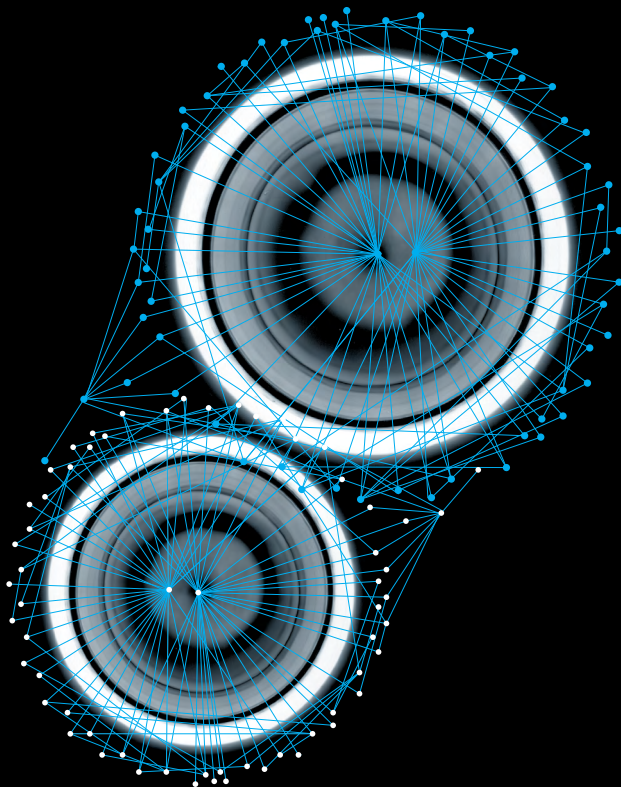

Technology Transfer Manual
For the Slovenian economy and Slovenian science



Technology Transfer Manual

For the Slovenian economy and Slovenian science

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Review

Biography

**Jon Wulff Petersen, Director, Technology Transfer
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Jon specialises in technology transfer, public-private innovation partnerships, technology roadmaps, technology scouting, and IP and technology valuation.

His primary experience lies within the areas of cleantech, especially energy and environmental technologies (waste and water); micro- and nanotechnology, and electronics.

Jon has headed the Plougmann Vingtoft technology transfer department since 2005 and has led a large number of assignments for Scandinavian companies and universities in Northern Europe. Previously, Jon has been deputy director of the Risø National Laboratory and director of the Micro- and Nano-electronics Centre (MIC) at the Technical University of Denmark. In addition, Jon has an Executive MBA from the Scandinavian International Management Institute.

Content Review

This long-desired manual outlines how Slovenian companies can be supported by the Slovenian universities and research centres in their common needs through how they think about and work with IP. Normally, every university or research centre around the world will have its own way of dealing with IP and collaborative efforts. This manual shows that there is a common view of the needs of the Slovenian economy and that there is a line of thought common to researchers from different research institutions.

This book unravels the secrets and paths available for a collaboration between the economy and research institutions in Slovenia, along with practical information on how the TTO is dealing with its everyday tasks, some administrative and some very demanding, ranging from sorting out the paperwork to developing new financial instruments together with the European Commission.

I believe that for a small country like Slovenia, setting standards on a national level will be particularly important.

I understand that many Slovenian companies are already using competencies and results from the public research to develop their business, and it is my hope that many more Slovenian companies will benefit from working with these institutions, inspired by this manual.

The manual describes principles and guidelines, but also goes into detail on how collaboration and access to IP can work in practice. Public research institutions have a difficult task – especially in a small country – to balance their international outlook and the need to serve their local community. I trust that this manual will help Slovenia take a big step further!

A handwritten signature in blue ink, appearing to read 'J. Winkler', with a long horizontal flourish extending to the right.

Authors

Dr. ŠPELA STRES LL.M., MBA, Patent Attorney, Certified Licensing Professional – CLP, Registered Technology Transfer Professional – RTTP

Dr. Špela Stres has been Head of the Center for Technology Transfer and Innovation since its inception in 2011. In addition to extensive experience as a leader, she is also the President of the Association of Professionals for Technology Transfer of Slovenia, the Chair of the International Technology Transfer Conference (ITTC) organizing committee, a member of the distinguished network TTO Circle, a member of the Interinstitutional Working Group on Science, Technology and Innovation for achieving the objectives of sustainable development, a member of the Management Board at CERN HEPtech, project coordinator for the Enterprise Europe Network, a member of the Science With and For Society Advisory Group at DG Research and Innovation, a member of the Future and Emerging Technologies Advisory Group at DG INFSO, a member of the Enterprise Europe Network Strategic Advisory Group at DG Grow, a regular associate in expert groups at DG Grow and DG Research, and an evaluator in national and foreign tenders. She also has experience in the field of managing complex licensing cases, resolving intellectual property disputes, managing Slovenian and European projects and consortia, and as a lecturer on innovation, intellectual property and technology and knowledge transfer, both in Slovenia and abroad.

Dr. LEVIN PAL

Dr. Levin Pal is Head of the Intellectual Property Patenting and Licensing Group, Senior Expert in Technology Management at the Center for Technology Transfer and Innovation, as well as the Vice-President of the Association of Technology Transfer Professionals and Chair of the BioChemTech Sector Group. As a technology transfer officer, his experience is in the field of group leadership, operational work on EU projects, management of intellectual property protection procedures (acquisitions of inventions, cooperation with the IP commission, preparation of draft patent applications, conducting communication with patent agents, advising researchers on protection strategy, managing the co-ownership of inventions ...), passive and active marketing of technologies (preparation and publication of technology offers, active marketing at B2B events and within sector groups), management of negotiations with interested companies, and signing of research, licensing and other contracts.

It's a question of trust
It's a question of trust
It's a question of not letting what we've built up crumble to dust



Foreword

WE LIVE IN MOMENTOUS TIMES. Every year, less funding is available for research. We rely on what have until recently been non-existent financial resources in order to survive and attempt to maintain a level that befits the important performers in Slovenian science, who have helped write the history of our institute over decades and centuries.

We are strong and fearless, as science is the tip of an arrow that flies through time into the future, and only by trusting it will we be able to take the necessary step forward, infinitely difficult as it may be.

We live in momentous environments. Improving the cooperation between public research organisations and the economy is a political guideline, but we are on the side of professionalization.

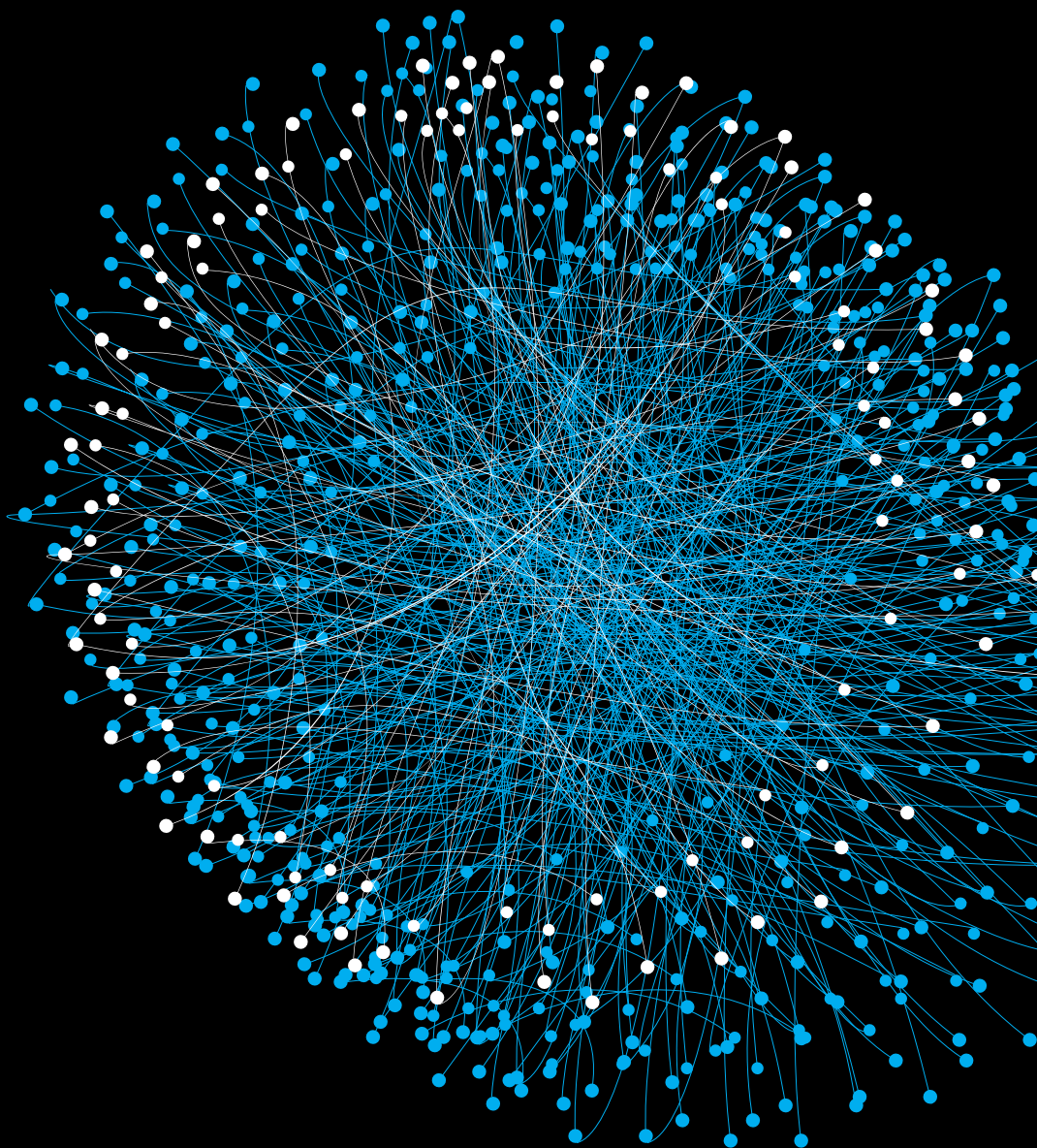
We try to open this place up as much as we can and illuminate it so that fragments of possibilities can shine through. Possibilities that, like gentle pieces of being, reflect in the air – between us and them. We are not nothing.

We are merely weavers of threads between them – between two brothers, two sisters, a brother and a sister who, over decades of their own excellence, have lost their touch and sense for each other. Perfect on their own, but together so insufficient in their ability to shake each other's hand, as particles of stardust are suspended in the air. These opportunities, which the universe created with their help and for them to use, yet they peer through them into space, cold and disconnected. We are not nothing.

We are merely the creators of sparks through which newly opened and illuminated space and time morph into a space without gravity, into a space of discovered opportunities, joined hands and love – a love of cooperation. We are not nothing.

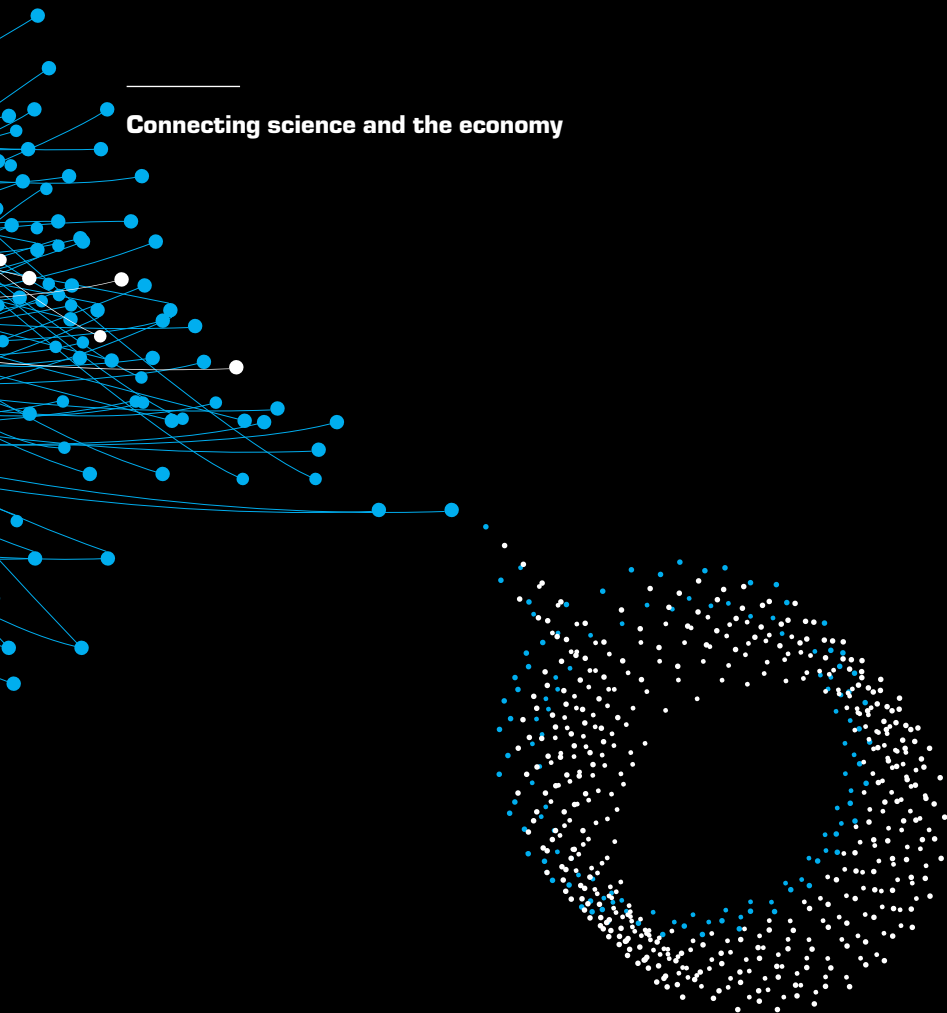
And yet we are here, and we are presenting you with one of these sparks.¹

¹ Opportunities for Collaboration with the Jožef Stefan Institute (November 2017)



1.

Connecting science and the economy



THE PURPOSE OF BASIC RESEARCH is not the direct and rapid application of the results for practical use, it is focused primarily on discovering the foundations of long-term benefits for humanity. More applied areas of research are, by their very nature, intended for the faster transfer to practical use, but the timing of the practical application of the research results varies widely by field, from relatively short cycles e.g. information communication technologies, to longer cycles e.g. biotechnology or pharmacy.

At the personal level, researchers are driven by various motivations, but from the point of view of the broader society that finances research activities, it is clear that regardless of the character and field of research, society expects a short-term or long-term practical benefit from the activities that it finances. This is also reflected in practice. In a global competitive environment, in which we as a country are situated, technological development is one of the few competitive leverage mechanisms with which we can indirectly create added value. It generates a head start over other players in the global market, enabling adequate earnings of the economy, part of which returns via taxation to the financing of development and research within public research organizations (PROs). For the operation of the entire cycle (Figure 1), the success of the application of knowledge and technologies from PRO is of vital importance. This is an extremely important issue, since the economy of Slovenia, like other economies, generally does not have sufficient knowledge and capital to independently develop the demanding technological breakthroughs that are urgently needed for dominance on the market, and it often remains in the field of technological improvements and intermediately sophisticated technologies. The actions of the economy in the field of high technology are far too scarce in light of the relatively high price of the workforce in Slovenia relative to the competitive conditions in the global market.

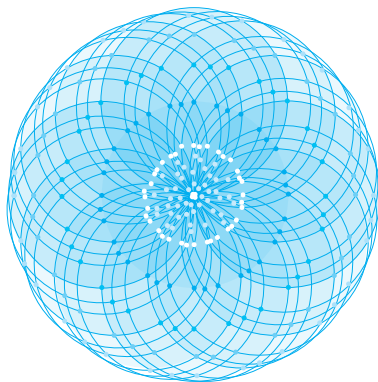


Figure 1.: Science – economy – society are intertwined in a vortex of time, where science offers breakthrough development ideas and novelties to the economy, the economy develops new and improved services and products, and society takes part in the developments, and consumes, paying the economy for services and products and paying taxes to the country, which in turn fuels the financing of science.

A particular reason for unsatisfactory results in the transfer of knowledge from research into the economy, as often reported by newspapers, are low investments in R&D. The statistical data² do not support these claims in full; they show that, according to R&D expenditure, the proportion of researchers versus the total population and the business sector, according to the EU27 mean, is average. Nevertheless, the claim that greater investment in research and development would definitely enable better, faster development is always correct.

Elsewhere, we can find statements that the economy is not interested in collaborating with science, and while we will not be discussing this in detail, we should add that our experience in the field of science and the economy in recent years suggests otherwise. The fact is, of the hundreds of Slovenian enterprises invited to collaborate with the JSI or other public research organizations in recent years, not one has expressed disinterest in cooperation.

Some argue that the competitiveness of the economy, being less than desired, is the result of poor cooperation between science and the economy in the field of intellectual property, alongside the ignorance of researchers and their inadequate diligence in intellectual property issues.

National authorities are becoming increasingly aware of the extraordinary importance of transferring technologies and innovations generated within public research organizations for commercial exploitation in the economy and are trying to encourage such activities using various mechanisms. A better understanding of the field also coincides with the guidelines of the European Commission and its constantly updated reflections on innovative pushes for the economy in the single market. In parallel, the activities of public research organizations in this field are increasing. In recent years, several high-tech spin-out companies and licensing contracts or industrial property contracts have been established within the framework of public research organizations. Unfortunately, despite the elaborate legal frameworks for the successful transfer of technologies, this kind of legal practice is still in the throes of old habits and vices, which are not always consistent with the formal legal situation. Some virtual problems are presented as well; it is actually impossible to establish a spin-off company in Slovenia within the framework of public research organizations. This presents a problem, especially if we do not know what we want to achieve or what a spin-off company is – and particularly in the virtual condoning of the still low number of high-tech spin-out companies. And no, we have indeed not mixed the two terms here. Practical examples of technology transfer are still in their early stages, and the great untapped potential of Slovenia in the field of technology transfer calls for intense and accelerated operations.

And yet, the transfer of technologies requires - a researcher. There can be no flow without a source. Slovenian researchers are bold, positive and a remarkable

² Innovation Scoreboard

type of people. To date, there has not been a case of a researcher refusing to transfer their discovery to the economy for use and benefit. Encouraging, isn't it? Therefore, they deserve respect and support for their efforts. Each and every one of them.

1.1. Activities of technology and knowledge transfer

Science is focused primarily on discovering the foundations and creating conditions for long-term benefits for humanity. In this effort, science is and must remain free and autonomous.

Science is also a generator of technological, non-technological, organizational and other inventions that, through economic activity, get the opportunity to be implemented as services or products and come to life as innovations. In this way, science (in a more or less direct or short-term form) returns the benefits to the economy as a public budget generator.

The collaboration of public research organizations (PROs) with the economy is roughly divided into the following types of activities (Figure 2) (EC, A composite indicator for knowledge transfer, October 2011):

- contract collaboration with the economy, which includes consultancy, contract research and contract collaborative research (the degree of involvement of the economy in the latter is increasing);
- marketing intellectual property by establishing spin-off and spin-out companies;
- the licensing and disposal of intellectual property rights of PROs;
- communication through public announcements and events (non-technical, professional, scientific articles; conferences, exhibitions);
- teaching (at graduate and postgraduate levels);
- the exchange and transfer of staff.

The part of the transfer of knowledge from the PRO to the economy, which directly brings or helps bring a new product or service to the market, is characterized by an orderly, moderated process (management of innovations, CEN/TS 16555-1 standardisation), which seeks to increase the number of positive coincidences in which an invention is transformed into an innovation on the market. The moderation (management) of this process is implemented via technology transfer offices.

The transfer of knowledge from PROs to commercial exploitation in the economy, where technology transfer offices are key players, comprises the first three types of activities. The activities are connected in their implementation and run in parallel with the adequate protection of intellectual property rights. Due to the lengthiness of the protection processes and their potential financial complexity, the design of strategies is a necessary part of the protection of intellectual property itself.

Set 1.

Contract collaboration

These are various forms of cooperation between businesses and PROs for which a collaboration agreement is signed. The results of the contractual activities vary according to the size and complexity of the operations and the company's involvement in carrying out the contract.

- **Consultancy.** Problem-solving in the form of opinions and studies that do not require specific equipment, but rather the knowledge of the researcher.
- **Contract research.** This mainly involves solving problems encountered by contractual economic partners (various measurements and assessments). Generally, this research has lower values and a shorter duration. Problem-solving requires specific knowledge from researchers and equipment from the research institution. The results of development research work are generally not publishable or patentable and constitute a trade secret. This type of collaboration between Slovenian PROs and the economy is an established practice and has been successful in its current scope.
- **Contract research collaboration.** This is more complex and extensive research, aimed at the further development of technology and bringing the technology closer to market requirements. The usefulness of the results is not directly obvious, but there is a strong interest in research by industry. Research development work results are typically intermediate products and prototypes, the contract values are significant, and the duration of the research is longer. The results obtained are normally suitable for publication and new intellectual property is eligible for protection.

Set 2.

Licensing / Sales of intellectual property (IP)

This is the marketing of intellectual property to business partners or to own spin-out companies under a licence agreement or sale of IP. It concerns the sale of a licence for the right to use the IP or the divestment of the ownership of IP rights, generated by the PRO, to interested economic partners.

Set 3.

Establishing Spin-Out / Spin-Off Companies

In order to exploit the newly created knowledge, the researchers can establish a company with the PRO, co-owned by third parties (spin-out company) or co-owned by the parent PRO (spin-off company). In the case of spin-off companies, the PRO is a proprietary co-owner on the basis of intellectual property in the [joint] ownership of the PRO and the spin-off company. In the case of spin-out companies, the PRO signs a licence agreement with the new company to benefit from the resulting knowledge. In the long term, technology transfer from a PRO to the economy in the form of a new company is the most profitable, and directly contributes to the creation of new jobs and improves the competitiveness of the economy; however, it represents the highest risk for the individual.

