&I governance are as follows:

- The Czech R&I system suffers from fragmentation and lack of clear responsibilities about knowledge transfer policies. The knowledge transfer mandate is shared between MEYS, MIT and the office of the Minister of SRI, with the RDI Council acting as a coordinating body for monitoring and controlling the implementation of the national RDI policy. Broadly divided responsibilities are considered to hinder the efficient implementation of knowledge transfer policies.
- As an advisory body, the mandate of the RDI Council is limited with regard to policy implementation. The RDI Council provides an umbrella view, but it does not have the power to implement its guidelines when the responsibilities fall under other ministries.
- A major reform has been on the table since 2022, which is a step towards building a more enhanced knowledge economy. It started with the development of a new law to clarify the roles, mandates and objectives regarding knowledge transfer. This includes designating knowledge transfer as one of the main roles of Czech research organisations. The reform is also expected to bring changes to the current university laws and norms to this end.
- The reform is based on the view that the driver of change must largely be the business sector, for which innovation is a condition for development. Therefore, the reform also focuses on various forms of tax incentives for companies engaged in research and development.
- The overall knowledge transfer reform kicked off in January 2024. Its measures sought to facilitate the creation and absorption of knowledge and, as a result, enhance Czechia's global competitiveness. Many of the planned activities in the reform are relevant – to a larger or smaller extent – to the PSF topic.
- The KT reform is also mentioned in the National Reform Programme (NRP) 2024, which is an annual strategic document describing the reforms and investments that the Government plans to undertake (usually in the next 12 months).

In summary, the Czech R&I governance system exhibits **signs of fragmentation and a lack of coordination** between the ministries (not only MIT and MEYS, but also other relevant ministries). Innovation – and, hence, knowledge transfer – does not fall under the portfolio of either MIT or MEYS. A gap which is currently covered by the Minister of Science, Research and Innovation, who – as a member of the Government – chairs the Czech RDI Council and receives professional administrative support from the SRI Section of the Office of the Government. As a result, when it comes to innovation, the RDI Council has a prominent place

in Czech R&I governance. It offers valuable advisory input but lacks executive power to implement necessary reforms and deliver actions on the operational level.

The vision of innovation and its importance for the national economy and the role knowledge institutions and industries play in this respect are crucial and should be at the top of the political agenda, as well as an integrated policy to strengthen KT in Czechia. Implementing national strategies, programmes and policy support measures without this clear vision and stance will not lead to the desired outcomes and change in the long term. Czechia has an excellent and internationally recognised research community, but very few knowledge-intensive products being developed for the market. There is a clear gap between university research and industry. While spin-offs are seen all over the world as change drivers that boost the economy, further development of a spin-off scene in Czechia – including high-tech companies or innovative companies rooted in research – would help more companies move up the value chain. This requires a structural solution in terms of governance, legislation and mandates but also a cultural change.

A lack of coordination is also partly visible in a number of strategic documents setting directions for the Czech R&I system. It is unclear which of the documents is the leading one. Although the basic vision and strategic direction for the development of the R&I system in Czechia is set out in the *Innovation Strategy of Czechia 2019-2030* this was not frequently mentioned in the discussions with stakeholders. Several other documents are in place but with different time horizons. The *National R&I Policy* (valid for 2021-2027) is sometimes cited as the main strategic document at national level for the development of all components of RDI in Czechia. The *NPOV* (set by the RDI Council) outlines long-term strategic directions and objectives for the focus of R&I activities. The *National S3* sets medium-term goals and topics for RDI in areas that have a high potential for creating a long-term competitive advantage.

Knowledge transfer in academia – a marginal activity?

Universities have three missions: education, research, and valorisation (often called ‘third mission’). To date, knowledge transfer (and valorisation as a whole) has not been a ‘core issue’ in the Czech research policy agenda at any level: national, university, or principal investigator (PI) level. This is also reflected in the governance structure at these levels. Moreover, and probably related, knowledge transfer is not part of the current mindset of administrators and researchers, as was indicated several times by interviewed stakeholders during the country visits and visible in other sources. On the institutional level, knowledge transfer is viewed as a marginal activity and does not end up on the strategic agendas of academic institutions. On the individual level, academics are not evaluated on this aspect by their hierarchy, nor by the administration of the university.

The allocation of the state budget to the funding of universities is based on their contribution to education. Additionally, they receive institutional support for research. However, KTO activities are funded only through projects. Secure ‘base funding’ is crucial to facilitate and encourage knowledge transfer. The fragmentation of KT activities due to project-based funding also increases the administrative burden for all stakeholders: the funding agency, the applicant and the beneficiaries. To encourage academics to start a spin-off, support KTOs wishing to extend their activities and attract both foreign and domestic investors, administrative processes should be simplified.

The RDI Council is responsible for the research strategy but does not have a mandate for the knowledge transfer policy. There are no base funds to support KTOs nor a central entity that is responsible for implementation. This implies that universities are depending on finite project timeframes. This hampers the continuity of activities.

Research-performing institutions receive performance-based funding based on an assessment following approved methodology (i.e. Metodika 17+ which is being updated to

Metodika 25+). The RDI Council uses Modules 1 and 2 to evaluate all research-performing institutions on an annual basis. Metodika 17+ stipulates that the funding providers should develop their own methodologies, based on Modules 3-5, to evaluate research-performing institutions under their jurisdiction. For higher education institutions this is being done by MEYS, which has prepared the Methodology for the Evaluation of Higher Education Institutions (Methodology HEI2025+). This approach includes several indicators directly or indirectly linked to knowledge transfer. To a limited extent, these are reflected in the decisions on institutional funding. Moreover, it is not specified if at least one member in the international group of experts for the research assessment is an expert in knowledge transfer/knowledge valorisation. Indeed, the composition of the expert panel is crucial.

KTO offices are mostly not funded structurally by the university but rely on project funding from regional, national or EU sources. In the past, universities have received a budget to set up a 'technology transfer centre'. Most KTOs are required to operate self-sufficiently, relying predominantly on external funding, which is currently almost exclusively project based. This dependency hinders their ability to allocate a budget towards a long-term vision and strategy. The continuity of KTOs should not depend on political changes either within the university or a regional government. Not only are the KTO offices very small in most universities, but they also do not have a clear mandate or influence on the overall policy of the university.

Skills and capabilities on the KTO level vary between the institutions, although capacity-building does occur between different KTOs (e.g. through the Transfera.cz initiative). While this is a positive development, not all KTOs are equally active in this initiative. Another issue that emerged is that KT professionals sometimes spend insufficient time on the core tasks expected of them, focusing too much on various events and activities aimed at promoting entrepreneurial culture and competencies more broadly. While these activities are undoubtedly important, it raises the question of whether they fall within the core responsibilities of an already understaffed and underfunded KTO, or if they should be delegated to other departments (e.g. education) or other stakeholders/partners. On the subject of internal competency development, several KTOs are already investing in their staff, for instance, by enabling them to take courses through the Association of European Science and Technology Transfer Professionals (ASTP), and there are also KTOs with staff holding the European Registered Technology Transfer Professional (RTTP) certification. This is certainly a good approach, however, if those skilled KT professionals are not sufficiently supported within their own universities, successful knowledge transfer cannot be guaranteed.

The lack of attention to knowledge transfer in the assessments is also reflected in the motivation of researchers. Career tracks are based on performance in teaching and research. Hence, project funding is often more attractive to support their own research and career. In general, researchers show little interest in collaborating with KTO offices despite opportunities and there is a lack of entrepreneurial culture at all levels.

The role of regions in knowledge transfer – strengths and connections between KTOs and RICs vary

Knowledge transfer is a key element for regional development. In this regard, a regional innovation system encompasses a complex network where its internal (regional) dynamics focus on processes of innovation and knowledge transfer. In the process of technology and knowledge transfer, the role of the Czech regions aligns with global trends that began in the late 1990s. The regions have become key players in promoting economic development. However, it is evident that they are not entirely self-sufficient in generating and transferring the knowledge and technology necessary to enhance their competitiveness.

The key regional players when it comes to R&I are 'regional innovation centres' (RIC), or equivalent institutions, set up by regional authorities or as an association of the region, the city and the universities located in the region. They are fully or partially funded by the regional

budget. Both RICs and KTOs play a role in the knowledge transfer process in the regions, but their connections and input vary.

Coordination between national and regional R&I strategies and activities has not been very strong in Czechia. Regions have no legally-binding powers in the field of R&I. However, the current legislation does not prevent them from being active in this area for from using their own resources to support R&I activities. The situation has recently started to improve due to the implementation of the national S3.

As such RICs are designed to partly work as innovation brokers by mobilising the demand side (i.e. businesses) of innovation while establishing strong links with the supply side of innovation (i.e. a research base). Ideally, they should get the support of KTOs within the regional research base. However, the activities and roles of KTOs and RICs overlap or even clash when it comes to working with the research base. On some occasions RICs go directly to the researchers, by-passing the KTO.

The role and place of knowledge transfer in relation to industry

Czechia has long been striving to strengthen the links between the public and private sectors, as evidenced by the inclusion of this issue in numerous strategic documents. This is also reflected in the recommendations included in the National Reform Programmes and in operational programmes. One such programme, the Technology Agency of the Czech Republic (TA CR) established in 2009 has contributed to the development of collaborative research, which is strongly emphasised in the different programmes (including the National Competence Centres programme) of the agency.

The statistics indicate that over the years Czechia has made notable progress in promoting innovation and collaboration. However, there is limited absorption capacity in many small and medium-sized enterprises (SMEs) and a lack of interest in collaboration from multinationals. **For effective knowledge transfer, there must be an 'entity' with whom the transfer (back and forth) can be made or with whom collaboration can occur**. Companies sometimes lack the know-how to identify needs and spot opportunities for innovation. KTOs or regional players can also potentially address these gaps. Ultimately, it comes down to the need for all actors within the entire ecosystem to develop their knowledge, skills, and broad-based entrepreneurial expertise, while effectively aligning genuine needs with the necessary expertise.

The weak patenting activity of domestically owned Czech SMEs indicates there is a need for increasing general awareness, competence-building and the promotion of intellectual property rights (IPR) and practices among SMEs, as well as incentives for more ambitious R&D activity. Due to large sectoral variations and differences in R&D collaboration profiles, there is a need to (continue) designing tailored policy measures to support industry collaboration and knowledge transfer in identified priority sectors or areas.

Given that there are several science and technology parks as well as other innovation support facilities in Czechia, there is an opportunity and rationale to enhance collaboration and joint development within and among them.

Alongside RICs, KTOs could play a more active role in facilitating interaction between universities and non-academic stakeholders. To facilitate this, KTOs should increase their collaboration and competence-sharing. Closer connections between KTOs and RICs could be established to support business development services for entrepreneurs. This could lead to more joint patents between companies and universities, as well as an increase in licensing agreements.

Recommendations for reforming the Czech knowledge transfer system

The PSF expert panel puts forward **ten recommendations** to further reform and strengthen the knowledge transfer system in Czechia. The recommendations have to be looked at as a whole and not in isolation. They cover different KT aspects and target different levels of the R&I ecosystem in Czechia and its regions. They are also tightly interlinked, i.e. if one recommendation is not taken forward this could mean other recommendations will struggle to gain traction. Recommendations provide a framework for systemic change in the R&I system and are visualised in the pyramid figure below representing a comprehensive change strategy.

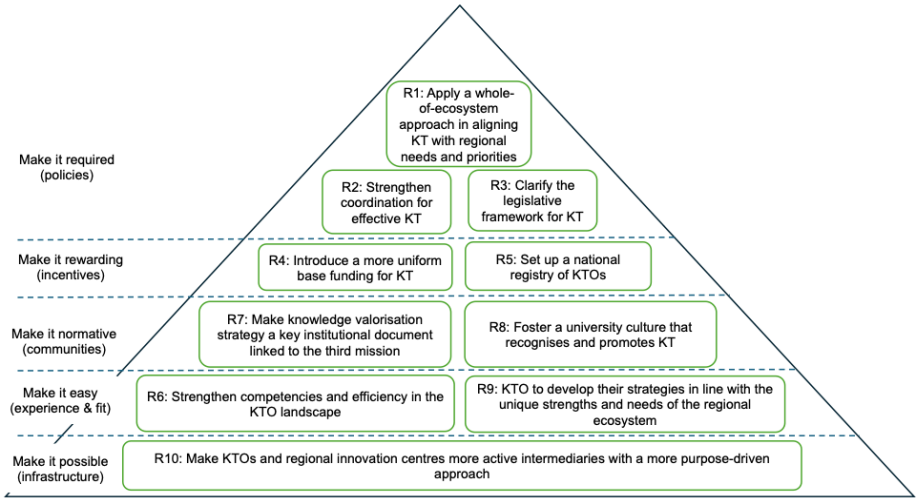


Figure 1: Recap of PSF's proposed framework for systematic change
Source: Authors' own composition, framework adapted from Nosek, B., 2019. Strategy for Culture Change https://www.cos.io/blog/strategy-for-culture-change

Recommendations for improving the overall governance and clarity for knowledge transfer (in the future knowledge valorisation) and R&I in general:

- Recommendation 1: The RDI Council should lead the development of a common vision by coordinating universities, research institutes, KTOs, RICs, and regional stakeholders in order to align their strategies and strengths with regional needs within this shared national vision.
- Recommendation 2: A cohesive governance framework and related practices for coordination of knowledge transfer efforts should be established, thus empowering the RDI Council to oversee and coordinate joint KT efforts.
- Recommendation 3: The RDI Council should request MEYS, MIT, and TA CR to develop a comprehensive compendium of key terms, concepts, and procedures related to KT. This compendium should be aligned with existing legislation and integrated into relevant laws, including the proposed new Act, when approved.

Recommendations for building long-term/stable capacity of KTOs:

- Recommendation 4: A dedicated part (e.g. 1-3%) of the universities' and institutes' funding should go towards their 'third mission' activities, prioritising societal and economic impact, including knowledge transfer and support for KTOs.

- Recommendation 5: Instead of establishing a central KTO or knowledge transfer authority, the Czech Government should complement the bottom-up initiative (i.e. Transfera.cz) with a top-down national registry of KTOs. This registry will have very clear acceptance criteria with the objective of purposefully orienting KTO activities towards obtaining economic and social results from knowledge transfer and towards building connections between knowledge creators, businesses and society.
- Recommendation 6: Based on past experience with support instruments, TA CR could propose ways to further strengthen competence development in KTOs (especially smaller ones) where there is a vision and strategy. The aim is to develop 'communities of knowledge transfer', pooling of competences, economies of both scale and scope.

Recommendations for recognising and rewarding knowledge transfer activities for researchers:

- Recommendation 7: Universities as well as CAS should develop their knowledge valorisation strategy. Funding for knowledge transfer/valorisation from the institutional budget should be directly linked to this strategy and its related targets and indicators. One part of the strategy should focus specifically on intellectual asset management.
- Recommendation 8: Universities in Czechia and the Czech Academy of Sciences should put more effort into building a culture that recognises knowledge transfer and entrepreneurship as being equally important as education and research.

Recommendations for embedding KTOs in and aligning KTO activities with the regional ecosystem:

- Recommendation 9: KTOs – in cooperation with both internal and external stakeholders – should develop their vision and strategy in line with the unique strengths and needs of the regional ecosystem and aligned with the regional specialisation. This strategy should be translated into an operational plan.
- Recommendation 10: KTOs and RICs should involve regional businesses and other stakeholders to develop a shared roadmap for science-business cooperation.

The PSF Country Team

The Policy Support Facility Country team brought together a diverse set of competences, knowledge, and experience to address the assignment requirements.

Barbara Tan, **RTTP, Chair (Belgium**) is currently the head of the Creativity & Entrepreneurship Office at the University of Antwerp, a newly established office where her role is committed to enhancing student entrepreneurship, fostering an entrepreneurial mindset, and driving sustainable societal impact across students, researchers, professors, and staff. Barbara brings more than 25 years' experience in various aspects of higher education with focus on research, innovation, science and knowledge transfer policy. She started her professional career as a researcher at the Centre for Social Policy Herman Deleeck, where she published about persistent social inequalities in Flemish higher education. Then she became advisor for education and innovation at the Flemish employers' organisation Voka-Vlaams Economisch Verbond for almost six years, where she built a wide network of business contacts. Barbara returned to the University of Antwerp at the Department of Research & Innovation (RIVA) in various functions. In recent years, Barbara has been active in the field of knowledge and technology transfer and holds the certificate of Registered Technology Transfer Professional (RTTP).

Barbara's expertise in knowledge valorisation is well recognised across Europe, where she actively contributes to advancing the field through her roles in international committees and working groups, such as the European Committee of ASTP, the European Commission's S3 CoP Working Group on Innovation Diffusion (2023), and the YERUN Expert Group on Knowledge Valorisation. She is also regularly invited to share her insights at international conferences, with recent contributions including presentations at the ASTP Annual Conference in Tallinn (2023), the COINTT Conference in Bratislava (2023), the UIIN Conference in Madrid (2024), and the Transfiere Conference in Málaga (2024).

Dr Jelena Angelis, **Expert/Rapporteur (Lithuania/Sweden)** is Research Director and Principal Researcher at European Future Innovation System (EFIS) Centre, a not-for-profit and recognised European research and innovation policy research lab. Jelena has over 20 years of experience in the field of support to R&I and entrepreneurship starting in 2002 with SQW Consulting and Oxford Innovation in the UK, Technopolis Group in Estonia and EFIS Centre in Belgium. For the PSF Country Czechia she brings thematic policy-making expertise, hands-on experience related to technology transfer, and knowledge of the PSF as a facility (having acted as a Rapporteur for PSF Country Moldova and as a Quality Reviewer PSF Country Croatia, which focused on developing support to early stages of innovation and science-business linkages).

Through her projects with the European Commission, OECD, World Bank, Nordic Council of Ministers, national ministries, government agencies, and universities she was involved in the design of national R&I programmes using national and EU Structural Funds (e.g. support to Lithuania in increasing science-business cooperation); preparation of the research assessment exercises (e.g. development of an evaluation methodology and institutional funding principles for the R&D system in Czechia); reviews of national and regional R&I systems (e.g. through DG RTD PSF in Ukraine, Lithuania and Moldova); and hands-on activities and capacity-building in setting up needed functions (e.g. working with the Vytautas Magnus University in Lithuania to help them set up and run their Knowledge and Technology Transfer Centre; setting up technology transfer offices in Bulgarian universities; EU4TECH – Capacity Building for Technology Transfer for the Western Balkans project for DG NEAR).

She has published a number of peer-reviewed publications, e.g. *Innovation into Business* (a book chapter in The Innovation Handbook: How to Develop, Manage and Protect Your Most Profitable Ideas) and spoken at a number of events, e.g. a keynote talk 'Commercialisation

of R&D – Do we still need it?' at the TAFTIE Expert Session focused on 'Creating ecosystems for innovative high – technology entrepreneurship: pathway to successful R&D outputs commercialisation'.

Kimmo Halme, **Expert (Finland)** is Senior Partner at Forefront Ltd with 30 years of experience in the design, development and evaluation of R&I policies, strategies and instruments, having worked in research for the Finnish Government, as a regional innovation strategy expert for the European Commission, and lately as an R&I consultant. He has been contributing to the R&I policies of several countries and international organisations, including European Parliament, OECD, World Bank, and European Commission as well as in many EU Member States, African, Latin-American and Asian countries. He is also an advisor to the Finnish Evaluation Society.

Over the years, Kimmo has led or participated as an expert in projects focusing on the development of research organisations and infrastructures, such as an evaluation of the Academy of Finland (Research Councils), a feasibility study for the establishment of two UNICEF Innovation Hubs in Finland, another study on establishing a UN Technology and Innovation Laboratory in Finland, as well as an evaluation of Finnish Strategic Centres of Science, Technology and Innovation.

Prof. Dr Geert Dewulf, **Expert (UK/The Netherlands)** is Pro-Vice-Chancellor Engineering and Physical Sciences of Queen's University (Belfast). Until the end of 2024, he was the Chief Development Officer and member of the Strategic Board of the University of Twente in The Netherlands. He is also Professor of Civil Engineering and Management and has previously been Dean of the Faculty of Engineering Technology at the university (2013-2020), and served as Vice-Dean of the Faculty (2008-2012). He was the Chairman of the Deans of Engineering of The Netherlands between 2018 and 2020. From 2002 until 2012, he was the Head of the Department of Construction Management and Engineering. He was the UPS Foundation Visiting Professor and Visiting Fellow (2013-2019) at Stanford University, US. Before he joined Twente University, he worked at TNO and Delft University of Technology. He holds a PhD from the University of Utrecht. He was a Visiting Fellow at Harvard University in 1990-1991 and the GEAN Visiting Professor at IIT-Madras in 2016.

Geert has written numerous publications on public-private partnerships, scenario planning, urban planning, and engineering project management. He received the Pathfinding Award and Distinguished Service Award of the Engineering Project Organisation Society. He has received various grants from Horizon Europe, the Dutch NWO, the US National Science Foundation, and from public and private companies. He was scientific president of the national BSIK programme PSIBouw, and until 2012 Scientific Director of the 3TU (Federation of the Dutch Technical Universities) Centre of Expertise on the Built Environment. He is also Board Member and one of the founders of the Fraunhofer Project Centre at the University of Twente.

Sonia Palomo, Expert (Spain), is Director of Technology Transfer and International Relations at Malaga TechPark, a public-private initiative including stakeholders such as the Regional Council of Andalucía, Malaga City Council, Unicaja Bank, and University of Málaga. She coordinates the Blockchain Working Group organised by the International Association of Science Parks and Areas of Innovation (IASP) as well as the Circular Economy Group organised by the European Regions Research and Innovation Network (ERRIN). She is also an active member of the S3CoP Work Group on Industrial Transition. She is currently involved in ten European projects with different European partners.

The panel of experts was supported by two national peers:

- **Fernando Mérida Martín**, Deputy Director for Transfer, Minister of Science, Innovation and Universities, Spain,
- **Siim Kinnas**, Enterprise Estonia, Head of Technology Transfer Unit, Estonia.

The project was overseen by the PSF team at the European Commision's Directorate-General for Research and Innovation, Unit A1 European Semester and Country Intelligence. **Michaela Žarošská** coordinated the exercise and liaised with the Czech authorities. **Susana Elena Perez**, project manager at EFIS Centre (Belgium), supported the PSF team and **Alasdair Reid**, Executive Director at EFIS Centre, acted as quality reviewer. **Michal Pazour**, the national expert, prepared the background country report.

Czech authorities provided data and background documentation and supported the visits to Czechia by inviting the representatives of national institutions and stakeholders to meet the PSF expert panel. The panel thanks their Czech counterparts and all national stakeholders who generously shared their time and insights during this PSF exercise.

2. Scope and context of the PSF Country review

2.1. Scope and objective of the review

2.1.1. Policy Support Facility Country – Czechia

The Horizon Europe Policy Support Facility is an instrument of the European Commission (EC) that supports EU Member States and countries associated to Horizon Europe in improving the design, implementation, and evaluation of research and innovation policies. The PSF Country exercises (formerly PSF Peer Reviews and Specific Support to Countries) aim to provide national authorities with actionable policy recommendations for necessary R&I system reform. These are developed by a panel of experts and peers and grounded within an in-depth assessment of a country's R&I system (or specific aspects of it).

The Office of the Minister of Science, Research and Innovation of Czechia[1] requested the support of the PSF in December 2023 with a focus on the reform of its technology transfer offices – commonly referred to as TTOs. The Czech Minister of SRI plans to implement a set of legislative and non-legislative measures in order to reform technology transfer and knowledge valorisation practices in the Czech RDI[2] environment. The central challenge lies in establishing an effective institutional framework for TTOs and aligning their operations with the needs of the Czech technology transfer ecosystem. Accordingly, the objective of the PSF review was to offer external guidance and practical recommendations to national authorities for reforming the Czech TTO sector, drawing on proven best practices.

The Czech authorities specifically requested the PSF panel to provide advice and practical recommendations on the following:

- **Needs analysis and gap identification**: analysing the needs TTOs should address and identifying gaps or underperformance in meeting these needs. This includes pinpointing weaknesses in the current TTO system to support the Czech TT environment, considering the focus areas and capacities of local research institutions and regional innovation ecosystems.
- **Policy tools for optimisation**: identifying tools policy-makers can use to enhance the functions and performance of TTOs, as well as to strengthen their local and international networks.
- **Institutional setting and role definition**: defining the appropriate institutional structures, roles, and functions of TTOs within different types of organisations in the Czech TT system (e.g. large research universities, regional universities). This includes addressing the lack of experience and capacity in weaker regions, institutions, and businesses, while respecting stakeholders' focus areas and preferred intellectual property arrangements.
- **Central TT authority**: if deemed relevant, providing recommendations on the potential establishment of a central TT authority, including its role and responsibilities.
- **Collaboration between TTOs and innovation centres**: identifying areas and mechanisms for collaboration between TTOs and regional innovation centres, or RICs, in the technology transfer process.

[1] While 'Czech Republic' is still seen in general publications, PSF applies the officially recognised new name 'Czechia', which is also in line with the Inter-Institutional Style Guide.

[2] For simplification and consistency the term research and innovation (R&I) is used throughout the report when discussing the research, development and innovation (RDI) environment.

2.1.2. Approach and methodology

A group of internationally recognised experts was convened to provide policy advice and operational recommendations addressing the topics outlined above. The PSF Country review was carried out by a panel of five independent experts in the field of R&I and technology transfer from Belgium, Finland, Spain, Sweden/Lithuania, and The Netherlands, as well as two national peers from Estonia and Spain, all acting in their personal capacity. The process of the PSF exercise is summarised in Figure 2:

Work on the project started by gathering and analysing information from Czech and international sources. A background report[3] summarising relevant facts and data relevant for the PSF topics was prepared by the PSF national expert.

The PSF kick-off meeting (held virtually on 6 June 2024) was a first opportunity for the PSF experts to meet and discuss with the Czech authorities. Discussions covered the authorities' needs, a situational analysis of the national R&I system, and the PSF timetable. Following the kick-off meeting, and feedback from the members of the panel, the background report was updated and expanded.

Having formed an initial impression of the Czech R&I system – and TTO sector in particular – based on the information collected and the kick-off discussions, the expert team formulated the agenda and questions for the first country mission, which took place between 18-20 September 2024 in Prague and Olomouc. Over the course of 2.5 days, the experts held 10 meetings with 35 representatives. Following the first visit to Czechia, a mission report was prepared and further background documents were collected and consulted.

