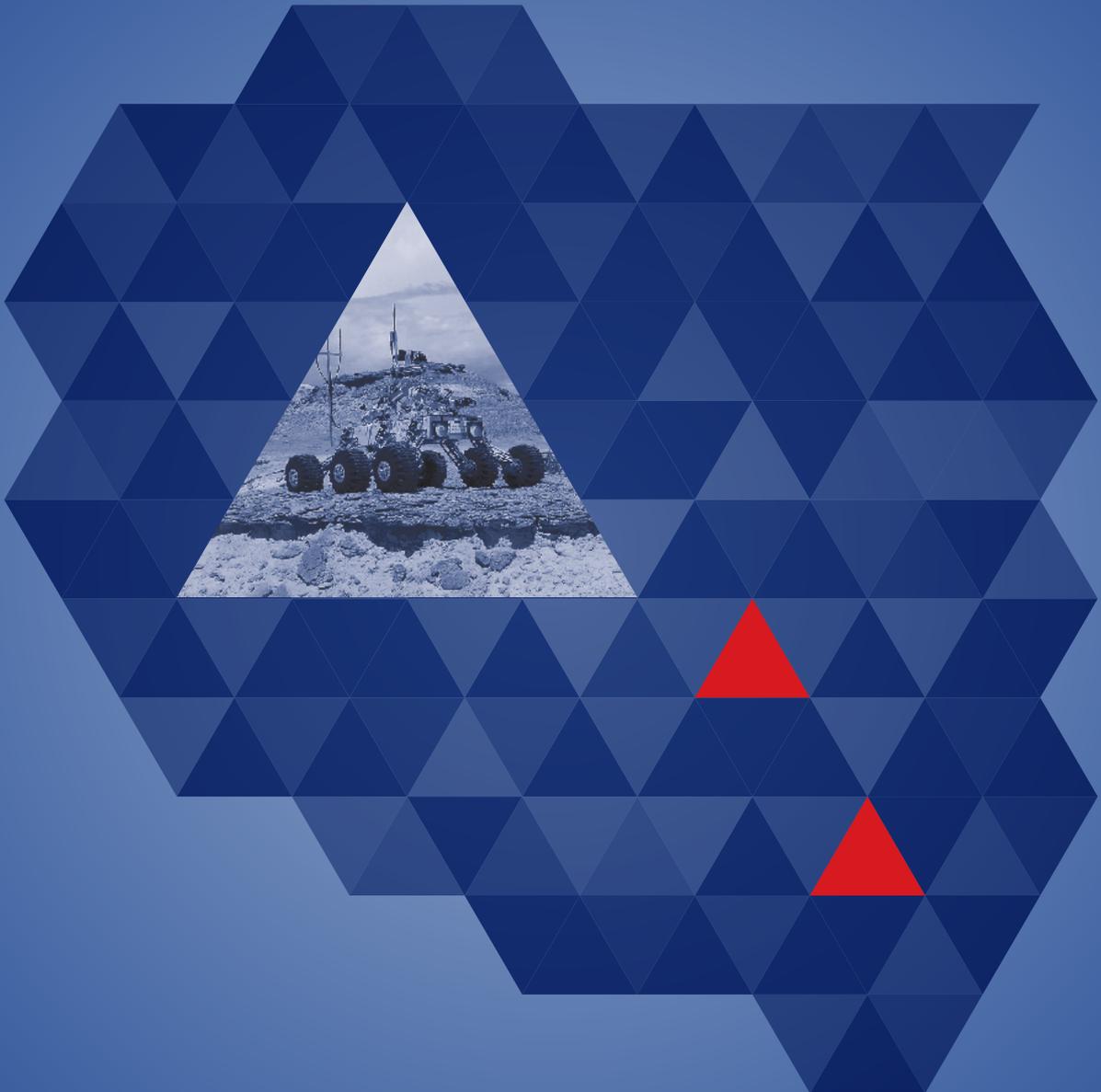


POLAND CATCHING-UP REGIONS

DESIGNING REGIONAL TECHNOLOGY TRANSFER OFFICE: PODKARPACKIE CENTER FOR INNOVATION



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Trust Fund No. TF072592
EC Contract No. CCI201

POLAND CATCHING-UP REGIONS

**Designing Regional Technology Transfer Office:
Podkarpackie Center for Innovation**

Acknowledgements

This report was prepared by a core team comprised of Grzegorz Wolszczak, Dariusz Wiatr, Jerzy Toborowicz, Krzysztof Malicki, Andrzej Kaznowski, Michał Żukowski, Elista Panayotova and Anwar Aridi, and coordinated by Paul Kriss and Marcel Ionescu-Heroiu. The report benefited from thoughtful comments by peer reviewers Lisa Cowey, Robert Hodgson and Marcin Piątkowski.

The team would also like to thank Commissioner Corina Crețu for initiating the Initiative, Minister Jerzy Kwieciński from Poland's Ministry of Economic Development for his invaluable support, and the European Commission's team for outstanding engagement and support, especially Mr. Patrick Amblard, Mr. Wolfgang Munch, Ms. Justyna Podralska, Ms. Magdalena Horodyńska, and Ms. Karolina Tilman from the DG REGIO.

The team would like to thank Arup Banerji, Marina Wes, David Sislen, Carlos Piñerúa and Isfandyar Zaman Khan for the advice and guidance provided throughout the elaboration of this report and Agnieszka Boratyńska for her excellent support.

The team is also indebted to all counterparts for the support offered in the elaboration of this study, the timely feedback, the excellent collaboration throughout, and their passion for developing their institutions and region, especially: from the Podkarpackie Marshal Office: Danuta Cichoń, Bartosz Jadam, Anna Lorynowicz, Agnieszka Łapa-Krzywonos; from the Ministry of Economic Development: Renata Calak, Joanna Kościcka-Posiewka, Anna Banaszczyk; from Rzeszow University: Sylwester Czopek, Józef Cebulski, Barbara Oskroba, Grzegorz Wisz; from Rzeszow University of Technology: Mariusz Oleksy, Grzegorz Budzik, Maciej Szalacha, Artur Polakiewicz, Agnieszka Łabaj; from University of Information, Technology and Management: Wergiliusz Gołąbek, Agata Jurkowska-Gomułka, Grzegorz Karpiuk, Wojciech Pitura.

The report was completed in March 2017.

What is the Lagging Regions Initiative

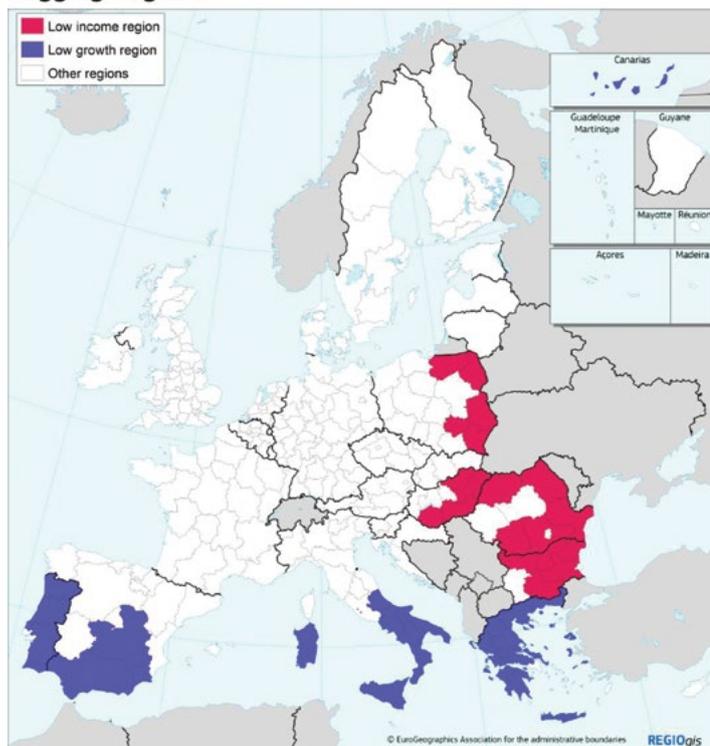
The scope of the EU Cohesion Policy is to narrow development gaps and reduce disparities between Member Countries and regions. To this extent, around €454 billion of ESI (European Structural and Investment) Funds have been allocated to help EU regions become more competitive. However, not all EU regions have been able to fully take advantage of the benefits of EU growth, due to the effects of the 2008 economic crisis and due to a host of structural problems.

To this end, Corina Crețu, the Commissioner for Regional Policy, together with the Task Force for Better Implementation has started the Lagging Regions Initiative. The aim of the Initiative is to identify what holds back growth in less developed regions, and to provide targeted actions for unlocking their growth potential. Thus, these lagging regions will be assisted to involve a broad range of stakeholders (regional and local administrations, educational institutions, business support institutions, SMEs, entrepreneurs, investors, NGOs, IFIs) to help respond to concrete needs they have and to maximize the impact of regional investments. Two types of lagging regions have been identified:

- **LOW GROWTH REGIONS**, which cover the less developed and transition regions that did not converge to the EU average between the years 2000 and 2013 in Member States with a GDP per Capita (PPS) below the EU average in 2013. These include almost all the less developed and transition regions in Greece, Italy, Spain and Portugal
- **LOW INCOME REGIONS**, covering all the regions with a GDP per Capita (PPS) below 50% of the EU average in 2013. This group covers the less developed regions of Bulgaria, Hungary, Poland and Romania.

Lagging Regions in the EU

Lagging Regions



Source: DG REGIO

Poland and Romania are the first countries to pilot this initiative, with two regions each – Swietokrzyskie and Podkarpackie in Poland, and North-West and North-East in Romania. In April 2016, Commissioner Crețu together with Marshal Adam Jarubas in Swietokrzyskie and Marshal Wladyslaw Ortyl in Podkarpackie have officially launched the Polish part of the Lagging Regions Initiative called „Catching-up Regions Poland”. The „Catching-up Regions Poland” is an implementation-focused program that aims at providing tailored support to the two Polish regions to boost the impact of EU and private investments in specific areas selected by the two regions.

Over a year of joint work, the World Bank provided hands-on technical assistance and helped coordinate five activities that were selected by the Podkarpackie and Swietokrzyskie regions in coordination with the European Commission, Ministry of Economic Development, and the Bank. The five selected activities were:

- Improving the commercialization of Research & Development (R&D) results generated by public research facilities and enabling better utilization of existing technology transfer centers in the Podkarpackie region.
- Strengthening the vocational education and training system in the Swietokrzyskie region, using best practice examples from around the world and tailoring them to the regional context.
- Activating entrepreneurship in deprived areas in the Podkarpackie and Swietokrzyskie regions.
- Identifying ways to improve conditions for starting a business in the Podkarpackie and Swietokrzyskie regions.
- Supporting the creation of in-house financial instruments in the Podkarpackie region.

This report constitutes one of the outputs of the “Catching-up Regions Poland” work. More outputs, including an overview report and reports for individual activities in both English and Polish can be accessed on the World Bank’s website.



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List of Acronyms

ADF	Aalto Design Factory
BEP	Break-even point
EC	European Commission
EU	European Union
GDP	Gross domestic product
GSM	General Shareholders Meetings
IP	Intellectual property
IPR	Intellectual property rights
IPO	Initial public offering
KUL	KU Leuven University
LRD	Leuven Research & Development
MA	Managing Authority
MC	Management Company
MO	Marshal Office
MoED	Ministry of Economic Development
MoSHE	Ministry of Science and Higher Education
MVP	Minimum viable product
NCBR	National Center for Research and Development
PARP	Polish Agency for Enterprise Development
PCI	Podkarpackie Center for Innovation
PE	Private equity
PoC	Proof of concept
PoP	Proof of principle
R&D	Research and development
RAC	Resource Allocation Committee
ROP	Regional Operational Program
RPW	Development of Eastern Poland Operational Program
RU	Rzeszów University
RUT	Rzeszów University of Technology
SB	Suprevisory Board
SGOP	Smart Growth Operational Program
SLA	Service level agreement
SME	Small and medium-sized enterprise
SPC	Special purpose company
SZOOP	Detailed description of priority axes in the Operational Program
TRL	Technology readiness level
TTC/TTO	Technology transfer center / office
TTT	Toulouse Tech Transfer
UITM	University of Information, Technology and Management
VC	Venture capital
WB	World Bank

ACTIVITY 1:

**Designing Regional Technology Transfer Office:
Podkarpackie Center for Innovation**

Executive Summary

1. This report is an implementation focused document that proposes a solution for addressing the problem of unexploited potential in the Podkarpackie R&D ecosystem (in particular, relatively low, although gradually increasing, level of intensity of business - university collaboration).

This problem was jointly identified by the project partners, the European Commission, the Podkarpackie Marshal Office (MO), the Ministry of Economic Development (MoED) and the World Bank (WB), and a single regional technology transfer office (TTO) was found to be a preferred option to tackle it. The main goal of this report is to present a model of a proposed Podkarpackie Center for Innovation (PCI) that resulted from a joint effort of key local stakeholders (MO, universities, enterprises and their representatives).

2. The Podkarpackie region is doing relatively well on some key measures of innovation.

Research and development (R&D) expenditures per capita and employee were on par with the national level in 2014 (€90), and almost five times higher than in 2007 (€20). On this measure, the region ranks fourth nationwide. In terms of private R&D expenses, the Podkarpackie region ranks third in Poland, after the Mazowieckie and Malopolska regions. Despite negative national trends, the number of students (and in particular, students of technical universities) in Podkarpackie grew significantly over the last years. In particular, with close to 50 thousand students, Podkarpackie ranks at the top of all European cities in terms of the number of students per capita.

3. However, the Podkarpackie R&D landscape has five opportunities for improvement in the university-business R&D cooperation realm:

- The rate of creating technology start-ups (in particular, a low rate of R&D-based start-ups founded as a result of research performed at the local universities) is below the region's potential
- The levels of licensing revenues generated by the region's universities may be significantly improved (today's levels suggest that there may be a problem translating intellectual property (IP) into commercial success)
- The level of utilization of the local universities R&D equipment for commercial purposes is low and could be significantly increased (this applies as well to the level of revenues derived from contract research that is based on that equipment)
- The involvement of the local corporations in the joint university-business collaboration, even though good in some areas by Polish standards (example: the Aviation Valley cluster companies and their cooperation with the Rzeszow University of Technology, RUT), falls short of its potential
- Local student successes in national and international level competitions could be more systematically translated into subsequent entrepreneurial success.

In recent years the Podkarpackie universities and companies have achieved significant successes in these five areas, however, their further intensification is necessary for the Podkarpackie innovation ecosystem to become one of the leaders in the country.

4. The root causes behind the unexploited potential of the Podkarpackie innovation system lie first in the still-limited competencies and capacity to deliver (mainly in areas of valorization and structured contract research) and secondly in underdeveloped entrepreneurial ethos at the two local universities.

This problem affects researchers, students and university support personnel. While the local universities began efforts to strengthen their commercialization capacity (e.g., the RUT operates both a sizeable technology transfer center and a special purpose company), the schools typically lack the concentrated critical mass of skills necessary for successful commercialization of university-born R&D results. This stems in part from their overall shortage in Podkarpackie, and partly from a dispersion of these skills across multiple players of the Podkarpackie innovation ecosystem (such as universities, regional development agencies, technology parks, clusters, incubators, accelerators). Lack of the business-science collaboration ethos stems primarily from the misaligned incentive system for the researchers, still limited scope of such activities, constraints not allowing commercial utilization of the universities' R&D equipment,

and differences in the organizational cultures of corporate and science worlds that area difficult to match. As of today R&D collaboration does not generate sufficient benefits (e.g., in terms of a parametric evaluation by the Ministry of Higher Education, revenues, research opportunities) for either the universities or researchers to gain their attention. Leading European universities and TTOs acknowledge that the presence of a strong entrepreneurial ethos at the universities is an important ingredient of successful innovation ecosystems, and that this needs to be started early on. For that reason, initiatives that shape innovation-oriented attitude among students and provide them with opportunities to prototype and experiment have been gaining popularity.

- 5. The aforementioned improvement opportunities are not being addressed by the existing R&D ecosystem.** For instance, the technology transfer centers (TTCs) do a very good job at some tasks (e.g., support on IP issues, administration of research grants, etc.), but have neither the scale, nor the required competencies or resources to significantly ramp up the licensing revenues, increase the level of university-originated start-ups, proactively market services to be provided on the university R&D equipment, or to spur the entrepreneurial drive of students.
- 6. The report recommends the creation of the Podkarpackie Center for Innovation (PCI), a technology transfer office (TTO) to address the weaknesses of the regional innovation ecosystem.** In principle, the PCI will help link businesses and university researchers, develop key skills of university researchers and administrative staff necessary for R&D collaboration, support R&D projects by providing resources (money, skills, knowledge), and stimulate students' entrepreneurship. By intensifying such a collaboration thanks to a proactive attitude and envisaged early commercialization successes, the PCI will contribute to strengthening the ethos of business-university cooperation at the local universities. Its activities will be complementary to and supportive of work performed by university TTCs and special purpose companies (SPCs). The second approach that was considered during this project focused on building up the capacity of individual TTCs and SPCs operating at the universities, however, this was regarded as suboptimal due to the lack of economies of scale and scope, and potential lack of financing.
- 7. Creation of a relatively independent professional entity (PCI) to deal with commercialization and technology transfer seems a more effective and efficient choice.** Such an approach allows attracting private sector talent to develop business-academia collaboration, while also building up capacity of the universities in a mid-term horizon (by working hand-in-hand with the PCI, the universities will learn in practice key principles and good practices of commercialization). Creating an entity that gathers competencies in R&D project valorization and contract research under one roof (thus creating scale and scope economies), and has a stable mid-term financing model will help jump start business-university collaboration. R&D-based innovation usually requires several years to yield results. A five-year period seems sufficient to prove effectiveness of the proposed solution and demonstrate to the local stakeholders the value added of such an entity.
- 8. Building separately the capacity of each of the existing TTCs and SPCs from the inside of the universities seems a much longer and less cost-effective process.** Such option is also likely to be more difficult to pursue as financial, staffing and governance-related issues of the TTCs and SPCs are regulated by the universities' rules that may not be easy to modify. Current budgets of the existing SPCs and TTCs would need to be significantly enlarged to boost their capacities and competencies (attract new talent and train existing staff to form separate teams at each university). Such a change is unlikely, especially in light of the ongoing reform of the universities pursued by the Ministry of Science and Higher Education (MoSHE), which will impose financial constraints on the universities.
- 9. The PCI will complement the work of TTCs and SPCs in several ways.** First, by providing experienced private sector people, who could coach and assist research teams

in developing their inventions. Second, by proactively reaching out to entrepreneurs and marketing services that could be offered by universities. Third, by co-financing promising applied research work performed by scientists. Fourth, by helping upgrade existing R&D equipment to increase its commercial potential. Collaboration with the PCI will benefit TTCs and SPCs at least in three important ways, while at the same time will not add extra burden to their ongoing operations. First, enhancing the capacity of TTC/SPCs' staff (learning by doing); secondly, raising awareness and entrepreneurial ethos among researchers, staff and management; finally, accruing real financial benefits from the enhanced business-science collaboration (i.e., increased revenues from licensing and royalties).