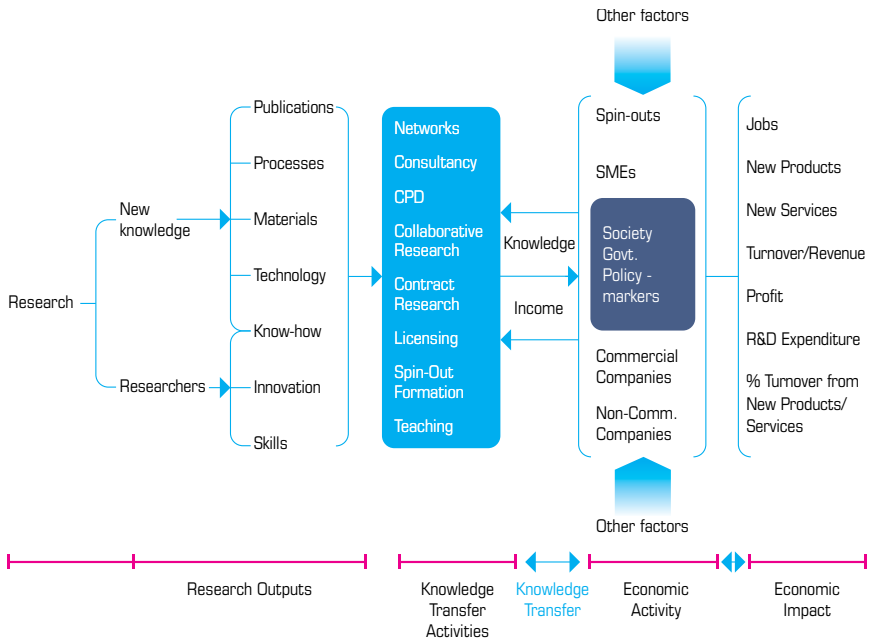


Figure 2.: The process of transferring technologies from research to its impact on the economy. Source: A composite indicator for Knowledge Transfer, European Commission, October 2011

1.2. Intellectual property

The basis for transferring technologies from PROs to commercialisation is the intellectual property created by the PRO.

Intellectual property is divided into copyright (know-how) and industrial property rights (patents, designs, brands, ...) (Figure 3).

Copyright is covered by the Copyright and Related Rights Act, while industrial property rights are covered by the Industrial Property Act. Copyright is important for understanding the rights deriving from various forms of scientific contributions (e.g. articles, speeches, lectures). Forms of industrial property are patents, which are most common in the industrial property portfolios of public research organisations (PROs), as well as brands, models, geographical indications, printed circuits and agricultural varieties, which, however, occur less frequently among researchers.

Intellectual property does not represent a physical object, so we will address it in the context of the obligation right we may own or are transferring (possibly

against compensation]. As an intellectual property holder, the PRO manages the right to use intellectual property and decides what to do with it. This primarily includes the decision on whether or not to protect it and, in the case of protection, how the latter will be commercialised. In the case of commercialisation, the benefits or rewards for the authors of the intellectual property created in the PRO must be regulated as well.

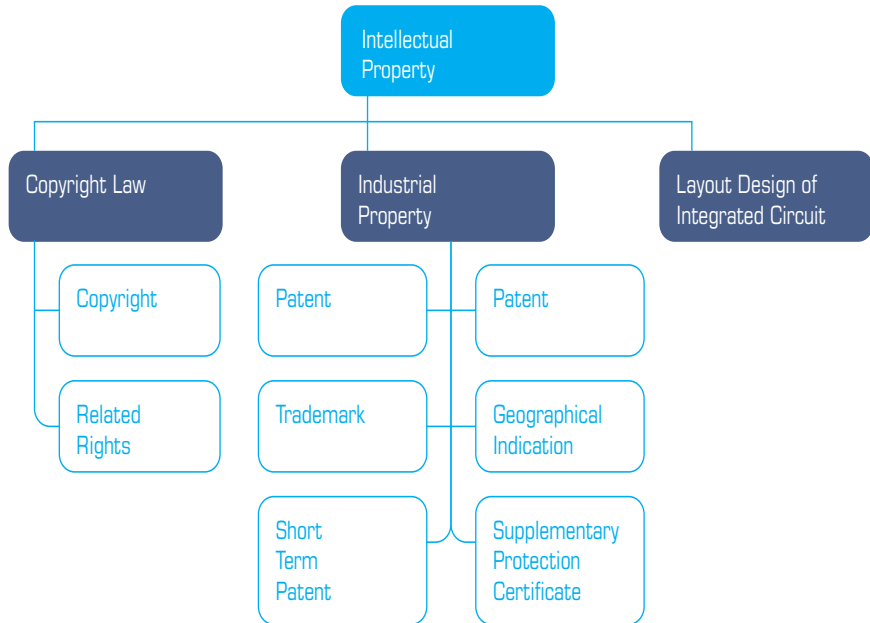


Figure 3.: Intellectual property – division by category.

The legal basis for determining ownership of the results of the research work of PROs is mainly Article 22 of the Employment-Related Inventions Act, which defines the contractual relationship between innovation funders and the actual inventors. The Act stipulates that contracts signed by public institutions of higher education or public research institutions with third parties relating to the financing or co-financing of research work must determine the owner of the inventions generated in the context of such research and resolve the question of the rights to use these inventions, as well as the amount and modalities of the potential specific payment. In doing so, due account should be taken of the contractual obligations of all participants. An important provision of the Act is that contracts for the financing of research signed by the state with public higher education or public research institutions will also stipulate that the state renounces the rights to potential innovations stemming from this work.

The moral copyright of the author is inalienable. In the case of material rights, however, there is no unambiguous rule, the key question is who pays for their protection and creation. In the case of a PRO, the funder, i.e. the state that is financing the scientific research work from the budget obtained from tax collection, renounces the material rights to intellectual property. The PRO decides whether the newly created intellectual property is a result of the work of the employees or of persons related to the organization in projects of the PRO (but not necessarily during working hours) or through infrastructure that owns the PRO. If it decides that the newly created intellectual property is connected to the organization, it shall also decide how to manage the intellectual property. However, if - since it is not possible to establish a connection with a PRO - it is given to the author and the author decides to carry out commercialisation independently, the author bears the costs and also the potential benefits of marketing the results or material intellectual property rights. The party that takes on the risk of investing in the invention and its potential commercialisation will also reap the benefits of a successful sale. If the PRO has decided to commercialise the property rights of intellectual property, it shall also bear the costs and potential benefits of commercialisation.

1.3. Support for the transfer of technologies and knowledge from PROs to the economy

There are several different organisational forms in Slovenia that allow or support the transfer of knowledge from PROs to the economy, between PROs, between enterprises, and from the economy to PROs. These include centres of excellence, university incubators, technology parks, VEM points, technology transfer offices, competency centres, etc. Some (but not all) of them are defined in the Supportive Environment for Entrepreneurship Act, while others are part of the cooperation with the SPIRIT state agency or with various ministries that have established and supported these organisational forms over time.

Transfer activities can be divided into (1) network and platform creation, (2) contract research, (3) collaborative research, (4) establishment of spin-outs, (5) licensing, (6) continuous professional development, (7) teaching.

The target interest groups for which these different organisational forms provide support services vary according to industry, the age of persons, education achieved, geographical location ... The various stakeholders must be addressed in such a way as to ensure the comprehensive progress of society. Therefore, balanced support should be offered, taking into account the needs.

It is important to distinguish between organisational forms that can carry out different knowledge transfer activities and the knowledge transfer activities themselves – and that individual knowledge transfer activities are dispersed

for implementation in different organisational forms. Table 1 summarises some of the organisational forms found in Slovenia and the knowledge transfer activities that they perform – along with their respective target groups.

Table 1.: The individual existing organisational forms of knowledge transfer in Slovenia, activities (from the process) of knowledge transfer (from Figure 2) they provide, and the target groups to whom these services are offered. Also shown is the assessment whether the offer is comprehensive (leads to realisation) or partial (only part of the service necessary for market realisation).

INDIVIDUAL ORGANISATIONAL FORMS (Slovenia and foreign examples)	Transfer activities	Target group	Offer of services
E-platforms – open innovation platforms	creating networks/ platforms	everyone	partial
technology transfer offices	contract research contract research collaboration, the establishment of spin-outs, licensing	researchers professors doctoral students enterprises linked to the above	comprehensive
CEs	contract research contract research collaboration	researchers professors employed in economic activities employees in non-economic activities doctoral students	comprehensive, but with a lack of technical staff for mentoring and coaching process
CCs	contract research contract research collaboration	researchers professors employees in economic activities employees in non-economic activities	comprehensive, but with a lack of technical staff for mentoring and coaching process
MBC (U.Aalto) – an example of a comprehensive approach from abroad	contract research contract research collaboration, the establishment of spin-outs licensing continuous professional development	researchers professors employed in economic activities employees in non-economic activities students	comprehensive
innovation vouchers / development vouchers	contract research	researchers professors employees in economic activities employees in non-economic activities development departments (may also be dedicated to a broader social environment or non-technological innovation)	Slovenian voucher – (a measure that is underdeveloped in Slovenia but has great potential with a reasonable formal system)
CPI	continuous professional development	staff pensioners	partial

INDIVIDUAL ORGANISATIONAL FORMS (Slovenia and foreign examples)	Transfer activities	Target group	Offer of services
Demola	contract research	students professors – mentors	comprehensive
technology centres	contract research collaboration	employees in economic activities – development departments (including universities, PROs, etc.)	comprehensive
consortia of universities and/or faculties/institutes/PROs with economic and non-economic activities – networking forms of knowledge transfer (e.g. Collaborative Projects in FP7)	contract research collaboration	researchers professors employees in economic activities employees in non-economic activities (impact and cooperation with the broader social environment)	integrated, supported by coaches on the ESIC2 platform to assist with commercialisation
»hekovnik« (part of the services that most incubators do not provide because they do not have sufficient human and financial resources and therefore do not develop an integrated approach)	the establishment of spin-outs	students and self-employed innovators	partial by nature – offering only coaching in one segment, urgent connection to technology parks (this connection is already happening through Start:up Slovenia)
student incubators / university incubators	the establishment of spin-outs	students	partial; limited resources for advisory and other comprehensive services

1.3.1. Formal regulation of technology transfer offices in Slovenia

The state has established universities and public research institutes (PRI) with the Institutes Act and the Higher Education Act.³ The funding of research in universities and PRIs is presently being carried out through calls for tenders from the Slovenian Research Agency (ARRS) in accordance with a number of regulations.⁴ Because researchers compete for funding for their research proposals at regular intervals (every year, every 4 or more years) on the basis of specific criteria, it can be argued that the research funding from the Slovenian national public budget is organized on a project and programme basis, which to a certain extent supports positive selection within the field of research and allows researchers to carry out creative work in a relatively stable environment.⁵

³ <http://www.uredni-list.si/1/objava.jsp?urlid=2003134&stevilka=5826>

⁴ <http://www.arrs.gov.si/sl/akti/>

⁵ We will not be discussing the qualifications of the researchers as civil servants and the absolute impact of the ARRS selection system at this time. It is only worth noting that the system is regulated in many places by a more positive or a more negative selection, which also depends on how we define positive and negative selection.

With the Industrial Property Act⁶, the government has adopted a regime in which it leaves the ownership of all inventions, funded from the budget in the above-described way, under the management of the universities and PRIs where the research was conducted (under conditions that ensure the established rules for the management of these inventions are followed) [see Articles 21 and 22]. Since the Republic of Slovenia followed the rest of the EU (excluding Italy and Sweden, both of which leave their intellectual property under the management of the researchers themselves), commercialization is a responsibility of the knowledge institution (not the researchers themselves).

The Supportive Environment for Entrepreneurship Act⁷ (or the Guidelines on Keeping Rules on the Innovative Environment)⁸ introduced a corporate environment in Slovenia (enterprise and university incubators, technological parks ...) [see Article 2 of the Guidelines]. Each of these organisations should support the development and mutual participation of young and somewhat older enterprises in a specific way prescribed by the Guidelines. The transfer of knowledge and inventions to the market through the creation of new businesses should be mainly facilitated by university incubators together with technology transfer offices.

With the Industrial Property Act⁹, the state established the Slovenian Intellectual Property Office (see Article 5) and primarily tasked it with receiving filed applications, by which the assigning of industrial property rights is requested, and conducting procedures for granting these rights, managing the accompanying rights registers, performing information services, and representation of Slovenia at WIPO, EPO and other international organizations managing international contracts in the field of IP, a signatory of which is the Republic of Slovenia.

Technology transfer offices are mentioned (but not defined) in the Guidelines on Keeping Rules on the Innovative Environment. A proper location was given for the offices in the 2011 Resolution on the National Research and Development Programme 2011-2020¹⁰, whose initial goal envisions an improvement in knowledge transfer through the regulation of the systematic financing of technology transfer offices and the establishment of a metric for the evaluation of its effectiveness, with the aim of defining the transfer of knowledge as one of the key strategic missions of the PRO towards society, in a system that provides incentives for collaboration, trust and good integration in the field of research. The resolution also defines the bases for the evaluation of performance through the achievement of the effects of the transfer of knowledge

⁶ http://zakonodaja.gov.si/rpsi/r02/predpis_ZAKO5122.html

⁷ <http://www.uredni-list.si/1/objava.jsp?urlid=2007102&stevilka=5064>

⁸ http://zakonodaja.gov.si/rpsi/r05/predpis_PRAV8195.html

⁹ http://zakonodaja.gov.si/rpsi/r08/predpis_ZAKO1668.html

¹⁰ <http://www.uredni-list.si/1/content?id=103975>

and technology in the form of licences, newly created enterprises (number of companies and employees) and revenue growth.

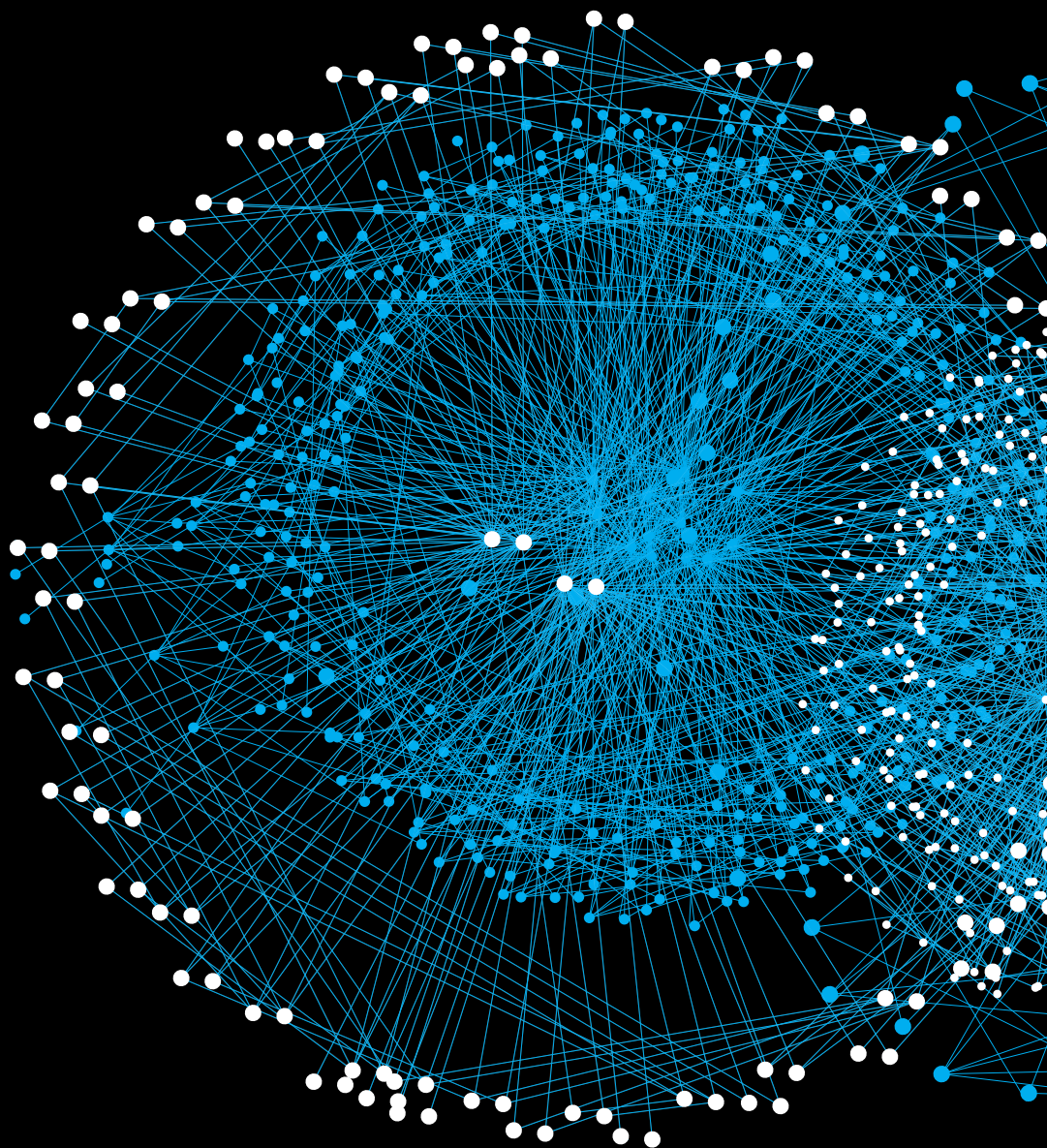
The Slovenian economy is a public budget generator of the Republic of Slovenia. A substantial share of the financing for Slovenian science comes from public funds – partly from Slovenian public budget, partly from the European budget (European projects), and the share of funding directly from the economy is not negligible. Therefore, at PROs, we are aware that an increase in the competitiveness of the Slovenian economy also depends on good cooperation between science and the economy, and we want to do everything we can to enable such cooperation.

This would conclude the path from science to the economy, and everything in the innovation support system in Slovenia seems to be in the right place. And yet, debates often arise among the public on the reasons why cooperation between science and the economy is not optimal.

1.3.2. The average technology transfer office

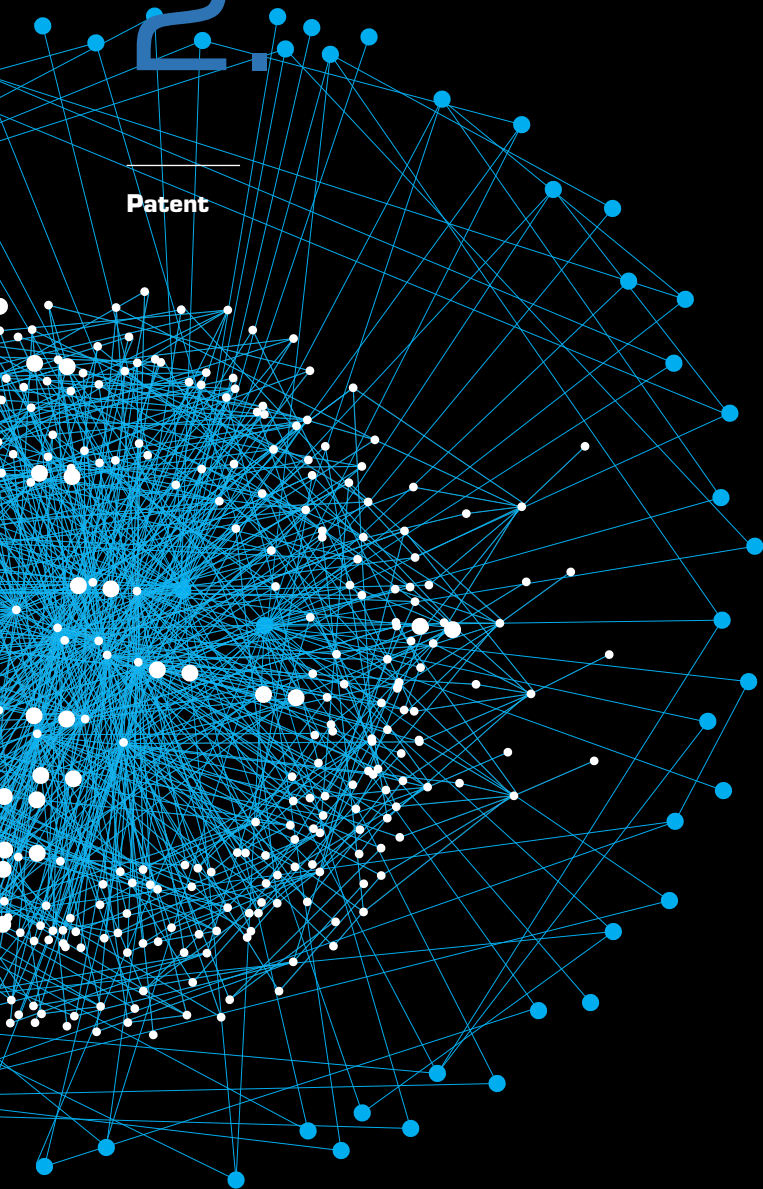
The average size of a technology transfer office in the EU (Knowledge Transfer Survey, 2011, EC, 436 JRO) is 8.5 FTE. More than 83% of technology transfer offices employ staff with degrees in technical or life sciences, 70% employ staff with formal management qualifications, 58% with formal legal qualifications and 35% with degrees in finance. Among the other employees, we find mostly expertise in medical science, innovation management, technology management and patent professionals with formal qualifications – 13% of technology transfer offices employ this type of staff. The surveyed organizations included 93 PROs with up to 500 researchers, 126 PROs with 501 to 1250 researchers, 92 PROs with 1251 to 2500 researchers, and 103 PROs with more than 2500 researchers.