The panel discussed initial findings, first/preliminary recommendations, and policy options during the mid-term online working meeting with the European Commission on 23 October 2024. Following a mid-term meeting a first draft outline report was finalised and summarised in a PowerPoint presentation for a discussion with Czech stakeholders during the second mission. This country visit took place between 27-29 November 2024. The PSF expert panel presented and discussed the preliminary policy recommendations with the national authorities and relevant stakeholders.

The panel prepared this final report based on the documents, information and feedback gathered from various Czech R&I stakeholders, and especially from the TTO sector. They also drew on in-depth discussions with the consulted stakeholders and experts as well as comments received during the two country missions.

[3] https://op.europa.eu/en/publication-detail/-/publication/ce5f1bd2-7569-11ef-a8ba-01aa75ed71a1/language-en

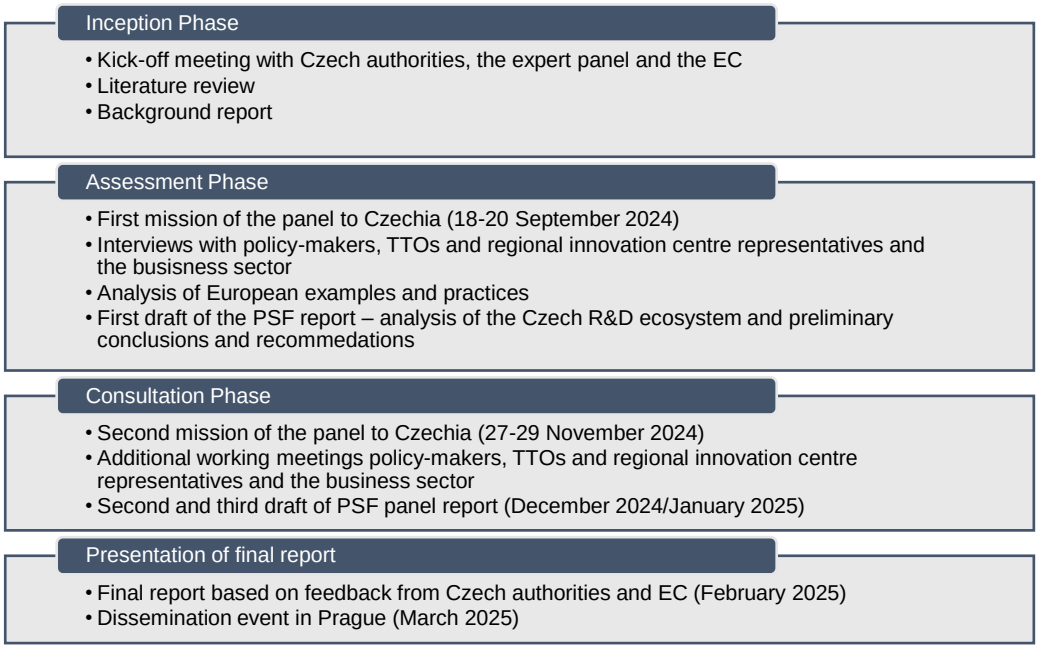


Figure 2: Key steps in the PSF Country – Czechia
Source: Authors

2.1.3. Aim and structure of the report

This report presents the outcome of the PSF Country – Czechia and includes an overview and assessment of the Czech R&I system, the challenges it faces and recommendations. The report is structured as follows:

- **Chapter 1** presents the purpose and focus of this PSF and sets the scene. It discusses the concept of 'technology transfer' and how it has evolved over time in European policy-making to the broader concept of 'knowledge valorisation'. It also discusses the expected benefits from supporting KT and what type of models exist.
- **Chapter 2** summarises the state of play of the Czech national R&I system. A focus is placed on the current systemic challenges, the role and place of KT within the national policy objectives. The chapter also describes the role, place, and incentives of knowledge transfer in academia, geographical regions, and in relation to industry. Examples from other countries are included (see Boxes in the Table of contents).
- **Chapter 3** presents the overall conclusions structured into: strategic decision-making on the national level, KT in a complex national set-up, the place and role of academia in the KT process, the regional dimension in the knowledge transfer process, and competences required for the knowledge transfer process.
- **Chapter 4** introduces the panel's recommendations.

The assessment and recommendations outlined in the report reflect the situation as of **early January 2025.**

2.2. Setting the scene: from 'technology transfer' to 'knowledge valorisation'

2.2.1. Evolution of the concept in European policy-making

Initially, in Europe, TTOs were primarily established within universities to manage intellectual property (IP) assets and facilitate knowledge and TT to industry adopting a 'technology push' approach.

In the past two decades, in both the academic literature and in European policy circles, a **gradual shift is observable from traditional notions of technology transfer to a broader understanding of knowledge transfer and ultimately knowledge valorisation**.[4]

While Etzkowitz and Leydesdorff's[5] original conceptualisation of the Triple Helix Model emphasises the relationship between academia, industry, and government (1998), Carayannis and Campbell's 2009[6] Quadruple and Quintuple Helix models seek to provide a broader conceptualisation by including civil society and environmental considerations. The inclusion of civil society reflects the emergence of user-driven innovation models, in which end-users generate demand for innovation, prompting universities to respond through more co-creational knowledge transfer practices involving both industry and citizens, alongside other societal actors (Miller et al., 2016). This shift is in line with the concept of 'open innovation', which was initially positioned within the business sector but has since been extended to encompass all innovation actors, recognising the value of integrating both internal and external ideas to drive technological progress (Chesbrough, 2003).

More recent literature has sought to reconceptualise the modern role of knowledge transfer. This literature suggests that the role of university KT and the mechanisms through which this role is fulfilled are evolving towards a greater emphasis on solving societal challenges through increasingly collaborative processes. For instance, the recent work of Knudsen et al. (2021: 209)[7] has identified an emerging model of knowledge transfer – the so-called 'ecosystem model' in which universities "*engage more extensively and with greater*

[4] A summary of the key concepts and definitions:

- **Technology transfer**: (disseminating) technology from the person or organisation that owns or holds it to another person or organisation or the society at large, in an attempt to transform inventions and scientific outcomes into new products, processes, applications, materials or services that benefit society
- **Knowledge transfer:** expands beyond technology and includes sharing knowledge, skills and expertise between academia, industry, and the broader society.
- **Knowledge exchange:** refers to the collaborative, two-way process between researchers and external organisations, allowing for the co-production and sharing of knowledge to address societal challenges. Source: UKRI (2018), *Knowledge Exchange Framework*. Available at: https://re.ukri.org/knowledge-exchange/knowledge-exchange-framework
- **Knowledge valorisation:** process of creating social and economic value from knowledge by linking different areas and sectors and by transforming data, know-how, and research results into sustainable products, services, solutions, and knowledge-based policies that benefit society. Recommendation on the Guiding Principles for Knowledge Valorisation.

[5] Etzkowitz, H. and Leydesdorff, L. (1998), 'The endless transition: a 'triple helix' of university-industry-government relations', Minerva, Vol. 36, No. 3, pp.203-208.

[6] 'Quadruple helix model' extends the traditional triple helix model (university-industry-government collaboration) by incorporating **civil society** or the **public** as a fourth key actor in innovation systems. It emphasises the importance of user-centred innovation, where citizens, NGOs, and community organisations actively participate in co-creating knowledge and shaping innovations. Source: Carayannis, E. G., and Campbell, D. F. J. (2009), 'Mode 3' and 'quadruple helix': Toward a 21st century fractal innovation ecosystem. International Journal of Technology Management 46 (3/4), 201-234.

[7] Knudsen, M., Frederiksen, M. and Goduscheit, R. (2021), New forms of engagement in third mission activities: a multi-level university centric approach, Innovation, 23:2, 209-240.

responsibility in collaborative efforts with a range of public and private actors on addressing comprehensive industrial and societal challenges through technology development and market insights". Another plea for reconceptualising the modern role of university knowledge transfer is offered by Amry et. al (2021),[8] who invite universities to widen academic entrepreneurship practices to include more diverse forms of knowledge transfer, while putting stronger emphasis on the societal benefits of such practices.

This quadruple-helix approach and the inclusion of civil society is also pushing universities to respond. Instead of being solely technology push (inside-out), knowledge transfer is increasingly seen as a bi-directional process, combining both (technology) push and demand-driven approaches. At the same time, universities are under pressure to redefine the role of knowledge transfer in relation to public value and societal relevance.

During the 1980s and early 1990s, in European policy documents, the focus was still predominantly on **technology transfer**, which was understood narrowly as the transfer of technical inventions from research institutions to industry, primarily through patenting and licensing activities. The emphasis was on exploiting technological innovations to enhance industrial competitiveness. This perspective was also reflected in policy instruments, such as the European framework programmes, which support technological cooperation and innovation between European industries and research bodies, establishing technology transfer as a crucial element of European economic development. By the mid- to end-1990s, the concept of technology transfer gradually expanded towards **knowledge transfer**, acknowledging the broader exchange **not only of technologies but also of skills, expertise, and know-how between academia, industry, and society.**

This broader approach was clearly reflected in the **Lisbon Strategy,** adopted by the European Council in 2000, which marked a significant turning point by prioritising knowledge transfer with the aim of making Europe "*the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion*" (Presidency conclusions, Lisbon European Council, 23-24 March 2000). In the Lisbon Strategy, the role of universities was explicitly recognised as crucial for the knowledge economy, as they occupy a central position at the intersection of education, research, and innovation. The strategy **emphasised that universities are not only responsible for producing knowledge (through research) and transferring it to students (through education) but also for actively contributing to the application of knowledge in society.** This meant that universities were given greater responsibility in driving innovation, not only through technology transfer but also through **their broader role in knowledge transfer and societal impact.**

To build on the foundations laid by the Lisbon Strategy, several key European policy documents between 2000 and 2022 addressed the evolving role of knowledge transfer and valorisation. Notably, the 2008 European Commission Recommendation on the Management of Intellectual Property in Knowledge Transfer Activities and Code of Practice for Universities and Other Public Research Organisations (C(2008) 1329 final)[9] provided guidelines to improve IP management between researchers and the private sector (including SMEs), reduce discrepancies between national regulatory frameworks, policies, and practices, and enhance knowledge dissemination across Europe. Another significant document, the 2012 European Commission Communication, A Reinforced European Research Area Partnership for Excellence and Growth (COM(2012) 392 final),[10] highlights the importance of knowledge

[8] Amry, D. K., Ahmad, A. J., & Lu, D. (2021), The new inclusive role of university technology transfer: Setting an agenda for further research. International Journal of Innovation Studies, 5(1), 9-22.
[9] https://op.europa.eu/en/publication-detail/-/publication/743a513c-e1ab-455e-a2f2-20ef43c3060e
[10] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52012DC0392

transfer for fostering innovation through stronger links between research, business, and education. As stated in the document, research stakeholder organisations are invited to "*improve recognition and professionalisation of knowledge transfer activities and strengthen the role of knowledge transfer offices*" (p. 14). Collectively, these policy efforts and especially European Research Area (ERA) Action 7 – 'Upgrade EU guidance for better knowledge valorisation' – laid the groundwork for a more inclusive understanding of knowledge valorisation and resulted in the 2022 **EU Guiding Principles for Knowledge Valorisation**[11] and the four Codes of Practice. The Guiding Principles further expanded the concept and emphasised the importance of translating R&I results into **societal and economic benefits** across sectors; and the Code of Practice on industry-academia co-creation contains a specific chapter on 'involving intermediaries'. The aim of the Council Recommendation on the guiding principles **for knowledge valorisation**[12] is to adopt a common line on policy principles and measures for national, regional and local policy-makers to maximise the transformation of R&I results into solutions that benefit society. The Recommendation explicitly adopts a **broader definition** of the concept, namely: *"Knowledge valorisation is the process of creating social and economic value from knowledge by linking different areas and sectors, and by transforming data, know-how, and research results into sustainable products, services, solutions, and knowledge-based policies that benefit society. Focusing on knowledge valorisation makes it necessary to broaden the scope of Recommendation 2008/416/EC to encompass the entire R&I ecosystem and its increasingly diverse range of actors."*

Further, the Recommendation refers to three major pillars, which encompass the key elements for achieving effective knowledge valorisation:

1. **A whole ecosystem approach**: emphasises the importance of collaboration among various actors, such as universities, businesses, policy-makers, and society. An ecosystem creates an environment where knowledge, expertise, and resources can be shared to foster innovation and valorisation.

2. **Intellectual assets management**: crucial for maximising the value of generated knowledge and technologies. Effectively managing different types of intellectual assets rooted in R&I that generates IPR, such as patents, licences, but also data, know-how, prototypes, processes or other research results, is essential to ensure that these assets will be successfully translated into commercial or societal applications.[13]

3. **Strengthening an entrepreneurial culture**: focuses on promoting a culture that places entrepreneurship and innovation at its core. It encourages researchers and students to apply their knowledge in practice and seize opportunities to develop new products, services, or companies.

The interaction between these pillars ensures that knowledge is not only generated but also efficiently managed and applied in an ecosystem that fosters entrepreneurship. This aligns with the **broader concept of knowledge valorisation**, which emphasises leveraging knowledge for economic and societal value-creation.

[11] https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform/guiding-principles-knowledge-valorisation-and-implementing-codes-practice_en

[12] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022H2415&qid=1670573108748

[13] Commission Recommendation (EU) 2023/499 of 1 March 2023 on a Code of Practice on the management of intellectual assets for knowledge valorisation in the European Research Area, https://eur-lex.europa.eu/eli/reco/2023/499/oj/eng

The Council Conclusions (adopted in May 2024)[14] emphasise the importance of "*strengthening knowledge valorisation as a tool for a resilient and competitive industry*". The Draghi Report (September 2024)[15] highlights the critical role that universities should play in addressing Europe's innovation gap, particularly in relation to global competitors like the United States and China. Hence, universities should not only focus on technology transfer but also prioritise knowledge valorisation to create broader societal and economic value. The report calls for a more coordinated policy approach across the EU to ensure that universities can effectively contribute to innovation and competitiveness on an international scale.

2.2.2. Benefits of knowledge valorisation

Knowledge valorisation plays a crucial role at various levels, nationally and across Europe, from individuals to organisations and intermediary organisations, contributing significantly to economic development, innovation, and societal well-being. In what follows, we briefly outline the benefits of knowledge valorisation at these different levels.

At the **national level**, knowledge valorisation serves as a key driver of economic development, innovation, and global competitiveness. By facilitating the transfer of knowledge, policy-makers enable the creation of high-value jobs, industrial innovation, and solutions to pressing societal challenges, such as climate change, an ageing population, and energy transitions, among others. This aligns with the Draghi Report, which highlights knowledge valorisation as a critical process for addressing national challenges, enhancing economic resilience, and fostering sustainable development.

National policies frequently integrate R&I strategies with broader economic policies, creating synergies that drive societal and industrial transformation. Policy-makers employ various instruments to support key actors in the quadruple helix (academia, industry, government, and civil society). These include targeted funding programmes, tax incentives, and support for public-private partnerships, all aimed at fostering collaboration and turning research into impactful innovations. For example, tax relief for R&D-intensive industries in accordance with relevant State aid legislation can encourage partnerships with universities, while funding for industrial PhD programmes provides a pathway for translating academic knowledge into real-world applications.[16]

At the **European level**, knowledge valorisation plays a crucial role in fostering cross-border collaborations, enhancing the EU's global leadership in innovation, and addressing shared challenges such as sustainability and digitalisation. European policies, including those reflected in the Draghi Report, emphasise knowledge valorisation as a key driver of cohesion among Member States. By facilitating the co-creation, dissemination and valorisation of knowledge and technology across borders, the EU aims to stimulate research impact throughout Europe, ensuring that all Member States benefit from advancements in science and technology. Horizon Europe, as a funding programme, includes specific calls aimed at fostering collaboration between industry and academia, as well as calls of the European Research Council (ERC) designed for proof-of-concept (PoC) projects and offers various support services like the Horizon Results Booster to bridge the gap between research

[14] https://www.consilium.europa.eu/en/press/press-releases/2024/05/23/council-adopts-conclusions-on-strengthening-knowledge-valorisation/

[15] https://commission.europa.eu/document/download/97e481fd-2dc3-412d-be4c-f152a8232961_en

[16] For more detailed information about the national/regional policy frameworks and governance models for knowledge valorisation and the use of funding and non-funding instruments to embed a knowledge valorisation culture, see the Thematic Report of the PSF Mutual Learning Exercise (MLE) on Knowledge Valorisation – Focus on Skills, Intersectoral Cooperation, and Incentive Systems available: https://op.europa.eu/en/publication-detail/-/publication/e1c70b02-df5b-11ee-b9d9-01aa75ed71a1/language-en

outcomes and market applications. These targeted funding instruments promote the translation of academic knowledge into innovative solutions and scalable technologies. The ERA, as a policy framework addressed to Member States, encourages coordinated policy action to create a unified research and innovation ecosystem. Together, these initiatives foster innovation ecosystems that address Europe's most pressing challenges while advancing knowledge valorisation across the continent.

The critical role that European universities play is outlined in the European Commission's Communication of January 2022: A European Strategy for Universities.[17] This strategy, developed in alignment with other key Commission priorities, sets out four main objectives:

1. Strengthen the European dimension in higher education and research.

2. Support universities as beacons of the European way of life.

3. Empower universities to drive the twin green and digital transitions.

4. Reinforce universities as key players in shaping the EU's global role and leadership.

Moreover, the enhanced **role of universities in knowledge valorisation** goes beyond contributing to society through research and education. For the universities themselves, these activities open new opportunities: they create pathways to secure external funding, foster partnerships with industry, and enable the commercialisation of research results. Engaging in knowledge valorisation not only enhances the university's profile both regionally and internationally but also builds networks with stakeholders across academia.

In the process of knowledge valorisation, **intermediary actors such as TTOs but also RICs** (which exist in Czechia) within the ecosystems play a crucial role. TTOs, in particular, serve as key intermediaries between academia and the market. They facilitate the protection of inventions, for instance, through patents, and oversee the commercialisation process. Their work ensures that research outputs are translated into market-ready products and services that address industrial and societal needs. Additionally, TTOs and other intermediary bodies support the creation of spin-offs and start-ups, contributing to regional economic development. More and more, this traditional role of TTOs and other intermediaries is being shifted towards knowledge valorisation. This implies they are starting to consider intellectual asset management in a broader sense (e.g. by enabling socially responsible licensing) and to widen their service offer by including other aspects such as citizen engagement and informing policy.[18]

[17] https://education.ec.europa.eu/sites/default/files/2022-01/communication-european-strategy-for-universities-graphic-version.pdf

[18] For more detailed information about knowledge and innovation intermediaries and their role as knowledge valorisation actors, see the Third Thematic Report produced under the PSF Mutual Learning Exercise (MLE) on Knowledge Valorisation – Focus on Skills, Intersectoral Cooperation, and Incentive Systems available: https://op.europa.eu/en/publication-detail/-/publication/8a564e12-af6a-11ee-b164-01aa75ed71a1/language-en

Finally, on the level of individual researchers, **motivations for researchers to engage in knowledge valorisation** include the following three factors:[19]

- **Contribution to society,** by seeing their research translated into something more tangible and concrete (impact). Researchers often value the opportunity to address real-world challenges and create societal benefits, a motivation emphasised in various studies (Perkmann et al., 2013; ASTP, 2021).[20]
- **Enrichment for future research,** because by engaging in technology transfer, entrepreneurship, or collaborations with industry, new opportunities and perspectives are discovered that are also relevant for research. Collaborative activities often throw up new insights and research questions that enrich both basic and applied research agendas (D'Este et al., 2012; Stephan, 2012).
- **Motivators (although more limited) can also be financial benefits**, for example, if a researcher has built up IPR and can receive a portion of royalty income for their research group or for themselves. This financial incentive, while not the primary driver for many, can play a supportive role in encouraging participation (Geuna and Rossi, 2011; ASTP, 2021). An added possibility is launching a spin-off company (commercial enterprise) based on their research, and the recognition and career advancement opportunities that come with it. These benefits have been particularly highlighted in the work on entrepreneurial motivations and the impact of spin-offs by De Cleyn et al. (2014 and 2016).[21].

Researchers are less motivated to be engaged in knowledge valorisation if the enticements described above are not in place, if sufficient support is not given by the universities to individual researchers to get involved in knowledge valorisation, or if they lack time because only the traditional academic output parameters (like supervising PhDs, publications, and citations) are considered in their career development.

These insights draw on academic studies and recent policy-focused reports that examine the motivations and benefits for individual researchers engaging in knowledge valorisation.

2.2.3. Relevance for Czechia

The PSF expert panel notes that the broader interpretation of the concept of knowledge transfer is visible in the current policy agenda in Czechia. The draft **Act on Research, Development, Innovation, and Knowledge Transfer**, which aims to create a more effective

[19] For more detailed information about research talents, capacity building and intersectoral mobility for knowledge valorisation, please see Second Thematic Report under Topic 2B "Incentives and Skills: Focus on Research Talent" produced under the PSF Mutual Learning Exercise (MLE) on Knowledge Valorisation – Focus on Skills, Intersectoral Cooperation, and Incentive Systems available at: https://op.europa.eu/en/publication-detail/-/publication/9aa3c0bf-9325-11ee-8aa6-01aa75ed71a1/language-en

[20] Perkmann, M. V. Tartari, M. McKelvey, E. Autio, A. Brostrom, P. D'Este, R. Fini, A. Geuna, R. Grimaldi, A. Hughes, S. Krabel, M. Kitson, P. Llerena, F. Lissoni, A. Salter, and M. Sobrero. (2013), Academic engagement and commercialisation: A review of the literature on university Industry relations. Research Policy 42 no. 2: 423-442.
ASTP (2021), *Annual Survey on Knowledge Transfer Activities*. Association of European Science and Technology Transfer Professionals.

[21] De Cleyn, S., Meymans, J , Gielen, F., Braet, J. (2014), 'How engaging start-ups in research activities can lead to more effective technology and knowledge transfer from public research organisations', paper presented at RENT Conference 2014.
De Cleyn, S., and Gielen, F. (2016), 'Flipping the knowledge transfer model using start-ups: how entrepreneurs can stimulate faster adoption of academic knowledge', *Academic Spin-offs and Technology Transfer in Europe*.

and supportive environment for R&D and knowledge transfer, puts a much greater emphasis on the promotion of innovation, knowledge transfer, the principles of open science, and the popularisation of R&I activities in society.

The proposed law redefines the term **knowledge transfer** as follows:

"The process of creating social and economic value from knowledge by linking different fields and sectors and transforming data, know-how, and research results into sustainable knowledge-based products, services, solutions, and policies for the benefit of society, with the aim of generating, pooling, and sharing knowledge, including skills and competences, in economic and non-economic activities such as collaborative research, consultancy, licensing, transfer of intellectual property rights, spin-offs, publications, and the mobility of researchers and others involved in these activities."

This definition aligns very well with the broader concept of knowledge valorisation as previously defined in the EU Guiding Principles on Knowledge Valorisation.

In its use of the terms 'knowledge transfer' and 'knowledge transfer offices' in this work, the PSF takes a **broader view of transferring not only technologies from the research institutions but knowledge in general.** This approach does not change the scope of the PSF assignment as such but allows the team to offer recommendations/guidance better **aligned with the developments at European level and, thus providing useful input into the ongoing reforms in Czechia**.

This broader concept of knowledge valorisation is employed by the expert panel as a general framework to specifically examine the role of KTOs. It is by no means intended to cover all aspects of knowledge valorisation and related policies in this PSF, as these fall outside the scope (i.e. into the realm of 'open science').

The broader benefits of knowledge valorisation – from enhancing economic growth and global competitiveness to supporting societal well-being and policy development – provide a valuable framework to assess and strengthen the role of KTOs within Czechia's innovation ecosystem. The Czech authorities' PSF request highlights the **critical need for KTOs to fully embrace their potential** by bridging existing gaps and aligning their functions more closely with local research institutions and regional ecosystems, addressing specific fields of focus, and overcoming capacity disparities across regions.

3. Knowledge transfer in the Czech R&I system

This chapter analyses the place and role of knowledge transfer in the Czech R&I system. Examples from other countries are included to highlight experience that could be of relevance or serve as inspiration for Czech stakeholders.

3.1. The current state of the Czech national R&I system and policy-making

Czechia is a small open economy with a population of 10.8 million, a high-income country with GDP per capita of 34,200 EUR[22] and is historically highly industrialised. According to the European Commission's economic forecast for Czechia, the country's economy will have an

[22] https://european-union.europa.eu/principles-countries-history/eu-countries/czechia_en

estimated real GDP growth of 1.0% in 2024 jumping to 2.4% in 2025 and continuing at 2.7% in 2026.[23] Its unemployment rate (2.7% in June 2024) remains the lowest in Europe, with the highest share of employment being in the manufacturing sector. However, the country is also characterised by a shortage of workers and low (in comparison to many EU countries) labour productivity.

3.1.1. Research and innovation in Czechia

The Czech R&I system underwent major changes in the early 1990s. The restructuring of the Czech Academy of Sciences, or CAS, through the closure of about 25 institutes and the privatisation of research institutes performing industrial research (formerly controlled by sectoral ministries) notably took place. The business sector – at that time mostly public enterprises – underwent large-scale privatisation and in the process lost much of its R&I capacity. Since the 1990s, the system has evolved slowly without major disruptions or changes until 2008, when a reform of the R&D system was launched, which significantly changed the governance of R&I policy and the responsibilities of the main bodies.

Currently, there are 54 public research institutes under CAS, numerous higher education institutions (26 public, two state and 26 private[24]), and 22 sectoral research institutes overseen by relevant ministries and other national authorities or regions. Since 2007, the HEIs have significantly expanded their research activities, notably thanks to investments from the European Structural and Investment Funds into the building of new R&D capacities. Most of the funding for research within the HEI sector and CAS (i.e. 75%, or EUR 735 billion and EUR 480 million respectively) comes from the state budget (both institutional and project-based funding); and the level of public funding for sectoral research institutes is even higher – at 82% (or EUR 57.5 million).

The quality of the public science base is increasing but needs further strengthening.[25] The 2024 European Semester report mentions that the share of scientific publications among the top 10% most cited publications is increasing although still below the EU average. The country is also below the EU average with regards to international co-publications as a percentage of the total number of publications.