10. The PCI will aim at increasing universities' revenues from licensing of R&D results and certain kinds of contract research, and enhancing the rate of creation of IP-driven start-up companies.

These are three key measurable indicators that will define the success of the PCI. Increasing revenues from licensing and contract research can further translate into universities' enhanced R&D capacity and stronger acceptance of the entrepreneurial ethos among academics. This can create a virtuous circle mechanism and, in turn, lead to a continuous increase of university revenues. However, currently, the main three local universities focus primarily on education and basic research, with applied research being a third priority (this allocation of priorities is consistent with the way universities are being evaluated by the MoSHE). Applied research efforts are largely directed at expertise-based contract research projects performed for local companies.

11. The PCI will help develop and fund high-risk innovative projects that emphasize research and development background and originate at the Podkarpackie universities.

The R&D focus implies that the PCI will focus on identification of projects that create new knowledge, which will be turned into university-originated intellectual property, as well as product or process innovation. Such innovation can originate from any field of science, hence both social and engineering sciences projects will be taken into account. In addition, interdisciplinary projects will be sought out, on the assumption (born from the available research) that such projects are especially promising and are likely to result in disruptive innovation.

12. A higher rate of innovative R&D projects and start-up companies could yield a positive spillover effect for the Podkarpackie region and beyond.

Innovation implies higher productivity, and this, in turn, translates into higher competitiveness of companies, both domestic and international. Table 1 presents selected benefits to the stakeholders of the Podkarpackie ecosystem from increased intensity of the R&D collaboration.

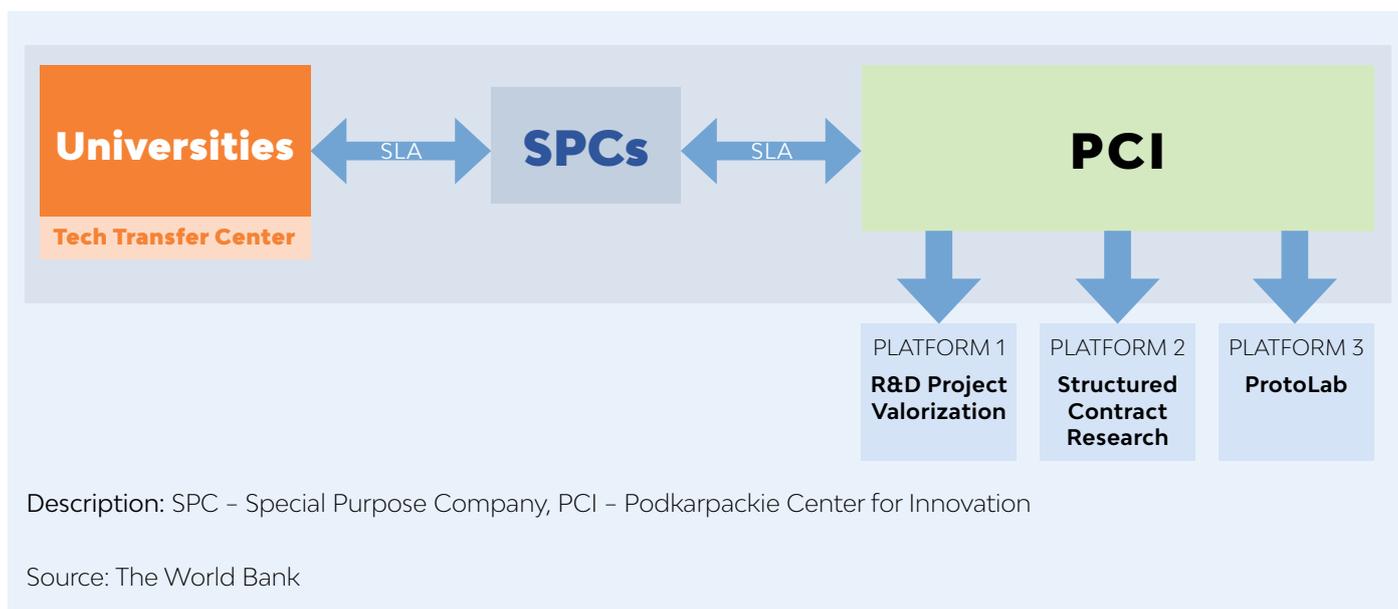
Table 1. Selected benefits for major stakeholders resulting from a high intensity of R&D collaboration

Universities (SPCs, TTCs)	Inventors	Students	Enterprises	Region	Investors
<ul style="list-style-type: none"> • More potential clients for university IP and contract research work • Potential for private funding of research work • Increased attractiveness of universities to potential students 	<ul style="list-style-type: none"> • Ease of attracting investors • The "networking effect" (easier to find skilled people, make business contacts, etc.) 	<ul style="list-style-type: none"> • Attractive local employment opportunities • Supportive environment for young entrepreneurs • Increased value of degrees from local universities 	<ul style="list-style-type: none"> • Access to skilled student base and R&D • Innovation flows up and down the supply chain • Easier access to university-based R&D 	<ul style="list-style-type: none"> • Higher tax revenue base • Ability to attract direct investment (including FDI) • Positive spillover effect into other industries 	<ul style="list-style-type: none"> • Attractive pipeline of potential projects • The "networking effect" (easier to find the right managers, skilled people for target companies)

Source: The World Bank

13. APCI team will operate three activity platforms (R&D project valorization, structured contract research, and the ProtoLab). Platform 1 will perform R&D project valorization tasks, thus raising the TRL (Technological Readiness Level) of the funded projects to the point where commercialization becomes possible. Platform 2 will focus on taking advantage of universities' R&D equipment being freed up¹; it will do so by marketing to businesses structured, repeatable contract research services that leverage this R&D equipment. Platform 3 will target Podkarpackie university students; it will foster entrepreneurial culture among them by providing a facility and tools to prototype their inventions and experiment in an interdisciplinary atmosphere. Through those platforms, the PCI will support the local universes (and their TTCs and SPCs), as well as Podkarpackie innovative enterprises, students, and young researchers (Figure 1). Ideally, the PCI would be located in close proximity to universities and student dorms in a location that has good transport accessibility to provide easy access to and from the schools for both researchers and students.

Figure 1. A model of the Podkarpackie Center for Innovation



14. The presented model of PCI is a result of consultations with all key local stakeholders and lessons learned from other European and Polish TTOs. The MO, universities (university management, TTCs, researchers, students) and enterprises have been active partners in designing the model, and during multiple individual interviews and workshops they have contributed comments and verified feasibility of subsequent versions of the proposed model. They also expressed support for the three-platform PCI concept (for instance by offering a building to house a ProtoLab, etc.), though the design is still work in progress and its details are likely to evolve during the implementation stage. The universities are interested in the specifics of how PCI can add value to their operations without disrupting the progress on the commercialization front that some of them (e.g., RUT) accomplished over the recent period. This report proposes a number of detailed solutions, especially regarding PCI's activities, governance, team selection and financing to illustrate the current state of the model development and set up a baseline for the further implementation work.

15. A top-quality team will be key to the success of the PCI. A professional team that is experienced in commercialization, innovation management, and knowledge of both the private sector and scientific environment, offers significant potential to help push the Podkarpackie region to the next level on the innovation front. Such experience will enable the team to act as a contact point for business and academia. The PCI can start with 14-28 people in the core team and grow with the expansion of its activities.

¹ The "freeing up" of universities' R&D equipment means that up to 20% of that equipment's capacity can be used for ancillary purposes; in practice, this means for commercial use

- 16. Stable political support for the PCI concept and a clear vision of its future are at least as important for the PCI's success as is the assurance of its funding.** International good practices underscore the critical importance of stable and favorable environment for developing a robust technology transfer organization. To achieve that, coordination and collaboration is needed between all key stakeholders, including universities, regional and city authorities, as well as local companies.
- 17. The PCI should be set up as a limited liability company (LLC), with mixed public-private shareholding and managed by the competitively selected team of top professionals.** The PCI's shareholding will include a private entity representing the management team, the Marshal Office (it is recommended that the PCI have a 10-year agreement with the MO), and possibly other parties (e.g., the City of Rzeszow or local corporations). The PCI's management team has to be competitively selected in an open procedure to ensure that best possible professionals are hired. The management team has to have hands-on experience in both technology investing and R&D commercialization, and willing to commit to implement the PCI's mission on the ground in Podkarpackie. Clear goals and incentives will motivate performance of the PCI management team.
- 18. The PCI will use a transparent process to allocate resources to valorized R&D projects and create a commercially attractive structured contract research offer.** Decisions to fund R&D projects through microgrants (both at the Proof-of-Principle (PoP) as well as Proof-of-Concept (PoC) stages), as well as decisions to fund other initiatives (e.g., using the Enhancement Fund to add to the universities' R&D equipment in order to increase its commercial potential) will be made by the Resource Allocation Committee (which will include members of the PCI management team and representatives of the universities and local business, with a MO representative as an observer). Similarly, decisions to discontinue funding will be done transparently and based on analytical materials gathered by the management team.
- 19. The PCI will aim at full financial sustainability in the long-term, yet public resources will constitute indispensable support in the short- and medium-term.** International experience shows that it usually takes around ten or more years for a TTO to become nearly or completely self-sufficient and that public funds play a facilitating role in their success. It is assumed that the PCI will generate increasing revenues, thus its dependency on public funds will diminish over time. The report sets the target break-even date for the PCI at year 15 after the launch of its operations.
- 20. Approximately PLN 70 million is needed to fund the launch and the initial five years of the PCI's operations.** The report also recommends a funding solution for the subsequent five-year period. The PCI will be funded from the Podkarpackie Regional Operational Program (ROP), which needs to be changed to accommodate the program. It is expected that during PCI's initial five-year period, revenues generated from its activities will amount to 15% of its expense base. That percentage will gradually increase, allowing for the PCI to reach a break-even point after 15 years from its launch.
- 21. This report is an interim milestone that will guide subsequent discussions on the implementation of the PCI model.** Its conclusions and recommendations will be further validated and developed during the remainder of 2017.

ACTIVITY 1:

**Designing Regional Technology Transfer Office:
Podkarpackie Center for Innovation**

1.

**The Current
Innovation
Ecosystem of
Podkarpackie**

This chapter describes demand and supply sides of the Podkarpackie innovation ecosystem. The main purpose is to present the current state of affairs in the region, shortly describe main players in the innovation field, and relationships between them. On the demand side, companies and local science parks' perception of the current system are presented. An assessment of the current business-science collaboration is provided, potential collaboration areas are specified, and main obstacles to more effective cooperation are identified. The supply side focuses on the Podkarpackie universities. It describes available R&D equipment as well as entities at the universities that deal with technology transfer and thematic areas with high commercialization potential. Additionally, this chapter describes issues related to the "freeing up" of "20% of capacity" of the universities' R&D equipment.

1.1 Demand side

Podkarpackie companies seem to express high demand for selected R&D services. This observation is based on a number of interviews with local entrepreneurs as well as managers of two science and technology parks (Rzeszow and Mielec), representatives of two regional development agencies (Rzeszow and Mielec), personnel and representatives of the TTCs at Rzeszow University of Technology (RUT), Rzeszow University (RU) and the University of Information, Technology and Management (UITM), and selected researchers at the universities, who are involved in R&D collaboration with companies. Interviews were carried out with a selected group of 27 companies that either have a track record in technology transfer with local universities, or are strongly focused on innovation (the list of companies interviewed is included in the Appendix to this document). In general, these companies express interest in closer R&D collaboration with the universities, should the latter be able to use, at least partly, their R&D equipment for commercial purposes.

The interviewed companies represent a wide variety of business areas. They range from young and small companies to large international corporations. The companies were selected in cooperation with RUT, RU and the Podkarpackie MO. The key criteria were the presence of R&D activities in the company (e.g., the presence of an R&D department), and/or experience in cooperating on research projects with the universities. R&D activities undertaken by the interviewed companies are typically closely related to their core business and their successful implementation ensures companies' competitive position in the marketplace. The range of R&D activities pursued by companies varies from advanced materials engineering – both metal and plastic – to research on different types of coatings, electric materials, automation, robotics, chemistry, to new aeronautics engine construction. The size of corporate R&D departments differs as well, from small (a few people) to large corporate divisions employing hundreds of people. The corporate sample – although relatively small – appears to have covered sufficiently broad range of types of R&D work being pursued by private companies.²

Current state of business-universities cooperation

The interviewed businesses seem reasonably familiar with the type of R&D equipment at the Podkarpackie universities. Some companies currently engage in contract research projects involving the universities' R&D equipment and infrastructure, usually on a limited scale. The majority of companies do not perform contract research projects that would use

²According to GUS, 145 private companies are engaged in R&D activity in Podkarpackie, and the number of companies doing R&D work per 100,000 of inhabitants (7.4) is below average for Poland (9.0)

the universities' R&D equipment, but would like to do so in the future. One of the reasons for their current limited, or no use, usually is due to the companies' perception that universities are not allowed to use EU-financed equipment to perform commercial R&D activities. Until recently, this has been true, but currently this situation changed (more information is provided in the section on the rule about "20% of capacity" of R&D equipment). There is also a group of businesses that cooperate sporadically with individual scientists acting as consultants, without relying on university-based R&D equipment. Regardless of the extent and type of cooperation with researchers, all of the interviewed companies seemed to be aware of the universities' R&D equipment and infrastructure; however, knowledge of what kind of specific research services can be undertaken there and about the competences of researchers who could deliver these services was much more limited among enterprises.

The companies have limited experience of ongoing, systematic cooperation with local universities on the R&D front. Among the 27 companies interviewed in Podkarpackie, around 30% have initiated cooperation with at least one university. The main reasons of the relatively low number of cooperation projects – as pointed out by the companies – include: the lack of marketing from academia's side, formal difficulties in getting access to the EU-funded R&D equipment, and the lack of flexibility in cooperation with researchers. A small group of successful companies explained two reasons underlying examples of successful cooperation: i) good personal relationships with university researchers (usually applicable to entrepreneurs that used to study at the local universities), ii) presence of a researcher in a given department or laboratory of a university, who is more business-oriented and open to collaboration with the corporate sector. One of the best practice examples in this area is the cooperation between Pratt & Whitney and RUT (see Box 1, below), though there are also numerous other examples from outside of the aviation sector (for instance, in the chemical and pharmaceutical sectors).

BOX 1

CASE EXAMPLE OF COOPERATION – PRATT & WHITNEY AND RUT

Pratt & Whitney (P&W) is a leading global aviation company, a unit of United Technologies Corporation (UTC), operating its Polish unit in the Aviation Valley in Podkarpackie. P&W entered Poland in June 2015, although the UTC acquired a Polish jet engines manufacturing company (PZL) already in 2002. P&W has about 1400 employees in Poland and more than 50 employees work in their R&D department in Poland.

The cooperation between P&W and RUT is continuous and has lasted since UTC purchased PZL. All R&D managers from P&W had graduated from RUT and there is continuous exchange of students and R&D workers between RUT and P&W. Moreover P&W was consulted when RUT was choosing R&D equipment and infrastructure for their labs. This has ensured that the R&D equipment and infrastructure at RUT reflects business and technology needs of the Aviation Valley companies.

There have been many detailed examples of successful cooperation between P&W and RUT. Those examples include numerous joint research projects or research grants (P&W and RUT applied for those projects and grants jointly). Both parties are satisfied with the cooperation – RUT because it ensures that its students are offered the skills demanded by the private sector, and P&W because it allows them to access the R&D infrastructure they do not have in P&W labs. Examples of successful joint projects include materials research, jet engine blades design, coatings of the inside of the turbines, automation processes, and robots for the parts manufacturing plants.

Source: *The World Bank*

Recent changes to EU regulations ("20% of capacity" rule) paves the way for stronger business-science cooperation. Due to the fact that universities' R&D equipment could not, as a matter of principle, be used for commercial purposes (the universities bought it with a high

financial contribution from EU funds), successful technology transfer collaboration examples were limited. The collaboration was often limited to situations where i) a company could cover the cost of materials used for research purposes but could not pay for the commercial use of the equipment, or ii) a business and a university would jointly apply for R&D grants. The interviewees pointed out that the constraints associated with EU-funded equipment have been a powerful brake on the extent of R&D cooperation. Most times, companies did not even request R&D services from the universities, since they knew that commercial utilization was not allowed. The recent introduction of the “20% of capacity” rule is changing this situation. This rule refers to R&D equipment and infrastructure financed from EU funds, and it allows for “ancillary” (i.e., commercial) use of up to 20% of equipment’s available capacity.³

There seems to be significant demand to use the “freed-up” R&D equipment. Although present day cooperation between the Podkarpackie businesses and universities is neither frequent, nor systematic in nature, all of the interviewed companies declared that, should commercial use of the universities’ R&D equipment be allowed, they would use it more extensively. A necessary condition for such increased demand is the existence of clear rules of the game – i.e., transparent and competitive pricing, contractually guaranteed access (e.g., agreed upon time slots when infrastructure is accessible for commercial use), as well as adherence to committed deadlines.

Companies indicate several areas for potential R&D commercial cooperation with universities. Podkarpackie universities own R&D assets that would be of high interest to business. A list below presents a selection of areas where Podkarpackie businesses see potential for closer R&D collaboration with universities. Detailed information on attractiveness to businesses of a specific piece of R&D equipment is included in the R&D equipment database (excerpts of this database are presented in Appendix 4):

- Chemical companies are interested in access to R&D facilities in the nanotechnology area (e.g., the laboratories at RU’s Centre for Microelectronics and Nanotechnologies);
- Metal engineering companies (especially in aerospace) show interest in the modern CNC laboratories at RUT;
- Companies in the aeronautics sector want access to the aerodynamic tunnel facility at RUT;
- Companies located in the Science and Technology Park in Rzeszow would to collaborate with the Park’s labs with metal 3D scanning and printing equipment, as well as advanced metal engineering machines.

Constraints and barriers to R&D cooperation – companies’ viewpoint

Companies usually name three key barriers that hamper business–research cooperation.

These constraints highlight differences in attitudes between entrepreneurs and researchers, and they focus on processes that take place on the universities’ side. The three areas are as follows:

a) “Casual” (i.e. loose) time management by university counterparts

Time management by university staff was the most often mentioned constraint by entrepreneurs experienced in cooperating with universities on the R&D front. Some companies complained about the amount of time required by researchers to prepare to start a project, or even decide whether they want to participate. There were situations when an entrepreneur wanted to quickly initiate a certain project within a specific area, and it took four months for a group of university workers to decide that they are not interested (or not competent enough) to undertake it. Other companies experienced the time management problem. In those cases, their university counterparts extended the duration it took to complete project milestones, while businesses worried about such impacts to the success of the project.