It is therefore likely that for PROs with a small number of researchers, it is not financially reasonable to maintain a technology transfer office that will have all the necessary personnel to operate successfully. Especially in Slovenia, which has about 3000 registered researchers (not all of them from PROs, some come from the economy), it doesn't make sense to organize several offices for technology transfer and, therefore, collaboration is of key importance.



2.

Patent



A PATENT IS AN INVENTION, written in a specific, predefined form for which we can determine, following a certain amount of verification, that it comprises a new, economically usable and sufficiently unexpected content to meet the criterion of an inventive step and cannot be classified as obvious or trivial. Verification of the adequacy of the contents and forms of the patent application is carried out by intellectual property offices. If all three verifications are carried out, this means that a complete examination of the patent application has been carried out before the patent is granted. If it is being verified whether a patent application formally meets the legal form requirements and, for example, that it is not trivial (*perpetuum mobile*) or offensive to the state; this is called an »examination of obviousness«.

A patent is a type of contract between the state and the individual (a natural or legal person), by which the state provides the individual with a negative right – a time-restricted monopoly by which they prevent others from using their industrial property in exchange for the disclosure of the invention to the public.

By filing a patent application, the definition of the protection of the patent is mostly finalized, so the patent application must be well written, as it cannot be significantly changed later without changing the priority date or making substantive alterations. The validity and marketability of the patent depend on the patent application. If the patent application changes throughout the process (it can be reduced), this will hinder us in any subsequent court proceedings that could arise if the patent has a high market value.

Intellectual property offices act as a support by ensuring that the contract between the state and the individual can only be signed by an individual whose invention meets predetermined substantive criteria. The Slovenian office grants patents to applications that meet the formal criteria for a patent; patent examiners do not pay much attention to the content, since a complete substantive examination is not a prerequisite for awarding a Slovenian patent document. This type of regulation is part of the procedure written in the legislation of the Industrial Property Act, but inventors may not be sufficiently aware of it. For the Slovenian inventor who proudly exhibits a Slovenian patent document (the fact that in international law, a granted Slovenian patent only means a published patent application, is not specifically highlighted), this document acts as an attestation of achievement. However, the Slovenian patent is not proof of the quality of the invention, as it was granted solely on the basis of an obviousness examination and a review of the format of the application – and moreover, no patent granted in the world is a guarantee of successful marketing.

2.1. Does a patent guarantee market performance: Interweaving protection and commercialization

A patent is not a guarantee of the quality of the invention, much less a guarantee of its market performance. The existence of a Slovenian patent ensures that the text is properly formulated and, after a preliminary examination, that the content is not entirely impossible, offensive and the like. The existence of a foreign national patent could mean that patent examiners did not find anything equal or sufficiently similar in the existing literature, which does not guarantee that this will not be found by the counterparty's experts in court in the event of an alleged infringement of industrial property rights.

A (breakthrough) invention is not a guarantee of a high-quality patent. High-quality research work and the quality of the resulting protected intellectual property are not necessarily directly interdependent. It is entirely possible to write a high-quality patent for an obscure invention and vice-versa. After all, patents are not meant to be registered in a database, but to be marketed. A high-quality patent enables presence on the market (even if it describes an obscure invention), allowing sales of products or services based on protected technology only by those who can use the rights from the patented technology (rights holders). A high-quality patent is written in such a way that it can prevent others from using the invention described with no particular reason, or a rights holder may prevent the use of a particular technology on the market in order to boost another technology instead. Low-quality patents do not enable marketing because they do not provide any of these rights with a sufficiently high probability. The fundamental difference between invention and innovation is the market: invention only becomes innovation when it is accepted by buyers, or when the author has an economic benefit from the innovation. A patent that does not generate economic benefits (from its exploitation or prevention), also does not justify the cost of protection and is therefore nonsensical from this perspective.

There is a complex relationship between the protection of intellectual property and commercialization in technology transfer. From the point of view of intellectual property protection, it is sensible to keep a discovery or innovation secret for as long as possible, while from the point of view of commercialisation – the cooperation of key stakeholders and the acquisition of financial resources – it is sensible to disclose the innovation, or at least its functionality, relatively quickly.

Intellectual property in technology transfer is normally protected by patent protection, first by a national patent application, then by international PCT protection. With the help of these two protections, it is possible to protect intellectual property for 30 months practically all over the world and at a low cost, which does not exceed EUR 3000 when the applications are drawn up independently. Further protection of intellectual property is, however, very expensive. For

example, initial patent protection in 10 European countries amounts to around EUR 50,000, to which annual extension payments must be added after the initial protection period has expired. Due to the dynamics of intellectual property costs, the proper timing of the first intellectual property protection application is extremely important – this is most often a national application, also enabling the extremely fast implementation of the process of commercialisation, so that a large part of the process of commercialisation can be implemented with low protection costs. Quick action is also important from the point of view of followers and the simultaneous development of related solutions elsewhere in the world.

At the same time, it is crucial to be aware of the fact that the protection of intellectual property rights through patents is just one of the possible mechanisms for the protection of commercial benefits of the organization that holds the intellectual property. On many occasions, protection through patents can even be harmful – for example, if the commercialisation process is too slow, if the commercial exploitation process is very time-consuming, or if we do not have (extreme amounts of) protection resources available in the targeted global markets after the expiry of PCT protection. The patent application describes the innovation in detail, and the application is available on the world wide web for a certain time after filing, so that anyone from anywhere can have insight into our technology. This enables potential followers to copy the innovation if it is not adequately patent protected. In the case of your own marketing of solutions, the rapid penetration of the global market is also of crucial importance from the point of view of the protection of intellectual property rights, since an already successfully launched innovation will only yield meagre market rewards, and therefore be less attractive, for any followers that would attempt to copy the innovation.

2.2. The eternal crisis of the patent system

The patent system was created on the basis of the interests of individuals in order to protect the intellectual creation they have invested finances and time into, with the aim of being able to market it as well. The first patents were Venetian, formally intended for the same purpose as today and under similar conditions. After that, the Queen of England shifted the focus of the patent system by distributing patents primarily to those who had stolen their knowledge abroad (as a reward for their theft); patenting with the goal of destroying competition became widespread, and the queen would award patents to her loyal followers ... This was when it first became apparent that the patent system was not working¹¹.

Today, the largest investments of time and money in development are not made by individuals but by corporations. Patents are the wars of large companies, and individual innovators have a much more difficult time during the

¹¹ Craig Allen Nard, *The Law of Patents*, Wolters Kluwer, Aspen Publishers

commercialization of patents. The patent business is a business of litigations and courts, which does not guarantee the transparent international protection of intellectual property in the field of patents under international law due to the principle of territoriality, which is integrated into the patent system itself. Thus, in the case of *Lucasfilm vs. Ainsworth*, when British intellectual property was violated by a British citizen in the US, the courts there refused to rule on the infringement because the British citizen was never present in the US (he sold over the internet), and Britain likewise, since the violation took place in the US and they did not deem to have jurisdiction¹². [The case comes from the field of copyright law and had a happy ending.]

The same thing happened in the case of *Voda vs. Cordis*¹³ – when Jan Voda, an Oklahoma physician who held the rights to a special cardiological catheter for which he had acquired patent rights in seven different countries, sued Cordis for marketing a catheter similar to his patented product. The US Court initially ruled that Cordis was in violation of the rights of Jan Voda, but Cordis argued that the US Court cannot judge on intellectual property whose rights were granted by the office of another country. The judgment of the higher-level court was in favour of Cordis, concluding that even though Cordis may have been in violation of the rights in the US, the court where Voda filed his suit did not have jurisdiction, and thus he was denied intellectual property rights originating from outside the US and any related trial. In their opinion, Jan Voda had to seek justice in each of the six countries where he had a valid patent right. [Unfortunately, this story does not have a happy ending.]

In the United States, the patents of individuals and small businesses are often bought up by so-called Non-Practising Entities (NPEs or Patent Trolls), which have no intention of commercialising them, but rather to become a thorn in the side of a large corporation, threaten them with action little by little and hope to receive a settlement (pocket change for the corporation, but a fortune for the NPEs and the inventor). The patent world is wicked, much like the world of design and brands. This is a world in which we Slovenians are not very competitive with our patents – our expertise in their production, assessment and protection. But this is not because our researchers don't know enough about IP.

In defence of the statement that the patent system was created in order to support innovation, this is best seen now in the field of pharmacy, and partially biotechnology, as many drugs would not have been developed due to the large initial investments if investors did not have the opportunity to protect their market interests, at least for a certain period of time. Therefore, the patent system today is operational and supports investments in development, particularly where initial research inputs are large and research work is concentrated

¹² Benedetta Ubertaini, Intellectual Property Rights and Exclusive (Subject Matter) Jurisdiction between Private and Public International Laws

¹³ http://www.patentlyo.com/patent/2007/02/voda_v_cordis_p.html

in international giants. Here, the patent system is reflected in court proceedings that, for example, try to achieve delays before a generic drug enters the market, in the manufacture of drugs with a lower content of active substances for third world countries, and during negotiations and compensations¹⁴.

Another battlefield of the giants is information and communication technology. In the US, patenting in the field of software has been underway since at least 1970; through important Supreme Court rulings in software patent cases from 1972 and 1981, the USPTO (U.S. Patent and Trademark Office) issued the »Final Computer Related Examination Guidelines« in 1996 stating that the practical use of computer-related inventions is a matter that is entitled to patent protection. This has led to patents such as the Apple patent for the »Slide to unlock« function of the iPhone – a battle waged between Apple and Samsung in European courts. The European Commission has agreed to a compromise whereby so-called »computer-related inventions« are patentable in Europe as well, provided the proper terminology is used.

Developing countries are endeavouring to include the right to »traditional knowledge« in the system of international industrial property contracts, to which Slovenia is a signatory as well (PCT, Bern Convention, TRIPS ...). If your country has been using a local tree's active substance in its traditional medicine for centuries, but then some multinational corporation comes along and patents it, it is not difficult to imagine why this would happen.

Our country is »somewhere in between.« We are neither particularly developed nor underdeveloped. How can we use our skills to increase the competitiveness of our economy? Using industrial property to develop a country is a strategic decision that cannot be made overnight. According to some theories, the »deadweight loss« of monopoly in the case of a patent is still smaller than with reverse-engineered secret know-how. Others have ways of calculating¹⁵ when an economy would benefit more from keeping a secret than from patenting it. Pharmaceutical giants were looking forward to the adoption of TRIPS, since Article 27 explicitly set out their rights to patent microbiological processes. With this, the battle for patenting DNA has only just begun. Chakrabarty¹⁶ opened the door to the patenting of micro-organisms and today, a multinational corporation's patent is preventing the production of less expensive tests for the predisposition to breast cancer, as they have a patent on the gene. The patent system is reflected in all features of the world and experts from various universities are calling for reforms to allow it to realise its primary objective – »to support innovation«.

¹⁴ Carlos Correa, Patenting Human DNA: What Flexibilities Does the TRIPS Agreement Allow?, The Journal of World Intellectual Property, 2007, Vol10, no.6

¹⁵ Weak IP Rights and Innovation, L.A.Franzoni

¹⁶ Diamond vs. Chakrabarty

2.3. Estimation of the costs of a patent application

The application for a patent is associated with a number of costs, which can be divided into the costs of the application and the costs of the procedure. The amounts will vary considerably depending on the type of application in question (a national application in Slovenia or abroad, a European or an international patent application), as well as on the patent agent (or the country of the patent agent) chosen for assistance in the execution of the individual tasks.

The price of the patent increases with the passage of time; after the initial EUR 110 for fees at the office in Slovenia, it is necessary to add another EUR 3000 for an opinion on novelty, for which it is best to select a professional provider among one of the »International Search Authorities – ISAs«, and then also for the assistance of a specialized foreign patent agent, which will be able to edit the application in such a way as to withstand at least the first stage of verification of the validity of the patent application in court. Figure 4 shows the rough price rise over time for a specific case. Perhaps the most sensible thing to do is to follow the example of some small and medium companies abroad – if the patent is worth anything, sell it before the national stages; that is, within 30/31 months of the first application at the latest.

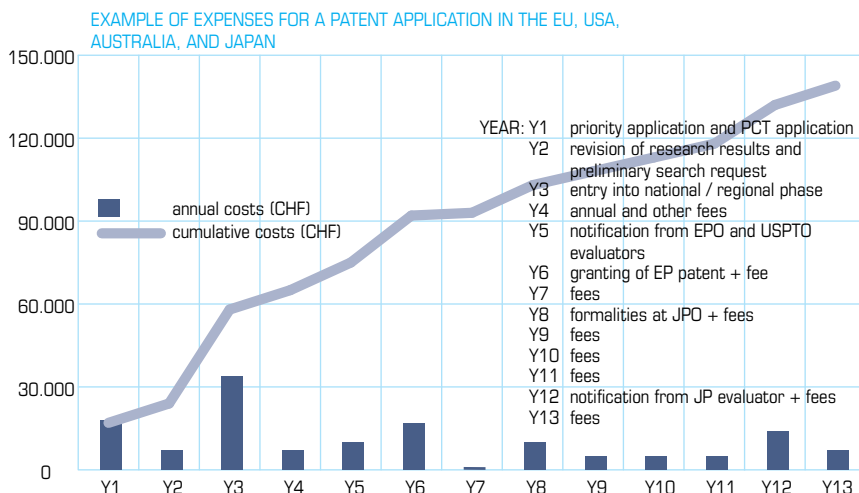


Figure 4.: »Costs of a patent application and patent-related costs increasing over time.« Source: EPFL materials for inventors, 2009

The following is an overview and an indication of the level of costs according to the stated modalities and, finally, the recommendations to be taken into account in light of the results of this analysis when submitting a patent application.

a) Overview of the fee costs for individual national and international patent applications

Table 2.: Indicative prices for each type of cost in the patent registration process at each patent office.

Patent office	Fees*		Costs of the application			Costs of the proceedings		
	Physical / electronic application	Application fee (EUR)	Search request fee	Fee for the international preliminary examination following the submission of a search request (EUR)	Total (EUR)	Fee for each further enquiry (absence of unity of invention) (EUR)	Obtaining a certified copy (EUR)	Annual fee for the fourth year of the patent (EUR)
SiPO	physical	110	/	/	110	/	16	34
DPMA	electronic	40	300	150	490	nd	nd	70
	physical	60	300	150	510	nd	nd	70
UK IPO	electronic	25	160	100	285	160	20	70
	physical	35	180	120	335	160	20	70
EPO	electronic	120	1195	1620	2935	1195	nd	**
	physical	210	1875	1620	3705	1195	nd	**
PCT	electronic	921	1875	2015	4811	1875	nd	**
	physical	1084	1875	2015	4974	1875	nd	**

* the prices collected on 09.04.2014 are informative and serve primarily for general comparisons of the amount of costs for individual national and international offices for IP

** in the case of international applications, include designation and extension [e.g. EPO: designation EUR 580; extension EUR 465 for year 3 and EUR 580 for year 4]

/ – service does not exist

nd – data not explicitly defined in the price-lists

b) Costs of patent agents

PREPARATION OF A PATENT APPLICATION

- the cost of drawing up a patent application is usually up to EUR 4,000 – on average about EUR 2,000

FILING A PATENT APPLICATION

- through a Slovenian patent agent
 - in Slovenia EUR 340
 - PCT application EUR 540
- via MewburnEllis
 - in Great Britain EUR 805
 - PCT application EUR 1400
 - EPO application EUR 1050

OTHER COSTS: patent agents (PA) charge additional costs (e.g. the modification of claims following a negative ISR, etc.), which are not covered by the following estimates

Data on the prices of services of patent agents are collected on the basis of price lists, quotations and invoices provided by patent offices and patent agents.

c) Estimation of the costs of the first patent application

Table 3.: The indicative service prices of each type of provider when submitting patent applications to individual patent offices.

Services	SIPO: prepared by a foreign PA, filed by a Slov. PA	UK IPO: prepared by a foreign PA, filed by a foreign PA**	DPMA: prepared by a foreign PA, filed by a foreign PA**	EP: prepared by a foreign PA, filed by a Slov. PA	EP: prepared by a foreign PA, filed by a Slov. PA**	PCT: prepared by a foreign PA, filed by Slov. PA	PCT: prepared by a foreign PA, filed by a foreign PA
Preparation of the patent application*	4000	4000	4000	4000	4000	4000	4000
Filing the patent application*	340	800	800	500	1150	500	1400
Application fee	110	25	40	120	120	921	921
Search report fee	0	160	300	1195	1195	1875	1875
International preliminary examination report fee	0	100	150	1620	1620	2015	2015
Costs of translation***	0	0	750	0	0	0	0
Total	4450	5085	6040	7435	8085	9311	10211

The prices are in EUR, the data is informative and serve primarily to compare the overall costs of the preparation and protection of IP with individual national and international IP offices.

* for the preparation of a patent application with a foreign PA, we take the fee to be EUR 4000

** price information taken from the Mewburn Ellis LLP patent office

*** minimum price for translation: 5000 words, official translation costs 0.15 EUR / word (data for translation from English to Slovenian; Antonija Flak, personal communication)

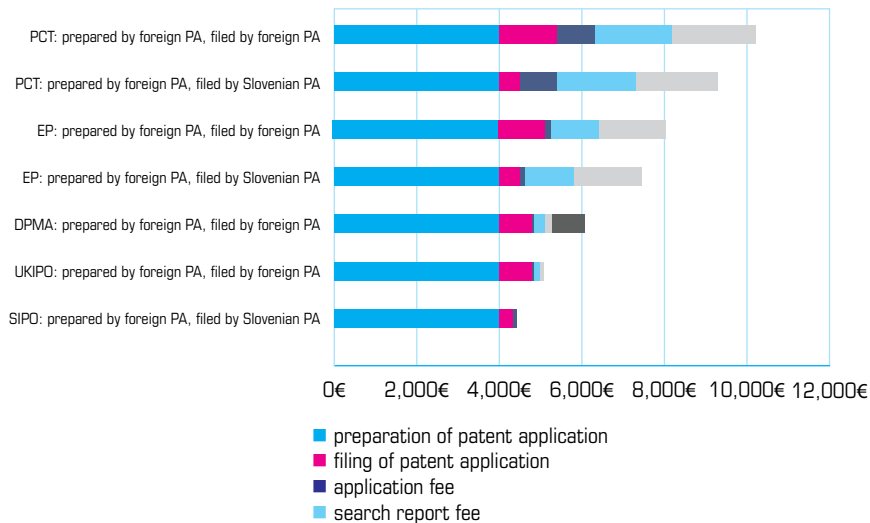


Figure 5.: The indicative ratios between the different types of costs involved in applying to individual patent offices.

d) Estimation of the costs of the international patent application under different scenarios

Table 4.: Indicative prices of an application to a patent office for different scenarios for filing an application for a patent.

Cost comparison	Scenario 1: PCT	Scenario 2: SIPO + PCT (Slov. PA)	Scenario 3: GB (foreign PA) + PCT (Slov. PA)	Scenario 4: GB (foreign PA) + PCT (foreign PA)
Preparation of a patent application	4000	4000	4000	4000
Costs of the first national patent application	0	450	1085	1085
Further costs of the international patent application	5311	5311	5311	6211
TOTAL	9311	9761	10396	11296

The data is informative and serves primarily to compare the overall costs of preparation and protection of IP with individual national and international IP offices.

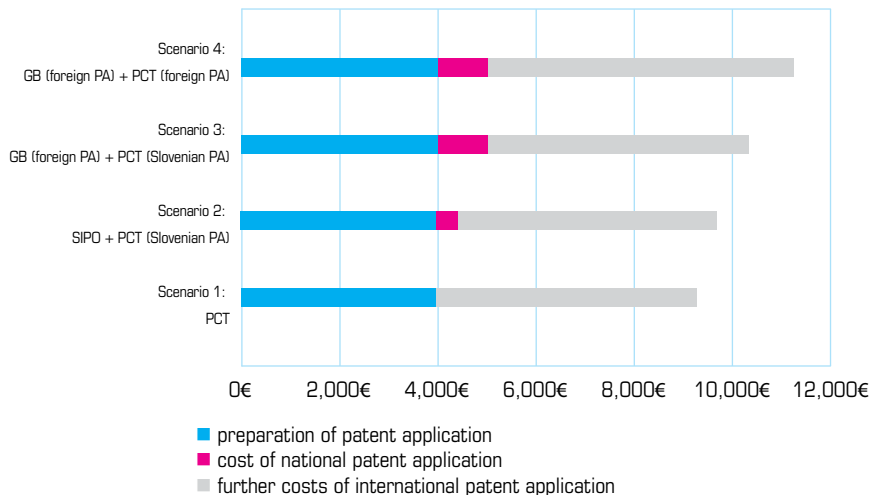


Figure 6.: The relationship between the total indicative prices for an application to a patent office for different scenarios of filing an application for a patent.

e) The recommendations

are the result of data collected in the previous three tables and in the previous three figures.