According to the background report (Pazour, 2024[26]) despite the solid and continuous support for publicly funded research, the largest research performer in the country remains the business sector. Enterprises spend 64% of gross expenditure on R&D (GERD), followed by the higher education spending of about 20%; with the remaining 16% by CAS, sectorial research institutes as well as public cultural institutions (such as museums, libraries and archives) and public health institutions (excluding university hospitals). Overall, Czechia has experienced steady growth in R&D expenditure over the last 15 years.

Manufacturing (i.e. automotive, electro-technical and electronic, as well as mechanical engineering industries) and services enterprises, notably IT and ICT services, as well as about 60 private research organisations (PROs) – grouped under the Association of Research Organisations and which provide R&D services to other companies – lead private-

[23] https://economy-finance.ec.europa.eu/economic-surveillance-eu-economies/czechia/economic-forecast-czechia_en

[24] The number of private universities has been changing even during the timeframe of the preparation of this report. As of January 2025, there are 26 private higher education institutions, https://msmt.gov.cz/vzdelavani/vysoke-skolstvi/prehled-vysokych-skol-v-cr-3

[25] European Commission (2024), '2024 Country Report – Czechia', Commission Staff Working document.

[26] https://op.europa.eu/en/publication-detail/-/publication/ce5f1bd2-7569-11ef-a8ba-01aa75ed71a1/language-en

sector R&D activities. Most of these organisations were created in the 1990s because of the privatisation of state research organisations. About a dozen of these private research organisations (working in areas of strategic importance for the State, such as nuclear, aerospace, or specific materials research) receive institutional support from the Ministry of Industry and Trade. Among the R&D-performing companies, foreign affiliates play a dominant role. Of the total composition of the sector (approximately 2,900 companies conducting research), 49% are SMEs and 21% are foreign affiliates. The latter group spends 65% of total business expenditure on R&D (BERD), with a year-on-year steady increase. These foreign-owned enterprises make much greater use of tax credits for R&D; in 2021, 63% of the total indirect support for R&D in Czechia went to these companies via a tax reduction. Domestic enterprises are less visible. For example, public expenditure on R&D financed by domestic business enterprises as percentage of total public expenditure on R&D remains around half of the EU average (3.22% in 2020 compared with the EU average of 7.45%) and has declined over time.[27]

Czechia has long been associated with the group of moderate innovators in the European Innovation Scorecard (EIS) and in 2024 ranked 30th among the 133 economies and 19th among the 39 economies in Europe in the Global Innovation Index (GII). According to the 2024 EIS,[28] Czechia's performance is at 89.7% of the EU average – above the moderate innovators (84.8%) – and performance is increasing more than the EU average (+10%). Czech strengths centre around public-private co-publications and non-R&D innovation expenditures, and a main weakness is the number of patent applications under the Patent Cooperation Treaty (PCT). Between 2017 and 2023, the country has reported strong growth in terms of venture capital expenditures, innovation expenditures per person employed, and non-R&D innovation expenditure relative to the rest of the EU. Yet, for the same period it proved less promising in terms of R&D expenditure in the public sector, direct and indirect government support for business R&D, and SMEs introducing business process and product innovations. The 2024 European Semester report[29] similarly states that business innovation is still underperforming. The country is below the EU average when it comes to the number of researchers employed by businesses, and the number of patent applications. Regulatory barriers and insufficient incentives for spin-off creation, low levels of investments in early-stage firms as well as a low venture capital volumes (VC) create further obstacles (although VC as a percentage of GDP has significantly increased in the last five years).

The GII 2024 finds that relative to its GDP, Czechia's performance is in line with its level of development. The country's GERD was equal to 1.96% GDP in 2022 (ranking 19th among the countries featured in the GII 2024). Czechia performs better in innovation outputs than innovation inputs, and its position in the GII is higher compared to the previous year, although still behind its own performance in 2021 and 2020. It ranks highest in knowledge and technology outputs (17th), infrastructure (24th), business sophistication (30th), but lowest in human capital and research (32nd), creative outputs (33rd), and market sophistication (75th). These findings are also supported by the information presented in the Background Report to this study, which found that knowledge intensity in the country has increased in the last year and the share of R&D workers (in total employment) is gradually increasing.

Skills continue to be a weak point.[30] For example, the number of tertiary education graduates in science and engineering is sharply decreasing; Czechia is only 23rd in the EU in terms of the share of population aged 25-34 who have successfully completed tertiary education; there

[27] European Commission (2024), '2024 Country Report – Czechia', Commission Staff Working document.
[28] https://ec.europa.eu/assets/rtd/eis/2024/ec_rtd_eis-country-profile-cz.pdf
[29] European Commission (2024), '2024 Country Report – Czechia', Commission Staff Working document.
[30] European Commission (2024), '2024 Country Report – Czechia', Commission Staff Working document.

is a mismatch between labour force shortages and skills, which creates hurdles for innovation diffusion, and the gender gap among researchers in all sectors is still prevalent.

3.1.2. Stakeholders in the R&I system

The structure of R&I governance in Czechia (see Figure 3) has three levels: strategic (i.e. setting direction and priorities for the national innovation system), funding (i.e. involving organisations involved in financing of R&I activities nationally and regionally), and implementation (i.e. covering all organisations carrying out R&I activities). Knowledge transfer offices are located at the implementation level of the R&I system within the universities, CAS research institutes, as well as some other research organisations.

The development of the **39 knowledge transfer offices (KTOs)** (see Table 1) in Czechia can be traced back to the EU's Phare pre-accession assistance programme in the 1990s. One of the activities was a pilot project that led to the establishment of a technology innovation centre at the Czech Technical University Prague. Other KTOs were set up much later thanks to ESIF operational programmes (OP). A total of 19 technology transfer and commercialisation centres were established with support from the Operational Programme Research and Development for Innovation (OP RDI) (2007-2013) through the call 'Technology Transfer Centres', published in 2010. The total spent on the establishment of the centres was EUR 41 million. Some 22 organisations were supported later by the Operational Programme Research, Development and Education (OP RDE) (2014-2020) through the call 'Building Expert Capacity – Technology Transfer' and the total amount spent under this call was EUR 20 million.

Another important group in the Czech R&I system are the **14 regional innovation centres.** Set up by regional authorities or associations, cities and universities they are key actors in the implementation of the national smart specialisation strategy and the regional S3 strategies. The nature and role of the centres differs: some are solely focused on the development of the regional innovation ecosystem (e.g. the South Moravian Innovation Centre or the Central Bohemian Innovation Centre); others focus more on regional economic transformation (e.g. the Moravian-Silesian Innovation Centre); or on spatial planning, transport, environment and cultural development (e.g. the Regional Development Agency of the Pilsen Region). Ten of the Czech innovation centres participate in the Ynovate network, which also involves two similar centres from Slovakia.

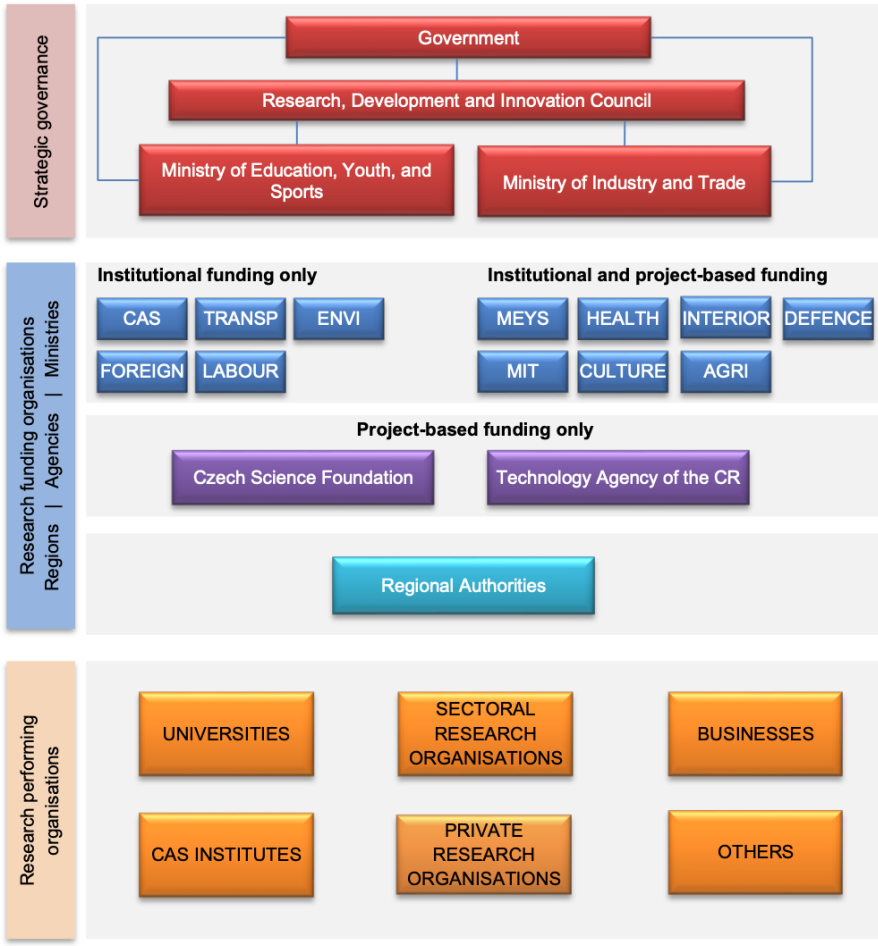


Figure 3: Structure of R&I governance in Czechia
Source: Pazour, M. (2024) Support to Czechia on the reform of the Technology Transfer Offices Sector: Background Report

Research organisation	KTO name	KTO type
Public universities		
Czech Technical University in Prague	Technology Transfer Centre	University KTO
Czech Technical University in Prague	Prague Advanced Technology and Research Innovation Centre (PATRIC – CTU and two partners)	Subsidiary for technology transfer
Czech Technical University in Prague	CTU Tech s.r.o	Subsidiary for technology transfer
Czech University of Life Sciences	Centre for Projects, Innovation and Technology Transfer	University KTO
University of South Bohemia	South Bohemia University and Academic Centre for Technology Transfer	University KTO
Mendel University in Brno	Department of Technology Transfer	University KTO
Masaryk University in Brno	Centre for Technology Transfer	University KTO
Ostrava University	Knowledge and Technology Transfer Centre of the OU in Ostrava	University KTO
Technical University of Liberec	The University Company TUL	Subsidiary for technology transfer
University of Hradec Kralove	Office of Technology Transfer	University KTO

Research organisation	KTO name	KTO type
Jan Evangelista Purkyně University in Ústí nad Labem	Technology and Knowledge Transfer Centre	University KTO
Charles University	Centre for Knowledge and Technology Transfer	University KTO
Charles University	Charles University Innovations Prague s.r.o.	Subsidiary for technology transfer
Palacky University in Olomouc	Science and Technology Park	University KTO
University of Pardubice	Technology and Knowledge Transfer Centre	University KTO
Tomas Bata University in Zlin	Technology Transfer Centre	University KTO
University of Veterinary Sciences Brno	Project and Technology Transfer Centre	University KTO
Technical University of Ostrava	Technology Transfer Centre	University KTO
University of Chemistry and Technology Prague	Research and Technology Transfer Unit	University KTO
Brno University of Technology	Department of Technology Transfer	University KTO
University of West Bohemia	Transfer and intellectual property	University KTO
University Hospital Hradec Kralove	Centre for Biomedical Technology Transfer	University hospital KTO

Research organisation	KTO name	KTO type
Faculty of Pharmacy, Charles University	Technology and Knowledge Transfer	Faculty KTO
Third Faculty of Medicine, Charles University	Technology Transfer	Faculty KTO
Faculty of Management, Prague University of Economics and Business	Centre for Education and Knowledge Transfer	Faculty KTO
Faculty of Informatics and Statistics, Prague University of Economics and Business	Knowledge Transfer through Specialised Courses and Programmes	Faculty KTO
Public research institutes		
Biology Centre CAS	Technology Transfer Section	Research institute KTO
Institute of Physics CAS	Department of Technology Transfer – CITT	Research institute KTO
Centre of Administration and Operations CAS	Technology Transfer Centre of the CAS	Research institute KTO
Institute of Analytical Chemistry CAS	Technology Transfer	Research institute KTO
Institute of Experimental Medicine CAS	Project Support and Technology Transfer Unit	Research institute KTO
J. Heyrovský Institute of Physical Chemistry CAS	Heyrovsky Centre for Technology Transfer	Research institute KTO

Research organisation	KTO name	KTO type
Institute of Computer Science CAS	Department of Technology and Knowledge Transfer	Research institute KTO
Institute of Macromolecular Chemistry CAS	License	Research institute KTO
Institute of Organic Chemistry and Biochemistry CAS	IOCB Tech Technology Transfer Office	Subsidiary for technology transfer
Transport Research Centre	Technology Transfer Centre	Research institute KTO
Food Research Institute Prague	Technology Transfer Centre	Research institute KTO
Private research institutes		
SVUMM	Centre for Technology Transfer Support	Research institute KTO
Research Institute of Textile Machines	Transfer of Results	Research institute KTO

Table 1: KTOs in Czechia
Source: Updated based on Pazour, M. (2024) Background Report (compilation based on Růžička (2023), Transfera.cz database and CzechInvest database)

3.2. Knowledge transfer within the national goal settings

Knowledge transfer is increasingly recognised as a critical component within national goal settings, bridging the gap between research and practical application to support societal and economic development. This section examines the current and evolving landscape of knowledge transfer in Czechia, particularly through legislative reforms, governance structures, and policy objectives aimed at enhancing coordination and maximising impact.

3.2.1. Governance and steering of knowledge transfer

Strategic governance of knowledge transfer in Czechia is shared by three government offices. The main body responsible for formulating and coordinating R&I policy is the

Research, Development and Innovation Council, or RDI Council. Knowledge transfer is very much on the agenda of the RDI Council. It is chaired by the Minister of SRI, with the support of the Science, Research and Innovation Section of the Office of the Government. The **Ministry of Education, Youth and Sports,** or MEYS, is responsible for R&D except for areas falling under the responsibility of the RDI Council. Regarding knowledge transfer, important responsibilities of MEYS are, among others, institutional support for research in universities and other public research organisations, support to international cooperation in research, support for research infrastructures, and researcher mobility. The **Ministry of Industry and Trade** (MIT) is the owner of the national S3 strategy and responsible for the entrepreneurial discovery process at national level. It is also the managing authority for the Technology and Applications for Competitiveness Operational Programme.

The PSF expert panel observations regarding the governance set up are as follows:

- The Czech R&I system suffers from **fragmentation** and lack of clear responsibilities about knowledge transfer policies. As knowledge transfer is a cross-cutting policy objective, it is important that related policies are mutually well-aligned in ministries. Currently, the knowledge transfer mandate is shared between MEYS, MIT and the Minister of SRI's Office, with the RDI Council as a coordinating body. **Broadly divided responsibilities are considered to hinder the efficient implementation of knowledge transfer policies**.
- As an advisory body, **RDI Council has a limited mandate with regard to policy implementation**. It provides an umbrella view, but does not have the power to implement its guidelines when the responsibilities fall under other ministries. Earlier studies (e.g. Arnold 2011, RDI Council 2020) have also pointed out that the responsibilities of the RDI Council are not matched by sufficient executive capacity.
- There has been a **major reform** on the table since 2022, which officially launched in January 2024. It includes a mix of 30 specific legislative and non-legislative measures aimed at promoting the connection between research and business, commercialisation of research results, and the broader utilisation of knowledge. The reform is a step towards building a more enhanced knowledge economy. A new draft law is also expected to clarify the roles, mandates and objectives regarding knowledge transfer. This would include **designating knowledge transfer as one of the main roles of Czech research organisations**. The reform also seeks to bring changes to the current university practices and norms towards this end.
- The reform is based on the view that the driver of change must largely be the business sector, for which innovation is a condition for development. Therefore, the reform also focuses on various forms of **tax incentives** for companies engaged in research and development. It also includes the intention to create **a transfer investment fund in collaboration with the European Investment Bank (EIB),** which has already gained the support of the Government Committee for Strategic Investments.[8]

3.2.2. Policy objectives for knowledge transfer

- The vision and direction for the Czech R&I system is governed by several strategic documents. The **Innovation Strategy of Czechia 2019-2030**[31] sets out the efforts needed to elevate the country to the group of most innovative countries, according to the EIS. While key messages of the strategy are visible in some operational practices, the

[31] https://mzv.gov.cz/file/3569261/Innovation_Strategy_of_the_CR_2019_2030._The_Country_for_the_Future.pdf

overall strategy has **not been prominent on the Czech policy agenda** since the change of the Government in 2022.

- The strategy consists of nine interrelated pillars: 1. R&D funding and evaluation, 2. innovation and research centres, 3. national start-up and spin-off environment, 4. polytechnic education, 5. digitisation, 6. mobility and construction environment, 7. intellectual property protection, 8. smart investments, and 9. smart marketing (Pazour, 2024). The core elements of this innovation strategy continue to be implemented through other policy documents, listed below:
- The **National R&I Policy**[32] (running for seven years and aligned with the EU Multiannual Financial Framework) is the main strategic document for developing all components of research, development and innovation in Czechia. This policy document thus **informs all components of the RDI system** in the country and sets out the main strategic goals, directions, objectives, and measures. The latest version is valid at least for the seven-year period from 2021 to 2027.
- Linked to this policy document, the RDI Council's **National Priorities for Oriented Research, Development and Innovation** (NPOV),[33] outline the long-term strategic directions and objectives for Czech R&I activities. The priorities focus on important societal needs determined by top-down analyses and consultation. They are reflected in related strategic documents and policies, and in turn, implemented through R&I policy instruments and actions by funding agencies. NPOV essentially frames public and private R&I investments to stimulate collaboration between different stakeholders in meeting tangible objectives on the ground.
- The **National Research and Innovation Strategy for Smart Specialisation of Czechia 2021-2027,** or S3 Strategy,[34] sets medium-term goals and topics for RDI in areas that have a high potential for creating a long-term competitive advantage for Czechia thanks to knowledge-generation and innovation. Priority R&I themes are based on identified market opportunities, build on the strengths of Czechia and individual regions, and are determined in a bottom-up manner through consultations within the entrepreneurial discovery process. The S3 Strategy ensures the matching of European, national and regional resources to support R&I, with a focus on the knowledge economy and transformations seen as helping to boost innovation-based competitiveness. Thematic areas for technological specialisation in Czechia are defined in the National S3 Strategy.
- The **National Artificial Intelligence Strategy of Czechia**[35] (updated in 2024), the **National Semiconductor Strategy**[36] (approved in 2024) and the **National Quantum Strategy** (in preparation) set strategic directions for developing R&I activities in their respective technology areas. These technologies have been selected as strategic for strengthening the competitiveness of the Czech economy.
- The **R&I strategies of respective research funding organisations** are also important policy documents that set the objectives for institutional and project-based R&I funding.

The policy documents cited above are situated at the national level, but **strategic documents also exist at the level of research-performing organisations themselves**. For instance, as the PSF Background Report (Pazour, 2024) states: *"The long-term plan of*

[32] https://vyzkum.gov.cz/FrontClanek.aspx?idsekce=932081?
[33] https://vyzkum.gov.cz/FrontClanek.aspx?idsekce=782681
[34] https://www.ris3.cz/en/about-ris3/national-dimension/national-research-and-innovation-strategy-for-smart-specialisation-of-the-czech-republic-2021-2027
[35] https://mpo.gov.cz/assets/cz/rozcestnik/pro-media/tiskove-zpravy/2019/6/NAIS_eng_korektura_06-19_web.pdf
[36] https://mpo.gov.cz/en/guidepost/for-the-media/press-releases/czech-republic-as-an-important-player-in-the-production-of-chips--the-government-approved-the-national-semiconductor-strategy--283625/

the university is the mandatory strategic document of the university, which defines, among other things, the strategy for knowledge transfer and cooperation with industry." It is approved by both the academic senate of the university and the Board of Trustees of the university.

In addition to the long-term plans, universities have their own **internal regulations** on the protection of IP, commercialisation, and cooperation with industry. Guidelines issued by the rector are the most used instruments defining internal procedures related to commercialisation, IPR, and knowledge transfer. These guidelines are usually prepared by the relevant vice-rector or bursar and approved by the rector, making them binding for the entire university. Individual faculties have the freedom to develop their own guidelines and regulations. While all documents relating to commercialisation and collaboration with industry are formally binding, universities typically do not enforce compliance strictly. If breaches occur, they are generally resolved through agreement rather than penalties or compensation. In general, according to the PSF Background Report (Pazour, 2024, p.52) "*formal instruments for the protection of intellectual and, in particular, industrial property rights are relatively little used in Czechia"*.

University researchers enjoy considerable freedom in transferring their knowledge and collaborating with industry. If the university has no interest in claiming the rights to an invention, researchers can commercialise it independently without being required to use the services of the KTO. In most universities with a KTO, researchers are only obliged to use its services if the university expresses interest in the rights to their knowledge (Ministry of Education, Youth and Sports, 2013).

For public research institutions, the law (Act No. 341/2005 Coll. on Public Research Institutions[37]) does not mandate the development of a long-term plan. However, the founding authority may request the PRO to prepare such a plan (Pazour, 2024).

3.2.3. Funding for knowledge transfer and its link to research assessment

To build a clearer picture of KT in Czechia it is important to outline how funding for R&I in the country is organised. The two main types of R&I funding are institutional (basic) funding and project-based (competitive) funding, which are administered by different institutions:

- **Institutional support** is provided to research organisations by MEYS (funding of universities), CAS (funding of its institutes), and nine ministries funding sectoral research organisations under their jurisdiction.
- Most of the **project-based funding** is provided by two agencies, namely the Czech Science Foundation, and the Technology Agency of Czechia; although some project-based funding also comes via sectoral and cross-sectoral programmes from respective ministries (Ministry of the Interior, Ministry of Culture, Ministry of Defence, Ministry of Agriculture, and Ministry of Health) and through MEYS programmes specifically focused on international research cooperation, large research infrastructures, and specific university research.

The system of institutional support has undergone significant changes over the last 25 years resulting in fluctuations in the levels of both institutional and project-based funding. The share of institutional support has been increasing since 2019; whereas the share of project-based funding has decreased (also in absolute terms) from 2020 onwards (see

[37] https://vyzkum.gov.cz/frontclanek.aspx?idsekce=15607

Million EUR by year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Institutional funding	464	467	498	526	524	539	559	605	671	709	783	813	871
Project-based funding	441	566	548	542	567	575	560	621	664	723	740	719	669
Share of institutional funding	51%	45%	48%	49%	48%	48%	50%	49%	50%	49%	51%	53%	57%

Table *2*).

Million EUR by year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Institutional funding	464	467	498	526	524	539	559	605	671	709	783	813	871
Project-based funding	441	566	548	542	567	575	560	621	664	723	740	719	669
Share of institutional funding	51%	45%	48%	49%	48%	48%	50%	49%	50%	49%	51%	53%	57%

Table 2: Distribution of institutional and project-based funding in Czechia (2010-2022)
Source: Data behind Figure 7 in Pazour, M. (2024) Background Report (based on Czech Statistical Office)

A performance-based research funding model was introduced in 2009. In 2013, this model was replaced by a form of index-based model where a significant part (80%) of the institutional support is allocated at the same level as in the previous year, and the remaining part is allocated according to the results achieved or (since 2017) based on a more robust methodology for the assessment of research organisations and the evaluation of research programmes (Metodika 17+).

Metodika17+ provides a common framework for research assessment, with detailed parameters defined by each funding agency. The framework is divided into the following five modules: M1 – Quality of selected research outputs, M2 – Research performance, M3 – Societal relevance, M4 – Viability, and M5 – Strategy. The assessment of the transfer of research results into practice is primarily emphasised in M4, where individual forms of knowledge transfer (such as contract research, income from licensing or sale of intellectual property rights, and income from spin-offs) and their valorisation are evaluated. The impact of research results in practice is assessed in M3 and partly in M1.

Although Metodika 17+ took into account various aspects of the functioning of research organisations beyond research results, including cooperation with industry and knowledge valorisation to a much greater extent than the previous system, the way research organisations were evaluated was still widely considered to offer limited incentives for knowledge transfer and the commercialisation of research results (RDI Council, 2022).

M1 and M2 are the responsibility of the RDI Council and the results reported in M1 and M2 are being assessed on a national level. Each funding provider (i.e. ministries and CAS) is obliged to develop its own assessment methodology based on M3, M4 and M5 to achieve strategic goals.

MEYS, based on the Modules 3, 4 and 5 of Metodika17+, developed its own assessment methodology for universities and conducted the first evaluation cycle in 2020. The next evaluation cycle of HEIs is scheduled for 2025. For this purpose, MEYS has approved a new approach called the Methodology for Evaluation in the Higher Education Institutions Segment

2025+ (Methodology HEI2025+).[38] The methodology is particularly relevant in the context of policy aimed at promoting knowledge transfer and valorisation. By revising and refining its evaluation criteria, this methodology can play a **crucial role in incentivising research organisations to enhance their contributions to knowledge transfer and societal impact**.

In the approved Methodology HEI2025+ both Modules 3 and 4 have indicators relevant for knowledge transfer; for example, application of research results in practice, cooperation with industry (under Module 3) and contract research, income from licensing or sale of IPR, income from spin-offs (under Module 4). Under the new version of the assessment methodology, both innovation and knowledge transfer are clearly included in the definition of terms used in the methodology and Modules 3, 4 and 5 provide indicators directly or indirectly linked to knowledge transfer. These include:

- Module 3 (social relevance):
  - Indicator 3.4: Research results with exciting or prospective impact on society (qualitative indicator)
  - Indicator 3.5: Transfer of results into practice; a **qualitative indicator** describing a system for transferring results into practice, indicating typical users of results, how new users are being attracted, and how collaboration works; describing commercialisation methods (i.e. selling licences, creating start-ups or spin-off companies, etc. On the **quantitative** side, funds received from non-public, non-grant sources, e.g. sold licences, spin-off revenues, donations, etc., are referenced.
- Module 4 (viability) evaluates the quality of the management and internal processes:
  - Indicator 4.2: System of support for a quality RDI environment and incentive measures for quality science including elements somewhat linked to knowledge transfer, e.g. a description of science management which includes, among others, personnel and financial capacity for RDI transfer, science manager, and business and innovation advisors.
  - Indicator 4.3: Quality control system for RDI environment focusing on internal and external evaluation of research units. While there is no direct reference to knowledge transfer here, it is assumed that if the institution is serious about knowledge transfer, it will have a system in place to assess the work of its KTO and internal processes.
  - Indicator 4.4: Sustainability and resilience of RDI focusing on arrangements for sustainability and increasing RDI resilience, and thus describes, among others, a knowledge transfer system. As part of the third role (i.e. 'third mission'), the indicator ask to describe the transfer of RDI results to society and interaction with local actors, and intellectual property protection. In more quantitative terms, the institution should show the number of people trained in IP protection and technology transfer.
- Module 5 (strategy and policies) is dedicated to the forward-looking, long-term objectives for the development of the institution during the five years after the evaluation:
  - Indicator 5.2: Research and development objectives is dedicated to RDI and knowledge transfer as well as objectives in the field of cooperation with public administration, entrepreneurs, and non-profit organisations.