³Calculation of the “20% of capacity” depends on an adopted calculation methodology and each university can propose own approach. It seems recommendable that all universities prepare a uniform methodology that would optimize potential use of the R&D equipment for commercial purposes and that would be easy to monitor. For instance, the approach specifying 20% of nominal capacity could be a preferable solution

b) Inflexibility on intellectual property rights ownership

The second barrier is the ownership of intellectual property (IP) rights. University researchers are motivated to develop R&D ideas by the prospect of having a percentage of the potential future profits from the project. They therefore insist on securing IP rights to inventions or research outcomes originating from contract research projects. On the other hand, businesses argue that, since they are the ones funding contract research projects, they should be sole owners of IP rights (after all, it is they who set goals of those R&D activities, fund them, find commercial application for their results, and bear all the risks of commercializing the outcome of the project). This is not a view typically shared by researchers, who usually propose a 50/50 intellectual property rights split.

c) Poor management of processes and lack of results orientation

The third barrier is the quality of process management by university staff. Often there are no good practices in managing project processes within the university driven projects. Entrepreneurs complain about the lack of dedication from research personnel – they have no incentives to work long hours, especially close to deadlines and have little understanding of the need for results (input vs. output orientation). It is fair to conclude that research staff simply does not understand or appreciate the way in which commercial businesses operate. Business and researchers speak different languages, and both sides do not exhibit the will to alter their priorities and behavior.

Entrepreneurs also name other impediments, though less frequently. These include:

- Lack of a middleman function at the universities to guide entrepreneurs interested in joint R&D projects in the right direction (despite all the efforts of the TTCs, some companies view them as not having sufficient knowledge or “pull” to enable effective cooperation).
- The R&D offer of the Podkarpackie universities cannot be found easily. This issue concerns not only finding the R&D equipment and infrastructure, but also access to an easy-to-search list of research available for business.
- Some university laboratories do not meet the certification standards, and thus have only limited usefulness to business from the commercial standpoint.

Summary observations and conclusions

At least two reasons give hope that business–university cooperation in Podkarpackie, which capitalizes on the R&D equipment that will be freed up, will grow in the future.

First, all interviewed companies expressed willingness to increase their level of cooperation with universities once the issue of access to R&D equipment is resolved. Companies that operate in cluster functioning in the Podkarpackie region are good examples of businesses looking forward to this (see Box 2 for an example of the Aviation Valley Cluster).⁴ Second, a number and value of R&D equipment estimated as having great commercial potential (“5”)⁵ is high at both RU and RUT. Despite the fact that these findings are based on non-random and mostly qualitative interviews, it can be concluded that under favorable circumstances, R&D equipment owned by universities could be in high demand.

University TTCs’ performance on key technology transfer tasks could be enhanced by a complementary regional entity focused on the demand for R&D. The type of key barriers identified by Podkarpackie businesses that hamper their R&D collaboration with universities indicates that the mediation role of TTCs and SPCs is viewed as being performed with a modest

⁴ In the Podkarpackie region a number of clusters functions: Aviation Valley, Subcarpathian Aviation Cluster, Eastern Poland IT Companies Cluster, Subcarpathian Renewable Energy Cluster, Welding Cluster KLASTAL, Plastics Processing Cluster POLIGEN, Podkarpackie Country, Enology Cluster, Podkarpackie Tastes Cluster, Świętokrzyski-Podkarpacki Construction Cluster INNOWATOR, „AVIA-SPLot” Network, Eco-Food Valley Cluster

⁵ This is measured by actual expression of interest that businesses directed to universities and their TTCs

level of success today. Some TTCs, to a large degree, focus their efforts on supporting university grant projects; others lack scale and funding. As a result, companies often do not understand TTCs' functions and their potential usefulness. To address that, the TTCs should work on further strengthening their middleman capability and set specific goals to address some of the barriers (e.g., by continuing their educational role on IP rights issues). Second, the new regional-level TTO organization, (i.e., the PCI) could complement work performed by the TTCs in several ways. For example: representing the interest of businesses in their relations with the universities (especially helping to address various contractual matters), guiding companies on how to obtain required R&D services, pro-actively educating business on potential use of universities' R&D equipment, and infrastructure (and thus stimulating demand for that equipment).

BOX 2

AVIATION VALLEY CLUSTER

The Aviation Valley is one of the most successful clusters in Poland. It started in 2003, when 18 CEOs of companies in the aerospace sector decided to form a cluster. In 13 years, the cluster has grown and become a symbol of positive economic transformation. The number of members amounts to 137 companies, out of which most are small and medium-sized companies. Initially, 18 companies of the original cluster employed 9,000 people; currently, cluster members employ 24,000 people in total. The annual sales of member companies have risen from 250 million USD in 2003 to two billion USD now.

The cluster played an important role in facilitating the cooperation between the corporate sector and science researchers. First, due to the cooperation with RUT, the Aviation Valley helped RUT choose cutting edge R&D equipment, which will enable close business-academia cooperation in the future. Second, the Aviation Valley cooperated with the National Center for Research and Development to formulate the InnoLot Research Program – a sectoral, tailor-made program for companies in the aerospace industry. Third, the Aviation Valley helped build a consolidated education system that supports the development of aerospace companies in the Podkarpackie region. The system includes special courses at universities, colleges, high schools and primary schools. The Aviation Valley also modernized 13 practical educational centers in Podkarpackie at the cost of 13 million USD. Last but not least, the Aviation Valley helped set up the Aeropolis Science-Technology Park that focuses, among others, on the aviation industry.

The cluster also cooperates with the local authorities. Thanks to this cooperation the aerospace industry has been selected as one of four Regional Smart Specializations of the Podkarpackie Region.

Source: Aviation Valley Cluster Strategy (2015) and World Bank's interviews

1.2 Supply side

The R&D supply side in Podkarpackie is diversified and displays elements of excellence.

This section presents a methodology for a systematic overview of the available R&D equipment and its commercialization potential. Areas with high R&D commercialization potential are listed, the issue of freeing up the 20% of capacity is explained in a greater detail, and estimates of revenue potential of this freed-up equipment are discussed. Finally, the university TTCs are presented in a greater detail.

An assessment of the universities' R&D resources requires a standardized approach and creation of a unified database.

RU and RUT used different methods to describe their R&D infrastructure and equipment. To allow comparisons across different labs and universities and

to create a comprehensive and business friendly description of R&D equipment, the WB team proposed a standardized template to universities and they adopted it (the template is provided in the Appendix 9). On this basis, a unified database of the R&D equipment was initiated that in a business-friendly manner gathers information about this equipment, indicates its potential uses and people responsible for individual equipment.⁶ Appendix 10 provides an overview of the R&D infrastructure and equipment at RUT and RU.

This database forms the basis for future record-keeping of information on the schools' R&D equipment. The database describes approximately 30% of total R&D equipment at both universities that possess the highest potential from the standpoint of likely business interest. It is recommended that, once the database with R&D descriptions is complete, it should be publicly available online, and access to it should be enhanced by a search engine optimization strategy that facilitates high search results rankings and helps the Podkarpackie universities effectively communicate its research capabilities to the business world and other potential partners.⁷

The database includes an assessment of expected demand from business for services that could be provided on specific R&D equipment. To quantify this potential demand, a scale of 1 to 5 was applied where "1" means R&D equipment that is the least attractive from the commercialization perspective, and "5" represents R&D equipment that is the most attractive in potential commercial uses. The scoring is based on the university staff's perceived attractiveness of the R&D equipment to potential commercial customers. The assessment was performed by the laboratories' management, based on actual track records of collaboration with the private sector and conversations about potential utilization of this equipment. The assessments were subjective and, in general, the overall level of self-assessment at RUT was more stringent (i.e., on average, lower) than those at the RU. Despite the subjectivity of the scale, from a practical viewpoint, the top two scores (4 and 5) provide a fairly accurate assessment of actual commercialization potential of a given piece of equipment, although cross-comparisons between universities are made difficult because of the differing standards used to assess commercialization potential.

The database could provide transparency and visibility to the potential commercial uses of R&D equipment. The information included in the recommended format went far beyond the data shared online⁸ by the universities thus far, and contained such additional information as ancillary equipment without which a given piece of infrastructure cannot be used, R&D equipment operators, main and ancillary uses of the equipment, the degree of actual and potential commercial use, key industries likely to be the clients, potential ways to enhance the value of the equipment (e.g., through certification), etc.

In describing the R&D equipment, the database uses language that is easily understandable to business people. One of the goals of this newly initiated database is to provide entrepreneurs with an overview of R&D capacity of universities. Such a tool has to be written in clear and simple language, so entrepreneurs that are not researchers could use it for their purposes. For that reason, the focus of the database is on benefits to business from the potential use of a given piece of R&D equipment, rather than just descriptions of equipments' technical attributes. This way of describing the R&D infrastructure and equipment is key to proactively market the access to freed up R&D equipment in the future.

⁶ Each of the universities' organizational units (e.g., centers, labs, departments, etc.) was asked by the rectors (and the TTCs) to assist in the process of completing the aforementioned information. World Bank and TTC teams were available on as-needed basis to perform these activities. Subsequent work involved designing and implementing a template to describe these pieces of R&D equipment at both universities that have the highest commercialization potential

⁷ In addition to accessing information about available R&D equipment, businesses should be able to see a description of standardized, structured services that can be performed on this equipment, their pricing terms, etc.

⁸ The existing descriptions typically available on the websites of both university TTCs were not always complete and written in a language that could be difficult for commercial clients to understand. This imperfect communication of what is available at the universities in terms of R&D equipment and how businesses may use it seemed one of the major barriers limiting the university-business collaboration

Constraints and barriers to R&D cooperation – universities' viewpoint

A misaligned incentive system for researchers is one of the reasons of ailing R&D collaboration. Researchers are not encouraged to collaborate with the business on R&D; such cooperation does not “benefit” the researchers when an assessment of their scientific performance is conducted. This assessment is important as it is further translated into a score of a university department/lab where a researcher works, and this departmental score is, in turn, used by the university to allocate between departments/labs resources flowing from the school's general budget. Researchers “earn” more points for publishing papers in scientific journals, hence their incentive system is oriented towards publishing and not towards R&D collaboration with businesses.

Inability to utilize “20% of capacity” of the R&D equipment constitutes another obstacle. The interviewed researchers indicate that because the R&D equipment is not freed-up yet, they cannot use it for commercial collaboration with the private sector. Since a big part of this equipment was purchased with high co-financing of the EU funds, the “20% of capacity” rule has to be applied, prior to commercial utilization of the equipment. Researchers also mention that only when the freeing-up is completed, a serious marketing effort of the universities' R&D offer could be undertaken, including for instance maintenance of a up-to-date database describing the R&D equipment.

Different perceptions of the nature of R&D work also seem to hamper R&D cooperation. The researchers point out that companies often do not understand their point of view. One of examples provided by researchers is that companies expect from researchers to perform R&D work in the framework of a too tight a schedule and budget. Companies tend to not understand that R&D is a trial and error process that requires time and resources, which cannot be exactly planned in advance. Another argument is that some companies' requests for R&D work are imprecise, suggesting that the entrepreneurs are not always fully aware of what they intend to pursue or do not understand the R&D processes. Other entrepreneurs, on the other hand, are said to expect specific results without paying attention to the fact that the R&D work may yield different outcomes. Such differences, researchers say, make R&D collaboration with companies difficult and not always tempting for universities.

Areas with high commercialization potential

RU's four areas with the highest commercialization potential are: biotechnology, agricultural sciences, material sciences, and medical science. The biotechnology department is the only top-rated faculty at RU (A-rating). Its research focuses on genetics, botany, animal reproduction, and ecotoxicology. The agricultural sciences faculty also has commercialization potential, and this field is critical to the local economy. There are four institutes within the agricultural science faculty, focusing on landscape architecture, plant biotechnology, dairy technologies, and food economy. Material sciences are relatively new at RU, and comprise 13 institutes and laboratories, some of which dispose of modern, sophisticated R&D equipment. Research focuses on such areas as nanotechnology, microelectronics, and magneto-transport. In medical science, the university's medical center has a strong R&D potential.

At RUT, the top four areas are: aviation and aeronautics, chemistry and composites, construction materials, and mechanical gear/large scale machining. Aviation and aeronautics have large commercialization potential, due to the sophisticated R&D equipment and research and technical skills at the university, especially if collaboration with the Aviation Valley is to intensify. Chemistry and composites is another field with high potential, due to top R&D equipment for analysis of composites and experienced researchers. Moreover, RUT has a good track record of collaboration with local businesses in both fields and they are competitive

in international markets thanks to their innovative products. The construction materials sector is another promising commercialization area, because the RUT possesses both infrastructure and capacity to conduct R&D work. There are a couple of pieces of R&D equipment demanded by the market, and a number of R&D projects are on-going. Finally, mechanical gear and large-scale metal machining also have high commercialization potential. The mechanical gear faculty has a highly skilled academic staff, with lots of experience, good pro-business orientation, and modern R&D lab equipment allowing for machining of high-precision parts.

Strong areas of the University of Information, Technology and Management (UITM) are IT and cosmetology. In terms of R&D work, the UITM mostly focuses on development, rather than research. The school has invested much less in the R&D equipment and infrastructure during recent years than the other two schools, due to its smaller size and different profile. Because both public universities (RU, RUT) possess more R&D equipment than UITM, the remaining of this chapter focuses on them.

Freeing up “20% of capacity” of the R&D equipment

To exploit the commercial potential of the R&D equipment, the universities have to first free up the so-called “20% of capacity” of their equipment. The term “freeing-up of R&D equipment” refers to the process of amending the contracts (annexing) to purchase R&D equipment and accompanying infrastructure, which were to a large degree co-financed by EU funds. Recent decisions by the European Commission make it possible to amend those contracts in a way that allows “up to 20% of equipment’s capacity” be used for “non-essential purpose” (ancillary). Because the equipment and infrastructure was purchased with the intention of being used for primary research or educational purposes, in practice “non-essential purpose” means the use of R&D equipment for applied research and commercial applications.

The Podkarpackie universities differ in their approach to freeing up the R&D equipment.

Both RU and RUT decided to amend (“annex”) their R&D equipment contracts, but each school took a different approach to this process – this process is also commonly referred to as “annexation”. RUT decided to amend contracts financed under both the Development of Eastern Poland Operational Program (RPW; where the Polish Agency for Enterprise Development –PARP– is the Managing Authority) and the Regional Operational Program (ROP) 2007-2013 (the Marshal Office of the Podkarpackie region is the MA). The RU decided to amend only contract financed under the ROP 2007-2013. The process of amending the contracts required the universities to describe in detail the R&D equipment covered by the contracts they believed worthwhile to amend and to identify the commercial potential of said equipment and infrastructure. Annexation also requires calculation of a forecasted income stream that such freed up infrastructure is expected to generate.

The different approaches to freeing up the R&D equipment most likely stem from different situation at each of the universities.

While reviewing their projects’ timelines included in an original project documentation, RU calculated that the “durability period” for a large part of the R&D infrastructure purchased under contracts with PARP (RPW) ends in 2017. The RU assumed that this period ends after five years and is set to five years from the payments of the last invoice for the purchase of the R&D infrastructure in the project. Hence, the RU decided not to amend the RPW contracts; instead it chose to wait one more year and then (after 2017) be able to use this equipment for commercial purposes without having to worry about the “20% of capacity” rule.⁹ As for the regionally managed ROP contracts, their durability period ends in 2020, so the RU decided to amend contracts pertaining to two projects with R&D equipment valued at PLN 55 million. The completion dates for “durability periods” at RUT fall between 2019 and 2022, so the university’s management decided to amend contracts pertaining to eight projects funded from both RPW and ROP programs. The total amount of the “freed-up” R&D infrastructure amounts to a combined PLN 81.6 million under both programs.

⁹Status as of 2016

Revenue potential from commercialization

The RU's TTC currently has two revenue sources that are estimated to bring in about PLN 50–60 thousand revenues annually. The first source is derived from student recruitment fees (a percentage from those fees are allocated to the TTC). The second source comes from revenues generated from R&D commercialization. In general, revenues from commercialization activities undertaken to date seems limited.

The envisaged revenue potential of the RU's freed up infrastructure should be much larger. An initial estimate of potential commercialization revenue that could be generated from the 20% of R&D equipment capacity being freed-up amounts to PLN 3.5 million annually, in the early period after the annexation. This estimate was developed by RU's Finance Office as a part of the annexation process of agreements for the purchase of R&D infrastructure that was co-financed from European Union funds. No independent validation of this estimate has been performed. The World Bank (WB) team assesses that the likely revenue potential of leveraging the five-level¹⁰ R&D equipment appears to be significantly higher than the aforementioned estimate of PLN 3.5 million per annum. A directional estimates for RU (as well as those made for RUT, see below) are based on information acquired during interviews with companies and universities' personnel, however no statistically valid confirmation of these estimates has been performed.

The envisaged revenue potential of the freed up infrastructure can make RUT revenues from cooperating with business grow even faster. Initial estimates of commercialization revenue generated from the 20% of R&D equipment capacity being freed-up hover around PLN three million annually in the early period after annexation. The predicted revenues come from ROP-financed equipment (predicted revenue amounts to PLN 2.85 million per annum) and RPW-financed equipment (PLN 164 thousand per annum). These estimates have been developed by RUT's Chancellor's Office as part of the preparation of annexes to the ROP and RPW contracts with the Marshal Office and PARP, respectively. No independent validation of these estimates has been performed. However, interviews and visits conducted by the WB team at the RUT TTC, as well as with a number of RUT's professors and researchers confirmed interest in closer cooperation with businesses, as well as understanding what it takes to make this cooperation work. These findings reinforce the view that freeing up R&D equipment can get RUT revenues from collaborating with business to an entirely new level.

University TTCs – current status

The TTC at RUT employs 26 staff divided into four departments,¹¹ some of which perform "traditional" TTC activities and others provide support to grant projects. RUT also owns an SPC that currently develops its activity. Most of RUT TTC employees focus on acquiring research grants and managing their administration. As of 2016, more than half of its staff (17 people) were engaged in this "project funding" activity. The rest of RUT's TTC team (nine people) work on addressing contract research from the corporate sector and IP issues. TTC's internal division is as follows:

- European Projects Department – nine people; the task of the department is to run the EU-funded research projects, i.e., to seek grants, educate and recruit research staff, prepare applications and contracts, provide the organizational structure to support the projects carried by the university, and provide documentation for the projects;
- National-level Projects Department – eight people; the department runs national-level, Polish-government-funded research projects similar to the European Project Department;
- Technology Transfer Department – five people; the role of the department is to be a 'middle man' between an industry partner and researchers; the department prepares the research

¹⁰This refers to the 1-5 scale used for the assessment of the R&D equipment that is provided in the database of the R&D equipment, 5 is the highest score indicating the highest commercialization potential

¹¹This section reflects status as of second half of 2016; after restructuring actions in 2017 the number of TTC employees has been reduced to 18 (as of May 2017)

offer for the private sector companies, monitors researchers' projects and helps them connect with companies;

- Intellectual Property (IP) Department – four people; the department is engaged in legal issues involving negotiation of IP rights, (their apportionment and pricing); a patent specialist works on the team and is responsible for the preparation of patent applications.