National application in Slovenia (SIPO)

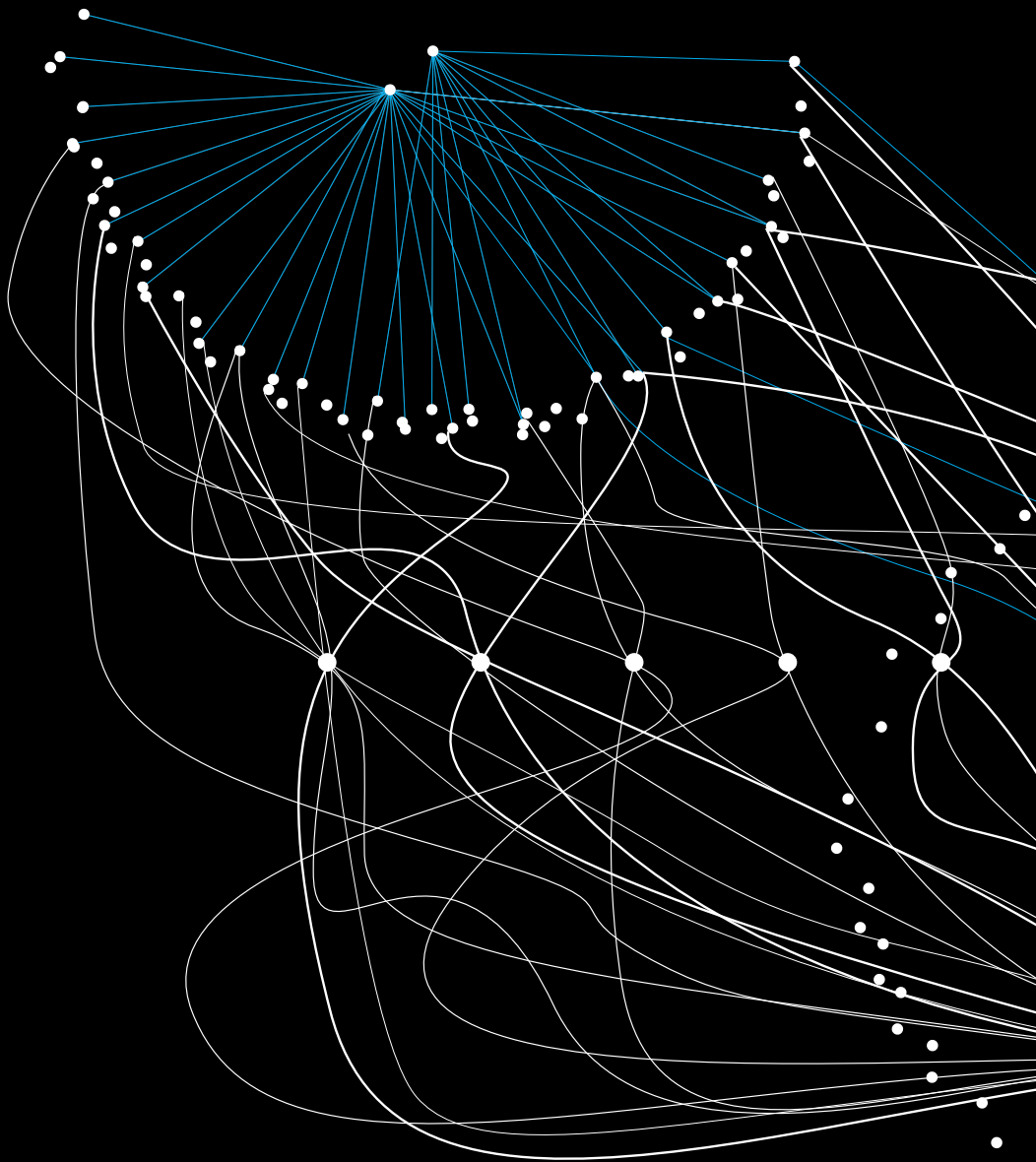
- for inventions with a low market potential

National application abroad

- for inventions with market potential, as assessed by the case administrator and the KTT commission
- for inventions where it is necessary to confirm novelty and inventiveness through an ISA query
- for inventions that would be forwarded to EP/PCT in the event of clearly expressed market interest

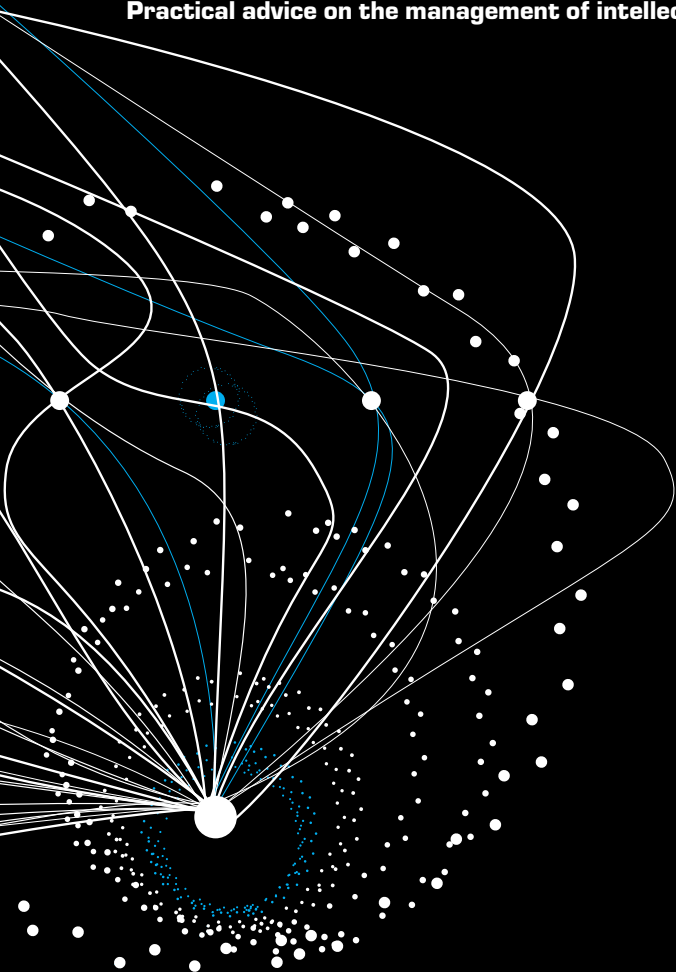
International patent application

- for inventions with a high market potential for which there is a clear and documented interest on the market
- for national patent applications whose international search report indicates novelty, an inventive step and industrial usability



3.

Practical advice on the management of intellectual property rights



3.1. Advice for deciding on protection

We will be focusing primarily on advice in the phase of deciding on protection, since this is the phase where most errors occur among inventors and their support teams, and at the same time, it is the most sensitive phase in the management of intellectual property.

As a general rule, the protection of intellectual property rights is only relevant if there is a clear commercialisation plan, including a preliminary market analysis and the identification of target buyers (of the intellectual property rights, licences or finished products launched on the market in the context of a spin-out). This should also be the basis for drawing up a time schedule for the protection of IP.

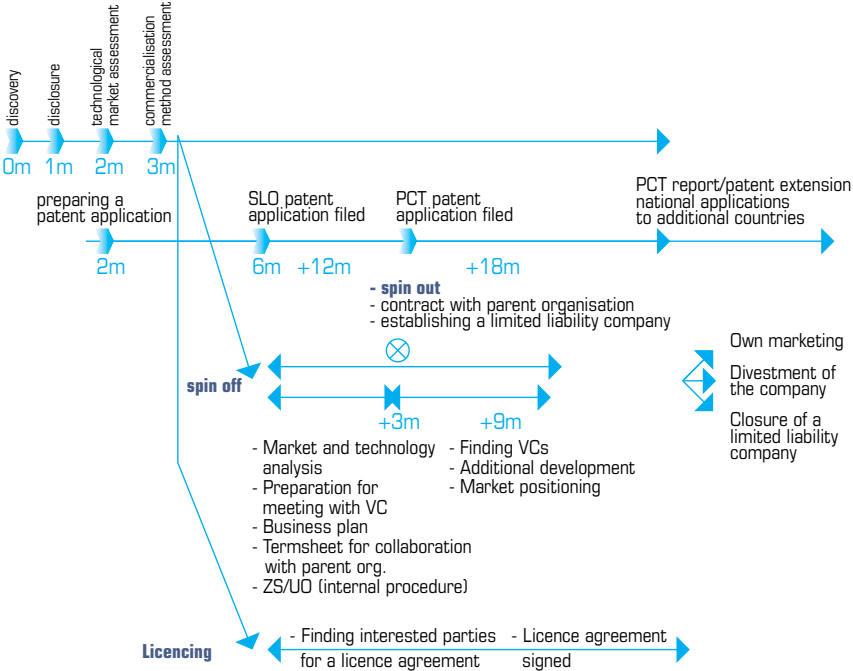


Figure 7: Different scenarios for the use of intellectual property from inception to realisation. The patenting procedure with regard to the entire process – the commercialisation of knowledge.

The above figure shows how patenting could be done in order to incur as little cost as possible and have as much chance of success as possible – the objective is to sell the patent application or, barring that, to sell the patent, license it, or set up a spin-out.

This does not need to happen immediately after the discovery but it should happen soon after the moment the researcher realizes that their research step into the unknown could bring about a market novelty or opportunity now or in the future, developing the market and its services and products in a known or completely unknown direction – this is the moment when the researcher decides to reveal their invention to a public research organization.

The informal disclosure of the invention can be carried out by the researcher with their colleagues, superiors and co-workers in the technology transfer office, and it is formalized as an application of the invention to the competent authorities in the public research organization (the director, the relevant assessment committee, the technology transfer office). The formal application comprises a draft patent application prepared by the inventor together with the technology transfer office and an invention application form containing information on the inventor, their employment, possible use as initially assessed by researchers and the technology transfer office, the projects that financed the research, the equipment used and other administrative/technical data.

Typically, the PRO has three months to examine and identify the application following its formal disclosure. As a rule, the invention is acquired by the PRO, since only a small proportion of inventions are not in any way related to the researcher, contracts or infrastructure of the research organisation. During the assessment, the researcher and the technology transfer office supplement the draft patent application and prepare a more detailed assessment of the technical aspects and a commercialisation plan, all of which serve as a basis for the final decision, not only about whether the institution should assume the burden of ownership of the intellectual property rights, but also on what further steps should be carried out: the planned direction of commercialization and its schedule, the selection of a patent office, and the selection of a patent agent.

3.2. Advice prior to the signing of a collaboration agreement with the aim of commercialisation

In the light of the exceptional economic importance of intellectual property rights, each of the partners in development, research and innovation projects wants to profit as much as possible, not only from their own input into a joint project, but also from the results of the joint work. The proper, clear and timely management of intellectual property is therefore essential to ensure the transfer of knowledge, enabling the fair distribution of benefits among all partners.

The management of intellectual property is necessary at all stages of the project, from preliminary discussions and negotiations to the development and implementation of the project and the exploitation of its results.

3.2.1. Signing a non-disclosure agreement (NDA)

Before any sensitive information on intellectual property rights (or other sensitive data) is included in the communication with potential partners, it is strongly advisable to sign a written agreement on non-disclosure of confidential data. The agreement will protect sensitive information from disclosure to unauthorised persons.

The reason why it is so important to sign a non-disclosure agreement is illustrated by the following three situations: (1) in order to be able to patent the invention, the invention must be new – it must not be accessible to the public before the filing of the patent application (if only one unauthorized person is aware of it, the patent application may be published but patent protection for that particular invention will not be granted); (2) the invention may not even be patentable, maybe the inventive step is too small or the evaluators deem the progress too small or even trivial with regard to existing technology; (3) the patent protection expires after 20 years, but you would like to ensure that your competitors cannot exploit the invention for a longer period.

The practical tips to keep in mind before initiating a dialogue with potential partners for marketing an invention are simple enough, though they are often omitted in practice, particularly under time constraints in signing any type of agreement with industry (where time is always of the essence). For the correct implementation of the collaboration, it is necessary to ensure that the information the non-disclosure obligation relates to is clearly defined – as a general rule, it should explicitly comprise (a) data designated as confidential; (b) data not designated (e.g. communicated orally) but treated as confidential at the time of distribution, whereby the counterparty must be notified of its confidentiality in writing within a few days; (c) data whose confidentiality would be reasonably deducted from their nature and the circumstances of the distribution. Likewise, the specific spectrum of use should be defined comprehensively – we recommend that the usage is determined (as accurately as possible) for a specific purpose. At the same time, it is necessary to consider that certain persons (employees, subcontractors ...) will need to know the information in order to implement the purpose; they too must sign an NDA with the same contents. It is necessary to determine the time frame of the obligation to keep information confidential (typically 3-5 years, possibly indefinite). It is very useful to note which data has been transmitted to potential partners/ third parties, including during informal talks, and, last but not least, to devise a strategy on which data to disclose and which not. All of this is crucial despite having signed a non-disclosure agreement!

3.2.2. The identification of existing intellectual property

Prior to signing of the contract, it is recommended that each party indicate their pre-existing intellectual property created or acquired in the past that is relevant to the performance of the project. The existing intellectual property of each party to be used in the execution of the project is then recommended to be explicitly mentioned in the collaboration contract or consortium agreement.

3.2.3. Intellectual property rights belonging to third parties

In order to avoid potential infringements, it is necessary to check whether the intellectual property associated with any of the parties and that will be used in the implementation of the project is subject to the rights of a third party – if so, it must be determined in a timely manner whether and under what conditions the use of such intellectual property is possible in the project in question. It is equally important to determine whether the technological field covered by the project in question already has results protected by intellectual property rights, especially with patents. To this end, it is advisable to carry out a review of the relevant registers as existing intellectual property may seriously impede the subsequent exploitation of the project's results.

3.3. Advice on managing multi-partner relationships – consortium agreements

Several partners are often involved, with both PROs (multiple organisations) and companies (e.g. affiliated companies). The collaboration or consortium contract must include provisions governing the ownership, access and use of background intellectual property (intellectual property belonging to an individual partner prior to the start of the implementation of the project) and foreground intellectual property (intellectual property created within the project).

3.3.1. Background intellectual property

Even during and after the execution of the project, the owner shall remain a partner to whom the intellectual property belonged before the contract was signed.

As a rule, it should be stipulated that each of the partners grants the other partners, upon request, a right of access to the background intellectual property rights if this is necessary for the implementation of the project or the use of foreground intellectual property.

A provision may be made for the right of access to existing intellectual property to be granted free of charge or under fair and reasonable conditions. As long as

access to the background intellectual property rights of one of the partners is necessary for the implementation of the project, the right of access, as a rule, should be granted free of charge. Where access to the background intellectual property of one of the parties becomes necessary later on in order to exploit the results of the project, the right, as a general rule, can be granted against payment under fair and reasonable conditions.

It is advisable to provide that the request for granting the right of access to background intellectual property should be made in writing. A provision may also be made for certain pre-specified intellectual property to be exempt from the obligation to grant access rights. As a rule, it should be determined that granting of the right of access to the background intellectual property does not include the right to grant a sub-license to any third party; however, an agreement can be made that the granting of the right of access to the background intellectual property includes the right to grant a sub-license to third parties. In the latter case, it can be established that a sub-license may only be granted to an affiliated entity.

3.3.2. Foreground intellectual property

In cases where foreground intellectual property is the result of the work of only one of the partners, it can be established that the foreground intellectual property will be the exclusive property of the partner who created it (as a rule), or that it will be the joint property of all the partners, even if it was created by only one of them.

In cases where foreground intellectual property is the result of the work of several partners, it can be established that the foreground intellectual property will be the exclusive property of the partners who created it (as a rule), or that it will be the joint property of all the partners, even if that it was created by only some of them.

As a general rule, if the foreground intellectual property is the property of one or only certain partners, it should be established that this partner or partners will grant the other partners the right of access to the foreground intellectual property upon request. When access to the foreground intellectual property is necessary for the implementation of the project, the right of access is given free of charge, but when the access to such foreground IP becomes necessary later on in order to exploit the results of the project, the right, as a general rule, can be granted against payment under fair and reasonable conditions. As a general rule, the remaining partners shall not have the right to sub-license to third parties on the basis of the access right acquired, but an agreement can be made allowing the granting of licences only to affiliated entities.

If all partners have joint ownership of the foreground intellectual property, it should be established that all partners are free to use it. In that case, it should also be established that each partner may grant licences to third parties, subject to prior notification to the other partners. In such a case, the partner must pay fair and reasonable compensation to the other partners.

3.4. Practical advice on finding the right type of contractual relationship

There are many possibilities for regulating the relationship between the technology provider and the customer; and the decision on its appropriateness depends on the purpose of the collaboration, the owner of the IP in question, and the way we intend to manage the intellectual property that is expected to result from the collaboration.

The options include: (1) development collaboration – joint research agreement or collaboration agreement; (2) research services agreement; (3) MTA (material transfer agreement); (4) sponsored research agreement; (5) consultancy agreement; (6) NDA (non-disclosure agreement); (7) easy access IP agreement.

Each of these types of contract includes at least two parties – a PRO and a company. In all cases, the organisation holds ownership rights to a set of intellectual property that is of interest to the company.

In contract types (1) development collaboration – joint research or collaboration agreement and (2) research services agreement (Figures 8 and 9), the company typically also holds background IP in the area of interest. A development collaboration is initiated if both the company and the organization are planning to invest financial and human resources in the further development of technology and also to share the newly created IP and the benefits of its exploitation, while the previously existing IP is the subject of mutual rights of access and use between the organization and the company. A research services agreement is signed in cases where the work will be carried out within the organization and will be financed by the company, which will also be the holder of the rights from the newly created IP; typically, the organization will negotiate the right to publication with the consent of the company and receive the right to the commercial use of the newly created IP, while the previously existing IP will be the subject of mutual rights of access and use between the organization and the company, as is the case under development collaboration.

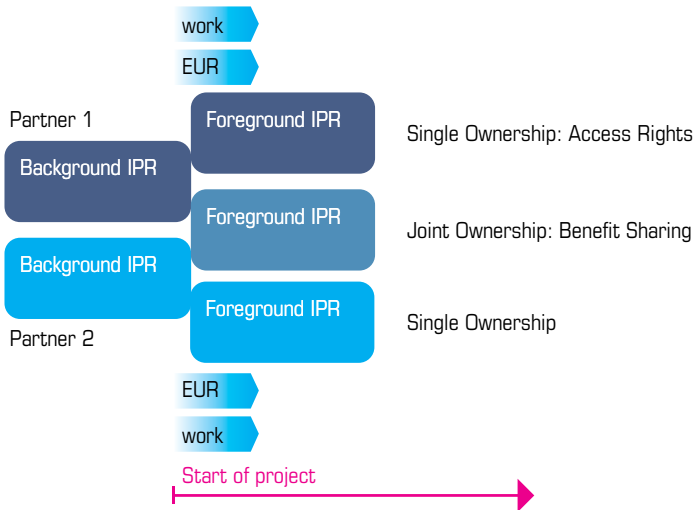


Figure 8.: Schematic representation of the relationships between the partners in case of (1) development collaboration / joint research agreement.

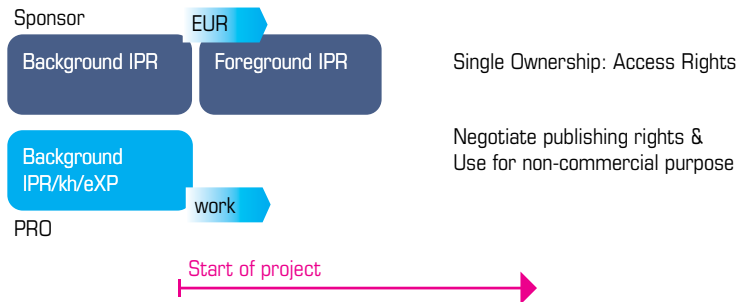


Figure 9.: Schematic representation of relationships between the partners in case of (2) research services agreement.

Type (3) MTA (material transfer agreement) (Figure 10) includes the transfer of rights from research materials and substances (unpatented biological materials such as reagents, cell lines, plasmids, vectors and chemical compounds, may also include certain types of software) that the recipient of the rights – the company – intends to use for further development and commercial use. The aim of the company is to acquire exclusive rights over pre-existing rights and exclusive rights ownership over newly created rights. The organisation may negotiate the right to publicise and further research for non-commercial purposes.

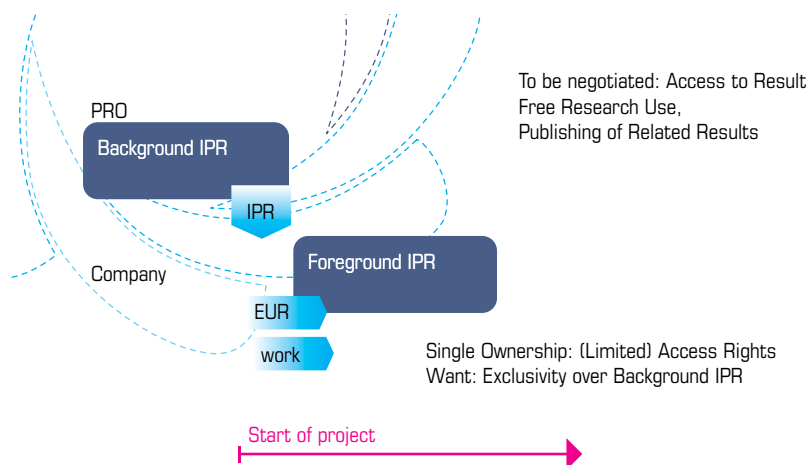


Figure 10.: Schematic representation of relationships between the partners in case of (3) MTA / Material Transfer Agreement.

In the case of a (4) sponsored research agreement (Figure 11), the work is carried out entirely in the organisation and the company is the payer; regardless, all the rights of existing and newly created intellectual property remain in the ownership of the organisation, except that the company is granted preferential rights to an exclusive licence over the entire package of IP (for a limited time) in return for payment for the work and any intellectual property protection costs.