[38] https://msmt.gov.cz/research-and-development-1/documentation-for-evaluation-of-research-organisations-in?lang=2

An overview of European reform initiatives of research assessments[39] indicates that even though the concept of impact has become increasingly important in R&I policy and as a funding criterion, the assessment practices still largely rely on traditional journal- and publication-based indicators. **Changing the criteria is not enough, the culture must change**. The adoption of novel assessment frameworks requires a cultural change at all levels of assessment. Publishing of good practices on how to evaluate the knowledge valorisation efforts can certainly help. For example, ENLIGHT universities[40] are supported by awards for 'impact ambassadors' who have been selected for their exemplary work in planning and achieving research impact. An example of a changing culture can be found in The Netherlands (see **Error! Reference source not found.**). The new protocol for the research assessment of academic disciplines focuses more than in the past on societal impact including knowledge valorisation.

Research Assessment Protocol, The Netherlands

Academic research in The Netherlands is evaluated every six years using a Research Assessment Protocol with three major categories: 1. research quality, 2. societal relevance, and 3. viability. Knowledge transfer is an important criterion of societal relevance.

Societal relevance: "*The societal relevance of the unit's research in terms of impact, public engagement and uptake of the unit's research is assessed in economic, social, cultural, educational or any other terms that may be relevant."*

Assessment of societal relevance focuses on evidence in terms of impact and engagement of the evaluated research unit. By explicitly focusing on this research units (and universities overall) are stimulated to develop a clear strategy on how knowledge production is transferred to society. This, in turn, strengthens the position of KTOs in universities.

*For more information, please visit**:** SEP Protocol the Netherlands, https://storage.knaw.nl/2022-06/SEP_2021-2027.pdf*

Box 1: International example: Research assessment protocol in The Netherlands
Source: Authors' own composition

Project-based funding is allocated based either on project calls or through R&D procurement. Two major funding agencies are in charge:

- The Czech Science Foundation (GA CR) funds **basic research** mainly in public universities and CAS institutes, although in principle it is open to applicants from all sectors. In addition to standard basic research projects, which account for most of the funding provided by the GA CR, it also supports the development of young researchers, international cooperation in basic research, and the international mobility of early-stage researchers. All support is allocated as project-based funding.

[39] https://op.europa.eu/en/publication-detail/-/publication/219aa5ea-fae2-11ee-a251-01aa75ed71a1/language-en
[40] https://enlight-eu.org/

- The Technology Agency of the Czech Republic (TA CR) funds **applied research, development and innovation projects**. It implements a wide range of funding programmes on behalf of the RDI Council, ministries, and other central authorities:

Sectoral programmes prepared in cooperation with the relevant sectoral ministries (e.g. Ministry of the Environment, Ministry of Transport, MIT, Ministry of Defence).

Applied research programmes prepared directly by TA CR, which focus on selected thematic areas (e.g. supporting research in the energy sector) or on the development of systemic aspects of R&D (e.g. supporting early-stage researchers in applied research). Some of the programmes are linked to knowledge transfer – e.g. GAMA and SIGMA programme to support commercialisation of research results – or programmes for competence centres which concentrate R&I capacities on long-term research and cross-sectoral cooperation.

Programmes related to international cooperation activities in applied research.

When preparing each new research programme a funding organisation must consult the RDI Council about the consistency of this new research programme with national priorities (NPOV) and the national strategy (National R&I Policy). Once checked by the RDI Council, the research programme can be submitted to the Government for approval.

In addition to direct support in the form of institutional and project-based support, research in Czechia is also fostered by **indirect support in the form of R&D tax deductions**.

3.2.4. Ongoing knowledge transfer reform in Czechia

In 2024, the knowledge transfer reform (see Figure 4) was launched (although this was in the making for more than a year before that). As highlighted by the Prime Minister Petr Fiala,[41] the reform is set to strengthen the innovation ecosystem and provide more effective cooperation between academic and private sectors. Among the main measures highlighted in this programme is the knowledge transfer reform "*An economy driven by science*", which includes specific measures to strengthen the valorisation of scientific and research knowledge.

The KT reform introduces measures to help create and absorb knowledge and, as a result, enhance Czechia's global competitiveness. In designing the reform, developments in the European policy context were strongly taken into the account. First, knowledge transfer needs to work as a support for competitiveness and economic growth. Second, knowledge transfer is a path to strategic resilience. The reform also acknowledges the fact that a change in the mindset of the whole system (i.e. going beyond the pure organisational or technical changes and more towards cultural changes) is needed.

The two main routes for KT highlighted in the reform are **Science2Business and Science2Policy**. In combination, they consist of 30 measures (marked in yellow in the figure) divided into the following six thematic blocks:

[41] https://vlada.gov.cz/cz/clenove-vlady/premier/projevy/projev-predsedy-vlady-petra-fialy-na-predstaveni-reformy-transferu-znalosti-211663/

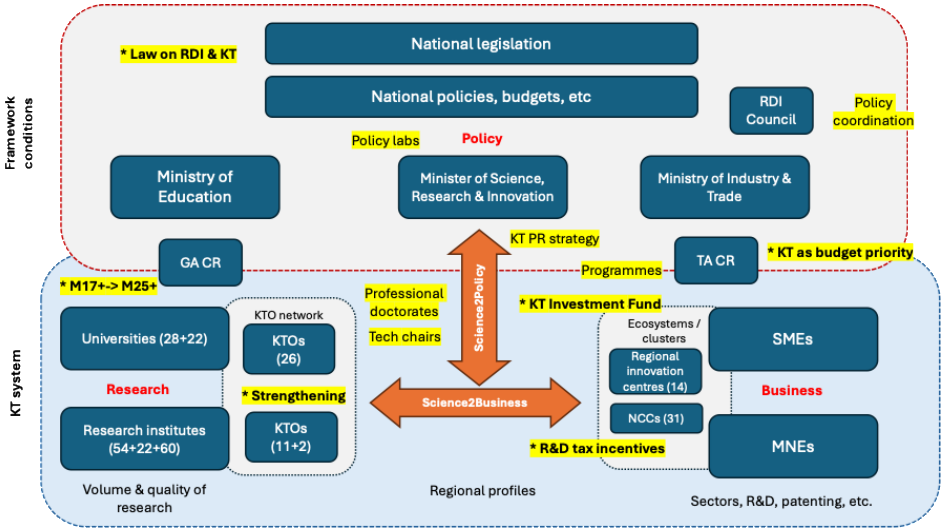


Figure 4. Knowledge transfer reform in Czechia
Source: Authors' own composition
Note: the placing of the topics (marked in yellow) in the figure is purely illustrative

1. Orienting the economy towards research and development
2. Orienting research organisations towards knowledge transfer
3. Strengthening the transfer ecosystem
4. Ensuring a secure and transparent regulatory environment
5. Providing targeted and effective public support
6. Encouraging private investment

Although the PSF exercise is linked only to the left-hand side of the picture (i.e. strengthening the position of KTOs and regional innovation centres), many of the planned activities in the reform (listed in bullet points below) are relevant – to a larger or smaller extent – to the PSF topic:

- The main objective in the thematic block 2 'Orienting research organisations towards knowledge transfer' is to strengthen the motivation of research organisations to valorise R&D results (i.e. yellow element 'Strengthening' in the figure). The aim is also to revise the methodology for evaluating research organisations, the so-called Metodika17+, and to place greater emphasis on knowledge transfer within the evaluation process of research organisations (i.e. yellow element 'M17+->M25' in the figure). In addition, and linked to academia, the creation of professional doctorates and technological chairs are measures included in the reform.
- Knowledge transfer (including spin-offs) will be defined as a clear role of research organisations, with uniform guidelines and KT as budget priorities in RDI.
- In relation to the business side, R&D tax deductions for companies are planned.
- Knowledge Transfer Investment Fund is in preparation with EIB (fund-of-funds, with pre-seed and seed funding to spin-offs).

At the national level, the main change is linked to Czechia's proposed **Act on Research, Development, Innovation Knowledge Transfer** (i.e. yellow element 'Law on RDI & KT' in the figure). In regulatory terms, the R&I policy formation (presented in Section 2.2.2) is governed by the Act No. 130/2002 Coll. on the Support of Research, Experimental Development and Innovation. It concerns the governance of the national R&I system, its strategies, budgeting, support and financing for RDI, as well as the reporting of research results, among other issues. Preparations have been ongoing to replace the current legislation with a new act (under preparation in 2024). Through the act, the R&I community expects a more supportive environment for R&D and knowledge transfer. If adopted, it will replace the existing Act No. 130/2002 Coll.

The proposed act aims to address systemic shortcomings, such as inadequate legislation on ethical principles, career development for researchers, open science, and state security interests in R&D. The planned revisions emphasise:[42]

- The need for a **more coordinated approach** to international cooperation in R&I and KT, and clarification of the current relationship between key institutions like the GA CR, the TA CR, and state administrative bodies.
- **Administrative simplification** to reduce burdens on applicants and beneficiaries.
- **Enhanced funding flexibility**, including multi-provider programmes, transferability of projects, and systematic evaluation of project-based funding programmes, including impact assessment in line with Metodika17+.
- **Open science promotion**, ensuring compliance with European directives for open access to research data and linking public administration systems with RDI information systems.
- **Popularisation of R&I** activities in society.
- The Act also introduces a revised definition of knowledge transfer.

A draft of the new law was circulated for inter-ministerial comments in November 2023. That version was substantially changed in summer 2024 and then approved by the Government in December 2024. At the time of writing, it is under discussion in the Czech Parliament. The Government aims to adopt the law before Parliamentary elections in autumn 2025. If adopted, it will strengthen the legal framework for knowledge transfer and align Czechia's RDI system with national and international priorities.

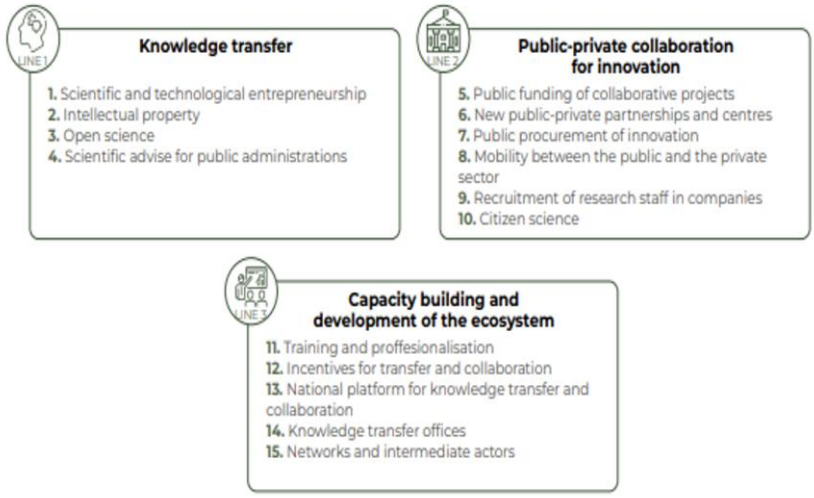
As the reform is still ongoing an example from Spain's strategic approach towards knowledge transfer and innovation, and a linked reform can be an interesting example (see **Error! Reference source not found.**).

Empowering society through science: Spain's strategic plan for knowledge transfer and innovation

Background and context: Knowledge transfer is a key element in Spanish R&I policies. It is a driver in the design and implementation of diverse mechanisms at all levels, intended to create a favourable regulatory, political, and financial framework, to ease the circulation of knowledge among the different agents involved. The final objective of these processes in Spain is reinforcing governance, trust, and effectiveness within the Spanish innovation ecosystem.

[42] This is based on the explanatory memorandum before the inter-ministerial consultation.

Key features: The main instruments to promote this initiative include national and regional legislation on science, technology and innovation, national and regional S3, the State Plans for Scientific and Technical Research and Innovation 2021-2027 and Knowledge Transfer and Collaboration. The latter has the aim of strengthening the links between the public and private sectors in RDI, to increase the socio-economic impact of public investment in research and boost the innovative capacity of Spanish companies. It is organised in three main axes:



Lessons learned: As result of the implementation of the National Law on Science, Technology, and Innovation, and its related plan, a broad reorganisation of the Research Results Transfer Offices (*Oficinas de Transferencia de Resultados de Investigación, OTRI*) took place. This reorganisation of the national model started by the creation of a new registry for KTOs (*Oficinas de Transferencia de Conocimiento, OTC).* The reform's goals were twofold: 1. update the obsolete regulatory framework created back in 1996, which was the foundation of the activity of the above-mentioned OTRIs, and 2. align the activity of public (but also private) entities acting as intermediaries within the Spanish innovation ecosystem. The outcome (new scenario) reshuffled the concept of transfer from a technology-driven to knowledge-driven mindset, thus impacting on the ecosystem around it. Within this model, KTOs are the key to strengthen the interaction between knowledge-generating entities and the productive sector, as an essential element to increase Spanish innovative capacities and the positive impacts on growth and social well-being.

For more information, please visit:

https://www.ciencia.gob.es/Estrategias-y-Planes/Planes-y-programas.html;jsessionid=C5F7A33900E4DE9F8332BC07FBF306EB.2

Transfer and collaboration plan: https://www.ciencia.gob.es/dam/jcr:99d563bc-1277-4c6d-8df3-edb4664aa405/plantransferenciacolaboracion_en_aa.pdf

Royal decree establishing KTOs: https://www.boe.es/eli/es/rd/2022/11/22/984/con

Box 2: International example: Spain's strategic plan for knowledge transfer and innovation
Source: Authors' own composition

3.3. Knowledge transfer in academia

In general, universities have three missions: education, research, and valorisation (often called 'third mission'). Valorisation or knowledge transfer is poorly developed in most Czech universities and needs more attention in Czech policy. Moreover, European universities and EU policy-makers are discussing the concept of a **fourth-generation university**, and the role universities play in transforming society. This requires an enhanced place for the third pillar both in government policy and within the university landscape. The topic of knowledge transfer is commonly discussed on three levels: in national policy, at university level, and at scientific staff level. Internally within R&I institutions, this ought to be reflected in formal procedure and structures as well as in the culture of organisations.

To date, knowledge transfer has not been a core issue in the Czech research policy agenda at any level (national, university, principal investigator), nor is it reflected in the governance structure at these different levels. Moreover, and probably related, KT is not part of the current mindset of administrators and researchers, as was indicated several times by interviewed stakeholders during the country visits for this study and visible in other sources.[43] On the institutional level, knowledge transfer is viewed as a marginal activity and does not end up in strategic goals of academic institutions. On the individual level, academics are not evaluated on this aspect by their hierarchy, nor by the administration of the university. The latter point is more difficult to change since a cultural transformation takes time. These levels are discussed in the rest of this section.

3.3.1. Fragmented funding for knowledge transfer

The allocation of state funding for universities in Czechia is based on their contribution to education (see Background Report, Pazour, 2024). Additionally, they receive institutional support for research. KTO activities are funded only through projects, despite the importance of base funding to facilitate and encourage knowledge transfer. The draft Act states that a systematic evaluation, including impact assessment, of project-based funding programmes should be introduced. It also suggests that increasing the contribution of private sources to the funding of R&D, innovation, and knowledge transfer should be considered. However, private investors are likely to be reluctant to invest if there is no strategy ensuring long-term continuity of public-sector funding/resources. Building trust by developing a stable innovation policy is one of the basic requirements for attracting needed talent for the commercialisation of knowledge products – i.e. starting and growing spin-off companies. As it is mentioned in the draft Act, the provision of project-based funding should be moved to a public law regime, and the breakdown of expenditure on R&D, innovation, and knowledge transfer made clearer.

The fragmentation of knowledge transfer activities due to project-based funding also increases the administrative burden for all stakeholders: funding agencies, applicants, and beneficiaries. To encourage academics to start a spin-off and help KTOs to extend their activities and involve foreign and domestic investors, administrative processes should be simplified. This could be done by reducing the number of applications for small projects and moving to programme funding or base funding for KT based on performance.

The RDI Council is responsible for the research strategy but does not have a mandate for KT policy. CzechInvest has a substantial budget but does not have ownership of the innovation agenda of the university. There are no base funds to support KTOs nor a central entity that is responsible. This implies that universities are depending on temporary (project) funding (e.g. through GAMA programme in 2014-2019 which targeted transformation of R&D results into practical applications). This hampers the continuity of activities. As highlighted in a 2022

[43] https://sciencebusiness.net/news/technology-transfer/czechia-targets-knowledge-transfer-reforms-tackle-stagnant-situation

McKinsey report on Europe's climate for supporting spin-offs, fragmentation leads to a lack of scale, a lack of established technology ecosystems and less developed risk-capital funding.[44]

Another downside of non-recurrent project funding is that it is difficult for KTOs to build skills and competences as well as 'visibility' within the university. Many of the KTOs interviewed (certainly those from the smaller and regional universities) mentioned their vulnerability. Uncertainty due to insecure funding sources makes it harder for KTOs to attract and retain talented people.

Some useful examples can be found in other countries, such as Flanders' twin-policy (see **Error! Reference source not found.**) and in Greece (see Box 4).

Flanders twin-policy: Interface activities and industrial research fund

Background and context: Flanders, a region within federal Belgium, exercises significant autonomy over its policies on economy, science, innovation, and education. Over the past three decades, R&I policy has been prioritised, with public funding substantially increasing in this area. Universities play a crucial role in Flanders' strategy and enjoy considerable autonomy, receiving a significant share of additional R&D funding as lump sums. Historically, universities in Flanders have been supported through lump-sum payments covering both education and research. In 1994 and 2004, the Flemish government introduced two major supplementary funds to further enhance this approach: the Special Research Fund (BOF) for blue-sky research, and the Industrial Research Fund (IOF) for strategic applied research, innovation, and knowledge transfer activities. This case study examines Flanders' twin-policy approach, in which a portion of annual R&D funding is specifically reserved to support strategic, industrial, and applied research, as well as innovation and interface activities within universities. This system, established in 2004, is a relevant example for Czechia because it aims to balance autonomy with accountability, ensuring uniform funding support for KTOs while filling previously unaddressed gaps.

Key features: A percentage of the Flemish budget for additional R&I is reserved specifically to support universities in their KT strategies and activities:

Interface activities: EUR 4.9 million is allocated to support KTOs in universities and university colleges. This funding assists researchers with intellectual property management, licensing, legal advice, and networking.

IOF: An annual budget of EUR 58 million promotes applied and industrial research. This funding supports spin-offs, patents, and collaboration with industry to generate both economic and socio-economic impacts. The IOF budget is earmarked by the Flemish government for universities and university colleges, to strengthen their engagement with economic stakeholders and increase the potential for application-oriented knowledge with an economic purpose.

Funding under IOF is allocated based on six parameters, each with specific weights (W) and reference periods (RP), and calculated annually. The six parameters include: doctoral degrees (5%), publications and citations (5%), industrial contract income (30%) indicating successful collaboration with industry, European framework programme income (20%), patents (20%), and spin-offs (20%). Performance on these six output parameters determines future shares of the IOF budget.

[44] McKinsey Global Institute Securing Europe's competitiveness, September 2022.

Lessons learned: Key take-aways of IOF as inspiration for tackling some obstacles in the Czech knowledge transfer system include:

The IOF-decree outlines a uniform funding mechanism applicable to all KTOs in Flanders and specifies the permitted uses of the IOF budget, namely: building an IP portfolio (covering patent costs), supporting proof-of-concept projects (two types: 'Create' and 'Develop') and service platforms, and hiring staff as valorisation managers. The legislation also stipulates that a maximum of 10% of the budget may be allocated to patent costs and a minimum of 25% to staffing.

The allocation of the IOF Internal fund is under the advice of the IOF Council with representatives from the university, university colleges, and industry. This Council also needs to approve the Strategic Plan.

The IOF decree provides a clear definition of a spin-off: There must be a significant contribution from the university to the spin-off, either through acquiring a shareholder position via technology transfer or by granting an exclusive licence to use technology and knowledge at market value, both documented contractually.

The IOF adopts an approach that balances autonomy for associations to develop their own strategies and utilise the IOF budget, with accountability through financial incentives (based on six key performance indicators or KPIs) and the Strategic Plan.

IOF stimulates economies of scale (five associations): integration of the twin-policy across universities and university colleges. IOF developed a greater awareness of the potential for valorisation of research results, especially in the smaller university associations. The funding structure provides a solid foundation for long-term and ambitious strategies + clear results.

The Flemish model provides insights into addressing Czechia's KTO funding inconsistencies, competence gaps, and the need for clearer KPIs tied to knowledge transfer outcomes.

For more information, please visit:

Industriële Onderzoeksfondsen en interfaceactiviteiten, Departement EWI (ewi-vlaanderen.be)

Box 3: International example: Flanders twin-policy – interface activities and industrial research fund
Source: Authors' own composition

Greece: Financial support to technology transfer and innovation units embedded in the law

Background and context: KTOs in Greece, or as they are called Technology Transfer and Innovation Units, do not receive any external funding, thus making own university funds the main source of financial support. A recent amendment to the national law by the Ministry of Education, Religious Affairs and Sport is a way to bring more financial stability to KTOs. In 2022, Article 211 (of the Law 5094/2024) dealing with the topic of technology transfer and innovation units within universities in Greece was amended calling for higher education institutions in Greece to dedicate part of their finances annually to support their technology transfer and innovation units. The law defines the objective of Technology and Innovation Transfer Units as strengthening the "research capacity of the HEI, to link it with industry, to transfer the knowledge produced to society

and to foster the idea of entrepreneurship within the academic community". These units thus present a clear equivalent of KTOs in Czechia.

Key features: These units may attract funding of any kind, from private or international resources, as well as co-funded programmes. To cover the needs, however, the HEI's Management Board – upon recommendation of its Research Committee – decides the amount of revenue that in the following financial year *"(a) will either be credited to a separate project in the Special Research Funds Account, SRA (Operation of the Technology Transfer Unit), or (b) will be transferred to the HEI Asset Utilisation and Management Company*".

This amount may not be less than two percent (2%) of the total annual revenue of the current financial year, derived from the HEI's own resources. This decision on funding is made on an annual basis by the end of July of each year at the latest.

The SRA concept was established following the joint Ministerial Decision no. KA 679/96 on the 'Establishment of Special Accounts for funding Research Projects and similar services rendered at Greek Universities' and Law 3027/2002. The aim is to manage and hold funds received from any external sources, as well as its own resources, intended to cover the needs of research, educational, training, and developmental projects, projects of continuing education and training, seminars and conferences, etc.

For more information, please visit:

Law N. 5094/2024 Αρθρο 114 Τροποποίηση του Αρθρου 211 Ν. 4957/2022 (available only in Greek), https://www.kodiko.gr/nomothesia/document/983677/nomos-5094-2024

Sachini, E., Sioumalas-Christodoulou, K., Chrysomallidis, C. et al. Mapping the Technology Transfer Offices in Greece: Initial Outcomes Concerning Medical and Health Technologies and Next Steps. Journal of the Knowledge Economy (2024). https://doi.org/10.1007/s13132-023-01715-w

Examples of SRA funds in different universities: National and Kapodistrian Univeristy of Athens (https://en.uoa.gr/research/projects/), University of Crete (https://en.elke.uoc.gr), Democritus University of Thrace (https://duth.gr/en/Services/Special-Account-for-Research-Grants-SARG-DUTh), Aristotle University of Thessaloniki (https://www.auth.gr/en/rc-en/), Agricultural Univeristy of Athens(https://www2.aua.gr/en/info/special-research-funds-account)

Box 4: International example: Greece: Financial support to technology transfer and innovation units embedded in the law
Source: Authors' own composition

3.3.2. Knowledge transfer function in research organisations

KTO offices are mostly not funded structurally by the university but rely on project funding from regional, national or EU sources. In the past, universities have received a budget to set up a 'technology transfer centre'. Most KTOs are required to operate self-sufficiently, relying predominantly on external funding, which is currently almost exclusively project based. This is also the case for support for incubators such as the Technology Incubation Programme. An example of how base funding can help is the CAS which offers equity funding provided by regional and university funds to local incubators. Moreover, Charles University, Masaryk University and Palacky University are examples where university are structurally financing their KTO.

This dependency hinders their ability to allocate a budget towards a long-term vision and strategy. The continuity of KTOs or innovation centres should not depend on political changes

either within the university or a regional government. Not only are the KTO offices very small in most universities, but the offices also do not have a clear mandate or influence on the overall policy of the university. In some cases, the KTO director reports to the rector, but mostly there are several levels in between. To emphasise the role knowledge transfer has in the overall policy of the university, various universities have appointed a board member with this specific role (to promote the importance of the third pillar). In the UK, many universities have a deputy vice-chancellor for innovation or in Australia a deputy vice-chancellor for enterprise, the Norwegian University of Science and Technologic (NTNU) has a vice-rector for innovation, the VU Amsterdam and University of Twente have a chief innovation or chief development officer with a board-level mandate. The University of Antwerp also has a dedicated vice-rector for valorisation and sustainability in the rector's team alongside vice-rectors for research and impact, education, and societal engagement and international policy.

Through such actions and appointments, these countries and universities clearly signal the importance of knowledge transfer and innovation both internally (towards the academic fraternity) and externally (stakeholders).

Many Czech KTO officers interviewed during this PSF exercise mentioned that a clear mandate for negotiation of licences and innovation in general is missing within the university. In most cases, deans are making decisions and a central policy is lacking, which hampers the development of a clear approach to and support of spin-offs. Moreover, it was indicated that academics are more interested in contract research than in licensing. Helping spin-offs is often seen as 'losing budget for research'. As was stated by some interviewees during the country visits, the management of universities does not want to lose their good scientists to a spin-off. It was also mentioned that many researchers see huge uncertainty in terms of the legal conditions when it comes to creating spin-offs in Czechia.

Skills and capabilities on the KTO level are also rather diverse from one institution to the next. Findings from the YUFERING project (Transferring R&I through Europe-wide Knowledge Transfer) as well as from ASTP present some interesting European practices (see Box 5).