The operational model of RUT's TTC differs from best-practice TTC models in some ways: There is no separate TTC budget and engagement is funded mostly from grants, and partly from the university's budget. The TTC provides a wide variety of services, but its grant administration activity (performed by the two "projects" departments) does not fall under a typical technology transfer definition. TTC's output (in terms of licenses sold, start-ups created or patents filed) in core technology transfer activities is somewhat constrained by its limited budget. The TTC annual budget in 2016 amounted to PLN 1.4 million; it did not cover all the ongoing expenses, moreover it was too small to build a strong, self-funding TTC. Given this small size of the budget, TTC's ability to generate about PLN 400 thousand in annual licensing revenues should be viewed as a success. The TTC has no marketing department and provides limited assistance to researchers and entrepreneurs in creating marketing strategies and pursuing business development opportunities. Some value-added services for RUT personnel are provided free of charge, e.g., the IP services and educational events. The TTC processes about 400 requests from the corporate sector per year, and coordinates and oversees contract research activity at the RUT even though some requests from business go directly to various units and labs of the RUT.

The RU TTC has not yet achieved the scale it needs to operate successfully. Today, the total staff of the RU's TTC is small: two full-time equivalents plus a part-time Deputy Director. It does not rely on a fully dedicated team and its members are part-time employed, with an exception of the full-time secretary.

The financing model of the RU's TTC does not seem optimal. There are at least three areas that could be addressed to enhance the TTC's performance. The RU TTC does not have a separate budget that is not funded from grants. The source of current funding is a part of the university budget called "Rector's reserve," that covers unpredictable ad hoc expenses, and is not dedicated to systematically cover the TTC budget. The current budget does not cover all expenses. The expenses of the RU TTC amount to ca. PLN 100 thousand, whereas the budget covers around half, resulting in an annual deficit of around PLN 50 thousand.

Setting up an SPC at the RU would enhance the commercialization potential. Currently the university does not have a SPC that would manage commercialization of the R&D results through the creation of spin-off companies (indirect commercialization) and equity participation in university-originated start-up companies. This activity could allow for better management and enhance revenues flowing from commercialization activities.

Both TTCs have scope for improvement of their performance, e.g., by implementation of specific good practices. One solution would be to introduce key performance indicators (KPIs – performance measures of output) could be used to support management of the TTC. These comprise: i) total number of requests for support from business at the TTC level, which currently is an unknown, ii) total number of requests for support from businesses that go straight to professors or laboratories – the TTCs are aware that a part of contract research is conducted outside of TTC, but its size is unknown, and iii) total number of requests turned down or those that for some other reason did not lead to cooperation between a company and the university is not monitored and registered (this also means that the universities are unable to identify and quantify the reasons why the business' requests did not result in projects). Setting up such KPIs would allow for better management and performance of the TTCs.

TTCs at both universities can benefit from the creation of the PCI. It seems reasonable to set up a new regional entity to ensure high quality of commercialization activities to support both TTCs. The RU and RUT staff is largely university-oriented, as they tend to work with internal research teams. It is critical that a more proactive and outward-looking approach to marketing of universities' R&D is prepared and implemented, especially with the expected increase in volume of the commercial cooperation between companies and universities as a result of the partial freeing up of the universities' R&D equipment for commercial purposes. This could be one of the PCI's tasks. Moreover, professional experts will be crucial to perform high-quality services in the area of contract research marketing. It also seems more effective and efficient to establish a relatively small, highly competent commercialization team at the regional level, rather than separately at each of the universities. Such a team would benefit from professionalization and economies of scale and could serve both universities.

There is much to be done in the area of marketing of the freed-up R&D equipment in the future. The necessary, but not sufficient, condition is finalization of the annexation process with the MO and PARP. Second, proactive management and marketing of the universities' R&D equipment and infrastructure have to be put in place. Third, a joint marketing effort by the RU and RUT (and other universities), or the future PCI, should rely on a set of new tools and processes (e.g., a common database of equipment, jointly developed access procedures to R&D equipment, compensation mechanisms, etc.).

IPR regulations in Poland

The Polish law provides a general framework for the issue of IP rights (IPR) for inventions originating at the universities and the PCI will further work with the universities to specify more detailed solutions.¹² The law regulates the principles of commercializing IP originating at the universities, it imposes an obligation on the universities to enact detailed regulations on IP management, and sets the guidelines on division of profits from commercialization. Article 86f of the Law on Higher Education specifies certain threshold limits for the division of proceeds from commercialization (these limits cannot be modified by individual university regulations):

- Minimum participation of the researcher (or a research team) in profits from commercialization done by their university (or its SPC) is to be at least 50% of the proceeds, reduced by no more than 25% of the costs directly attributable to such commercialization)
- The level of university participation in the profits from commercialization received by the researcher is set at 25% of the proceeds received by the researcher (or research team), reduced by no more than 25% of the directly attributable costs incurred by the employee

Individual universities devise their own specific regulations within the broad framework of countrywide regulations. For instance, the Jagiellonian University in Cracow has the following scheme for division of profits ("benefits") from commercialization of university-originated IP:

- Researcher(s): 50%
- Faculty or department from which the research team comes: 15%
- University central budget: 25%
- IP support fund: 10%

The PCI will work within the national legal framework and universities' regulations regarding the IPR proceeds. Since the PCI will, at one point in time, take over the responsibility of funding the valorization of R&D projects (via grants), it is expected that a framework of PCI-

¹²The Law on Higher Education from July 27th, 2005, and the Law on Industrial Property from July 30th, 2000

university agreements will be prepared to assure that the PCI is included in the division of proceeds from commercialization. The PCI will act as an extension of the TTCs and SPCs in performing valorization and commercialization work, which currently is limited, hence it should be entitled to part of generated profits. Early discussions with both RUT and RU suggest that such an “extension” role for the PCI would be welcome by the schools. The exact division of proceeds from commercialization of IP will be the subject of detailed agreements between the PCI and the universities (although an outline of such an agreement will be prepared with the universities prior to the launch of the program and the selection of the PCI management team).

1.3 R&D support activities in the Podkarpackie ecosystem

The PCI will help fill in gaps of the Podkarpackie innovation ecosystem. Table 2 presents a selected list of activities that are important for the R&D collaboration between universities and companies and their division between stakeholders in Podkarpackie and which roles could be performed by the PCI. Activities are grouped according to three platforms that are proposed in the PCI model. The table indicates, which of the activities are currently well performed (green), require significant strengthening (yellow) and are missing or require complete revamping (orange). The PCI will have skills and resources to support the TTCs and SPCs in further developing their capacity, and to fill in existing gaps. Further sections of this report will discuss all three activity platforms and collaboration between the PCI, universities and their TTCs/SPCs.

Table 2. Division of tasks related to R&D collaboration and foreseen function of the PCI

Activity	Universities	TTCs / SPCs	University departments	Tech parks	Regional Development Agencies	Clusters	PCI
General services							
Helping administer R&D grants		x		x	x	x	x
Helping prepare R&D grant applications (H2020, Fast Track)		x		x	x		x
Valorization of the R&D projects							
IPR protection		x					x
IP management (submitting and filing patent application, paying patent fees, negotiating the split of the IPR etc.)		x					x
Nurturing R&D ideas/projects (developing business model, R&D strategy, market research)		x					x
Providing pre-seed financing for further research at low TRL (after a research grant)	x						x
Screening of and selecting R&D ideas at universities		x					

Activity	Universities	TTCs / SPCs	University departments	Tech parks	Regional Development Agencies	Clusters	PCI
Providing external technology advice to R&D teams							x
Reaching out proactively to companies (business development/client acquisition)		x	x				x
Attracting external funding (investors, e.g. venture funds)		x					x
Helping negotiate agreements with external investors		x					x
Helping establish spin off and start-up companies		x					x
Structured Contract Research							
Funding for upgrading infrastructure	x		x				x
Carrying out expertise-based contract research		x	x				
Systematic monitoring requests from businesses for R&D services		x					x
Guaranteeing the minimum quality of R&D services provided to companies							
Identifying R&D needs of companies		x					x
Providing proactively information to companies about the R&D offer available at universities							x
Preparing business-oriented offer of R&D services							x
Funding for additional technical staff	x		x				x
Carrying out standardized (structured) contract research		x	x				x
Updating R&D equipment inventory that is publicly available		x	x				
ProtoLab							
Providing dedicated experimentation space for students			x				x
Providing students with basic machinery toolkit			x				x
Helping organize competitions for students	x		x				x
Helping link students and business							x
Providing space for collaboration of students from different universities							x

Labels: **Green color** indicates that the activity is currently well performed in the Podkarpackie innovation ecosystem, **yellow** means that strengthening is necessary, **orange** signals that the activity is not performed or the sufficient capacity does not exist.

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2.

Design Implications for a Regional TTO

This chapter discusses key principles of a TTO design that are derived from identified best practices and a literature review, and presents their implications for the PCI design.

This discussion helps understand key directions and rationale for the recommendation presented in this report regarding the PCI's functions, governance, organization and financial structure.

The overall design principle is to complement and enhance existing structures, not replace or compete with them.

By law, each university or technology university in Poland must have a TTC within their organizational structure, as well as a special purpose company as a fully owned subsidiary.¹³ For instance, both RUT and RU each have a TTC organization, the RUT also has a working SPC. Any proposed PCI solution must therefore complement the existing TTC and SPC organizations (e.g., performing activities the TTCs and SPCs either do not offer, or provide services to TTCs and SPCs in situations when their own offer or resources are weak or insufficient or otherwise are limited by other regulations corresponding to public universities).

The EU Commission and the MO are prepared to provide funding to one new PCI entity.

The EU Commission made it clear that under no condition should such funding be provided to multiple entities. New types of activities not provided by the existing TTCs and SPC (such as valorization, creation of start-ups, specialized advisory, or operating student-oriented prototyping facilities – see further chapters that explain these concepts) are best done in a single, autonomous and well-resourced entity rather than building up duplicate structures at each of the Podkarpackie schools.

The PCI design should reflect global and Polish best practices as well as avoid repetition of mistakes made by others.

Of several global TTO¹⁰ models analyzed, the LRD Leuven, the Toulouse Technology Transfer (TTT) and the Aalto Design Factory (ADF) were selected as good examples of successful TTO organizations (Leuven, Toulouse), and new ideas in TTO design (ADF). Experience of some relatively long-established Polish TTCs was considered (e.g., at the Wrocław University of Science and Technology, Gdansk University of Technology, and AGH University of Science and Technology), as well as some independent regional initiatives, which were meant to complement the TTCs (e.g., the Pomeranian InnoBaltica or EIT+ in Wrocław). In addition to these real-life case examples, an extensive literature review of best practices in designing TTOs was conducted and used when designing detailed concepts of PCI's operations.

The PCI design should be adaptable to possible future changes.

On the one hand, the process of freeing up the R&D infrastructure is taking place and the PCI structure has to reflect its outcome. On the other hand, should the law regulating IP issues change, to enable researchers to become owners of IPR, such a situation should not require strong adjustment of the PCI's basic activities, business model, and organizational structure. Moreover, physical location of the PCI should offer an easy access to the universities, which on the one hand will facilitate PCI's team contact with researchers, TTCs and SPCs, and on the other hand will encourage students to use PCI's facilities.

¹³ The purpose of the SPC is to manage the intellectual property rights of a given university. The SPC can create spin-off/spin-out firms which are university's IP and know-how

¹⁴ Aalto Design Factory, UC Berkeley's Office of Intellectual Property & Industry Research Alliances (IPIRA), AMC Technology Transfer Office, AFO, innovation office at the Westfälische Wilhelms-Universität, Technology Transfer Office at the Aarhus University, Aarhus University Center for Entrepreneurship and Innovation, University of Vienna Technology Transfer Office, University-Industry Collaboration Center at Sungkyunkwan University (SKKU), Office for University-Industry Collaboration at the Osaka University, Toulouse Tech Transfer, LRD Leuven

2.1 PCI's mission and objectives

The PCI's mission is to provide an effective bridge between the region's R&D providers and users of that R&D. The PCI's activities are to foster the culture of entrepreneurship at the universities and be complementary to and supportive of work done by local TTCs and SPCs. The PCI will accomplish this mission by performing three key functions that encompass the following selected activities:

1. Valorization of university-sourced R&D projects:

- Select and nurture promising R&D projects, and help increase their level of technology readiness (TRL) to prepare them for commercialization via licensing deals;
- Help incubate, accelerate, and fund (through microgrants) university spin-offs and start-ups;
- Facilitate access to business angel networks and assist in obtaining access to subsequent rounds of venture capital funding (in case of successful projects);
- Perform specialized advisory for R&D projects to help them obtain grants from public programs such as the Fast Track (by the National Center for Research and Development), Horizon 2020, and ROP initiatives targeting R&D projects.

2. Structured contract research:

- Proactively re-sell and/or broker up to 20% of the capacity of the universities' R&D equipment;
- Identify R&D needs of companies potentially willing to collaborate with Podkarpackie universities.

3. Provision of the prototyping platform for students:

- Launch and operate a physical platform (the ProtoLab) for students and young researchers to meet, learn, experiment;
- Proactively identify and organize joint university-corporate R&D projects.

2.2 Good practices and practical examples

A successful and professional TTO requires a favorable environment to flourish. While setting up a TTO, various organizational and financial aspects that match local circumstances have to be accounted for. For instance, stakeholders need to be identified and relationships must be established and developed, adequate core staff that is equipped with suitable skills is needed to provide diversified services (since TTO's in house capacity is important), outsourcing should be carefully managed, information management is key, sufficient and stable budget has to be ensured, a suitable business model is required, suitable incentives for researchers should be in place (e.g., advisory support, trainings, financial benefits, appreciation), and student entrepreneurship should be promoted.¹⁵ Box 3 presents 10 aspects that are important when considering setting up a TTO.

¹⁵ More information on these aspects are provided in Appendix 8

The economic five:

- 1 **Technology transfer will not make a university rich.** A successful program will make a small profit but will not support the university. It will, however, provide many other benefits to the institution and the community.
- 2 **Building a robust technology transfer program takes sustained financial investment.** Investments are required to develop a patent portfolio, attract expert talent, and train office professionals.
- 3 **It will likely take eight to ten years before your program stops losing money—and it may never make your institution any substantial amount.** It takes time to build an IP portfolio, establish contacts, and develop skills in technology transfer. Following the set up, the TTO may begin to make money.
- 4 **It may take two decades or more before a university technology transfer program (including entrepreneurial spinouts) substantially affects the local economy.** Impact in regional economic development takes 20 to 30 years. Expecting substantial returns in a few years leads to underinvestment and disappointment.
- 5 **The ultimate impact may be large—both economically and culturally—for the university, its graduates, and the community.**

The implementation five:

- 6 **Sustained effort requires visible support—fiscal and otherwise—from senior administration.** Senior management must not only lead the way, but also sustain the effort to change the culture of research and investment.
- 7 **Only senior administration can set the mission, policies, and priorities for the program.** Clear mandates will help technology transfer professionals choose among competing priorities and the ever-present trade-offs between business and academic values. These policies will ultimately help to define the university. They need to be clearly stated, and supported from the top, so that technology transfer professionals can make the best decisions and withstand pressure from competing interests.
- 8 **Clear policies on IP ownership, the roles of researchers in interactions with industry, and other ground rules should be set up before the program begins.** Working out such policies in the middle of making deals leads to confusion and bureaucratic lethargy, slows down the learning process, and hurts a university's reputation for being able to consummate deals.
- 9 **Conflicts of interest, both real and perceived, are inevitable.** Clear policies and a well understood review and appeal process need to be put in place early. Much can be learned from the experience of others in the technology transfer field. Again, support from senior administration is critical.
- 10 **Technology transfer is a talent-based business.** It is difficult to find people who can speak the two languages of academia and industry and who also have the creativity to craft agreements that meet the needs of both sides. One should not underestimate the combination and level of skills required. These skills and experiences are very different from those needed to conduct research.

Source: *Ten Things Heads of Institutions Should Know about Setting Up a Technology Transfer Office; Handbook of Best Practices*, Lita Nelsen, Director, M.I.T. Technology Licensing Office

The LRD Leuven is widely recognized as the top TTO in Europe. It began its operations in the 1970s, and since then has seen continuous growth. The so-called virtuous circle of the LRD is attributed to the following eight best practices developed over the 40+ years of LRD operations:¹⁶

- **Engagement:** Start at the top. University leaders should send a signal that they are embracing technology transfer as a core role of the institution and engage with academics to build consensus.
- **Autonomy:** Structure the TTO as an autonomous unit of the university with the power to make legal contracts.
- **Funding:** Dedicate sufficient budget for at least three full-time equivalent professionals to set up and launch the TTO.
- **Expertise:** Hire professionals who understand industry and have experience in technology transfer. They should be facilitators and dealmakers who have experience bridging the university-industry divide.

¹⁶ Source: Based on the information obtained in interviews during a study visit and a desk research

- **Incentives:** Design incentives that channel the rewards of engaging with industry back to university researchers.
- **Industry collaboration:** Focus first on industry collaboration to learn how it works. Do not rush to develop spin-outs without first learning how to work with industry.
- **Service mentality:** Provide excellent service to academics in every aspect of technology transfer.
- **Catalyst role:** Actively engage with researchers and industry, connect researchers within the university, innovate on the job, avoid the role of rubber-stamping projects.

2.3 Implications for the PCI

The recommendations of this report directly address key best practices identified in the academic literature review as well as in practical lessons from the leading TTOs. For example:

- **The PCI program is developed with top-level managers of the leading regional stakeholders,** i.e., with university rectors, representatives of the MO and leading companies. Their interest in and commitment to the PCI concept is built through collaborative work on designing the details of the program and by piloting various elements of the PCI (where, and when, possible) before the launch of the program.
- **The scope of the PCI's activities covers typical areas, which good TTOs attempt to address.** In addition to the commercialization of R&D through start-ups, licensing, and contract research, it should also stimulate student entrepreneurial activity, including business projects.
- **Expectations on how soon the PCI will be able to break-even are managed carefully and conservatively.** The point at which revenues cover operating expenses is assumed to be about 15 years, based on the experiences of successful TTOs.
- **Adequate funding is guaranteed for the first five years, and clear expectations on the sustainable sources of funding for the next 5-10 years are outlined.** Mechanisms (e.g., the Trust Fund, funded with revenues from the first five years of the PCI's operations) are created to assure that a long-term planning perspective is applied to the funding strategy.
- **The PCI management team is accountable to the Supervisory Board and shareholders.** The management team has autonomy in operating the PCI and its contract could be terminated in case of significant underperformance, defined in the contract with the MO.
- **Strong stress is put on the "talent" issue from the beginning.** Recommendations of this report highlight the need for selecting a team with the best demonstrated competencies one can find in Poland (or perhaps even within the EU), making sure the commitment of such a team to Podkarpackie is strong and lasting. Appropriate, competitive, and performance-oriented motivation schemes are planned for, making sure that best teams will be attracted to the program to ensure the high quality service delivery for researchers and companies.