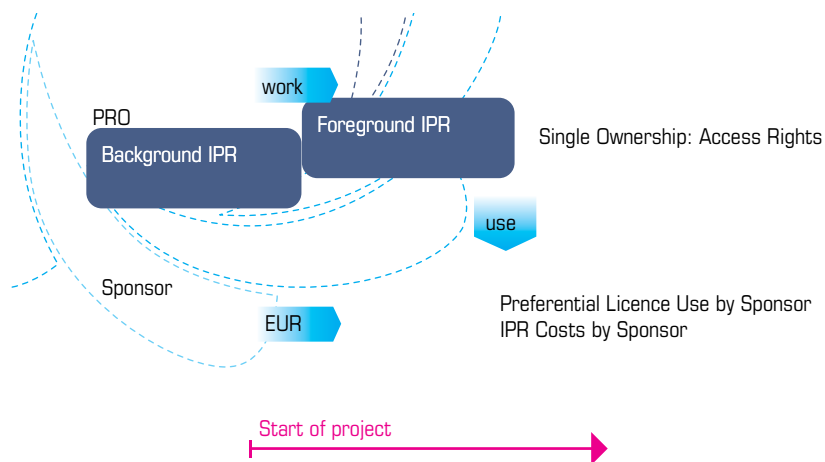


Figure 11.: Schematic representation of relations between the partners in case of (4) sponsorship research agreement.

The (5) consultancy agreement (Figure 12) is carried out by individual researchers, in some systems even for their own account (e.g. MIT professors receive at least 20% of their payment in this way, while 80% is provided by their institution – of course, if they manage to obtain a higher payment from consultation in 20% of the allotted time, they will receive the extra, but their work at their home institution must not suffer because of this, which does not happen, due to the high standard of awareness of the importance of the development of their home institutions,). The company pays for the service provided by the researcher, and the researcher usually does not use employees in their team in the research organisation or any other equipment and infrastructure of the organisation. Normally, all new intellectual property rights are the property of the company.

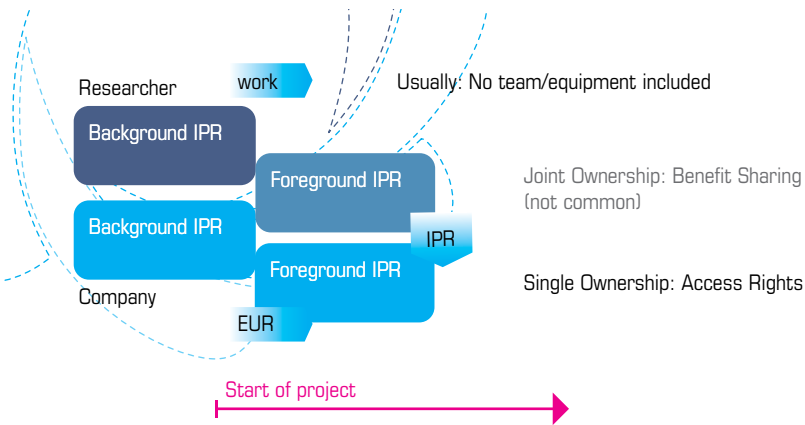


Figure 12.: Schematic representation of relationships between the partners in case of (5) consultancy agreement.

It is important to note that with an (6) NDA (non-disclosure agreement) (Figure 13), disclosure of the information referred to in the existing intellectual property right of one or both partners will occur; however, there will be no transfer of rights or benefit from the IP between the partners. Since this is a contractual but nevertheless a soft regulation and protection, it should be noted that the best protection is non-disclosure and the best basis for collaboration is trust.

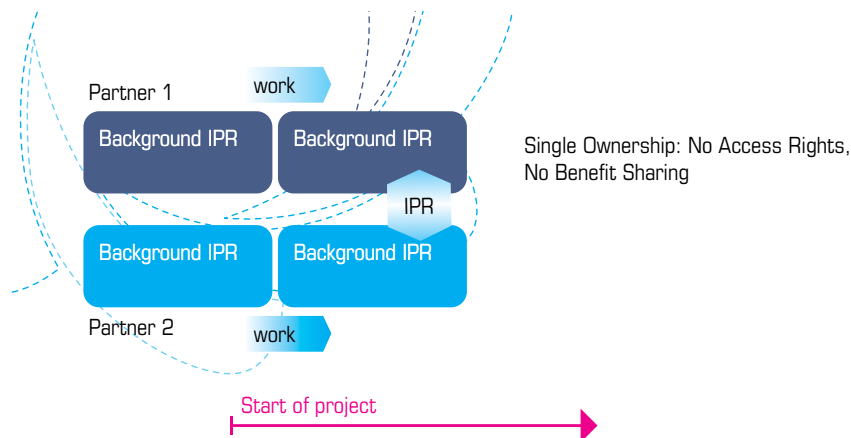


Figure 13.: Schematic representation of relationships between the partners in case of (6) NDA / Non-Disclosure Agreement.

An (7) easy access IP agreement (Figure 14) is characterised by »free, but not open« access to the intellectual property of a PRO. It permits the use of technology for a limited period in the context of such agreements without cost, but requiring the source of the technology to be indicated. This type of collaboration is particularly interesting for smaller companies, which have not found their place on the market, for testing the possibilities for using technologies in the market with the aim of the technological advancement of the company while ensuring the usage of the technology.

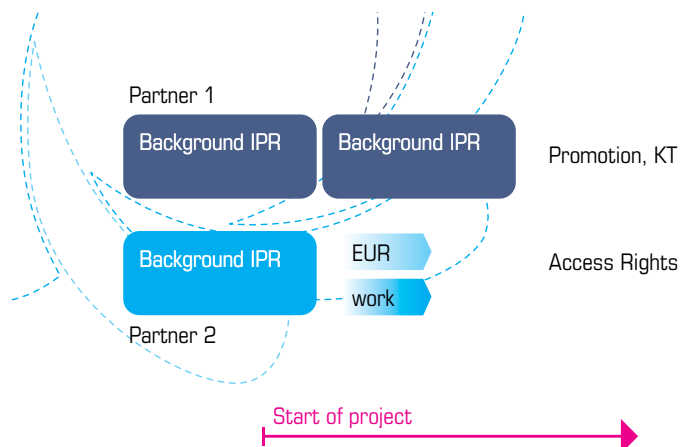


Figure 14.: Schematic representation of relationships between the partners in case of (7) Easy Access Agreement.

3.5. Spin-out or spin-off companies and start-up companies

The Slovenian language does not have separate appropriate terms for spin-off/spin-out, so it uses the established English terms. In general, spin-out companies have a link to the parent organization based on licensing relationships (the company is 100% owned by investors, of which at least one shareholder is a researcher in employment at the PRO), while in spin-off companies, there is an ownership share of the parent organization in a new company on the basis of the input of intellectual property and/or capital investments. A start-up company is a company created on the basis of an idea, the creation of which is not directly related to public funds, and the owners of the company are not part of a university/institute (e.g. students).

The main purpose and goal of spin-off and spin-out companies is to generate profits from the commercialization and commercial use of innovations (patents and other industrial property rights, intellectual property rights, unpatentable know-how, or the results of the research) owned by the PRO, for which the PRO itself has no interest in continuing commercialization. However, a spin-out or spin-off is not a company that commercialises innovations that have not been acquired by the PRO, regardless of whether the company was (co)involved in its creation.

Innovation holders (researchers) from PROs participate in the undertaking of spin-off and spin-out companies. Any other economic activity of the researcher outside working time or participating in the company (as a shareholder, etc.) outside the definition of spin-off or spin-out companies, however, constitutes a violation of the prohibition of competition in Article 37 of the Employment Relationships Act.

In the period since its independence, Slovenia has not been able to decide on procedures in the field of the establishment of spin-out/spin-off companies in PROs; the establishment of spin-off companies within PROs is legally impossible, the establishment of spin-off companies within universities is extremely difficult to achieve in practice (the founder would be the Government of the Republic of Slovenia, which is barely feasible in practice), and spin-out companies are already being established, but the procedures are hampered by unmanaged internal rules in PROs.

3.5.1. Appropriate enterprise types in individual cases

Spin-out companies are the dominant form in larger research environments and strong knowledge brands (such as the Massachusetts Institute of Technology – MIT), where such young companies can easily hire expensive equipment

for the first phase of development, and the fact that they come from a reputable technological environment will provide them with a good competitive starting point. In the case of a licensing relationship with a previously established larger company, there is usually no creation of a new spin-out business, only the establishment of licence relations.

The main element of the licence relationship between the licensor and the licensee is the licence agreement. The latter should contain clear definitions about who is granting what to whom (detailed definition of the technology). Restrictions must be determined on the permitted territory for the exploitation of the technology and the purpose of use of the technology. The licensor's guarantees and the licensee's responsibilities must also be defined. The level of the licence fee must be determined by means of calculation (from turnover, profit, physical volume, flat rate ...), along with an introductory period. Provision must be made for the possibility of purchasing the technology and the conditions of entry for other investors. It also makes sense to set out specifications that are relevant to specific cases, such as further development cooperation, hiring equipment, the use of the PRO's logo, etc. At the same time, it is important for the PRO to define outside the licence agreement the internal allocation of royalties within the PRO (organisation as a whole, departments, authors, administrator of the contract).

Spin-off companies are a dominant form in smaller environments where, due to the lack of other options, it is necessary to regulate the relationship between the newly established company and the parent laboratory regarding the shared use of equipment (the company can use the equipment and premises of the PRO, for example, at night or on weekends) and in cases when a young company is derived from a relatively unknown institution with which they are jointly creating or improving the competitive position and protecting each other while also strengthening the brand of their knowledge.

Shaping appropriate holding shares in spin-off companies is quite a practical challenge. Smaller PROs normally use a model with a maximum of a 49% equity stake of the PRO, and the remainder is divided among capital investors who contributed to the current work in the establishment of the company and investors of the expected future work for the company. As a general rule, a lower expected return means a higher equity portion for the PRO and vice versa; there is also a mathematical model for calculating the optimal amount of interest. In establishing a spin-off company, issues may arise with rewarding the associates of the PRO, the co-creators of the innovation that the spin-off is commercialising, when they are not co-owners of the spin-off.

A comparison of the strengths and weaknesses of the two ways of establishing spin-off companies from PROs can be seen in Table 5.

Table 5.: Comparison of the positive and negative sides of two different ways of starting undertakings from PROs – spin-out and spin-off.

LICENCE	SPIN-OFF
higher transparency no mixed ownership and no issues with management responsibilities	lower transparency (interpersonal relations), mixed ownership, involvement of the institution in the management of the company, impact on the agility of the company
less risk licence income (fee) immediately and a share from sales (royalty)	a long period until first income (if any at all – risk) additional capital required
less effort on the part of the licensor management in the hands of experienced people	requires a lot of engagement from persons involved
limited association with the parent institution (equipment, premises, people)	association with the parent institution (equipment, premises, people)
IP not owned by the company (bad for young companies, difficulties in upgrading foreign IP)	IP owned by the company (good for financing, transparent upgrading of IP)
less control over the use of technology	share of the company remains after the »lifetime« of the technology
less income for the institution, the profit belongs to the company	more income , open doors for a potential »jackpot«
minor economic impact	new jobs , collaboration with the institution

3.5.2. Sources of funding for young spin-offs

A young spin-off passes through various stages of growth (Figure 15) – from the idea, the seed stage, the growth stage, through to the harvest stage – whereby each stage has different sources of funding available, as long as the company itself still generates enough revenue in the market. In particular, the start of the business through to the growth stage is critical; the company is only just penetrating the market and has more costs than revenues, as well as poorly established internal competences. Normally, a paradoxical situation occurs: when the company needs investors the most, they are least interested in entering, but when the company succeeds and no longer needs investors so much, they have the greatest interest.

The first source of financing is usually the ownership financing of founders based on savings, reduced wages and personal debt sources of founders (the 3F model = Family, Friends, Founders), where equity stakes need to be determined at the beginning and other relationships clearly defined. The benefit of this type of funding is the higher manageability of financing, but at the same time, personal financial risks may become an issue. In the early stages of development, it is particularly important to search for sources of state aid in

the form of grants; this is a very welcome source of funding, in particular from the point of view of retaining ownership, but it is also associated with administration and potential constraints to development because of various tendering specifications.



Figure 15.: The amount of funding required in relation to the stage of development of the young enterprise and the risks involved.

At a relatively early stage of development, private investment – by business angels – in the company can in principle be obtained for particularly viable companies, especially in industries where quick returns can be expected (such as information technology). Business angels, apart from their financial contributions, can also be useful in terms of offering consultancy support in the management of the company, and in view of the various useful connections in marketing and finance. However, this form of financing is still very poorly developed in Slovenia; business angels set very challenging conditions for entry and bring about less possibility of subsequent investment, which can pose a problem for an increasingly complex business.

Investment by venture capital funds takes place in a similar fashion. They invest diversified investors' investments into a fund that, in principle, invests in high-risk and expected high-yield investments. Much like business angels, the fund can also actively enter the investment and benefit the company in terms of running the company and establishing strategic links. But at the same time, waiving a part of the ownership rights to the fund means a partial loss

of freedom and various restrictions on the disposal of intellectual property as well. In Slovenia, investing by venture capital funds is indirectly supported by the state's contributions to the selected private venture capital funds or in the projects of such investments, but abroad there are also other related types of private investment funds, where in principle, financing can be obtained, in particular in the business growth phase.

The acquisition of foreign investment resources is often linked to a reference, which means that foreign investors rarely enter a company that has not already been trusted by local investors, or a company that has not obtained any other recognition.

A typical source of financing at a mature stage of the company's growth and an exit strategy for venture capital investors is the appearance on public share markets.

The characteristics of the company's acquired financial assets have different influences on the internal relationships between starting partners; tender grants and debt resources do not change proprietary relationships, and 3F contributions, business angels and various funds, as a rule, enter into the ownership structure and indirectly also in the value of the intellectual property of the PRO the spin-off is derived from.





4.

Transfer of technologies and knowledge to the economy: Slovenia

4.1. The transfer of knowledge from Slovenian PROs to the economy from the viewpoint of researchers and entrepreneurs

On 17 September 2014, the Jožef Stefan Institute and the Chamber of Commerce of Slovenia held the »Day of Innovation 2014« and the »7th International Technology Transfer Conference« in Brdo pri Kranju, the latter of which also included the »1st National Consultation on Technology Transfer in Slovenia«. In the framework of the »National Consultation«, the participants of the conference were invited to share with the organizers their views, opinions and thoughts about the state of technology transfer from PROs to the economy through a survey – thus giving the general public insight into the specific situations of individuals who encounter technology transfer in the scope of their work, the barriers they face and their suggestions on how to provide for a more effective future in the above areas.

The survey was conducted by 71 participants out of 151, who all shared a high level of education, and their age structure and employment distribution between PROs and companies were balanced as well. The analysis of the respondents' replies in many cases shows a deviation in their expectations and views from the reality as they see it. The vast majority of respondents (73%) were of the opinion that public research organizations should be focused primarily on technological research and development, technology transfer, and collaboration with the industry, rather than in basic research, publishing and the international comparability of research, which, in the opinion of the majority (68%), reflects its current trajectory. The respondents therefore believe that PROs should better detect and take into account market needs and follow them. A similar discrepancy can also be found in the interest in the establishment of new companies – as many as 74% of the respondents, regularly employed at PROs, have already considered establishing their own company, but as many as 56% of them believe that the PROs do not support creating spin-offs among their groups. They are also concerned about initial financing, reductions in social security and the complex procedures of establishment, but are particularly driven by the desire for decision-making autonomy, opportunities for the commercialisation of work achievements, and greater professional and business flexibility. The pursuit of such objectives and the desire for autonomy and the more proportionate rewarding of their own achievements is not incidental, as the answers of the survey highlight the opinion that the system of motivation of employees at PROs for technology transfer is not satisfactory and that financial stimulation is only a rare exception. In addition, the respondents also made critical remarks about the communication between PROs and companies, since in their view, it is limited in most cases to individual groups and the information is concentrated in closed circles. It was also

one third of the respondents who thought that communication was poor and that information is being withheld; we find that only 3% of the respondents are satisfied with the communication between PROs and companies.

The fact is that both employees at PROs and the industry have a desire for closer collaboration – researchers want to market their knowledge and research achievements more intensely and companies see new development opportunities in these achievements. It should be noted that in this particular case, all the respondents, regardless of their field, place great importance on the development part, since as many as 85% deemed it very useful or even crucial. The results of the questionnaire may serve as a guide in terms of aspects requiring special attention and upgrading in order to achieve the highest possible level of collaboration between PROs and the economy, thus ensuring the rapid progress of society.

4.2. Comparison with the situation abroad: transfer of knowledge from PROs to the economy

There are many practical examples of knowledge transfer in the area of contract collaboration in Slovenia, but still too few in relation to the needs of the economy. »The influence of public research on industrial R&D« (Mgmt Science Vol. 48#1) found that more than one third of researched companies expected support from science in the form of contract collaboration and more than 42% expected collaboration with industry regardless of form. The proportion of such companies in Slovenia was significantly lower in 2010, around 24%, according to the »Innovation Scoreboard«. Contract collaboration is particularly important because the consequences of positive development exceed the amount of contract collaboration.

Practical examples of the transfer of knowledge in the field of licensing and the sale of patents are still in their infancy in Slovenia, especially when compared to the most successful examples, such as Berkeley, MIT and others in the US, or for example K.U. Leuven in the Netherlands, CERN in Switzerland, etc. In Slovenia, we are currently talking about minimum values, while billions of USD or EUR are realized per year in relevant developed environments. Slovenia's huge untapped potential in the field of knowledge transfer calls for intense, systematic and accelerated action.

»The monitoring of research excellence usually employs data on the number of publications, number of citations, the number of highly cited publications, the impact factor, and the number of patent applications with the selected patent offices. In the 2004-2008 period, Slovenia achieved 155% of the EU average under this criterion with 5,840 publications, which means 7th place in the EU. In terms of the number of citations, we have 18,062 citations per

million inhabitants, placing us in 13th place in the EU, reaching 95% of the EU average. With an impact factor, meaning the average number of citations per publication, of 3.09, we are at 61% of the EU average, ranking us in 22nd place in the EU, which shows an average relatively low profile of the publications produced by Slovenian authors.«¹⁷ On the other hand, »with 62 cited publications per million inhabitants in the 1998-2008 period, Slovenia reached 151% of the EU average and thus the 13th place in the EU.«¹⁸ According to the criterion of citation, the best Slovenian researchers are relatively successful, but no data has been collected as to whether these inventions from scientific research are the same that are then patented by the PROs. It can be concluded that Slovenia's science is undeniably top-notch in certain areas.

The results of the marketing of scientific achievements paint a different picture. In comparison with the EU (Respondent Report of the Knowledge Transfer Study, EC, 2011 and the Results of the largest PROs in Slovenia, 2009-12), we are in a decent spot in terms of newly established companies per 1000 researchers (the top PROs are approx. 80% of the EU average). With regard to the number of patents awarded with full examination (a Slovenian patent does not have the status of a patent in international law, only a patent application), even the finest in Slovenia are lagging behind (about 50% of patents awarded in relation to the EU average). In terms of the number of licences entered into, we are lagging behind (less than 10% of the licenses and patents sold according to the EU average). In particular, we are lagging far behind in the sale of patents and licensing (significantly below 10% of the EU average).

There are no, and cannot be any, practical examples of spin-off companies in Slovenia, as the legislation does not allow PROs to invest intellectual property in a company as a capital investment, which is a key feature of the spin-off company.

4.2.1. The Specifics of Slovenia: Contract Collaboration

The prevailing need of the Slovenian economy to cooperate with the scientific research sphere is in the field of contract collaboration. In Slovenia's small and medium-sized enterprises (SMEs), the innovation processes, in the part where these processes are linked to PROs, are closely linked to contract collaboration with PROs.

The competitiveness of the domestic economy is undoubtedly dependant on the funds invested in research and development (DG Enterprise, 2011); however, a clear link between the level of that input and the competitiveness of the company at the level of individual companies has not been established. Instead, they use the gazelle model to identify the link between competitiveness

¹⁷ Resolution on Research and innovation strategy of Slovenia 2011-2020, <http://www.drznaslovenija.mvzt.gov.si/ch02s03.html>

¹⁸ Resolution on Research and innovation strategy of Slovenia 2011-2020, <http://www.drznaslovenija.mvzt.gov.si/ch02s03.html>

and the quality of innovation management in a particular sector. Companies themselves believe that the two most significant barriers in achieving market competitiveness are (1) the lack of funding for development in individual stages of the company and (2) the inability to manage the innovation process efficiently.

SMEs usually do not have their own development departments. SMEs also typically do not maintain services that provide support for the integrated treatment of an invention and its development into an innovation; e.g. in the search and management of ideas, the development of innovation projects, the preparation of a marketing strategy and in protecting intellectual property, entering the market, results of the innovation, assessment of the innovation project, predicting and planning improvements, and searching for new ideas, which would also include systematic communication with researchers from PROs. (For the definition of key elements of the standardised process and innovation management systems, and standardisation CEN/TS 16555-1.)

Similarly, researchers in PROs do not have the relevant knowledge of strategic assessment and the protection of intellectual property, nor the skills and time to systematically seek out, contact, negotiate and ultimately prepare contracts and regulate other legal and administrative matters.

SMEs, on the one hand, have technical and other professional problems that they cannot solve and PROs, on the other hand, have solutions that they do not know how to offer to businesses. There are also technical and professional issues that SMEs are not aware of, as well as solutions for which PROs are unaware of any requirement on the market. Sometimes people with technical and professional issues may even know the appropriate specialists with solutions and have an idea of how collaboration could be implemented, but they do not have the available financial and human resources to carry out the tasks. When connections do occur, a large part of the collaborations encounter issues with the regulation of mutual rights as a result of the insufficient legal-economic preparation for the collaboration.

In recent years, there has been a growing awareness among SMEs and researchers at PROs that in order to increase the competitiveness of the economy, it is crucial to improve existing products, to optimize production processes through the introduction of new specific technical solutions, to look for alternative sources of funding, to take care of protection of intellectual property rights, to have functioning relationships with partners, to know the professionals who have practical solutions to the problems, etc., but there can be no rapid growth in the amount of collaboration without any substantive support.