Profile and career development path of knowledge transfer managers

The YUFERING report *Profile and career development path of knowledge transfer managers* (March 2023),[45] describes several core competences that KT professionals should ideally possess to drive effective knowledge transfer. These include:

Entrepreneurial leadership, i.e. the ability to secure funding, lead negotiations, and develop ventures.

Strategy and business insight, i.e. the skill to identify market needs and translate these into commercial opportunities.

Effective engagement, i.e. competence in building networks and relationships.

Knowledge transformation and management, i.e. establishing and managing systems for knowledge sharing.

Legal and technical know-how, i.e. understanding IP and legal implications critical for successful transfer activities.

The report emphasises that a complementary team structure, where diverse skills are pooled rather than relying on individuals with comprehensive profiles, is crucial to achieving effective knowledge transfer in a "flipped" or demand-driven model. This approach is particularly relevant given the challenges of recruiting professionals who are

[45] https://yufe.eu/wp-content/uploads/2023/05/YUFERING_D3.3-Profile-of-Knowledge-Transfer-Managers_Final_CareerprofileKTprofessionals_March2023_DEF_31.03.23.pdf

equally skilled in legal matters, IPR strategy, industry networking, and familiarity with both academia and the business sector.

The report emphasises that instead of solely focusing on individual competencies, KTOs should prioritise building complementary teams with a mix of skills. It is crucial that, in addition to the traditional "inside-out" technology-push competencies, KTOs also cater to external needs (a demand-driven approach) and collaborate with external partners. Many Czech KTOs have limited capacity, which underscores the benefit of networking with other KTOs or regional innovation centres to bridge certain skill gaps.

For more information, please visit:

https://yufe.eu/wp-content/uploads/2023/05/YUFERING_D3.3-Profile-of-Knowledge-Transfer-Managers_Final_CareerprofileKTprofessionals_March2023_DEF_31.03.23.pdf

ASTP has put substantial efforts into the professionalisation of the knowledge transfer professions. To promote and maintain global standards in knowledge and technology transfer ASTP introduced the Registered Technology Transfer Professional (RTTP) standard for knowledge transfer and commercialisation practitioners working in universities, industry and government labs.

This standard acknowledges and supports core competences and skills needed for KT, such as:

Strategic and business insight, e.g. through sourcing opportunities, translating knowledge into commercial application, developing the strategy etc.

Entrepreneurial leadership, e.g. supporting new venture formation, accessing investment funding, nurturing new projects etc.

Legal, scientific and technical know-how, e.g. developing an IP exploitation strategy, drafting, negotiating and reviewing agreements, etc.

Effective engagement, e.g. building new networks, finding partners, investors and collaborators, etc.

Governance and project management, e.g. developing, setting up and managing complex projects, establishing governance framework etc.

Knowledge transformation and management, e.g. knowledge capture and management, knowledge value recognition and reconciliation, developing, setting up and managing systems etc.

For more information, please visit: https://www.astp4kt.eu/about-us/

Box 5: International example: Profile and career development path of knowledge transfer managers
Source: Authors' own composition

During interviews, it was noted that capacity building does occur between different KTOs, for example, through the Transfera.cz initiative. While this is a positive development, not all KTOs are equally active in this initiative. Another observation emerging from interviews is that KT professionals sometimes spend insufficient time on the core tasks expected of KT professionals, focusing too much on various events and activities aimed at promoting a more entrepreneurial culture and competencies. While these activities are undoubtedly important, it raises the question of whether they fall within the core responsibilities of what was identified as already understaffed KTOs, or if they should be delegated to other departments (e.g. education) or other stakeholders/partners.

Several KTOs in Czechia are indeed investing in competency development by enabling staff to take courses through ASTP, and there are also KTOs with staff holding the European RTTP certification. This is a good sign but if those skilled KT professionals are not sufficiently supported within their own universities successful knowledge transfer is by no means guaranteed. During interviews with KTO staff in Czechia, the PSF expert team identified skilled KT professionals who could not reach their full potential largely because of systemic challenges and inadequate support.

Knowledge transfer is mostly decentralised, and the autonomy of deans is seen as a major barrier to support IP commercialisation. In general, KTOs do not have 'ambassadors' in the faculties which hampers scouting and support activities. This is especially the case for the small regional universities with KTO offices that have limited expert capacities and, hence, are more vulnerable. Faculties in these universities are autonomous in handling technology and knowledge transfer activities despite their size and lack of competences. KTO offices of these small universities might team up with larger ones and regional governments. Especially in remote regions KTO offices can play a crucial role in stimulating the economy of the region.

A regional Innovation cooperation in The Netherlands: 'Novel-T'

Novel-T is the regional innovation hub in Twente (The Netherlands) and is a legal entity involving the University of Twente, the regional University of Applied Science (Saxion), the municipality of Twente, the regional government of Twente region, and the province of Overijssel. The Saxion KTO is small but by teaming up with the university and regional partners skills and competences can be developed and more structured support provided. Teaming up helps to establish a strong innovation ecosystem with win-wins for all partners.

By joining forces in the region, Novel-T has 71 experts providing support for approximately 800 entrepreneurs over the last two years.

Novel-T can be seen as a spider in the web in the region, connecting all partners in the innovation ecosystem and by doing so integrating the entire value chain from innovation to market implementation. Novel-T provides 1 to 1 coaching, help start-ups with access to funders, develop events for start-ups, spin-offs, scale-ups and SMEs. What is important that they provide support for academics with novel ideas for setting up business, for start-ups, for SMEs in the region but also for entrepreneurial students.

For more information, please visit: https://novelt.com/en/

Box 6: International example: A regional innovation cooperation in the Netherlands – Novel-T
Source: Authors' own composition

3.3.3. Weak experience sharing

Besides the decentralised decision-making structure regarding KTOs in most universities, there is little in the way of knowledge-sharing between universities. The willingness is there but not on a structural basis. An example of a successful KTO sharing experience, despite the absence of a nation-wide KTO system, is the '4TU Impact' – where the four technical universities in The Netherlands collaborate in attracting funding, addressing challenges and developing education programmes, etc. (see **Error! Reference source not found.**). CAS implemented something similar at IOC Tech in Czechia, which allows KTOs – independent of their institutes – to share knowledge and organise events, but the focus is primarily on sharing knowledge.

In the new methodology HEI2025+, a section on knowledge transfer looks into aspects such as patents, KTO organisation/operations, and spin-offs. As such, an evaluated university needs to indicate whether and how it commercialises RDI results, e.g. selling licences, setting up start-ups or spin-offs. However, it is unclear what consequences will there be for universities if these RDI results are not achieved. According to the new methodology, 30% of the rating is based on the impact on society of which knowledge transfer is only a small part of it. Experience has also shown that international/academic panels focus mostly on scientific publications and reputation rather than on impact or demonstrated outcomes. Hence, setting the criteria is a major step forward, but it is more important that members of the evaluation panels have the expertise to evaluate 'knowledge transfer' in a tangible or wider sense.

4TU Impact – collaboration of four technical universities in The Netherlands

The four technical universities in The Netherlands are collaborating in the Federation 4TU. One of the important activities of the 4TU is collaboration on valorisation and innovation, the so-called '4TU Impact'.

The primary goal of 4TU Impact is to bring research ideas to the market more quickly. It helps to acquire extra funding and support for spin-offs to cross the so-called 'valley of death' – the difficult period for start-ups between initial capital investment and later growth stages leading to revenue generation. Investors and governments see this as a wide effort and are actively involved. 4TU Impact also organises student challenges, missions to important innovation hubs, and stimulates knowledge-sharing between the TTOs.

KTO staff of the four technical universities often meet to share lessons and experiences. Moreover, they attend international conferences as a group which presents The Netherlands as an attractive (innovation) country for foreign investors. One event they attend jointly is the Slush conference in Helsinki, where talented young scientists from the four universities present their innovative ideas/ventures to international investors. For example, a total of 28 start-ups from 4TU joined forces with representatives from the Dutch Ministry of Economic Affairs to attend Slush 2023, making them the largest international delegation at the conference that year.

For more information, please visit: https://www.4tu.nl/en/knowledge-valorisation/About%204TU.Impact/

Box 7: International example: Cooperation of four technical universities in the Netherlands – 4TU
Source: Authors' own composition

Although there is a lack of experience in 'sharing' among universities, there is a strong bottom-up initiative among KTOs in the form of Transfera.cz. Founded in 2014, this independent, non-profit professional organisation currently has 33 members and works to promote knowledge transfer in Czechia, and to defend the interests of the KT community. It has five key activities: 1. consultancy in the field of technology and knowledge transfer, IP, proof-of-concept activities, promotion of R&D results to industry, etc., 2. consultancy in the planning and implementation of applied research projects with an emphasis on applying project results in practice, possible protection of R&D results and cooperation with industry, 3. recruitment of possible project evaluators in the field of technology transfer, 5. consultancy and advisory services in European and international cooperation (through the international network of KTOs), and 6. helping KTOs share their experience (in different forms and through an annual conference). In addition, it maintains a database of research and development projects and results.

3.3.4. Entrepreneurship and knowledge transfer in academia

The lack of attention to knowledge transfer in the assessments is also reflected in the motivation of researchers. Career tracks are based on performance in teaching and research. Hence, project funding is often more attractive to support their own research and career. This poses a challenge for encouraging commercialisation even though the financial rewards are high. In most European universities the PI receives a maximum of one-third of the income from a patent. In Czechia, a much higher percentage is given but that seems not to be an incentive. During the PSF country visit KTOs indicated that researchers generally show little interest in collaborating despite the opportunities, demonstrating a lack of **entrepreneurial culture at all levels.** Studies from both the TA CR and OECD[46] point to the lack of entrepreneurial culture in Czechia as a key factor hindering the diffusion of innovation, development of innovative entrepreneurship, and the growth of higher value-added firms. The Czech population is perceived to be risk-averse, not so willing to create new tech-oriented companies, and lack sufficient RDI skills.

There is a clear gap between demand and supply, including in education. A collaborative mindset and innovation culture goes hand in hand. Stolworthy et al. (2021) indicated that there is a strong connection between science-industry collaboration and key KT metrics. In other words, an open innovation mindset is needed.

Developing an entrepreneurial culture should start in the early phases of an education/ career. During interviews with university representatives the topic was raised of how entrepreneurship or commercialisation was addressed in the regular education programmes. Universities (in Europe and beyond) that have been successful in stimulating knowledge transfer and successful spin-offs are actively fostering the next generation to become entrepreneurial. This requires a change of mindset and should start in the first year of academic studies. Moreover, in secondary education some schools are already working on an entrepreneurial culture – the younger students become involved the better. Even emerging economies such as Indonesia (see e.g. Wardana, L.W. 2020[47]), India, China and in the Global South have programmes on how to stimulate the entrepreneurial spirit within the next generation. Education is an essential element in this development (see also J. Cui and R. Bell, 2022).[48]

Many universities in Europe are implementing specific 'impact' elements in their assessment of researchers. The EU is promoting the use of impact criteria for career paths. Moreover, not all academics should be assessed on the same criteria. There is increasing attention given to diversity and team evaluations.

A term which is being increasingly used is "**researchpreneur**" – a researcher who applies an entrepreneurial mindset to commercialise their research and create societal or economic value. Researchpreneurs not only generate academic knowledge but also actively pursue innovation through technology transfer, patenting, launching spin-offs, developing market-ready technologies, or closely collaborating with industry to foster innovation. By bridging the gap between academia and the market, researchpreneurs play a crucial role in addressing real-world challenges while advancing their own careers. Many famous examples of researchpreneurs demonstrate how academic research can serve as a foundation for industrial applications. One well-known example is Jennifer Doudna, a pioneer in CRISPR

[46] Pazour, M. (2024) Support to Czechia on the reform of the Technology Transfer Offices Sector: Background Report.

[47] L.W Wardana, B.S. Narmaditya, A. Wibowo, N.A. WIbowo, G. Harwida and A.N. Rohman; The impact of entrepreneurship education and students' entrepreneurial mindset: the mediating role of attitude and self-efficacy in Heliyon, 2020, vol 6 (9). e04922.

[48] Cui, J. and R. Bell (2022) Behavioural entrepreneurial mindset: How entrepreneurial education activity impacts entrepreneurial intention and behaviour, The international Journal of Management Education, 20(2), 100639.

gene editing and Nobel Prize Winner in Chemistry (2020), whose groundbreaking fundamental research has had a tremendous impact on the healthcare and biotech sectors. Doudna is also a co-founder of several ventures, including Editas Medicine, Caribou Biosciences, and Intellia Therapeutics, highlighting how research can evolve into entrepreneurial ventures. This concept is gaining traction in various PhD-training programmes and bootcamps designed to equip researchers with entrepreneurial skills so that a researcher combines research and entrepreneurism, pursuing both scientific and commercial goals.[49]

There is no one-model-fits-all (see Box 8) solution to promote. The model should depend on the regional characteristics, the specifics of the university (comprehensive or technical or applied) and the role the university wants to play in society. However, whatever the model, the basic condition is the entrepreneurial spirit.

National knowledge centres in France, UK, and The Netherlands

Techleap, a Dutch non-profit organisation advised the Dutch Government to stimulate regional specialisations and effective national coordination and collaboration to boost the country's tech ecosystem. Coordination does not imply 'hierarchical steering' but KTOs should be stimulated to develop their specific brand and collaborate with other KTOs. Besides knowledge-sharing, central coordination is important to attract non-domestic investors. Techleap, for example, runs programmes, hosts events and connects investors with start-ups but collaborates also with the Dutch authorities to develop effective innovation policy measures connecting home-grown ventures with foreign investors. This shows the importance of not simply relying on domestic funds and that excellence should be stimulated to improve learning and growth. All valuable lessons for Czechia as it pursues more a joined-up knowledge-sharing to knowledge-transferring model.

Similar lessons can be learned from what is happening in France, which has a dedicated approach to entrepreneurship. *La French* is a government institution, led by entrepreneurs and technology experts, that combines sponsorship and engagement with a team of experts.

Meanwhile, in the UK a Scaleup Forum helps to bridge the gap between tech founders investors, and the Government. A typical Forum consists of experts that coach start-ups throughout their growth stages. The Government took this initiative to support promising start-ups and give them a clear path to scaling up through various stages of investment, and helping innovative spin-offs navigate UK regulations and the investment scene.

For more information, please visit: https://techleap.nl/

https://lafrenchtech.gouv.fr/en/our-programs/

https://www.scalingup.co.uk/ceo-scalingup-forum

Box 8: International example: National knowledge centres in France, UK, and The Netherlands
Source: Authors' own composition

[49] https://researchpreneurs.com

3.4. The role of regions in knowledge transfer

3.4.1. Stakeholders in the regional R&I systems

Knowledge transfer is a key element for regional development. In this regard, a regional innovation system encompasses a complex network where its internal (regional) dynamics focus on processes of innovation and knowledge transfer. Czechia has certain strengths and opportunities to evolve towards a more innovation-driven knowledge economy.

Czechia has 14 self-governing regions at NUTS III level, with R&I activities unevenly distributed across them. The capital city region of Prague has the highest concentration of R&I activities, followed by the surrounding Central Bohemia region, Brno (the second largest city in the country) and its surrounding South Moravia Region.

The key regional players when it comes to the R&I topic are regional innovation centres, or RICs, and equivalent institutions of regional authorities (see Table 3). These have been set up by the regional authority or as an association of the region, the city and the universities located in the region. They are fully or partially funded by the regional budget. The PSF panel did not receive information on either the budget allocated to each RIC or the size of the teams.

Region	Regional innovation centre/agency	Year of establishment	Founders
Liberec Region	Regional Development Agency of Liberec Region	1993	Liberec Region
Moravian-Silesian Region	Moravian-Silesian Innovation Centre	1997	Moravian-Silesian Region City of Ostrava Technical University of Ostrava University of Ostrava Silesian University of Opava
Pardubice Region	Regional Development Agency of the Pardubice Region	1999	Pardubice Region 11 cities
Plzeň Region	Regional Development Agency of Pilsen Region	2000	Association of Towns and Municipalities of the Pilsen Region Business Innovation Centre Plzeň Department of Conception and Development of the City of Pilsen

Region	Regional innovation centre/agency	Year of establishment	Founders
			University of West Bohemia Regional Chamber of Commerce
South Moravian Region	South Moravian Innovation Centre	2003	South Moravian Region City of Brno Masaryk University Mendel University Brno University of Technology University of Veterinary and Pharmaceutical Sciences Brno
Hradec Králové Region	Centre for Investment, Development and Innovation	2004	Hradec Králové Region
Zlín Region	Technology Innovation Centre Zlín	2005	Zlín Region Tomas Bata University in Zlin
South Bohemian Region	South Bohemian Science and Technology Park	2008	South Bohemian Region
Karlovy Vary Region	Business Development Agency of Karlovy Vary Region	2010	Karlovy Vary Region
Olomouc Region	Innovation Centre of the Olomouc Region	2011	Olomouc Region Palacky University Olomouc
Central Bohemian Region	Central Bohemian Innovation Centre	2015	Central Bohemian Region Czech Technical University Institute of Physics of the CAS Astronomical Institute of the CAS

Region	Regional innovation centre/agency	Year of establishment	Founders
			Research Institute of Geodesy, Topography and Cartography
Ústí Region	Innovation Centre of the Ústí Region	2015	Ústí Region Jan Evangelista Purkyně University Regional Chamber of Commerce
Prague	Prague Innovation Institute	2020	Capital city of Prague
Vysočina Region	Department of Regional Development of the Regional Office of the Vysočina Region	n/a	n/a

Table 3:Regional innovation centre or equivalent units in Czechia (listed by year of establishment)
Source: Based on information found on RIC websites

The region mentioned most frequently as an example of strong support to innovation activities is the South Moravia Region, which established the South Moravian Innovation Centre in 2003. It is tasked to implement region's innovation strategy. The 2018 evaluation of the regional innovation strategy of South Moravia showed that this strategy contributed to increasing the knowledge intensity of the regional economy, developing the entrepreneurial and innovative spirit, developing cooperation between the research and business sectors, retaining talent and attracting foreign university students and highly qualified workers, and strengthening the innovative image of the region.[50] **Lessons particularly around building research-business cooperation could be of interest and relevance to other regions**. One such experience already exists: Ynovate innovation development network[51] brings together innovation centres and agencies established by regions, cities or universities in Czechia and Slovakia to share experience, know-how, information, experts/expertise. The network currently includes 10 innovation centres in Czechia and two in Slovakia.

3.4.2. R&I policy implementation in the regions

Coordination between national and regional R&I strategies and activities has not been very strong. Regions have no legally binding powers in the field of R&I. However, the current legislation does not prevent them from being active in this area and to use their own resources

[50] Pazour, M. (2024) Support to Czechia on the reform of the Technology Transfer Offices Sector: Background Report
[51] https://www.ynovate.cz/en/#values

to support R&I activities. An example of such activities are regional innovation voucher schemes to connect research organisations and enterprises in several regions. As regional budgets have limited own resources to support R&I, the regions have often made use of ESIF-funded R&I projects.

The situation has recently started to improve due to the implementation of the national S3. The Czech strategic thematic areas of technological specialisation include: digital technologies and electronics, advanced machinery and technology; transport for the 21st century; healthcare and advanced medicine; culture and creative industries; sustainable agriculture and environment. These sectors form the backbone of the Czech economy and have high potential for the creation and absorption of new knowledge and R&D results, as well as for the use of key enabling technologies. The strategy has so-called regional appendices or annexes for all regions, to help the regions shape their regional innovation system and set up specific initiatives responding to local needs and conditions.

Regional governments approve their respective regional annexes to the national S3 making them (more) active participants in the R&I policy. Each regional S3 annex is complemented by a specific action plan. Funding for implementation of these strategies comes from regional governments, and national and EU funds, such as ESIF and the Recovery and Resilience Facility (which, for example, are used to support innovative enterprises in accordance with S3).

The OP JAC programme supports the development of regional capacities for the design and implementation of R&I policy in the regions. This is being done through specific Smart Accelerator calls which shared EUR 38.1 million between 14 regions for running the project in 2023-2026. The projects are implemented by regional innovation centres or agencies. The activities in the projects include developing capacity and competences for smart specialisation, training and education for key actors in the system, monitoring, analysis and evaluation of changes, consultancy services to develop strategic projects, and twinning with foreign institutions.

RICs are partners of MIT in the coordination/implementation of the national S3 strategy with regional S3 strategies. They are also – to a lesser extent and not in all cases – involved in implementing R&I policies. In addition to the S3 activities and preparation and implementation of projects to support innovation (as presented above), other typical services provided by innovation centres and agencies for the development of regional innovation systems include: assessing the innovation potential and performance of the region; identifying opportunities to increase the innovation capacity of the region; advising innovation companies in the start-up and scale-up phases; operating innovation infrastructure (business incubators and/or science and technology parks); facilitating cooperation in the regional innovation ecosystem (among businesses and between businesses and the public research); brokering and seeking financial resources for innovative business projects (e.g. micro-credit funds or patent and licensing funds); and marketing and promotion of innovation activities in the region.[52]

As such RICs are designed to partly work as innovation brokers by mobilising the demand side (i.e. businesses) of innovation while establishing strong links with the supply side of innovation (i.e. research base). Ideally, they should get the support of KTOs within the regional research base. However, what was voiced on multiple occasions during the PSF mission to Czechia is that the activities and roles of KTOs and RICs overlap or even clash when it comes to working with the research base. On some occasions RICs go directly to the researchers, by-passing the KTO.

KTOs and RICs can reinforce each other but university KTOs have an impact that is larger than the region. University spin-offs have, or should have, a market that is larger than the

[52] Pazour, M. (2024) Support to Czechia on the reform of the Technology Transfer Offices Sector: Background Report.

region. This is especially challenging for regional universities since the success of a region in terms of stimulating spin-offs and innovation in general does not only depend on the quality of the university but also on access to the financial markets as well as strong industry leadership in a region. For both KTOs and RICs it is important to link up with other regions and markets. As an analysis of Techleap[53] shows, regional specialisations with national collaboration improves the success of KTOs. Connections enable learning, data-gathering and co-investments.

The example from Belgium (below) shows how universities (and their KTOs) can collaborate with important local stakeholders to drive the innovation ecosystem, regionally.

Regional innovation cooperation through one regional university (Belgium)

The University of Antwerp (UAntwerpen) shows how a mid-sized university can contribute to the regional innovation ecosystems. By focusing on three priority valorisation domains – sustainable chemistry and materials, metropolitan challenges and smart cities, and infectious diseases and environmental health – the university aligns its research strengths with the specific needs of the Antwerp region, characterised by its globally recognised chemical cluster (the second largest worldwide), Europe's second-largest port, and a dynamic metropolitan context.

These three priority valorisation domains were not chosen arbitrarily but emerged from a collaborative vision-development process involving the university and key stakeholders, including the City of Antwerp, the Port of Antwerp, and the petrochemical cluster. This joint effort resulted in a shared roadmap, enabling the university to play a central role in the region's innovation ecosystem while addressing societal and economic challenges.

To operationalise this shared vision, UAntwerpen established three key innovation hubs, where researchers, start-ups, spin-offs and scale-ups are located under one roof:

1. BlueApp – Sustainable Chemistry and Materials: BlueApp is UAntwerpen's innovation hub for sustainable chemistry, directly connected to Antwerp's globally renowned chemical cluster. It bridges academic research and industrial innovation, enabling start-ups and established companies to develop, scale, and demonstrate sustainable solutions.
2. The Beacon – Smart City, Mobility and Logistics: Located in Antwerp's innovation district, The Beacon focuses on digital and internet of things (IoT) solutions for smart cities, logistics, and Industry 4.0. It connects companies, start-ups, and researchers to collaborate on urban and logistical challenges. This aligns with cross-border innovation goals, enhancing competitiveness in interconnected urban regions.
3. Vaccinopolis – Health and Disease Prevention: Vaccinopolis is a state-of-the-art facility dedicated to vaccine and infectious disease research. It also explores healthcare technology innovations through interdisciplinary collaboration, addressing public health challenges and contributing to global resilience.
4. These hubs foster sustainable development in Antwerp and create unique opportunities for students, start-ups and spin-offs to collaborate and grow within a supportive ecosystem. UAntwerpen's Knowledge Transfer Office plays a vital role in connecting research outcomes to these hubs, ensuring that innovations are effectively scaled for societal and economic impact.

[53] https://techleap.nl/report/state-of-dutch-tech-report-2024/

This strategic and stakeholder-driven approach offers a compelling model for regional universities in Czechia. By identifying their research strengths and co-creating roadmaps with local stakeholders, they too could leverage their unique ecosystems to foster innovation, sustainable growth, and societal progress.

For more information, please visit:

https://www.blueapp.eu/en

https://www.thebeacon.eu/

https://www.vaccinopolis.be

https://www.uantwerpen.be/en/research/info-for-companies/impact/mission/

Box 9: International example: Regional innovation cooperation through one regional university in Belgium
Source: Authors' own composition

3.4.3. Possible centralisation of technology transfer activities

One of the ongoing discussions in Czechia has been around a possible establishment of a central technology transfer authority or a central KTO. Experiences with the French central TTO model (SATTs, see **Error! Reference source not found.**) show that centralisation does not always lead to improved performance or efficiency, and regional contexts vary significantly, making a centralised approach more challenging. In addition, in countries like Spain and The Netherlands (4TU), clustering and collaborative networks have been successful, allowing TTOs to function autonomously while also benefiting from economies of scale. Another model is Interface Scotland which works to help domestic SMEs to identify their needs and then matches them with the most appropriate university team (across all Scottish universities).

The French central TTO model – SATTs

SATT stands for *Société d'Accélération du Transfert de Technologies* (Technology Transfer Acceleration Companies) and brings together 13 tech-transfer acceleration companies in France.

These organisations support the commercialisation of research from public institutions, creating a centralised point of contact for TT across different regions. SATTs was designed to simplify the national technology transfer landscape by replacing various fragmented structures with a single, localised entity at the service of the research units and their relations with the private sector.

Established under the 'Investments for the Future' programme, SATTs were intended to consolidate TT and streamline interactions between public research entities and the private sector, but evaluations (i.e. by the National Research Agency and Technopolis Group) have highlighted mixed results. The system has indeed achieved notable economic impacts, particularly in the creation of start-ups and supporting technology transfers to SMEs (e.g. between 2012 and 2019, over 400 start-ups were launched with SATT support, producing substantial economic value). SMEs engaging with SATTs also

reported significant added value, indicating some successes in technology commercialisation.