Detailed preparatory work will be done on setting the ground rules of the game prior to the launch of the program (i.e., by developing upfront legal agreements governing the relationships between the PCI and universities, and their SPCs).

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3.

Detailed Description of Activities to be Performed by the PCI

This chapter provides a description of the functions the PCI will perform. These are divided into three “platforms” (see Figure 2):

- R&D project valorization¹⁷
- Structured Contract Research
- Running the ProtoLab

Figure 2. Scope of the PCI’s Activities



Source: The World Bank

Although each of the above platforms could operate separately, the approach recommended by the WB assumes that for synergies and economies of scale and scope, all three functions are better housed within one “umbrella” entity, i.e., within the PCI.

The overriding objective for the PCI is to become an important element of the ecosystem for R&D, performing the functions and activities that are currently either missing or could be reinforced in the region.

3.1 Platform 1: R&D Project Valorization

Selection and nurturing of promising R&D projects will be a key activity of the PCI.

These will be R&D projects at Proof-of-Principle (PoP) and Proof-of-Concept (PoC) stages that are mainly initiated at the local universities. The PCI will add value to these proposals in several ways:

- Increase the TRL of the projects (e.g., by providing external market and technical expertise) from the level of approximately TRL 2-3, which is a standard technology level when a R&D project leaves the basic research stage, to the TRL 6-9, which are close to commercialization either via licensing (direct commercialization) or setting up a start-up company (indirect commercialization)
- Prepare grant applications for obtaining financing for further R&D work that aim at raising the projects’ TRL, e.g., from the Fast Track program run by the National Center for Research and Development or EU’s Horizon2020 (synergy with the national, interregional and European programs), as well as help attract external investors (e.g., venture funds, business angels)
- Provide advisory services (strategic and tactical) and hands-on assistance on securing the intellectual property rights (IPR) position of the selected R&D projects
- Provide advisory services and hands-on assistance on business strategy, marketing, staffing and business development to the selected R&D projects.

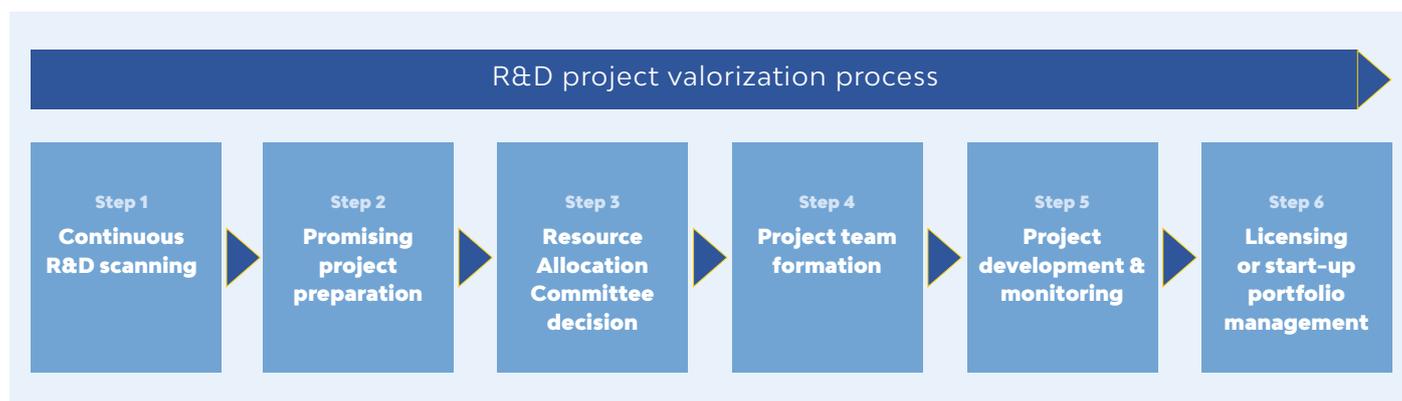
¹⁷ Valorization is defined here as adding value to R&D projects via a combination of technical, business, IP, and funding assistance

While providing the aforementioned activities, the PCI will fund selected R&D projects via the microgrant mechanism that will be financed from the Podkarpackie ROP see financing section in the Chapter 5 for greater detail). The PCI will act as a microgrant operator; microgrants will be oriented towards developing R&D projects. They will be divided into two broad categories, PoP microgrants and PoC microgrants. These will have different funding caps and requirements. In general, though, it is envisaged that the application mechanism for microgrants should be simple and not burdensome.

The exemplary process of the R&D project valorization will look as follows:

1. The PCI team, acting in collaboration with TTCs, will continuously follow R&D work performed at universities and potentially influence the behavior of researchers that could prohibit future commercialization or lower the commercial value of a potential R&D project, e.g., by premature publication of research results.
2. Promising R&D projects are selected and a PCI advisor, together with a researcher team (inventors), work to prepare the project for a hearing (several standard elements such as preliminary determination of IP issues, existence of the market for the invention, etc.).
3. The Resource Allocation Committee (RAC)¹⁸ makes a decision whether the PCI invests in the project, and if the decision is positive, then issues related to project development are agreed on, such as:
 - a. Resource allocation: in a form of time, know-how, cash, or all of these
 - b. Project team: what kind of expertise the project requires to grow further
 - c. Commercialization path: usually one of two main options will be selected, either licensing (a preferred path¹⁹) or setting up a start-up company
 - d. Milestones: key short- and mid-term targets and development goals for the project (or a start-up) are agreed upon.
4. A project team is formed. The team includes people with competencies such as: project management, business development, expertise in a given technology (mostly externally sourced), marketing, IP, etc. Experience from other successful TTOs show that the project team should have a stable core team and in source external expertise as needed.
5. The R&D project is developed (creation of value added by enhancing its TRL by the project team) and monitored, and the PCI's Resource Allocation Committee periodically revisits decisions about resource allocation.
6. A commercialization process is initiated and ultimately it leads to signing a licensing agreement, or in the case of a start-up path, a project team manages the start-up portfolio and undertakes efforts to secure successive rounds of external financing and/or exit.

Figure 3. R&D project valorization process



Source: The World Bank

¹⁸ See Chapter 4 for more details

¹⁹ Licensing is usually more flexible, less expensive and less risky to get invention to the market

Additional financial support by the PCI could further reinforce the valorization activity.

It is recommended for the PCI to have additional means to attract and retain in the Podkarpackie region and further support potentially promising R&D projects originating outside of the universities. One instrument could take a form of a micro grant for an R&D activity that would be provided to a company by the PCI on the basis of a grant application, which would be assessed in a light and swift procedure (an innovation voucher).

3.2 Platform 2: Structured Contract Research

The structured contract research platform will concentrate on matching demand for and supply of R&D.

The supply side will mostly focus on the local universities (20% of the freed up capacity²⁰), while the demand side should encompass entities beyond the Podkarpackie region and beyond Poland. Acting in accordance with its demand-driven mission, the PCI will not simply act as an intermediary in the sale of R&D services provided by the universities, but instead it will assist SMEs in purchasing these R&D services and assure the high quality level of such service. The PCI will focus on a specific sub-segment of R&D services, namely ones that are of standardized nature, hence the name “structured contract research”. This means that the PCI will not deal with highly specialized, one-off research services that require intense preparatory work of researchers. These expertise-based services will continue to be provided by the individual researchers and labs, while the existing TTCs will continue to be the primary conduit for such work.

“Technology brokers” will proactively help match R&D demand and supply. Brokers will be a dedicated team hired by the PCI that proactively reaches out to entrepreneurs (both local and beyond Podkarpackie and Poland) to understand their R&D needs. The brokerage team can serve as a primary link between the PCI and the corporate marketplace within the area of structured contract research. The brokers will also complement work of the universities’ TTCs. They will continuously collaborate with the universities to be up to date with ongoing research and able to market it to entrepreneurs.

The PCI will operate as a business-friendly one-stop shop for entrepreneurs that need R&D support.

There are two advantages to why the PCI could perform such a function. Firstly, thanks to the collaboration with all local universities (TTCs/SPCs), the technology brokers will have a good overview of research performed there. Second, the PCI will possess resources that could support further development of promising R&D projects (both via valorization and help with finding consequent rounds of financing).

The PCI can help universities upgrade their R&D equipment via the “Enhancement Fund”.

The model assumes that the PCI will support the universities in identifying bottlenecks and areas with high commercialization potential. The PCI will have at its disposal an “Enhancement Fund” through which the PCI will be able to support universities in upgrading these pieces of R&D equipment, where high potential demand for structured contract research exists but is constrained by incomplete equipment.

Additional R&D staff could also be financed by the PCI.

In situations where limited staff is a restraining factor for increased structured contract research (especially when technical, not scientific staff, is concerned), the PCI could finance such additional staff to fill in a capacity gap. For instance, the PCI could pay for skilled technicians that would be placed in the SPC to service structured contract research requests from companies during e.g., evening hours or academic holidays.

²⁰ See more information about the issues related to freeing up the 20% capacity of R&D equipment in Chapter 1

3.3 Platform 3: ProtoLab

The ProtoLab is a physical space equipped with basic tools that allow constructing prototypes. The main idea behind the ProtoLab is to offer students and researchers an opportunity to learn and experiment with various production technologies. Students and young researchers will be able to build PoC prototypes resulting from their R&D projects, as well as learn using some basic equipment (e.g., electrical equipment, basic 3D printers, basic lathe, milling machines, etc.) which will be accessible 24 hours a day. Experimentation could be targeted at students' and researchers' own ideas or at real-life business or societal challenges sourced from the public and private sector. When more sophisticated equipment is needed, arrangements could be made with a university to use its facilities.

Strong bottom-up demand for such a prototyping area exists. International experience, for instance Aalto Design Factory (ADF) in Finland, and interviews at Polish universities show that both students and faculty need a space where they can test ideas and gain hands-on experience in basic processing techniques. An example of SIMLE at the Gdansk Technology University, where such a prototyping area is located in a student dorm, shows that students are ready to pay extra premium to live in a building with access to the prototyping space (Box 4). Consultations with students at the three local universities confirmed their interest in such a facility and proved that students would be interested in not only co-developing this idea, but also co-managing its operations.

Business also seems interested in the idea. The interviewed companies indicate that the ProtoLab offers them several promising opportunities. Firstly, interdisciplinary student teams can help solve real-life problems of companies, either during regular "courses" or competitions sponsored by companies. Second, firms' collaboration with students could help them identify potential future employees and encourage students to apply for jobs. Third, the ProtoLab students are likely to come up with ideas for companies (as well as the public sector) to implement. Some companies indicated that they could be interested in contributing resources to co-finance specific activities of the ProtoLab, for instance student competitions oriented at areas relevant to companies' operations.

Ideally, the ProtoLab will facilitate collaboration between students from different schools and beyond. To ensure high uptake among students, universities could include interdisciplinary courses performed at the ProtoLab into their curricula. It should remain as open as possible to promote interdisciplinary. While closely linked with the universities, the ProtoLab could also attract students from other schools, such as vocational schools. Moreover, it could become a space for teaching young children basic manufacturing techniques and developing their manual skills and drive for experimentation.

The ProtoLab requires a dedicated building that will be student-oriented. It is assumed that the ProtoLab will be located in a refurbished building. To allow an instant kick-off 1000-1500 square meters is sufficient, and could expand over time to 2000-3000 square meters. Since a variety of the projects in different research/industry areas will be pursued in the ProtoLab, the space should include several different sub-labs (e.g., for 3D printing, lamination, electric work, mechanical processing, etc.). An area to display the results of the projects (i.e. working prototypes) and a shared common area for interaction should also be planned (e.g. a kitchen with a coffee machine). The ProtoLab could be, for instance, designed by art students and student-users should have a significant degree of freedom to remodel and adjust the space, as needed.

The initial set-up could be basic. The ProtoLab definitely should not be a state-of-the-art facility.. Workshops will include aged equipment about to be sold by the universities or donated

by companies. This equipment should be supplemented by some selective purchases by the PCI. The users of the ProtoLab should in principle supply any materials needed to build prototypes, which would help them initiate contacts with business partners or future employees. In case such cooperation is not possible the ProtoLab could help selected student projects obtain the materials.

Location seems crucial, ideally in proximity of student dorms and universities. The ease of access by potential users should be one of the key factors for selecting the location for the ProtoLab. Ideally, it should be placed close to dorms and universities to allow 24/7 access. It should be well-connected to other parts of the city, and it would also benefit from a parking lot with substantial bike parking space. Such a location should encourage students to utilize its premises and stimulate socialization by extending the amount of time users spend inside the ProtoLab.

The ProtoLab has limited requirement for permanent staff. It seems that initially 2-3 people could operate the facility. A pro-active and student-oriented animator will be a key for running the facility – a university scientific staff member would be perfect for such a role. Then, one or two machine operators (supervisors) are required; these could be, for example, trained students. The animator would coordinate outreach to companies to solicit potential student projects. Supervisors would help students use tools, ensure safety, and teach students processing techniques.

The PCI could operate the ProtoLab, while the ownership would stay with the universities. It is assumed that the ProtoLab facility could be refurbished with the Podkarpackie ROP resources. Similarly the funding for the first five years of the ProtoLab operations will be provided from the ROP as part of the overall funding of the PCI. It is assumed that, like the PCI itself, the ProtoLab will use a combination of public funding from the MO as well as fees from sponsoring business and public entities.

BOX 4

SIMLE: A PROTOTYPING FACILITY AT THE GDANSK UNIVERSITY OF TECHNOLOGY

There is a working example of creating a small prototyping facility at the Gdańsk University of Technology in Poland. In 2014, the university signed an agreement with a local real estate developer. As the result of the cooperation, an old tenement house was converted into a small student dormitory. The real estate developer performed the construction work, and the final design of the facility was students' responsibility. The dormitory was adapted and the prototyping space in the immediate vicinity was arranged.

The ownership and responsibility for the space are the necessary conditions of boosting students' creativity. The prototyping space is located in an old garrison club. It consists of several rooms connected with a wide corridor. Each room has a different function. Smaller rooms serve as storage spaces for different student groups working at the facility. Larger ones are being used to perform work such as laminating, painting, or sanding, interchangeably with assembly and construction activities. The total space of the facility is roughly 300 square meters which forms enough room for two student associations, one working on a flight simulator, and the other on racing water bikes and solar boats. Access to the facility is allowed 24/7. The students themselves have provided the majority of the manufacturing equipment available at the facility. Part of it comes from the university because it was outdated and withdrawn from duty. Students' partners – companies cooperating with students, donated the rest of the equipment and materials. This way, students learn how to approach companies and establish business relations. The real estate developer owns the facility but the students were granted full control and responsibility over its design and arrangement. The general rules of use apply, but it is the students who manage the facility on an operational level.

Participation in prototyping facilities influences students' careers. Many participants of this prototyping facility see that they benefit greatly from this experience on many levels of their lives. Participation allows students to hone their manufacturing and team work skills. Using only basic tools, for example, students managed to design and construct a full-scale Cessna 172 simulator and several racing water bikes. Prototyping at SIMLE teaches all the participants how to cooperate better and help create networks, e.g., some of the students already graduated, yet they are still supporting younger colleagues. By pursuing joint project at SIMLE, students learn to be self-sufficient, usually no one helped them acquire the equipment and materials, and they designed and manage the prototyping space on their own. Feedback from former students, who engaged in prototyping, indicates that experience they gained helped them find a good job and is still supporting their careers.

Source: *The World Bank*

The PCI team could support promising projects. Inventions and IP created by students usually belong to them. Hence, promising ideas could be analyzed and channeled to the valorization process by the PCI to further develop their business potential.

3.4 Complementarity with innovation programs

The PCI complements the existing programs and instruments aimed at the innovation support. A number of instruments supporting innovation exist in Poland at the national and regional level that are mostly EU financed. The PCI was designed to fill in the gaps and reinforce existing measures.

The PCI will act as a spring board to the European (Horizon 2020) and national level programs (Fast Track operated by the National Center for Research and Development).

By supporting companies and local universities in application to these programs, the PCI will build up local capacity. The PCI will also reinforce the Alfa BRIDGE program by pre-screening valuable R&D projects, developing them at the pre-seed and seed stages and then attracting external investors, for instance Alfa or Starter funds, to participate in further financing rounds.

PCI will also support the macro-regional development of Eastern Poland. For instance the ProtoLab is likely to feed candidates to such initiatives as the Startup Platforms operated by the MoED. Students that experiment in the ProtoLab can come up with promising business ideas that need further nurturing to turn them into a viable business. Accelerators such as StartUp Platforms could be well suited to provide coaching and help students develop business plans and minimum viable products for their companies.

At the regional level, the PCI will support innovation programs by operating R&D-oriented grants (Proof of Principle and Proof of Concept grants). The grant program is an integral part of the ROP 2014-2020 and PCI's expertise will help invest the ROP funds in the most promising R&D projects. This means that the PCI is not an additional source of public money for the R&D projects, but it helps channel money that is already designated to such programs. By encouraging experimentation among students and raising commercialization capacity and awareness at the universities, the PCI will also help other innovation supporting entities in the region, such as tech parks, incubators, etc., to perform their tasks. By operating the Enhancement Fund the PCI will be, at the margin, able to support universities' R&D capacity. Such support will not interfere with regular financing of the universities that comes from the state budget, as the amounts from the Enhancement Fund will be relatively small when compared to these other sources and will be targeted at specific niche areas (e.g., additional technical staff, small upgrades of the existing R&D equipment etc.).

ACTIVITY 1:

**Designing Regional Technology Transfer Office:
Podkarpackie Center for Innovation**

4.

The PCI Governance and Management Team

The PCI will be set up as a legal entity subject to commercial law of Poland. This chapter describes recommended structural solutions for the PCI that relate to governance, relations with key local stakeholders, the questions of who is the team managing the PCI, and the selection process of such a team. As described in previous chapters, the PCI will run three distinct platforms (Valorization, Structured Contract Research, and the ProtoLab), but due to multiple synergies the “umbrella” entity (a management board) as well as the three platforms will all be housed under one roof in one PCI legal structure.