Since SMEs connect with PROs in innovation processes, technology transfer offices are a tool for systematically connecting PROs with Slovenian economic operators, especially SMEs, and for providing the latter with integration support in the field of innovation management where necessary.

4.2.2. The Specifics of Slovenia: Sale of Patents and Licensing

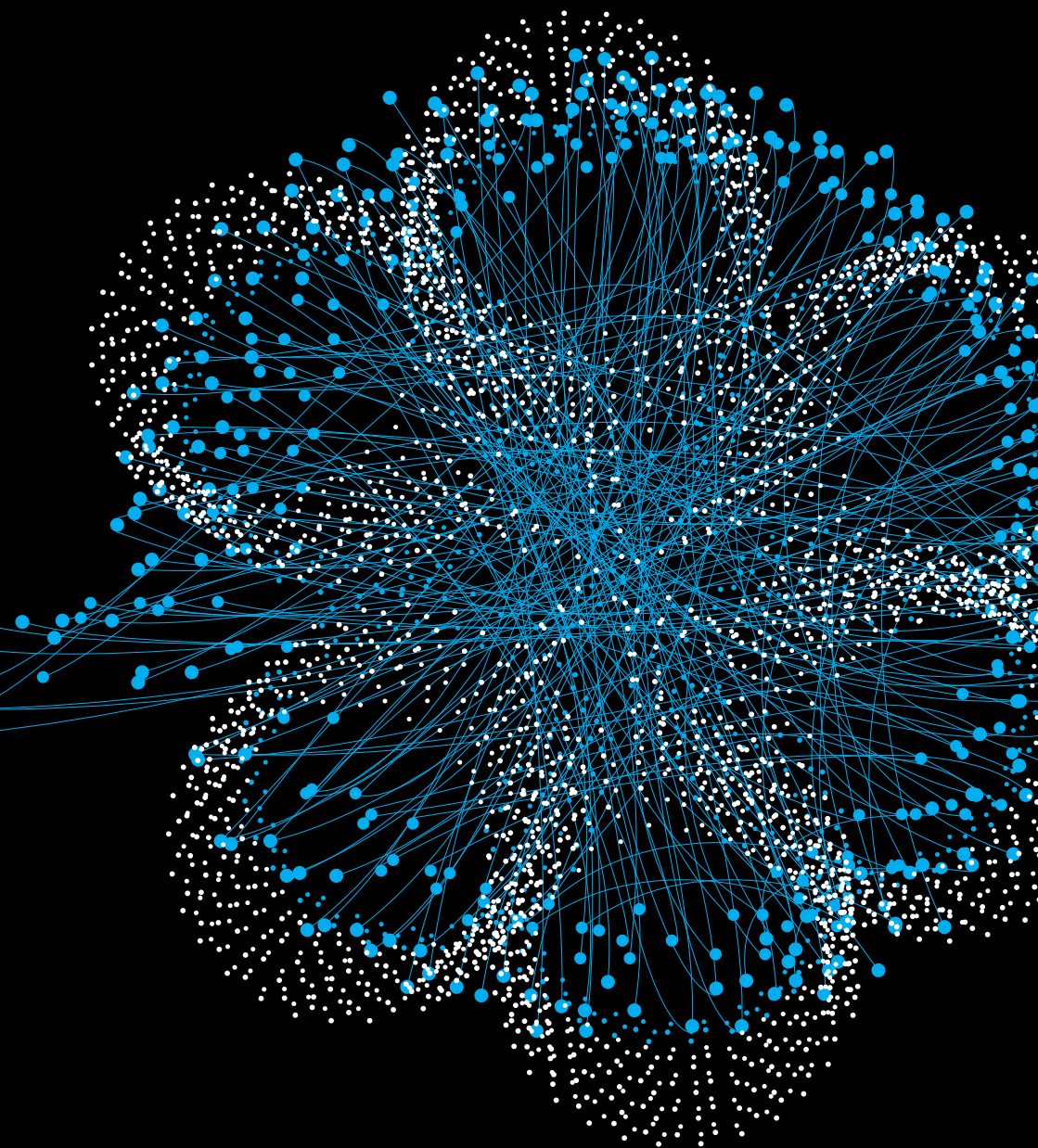
The Slovenian economy is largely unprepared for the marketing of inventions in the form of the purchase or licensing of patents. At the same time, a patent that does not generate economic benefits (from its exploitation or prevention of exploitation) also does not justify the cost of protection and is therefore nonsensical from this perspective.

Some data shows that industrial property (including patents) can increase the competitiveness of the economy and the value of businesses in the global market.¹⁹ In China (where the marketing of patents in the domestic economy is similarly not a highly prioritized activity), the number of PCT applications reported increased by almost 16 times from 2000 to 2010. The same number increased in Slovenia by 3 times (starting with 39 applications in 2000), and in Japan by 3.3 times (32,000 applications in 2010). According to the Global Competitiveness Report, China, whose Global Competitive Index (GCI) ranked it 47th in 2001 (of 75 countries considered at the time), has risen to 26th place (of the 142 countries considered today). Slovenia, however, fell from 32nd in 2001 to 57th in the 2012 report (a 25 place drop, mainly due to poor ratings in »Labour market efficiency« – 102nd place, »Financial market development« – 102nd place, and »Market size« – 80th place, but on the other hand, Slovenia ranked at a solid 32nd place in the »Technological readiness« category). However, Slovenia is not a big player in the intellectual property market. Our sciences receive about 2% of the GDP per year, about half of which is from public funds, which, taking into account the roughly 51 billion EUR GDP²⁰ in 2010, equals around 1 bn EUR and about 500 million EUR of public funds per year. According to some studies (C. Stein, Ascencion), the critical mass of the funds invested in patenting suitable breakthrough research is 500 million EUR per industry per year – a level that we will not reach in Slovenia any time soon.

Given that certain areas of Slovenian science achieve world-class results, it is reasonable, regardless of the needs of the domestic economy (which primarily wants to and already does cooperate with science through contract research), to prudently invest in patents within those fields of science that achieve superior results, with the goal of marketing them at home and abroad.

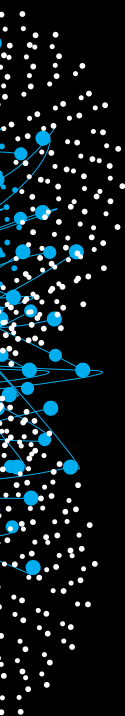
¹⁹ Several individual cases attest that a connection definitely exists there; for example, the Comparison of the increase in GDP and the number of PCT applications in the People's Republic of China.

²⁰ <http://www.gfimg.com/gdp-data-country-reports/179-slovenia-gdp-country-report.html#axzz1dFeZKfw>



5.

Integrated support for the researchers at the Jožef Stefan Institute



AT THE JOŽEF STEFAN INSTITUTE, THE CENTER FOR TECHNOLOGY TRANSFER AND INNOVATION

(CTT - <http://tehnologije.ijs.si/en/>) was established in 2011. The CTT was established on the basis of the experience of a technology transfer office functioning since 1998 and on the basis of the provisions of the Employment-Related Inventions Act, namely Article 21 thereof, which stipulates in the second paragraph that the organizational infrastructure necessary for the examination of inventions and their effective exploitation is provided by the state, under the condition that the PRO uses an appropriate policy on the acquisition and marketing of work inventions, whereby it should be noted that the JSI meets this condition as the largest Slovenian public research institution.

The CTT is a technology transfer office (TTO) based on the European model of these types of office, which connect infrastructure services to their own PROs in order to aid the economy. The CTT performs work in the field of the transfer of knowledge and technologies, and provides support for the researchers of the Jožef Stefan Institute, and especially domestically, to small and medium-sized businesses, with access to the research expertise of PROs and services, while at the same time including researchers from foreign PROs and larger and foreign companies.

In 2014, the CTT was thus active for 17,000 hours, of which 5,848 were for EU projects and with direct support for the internationalisation of the economy. For its infrastructure support activity, the CTT dedicated 11,152 hours to 225 major accounts, of which 23% came from the economy, 39% from domestic and 38% from foreign PROs (domestic PROs including National Institute of Chemistry, Agricultural Institute of Slovenia, University of Primorska, University of Ljubljana, University of Maribor, Institute of Oncology Ljubljana, UKC Ljubljana, IMT and the like).

Since the beginning of the operation of the CTT, tailor-made specific and structured services have been developed for the Slovenian market to carry out the above activities to support the cooperation of the PROs with the economy. Today, the CTT offers high-quality and efficient assistance in the preparation of marketing strategies – evaluations of technologies, market and commercialization opportunities assessments, in the protection of intellectual property (IP), assessments and the development of opportunities, evaluation of IP, IP marketing, developments and the preparation of draft contracts (substantive and legal assistance in the preparation of agreements and contracts related to collaboration with the economy and marketing of IP), licensing negotiations and negotiations for spin-out contracts, and monitoring the licensing agreements and contracts of spin-out companies.

The CTT is active in the creation of spin-outs and the licensing and sale of IP, as well as in the field of contract research and project collaboration (CCR).

It assists individuals in obtaining rights arising from intellectual property, when signing contracts with the industry, in setting up spin-out companies and their penetration into the market, it provides advice and assistance in patent applications and business plans, offers concrete advice to optimize intellectual property protection cases and carries out their active marketing, provides professional legal advice, especially in the field of intellectual property and the possibilities for the exploitation of the rights that originate from it, seeks out appropriate partners for the sale of intellectual property and carries out the negotiations, as well as prepares the appropriate contracts for licensing or selling intellectual property. In addition, the established system of visiting companies and presenting technologies developed within the Jožef Stefan Institute, or of obtaining information on the technological needs of companies, is paving the way for a wide range of collaborations and allows researchers to hand over to companies that do not have their own resources for technological development precisely the technologies they need to improve their economic performance.

The CTT offers assistance in obtaining an overview of the resources available to researchers and businesses to continue or upgrade their work and advises them on obtaining the said resources.

Finally, the CTT represents a bridge between education and the researchers of the Jožef Stefan Institute, organises visits to the Institute by kindergartens, schools and individuals, and develops content programmes for primary and secondary education with the aim of involving them in modern science as much as possible.

Our primary task is to transfer technologies and innovations from the Jožef Stefan Institute, the most successful Slovenian research organization, into the economy, both by acquiring new collaborations with the industry and by setting up new spin-out companies, producing market analyses, helping protect intellectual property and marketing it.

We assist individuals in acquiring intellectual property rights and signing contracts with the industry, setting up spin-out companies and penetrating the market, and provide advice and assistance on patent applications and business plans. We offer concrete advice for optimising intellectual property protection cases and carry out their active marketing, conducting professional legal advice, especially in the field of intellectual property and the possibilities of exploiting intellectual property rights (technological assessments and market assessments), seeking suitable partners for the sale of intellectual property and conducting negotiations, while also preparing appropriate contracts for the licensing or sale of intellectual property.

The Center for Technology Transfer and Innovation employs thirteen experts from various professional and scientific fields.

5.1. Types of support

To meet the specific needs of the research and economic environment, the CTT is providing infrastructure support in the following areas:

1. Strategy

- Collaboration in developing an intellectual property (IP) strategy in accordance with the organisational strategy for achieving economic or commercial objectives and identifying the needs, resource requirements and opportunities for collaboration.
- Conducting a »gap« analysis in accordance with the strategy, with an assessment of the technology portfolio and an ecosystem analysis in order to improve the use of existing resources and/or define resource requirements and implement the IP strategy.
- Collaboration in the development of the organisation by identifying the essential role, processes and structure in order to optimise the organisation's investment in IP resources.
- Introducing a well-organised, dynamic IP process with a focus on the impact of IP development and commercialisation in order to achieve greater benefit for all stakeholders.

2. Protection of intellectual property

- The creation of an IP portfolio through strategic IP protection with the aim of achieving the organisation's objectives.
- Analysis of the organisation's existing and potential intellectual capital using appropriate resources and with the objective of identifying IP that is worthy or in need of protection.
- The selection of inventions to be protected by means of an assessment of the legal factors, commercial opportunities and assets available with the aim of optimising the portfolio.
- The selection of appropriate domestic and foreign protection mechanisms based on an assessment of the legal factors, commercial opportunities and means available, with the aim of protecting IP.
- Implementation of the IP strategy using selected mechanisms to build and maintain the IP portfolio.
- Management of the IP portfolio by carrying out appropriate legal procedures with the aim of maintaining or raising the value of the IP portfolio.

3. Assessment and development of opportunities (Business development)

- Segmentation of the IP portfolio using appropriate analytical tools with the aim of identifying the best and most effective use of IP organization.
- Assessment of segmented IP in the light of business opportunities using appropriate analytical tools with the aim of identifying all the elements potentially suitable for licensing.

- Identification of business opportunities using appropriate methods and with the aim of identifying target partners.
- An assessment of the needs for rights controlled by third parties through market and legal analysis with the aim of optimising business results.
- Identification of IP that already exists on the market and is in line with the needs of the organisation with the aim of obtaining rights to use third parties' IP.
- Development of the business plan, also including IP, using appropriate methods and with the aim of achieving the objectives pursued.
- Development of basic licensing terms and conditions consistent with the strategy and business plan with the aim of establishing a core contractual structure.

4. Evaluation

- The definition of the IP to be evaluated, using data from the relevant business factors and in accordance with the overall business strategy, with the aim of achieving the agreed objectives.
- Defining the valuation context on the basis of relevant business principles with the aim of selecting the most appropriate methodology and defining the required level of diligence.
- The identification of factors affecting the value based on the proposed licence strategy with the aim of determining the appropriate price.
- Selecting the most appropriate methodology using accepted valuation principles with the aim of carrying out valuation and establishing a value range.
- Preparation of an evaluation report justifying the values in support of the proposed IP price.

5. Marketing

- Obtaining an agreement within the organisation on the licensing plan through the proposed calculated value with the aim of establishing the foundations for a licence contract.
- Designing a suitable marketing strategy that will reflect the suggested value of the IP and include a marketing plan and promotion program, taking into account the estimated business opportunities, market factors and the overall situation in the field of the IP, in order to achieve the highest possible revenue from the licence fee.
- Launching a marketing plan and the periodic assessment of its effectiveness and progress in order to take into account the dynamic marketing environment.

6. Development of agreements and the preparation of draft contracts

- Defining the contractual terms to be negotiated with the aim of achieving the objectives of the organisation.

- Ensuring that all the regulations are complied with by analysing the relevant legal requirements and with the aim of establishing a proper and enforceable contract.
- Preparing draft contractual terms with an analysis of key issues and with the aim of accelerating negotiations.
- Preparing a draft of any license or other agreement applying the final version of the contract terms using clear and precise language, with the aim of expressing the intention of the parties that the contract should be executed in accordance with its own purpose and so it is enforceable in the relevant regulatory environment.

7. Licence negotiations and negotiations for spin-out contracts

- Preparation for negotiations by identifying and anticipating the interests, needs and requirements of both parties and by analysing potential disputed points, all with the aim of establishing an appropriate basis for negotiation.
- Identifying the best alternative to the negotiated contract by exploring related opportunities and identifying an acceptable alternative (BATNA) with the aim of carrying out a successful transaction.
- The establishment of a negotiating strategy and tactics by including appropriate individuals in the negotiating team and by defining their roles and responsibilities, a timeframe for the negotiations and their other characteristics, with the aim of effectively implementing the negotiations.
- Conducting the negotiation process by implementing the negotiating strategy and tactics and by monitoring the impact of changes in the contract terms, as well as by negotiating in the light of acceptable results, with the aim of effectively performing and finalising negotiations.
- Review of the final version of the contract and the comparison of its understanding by both of the parties, with the aim of ensuring the consistency of the understanding of the negotiated terms and conditions.
- Obtaining approval by the organization regarding the final contract terms and the contract value or their compliance with the licensing strategy and objectives.

8. Monitoring licence and spin-out contracts

- Monitoring the execution of contractual obligations to ensure the appropriate conduct of all parties.
- Compliance with the responsibilities by defining contact points, other staff, documentation requirements and procedures to ensure accountability, in order to maintain compliance with the contractual requirements and to avoid any conflict or violation.
- Archival of the license agreement, together with a written summary of its key features and liabilities, with the entry of the documentation into an appropriate system that provides quick and easy access for future needs.

The structured professional services of the CTT are intended for all research programmes at the Jožef Stefan Institute and beyond, and are suitably tailored to the type of service and the specificity of the user or their field of research.

5.2. Areas of support

Different enterprises require different types of knowledge transfer when obtaining appropriate support from PROs. However, regardless of the type of need on the part of industry, each activity must contain four key elements covered by the **modern support for knowledge transfer**:

- marketing strategy and the protection of intellectual property;
- financing;
- marketing;
- promotion and education of researchers and industry representatives on transfer procedures.

Marketing strategy and the protection of intellectual property – The implementation of procedures in the IP protection phase includes an assessment of the market situation in relation to the particular technology, development of a strategy for marketing the defined intellectual property and, in line with this strategy, selecting and communicating with relevant patent agents, preparing and filing patent applications at the relevant intellectual property office, and preparation of agreements on the ownership of intellectual property rights and non-disclosure agreements. The assistance is required by both PROs and SMEs that are developing new innovations along with the PROs.

Funding for protection, for the »proof of concept« phase and PRO-economy joint projects, young doctors. Subsidies are needed to protect intellectual property in commercially interesting cases (exclusively in line with a pre-established marketing strategy that indicates the viability of intellectual property protection). Implementation of »proof of concept« projects. Financial support is needed for the implementation of joint projects between PROs and the economy, through the preparation of applications (for joint projects involving PROs and SMEs).

Marketing – It is necessary to provide support for the establishment of spin-outs, finding marketing partners, conducting B2B and B2R meetings, preparing starting points for negotiation, assessing the net present value, conducting negotiations, preparing and monitoring licensing or sales contracts, conducting active marketing at fairs, preparing technology offers for passive marketing and the like.

It is necessary to organize visits to and between businesses and researchers in order to locate and formulate issues for product improvement and to improve the ability to manage innovation in companies and among researchers; searching for the right experts by organizing meetings between entrepreneurs and researchers; through knowledge and access to tools for finding potential partners and with appropriate communication, connecting Slovenian SMEs and researchers with each other and with foreign companies and markets, and establishing appropriate relations between the business partners.

The promotion and education of researchers and industry representatives on transfer procedures – This involves improving the ability of economic and scientific entities to participate constructively in technology transfer processes, thereby facilitating procedures and improving the quality of collaboration, reducing complications and establishing long-term and constructive development collaboration.

It is also necessary to raise awareness of the importance of knowledge transfer, to transparently inform researchers and entrepreneurs about the needs and offers, thus promoting and encouraging the effective use of resources for science.

Organising promotional, motivational and educational events (e.g. conference on technology transfer, award for best PRO project for the economy, open days, education for young researchers ...) contributes to the popularization of science, as well as the possibility of cooperation between scientific research and the economy, and raises awareness about organizations and professionals who are familiar with the specific solutions to specific problems, while at the same time educating everyone involved in the process, so that they can partake as constructive participants.

5.2.1. Contract collaboration with the economy

Collaborations such as **measurements, consultancy, education, project preparation and/or submission, exchange of staff, joint publications, rental of equipment** and similar forms of collaboration between JSI researchers and companies. At the Center for Technology Transfer and Innovation we are paying a great deal of attention to creating new contacts and maintaining existing ones.

As an initial activity on the path to contract collaboration, we offer the following services to departments of the Jožef Stefan Institute:

- **The organisation of visits to companies and to the Jožef Stefan Institute.** We're happy to take young researchers along with us to visit smaller companies. When there is interest, we also invite representatives of the areas of individual departments to visit larger companies.

- We offer free **individual consultancy** and assistance with:
 - defining the theme and manner of collaboration with the Jožef Stefan Institute;
 - negotiations between departments of JSI and enterprises and in the development of collaboration contracts;
 - project application preparation for Slovenian and EU calls;
 - analysis of the state of a given technology and a search through patent bases;
 - assessment and implementation of technologies and innovation management;
 - preparation of non-disclosure agreements (NDA).
- On a monthly basis, we prepare a **review of open national and EU tenders**, which we regularly publish on our website. If you would like to receive calls for tender directly to your e-mail address, you can contact us at any time at tehnologije@ijs.si.
- Through the **Enterprise Europe Network**, we provide **information** on events and courses, on international development and business integration, information on open national and EU calls and information on open project partnerships.
- In addition, through the Enterprise Europe Network, we provide:
 - Assistance in finding commercial partners abroad (distribution, transport, franchise, joint ventures and subcontracting) through the monitoring of foreign offers and requests and the publishing of offers or requests in the Enterprise Europe Network database.
 - Assistance in finding development partners abroad (licensing collaboration, technical collaboration, joint ventures, production collaboration, commercial collaboration with technical assistance and financial resources) through the monitoring of foreign offers and requests and publishing of offers or requests in the Enterprise Europe Network database.
 - Assistance in finding project partners abroad through monitoring foreign requests and registering own requests for project partners.

5.2.2. Project applications for national and EU calls

We provide interested parties with:

- assistance in the **preparation** of project applications;
- assistance in the **preparation of individual parts** of project applications (e.g. communication, dissemination and impact);
- assistance in the **filing** of project applications
- assistance in **finding project partners** and the international promotion of the activities of departments through the Enterprise Europe Network.

Through the monthly review of calls for tenders, we post up-to-date information on open national and EU calls.