However, challenges have also emerged. The centralised model does not fully align with regional needs and complexities, and the integration of SATTs within local ecosystems has varied. Certain SATTs struggle with limited buy-in from universities and regional stakeholders, which hampers their ability to fully capitalise on local research strengths. Evaluations indicate that the centralised structure may lack the flexibility required for specific regional dynamics, which has led to discussions on revising aspects of the model to better address local needs.

Overall, while SATTs have demonstrated success in specific areas, particularly in economic impact and start-up support, they also highlight limitations that may arise from a one-size-fits-all approach in complex, diverse innovation landscapes.

Czechia could learn also from the SATT experience by employing a 'hybrid model' that provides both central guidelines and local autonomy, ensuring that regional differences do not undermine the efficiency and cohesion of the system as a whole.

For more information, please visit: https://www.satt.fr/en/the-satt-network/

Box 10: International example: The French central TTO model – SATTs
Source: Authors' own composition

3.5. The role and place of knowledge transfer in relation to industry

3.5.1. Science-business collaboration

Czechia has long been striving to strengthen the links between the public and private sectors, as evidenced by the inclusion of this issue in numerous strategic documents. This is also reflected in the recommendations included in the National Reform Programmes and in the operational programmes. The establishment of TA CR in 2009 has contributed to the development of collaborative research, which is strongly emphasised in the different programmes (including the National Competence Centres programme) of the agency.

The statistics indicate that over the years Czechia has made **notable progress in promoting innovation and collaboration**. In the EIS 2024 the Czech public-private co-publications is very positive at 133.9% of the EU average. Moreover, collaboration between innovative SMEs has developed positively (+9.4 percentage points since 2017) and is currently at 108.9% of the EU average. However, a closer look of the more recent development shows that collaboration increased until 2018 (exceeding 130% of EU average) but has since then **declined**. Particularly the share of SMEs engaged in innovation (-54.3 %-points) and the linkages and collaboration (-12.3%-points) show a decline over the latest period (2023-2024), yet a much more positive development prior to that. Before drawing further conclusions, it is important to analyse more deeply the reasons turning the previously positively developed public-private collaboration trend downwards in the last few years (i.e. whether they are for example COVID-19 related).

Competency gaps also exist on the side of companies or external stakeholders. The background report indicates the limited absorption capacity of many SMEs and the lack of

interest in collaboration from multinationals. For effective knowledge transfer, there must be an "entity" with whom the transfer (back and forth) can be made or with whom collaboration can occur. Companies sometimes lack the know-how to identify needs and spot opportunities for innovation. KTOs or regional players can also potentially address these gaps. Ultimately, it comes down to the need for all actors within the entire ecosystem to develop their knowledge, skills, and broad-based entrepreneurial expertise, while effectively aligning genuine needs with the necessary expertise.

Various countries maintain efforts in linking SMEs and other companies with the research organisations and increasing skills and interest of companies for knowledge transfer. The experience of Enterprise Estonia provides an interesting case (see **Error! Reference source not found.**).

Previous studies (e.g. INKA innovation capacity mapping by TA CR in 2023 and OECD 2020) and interviews during the PSF exercise point to the general **lack of entrepreneurial culture** in Czechia, which may be a factor hindering knowledge transfer and the establishment and growth of innovative start-ups. There is also a general perception of a lack of sufficient skills-base for entrepreneurship among the researchers, calling for general enhancement of public-private partnership and entrepreneurial culture. The findings seem to suggest that efforts should be continued for the general promotion of entrepreneurship and for the public-private collaboration in R&D.

Estonia's investments into the technology and knowledge transfer

Background and context: Estonia has invested in developing technology and knowledge transfer (KTT) competencies in universities since 2001. The focus of all these programmes has been the commercialisation of IP, but no significant licensing success stories have been reported, except for licensing the probiotic bacterium strain me-3 by the University of Tartu.

The Ministries of Economic Affairs (MKM) and Education and Research (HTM) created a joint strategy (Estonian Research, Development, Innovation and Entrepreneurship Strategy 2035[54] or TAIE[55] in Estonian), in which knowledge valorisation and KTT are reframed as tools to reach national growth and productivity KPIs.

Accordingly, the national innovation agency, Enterprise Estonia, is tasked with building the necessary underpinnings and demand for KTT and open innovation in SMEs, especially targeting the valorisation of knowledge via the creation of deep tech start-ups.

Key features: To generate demand in SMEs for KTT and open innovation, Enterprise Estonia works with business ecosystem partners to:

Raise the level of innovation ambition and innovation management capabilities and build network capital. See for example: 'Ambition is a choice' initiative by the Estonian Employers' Confederation; and Development advisors at industry associations.

Build a base layer of strategic IP management, KTT and commercialisation capacity among SMEs and start-ups, via training and strategic IP consultation services.

Reduce information asymmetries and frictions in negotiations, demystify and derisk RDI collaborations for SMEs via standardised tools, consultation services, training and funding.

[54] https://www.taie.ee/sites/default/files/documents/2022-11/taie_arengukava_kinnitatud_15.07.2021_211109a_en_final.pdf
[55] https://www.taie.ee/taie-arengukava-tutvustus

Provide free tools and resources for companies to prepare and manage such activities. See, for example: innotrepp.ee – innovation management capability self-assessment tool; and IP services and tools on Enterprise Estonia website eis.ee/io.

Raise entrepreneurship skills and KTT capabilities in would-be deep tech founders and researchers by horizontally deploying a specialised business model teaching methodology.

Lessons learned:

Varied IP needs across industries served by TTOs means differing skill sets are required of different TTOs. Patents may not be suitable as a universal KPI for measuring innovation, as industries differ in their IP needs, as well as licensing and assignment conventions. For example, MedTech often relies on patents, while AI uses trade secrets, and agricultural sectors might prioritize plant variety protections. TTO functions should align with the dominant IP needs of their ecosystem for more effective KTT.

The TTO's value proposition in any negotiation needs to be explicit and specific to the company. KTT activities are unfamiliar to SMEs and hence viewed as risky. To facilitate more alignment with end user/customer needs, primary market research and customer discovery should be encouraged in all levels of knowledge creation and transfer. Hiring TTO personnel with industry and entrepreneurship experience should be encouraged.

Challenges with expectations and realities of TTOs; a lack sufficient staffing, and skills can create bureaucratic hurdles that deter collaboration for both researchers and SMEs. Shifting the TTOs' role from IP gatekeepers to facilitators of collaboration is recommended, allowing their capabilities to grow alongside the companies they serve.

For more information, please visit:

eis.ee/io

strategic IP consultation services

KTT expert consultation service at Enterprise Estonia

Development advisors

innotrepp.ee

https://ambitsioononvalik.ee/

Enterprise Estonia and the Estonian Employers' Confederation: https://employers.ee/

Box 11: International example: Estonia's investments into the technology and knowledge transfer
Source: Authors' own composition

In Czechia, one of the concerns is that the absolute **number of patent applications filed with the Czech Industrial Property Office has been declining** in recent years. In the 2024 EIS, Czech PCT patent applications represented **less than half of the European average** (49.3%) with a seven percentage-point drop from 2017. In 2023, there were an average of 22.2 EPO patent applications per million inhabitants in Czechia, while the EU-27 average was 152.8 applications.[56] The largest number of patent applications have traditionally been filed by the technical universities, but these have also been declining. A similar trend is also visible in the number of new licences. Overall, business-sector patent activity in Czechia is rather low and is mostly concentrated in large foreign-owned companies, which typically file patent applications at EPO or PCT, rather than domestically. Roughly one-fifth of the active

[56] Eurostat CIS 2022

patent portfolio of Czech inventors is registered outside the country, but this share has been growing in recent years. The low patent activity of domestic companies combined with a relatively high number of utility model applications suggests that R&D activities of Czech domestic companies result mostly in incremental innovations. Although public-private collaboration has been a long-term objective and included in many measures, it appears the impact of earlier policy measures has not been quite sufficient to address the declining trends of patenting.

3.5.2. Sectoral specificities

In Czechia large, foreign-controlled enterprises dominate most sectors with significant R&D activities, such as the automotive industry, electronics, pharmaceuticals, electrical engineering, computer activities, and some other knowledge-intensive service industries, such as architectural and engineering activities, financial intermediation and telecommunications.

For several years, business funding for university research has been around EUR 40 million per year, which represents about 4% of R&D expenditure in the higher education sector. This overall share is somewhat below the average European level (7% in 2021), but not exceptionally low (Czech statistical office, OECD MSTI). **The vast majority (93%) of the business funding comes from domestic enterprises**.

When it comes to domestic companies the share of domestic SMEs in research activities has been decreasing over time. On the positive side, however, in those sectors dominated by large foreign companies, there are also significant concentrations of R&D activities in smaller enterprises.

In research conducted by the HEIs, the field with the highest share of business funding for R&D was perhaps not surprisingly engineering and technology (11% of HERD), while in the government sector, both natural sciences and agricultural sciences received 13% of their GOVERD funding from the business sector. For all other sectors these shares ranged between 1-5%. The business funding **flows for R&D collaboration with research reflect strong sectoral variations in Czechia.** There also appears to be completely different business collaboration profiles for universities and research institutes.

The National S3 Strategy defines specific technological **sectors of relevance** for Czechia. These include digital technology and electronics, advanced machinery and technology, transport, healthcare and advanced medicine, culture and creative industries, as well as sustainable agriculture and environment. These sectors form the backbone of the Czech economy, have a high potential for R&D and submit the most patent applications, making them **priority sectors for knowledge transfer**, too. According to the EU's Community Innovation Survey (CIS 2022), the sector with the highest proportion of innovating enterprises collaborating with public and private research institutes is pharmaceuticals. In Czechia, the sectoral variations in R&D and collaboration are large and it would appear useful that KT strategies or measures are designed specifically for some of the priority sectors.

3.5.3. Academic spin-offs and start-ups

There is a **very dynamic start-up ecosystem in Czechia**. Recent estimates (Smart Market Report 2024) show a healthy increase in the number of start-ups (in total 3,700) and a significant impact also on employment (150,000 people or 4% of overall employment). The EIS 2024 also shows a particularly positive development of VC investments (+87 percentage points from 2017), where Czechia is standing currently at 94% of the EU average level. As in most other countries, the establishment of start-ups is largely concentrated in the capital area and in a few larger cities (e.g. two-thirds operate in Prague).

However, the **data** on new research-based spin-off companies is **not systematically collected**, and available estimates are not quite as high as those of start-ups in general. Earlier mappings have reported, for example, 68 university spin-offs founded between 2018-2021 (i.e. on average 17 annually). Most spin-offs originated from the ICT sector. One of the challenges related to statistics and monitoring is the **unclear/varying definition of academic spin-off company**. Although the HEI2025+ includes some indicators linked to spin-offs (i.e. as stated in the methodology, "*It will also indicate whether and how it commercialises R&D&I results (e.g. selling licences, setting up start-up or spin-off companies, etc.), providing a brief description of the commercialisation methods used*"), there is no clear definition of spin-offs in the methodology and there is still an evident **lack of clear incentives for spin-offs** in academic institutions.

3.5.4. Available support structures and services

At the national level, CzechInvest has been playing an important role in supporting start-ups. The main support instrument has been **Technology Incubation Programme** (TIP) with direct financial support and other forms of support (networking, advice, etc.). The programme has supported nearly 140 start-ups so far. Related programmes include the DIANA accelerator and the European Space Agency's Business Incubation Centre (ESA BIC).

At regional level, over the past 10-15 years (and through the support of several successive OPs) significant investments have been directed towards developing various innovation support structures, including KTOs, incubators, accelerators, and science and technology parks. A recent mapping (CzechInvest 2022) identified more than 150 different support structures, with the highest densities in Prague and the South Moravian Region. In such a vast network of different innovation support structures, there is a natural risk of fragmentation and inefficiency. Earlier studies have already identified challenges in the current service provision, including lack of financial self-sufficiency, mutual coordination and sufficient entrepreneurial competence.

Professional support for the development of research-based spin-offs and new ventures is important and should be available. Typical functions include pre-incubators, incubators, and accelerators that support tech start-ups by providing resources, mentorship, and access to investors. One of the points that stood out in the interviews was the role of business training. Such competence development services, often as specific training programmes, can be offered by units within universities, research institutions, or externally by science and technology parks, for example.

Science and technology parks can play an important and active role as a hub for local business-academia interaction. When located within a university or research campus, they offer a physical location for various forms of fruitful collaboration. In this function, they can gather, facilitate and network other players that collectively make up the ecosystem, such as public administrations, companies, universities, and incubators. Together, these entities can establish a long-term foundation for university and business collaboration and knowledge transfer, and provide various mechanisms for relationship-building and cooperation. In Czechia, the role of science and technology parks for KT varies. Some parks are active and facilitate KTOs, others less so. Furthermore, as a network, the Czech science and technology parks are not very active.

4. Conclusions

This chapter summarises the conclusions of the PSF expert panel based on the analysis (presented in Chapter 2) structured according to the topics and questions requested by the Czech authorities. The recommendations follow in Chapter 4.

4.1. Summary of the assessment of the Czech R&I system

Based on the information analysed and presented in earlier chapters, the Background Report (Pazour, 2024) and consultations with the stakeholders in the Czech R&I system, the PSF panel summarises its assessment of the Czech R&I system in terms of strengths, weaknesses, opportunities, and threats (SWOT, see Table 4). A draft of this SWOT was sent to the Czech stakeholders prior to the second country visit and discussed in person. There was a unanimous confirmation from the stakeholders that the SWOT accurately presents the situation in the Czech R&I system. In interpreting the table it is important to note that bullet points are not presented in an order of priority.

Strengths	Weaknesses
• Highest employment rate in the EU; low unemployment and public debt • Substantial public investment and modernised research infrastructure • Improved research output, in certain fields achieving world-class standards • Significant government and institutional focus on knowledge transfer, supported by EU Structural Funds • Successful technological incubation programmes, creating 250+ start-ups since 2022	• Fragmented governance: insufficient coordination among ministries (trade, education, etc.), inefficiencies from parallel operational programmes • Unclear position of the RDI Council advisory body with vague role and no executive power • Unstable KTO funding: reliance on short-term projects without consistent institutional or financial support • Lack of KTO harmonisation: inconsistent strategies and large quality disparities across universities • Undervalued knowledge transfer and 'third mission': not integrated into legal frameworks, institutional strategies, or researcher career paths • Limited entrepreneurial culture, low motivation for commercialisation, skills gaps, and lack of incentives for knowledge transfer activities • Low innovation output: few patents, licenses, and spin-offs

Opportunities	Threats
• Strategic frameworks: Smart Specialisation Strategy, Smart Acceleration projects, new Act in pipeworks, revision Metodika17+ • Potential for strengthening universities/ KTOs in their role to enhance commercialisation and transfer of knowledge coming from publicly-funded research • Legal and financial incentives: clear definitions and laws supporting the 'third mission' • More uniform funding of KTOs linked to incentives for KT and its evaluation • Regional innovation ecosystems through quadruple helix collaborations between academia, industry, government, and other stakeholders • Role of regional innovation centres in the ecosystem • Public-private collaboration • Capacity-building: collaboration and competence-building • Growing number of start-ups/spin-offs • VC Fund in cooperation with European Investment Fund • EU Guiding Principles for Knowledge Valorisations, and the four Codes of Practice implementing them, will stimulate actions across all EU MS	• Limited capacity of Czech companies to absorb cutting-edge research and limited integration of multinationals into the Czech R&I ecosystem • Patent offshoring by foreign multinationals • Declining number of patent applications • No uniform intellectual assets management strategy, low awareness, and no incentives • No uniform definition of spin-offs and no consistent monitoring • Perception of legal challenges and potential penalties hamper proactive knowledge transfer efforts • Possible future reduction in the EU Structural Funds • VC market in Czechia rather underdeveloped

Table 4: SWOT of the RDI system in Czechia
Source: Authors' elaboration based on literature review and interviews with key stakeholders

Czechia's strengths, weaknesses, opportunities and threats are grouped, where possible, by applying the EU Guiding Principles for Knowledge Valorisation as a framework: knowledge valorisation in R&I policy; skills and capacities; system of incentives; intellectual asset management; relevancy in public funding schemes; peer learning; and metrics, monitoring and evaluation. The SWOT elements described below follow similar groupings: economy, R&I governance and policy, investments into R&I, research, knowledge transfer and KT in R&I policy and practice, skills and capacities, systems of incentives, intellectual asset management public and private funding; and metrics, monitoring and evaluation.

Among the **strengths**, the following is worth highlighting:

- **Economy:** Czechia has the highest employment rate and one of the lowest public debts in the EU, and a solid presence of established foreign affiliates engaged in R&D. Some stakeholders met during the PSF second mission questioned if the highest employment rate plays in favour of Czechia. Their arguments were that if there is unemployment, it makes people think more proactively and in more creative ways, often leading to the establishment of small enterprises. Although the PSF expert team acknowledges this argument, from an economic performance and stability perspective, a high employment rate is a strength.
- **R&I governance and policy:** There is notably strong interest from the government, institutions and agencies to improve knowledge transfer in the country. From a regional perspective, the current legal framework allows regions to play an active role in the R&I topic in their respective regional and/or local ecosystems.
- **Investments into R&I:** Substantial public investment since 2007 (mostly from ESIF) helped modernise R&I infrastructure and build needed capacity. GAMA and SIGMA programmes to support commercialisation of R&D led to noticeable results; and the Technological Incubation Programme has helped in the creation of over 250 start-ups since 2022. The role and activities of CzechInvest and TA CR have been praised by various stakeholders in creating and delivering impactful support measures.
- **Research:** Investments as well as various actions taken since 2009 are clearly visible in the quantity and quality of research outcomes, which in certain scientific fields are even of world-class standard. Universities have a strong position in research and the business sector is spending significant resources on R&D.
- **Knowledge transfer:** Czechia has good (although at the moment still limited) examples of successful research commercialisation. Regionally, several RICs play a strong and active role in connecting universities, KTOs, start-ups, and industries, thus facilitating knowledge transfer.

Despite the development over the years and the current strengths, several **weaknesses** in the system remain. If not addressed, these – or at least some of them – could become serious stumbling blocks in promoting the knowledge transfer topic further:

- **Economy:** There are many companies with limited innovation capacity, low investment in technology, R&D or product development, and if fewer and fewer companies prioritise innovation the cumulative effect could be difficult to surmount. Most of the industrial companies in Czechia are thematically focused on manufacturing and less on design and engineering, thus resulting in lower added value (and fewer opportunities for innovation absorption). Finally, over-reliance on foreign affiliates for R&D activities creates greater uncertainty over the longer term.
- **R&I governance and policy:** Czechia has a complex R&I system with many organisations, institutions, and agencies making coordination/alignment of activities more challenging. The role and impact of the RDI Council is unclear as it has no executive power due to its advisory nature. Insufficient coordination between MIT, MEYS, and other relevant ministries leads to insufficiencies in the governance framework/approach for effective knowledge transfer. There is a visible lack of multi-level governance between national and regional levels. The total number of research funding agencies (14, although a reduced number since the reform in 2008) is still too large given the size of the country. This structural complexity results in fragmentation of efforts and activities.
- **KT in R&I policy and practice:** There is no uniform definition in the legislation for a spin-off or the purpose of a KTO. This results in a clear lack of harmonisation across KTOs. There are significant differences in how KTOs operate across universities and research institutions, and the lack of a uniform national strategy and vision at the institutional level

leads to an undervalued role for KTOs and inefficiencies and inconsistent support for knowledge transfer, which results in huge quality differences across the system.

- **Skills and capacities:** The above weaknesses have a negative effect on skills and capacities in knowledge transfer. KTOs are – in most cases – understaffed; there are skills gaps in different domains and organisations (also within KTOs). Universities and public research institutions have an underdeveloped entrepreneurial culture, favouring education and research rather than KT/commercialisation.
- **System of incentives**: A system of incentives could help to alleviate many of the persistent weaknesses observed, but there is presently none in place. Financial incentives prompting universities to take up the 'third mission' are not included in a coherent legal framework; KT activities are not rewarded in the career path of researchers (i.e. there is no criterion in promotion policies); and there is a lack of incentives for individual researchers to valorise their research.
- **Intellectual asset management**: On the knowledge production side, Czechia has a very low number of European/international patents, licence income, and spin-off creation from universities and public research institutions. This is also partly due to the fact that there are no or few real intellectual asset management strategies within universities and research institutions.
- **Public and private funding**: On a national level, there is an over-reliance on ESIF support for R&I related investments in the regions, creating a rather unstable long-term situation. On an institutional level, due to a lack of stable and uniform funding most KTOs depend on short-term, project-based funding without consistent institutional support. Finally, on the innovation absorption side, there is a lack of venture capital (notably international investors).
- **Metrics, monitoring and evaluation:** The absence of overall performance-monitoring (i.e. KPIs) for KTOs exacerbates the strategic challenges they face.
- Looking to the future the PSF expert panel has identified several **opportunities**:
- **Economy**: Both large and small companies present solid opportunities for the economy. A good number of international companies in Czechia offers access to international markets, while a growing number of (tech) start-ups brings dynamism.
- **R&I governance and policy:** EU Guiding Principles for Knowledge Valorisation and the four Codes of Practice implementing them will stimulate actions across all EU Member States. In addition, provided the S3 implementation is effective, it could further reinforce the development of regional innovation ecosystems.
- **Knowledge transfer in R&I policy and practice:** The proposed new Act on Research, Development, Innovation and Knowledge Transfer gives more attention to KT and creates a level playing field in the Czech KT system.
- **Skills and capacities:** Strengthening universities, research organisations and their KTOs in their capacity-building role to foster KT and commercialisation is an opportunity that could lead to positive impacts in terms of patents, licence income, spin-offs, etc.
- **System of incentives:** The redirection of foreign investments towards 'Smart Acceleration' projects, introduction of financial and other incentives for KT, and with research assessments to stimulate collaboration and scale-ups can help to reduce fragmentation and introduce greater overall cohesion.
- **Peer-learning:** Transfera.cz is a solid existing example in Czechia of inter-KTO learning, which presents a great opportunity for further building competences within KTOs. Ynovate

network (although less explored currently) brings good examples from Slovakia and could potentially be explored further.

- **Public and private funding:** Establishment of a VC Fund in cooperation with the European Investment Fund using ESIF and private co-financing is a strong future funding-linked opportunity.
- Furthermore, if the following **threats** are not sufficiently addressed, they may impinge on the 'strengths', make the 'opportunities' harder to grasp, and potentially reinforce existing – or introduce new – 'weaknesses':
- **Economy**: Limited capacity/interest among Czech companies (lower levels in the value chains) to absorb cutting-edge research into their business activities; and limited contribution of foreign multinationals to the R&I ecosystem of Czechia are existing threats.
- **R&I governance and policy:** National stakeholders report a lack of trust in public policies and policy-makers in charge of implementation.
- **Intellectual assets management:** No uniform intellectual asset management strategy at HEI level; limited awareness of IPR and the importance of industrial property protection; declining number of patent applications; and patent-offshoring by foreign multinationals all present threats for the successful uptake of knowledge transfer practices.
- **Public and private funding:** Future possible reduction in ESIF resources (which has been the main source for R&I policy investments) and the underdeveloped venture capital market in Czechia are threats for public and private funding.
- The analysis presented in Chapter 3 and summarised in the SWOT table above highlights a need for a two-pronged approach to address the systemic challenges while taking advantage of existing strengths and opportunities in the Czech R&I system.

4.2. Fragmented national vision of knowledge transfer

4.2.1. Signs of fragmentation and a lack of coordination

The Czech R&I governance system exhibits signs of fragmentation and a lack of coordination between the ministries (not only MIT and MEYS, but also other relevant ministries). Innovation – and, hence, knowledge transfer – does not fall into the basket of either MIT or MEYS, a gap currently covered by the Minister of Science, Research and Innovation, which – as a member of the Government – chairs the RDI Council and receives professional administrative support from the SRI Section of the Office of the Government. As a result, when it comes to innovation, the RDI Council has a prominent place in Czech R&I governance. It offers valuable advisory input but lacks executive power to implement necessary reforms and deliver actions at the operational level.

The vision of innovation and its importance for the national economy – and the role knowledge institutions and industries play in this respect – are crucial and should be at the top of the political agenda alongside an integrated policy to strengthen KT in Czechia. Implementing national strategies and programmes and policy support measures without this clear vision and stance will not lead to the desired outcomes and change in the long term.

Czechia has an excellent and internationally recognised research community, but very few knowledge-intensive products being developed for the market. There is a clear gap between university research and industry. While spin-offs are seen all over the world as change drivers that boost the economy, further development of a spin-off scene in Czechia – including high-tech companies or innovative companies rooted in research – would help more companies

move up the value chain. This requires a structural solution in terms of governance, legislation and mandates but also a cultural change.

The governance models should be clear for all stakeholders internally, such as universities, and externally for businesses. That does not mean that every decision on education, research and valorisation should be taken by one ministry or government agency alone, but policies must be strongly aligned, and an integrated decision should be taken.

4.2.2. A complex map of strategic documents

A lack of coordination is also partly visible in a number of strategic documents setting directions for the Czech R&I system. It is unclear which of the documents is the leading one. Although the basic vision and strategic direction for the development of the R&I system is set out in *the Innovation Strategy of Czechia 2019-2030* this document was not frequently mentioned in discussions with stakeholders. Several other documents are in place but with different time horizons. *The National R&I Policy* (2021-2027) is nominated as the main strategic document at national level for the development of all components of RDI in Czechia. *The NPOV* (set by the RDI Council) outlines long-term strategic directions and objectives for R&I activities. *The National S3 strategy* sets medium-term goals and topics for research, development and innovation in high-potential areas for creating a long-term competitive advantage. Several thematic strategies, such as *the National Strategy for Artificial Intelligence* (updated in 2024), *the National Semiconductor Strategy* (approved by the Government in October 2024), and *the National Quantum Strategy* (in preparation as of writing) focus on respective technology areas. Both the National Semiconductor Strategy and the National Strategy for Artificial Intelligence are linked to the S3. Together with the S3 itself they are implemented through MIT's TWIST programme.

4.3. Academia in the knowledge transfer process

4.3.1. Knowledge transfer is viewed as a marginal activity

Knowledge transfer is not seen as a core strategic topic by research organisations or individual researchers. On the institutional level, knowledge transfer is viewed as a marginal activity and thus rarely ends up in their strategic goals. Here, funding plays a critical role.