While subject to the commercial law, the PCI should not be seen as an entity set up and run to maximize profits and pay off maximum-size dividends. During the initial years, the PCI will focus on increasing the implementation potential of R&D projects originating at local universities. It will do so by transferring public funding for those projects to universities and directly to research teams. In the longer term, revenues generated by the PCI from this commercialization activity will be used to fund its operations and, in this way, will be reinvested in the continued development of the Podkarpackie R&D ecosystem. It follows that, at least in the 5-10 year planning horizon, the PCI should have a budget that balances its expenses with the combination of the self-generated revenues and public funding, resulting in a neutral (zero) net profit outcome.²¹

4.1 Structural considerations

The PCI can take a legal form of a foundation, association or corporation (a partnership, joint-stock, or limited liability company). These are three legally feasible solutions for the PCI that could be implemented. While this section presents arguments as to why a limited liability company is a preferred legal form for the PCI, the Appendix 7 discusses the limitations of the remaining legal solutions.

The Polish Code of Commercial Companies²² distinguishes two main kinds of corporate legal entities: partnerships and companies. The companies themselves can take either limited joint stock or Limited Liability Company (LLC). Both the joint stock and the LLC forms have legal personality, and shareholders of such companies are not personally liable for company obligations. Transferability of shares is largely unlimited for both types of companies (unless articles of association or a shareholders agreement provide otherwise), thus the shareholders are, in principle, free to exit the company and reclaim their investments. Both forms also have separate governance bodies in their structures: a management board and a supervisory board (a supervisory board is an optional choice in a limited liability company), thus the shareholders do not run the business by themselves, but appoint and control selected agents.

A limited liability company structure is recommended as the optimal form of business activity for the PCI. A form of a limited liability company is better suited for PCI than a joint-stock company. One of the reasons is transparency of the shareholding structure (unlike in a joint-stock company, where data on shareholders is typically not made public). Another reason is relative simplicity and lower cost of the limited liability structures (e.g., no need for a notary deed at GSM, and a potentially simpler procedure of making in-kind contributions to the company – e.g., no need for a specialized audit procedure, which is mandatory in joint stock companies).

²¹ The incentive system for the private team running the PCI is discussed later in the chapter. The assumption here is that public funding is classified as “Non-operating revenue” from the financial statements perspective

²² ACT of 15 September 2000 Code of Commercial Companies (Journal of Law of the Republic of Poland of 2016 item 1578)

PCI set-up and shareholding

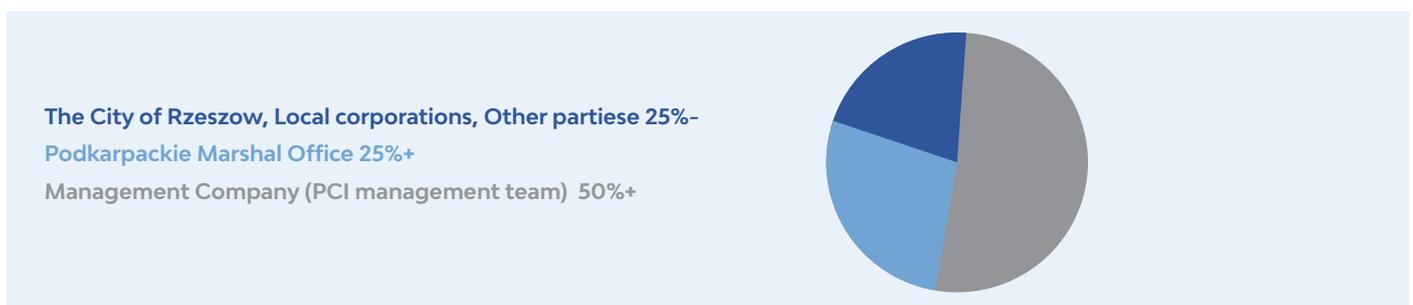
The PCI's role as a professional regional interface unit, its function as a conduit for EU funding managed by the MO, and its need for operational autonomy are three key considerations influencing the possible ownership structure of the PCI. It is a regional platform, set up to collaborate with several universities (Rzeszow University, Rzeszow University of Technology, and University of Information, Technology and Management), but not affiliated with any of them. A sufficient level of autonomy for the PCI managers, together with transparent rules and good corporate governance practices seem key conditions to attract best in class management teams to compete for this function. The candidate teams have to be assured that:²³

- The governance of the PCI will be relatively free of political influences and considerations, and that the performance of the team will be evaluated on objective criteria having to do with the PCI mission and goals;
- Unless the team significantly underperforms over a sufficiently long (18-24 months) period (i.e., at least 30% below initially agreed upon Key Performance Indicators), it should not be easy to cancel the management contract (appropriate agreements employing the concepts from the so-called Limited Partnership Agreements used by the private equity and venture capital industries should be considered as example for structuring such contracts);
- Decisions to fund (or not to fund) specific R&D projects should be taken on merit, based on analyses and recommendations of the PCI team, and according to clearly spelled out criteria.

An ideal design of the PCI shareholding structure would therefore be as follows:

- A private entity representing the future PCI management team ("Management Company"): 50%+ (a stake allowing an operational control of the entity) see Figure 4;
- The Podkarpackie Marshal Office: a 25%+ (a stake allowing for the so-called passive corporate controls over key decisions – i.e., control over strategic decisions such as the sale of a company or an acquisition of another, new share issues, etc.). The Podkarpackie MO should have the so-called call option ("Call Option" defined later in this chapter) to purchase the stake of the Management Company should the underperformance clause be invoked. Terms of such a call option should be set upfront during the selection procedure of the private partner to run the PCI. The existence of such a call option would allow the Marshal Office to intervene and replace a poorly performing management team;
- Other potential stakeholders: minor stakes (combined stakes should add up to less than 25%):
 - *The City of Rzeszow*
 - *Local corporations*
 - *Other parties*

Figure 4. Potential shareholding structure of the PCI



Source: The World Bank

²³ Selected teams with experience in such R&D-focused programs as Innovative Economy Operational Program 3.1 and BRIDGE Alfa were interviewed. The presented key success factors is partly based on their feedback

Despite the lack of local universities' formal participation in the PCI shareholding structure (mainly for the potential conflict of interest reasons; the universities will be PCI's main client), RUT, RU and UITM will have several mechanisms to use to ensure that they are adequately involved in the PCI operations. These will include mainly the participation in the Supervisory Board of the PCI and participation in the Resource Allocation Committee (more details below). Given the prerogatives of the SB, and in particular the RAC (which is the equivalent of an investment committee in a VC fund), the university representatives will have a real, day-to-day influence on the operation of the PCI. The lack of formal, equity ownership in the PCI should not be an obstacle in establishing a real involvement by the universities in the operations of PCI. These mechanisms are both necessary and sufficient to ensure the appropriate level of participation and buy-in into PCI activities by the Podkarpackie universities.

Given the envisioned concept of the PCI in the initial 5-10 years (i.e., an entity acting as a pass-through for public funding and attempting to cover as much cost basis from own-generated revenues), the initial capitalization of the PCI is not a major factor influencing the design of the program. The initial capital of the PCI can be set, for example, as low as PLN 10,000. Since the structure is designed not to be dividend-generating, and the funding of the structure is, for all practical purposes, guaranteed for the first 5-10 years, the initial capitalization seems to be of secondary importance.

The corporate structure of the PCI should give proper representation to all the relevant stakeholders. Figure 5 presents a recommended corporate structure that is made of General Shareholders Meetings (GSM), Supervisory Board, and Management Board. Besides representation of the main stakeholders, a key feature of the structure is that it is acceptable for the Management Company (representing the management team). The latter is responsible for the quality of the PCI's functioning because it is supposed to deliver skills, experience, and competencies – core value added to the PCI.

Figure 5. Governance structure of the PCI



Source: The World Bank

An additional "Shareholders Agreement" seems to be a useful tool to regulate detailed matters of day-to-day collaboration of the shareholders. Such an agreement, in addition to corporate bylaws, can bind parties participating in the shareholding structure (in particular, the Management Company and the MO). The Call Option, that is the situation when the MO may want to acquire the PCI shares held by the Management Company in case of its significant

underperformance, can be either written into corporate bylaws or regulated by the Shareholders Agreement. The recommended solution is that the Shareholders Agreement covers the Call Option and the specifics of when and how it can be invoked, while keeping the PCI corporate bylaws relatively standard (registration of PCI corporate documents in Poland's Share Registry, or *Krajowy Rejestr Sądowy*, will likely be faster that way). In addition to the Call Option, the Marshal Office will have typical rights of a significant (25%+) minority shareholder at the GSM, such as blocking rights over key decisions – i.e., control over strategic decisions such as the sale of the company or an acquisition of another, new share issues, etc.

Although the funding commitment of the MO is high, it is recommended that a private party control 50+ percent of the shares (and votes) of the PCI. The main rationale is as follows:

- Few good management teams will be attracted by terms that put them in situations where their fate is determined by factors beyond their direct control. In particular, no good team will bid for the privilege of operating the PCI if their contract could be annulled for reasons having nothing to do with their actual performance;
- The MO will have the Call Option to replace any underperforming PCI management team at a relatively low cost (making it possible to enact changes despite its minority stake at the shareholding level);
- As a *quid pro quo*, the candidates for the role of managing the PCI should be prepared to show their capability to attract (when needed) funding for the R&D projects being commercialized, as well as some potential 'skin-in-the-game' (own resources to be co-invested in projects moving past the seed stage). Some selected criteria for the selection of the potential team are reviewed later in this chapter.

The Management Board and the Management Team

The success of the PCI will depend on the quality of the selected management team (experience, track record, and competencies). This means that personnel with established track records in commercialization of R&D projects (either through licensing or through start-ups, but also with experience in contract research) will form the core of the PCI team. The formal management structure of entities putting bids to manage the PCI is of secondary importance. At the same time, an important requirement for the team will be their commitment to the program by allocating needed amounts of time the ground in Podkarpackie.

Composition of the Management Board of the legal entity housing the PCI is less crucial. The main issue is the quality of the so-called "Key Personnel".²⁴ A one to three person Management Board, proposed by teams interested in running the PCI (and satisfying the minimum formal requirements of the board management of Polish LLCs), should be enough to satisfy the conditions of the selection process. Any private party interested in managing the PCI should be able to field the team satisfying the conditions imposed by the MO in the open competition to select the PCI manager. The size of the team will vary, starting with a small initial core team, and expanding as the operations of the PCI (and the number of valorized R&D projects) grow and gain traction (estimation is between 14-28 people – see below and Figure 6). It is expected that teams interested in managing the PCI should be able to display their competencies and ability to source people in the following areas:

- The general management (1-2 people)

The general management has the legal responsibility for PCI. It performs the corporate duties and is charged with responsibilities as stipulated by the Code on Commercial Companies.

²⁴ Detailed rules and regulations of how the management board of the PCI will operate are not the subject of this report and will be developed as part of detailed planning for the launch of the PCI

- Valorization team (6-13 people)
 - 1-3 subject matter experts (technical background)

Most of the technical expertise will be purchased by PCI on an as-needed basis (i.e., after a given project team is launched and funded). In certain areas, however, (e.g., biotechnology, composites, or other areas where local universities have strong competencies) it could be advisable to build up in-house expertise.
 - 1-2 Intellectual Property (IP) specialists (IP lawyers)

As with the case of technical subject matter experts, most of the IP-related work will be either outsourced or leveraged with the university staff. However, examples of successful TTO teams suggest that it is advisable for the PCI to also have in-house IP expertise.
 - 1-3 business development/marketing specialists

Ideally business development personnel will also specialize in specific areas of technology. Their number can grow over time as the number of valorized R&D projects increases.
 - 1-2 “boundary spanners”

These are people that gather information, obtain feedback and perceptions from the external environment through their stakeholder network, building sustainable relationships across the boundaries, identify issues, influence, and support.²⁵
 - 2-3 specialists (by area) in structured contract research (“technology brokers”)

The ideal profile for this function is a combination of technology/engineering experience in a certain area and sales/marketing expertise (having an extensive network of contacts in the corporate world is also a desirable asset). People with experience and good track records in technology brokerage would fit this profile well.
- The ProtoLab team (4-5 people)
 - 2 animators

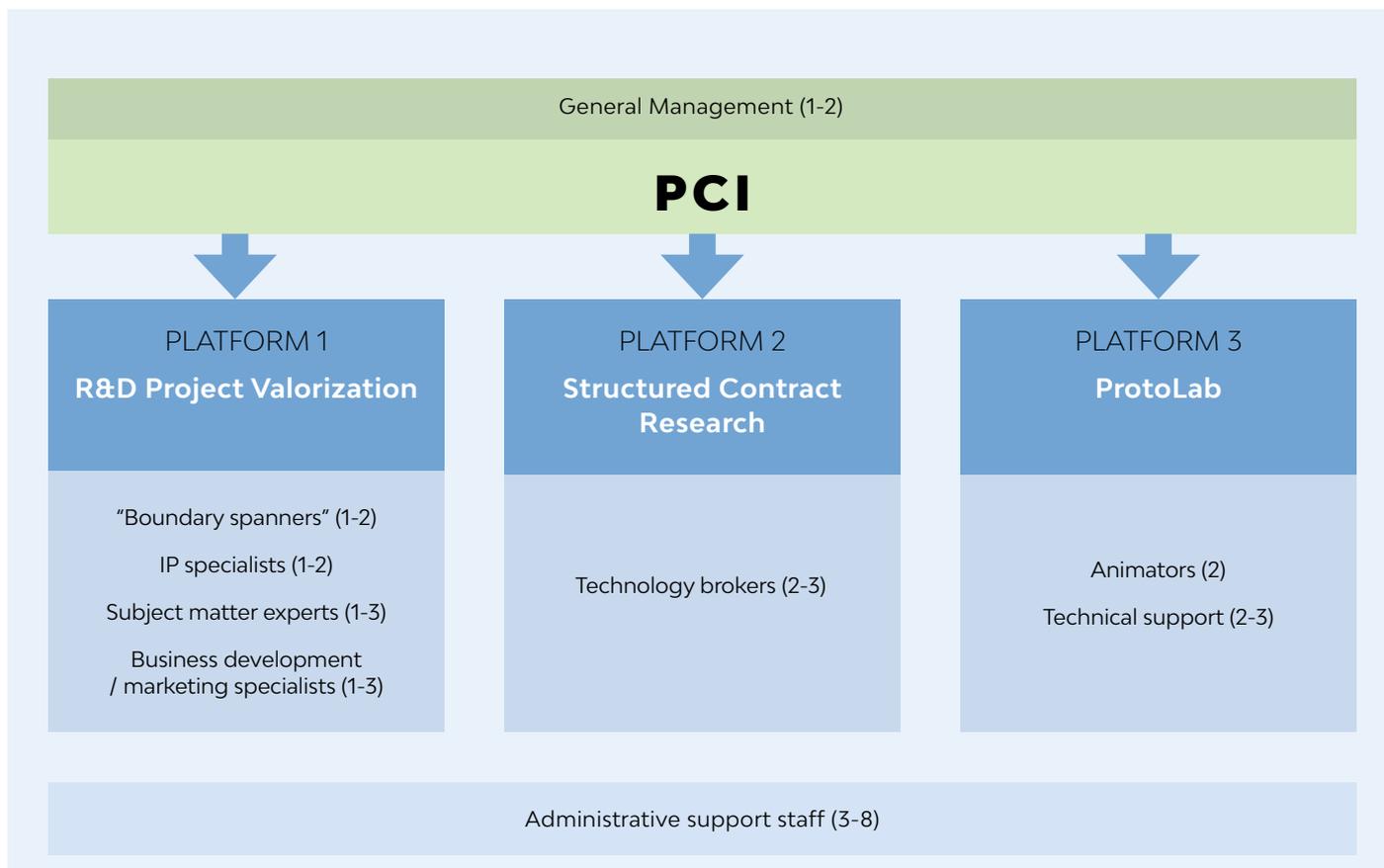
Managers with good exposure to the world of student associations and the local businesses and other organizations. Capable of facilitating student activity, organizing contests, carry out fundraising activity.
 - 2-3 technical support

Persons capable of operating some of the equipment in the ProtoLab (e.g., the machining centers), as well as performing simple service/repairs on most of the equipment.
- Administrative support staff (3-8 people)
 - 3-8 support staff

Support staff will be necessary to administer issues related to valorization of the R&D projects and structured contract research. They will deal with issues such as filing documents and applications, keeping deadlines related to patent applications, and general support to the PCI.

²⁵ Source: “Boundary Spanner: the Gatekeeper of Innovation in Partnerships” by Sean Ansett (in Accountability Forum)

Figure 6. The PCI staffing model



Source: The World Bank

PCI's General Shareholders' Meeting and the Supervisory Board²⁶

The Polish commercial companies law determines the key prerogatives of the General Shareholders' Meeting (GSM) and the Supervisory Board (SB). LLCs in Poland do not require the establishment of the SB. However, given the potential number and variety of shareholders, it is advisable that their representation in the form of SB is put in place. It also is recommended that, to the largest extent possible, the corporate bylaws and regulations and specific laws pertaining to such things as the GSM and the SB should follow the Polish Code on Commercial Companies (the Code), and any exceptions should be used judiciously. In particular, as the Code specifies, the GSM will have the prerogative to nominate and recall the members of the Management Board of PCI.

The five-person Supervisory Board will have the typical board prerogatives and responsibilities awarded to it by the Polish Code on Commercial Companies. Among other duties, the SB will evaluate financial statements and make recommendations to the GSM for their approval and prepare an annual SB report on its activities to the GSM. The SB prerogatives will allow it to examine any corporate documents and inquire the management board about various matters. It is also expected that the SB will hold periodic discussions about the direction of the program and work with the management board on preparation of quarterly and annual budgets, which it will approve. It will also be within the scope of SB's prerogatives to approve certain Management Board decisions that are of an unusual or extraordinary nature, or having to do with activities not covered in the PCI budget, for instance:

- Expenditures or decisions about assumption of financial responsibilities exceeding certain

²⁶ Detailed matters pertaining to PCI's GSM and SB (e.g., rules and procedures to call the meetings, regulations on how the bodies will operate, etc.) are not the subject of this report and will be developed as part of detailed planning for the launch of the PCI

limits;

- Asset (e.g., IP, other intangible rights, real estate, etc.) disposals exceeding certain limits;
- Related party transactions, etc.

The ideal setup of the SB should allow for representation of each counterpart of the PCI. A statutory minimum number of SB members are three. It is proposed that, in order to give proper representation to various shareholders, and to assure that SB has independent board members as well as the representation of the local universities, the PCI's SB should initially have the following five members:

- The Management Company will have the right to nominate two members (including the Chairman of the SB);
- The Marshal Office will have the right to nominate one member;
- The local universities will have the right to nominate one member;
- One SB member should be independent. A procedure to nominate the independent SB member should be made part of corporate bylaws.

The number of SB members may change in the future. Should other stakeholders, such as the City of Rzeszow or local companies, acquire PCI shares allowing it to collectively own more than 15% of the PCI shares, SB membership could expand to seven (in which case one additional SB seat would be given to a representative of those shareholders, and one additional seat to a representative of the Management Company).