5.2.3. Assistance in establishing new companies

At the Center for Technology Transfer and Innovation, we **offer assistance and advice to researchers of the Jožef Stefan Institute in establishing new companies**. For this purpose, we organise weekly office hours free of charge. The objective pursued by the Center for Technology Transfer and Innovation in agreeing on formal commitments between JSI and a company is to enable the newly created company to penetrate the market, while the secondary objective is the Institute's income from licensing.

In order to encourage entrepreneurship among researchers, awareness of all factors that affect the creation of opportunities for market breakthroughs is of paramount importance. The status of intellectual property rights and the prospects for its protection, the value of the product to the customer and its competitive advantage, the state of the market and, last but not least, the expected profitability and potential for growth are just a few of the elements that require special attention in the development of the business idea.

In setting up new enterprises, we provide the following services to departments of JSI free of charge:

- weekly **office hours**;
- **support in the protection** of intellectual property;
- support in the **preparation of the relevant documentation** and the **implementation of projects at the Institute**;
- assistance in the **preparation of business plans** for new companies;
- we offer a variety of educational **workshops** and **innovation contests** with the greatest commercial potential in the context of the **International Technology Transfer Conference**, where renowned experts (mostly from venture capital) assess the market potential of the proposed technologies and encourage researchers to consider business opportunities.

5.2.4. The protection of intellectual property and the preparation of a marketing strategy

Desiring to ensure the most effective protection and exploitation of the intellectual creations of inventors at departments of JSI, we provide, free of charge:

- **an assessment of the market situation** with regard to a specific technology;
- **the development of a strategy for marketing** specific intellectual property;
- the preparation and filing of **patent applications**;
- the preparation of **agreements on the ownership** of intellectual property rights and **non-disclosure agreements (NDA)**.

The technology assessment, carried out in the initial phase provides a brief overview and assessment of the potential of the technology for use in practice, as well as the strategy for the protection of intellectual property and the re-evaluation of the potential market value regarding the present value (important for spin-outs and the sale of a licence or patent). To facilitate communication on the level of technological development, we use Technology Readiness Levels NASA, TRL.

The market assessment includes a list of potentially interested companies; this material is confidential.

We want to ensure the highest possible quality of patent applications, especially claims, and therefore the final form of the patent application is also reviewed by a specialised external patent agent in the specific field of technology, who will, if necessary, prepare:

- the final application of the patent, model or trademark at the Slovenian Intellectual Property Office;
- the international patent application for PCT, valid in 156 countries, within 12 months of the patent application at SIPO;
- the extension of the patent application in the EU/USA/Asia (or the 156 countries) within 30 months from the registration of the patent at SIPO, or within 18 months after the registration of the patent at PCT, and the registration of a model or trademark in the EU/US/Asia within 6 months after its registration at SIPO.

5.2.5. Marketing intellectual property

Our core objectives include increasing the flow of knowledge and technology in the domestic and foreign economy, as well as the promotion of the Jožef Stefan institute as a centre of excellence in technological advancement.

For this purpose, we provide the inventors of JSI, free of charge, with:

- the preparation of **technology offers and requests**;
- **active marketing** and **finding business partners** with the presentation of technologies at scientific and professional **conferences, industry exhibitions**, and in print and other media;
- the preparation of **licence agreements** and other documents relating to the marketing of intellectual property;
- licensing;
- the establishment of **spin-out companies**.

The technologies of JSI that are available for licensing and/or research collaboration with the industry or other research institutes are also published on our website.

5.2.6. Assistance in the implementation of intellectual property acquisition procedures at JSI

Departments are offered active **assistance in the implementation of procedures at JSI in the context of intellectual property management**. An inventor can bring their invention idea to the Center for Technology Transfer and Innovation, where we will help them complete an »invention disclosure« and a draft patent application. This requires a preliminary examination of the state of the art regarding the invention and a preliminary assessment of the market, in cooperation with the inventor.

The inventor officially discloses the invention to the Institute by submitting an »invention application« and the draft patent application to the Director of JSI, which initiates a 3-month period for the Institute to decide on acquiring the invention.

This is followed by an internal assessment of the contents of the invention and the conditions for acquiring and protecting industrial property rights such as the patent, model, trademark or technical improvement:

- Industrial property commission – the form of invention; whether it is a direct/indirect work invention or a free invention; patentability of the invention;
- Center for Technology Transfer and Innovation – economic utility and commercialisation opportunities;
- Internal patent agent of JSI – patentability of the invention.

The Director of JSI receives:

- a professional assessment of whether the invention qualifies for the acquisition of IP rights; information on whether it is a direct/indirect work invention; and the proposal for the form of acquisition of the invention;
- a preliminary market assessment or potential economic exploitation of the invention and a proposal for the form of acquisition of the invention;
- a draft »patent application« or another proposal for the form of acquisition of the invention.

On the basis of the opinions obtained, the Director will issue a Decision on the non-/partial/complete acquisition of the direct or indirect work invention (no later than 3 months after receipt of the notification of the invention).

What is an invention?

An invention is a »new solution to a technical problem achieved by inventive thought«. An invention must primarily be new – an equal or very similar solution must not be known anywhere in the world. An invention can be a new

product or a new part of a product; it can be the process of its production, a use of the product, or a combination thereof.

What is a work invention?

An invention created during the period of employment or up to 6 months after its cessation and that the Institute has decided to acquire.

What is a direct work invention?

An invention created within the fulfilment of a contract of employment, following an explicit request from the employer or on the basis of a special contract between the employer and the employee.

What is an indirect work invention?

An invention created within work assignments, aided mostly by the experience acquired by the employee in the workplace or the resources made available to them by the employer contributed to the invention.

What is a free invention?

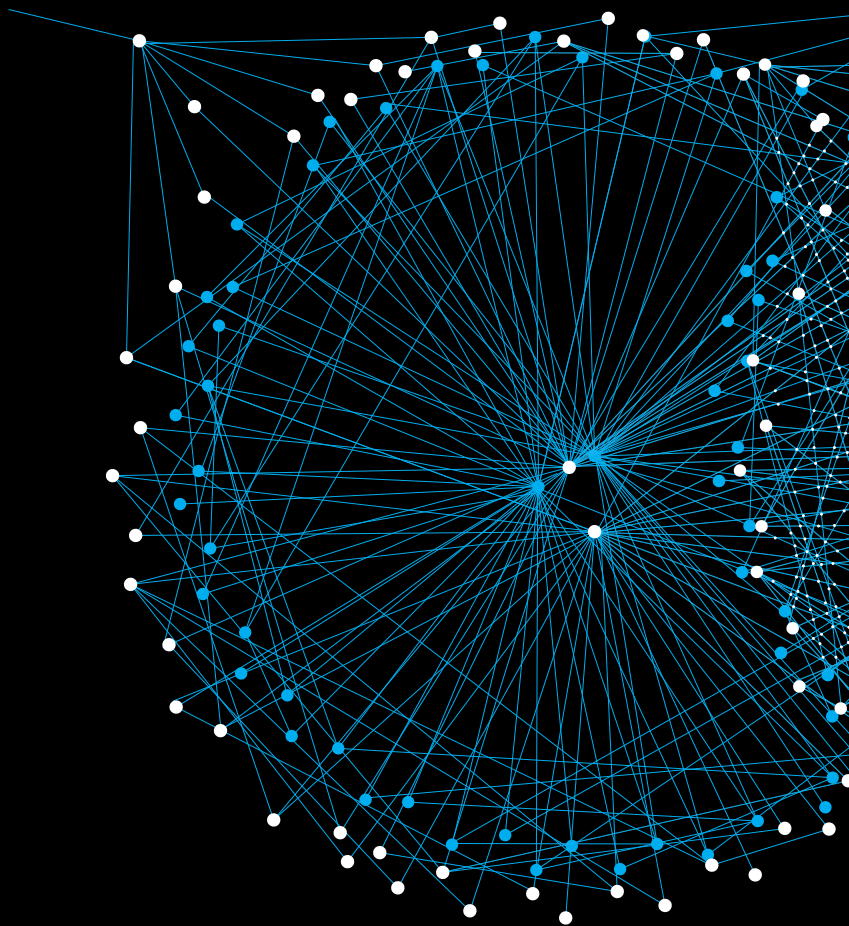
An invention managed independently by the inventor.

What is a full acquisition of intellectual property?

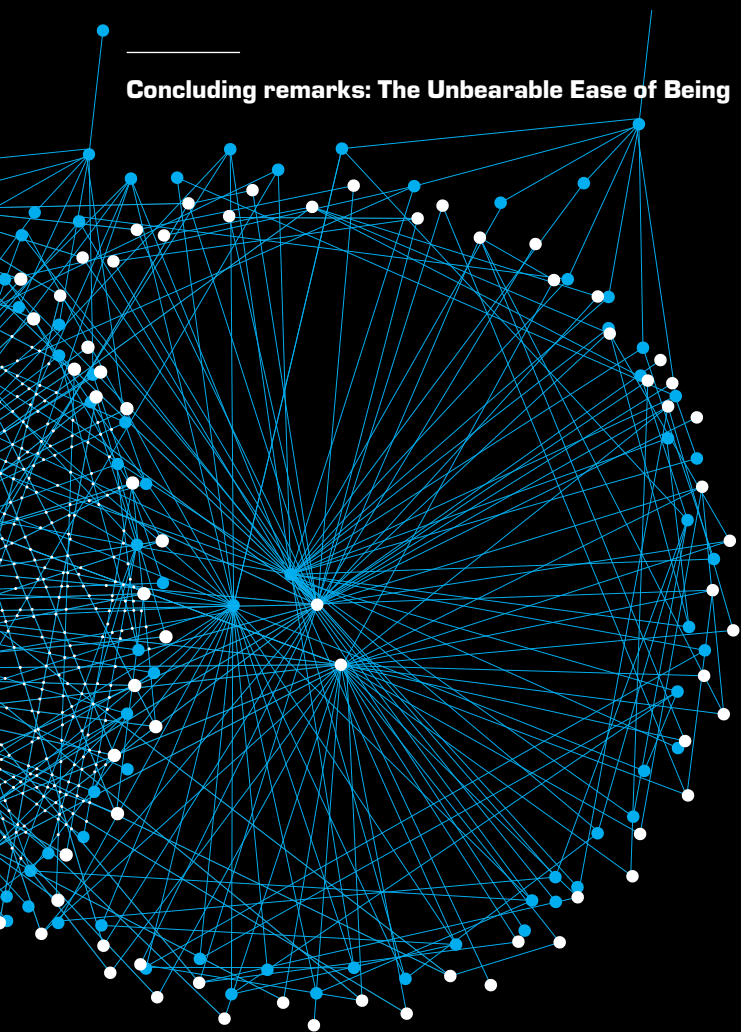
In the event of a full acquisition of intellectual property, all rights to the invention are transferred to the employer (PRO).

5.2.7. Visits to the Jožef Stefan Institute

At the Center for Technology Transfer and Innovation, with the help of other departments of the Jožef Stefan Institute, we arrange visits from primary and secondary schools and other organized groups. In addition, we annually hold open days at the Jožef Stefan Institute, every last week in March, during Stefan's Days at the Institute. We also organise visits by pupils, students or other organized groups through other departments of the Institute every Thursday throughout the school year.



Concluding remarks: The Unbearable Ease of Being



ACCORDING TO SOME ACCOUNTS, Dr William Edwards Deming, an important physicist and statistician with a major influence on the development of management theory in the second half of the 20th century, said: »You can't manage what you cannot measure.« In order to truly solve any problem, you have to analyse the situation, orient yourself, navigate and find a way between two points. Are we trying to establish better links between science and the economy?

It is important to know what science expects of the economy and what the economy expects of science. Patents? The results of a foreign study provide the answer to the second part of the question²¹ (Figure 16) – that is, that the primary desire of the economy is the informal flow of knowledge: published articles, informal contact with researchers and participation in research conferences; secondarily, they want more formalised collaboration in the form of consultancy, contract research, the acquisition of new colleagues trained at PROs, and joint research. The purchase of patents, licences and the short-term exchange of personnel are at the bottom of their list.

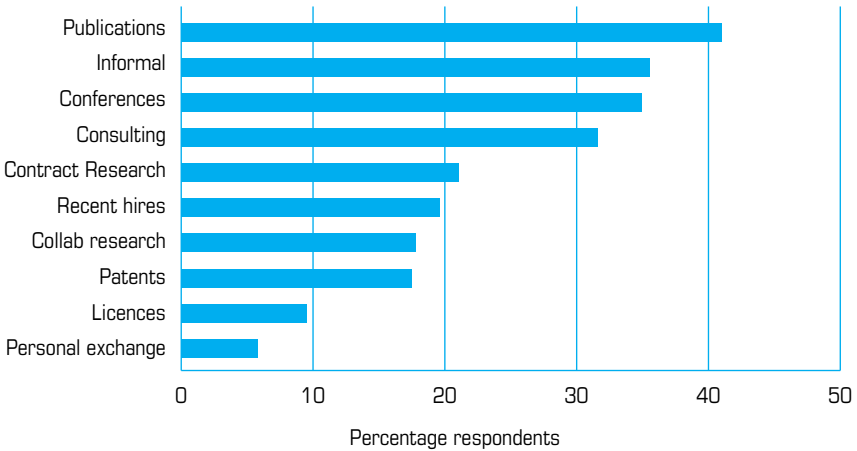


Figure 16.: What does the economy want from science?
Source: »Links & Impacts: The influence of Public Research on industrial R&D«. Cohen, et al in Mgmt Science Vol48 #1 p1-23

According to the survey, the essence of the collaboration between science and the economy is not in the protection and marketing of intellectual property, but in communication between the two sides – which will never be equal, always having different goals, but nevertheless we must strive for their collaboration. This does not rule out collaboration in the field of intellectual property,

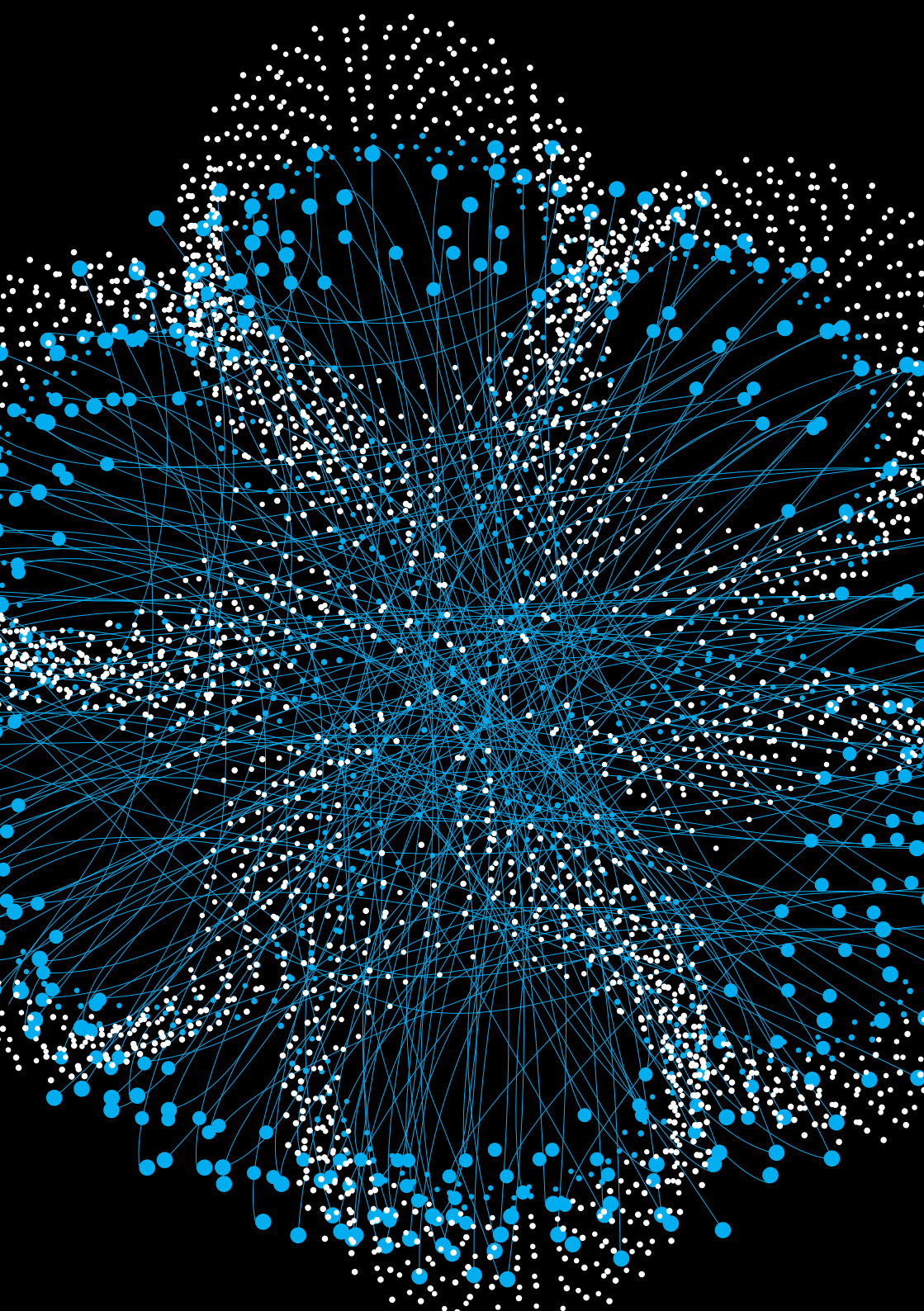
²¹ Cohen et al, The impact of Public Research on Industrial R&D, Management Science, Vol 48, #1

which, in some industries (biotechnology, pharmaceutical sciences, ICT), remains an important element in the demonstration of the competitiveness of companies or in securing the market for one's own products before the competition. The research characterizes intellectual property (8th and 9th place out of the 10 most important) as an important, but not the only and not the key method of collaboration between science and the economy.

The integration of the economy and science is a fluid space, where doors are opened and information is shared with anyone who feels the need to cooperate. For the economy, to come and visit the sciences. And we bring science over to the companies. We invite representatives of other support institutions to visit in order to interconnect the support environment.

We have learned that the integration of science and the economy requires a great deal of ingenuity, know-how, expertise, perseverance, honesty, compassion and self-initiative, as well as a lot of humility.

Others report that Dr Deming actually stated: »One, you can't measure everything of importance to management. And two, you must still manage those important things.« Life just doesn't want to be easy, does it?



6.

Sneak Preview: The way forward: »PoC« Funds – Design Proposal in Slovenia²²

²² Parts of the text marked with (CEF) were partially adapted from Cambridge Enterprise Fund sources, i.e. from insights into the administrative documentation of said »PoC«.

THE GOVERNMENT OFFICE FOR DEVELOPMENT AND EUROPEAN CO-
HESION POLICY [SVRK] conducted the »Analysis of the funding gap for
the 2014-2020 financial instruments«, which also includes equity financing
in the field of SMEs and research-development innovative projects. An »Analysis
of equity financing in Slovenia« was prepared by the Ministry of Economic
Development and Technology (MGRT) and the Slovene Enterprise Fund (SPS),
not yet published at the time of writing this text, as it is the subject of a debate
with the Ministry of Finance (MF). There is communication between the MGRT
and SID bank on the implementation of the 2014-2020 financial instruments.
The EIF has published the »Call for EOIs to select Pan-European FoF promot-
ers«, which gave rise to the preparation of our proposal for the introduction of
the »PoC« fund instrument in Slovenia, since it states that »FoF is also aimed
at supporting the company's development stage before its establishment,
when it is necessary to assess the feasibility of the concept, the feasibility of
transferring RD results into innovative applications, and validation of a prod-
uct, technology or process can be used for commercialization, including licens-
ing and selling intellectual property. This includes a review of the technical
and economic feasibility of research results, demonstration activities such as
late-stage clinical tests, prototyping, incubation. The issue addressed by the
above-mentioned call is strongly present in Slovenia, since there is no »Proof-
of-concept (PoC)« funding, which makes it difficult to transfer knowledge, skills
and technology from PROs to the economy through spin-outs with PROs and
through licensing / sales of licensing of technologically tested technologies.

We propose the establishment of a »PoC« fund in Slovenia, within the frame-
work of an existing financial institution (e.g. banks, public funds), with technical
assistance from the technology transfer offices. We see one option for estab-
lishment in that the SID bank could also include the »PoC« fund as a fund of
funds for the implementation of the 2014-2020 financial instruments, possibly
in the form of pre-seed capital. We propose that the structural funds be used
as a national resource to complement the EIF and EC funds. The decision-mak-
ing and support structure in the »PoC« typically consists of a technology-com-
mercial committee and an investment committee. In some countries²³,
investment in »PoC« funds is performed by transferring the powers of the
technology-commercial committee to the individual technology transfer office
that has requested the investment. The problem with this approach in Slove-
nia at the moment is that the technology transfer offices are, on average, too
under-developed for all of them to take on the role of a professional technol-
ogy-commercial committee; therefore, we propose the implementation of a
technology-commercial committee with members from individual technology
transfer offices as part of the »PoC« fund. In light of the foregoing, we propose
that the »PoC« should be governed by the SID bank.

²³ University of Bergen – Norway, Oxford University – UK, Steinbeis – Germany

The financing of projects from the »PoC« fund should be carried out through the recently published open program for various »PoC« fund products, but also through calls for various »PoC« fund products, according to the analogy of the implementation of the SPS in calls P2, SK75 and SK200. We present two possible »PoC« fund products, estimated at an indicative value of e.g. EUR 10,000 (the »Iskalec« product) and EUR 35,000 (the »Hitrih35« product). In Slovenia, it would be necessary (in our estimation and according to the analogy of the University of Cambridge) to annually implement a minimum of 10 projects for »Iskalec« and 5 projects for »Hitrih35«, meaning that a pilot implementation of the »PoC« fund would annually require a total of EUR 275,000 for the two products (or EUR 100,000 for »Iskalec« and EUR 175,000 for »Hitrih35«).