- Research organisations originally received some funding to set up KTO operations but they have been funded on a project basis thereafter. This is in the context of an increase in the share of institutional funding since 2019 and a decrease in the share of project-based funding since 2020. Besides the need for base funding, there are little to no incentives stimulating universities to develop and improve their knowledge transfer functions. Most KTOs are required to operate self-sufficiently, relying predominantly on external funding, which again is almost exclusively project based. Moreover, there are no direct financial consequences if universities fail to set up successful KTOs. Knowledge transfer and, more generally, the third pillar – valorisation – should be part of the overall governance structure. This could be a core part of the Evaluation of Higher Education Institutions Methodology, and recognised by the acronym HEI2025+.
- Research-performing institutions receive performance-based funding based on an evaluation of researcher programmes following the approved Metodika 17+ methodology, which is being updated to Metodika 25+. The RDI Council uses Modules 1 and 2 to evaluate all research-performing institutions on an annual basis. Metodika 17+ stipulates that the funding providers should develop their own methodologies based on Modules 3-5 to evaluate research-performing institutions under their jurisdiction. For higher education institutions this is being done by MEYS, which has prepared HEI2025+. This

methodology pays specific attention to knowledge transfer through several directly and indirectly linked indicators. These, however, are not reflected in the decisions on institutional funding. Moreover, it is not specified if at least one member of nominated international expert groups for the research assessment should be an expert in 'knowledge transfer' or 'knowledge valorisation'. Indeed, the composition of the expert panel is crucial.

The methodology describes how the universities are evaluated, but not how this translates into career development and assessments of staff. Increasingly, universities worldwide have introduced an impact criterion in their research assessments. Creating a transparent assessment for knowledge valorisation like this is seen as important. It should be described in the assessment report and become an intrinsic part of the whole evaluation procedure. Human resource managers should also be given some guidance on how to assess 'impact' including knowledge transfer in their annual evaluations. On the individual level, researchers are not evaluated on impact or knowledge transfer by their hierarchy nor by the administration of the university. The latter is more difficult to address as it calls for cultural change which can take significant time. Traditionally, money is not the prime driver for academics; it is more important to see how knowledge transfer activities and the impact they generate could be an important criterion for their career path development.

In Czechia, researchers are not incentivised in this way. For career advancement, knowledge valorisation is not perceived as an important performance criterion. Personal grants, research grants and, more broadly, education performance are the key criteria. To change this situation, leaders, such as deans and rectors, should be eager to stimulate knowledge transfer. Naturally, KTOs play an important role in knowledge transfer, but their power to deliver relies on how academics and university leaders perceive their role and support their actions.

4.3.2. Institutional capacity for knowledge transfer is often sub-optimal

KTOs need to incorporate and apply various disciplines to support knowledge transfer, e.g. legal, finance, business models, etc. If such skills are not available internally, clear mechanisms for acquiring the missing knowledge need to be in place. This could be achieved by linking to some central functions at the university or by sourcing it externally.

There are significant challenges around human capital and skills in Czech KTOs. They exhibit varying levels of human resources and expertise, with some severely understaffed and lacking specialists, while others are better resourced. Some KTOs appear to focus primarily on organising events around entrepreneurship rather than concentrating on their core mission of effectively promoting the process of knowledge transfer from research to the broader market and society.

However, representatives of several KTOs were consistent in their description of what they consider the 'core business' of a KTO: first and foremost, it should help detect the valorisation potential within the university, then support researchers in translating that into proof-of-concept projects, collaboration agreements with industry or other stakeholders, patents, licences, and spin-offs. To accomplish this effectively, KT professionals with the necessary competencies to provide minimum KTO capabilities are required.

There is a clear **need for the professionalisation of competencies** within both KTOs and universities. For KTOs to offer their support effectively, it is essential that they employ skilled KT professionals themselves and have robust networks outside the university to guide this process effectively. As pointed out in an OECD (2020) study, the quality of services provided by transfer offices critically depends on the experience and skills of their staff. Although some universities and public research institutions in Czechia set performance indicators for their

transfer offices, such as the number of patent applications, licences granted, licence income, and contract research returns, there is no comprehensive monitoring system for the performance of transfer offices in Czechia.

Moreover, there is considerable variation in the capacity and size of KTOs tasked with knowledge transfer. KTOs are very small in most universities and, as pointed out, often lack skills and competences. Yet, they do not have an explicit strategy to source such skills internally within their institution. There is also little sign of efforts to fill the gaps by teaming up and creating economies of scale. Certain examples of experience-sharing are visible in KTO cooperation within the Transfera.cz network, as well as between RICs of some regions, but these are not widely practiced or incentivised.

There are effective international examples to draw from, such as associations where a single KTO serves multiple HEIs. In Flanders, interface offices of five universities also carry out KTO responsibilities for the university colleges within their association. Another example is the collaboration between four technical universities in The Netherlands (see Box 6). The Industrial Research Fund in Flanders (see Box 3) also provides an interesting model, where KTOs within associations receive a dedicated budget (output-driven) that they can deploy according to their strategy. This allows them to hire valorisation managers and organise competitive calls within the association for proof-of-concept projects or other valorisation activities. The Government closely monitors KTO performance according to their strategic plans.

Benchmarks from other countries offer insights on what is possible in Czechia. Indeed, it could be a worthwhile exercise to explore the extent to which **rationalisation of the currently fragmented landscape could be achieved and linked to financial incentives**.

Most universities have a KTO staffed by one or two people. This presents a fragmentated picture and various KTOs – especially in small and regional universities – struggle to attract and retain staff, which makes continuous learning and professionalisation efforts more difficult. Scale is less of an issue if there is strong internal (political) support for knowledge transfer in the organisation. Yet KTOs in Czechia tend to have an unclear mandate and little say on the overall policy of the university. Knowledge transfer is mostly decentralised, and the autonomy of deans is seen as a major barrier to IP commercialisation and KT in general. KTOs need ‘ambassadors’ in the faculties to act as scouts and positive KT agents.

4.3.3. Weak entrepreneurial culture hinders knowledge transfer

In addition to the KT obstacles linked to skills, competence and size, the entrepreneurial culture within universities and public research institutions in Czechia is generally under-developed. A more entrepreneurial culture could foster greater openness among researchers, not only focusing on their scientific work but also engaging in ways to translate their academic insights into tangible outcomes that address the needs and solutions required by industry or other societal stakeholders. This is the essence of knowledge transfer but in Czechia it is being held back by a lack of recognition (career progression/incentives) when academics/researchers/scientists contribute to ‘third mission’ activities.

In Czechia, traditional academic outputs – such as publications, citations, supervising PhDs, and peer recognition – still remain the primary criteria. Transforming ideas into successful companies – or pursuing other forms of knowledge transfer for that matter – is not a top priority in academia. In Czechia, the emerging spin-off scene is an opportunity, though it remains limited at present. Universities and KTOs have a greater role to play in raising awareness among researchers of the possibilities for knowledge valorisation and the impact they can have by contributing solutions to the societal challenges of our time.

This is not simply a problem of knowledge transfer. The collaboration between academia and industry (or business agendas in general) should be strengthened. Fundamental and strategic research can also lay the essential groundwork for highly significant applications and breakthroughs, with positive impacts on industry and even spin-off creation.

KTOs could also provide the research community with the necessary training to enhance awareness of their intellectual assets and offer guidance and coaching through different stages of the innovation cycle, aimed at increasing the technology readiness level and commercial readiness level.[57] Support in identifying suitable funding schemes and potential collaborators would be beneficial.

4.4. The regional and industrial dimensions in knowledge transfer

4.4.1. Strengths of connections between KTOs and RICs vary across regions

In the process of technology and knowledge transfer, the role of the Czech regions aligns with the globalisation trend that began in the late 1990s. The regions have become key players in promoting economic development. However, it is evident that they are not entirely self-sufficient in generating and transferring the knowledge and technology necessary to enhance their competitiveness.

Given this, Czech regions should position themselves as both sources and conduits of technology and knowledge. The various tools for business, academic and economic development within each region should be more interconnected, playing a crucial role in the flow of knowledge. This knowledge should circulate more effectively among businesses, universities, research centres, researchers, and all institutions that form part of the regional innovation system. Strengthening this system is essential to attract a more skilled workforce and ensure a more robust, effective transfer of knowledge and technology.

In this sense, each Czech region, as a receiver or source of knowledge transfer, will have its own competitive advantages. Some regions may be stronger thanks to their expertise, quality workforce, research centres, or mixed training programmes, while others may excel due to their raw materials, market size, or labour force availability. Ultimately, the competencies that add the most value to each Czech region need to be better integrated to form a cohesive strategy for economic development and unified knowledge transfer.

Both KTOs and RICs play a role in the knowledge transfer process in the regions, but their connections and input vary. In the case of RICs, in some regions innovation support is part of the regional development agency, in others there is a separate agency, and, for example, in the Vysočina region it is just a department in the regional administration. This largely determines who the founders of innovation centres are. As there is some overlap between innovation support and regional development support in the regions, it is then difficult to determine what the staff capacity for innovation support is in each region. This calls for a stronger joint effort between KTOs and RICs in developing needed processes for knowledge valorisation and absorption.

[57] Technology readiness level (TRL) determines the development/maturity of research and its readiness for market uptake and potential investment. Commercial readiness level (CRL) determines how ready a technology is to be made commercially available. CRL is similar to TRL with a primary focus on the commercial viability rather than its technical status. See https://euraxess.ec.europa.eu/career-development/researchers/manual-scientific-entrepreneurship/major-steps/trl

Czechia has diverse regional innovation systems and specialisations that would be challenging to manage centrally. A centralised KTO might limit regional dynamics and misread local needs, which could negatively impact the flexibility and responsiveness of knowledge transfer. Instead, decentralised KTOs collaborating with RICs can strengthen local engagement with stakeholders such as businesses and universities.

4.4.2. More tailored support for science-business cooperation is needed

The weak patenting activity of domestically owned Czech SMEs indicates a demand for greater overall awareness, competence-building, and the promotion of IPR and related practices among SMEs, as well as the need to incentivise more ambitious R&D activity. Due to large sectoral variations in R&D collaboration profiles there is also a demonstrated need to (continue) designing tailored policy measures that support industry collaboration and knowledge transfer in identified priority sectors or areas.

More attention is also required to address the needs and ambitions of foreign-controlled enterprises in Czechia, in order to design suitable measures and incentives to broaden their collaboration and encourage knowledge transfer between domestic companies and research entities. Evidence suggests that separate measures are needed to support/stimulate KT in domestic companies, thus further emphasising issues such as IPR awareness and skills/capacity-building efforts.

Given that there are several science and technology parks as well as other innovation support facilities in Czechia, there is a strong rationale for – and perceived opportunity to – enhance collaboration and joint development among them.

Alongside RICs, KTOs could take a more active role in facilitating interaction between universities and non-academic stakeholders. To facilitate this, KTOs should increase their collaboration and competence-sharing. Closer connections between KTOs and RICs could be established to support business development services for entrepreneurs. This could lead to more joint patents between companies and universities, as well as an increase in licensing agreements.

5. Recommendations

5.1. Summary of the recommendations for reforming the Czech knowledge transfer system

The PSF Expert panel puts forward ten recommendations to further reform and strengthen the knowledge transfer system in Czechia. The recommendations have to be looked at as a whole and not in isolation. They are tightly interlinked and are intended to complement one another. They cover different aspects of knowledge transfer and target different levels of the R&I ecosystem in Czechia and its regions. All proposed recommendations provide a framework for systemic change in the R&I system, which is visualised in Figure 5 as a comprehensive change strategy or pyramid of actions.

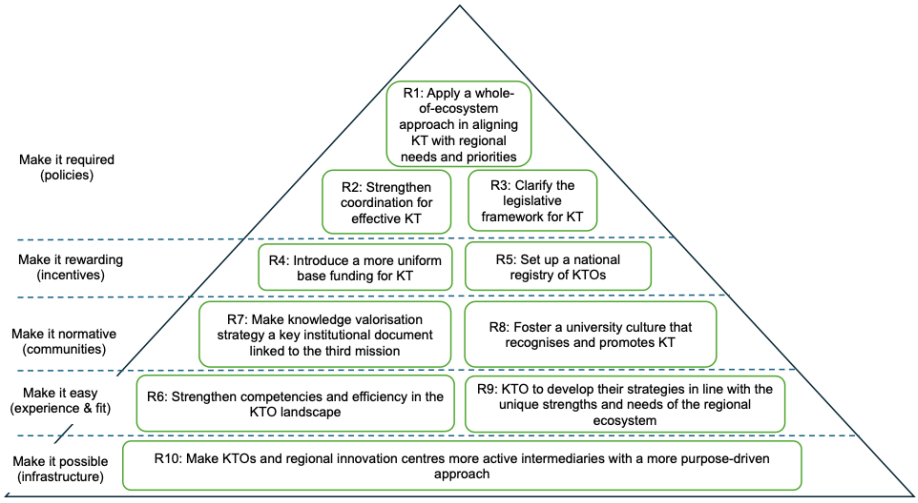


Figure 5. Recommendations for reforming the Czech knowledge transfer system as a framework for systemic change
Source: Authors' own composition, framework adapted from Nosek, B., 2019. Strategy for Culture Change https://www.cos.io/blog/strategy-for-culture-change

Each sub-section describing individual recommendations has the following structure:

- Recommendation itself followed by a more detailed explanation behind the recommendation.
- Lead organisation for taking this recommendation forward and other stakeholders to be involved.
- A diagram showing interlinkages between proposed recommendation and other recommendations given by the PSF expert panel. The arrows in the diagram show the influence of a proposed recommendation on other recommendations. This means that if a proposed recommendation is not implemented, other recommendations will struggle to gain traction.

5.2. Recommendations for improving the overall governance and clarity for knowledge transfer (in the future knowledge valorisation) and R&I in general

5.2.1. Recommendation 1: Apply a whole-of-ecosystem approach in aligning knowledge transfer with regional needs and priorities

Recommendation 1: The RDI Council should lead the development of a common vision by coordinating universities, research institutes, KTOs, RICs, and regional stakeholders to align their strategies and strengths with regional needs within this shared national vision.

As the highest strategic advisory body, the RDI Council should address the overall vision on a national level. The whole-of-ecosystem approach is what is ultimately needed and currently missing in Czechia. As the KT responsibilities fall under several sectoral ministries, the RDI (Policy) Council's mission should be to ensure a common vision and that a systemic approach is applied. Its role should be to bridge and facilitate, rather than to control and execute. The practical execution and more detailed funding decisions are then left to relevant ministries and their agencies.

This does not require the RDI Council to have executive power or be responsible for budget allocation. However, as the highest advisory body, the Government could formally seek advice from the RDI Council during budget preparations concerning funding for science, research, innovation, and aspects related to knowledge valorisation.

A whole-of-ecosystem approach – in aligning knowledge transfer with regional needs and priorities – will reduce duplication of activities/effort, enhance complementarity of roles, and create a clear vision for the KT chain, from knowledge production to implementation or 'application in practice'. In a traditional set up, KTOs tend to focus mostly on knowledge push (inside-out) while effective knowledge transfer requires a combination of push but also pull mechanisms, i.e. demand-led (outside-in) approaches. This involves building long-term relationships and partnerships with companies, industries, investors, and public-sector and societal actors.

A robust ecosystem must therefore integrate regional, national and international opportunities. This includes fostering connections to international networks, providing support for funding acquisition, and facilitating the internationalisation of spin-offs. To ensure sufficient deal flow and attract support from international investment bodies, such as the European Investment Fund, the ecosystem must function as part of a coordinated national system.

Such a coordinated approach aligns with *the EU Guiding Principles for Knowledge Valorisation*, where one of the three founding pillars describes the **"whole-of-ecosystem approach** [with] a focus on the whole R&I ecosystem and its connections, on co-creation between actors and on the creation of societal value". This pillar emphasises the importance of collaboration among various actors, the public and private sector, and citizens empowered to use and re-use knowledge. Such an ecosystem creates an environment where knowledge, expertise and resources can be shared to foster innovation.

Lead organisation for taking this recommendation forward: The RDI Council as a leading organisation in formulating the 'overall' vision with clear priorities at the national level that then act as a compass in an international context, while also providing guidance on how the regions can further implement this in the local ecosystem.

Other involved R&I stakeholders: The whole R&I ecosystem, including the SRI Section of the Government Office, ministries, universities, research institutes, KTOs, RICs, and other relevant regional stakeholders and organisations.

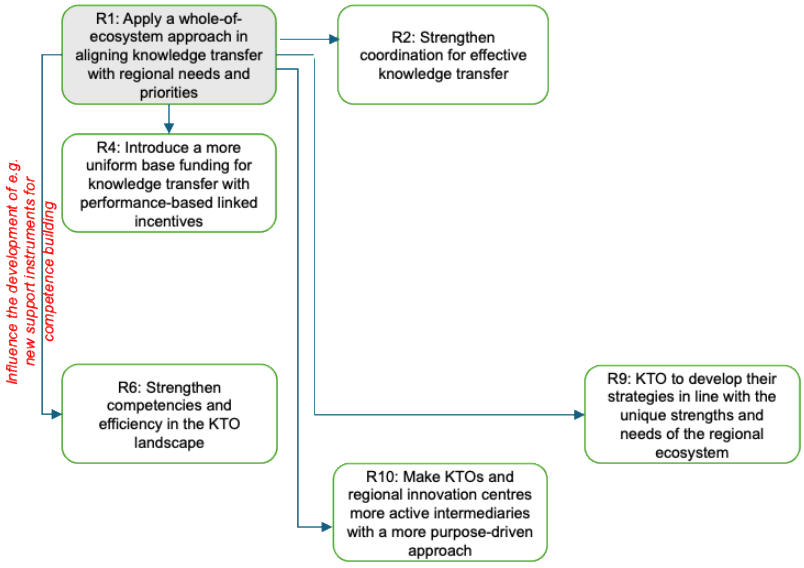


Figure 6: Interlinkages between Recommendation 1 and other recommendations
Source: Authors' own composition

5.2.2. Recommendation 2: Strengthen coordination for effective knowledge transfer

Knowledge transfer is a top-level objective that cuts across the responsibilities of several ministries, in particular MEYS and MIT, but often with strong regional and sectoral specificities, too. For the same reason, KT is not typically organised under the responsibility of any one ministry, but rather as a jointly coordinated effort. In the Czech hierarchy, this coordination role belongs to the RDI Council. Current government efforts to support knowledge transfer suffer from fragmentation and require stronger coordination to be more effective.

Recommendation 2: A cohesive governance framework and related practices for coordination of knowledge transfer efforts should be established, thus empowering the RDI Council to oversee and coordinate joint KT efforts.

This governance framework should include, inter alia:

- A review of all existing national strategies and policies could be beneficial for two reasons: 1. to establish and communicate clearly to the whole R&I community on how these various strategies and policies fit together and if all are needed; and 2. how the topic of knowledge transfer/valorisation is linked to or reflected in these documents. If a rationalisation of existing strategies and policies takes place, a high-level policy-making discussion needs to take place to establish if a national knowledge transfer/valorisation strategy would help address any existing gaps.
- Clarification on the complementarity of roles (RDI Council and individual ministries) in joint efforts, including respective inputs and dedicated budgets, to support knowledge transfer. A memorandum of understanding can be signed between the parties confirming the division of responsibilities.
- Finalise, agree with the research community and other relevant stakeholders and approve the KPIs for monitoring the joint efforts and results of knowledge transfer based on a list of indicators for monitoring KT prepared by the RDI Council working group and the Government regulation for monitoring indicators on R&D support (currently under preparation) which also includes a list of KT indicators. This is a critically important step giving clear guidance to the

community on the strategic direction the country is taking to boost knowledge transfer/valorisation.

- Setting up an interministerial working group under the auspices of the RDI Council, to develop the principles and practices for monitoring the joint efforts in KT, and to address any gaps or questions that may arise under this governance framework.

Lead organisations for taking this recommendation forward: The RDI Council (for strategic direction) and the SRI Section of the Office of the Government of Czechia (for executing the recommendation).

Other involved R&I stakeholders: MEYS, MIT and (if relevant) other ministries, implementing agencies, regional authorities.

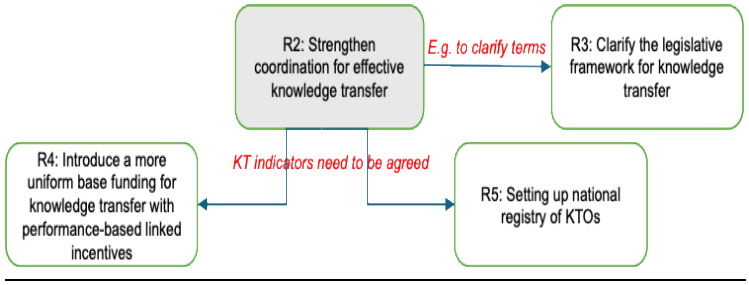


Figure 7: Interlinkages between Recommendation 2 and other recommendations
Source: Authors' own composition

5.2.3. Recommendation 3: Clarify the legislative framework for knowledge transfer

A clearer legislative framework is needed to support knowledge transfer activities in Czechia and address the lack of clear definitions and regulations surrounding knowledge transfer. Ambiguities exist regarding what universities can do, particularly around spin-offs, which may hinder effective innovation. Such a clarified framework will ensure standardisation in the understanding of terms, lead to more consistency and transparency across institutions and stakeholders, and thus reduce ambiguity and uncertainty. To some degree this is gradually being addressed, e.g. within the framework of the possible implementation of the set of KPIs into legal regulations related to the Act on RDIT (i.e. introducing mandatory reporting of data on knowledge transfer). However, more efforts are needed.

Recommendation 3: The RDI Council should request MEYS, MIT, and TA CR to develop a comprehensive compendium of key terms, concepts, and procedures related to KT. This compendium should be aligned with existing legislation and integrated into relevant laws, including the proposed new Act, when approved.

This should include (but is not limited to) the following:

- Gather feedback from the R&I community to understand in more detail which terms, definitions and procedures required clarifications.
- Agree on a standardised definitions for various terms, e.g. 'spin-off'.
- Provide clear legal guidelines on universities' roles in establishing spin-offs, IP management, and commercialisation.
- Bring together the most important and relevant legislative provisions on knowledge transfer into a single framework, making it easier for stakeholders to navigate the legal landscape.

Lead organisation for taking this recommendation forward: The RDI Council (for strategic direction) and the SRI Section of the Office of the Government of Czechia (for executing the recommendation).

Other involved R&I stakeholders: MEYS, MIT, and TA CR A broad R&I community needs to be consulted throughout the process.

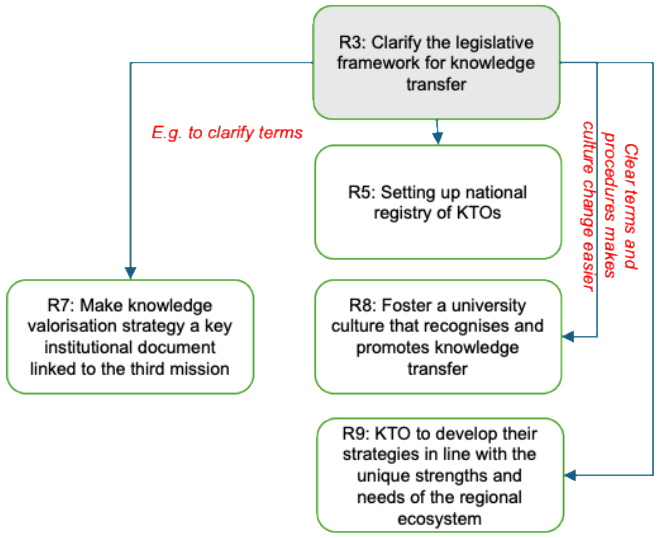


Figure 8. Interlinkages between Recommendation 3 and other recommendations
Source: Authors' own composition

5.3. Recommendations for building the long-term stable capacity of KTOs

5.3.1. Recommendation 4: Introduce a more uniform base funding for knowledge transfer with performance-based linked incentives

KTOs in Czech universities are funded in an inconsistent and fragmented manner. At the same time, universities and research-performing organisations do not have explicit strategies and processes linked to performance in place on the institutional level to push forward, acknowledge and reward knowledge transfer. The Czech KT system needs a stable, long-term, and more uniform funding base for KT activities, in general, and KTO in particular. This uniform funding system needs to be linked to KT indicators agreed at the national level (see Recommendation 2).

Recommendation 4: A dedicated part (e.g. 1-3%) of universities' and institutes' funding should go towards their 'third mission' activities, prioritising societal and economic impact, including knowledge transfer and support for KTOs.

The implementation of this recommendation has to be compliant with existing laws in Czechia.

Different approaches can be taken to achieve this:

- The Government should encourage universities and research institutes to think strategically about knowledge transfer (or 'third mission' imperatives in general) and financially support their KTOs, i.e. operational activities, development of KTO staff and needed capacities, intellectual asset management activities, cooperation with RICs and other R&I ecosystem players, etc. This could mean, for example, spending a dedicated part (e.g. 1-3%) of a university's/institute's

research funding (regardless of source) on knowledge transfer and 'third mission' activities. This will take away the current reliance on project – and, thus, irregular – funding for such activities.

- It is up to the universities and institutes to ensure that funding allocated for KTO operational activities is used exactly for that purpose. When this is done it will mean that their KTOs can be part of the national registry (see Recommendation 5) and thus become eligible for KT related project-based funding.
- On the funding providers side, institutional funding for KT should be strengthened, e.g. MEYS, CAS and sectoral ministries allocate part (e.g. 1-3%) of the institutional funding based on performance-related knowledge transfer activities. Knowledge transfer activities have to be evaluated to assess performance and progress, and to determine how much of the institutional funding to distribute. The indicators currently included in Methodology HEI2025+ (see Section 2.2.3 for the list) as well as some additional output/performance indicators suggested in Table 5 should be considered here.
- If the above actions prove to be insufficient and do not lead to improved KT performance, the funding institutions should put a suggestion forward to the RDI Council and the Government to incorporate this requirement into the law guiding institutional funding, thus turning it into a legal obligation for universities and institutes.