Resource Allocation Committee

The Resource Allocation Committee (RAC) will be PCI's main operational decision-making body. The RAC will meet monthly and approve R&D project funding decisions (ranging from PLN 50 thousand to PLN 1.5 million) regarding disbursements from the Enhancement and Patent Funds (i.e., funds at the disposal of PCI designed to respectively enhance the commercial attractiveness of universities' R&D equipment, or assist project teams with patent filing and IP protection), allocation of resources (people) to funded R&D projects, and assignment of research microgrants. The RAC will be presented with recommendations from the PCI management team to expand resources on certain R&D projects (or to cease funding them). The resource allocation decisions can take a form of non-cash allocations (e.g., allocating an analyst to perform a Freedom-to-Operate research²⁷), or cash allocations (e.g., PLN 200 thousand to continue the research and try to increase the TRL level of the funded project from TRL3 to TRL6). The PCI team will present its recommendations to RAC in a structured form (the RAC will need to have an analytical back up to make a decision).

RAC will consist of up to seven members:

- Two representatives of the PCI management team (one of the PCI representative will act as the Chairman of the RAC, and in situation of a split vote his/her vote will be decisive)
- A representative of the MO (with an observer status)
- Up to three representatives of the universities (one each)
 - The rationale is to involve universities to a maximum extent in the operational decision-making processes; it is assumed that, once involved and seeing the benefits of a structured, analytical process, the universities will come to view the PCI as a natural extension of their activities and a primary go-to place for commercialization of their IP.
- One representative of the local businesses

²⁷ Freedom-to-Operate analysis aims at verifying whether the R&D project does not infringe on valid IP rights of others

It is important to properly set the financial motivations for the RAC members. Since the RAC will operate on a monthly basis, non-PCI members of the RAC should be remunerated for the time spent in the process.

Three types of decisions could be taken by the RAC when it is presented with a recommendation from the management team. These are:

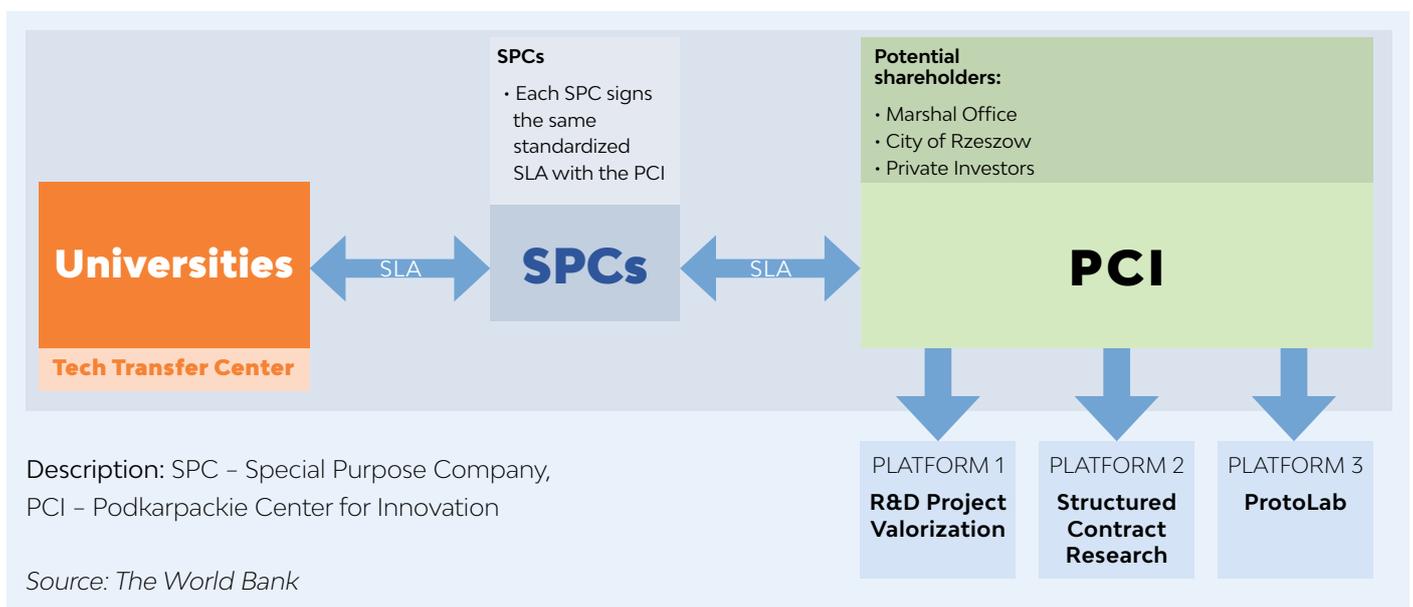
- Approve the R&D project funding recommendation from the PCI management team, or
- Disapprove and therefore discontinue the funding of the R&D project (this applies to R&D projects that previously received funding, but which subsequently failed to meet certain project milestones), or
- Postpone a decision and request additional information/analyses (such requests should be made only once; the next RAC meeting should take a definite “go” vs. “no go” decision on the funding of such a project).

RAC decisions about funding R&D projects (or discontinuation of such funding) are final (i.e., they cannot be overruled). The decisions may be conditioned, among others, on signing an agreement with a university covering the questions of IP rights on a given project.

4.2 Relationship between the PCI, SPCs and universities

Business-university R&D collaboration requires assuring clear rules that are acceptable for universities, researchers and companies. Without transparent regulations on access to the R&D equipment or providing R&D services (quality, time, cost etc.), the TTCs/SPCs and brokers can encounter problems when convincing corporations to engage in collaboration on R&D. The WB team recommends signing two types of service level agreements, one between the universities and their SPCs, and one between SPCs and the PCI (Figure 7).

Figure 7. Relations between the stakeholders



A relationship between a university and its SPC has to be also clearly regulated. According to article 86a of the Law on Higher Education, a university may form a LLC or a joint-stock company with a purpose of commercializing research and experimental development. Such an entity has a status of a Special Purpose Company. It should be separated from a founding institution by legal, organizational, and financial means and should work as a business unit of an institution, being responsible mainly for technology transfer and cooperation with the industry. The SPC should obtain the right (ideally, an exclusive one²⁸) to dispose of IP rights created at the universities, and use this right to either pursue the path of direct commercialization via licensing (with the help of PCI), or use it as an in-kind asset when following an indirect path of commercialization, i.e., when creating a spin-off company (start-up). Such SPCs have one significant limitation concerning the legal status of its shareholders: so far only universities can be shareholders of SPCs. Thus, participation of private or public financing from non-research public entities such as public agencies or the State Treasury is not allowed.

An SPC guarantees a university flexibility, which is important to establish a relationship with the PCI. This is the primary reason why the direct commercial relationship will exist between PCI and SPCs, and not between PCI and the universities. An SPC is not obliged to act in accordance with the Polish Public Procurement Act, nor to pursue a public procurement procedure when awarding contracts, despite the fact that an SPC is founded by public finance sector entities (i.e., the university/ies). That is because an SPC is not established for the purpose of meeting needs of 'general interests' (e.g., primarily education), which is one of the conditions for the Public Procurement Act in this situation, but for the management of universities' IP. Thus, an SPC can freely engage its contractors, e.g., the team operating the PCI, to perform various services, although some restrictions may be established by agreements with public institutions such as the MO, Ministry of Science and Higher Education, or National Center for Research and Development.

BOX 5

LIST OF THE ISSUES COVERED IN A COOPERATION AGREEMENT BETWEEN THE PCI AND A UNIVERSITY SPC

An example list of the issues covered in a cooperation agreement between the PCI and a university SPC:

- Full list of subject of the agreement
- Remuneration, fees, commissions and payments, and the rules of its calculation
- Rights and duties of both parties (e.g., cooperation in preparing and offering lab services), roles in valorization of R&D projects, and searching investors
- Procedure of hiring (or delegating) a personnel engaged in R&D projects
- Procedures of cooperation in different matters – delivery and pick-up, exchange of information, statements, documents etc.
- Liability, warranties, guarantee, liquidated damages etc.
- Scope and rules of assignment of IP rights
- Reimbursement of costs
- Exclusivity and confidentiality
- Force majeure and scientific risk.

Source: *The World Bank*

²⁸ Examples of best practices of European TTOs indicate that a relationship based on exclusivity, in a well-defined area, is one of the ingredients of success

The SPC has to manage at least 20% of capacity of R&D equipment at the universities.

It must be taken into account that, before a Service Level Agreement between the PCI and the university SPC is concluded, a university (or universities) needs to transfer certain rights pertaining to the use of their R&D equipment to an SPC (e.g., a purchase agreement) or give the SPC rights to “use and take benefits” (e.g., to issue license agreements allowing universities to earn profits from this activity). Without these university-SPC agreements, it will be difficult (if not impossible) for the PCI to enforce the SPCs performance requirements included in the SLA agreements.

4.3 Profile of the PCI team and its selection

The outcome of the selection process of the PCI team will define the PCI for the next 5-10 years, therefore its quality is key.

The selection process should be competitive and open for entities from Poland and other countries to participate (the idea is to select the best entity that will assure the optimal mix of track record and experience in the provision of services the PCI will deliver). The selection process should be performed by an independent board, whose members will include representatives of the Podkarpackie local government and universities, possibly representatives of the Ministry of Economic Development, as well as international experts. Detailed selection criteria and design of the selection process are not part of this report, which focuses mainly on the general profile of ideal candidates and directionally suggests ways to evaluate candidates (such detailed criteria, as well as detailed guidelines on process design, should be developed over the next few months in preparation for the launch of the PCI). The selected team (Management Company) will enter into a 10-year contract with the Podkarpackie MO, with an option for the Office to terminate it after five years (should certain minimum indicators of performance not be reached). Termination will be also possible after an extended period (usually defined as 12-18 months) of non-performance that will be defined in the contract between the MO and the PCI.

Ideal candidates for the PCI staff should form a balanced mix of competencies from the worlds of applied research, seed investing, and general management.

Candidates to manage PCI should be sought from among the best international teams managing R&D-focused seed funds (e.g., beneficiaries and candidates for the BRidge Alfa program or the selected Smart Growth Operational Program (SGOP) 3.1 funds, technology brokers, university researchers (PhDs) with some commercialization and business experience, existing personnel of the TTCs, IP lawyers, etc.). The role of the Management Company will be to assemble a team of such individuals, while indicating the platform in which each of them would be deployed (i.e., Valorization, Structured Contract Research or the ProtoLab). An investment or managerial background in a university R&D environment will be preferable to a pure advisory background. Measurable indicators of the team’s experience (e.g., number of license agreements negotiated and license revenues generated from them, number of R&D intensive start-ups funded/advised, revenues generated from contract research, etc.) should be given significant weight in the selection criteria.

The management team will be based in Podkarpackie, so the candidates will be expected to make a time commitment to the region.

The management team does not have to be local during the selection process (the scope of search for a Management Company should be at international), although willingness to make a tangible time commitment to Podkarpackie (and over time transfer know-how: employ and train a certain threshold number of local key personnel) is crucial. An important consideration while selecting the team should be its ability to organize independent seed funding for promising R&D projects in the total amount of commitments around PLN 10-15 million (e.g., in the form of letters of intent from seed/venture capital funds and angel investors).

The Podkarpackie MO should consider conducting a proactive process of selecting the ideal candidate for the Management Company. Before publishing the conditions of the competitive selection process, the MO should identify 10-20 potential institutional candidates to manage the PCI (e.g., using the profile description provided earlier in this chapter), and meet with those teams, explaining to them the goals of the program, judging the interest from the teams to participate, and listening to feedback and potential concerns.

Incentives for the team managing the PCI

The remuneration model for the PCI is crucial for motivating the management team to perform high quality work. The challenge in designing a model of remunerating the PCI management team is to come up with a system that encourages participation of successful, competent teams representing a good mix of managerial, investment, and advisory skills, and discourages candidates with a pure advisory bias. The concept of the PCI, with its stress on the provision of value-added services to R&D projects and the universities, as well as the philosophy of the PCI serving as the funnel for mostly public funding of commercially-viable R&D, poses some challenges for attracting management teams with the right motivation to perform their job well. The question is whether the PCI's mostly fee-for-service model will be attractive enough for upside-oriented management teams that the MO would like to attract to the program. The question is especially important since, for a foreseeable future, the PCI is unlikely to turn an operating profit, and therefore, it is unlikely to generate any meaningful dividends. The reverse side of the "upside" question ("will there be enough of an incentive for the PCI management team to be truly performance-oriented?") is the so-called "skin-in-the-game" issue ("will the team's remuneration be adversely affected if it underperforms and does not achieve its results?").

The motivation for good management teams to get involved in PCI is somewhat similar to that present in such programs as the BRIDGE Alfa or E-Pioneer. Good management teams will be attracted to the PCI concept primarily by the opportunity to be present at the very earliest stages of development of interesting R&D projects. They can profit by either investing in them at the later stages (but any conflict of interest issues are resolved by the fact that they act as co-investors only), or by getting remunerated on a transactional basis (for arranging the additional external financing), when the PCI acts as a corporate finance advisor to a valorized project. Having the assurance of the funding of the PCI for the first five years will help; with such funding that is classified as non-operating revenues, the PCI will show at least a break-even net profit result (will not be a loss making entity at the net profit level). With the proposed mechanism of the Trust Fund, as well as the opportunity to work on the prospective funding of the PCI by the local business and other entities (e.g., the city of Rzeszow), competent private parties will see the PCI as a good value proposition to get engaged in (this has been tested with several potential candidates for the role of the PCI operator).

Good practices TTOs suggest a simple performance compensation scheme. A performance scheme for key team members that relies on a competitive (not too high relative to a potential bonus) base salary, and offers a possibility of a sizeable (in comparison to the base, e.g., 50-75%) quarterly or annual bonus tied to the accomplishment of tangible results may be a feasible solution in Podkarpackie. Successful European TTOs (such as LRD in Leuven, Belgium, or TTT in Toulouse, France) have a fairly "flat" reward system (e.g., the team members do not share directly in the upside generated by successful licensing or start-up deals).

The underperformance penalty clause should motivate the management team to put its best efforts in managing the PCI. The Management Company chosen to manage the PCI will enter into a 10-year contract (with a possibility of cancellation after five years) with the Podkarpackie MO. In addition to the sheer size of the contract, it should give the management team a unique experience in the Polish university R&D space, alongside with a long-term

potential to capitalize on its relationships with local universities and the rich Podkarpackie ecosystem of innovative companies. The very status of being the operator of the ProtoLab can give the management team potential visibility and access to a stream of innovative projects and opportunities originating among students and young researchers. On the other hand, underperformance for a sufficiently long period of time, e.g., 12-18 months (counted from the first quarterly or semiannual report), can cause the MO to pull out of the contract and to invoke their right to execute the Call Option, buy-out, and replace the Management Company. Such “underperformance penalty” clause, as well as potential reputational implications, should be a sufficient disincentive to good teams for not putting their best effort into the PCI management task. An additional financial incentive could be also considered to increase Management Team’s “skin-in-the-game”.

Participation in the valorization process gives the management team a unique opportunity to observe and invest in most promising projects. By requiring that the selected Management Company demonstrate the ability to organize seed financing for successful projects, and giving the members of the Management Company an opportunity to co-invest their own money in the most successful R&D projects originating at the PCI at the post-seed stage²⁹, the program presents an attractive proposition to the management team. The team will have an ample opportunity to help a given R&D project progress through most risky stages of its development, so when most of the product risks have been addressed, the team should be in a good position to make an informed investment decision.³⁰

PCI will organize and facilitate third-party investments in valorized R&D projects. PCI’s own investments (if any) will come only in later stages of the project’s lifecycle, and in such cases it will be the third-party investor that will set pricing and other terms of potential capital raising rounds. Any potential conflicts of interest for PCI are thus eliminated. R&D projects receive funding supervised and organized by PCI in three stages. In the first stage PCI (with the approval of the Resource Allocation Committee) allocates a microgrant to the project, typically to get it to the Proof-of-Principle stage. In the second stage PCI organizes a seed round of financing (e.g., through BRIDGE Alfa type seed funds), typically to achieve a Proof-of-Concept and initial stages of commercialization of products that result from the R&D project. In the third stage growth/expansion type of finance (otherwise classified as pre-A or A series) is sought for the project. At this third stage investors are sought jointly by the PCI and the seed fund. The PCI design foresees that at this stage it would be possible for PCI managers to participate in the financing, but not as lead investors. It follows then that the terms of such investments would be set by new pre-A or A round investors, and not by PCI managers. Such definition of the role of PCI removes any potential for conflict of interest: PCI managers and investors would be at most co-investors in any further rounds and would have no significant influence on the terms of such investment rounds.

²⁹ To avoid conflict of interest, the PCI management team will be able to invest own money but not as a lead investor setting the terms, but rather as a passive coinvestor

³⁰ It should be noted that, in any case, a co-investor setting key terms of such a transaction would be required to avoid potential conflict of interest issues

ACTIVITY 1:

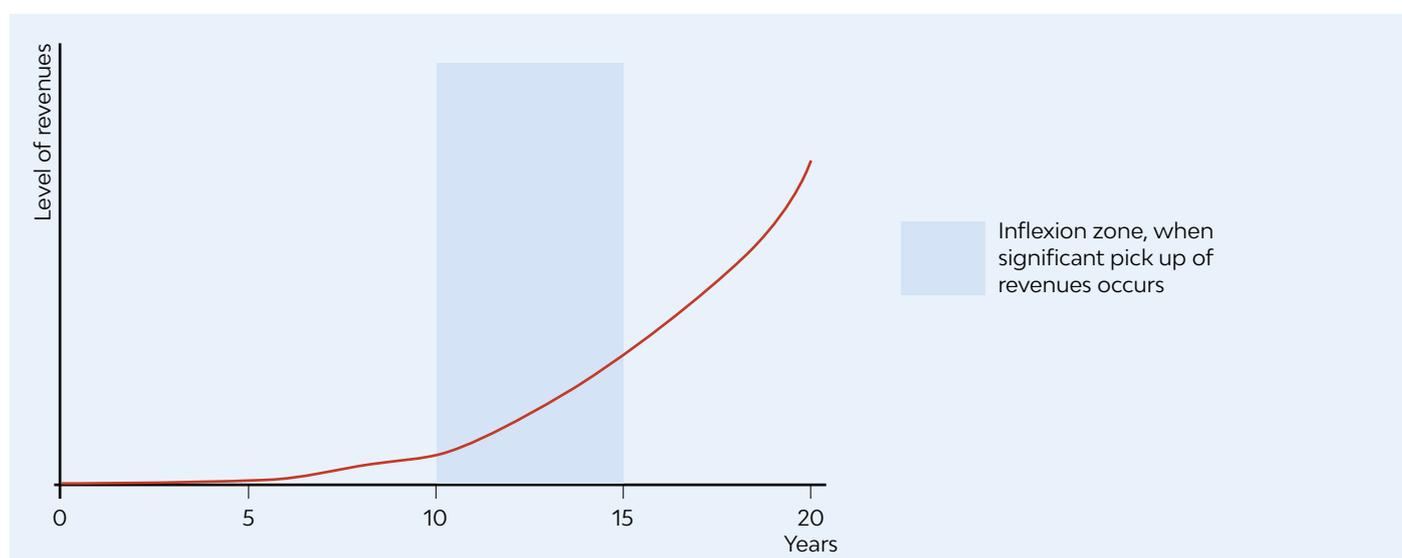
**Designing Regional Technology Transfer Office:
Podkarpackie Center for Innovation**

5.