The recipients of resources from the »PoC« fund products would be the researchers in PROs establishing a company with the PRO or seeking to license technology, and legally, the PRO as a legal entity. The PRO would declare that the project manager – the founder of the company – will be responsible for the use of the funding and that the funds will be managed within a separate cost point. In the financing agreement, the PRO would commit to recovering the financing, in line with the success of the investment. The technology-commercial committee, which would also perform the role of a mentor, should be required to decide on the use of the allocated funding for the project.

»PoC« investments are investments in pre-commercial, pre-entrepreneurial enterprises and are therefore high-risk investments. The investment would be considered to be completed in one of the following cases: (a) the establishment of a spin-out company, which acquires a certain annual income; or (b) without the establishment of a spin-out company, whereby the technology will be licensed to an existing company (and not to the spin-out with the PRO).

The »PoC« fund investment would be divided into recoverable and non-recoverable parts, both implemented uniformly within each product for each project. Their ratio is not fixed but depends on the success of the investment. The return on the investment could be implemented in two ways.

a) Return of the recoverable part of the investment: The recoverable part of the investment is calculated as a proportion of the net inflows to the PRO from the spin-out or the licencing/sale of technology (inflows minus e.g. reasonable investment costs, sponsorship income, other PoC fund revenues). An example of the division of the non-recoverable part of the assets for the Cambridge University »PoC« fund and the returns to the »PoC« fund is shown in Table 6. The non-recoverable part of the funds comprises reasonable costs in predetermined areas, where the »reasonability of costs« is limited by the amount of the non-recoverable part (amount-limited) and by the dedicated nature of the consumption of the non-recoverable part (e.g. the non-recoverable

part only includes patent costs for the first application of intellectual property); the »PoC« fund has the discretion to deem costs unjustified, e.g. in the case of estimates by »PoC« experts that the IP protection is too broad]; non-dedicated consumption (especially in phases a) and b)) in practice limits the active work of the »PoC« fund team, which monitors the investment and collaborates with researchers in a technical/mentoring capacity. The arrangements for recovering the investment are a matter of contractual relations.

b) Registration of the »PoC« manager for a share of the intangible asset (equity financing) that is commercialised (patent or secret knowledge). This type is less often used in the context of »PoC« funds.

6.1. PoC: method and extent of support, process, type of financing and revenue sharing

6.1.1. What is PoC

In order to test a concept, »proof of concept« (»PoC«) funds provide support for researchers and scholars with a uniform offer of direct investments and support in the building of their teams and knowledge, specialising in the situations researchers find themselves in with commercially interesting technologies, which are, however, not adapted to or tested by the market. The result of the work of the »PoC« funds is a boost in financing, which the team needs in order to test the concept of a technology (from their research) for the development of products and improving the level of knowledge in the team for the further development of technologies for commercial purposes, in situations specifically linked to PROs, along with their implementation. (CEF)

»PoC« funds serve to support the (future) founders of companies – those based directly on research from PROs. These are situations where the basis for the business idea is based on intellectual property (protected or registered hidden knowledge), the holder of which is the PRO. Typically, these are technologically-intensive undertakings in which the state has already invested a significant amount of non-recoverable funding through the research activity. The funding of »PoCs« thus follows the stages in which research was funded through non-recoverable assets. Following the funding of the »PoC« funds, undertakings (similarly to those not related to PROs) are expected to require starting capital, seed capital and venture capital. To quote the «Call for EOIs to select Pan-European Fund of Funds (FoF) promoters», »PoC« funds » also serve to validate whether a certain product, technology or process can be

used for commercialization, including the licensing and sale of intellectual property²⁴.

6.1.2. Scope of support from the »PoC« fund

»PoC« fund investments are pre-seed investments into newly created enterprises that are/will be established by the staff along with the PRO in order to enable the commercial development of research from the PRO (this type of newly created company is also called a PRO spin-off or spin-out). »PoC« funds provide a series of investments that assist the development of new enterprises of this kind.

The members of the »PoC« fund team (the investment committee and the technology and commercial committee) act as investors. The total investment under consideration comprises both direct contributions from the state in the research work already made, as well as »PoC« funds allocated by the PoC team independently. The aim is to optimise the joint ROI of the two parts of the investment (although the first part was carried out without the »PoC« team members having an impact).

Since an informed business and research team is needed to optimise the investment, some members of the »PoC« fund team (technology-commercial committee) also act as mentors, e.g. in the areas of intellectual property, the regulation of relations with the PRO, legislation governing the cooperation of companies with the PRO, etc. The scope of this type of mentoring is different to what is normally provided when receiving starting capital, e.g. when receiving a P2 product (SPS).

The members of the »PoC« team, together with the researchers, ensure the implementation of several distinct processes, since PoC funding involves several processes, of which the final two can be in parallel when a positive assessment is given in the first procedure (CEF):

(a) The formal part: The arrangement of ownership rights through the process of acquiring IP at the PRO and the arrangement of rights for the establishment of a spin-out with the PRO on the basis of the said IP. All the procedures are performed that are necessary from the point of view of the PRO and the state that funded the research, e.g. the definition of intellectual property and its registration as an intangible asset of the PRO, the definition of the ownerships of the PRO, ownership contracts, etc. Implementation of this part of the procedure is a precondition for the entry of venture capital in the next phase, as otherwise the ownership relationships would remain unclear;

²⁴ »Call for Eois to select Pan-European FoF promoters«, Internet (21.1.2017): http://www.eif.org/what_we_do/equity/pan european_venture_capital_fund_of_funds/call/Pan-European%20VC%20FoF%20Programme_Call%20for%20Expression%20of%20Interest.pdf

(b) The technical-ownership part: Evaluation of the sensibility and protection of certified research concepts within the market concept. Under »PoC« funding, these procedures include a technological assessment, a »freedom to operate« study, a patentability assessment and/or an assessment of other types of protection. Of the above processes, the PRO's business team and the »PoC« team (technical-mentoring part) jointly carry out all the necessary procedures from the point of view of the PRO and the state funding the research, and provide for the protection of intellectual property, if appropriate and necessary;

(c) The technological-entrepreneurial part: In this part, »PoC« funding enables the verification of the technological concept through reference to the business idea. This is a verification of the technical concept for feasibility within an existing business idea, i.e. the verification of the adequacy of an existing technology [whose development took years/decades] for the implementation of a specific business idea in the form of a PRO spin-out company [or of the licensing/sale of intellectual property to the PRO].

»PoC« therefore enables the verification of the business concept and technological concept of a research result already obtained for feasibility in the framework of the business idea.

In the Slovenian ecosystem, the discussed »PoC« financing for spin-out companies with PROs would act as a precursor for carrying out financing within the P2 product of the SPS. The P2 product, to sum up the web pages of the SPS and the Startup Initiative, enables searching for a solution to the identified problem on the market and is designed for start-up companies in the stage of searching for a solution for that problem. At this stage, the company knows the problem, has a business idea and a business team that can use the P2 funds to develop a prototype or a minimum viable product for the market. P2 funding can also include spin-out companies established with PROs, provided they successfully underwent the »PoC« phase, in which the technical feasibility of the technology [whose development lasted years/decades] was verified as a solution to the market problem. This phase requires »PoC« funding, which is not available in Slovenia. Today, spin-out companies with PROs do what they can in order to make it to the start-up funding phase without the »PoC« funding phase. It is estimated that the absence of »PoC« funding means that Slovenian spin-out companies with PROs are less successful than they could have been.

Spin-out companies from PROs that have successfully passed the »PoC« phase can successfully integrate into the P2, SK75 and SK200 products and continue their route through the start-up financing instruments established in Slovenia.

Example: Since 1995, the Cambridge Enterprise »PoC« has invested in 62 enterprises, which together exceed a three-year survival rate of 80%, compared

with the national average of 30% for technology companies in Great Britain. At Cambridge University, »PoC« funding is carried out in collaboration between researchers, the technology transfer office and a financial intermediary^{25 26}.

6.1.3. The process of »PoC« product implementation

As an example, we cite the projects carried out by Cambridge Enterprise for Cambridge University:^{26, 27}

- a) »Pathfinder investments Pathfinder investments «**, of up to £20,000 in order to carry out market analyses and analyses of intellectual property, estimations and prepare a basic business strategy.
- b) »Fast 50«**, a Cambridge Enterprise initiative offering up to £50,000 for work on time-sensitive projects and critical experiments requiring rapid investment, with the aim of verifying the technological concept for the market.
- c)** This is followed by starting and seed capital investments (which no longer fall under the »PoC« category!), up to £500,000 in the initial round, to provide first-stage financing for companies to promote technology development and management.

The »Pathfinder investment« product, which is easily and rapidly accessible, is used with the aim of rapidly developing/evaluating the plans (for the continuation or termination) of pre-entrepreneurial teams through mentorship.

Applicants submit an application for the »Pathfinder investments« product. This application contains an early discussion of the ideas and potential of the ideas²⁷, and includes a description of the current state of the technology, the history of publication, a description of the funding sources for the emergence of the technology, and the content authors. Next is the implementation of the formal and technical-ownership parts of the »PoC« financing procedure described in the text above. (CEF)

The continuation of positively assessed projects under the »Pathfinder investments« product is facilitated by the »Fast50« product, which includes a review phase of the technical concept of feasibility within the existing business idea. In order to obtain funding, a business plan needs to be presented to the technological-commercial committee (technology transfer office), which assesses the technological maturity and feasibility of the idea in terms of quick marketing

²⁵ Cambridge Enterprise, Start a Company, Internet [15.1.2017]: <https://www.enterprise.cam.ac.uk/our-services/academics-researchers-and-students/start-a-company/>

²⁶ Cambridge Enterprise, Translational Funding, Internet [15.1.2017]: <https://www.enterprise.cam.ac.uk/our-services/academics-researchers-and-students/commercialise-your-research/translational-funding/>

²⁷ Physical sciences Grants for Commercialization, Internet [15.1.2017]: <https://www.enterprise.cam.ac.uk/our-services/academics-researchers-and-students/commercialise-your-research/translational-funding/physical-sciences-grants/>

estimates, and decides whether the application is appropriate for presentation to the investment committee (investors). If the decision of the investment committee is positive, it is necessary to establish the necessary legal arrangements to complete the investment and take the steps of the technological-entrepreneurial part of the »PoC« financing process. (CEF)

In some countries (Bergen Technical University – Norway, Oxford University – UK, Steinbeis – Germany), investment in »PoC« funds is performed by a request through a technology transfer office. In this case, there is no technology-commercial committee alongside the »PoC« fund, only the investment committee, and the responsibilities of the technology-commercial committee are transferred to the technology transfer office that registered the project for financing. The problem with this approach in Slovenia at the moment is that the technology transfer offices are, on average, too under-developed for all of them to take on the role of a professional technology-commercial committee; therefore, we propose the implementation of a technology-commercial committee with members from individual technology transfer offices as part of the »PoC« fund.

6.1.4. Translational funding: Recoverable or non-recoverable assets?

Translational funding is used to bridge the development funding gap between the early stage of a technology, arising from research at the PRO, and its marketing.

In the UK, there are various translational funding resources available to researchers wanting to market their research, e.g. translational funding for physics²⁷, translational funding for biotechnology²⁸. The case of the UK and the mentioned support mechanisms exclusively involves non-recoverable assets. These are assets available to academics for the pre-commercial development of individual instances of technology that are (almost) mature enough for financing from »PoC« funds. These (non-recoverable) translational assets are used in the UK primarily for the preparation of the implementation of the technology-entrepreneurial part of the »PoC« funding, in cases where researchers are still deciding on the establishment of a spin-off company with the PRO on the basis of the developed technologies. In Slovenia, we estimate that part of this kind of development is taking place under research projects.

An additional part of the financing for the translational funding for PROs is available (in the UK) through »PoC« funds. The whole »PoC« funding process, i.e. points (a-c), are carried out in the case of a future spin-off company with a PRO or in the case of the future licensing/sale of technologies from a PRO. In the case of »PoC« funds, these are conditionally recoverable assets. The method for recovering the assets is described in the following paragraph and the

²⁸ Biotechnology grants for Commercialization, Internet (15.1.2017): <https://www.enterprise.cam.ac.uk/our-services/academics-researchers-and-students/commercialise-your-research/translational-funding/life-science-grants/>

recoverability depends on the success of the investment. The funds are recovered in the event of the market success of the spin-off with the PRO. (See the specific case of Cambridge Enterprise for Cambridge University below).^{26, 27}

6.1.5. Return on investment in »PoC« financing – revenue sharing model

All »PoC« investments are investments in pre-commercial, pre-entrepreneurial enterprises and are therefore high-risk investments.

Investments usually conclude with the following two exits:

- the establishment of a spin-off company with a PRO, which acquires a certain annual income;
- or
- without the establishment of a spin-off company with the PRO; however, the technology will be licensed to an existing company (and not to the spin-off with the PRO).

The recovery of assets to the »PoC« fund is carried out as follows:²⁷

- the non-recoverable part comprises reasonable costs;
 - the »reasonability of costs« is limited by the amount of the non-recoverable part and by the dedicated nature of the consumption of the non-recoverable part (e.g. the non-recoverable part only includes patent costs for the first application of intellectual property);
 - the »PoC« fund has the discretion to deem costs unjustified, e.g. in the case of estimates by »PoC« experts that the IP protection is too broad);
 - non-dedicated consumption (especially in phases a) and b)) is limited by members of the technology-commercial committee, who monitor and confirm the costs through the investment and collaborate with researchers in a technical-mentorship capacity;
- the recoverable part of the assets is recovered from the net investment income and is divided between the PRO (which is the 100% intellectual property rights holder) and the »PoC« Fund, which thus eventually recovers the investment (and more if the investment is successful).
- An example of the division of the non-recoverable part of the assets and returns to the »PoC« fund is shown in Table ²⁷.

Table 6.: Method of sharing the net revenue between the PRO and the Cambridge University »PoC« fund.

Net revenue	PRO	PoC fund
First £100,000	95%	5%
Next £100,000	80%	20%
Over £200,000	67%	33%

6.2. Findings and proposal for future actions

Through our work, we have reached the following assessment of the situation:

- SVRK conducted the »Analysis of the funding gap for the 2014-2020 financial instruments«, which also includes equity financing in the field of SMEs and research-development innovative projects;
- An »Analysis of equity financing in Slovenia« was prepared by MGRT and SPS, which is not yet published at the time of writing this text, as it is the subject of a debate with the MF;
- There is communication between the MGRT and SID bank on the implementation of the 2014-2020 financial instruments.
- The EIF has published the »Call for EOIs to select Pan-European FoF promoters«²⁵, which gave rise to the preparation of our proposal for the introduction of the »PoC« fund instrument in Slovenia;
- The issue addressed by the call is strongly present in Slovenia, since there is no »Proof-of-concept (PoC)« funding available.

Part of that call for FoF, which specifically addresses »knowledge and technology transfer (KTT)« activities, states that »FoF is also aimed at supporting the company's development stage before its establishment, when it is necessary to assess the feasibility of the concept, the feasibility of transferring RD results into innovative applications, validation of whether a product, technology or process can be used for commercialization, including licensing and selling intellectual property. This includes a review of the technical and economic feasibility of research results, demonstration activities such as late-stage clinical tests, prototyping and incubation.«²⁵

This gap needs to be filled because it impedes the transfer of knowledge and technology from PROs to the economy, both through spin-off companies with PROs and through the licence/sale of the rights of technologically verified technologies. We also held the same position during the preparatory meetings for the EC DGRTD call. The view that »companies before establishment, including the licensing and sale of intellectual property« should also be supported is well-reflected in the FoF tender. We want this position to be implemented for the benefit of technologies with PROs and the resulting ventures that want to enter the market but require funding from »PoC« funds in order to do so.

»PoC« funding is carried out in collaboration between researchers and technology transfer offices (see e.g. Cambridge Enterprise, Cambridge University Technology Transfer Office^{26, 27}) in mature systems to support the commercialisation of technologies. It is estimated that the situation in Slovenia is at a stage where technology transfer offices could participate at the level of Cambridge Enterprise, i.e. independently.

We believe that the SID bank is a suitable institution where the »PoC« fund could be realised. We also believe that experts from technology transfer offices should be included in the process of the creation and implementation of »PoC« funding due to their experience with »PoC« funds or the processes running within them, as well as their experience in the creation of spin-outs and the commercialization of technologies with PROs (which, as shown by the EIF materials, is one of the intentions of the aforementioned call²⁵).

We propose to establish a »PoC« fund in Slovenia. We propose that the SID bank should also include the »PoC« fund as a fund of funds for the implementation of the 2014-2020 financial instruments, possibly in the form of pre-seed capital. We propose that the structural funds be used as a national resource to complement the EIF and EC funds.

We propose the establishment of a »PoC« fund in Slovenia, within the framework of an existing financial institution (e.g. banks, public funds – our specific proposal is the SID bank), with technical assistance from the technology transfer offices. The decision-making and support structure in the »PoC« typically consists of a technology-commercial committee and an investment committee. In some countries²⁹, investment in »PoC« funds is performed by transferring the powers of the technology-commercial committee to the individual technology transfer office, which is also the only one to be able to formally apply for investment. The problem with this approach in Slovenia at the moment is that the technology transfer offices are, on average, too under-developed for all of them to take the role of a professional technology-commercial committee; therefore, we propose the implementation of a technology-commercial committee with members from individual technology transfer offices as part of the »PoC« fund, but we are also open to other forms of solution that meet the high requirements for quality and successful operation of the »PoC« fund.

We propose that the financing of projects from the »PoC« fund should be carried out through the recently published open program for various »PoC« fund products, but also through calls for various »PoC« fund products, according to the analogy of the implementation of the SPS in calls P2, SK75 and SK200.

The Slovenian equivalent of the UK instruments described above, namely »Pathfinder investments« and »Fast50« investments (up to £20,000 and up to £50,000 – recalculated for the Slovenian ecosystem), would be managed by SID bank:

- The »Iskalec« product – the equivalent of the UK »Pathfinder« product, estimated at a rough value of e.g. EUR 10,000 (in the UK up to £20,000) per project. The evaluation is carried out by the technology-commercial committee (technology transfer experts, by reference; possibly [also] from the technology transfer offices);

²⁹ University of Bergen – Norway, Oxford University – UK, Steinbeis – Germany

- The »Hitrih35« product – equivalent of the UK »Fast50« product, estimated at a rough value of e.g. EUR 35,000 (in the UK up to £50,000) per project. The evaluation is carried out by the investment committee (investment experts, the SID bank), with the technical assistance of the technology-commercial committee.

According to the analogy of the University of Cambridge, it would be necessary in Slovenia to annually implement a minimum of 10 projects for »Iskalec« and 5 projects for »Hitrih35«, meaning that a pilot implementation of the »PoC« fund would require a total of EUR 275,000 annually for the two products (or EUR 100,000 for »Iskalec« and EUR 175,000 for »Hitrih35«).

The recipients of the resources from the »PoC« fund products would be the researchers in PROs establishing a company with the PRO or seeking to license technology – and legally, the PRO as a legal entity. The PRO would declare that the project manager – the founder of the company – will be responsible for the use of the funding and that the funds will be managed within a separate cost point. In the financing agreement, the PRO would commit to recovering the financing, in line with the success of the investment.

The investments would conclude with the following two exits:

- the establishment of a spin-out company with a PRO, which acquires a certain annual income;
- or
- without the establishment of a spin-out company with the PRO; however, the technology will be licensed to an existing company (and not to the spin-off with the PRO).

All »PoC« investments are investments in pre-commercial, pre-entrepreneurial enterprises and are therefore high-risk investments.

The »PoC« fund investment would be divided into recoverable and non-recoverable parts. Their ratio is not fixed but depends on the success of the investment.

The return on the investment could be implemented in two ways:

a) Return of the recoverable part of the investment:

the recoverable part of the investment is calculated as a proportion of the net inflows to the PRO from the spin-off or the licencing/sale of technology (inflows minus e.g. reasonable investment costs, sponsorship income, other PoC fund revenues). The recoverable part of the assets would be recovered by the PoC fund from the net investment income and would be divided between the PRO (which is the 100% intellectual property rights holder) and the »PoC« Fund, which thus eventually recovers the investment (and more if the investment is

successful]. An example of the division of the non-recoverable part of the assets and returns to the »PoC« fund is shown in Table²⁷.

The non-recoverable part comprises reasonable costs in predetermined areas;

- the »reasonability of costs« is limited by the amount of the non-recoverable part (amount-limited) and by the dedicated nature of the consumption of the non-recoverable part (e.g. the non-recoverable part only includes patent costs for the first application of intellectual property);
- the »PoC« fund has the discretion to deem costs unjustified, e.g. in the case of estimates by »PoC« experts that the IP protection is too broad);
- non-dedicated consumption (especially in phases a) and b)) is limited by members of the technology-commercial committee, who monitor and confirm the costs through the investment and collaborate with researchers in a technical-mentorship capacity.

The arrangements for recovering the investment are a matter of contractual relations in this case, which, to our knowledge and experience, is already a relatively established practice in the Slovenian legal system today.

b) Registration of the »PoC« manager for a share

of the intangible asset (equity financing) that is commercialised (patent or secret knowledge). »PoC« will always encounter a situation where one of the results of the process will be an intangible fixed asset of the PRO (patent or secret knowledge, all of which must, according to Accounting Standards, be registered as an intangible fixed asset if it is to be subject to marketing-sales or a transfer of rights of use under a licence agreement). This type is less often used in the context of »PoC« funds. It is our opinion that the transfer of ownership rights is possible in the Slovenian legal system, though in practice it is not well established, especially for intangible fixed assets.

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