Quantitative indicators	Qualitative indicators
<u>High-quality output indicators:</u> Number of granted European/international patents Number of licensing deals Number of spin-offs Income from contract research Income from fee-for-service contracts with industry Income from other quadruple helix stakeholders <u>Future-oriented input indicators:</u> Number of invention disclosures Number of technology offers Number of service offers Pipeline development	A long-term vision (for 4-5 years) and strategic and operational objectives (annually) developed in collaboration with the KTO and relevant local/regional ecosystem partners Strategic collaboration with other KTOs or RICs around pooling of resources in order to raise efficiency and rationalisation (see also Recommendation 6) Capacity to deliver knowledge transfer activities, i.e. in combination with functions available through RICs and other external partners Internally available capabilities to perform knowledge transfer function; the KTO does not necessarily need to have all skills within the team but acquire needed capabilities from others in the institution (e.g. if legal advice is needed, a university legal team/department can be involved), and if specific capabilities are not available in the institutions, they should show how these can be attracted from within (e.g. agreement with a RIC for specific tasks)

Table 5: Potential (qualitative and quantitative) indicators
Source: Authors' own composition

Another approach to introduce even more incentives to the universities and institutes is, for example, to have an ear-marked budget set up as a programme (and managed by, for example, TA CZ), to reward high-performing KTOs with some top-up funding.

To achieve the goal of allocating 1-3% of funding to the 'third mission' activities a phased approach is essential. Thus, a timeframe from 2026 to 2030 is proposed, allowing universities and institutes sufficient time to organise, develop strategies, and implement action plans:

- This gradual implementation will ensure universities can align and re-allocate their resources and priorities towards KT activities effectively, while maintaining quality in their two other core missions: education and research.
- The vision, strategy and partnerships on KT from an ecosystem approach (with the necessary budget allocation) needs to be a priority at the highest level of the university, and developed in cooperation with KTO heads and the most important stakeholders (see Recommendation 1 + indicators in Table 5:).

Lead organisation for taking this recommendation forward: MEYS, CAS, sectoral ministries involved in allocating institutional funding.

Other involved R&I stakeholders: Universities, CAS research institutes, sectoral ministries and their stakeholders, the RDI Council (to support/approve changes and link to national KT indicators set out in Recommendation 2), the SRI Section of the Office of the Government of Czechia.

Relevant international good practice: The Flanders 'twin-policy' and its Industrial Research Fund (see Box 3), financial support to technology transfer and innovation units in Greece embedded in the law (see Box 4).

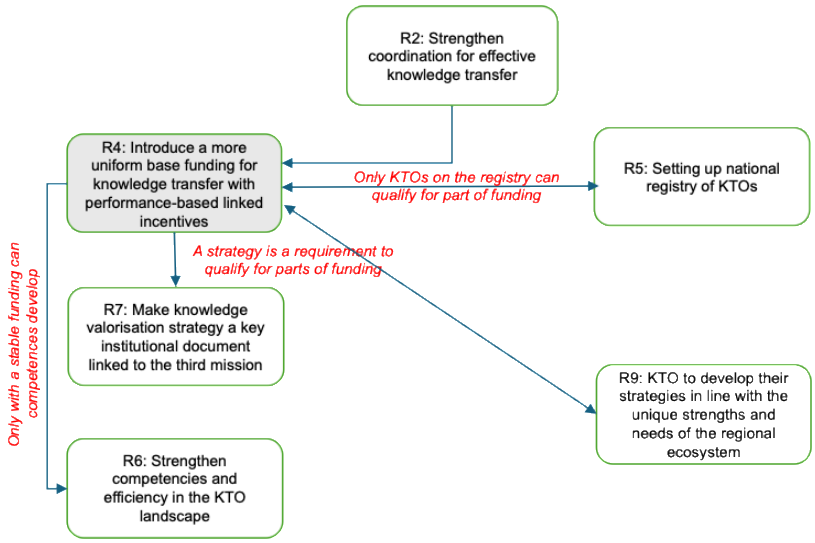


Figure 9: Interlinkages between Recommendation 4 and other recommendations
Source: Authors' own composition

5.3.2. Recommendation 5: Set up a national registry of KTOs

When discussing scale-up and rationalisation efforts, a core question is the need for the centralisation of KTO functions. It is under this recommendation that the PSF panel responds to the Czech authorities' question on whether a such a centralised KTO authority could address the fragmentation and varying capacities of KTOs.

The highly fragmented landscape in Czechia would not be effectively addressed by a single, centralised KTO as it would not adequately address the considerable regional diversity and specific needs across the country. Instead, the panel recommends that the Czech Government focus on

setting clear regulations/boundaries, establishing common guidelines, quality standards and rules, and creating defined criteria and specific conditions for receiving incentive-based funding, while allowing flexibility and diversity by respecting the unique roles and approaches in each region.

Recommendation 5: Instead of establishing a central KTO or knowledge transfer authority, the Czech Government should complement the bottom-up initiative (i.e. Transfera.cz) with a top-down national registry of KTOs. This registry will have very clear acceptance criteria with the objective of purposefully orienting KTO activities towards obtaining economic and social results from knowledge transfer and towards building connections between knowledge creators, businesses, and society.

By qualifying to be part of the registry, KTOs will receive a 'quality label' and become eligible to apply for calls linked to the knowledge transfer activities (i.e. the calls administered by the TA CR).

A KTO can be accepted to the registry if they can prove the following:

- Knowledge transfer is considered to be one of the strategic activities in the institution. **Evidence**: 1. long-term vision (for 4-5 years) of the institution and strategic and operational objectives (annually) developed in collaboration with the KTO and relevant local/regional ecosystem partners; 2. indicators 4.2, 4.4 and 5.2 from Methodology HEI2025+ (see Recommendation 4).
- KTO has stable financial resources to perform KT functions (in line with Recommendation 4).
- KTO has needed capabilities and competences to perform KT activities. This can be: 1. their own personnel with relevant competences and professional experience of relevance to KT; 2. agreed procedures on the involvement of other employees in the institution to perform specific functions (e.g. legal advice); or 3. collaboration agreements signed with some external stakeholders (e.g. RICs) for the provision of specific support services. The overall capacity (both internal and external) must be proportional to the R&I human resources involved in KT activities across the whole institution which the KTO represents.
- KTO (alone or in cooperation with other internal or external stakeholders) carries out at least three of the KT functions specified in Table 6 below. Specific exceptions can be made for institutions with a different scientific profile (e.g. social sciences and humanities) or specific characteristics in their regional context.
- KTO can show the implementation and performance of at least two KT functions.

The following criteria for inclusion in the KTO registry can be considered:

Suggested indicators	
Protection of R&I results	
Selection of indicators used in Modules 3 of the Methodology for Evaluation in the Higher Education Institutions Segment 2025+ (Methodology HEI2025+) (see Recommendation 4)	Indicator 3.4 – Research results with exiting or prospective impact on society (qualitative indicator)
Additional indicators suggested in Recommendation 4	Number of granted European/ international patents Number of licensing deals

Suggested indicators	
	Number of spin-offs
Additional indicators	Portfolio of protected inventions in force (by application and by families/groups)
Exploitation of R&I results	
Selection of indicators used in Modules 3 of the Methodology for Evaluation in the Higher Education Institutions Segment 2025+ (Methodology HEI2025+) (see Recommendation 4)	Indicator 3.5 – Transfer of results into practice (qualitative indicator) Funds received from non-public, non-grant sources, e.g. sold licences, spin-off revenues, donations, etc. (quantitative indicator)
Additional indicators suggested in Recommendation 4	Income from spin-off companies Income from contract research Income from fee-for-service contracts with industry Income from other quadruple helix stakeholders Number of invention disclosures Number of technology offers Number of service offers Pipeline development
Additional indicators	Number and type of agreements for the exploitation of inventions that are in force
Activities on collaborative research between public and private entities	
	Number of collaboration agreements and contracts signed with third parties to carry out RDI activities Total amount of collaboration agreements and contracts signed with third parties to carry out R&I activities Number of entities with which the institution has signed R&I contracts

Table 6: Potential indicators for KTO registry
Source: Authors' own composition

Lead organisation for taking this recommendation forward: The SRI Section of the Office of the Government.

Other involved R&I stakeholders: MEYS and universities, CAS and their research institutes, other institutional support providers (i.e. sectoral ministries), Transfera.cz, TA CR.

Relevant international good practice: Spain's Strategic Plan for Knowledge Transfer and Innovation (see Box 2), The French Central TTO model – SATTs (see Box 10).

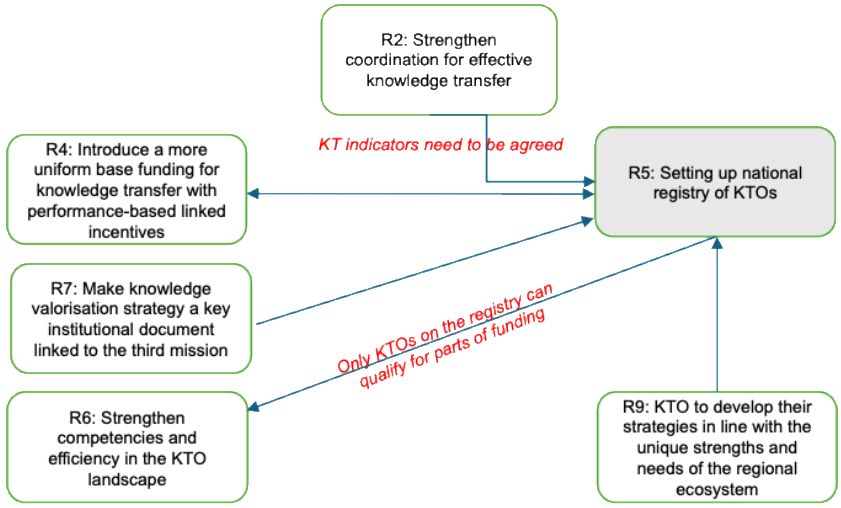


Figure 10: Interlinkages between Recommendation 5 and other recommendations
Source: Authors' own composition

5.3.3. Recommendation 6: Strengthen competencies and efficiency in the KTO landscape

Investment in KTO capacity-building will strengthen the role of KTOs in innovation ecosystems (national and regional) and enhance their role as key facilitators in the processes of implementing regional policies, notably S3. It will also help address the limited capacity of some KTOs. The 'ideal' profile or set of skills required of a KT professional would be challenging for one individual to meet. Ideally, they would need competencies in legal issues, IPR strategy and intellectual asset management, funding opportunities, plus an extensive network and deep connections with both academia and the business world.

Recommendation 6: Based on past experience with support instruments, TA CR could propose ways to further strengthen competence development in KTOs (especially smaller ones) where there is a vision and strategy. The aim is to develop 'communities of knowledge transfer', pooling of competences, economies of both scale and scope.

This can be achieved through dedicated support mechanisms, such as:

A support instrument to match different KTOs exploring joint work or partnership opportunities. For example, KTOs that share capacities and resources and, thus, raise efficiency through economies of scale, could receive top-up funding if they work as a kind of 'association', 'spearhead cluster', or cooperate in other ways around national or regional priorities.

University programmes co-funded by regions interested in knowledge transfer and in supporting links between the regional KTO/economy and specific thematic experts/coaches (e.g. legal, IP, sales, etc.).

Lead organisation for taking this recommendation forward: TA CR

Other involved R&I stakeholders: Regional authorities, RICs, MEYS, MIT, each research institution and their respective KTO should take the responsibility to develop KT competences.

Relevant international good practice: Profile and Career Development Path of Knowledge Transfer Managers (see Box 5), Flanders 'twin-policy': interface activities and Industrial Research Fund (Box 3), regional innovation cooperation in The Netherlands: 'Novel-T' (Box 6).

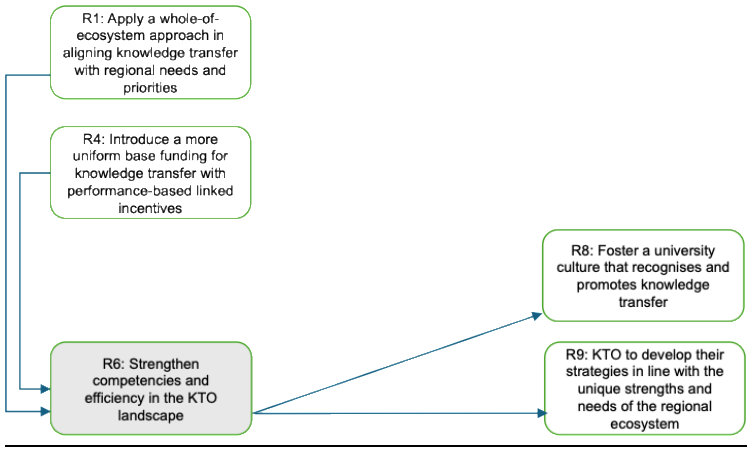


Figure 11: Interlinkages between Recommendation 6 and other recommendations
Source: Authors' own composition

5.4. Recommendations for recognising and rewarding knowledge transfer activities for researchers

5.4.1. Recommendation 7: Make knowledge valorisation strategy a key institutional document linked to the 'third mission'

To move knowledge transfer – and the 'third mission' as a whole – away from its place at the margins of research institutions it is critical to anchor it as one of the key strategic topics. Creating a knowledge valorisation strategy would be the first steps towards that.

Recommendation 7: Universities as well as CAS should develop their knowledge valorisation strategy. Funding for knowledge transfer/valorisation from the institutional budget should be directly linked to this strategy and its related targets and indicators. One part of the strategy should focus specifically on intellectual asset management.

Considering specific elements of knowledge transfer, the strategy should cover intellectual asset management. It is of great importance for the Czech R&I ecosystem to have higher awareness about IPR. Embedding intellectual asset management as part of a wider knowledge valorisation strategy will strengthen the institutional approach to IPR and, more importantly, management. The key element is not the quantity of intellectual assets, but what steps are being taken to generate value out of these assets.

Lead organisation for taking this recommendation forward: Rector's office of each university, CAS, and management in individual CAS institutes.

Other involved R&I stakeholders: KTOs

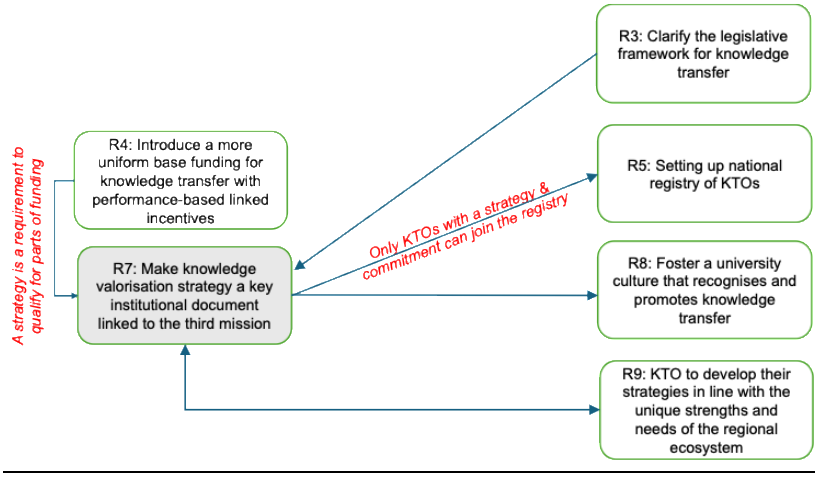


Figure 12:Interlinkages between Recommendation 7 and other recommendations
Source: Authors' own composition

5.4.2. Recommendation 8: Foster a university culture that recognises and promotes knowledge transfer

Efforts are needed to motivate and orient researchers towards knowledge transfer opportunities, and to address the weak entrepreneurial culture at all levels in Czechia. Universities should actively work to foster a more entrepreneurial mindset among students, researchers (including PhD candidates, professors, and staff), and the broader academic community. By embedding these entrepreneurial competencies as transferable skills, universities can lay the foundation for an environment where both students and researchers are more receptive to valorising their expertise and research outcomes in the future. Creating an environment that values both traditional academic output (such as publications and citations) and contributions towards societal impact and valorisation will help HEIs evolve into entrepreneurial entities as well.

Recommendation 8: Universities in Czechia and the Czech Academy of Sciences should put more effort into building a culture that recognises knowledge transfer and entrepreneurship as being equally important as education and research.

This can be achieved through the following elements:

- University councils/boards to include, if this has not happened yet, private-sector stakeholders.
- Establish leadership roles, e.g. vice-rector for innovation/valorisation, to champion knowledge transfer/valorisation efforts.
- Recognise knowledge transfer contributions in academic career progression alongside traditional metrics like publications and citations.
- Raise awareness of IPR among researchers and train them on the benefits of knowledge valorisation, the various forms of IP protection, and guidelines for collaboration with industry and other stakeholders.
- Integrate knowledge transfer and entrepreneurship into student curricula and doctoral programmes, e.g. offering PhD candidates a course related to the basics of entrepreneurship and innovation, in which the innovation process is explained.
- Integrate more demand-driven, challenge-based learning opportunities for bachelor's and master's students, engaging them with real-world challenges early in their academic careers and thus creating a lasting foundation for an entrepreneurial university culture.

Lead organisation for taking this recommendation forward: Rectors' teams in universities.

Other involved R&I stakeholders: KTOs, individual researchers.

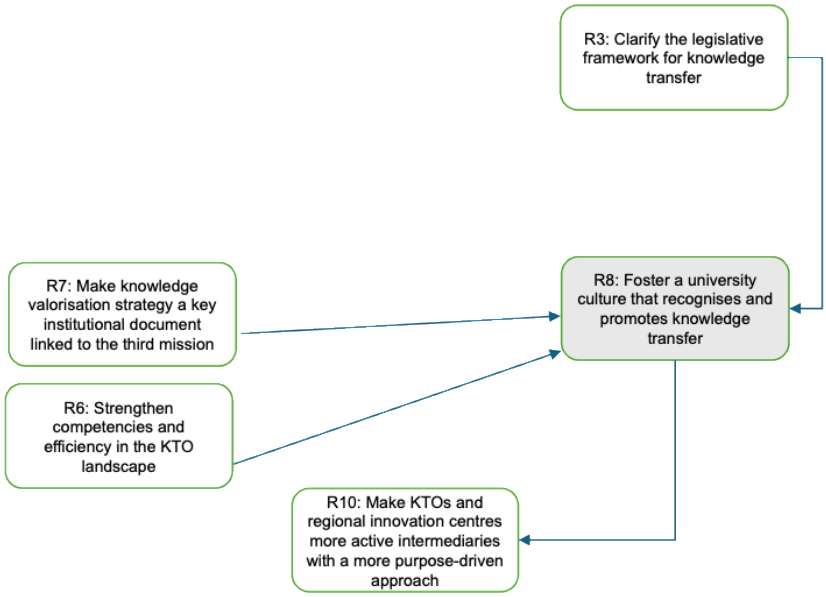


Figure 13: Interlinkages between Recommendation 8 and other recommendations
Source: Authors' own composition

5.5. Recommendations for embedding KTOs in and aligning KTO activities with the regional ecosystem

5.5.1. Recommendation 9: KTOs to develop strategies in line with the unique strengths and needs of the regional ecosystem

Once universities and CAS / CAS institutes have developed their knowledge valorisation strategies, they should clearly designate/nominate KTOs as the leading force internally for knowledge transfer efforts, acting as a broker and bridge between academia and business/society by translating research into practical, impactful solutions.

Recommendation 9: KTOs – in cooperation with both internal and external stakeholders – should develop their vision and strategy in line with the unique strengths and needs of the regional ecosystem and aligned with the regional specialisation. This strategy should be translated into an operational plan.

To achieve this, KTOs require support from a well-functioning innovation ecosystem to implement their strategies effectively. RICs should be active participants in the development of this strategy. KTOs and RICs should work collaboratively and agree on the division of responsibilities and activities. There is no one-size-fits-all structure or model for KTOs. It depends on the size of the office, the regional focus, historical relations, etc. of regional universities. This activity is of particular relevance to those regions where KTOs and RICs are active stakeholders working with or towards the same target groups (e.g. researchers).

Lead organisation for taking this recommendation forward: KTOs

Other involved R&I stakeholders: RICs, university management, regional authorities, university community.

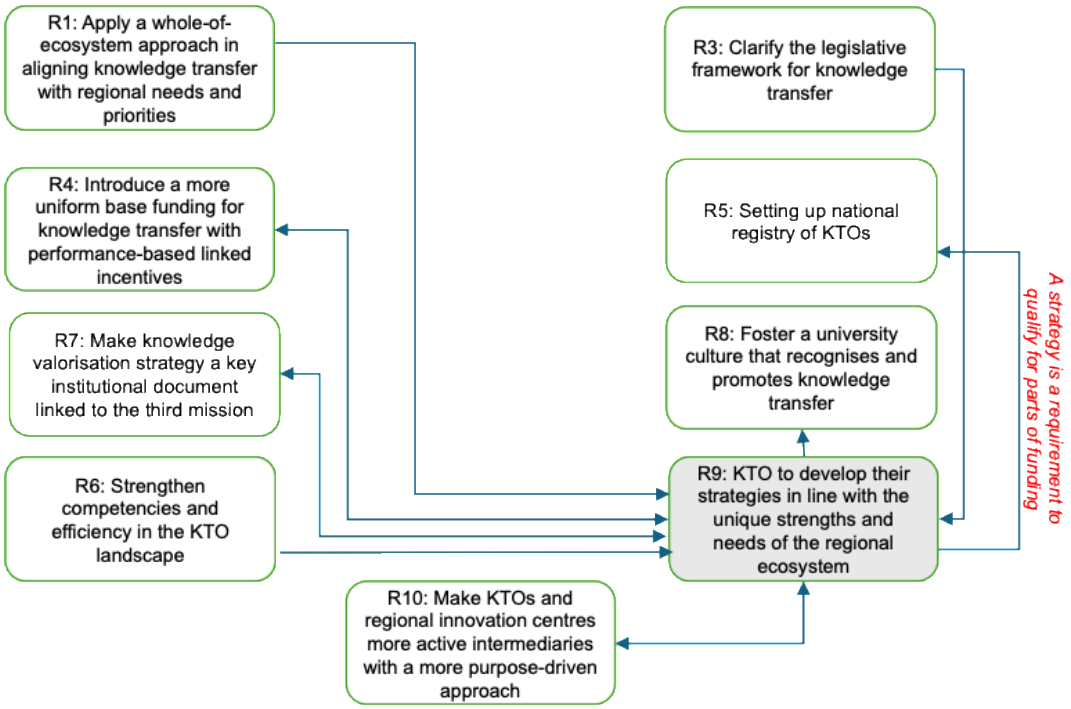


Figure 14:Interlinkages between Recommendation 9 and other recommendations
Source: Authors' own composition

5.5.2. Recommendation 10: Make KTOs and RICs more active intermediaries with a more purpose-driven approach

KTOs and RICs together should play an important role in purposefully implementing activities with the business sector as a 'receiver' of knowledge, and clearly linked to regional strengths and priorities. By aligning research strengths (if not all then at least some of them) with the specific needs of the region, universities will be able to play an active and central role in science-business cooperation in their respective regions.

Recommendation 10: KTOs and RICs should involve regional businesses and other stakeholders to develop a shared roadmap for science-business cooperation.

The following actions can help in implementing this recommendation:

- KTOs to work with their researchers to prepare an inventory of potentially useful ideas for businesses.
- A separate study or assessment should be conducted about the potential roles and functions of science and technology parks and other KT players.
- Test the demand among SMEs and start-ups for building their knowledge absorption and commercialisation capacity.
- Perform a needs analysis of larger (foreign-owned and domestic) companies.

- Regularly share successful regional practices via Transfera.cz to further strengthen national KTOs sector.

Lead organisation for taking this recommendation forward: KTOs and RICs (where appropriate).

Other involved R&I stakeholders: Businesses, incubators, science parks, TA CR, CzechInvest, regional authorities.

Relevant international good practice: Regional innovation cooperation in The Netherlands: 'Novel-T' (Box 6), regional innovation cooperation through one regional university in Belgium (Box 9), Estonia's investments in technology and knowledge transfer (Box 11).

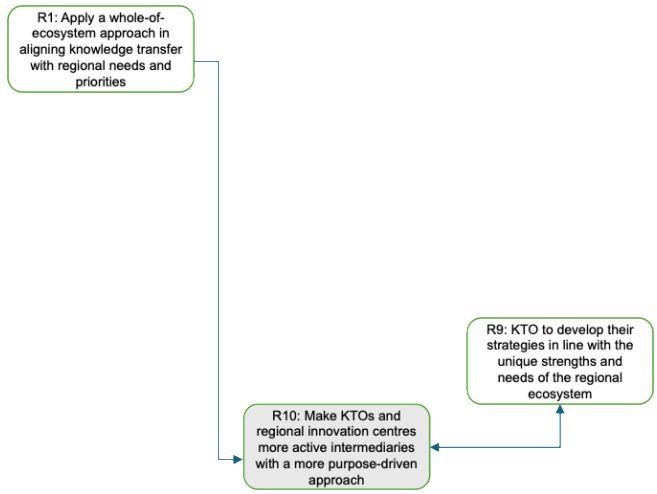


Figure 15: Interlinkages between Recommendation 10 and other recommendations
Source: Authors' own composition

5.6. Recommendations in the context of the EU Guiding Principles for Knowledge Valorisation

In line with the EU Guiding Principles for Knowledge Valorisation, the proposed recommendations can be categorised as presented in Table 7.

	Governance and regulation	KT in R&I policy	Skills and capacities + Peer learning	Public funding + System of incentives	Intellectual asset management	Metrics, monitoring, and evaluation
Strategic (policy level)	R1: A whole ecosystem approach R2: Strengthen coordination for effective KT R3: Clarify the legislative framework for KT	R1: A whole ecosystem approach R6: Strengthen competencies and efficiency in the KTO landscape R8: Foster a university culture that recognises and promotes KT R10: KTOs and RICs become active intermediaries	R5: Set up a national registry of KTOs R7: Make knowledge valorisation strategy a key institutional document linked to the 'third mission' R9: KTOs to develop their strategies in line with the unique strengths and needs of the regional ecosystem	R4: Introduce a more uniform base funding for KT	R7: Make knowledge valorisation strategy a key institutional document linked to the 'third mission'	R4: Introduce a more uniform base funding for KT R5: Set up a national registry of KTOs

Table 7: Alignment of recommendations vis-a-vis EC guidelines
Source: Author

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The Horizon Europe Policy Support Facility (PSF) has been set up by the Directorate-General for Research & Innovation (DG RTD) of the European Commission. It supports Member States and countries associated to Horizon Europe in reforming their national research and innovation (R&I) systems.

The review of the knowledge transfer system in Czechia was carried out between June 2024 and January 2025 by a panel of five independent experts and two national peers. The panel put forward ten recommendations which taken together offer a framework for a systemic change and in with the EU Guiding Principles for Knowledge Valorisation.

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