The PCI Funding Model

The good practices review suggests that the revenues of TTOs tend to rise slowly over first 5-10 years of operations. The funding model for the PCI's initial 10 years of operations includes a mix of public money and revenues generated from the PCI's activities. A 10-year planning horizon is assumed in this report because this is the proposed duration of the management contract for a management team selected through a competitive procedure. Over the initial five-year period, the coverage ratio of its cost base by revenues generated from its core activities is expected to reach 26%. After a 10-year period, the PCI is projected to reach the point where it covers 55%³¹. These parameters are in line with the historical track record of some of the most successful European TTOs. Extrapolating from this base of experience, and taking into account the expected inflexion point in the revenue "J-curve" of typical TTO operations (see Figure 8, below), during the following five years (beginning in 2028 and onwards) a substantial take-off in the performance of the PCI can be anticipated. This will result in PCI reaching the break-even point (the situation when cash revenues cover cash expenses for a given year) in years 15-18 after the launch of PCI, or between 2032 and 2035.

Figure 8. The revenue J-curve of typical TTO operations³²



Source: The World Bank

5.1 Expenses in the 2018-2022 period³³

The first five years of PCI operations will be funded mostly from the ROP managed by the MO.³⁴ The following Table 3 illustrates preliminary high-level budget of the PCI in the initial five years of operations (it is assumed that the projections assume an average level of performance indicators, i.e., the management team is meeting assumed performance targets – e.g., in terms of a number of valorized projects, but not necessarily exceeding them):

³¹ The 26% is the projected percentage of coverage (i.e., the portion of expense base covered by own-generated revenues) in year 2022. For the entire period between 2017 and 2022 the average percentage of coverage is forecast at 15%

³² Developed based on interviews with the LRD Leuven managers

³³ The report presents a baseline scenario that assumes neither a rapid growth of revenues, which would make the PCI profitable within the first five to seven years, nor a flat revenue trend that would not allow achieving the break-even point within first two decades

³⁴ The Podkarpackie ROP will be modified to accommodate funding for the first 5 years of PCI operations

Table 3. PCI gross expense budget for years 2018-2022 (PLN million)

Category	2018	2019	2020	2021	2022	Total 2018-2022	%
PERSONNEL EXPENSES							
Management Board & Office of MB	0.80	1.00	1.00	1.20	1.20	5.20	
P1: Valorization (team)	0.50	0.75	1.00	1.25	1.50	5.00	
P2: Structured contract research (team)	0.50	0.50	0.75	0.75	0.75	3.25	
P3: ProtoLab (animators)	0.36	0.36	0.36	0.36	0.36	1.80	
P3: ProtoLab (technical support)	0.23	0.23	0.23	0.23	0.23	1.16	
Subtotal	2.39	2.84	3.34	3.79	4.04	16.41	23%
PERSONNEL EXPENSES							
PCI G&A (General & Administrative)	0.52	0.52	1.05	1.05	1.05	4.20	
Subtotal	0.52	0.52	1.05	1.05	1.05	4.20	6%
P1 OTHER VALORIZATION COSTS							
Microgrants - PoP	3.15	3.67	4.20	4.20	4.20	19.40	
Microgrants - PoC	1.06	1.95	2.65	3.19	4.42	13.27	
Patent Fund	0.33	0.81	0.81	0.81	0.81	3.58	
Subtotal	4.53	6.43	7.66	8.19	9.43	36.25	50%
P2 STRUCTURED CONTRACT RESEARCH – OTHER COSTS							
Contract research offer	0.80	0.50	0.10	0.10	0.10	1.60	
Enhancement Fund	1.25	1.80	1.80	1.80	1.80	8.47	
Subtotal	2.05	2.30	1.90	1.90	1.90	10.07	14%
P3 PROTOLAB – OTHER COSTS							
Building adaptation	1.52	0.00	0.00	0.00	0.00	1.52	
Equipment	1.81	1.09	0.18	0.18	0.18	3.44	
Subtotal	3.33	1.09	0.18	0.18	0.18	4.97	7%
Annual expense base	12.84	13.19	14.14	15.12	16.61		
TOTAL PCI EXPENSES – 5 YEARS						71.90	100%

Source: The World Bank

Personnel expenses

The Management Board and its Office are the most important category in the PCI budget. The employees in charge of managing the umbrella PCI organization will include two senior people (MB) and one junior assistant (OMB). Table 3 totals for this category cover complete (base and bonus) average gross monthly pay for the three-person team (MB and OMB) of about PLN 22 thousand per month per person in the first year of operations, gradually increasing to a monthly PLN 33 thousand per person in year five of the contract to manage PCI. While high by Podkarpackie (and public sector) standards, the year one compensation can be considered at best average for good-performing Polish high-technology management teams. It is assumed that the teams will view the first few years as a warm-up period, designed to build networks, relationships, and get a feel for the potential pipeline of projects. Hence it is expected that they will accept relatively low compensation in initial years in anticipation of the ramp up of PCI operations (which should increase their chance of earning higher performance bonuses).

It is key that the Valorization team employs top-notch people. The initial team will be just two people, but over the five-year period, from 2018 through 2022, the core team will grow to six people. Gross compensation levels of around PLN 20 thousand per month per person (combined gross base salary and bonus) are assumed for a team which will include marketing experts, “boundary spanners”, as well as technology and IP specialists.

The headcount in the structured contract research team should grow steadily over time. Starting at two people initially, the team will increase in size to three people in year 2020 and stay at that level through the end of the first five-year period. The volume of demand from the companies should determine the number of people in the Structured Contract Research team. Compensation levels are assumed to be comparable to those of the Valorization team.

The ProtoLab may need to hire trained people to operate certain equipment. The levels of the animators’ wages are assumed at no more than PLN 15 thousand gross pay (base salary plus bonus) per person. This budget category covers the employment of up to two technical personnel (compensated at under month gross pay), whose task will be to supervise the use of the basic equipment which, for safety reasons, cannot be used by students alone, as well as providing basic training for the students who are not yet able to operate certain equipment. The technicians will also provide basic service and maintenance on the entire set of the ProtoLab’s tools and equipment.

Running a regional TTO that is to invest EU funds will require significant staff hours handling administrative duties. The General and Administrative Expenses cover a variety of administrative costs, such as office rental,³⁵ utilities, administrative support, office supplies, finance and accounting, and basic legal services. In addition, a back office for microgrant administration and supporting projects being valorized will also fall into the scope of G&A activities (e.g., dealing with microgrant documentation, cooperation with the universities on the status of patent applications, participating in the governance processes of start-ups – General Stakeholder Meetings, Supervisory Board meetings, etc.).

Platform 1 – Valorization unit

It is important to support R&D projects at low-levels of technology readiness (i.e. TRL 2-4). The PoP microgrants (budgeted between PLN 3-4 million per annum - Table 3) is designed to provide interim bridge funding to promising R&D projects entering the “Valley-of-Death” zone (i.e. reaching the point where the research is no longer fundable by universities as basic research, but no funding for commercialization has been obtained yet). This category can be used to continue promising projects’ research momentum until the Resource Allocation Committee

³⁵ If the rental space is co-located with the ProtoLab, it is possible that such expenses could be treated as revenues for the ProtoLab. This possibility has not been reflected in the revenue projections, though

reaches a decision on further funding (i.e. until full research into market potential or competitive/Freedom-to-Operate situation has been performed and a microgrant disbursement decision is taken). The PoP microgrant category is designed to fund personnel expenses and it is expected that typical funding allocations will range from PLN 30 to 100 thousand.

The PCI is expected to outsource a number of services. It will rely on a relatively small core (permanent) staff and leverage this core team with external resources on an as needed basis (details in the chapter 4.1). In particular, one can expect extensive reliance on external resources when it comes to staffing valorized R&D projects with project managers, external technology experts and business/marketing experts. Other types of services that could be outsourced include human resources/recruiting (e.g., for start-ups), small market research projects, Freedom-to-Operate studies, external research requiring specialized equipment, etc.

Microgrants at the Proof-of-Concept level remain one of the most important valorization tools. The microgrants will be awarded to promising R&D projects based on decisions of the Resource Allocation Committee (those decisions, in turn, will be taken after a recommendation to award a microgrant to a given project is made by the PCI valorization team). The PCI team will then monitor and administer the way in which the microgrant is being used, and the performance of the recipient project. For the purpose of budgeting the program, it is hereby assumed that, in a typical year, several PoC microgrant disbursements are made, and that a single PoC allocation can range from PLN 50 thousand to 1.5 million. As the program gets under way, up to 20 such PoC microgrants could be awarded annually (e.g., in year 2022 an amount of PLN 4.5 million could be disbursed on promising Podkarpackie-area R&D projects).

One of the expected constraints in the commercialization process is the patenting activity. The Patent Fund, budgeted not to exceed PLN 0.81 million annually, is supposed to supplement money available at the Podkarpackie universities for patenting activity. It will be used as part of the Valorization platform in situations when obtaining university TTC IP services is difficult or impossible (e.g., for early stages of the IP protection process), or where external IP expertise (e.g., from area-specialized patent lawyers) is necessary. The Patent Fund is expected to help streamline patenting activities needed to commercialize.

Platform 2 – Structured Contract Research

In order to establish a long-term relationship resulting in a high volume of contract research, a good research offer is necessary. It is assumed that the universities (through their SPCs) should be the ones turning a description of their R&D equipment into a description of the commercially available research offering. Such an offering would specify what type of standardized (or structured) contract research would be provided (quality specifications, conditions, etc.), and at what prices.

The Enhancement Fund will make the R&D equipment more competitive. The Enhancement Fund will be used as part of the Structured Contract Research platform to enhance the value of the R&D equipment being freed up for ancillary (i.e. commercial) use. The Fund will be used to address the most common barriers to such commercialization, including:

- Cover the cost of procedures/personnel necessary to obtain certification for a given piece of R&D equipment. Obtaining such certification (or attestation) will enable universities to sell services performed on such equipment, and thus substantially broaden the commercial attractiveness of a given piece of R&D equipment.
- Hire and train additional technical personnel needed to operate a given piece of equipment. If the barrier to provision of commercial R&D services on a given piece of equipment is that no personnel is available to operate it (e.g., after normal school hours), the Enhancement Fund can be used to fund the acquisition and training of extra personnel, and thus eliminate this barrier.
- Fund marketing activities designed to better communicate the research service offering of

the universities. This could include such items as redesigning the websites of the universities/TTCs, production of marketing brochures, participation in trade events (participation fees, display costs, travel expenses, etc.).

The Enhancement Fund should be focused on the most profitable investments. Given the variety of activities that may be funded from the Enhancement Fund, budgeting its projected size is subject to rough estimation. It is assumed that, given the magnitude of potential revenues, which can be generated on the basis of the R&D equipment being freed up, PLN 1.8 million annually is an appropriate size for this category's expense.

Platform 3 – The ProtoLab

The ProtoLab will require a renovation of an old building and its adaptation for this purpose. It is important that the concept of the ProtoLab is implemented relatively soon after the start of the PCI (in practice, within a year of its launch). As a result, an adaptation of an existing building seems to be a preferable option to that of a new building. Since no specific potential location for the ProtoLab has yet been selected,³⁶ estimating the cost of any renovation and adaptation work can only be preliminary. The PCI budget assumes that a gross amount of PLN 1.52 million will be sufficient to cover the cost of adapting a 1000-1500 square meter building (resulting in the implied cost of about PLN 1500 per square meter; such cost should be adequate to allow for fairly substantial building improvements to be performed).

Apart from the building, the ProtoLab will require an investment in basic equipment and tools, and a continuous purchases of materials. In a different section, this report covers the question of the type of equipment that will be used to provide the ProtoLab with basic core functionalities (i.e. standard metal machining centers, 3D printers, woodworking tools, laminating facilities, etc.). CAD software will also be made available, along with some computers on which it can run. Since various student societies at the Podkarpackie-area universities today have access to specialized tools, it is assumed that PCI should invest in basic (rather than specialized) equipment, and expand its equipment base as demand for its services (and popularity among students) grows. As a result, the budget for the ProtoLab assumes that less than PLN three million during the two initial years will be spent on equipment purchases. In addition, universities and local businesses will be asked to contribute any working equipment they may be considering to retire, thus allowing for inexpensive additions to the ProtoLab equipment base. In principle the students will have to obtain materials themselves, thus initiating contacts with business partners and possible future employers. This system proved to work well in other structures similar to the ProtoLab. In case the materials are difficult to obtain the ProtoLab will have a budget for such purchases at its disposal.

5.2 Revenues for years 2018–2022 and 2023–2027

The proposed funding model assumes that the sources of revenues for the PCI will be diversified. The revenues generated by PCI will come from five main sources: (1) commissions on licensing activity; (2) proceeds from start-ups; (3) revenues (retainers and success fees) from grant applications for R&D projects by companies and universities; (4) commissions on structured contract research contracts; (5) payments to The ProtoLab from local companies. While other types of revenues may appear gradually (e.g., payments from universities for certain valorization services), they are not budgeted in the timeframe of 2018-2027.

³⁶ Some initial options have been identified. Their assessment and fit with the ProtoLab objectives is underway

Table 4. PCI revenue budget for years 2018-2027

PCI Revenues – Gross amounts (inclusive of VAT) in PLN million												
Category	Period covered by the ROP						Period outside the ROP					
	2018	2019	2020	2021	2022	Total 2018-2022	2023	2024	2025	2026	2027	Total 2023-2027
P1 – Revenues												
Licensing	0.00	0.00	0.52	0.77	1.03	2.32	1.45	1.76	2.07	2.38	2.70	10.36
Start-ups	0.00	0.00	0.00	0.00	0.50	0.50	0.00	0.00	1.00	1.00	1.00	3.00
Grant-application related expert services (retainers)	0.10	0.20	0.25	0.25	0.25	1.05	0.25	0.10	0.10	0.10	0.10	0.65
Success fees generated from grant applications won	0.00	0.30	0.60	0.60	0.60	2.10	0.60	0.20	0.20	0.20	0.20	1.40
P2 – Revenues												
Contract research-related payments (commissions)	0.20	0.40	0.60	1.00	1.50	3.70	1.50	1.50	1.60	1.60	1.70	7.90
P3 – Revenues												
Payments from local companies/the City	0.00	0.15	0.23	0.35	0.50	1.23	0.50	0.60	0.60	0.70	0.80	3.20
PCI Costs	12.8	13.2	14.1	15.2	16.6	71.90	11.7	11.7	12.2	12.2	12.2	59.88
PCI Revenues	0.3	1.1	2.2	3.0	4.4	10.90	4.3	4.2	5.6	6.0	6.5	26.51
Coverage % ³⁷	2%	8%	16%	20%	26%	15.2%	37%	36%	46%	49%	53%	44%

Source: The World Bank

The most important revenue stream is licensing commissions. Today's licensing activity at the Podkarpackie universities generates marginal revenues (combined revenues generated from licensing by the local schools are under PLN 0.5 million per annum), which leaves much room for improvement and a possible opportunity for the PCI. It is highly desirable to entrust the PCI to be the Podkarpackie universities' exclusive representative in bringing the valorized R&D projects to the stage when they are ready for license deals (i.e. to near the TRL 8-9). The PCI revenue model assumes that this recommendation is accepted, and that PCI retains 10% of the license payments by companies as its sales commission. Revenue budget assumptions call for a slow ramp-up of the licensing activity (i.e. no revenues for PCI in the initial two years, and slow ramp-up afterwards). In the longer period (toward the tenth year of the planning horizon), provisions from licensing are likely to become the main source of PCI revenues, contributing close to 50% of its revenue base.

³⁷ Portion of PCI cost base covered by its revenues in a given period (expressed as %)

Proceeds from start-ups may bring in high, yet more unstable, revenues. It is not expected that PCI will ever become a significant shareholder of start-ups created as part of the valorization processes. Minor stakes (up to 10%) in start-up companies will be taken up in-lieu of cash for services delivered to founder teams and/or to start-ups themselves (typically PCI may receive a status of the so-called late founder). Since it takes 4-10 years for a typical start-up to allow for its shareholders to receive any cash proceeds from their investments (more frequently through the sale of shares rather than dividends). The PCI revenue projection assumes only one such liquidity event toward the end of the first five years of PCI operations (2018-2022), and three during the next five years (2023-2027). In all of these cases, valuations in exit transactions are assumed to be average for the Polish pre-A and A-round³⁸ deals (i.e., between PLN 10 million and PLN 20 million for 100% of the start-up's shares). Finally, it is assumed that PCI would be allowed to at least partly cash in their shares in such transactions (i.e., at least some transactions are buy-outs; rounds pre-A and A are mostly concentrated on capital-raising, not on providing liquidity to existing shareholders).

The PCI will also profit from offering services in writing grant applications for R&D projects for the business and universities. As part of the valorization activities, the PCI team will assist various businesses (local firms, but also other Polish companies), as well as the local universities in professional preparation of grant applications for R&D projects. The team will aid in performing needed analyses on market definition and research, IP questions, return-on-investment calculations, etc., in order to prepare applications to programs such as Fast Track (managed by the National Center for Research and Development), Horizon 2020, or the regional ROP R&D programs. It is assumed that the team prepares between five and 10 such applications per year during the first five year planning period. Commercial terms for such cooperation assume that firms will pay the PCI team retainers of PLN 20-30 thousand per application, plus a success fee of 3-5%. A 50% success rate on applications is projected in the revenues model.

The PCI will also profit from assisting in matching business with R&D equipment at the universities in structured contract research. At the time of writing this report, the Podkarpackie universities engage in a fair amount of contract research work for business (e.g., RUT generated over PLN four million in such revenues in 2016). A large part of this contract research work relies on expertise of individual professors and other research workers; any commercial use of R&D equipment is typically one-off, i.e., the research does not have a structured, repeatable, regular nature. One of the recommendations of this report is that universities would be well served giving the PCI an exclusivity for contracting this sort of research seldom undertaken today: structured, based on well-described, standardized procedures, not dependent on interpretation and expertise of professors – the latter kind of contract research work would remain as it functions today, i.e. it would stay with TTCs or university departments. The revenue model assumes, therefore, that PCI does have such limited exclusivity, and that it earns a 10% commission on such repeatable research contracts.

The smallest batch of revenues will come from payments to the ProtoLab from local companies. The PCI model assumes that the involvement of local companies (as well as some key local public institutions, such as the City of Rzeszow) in the activities of the ProtoLab will be gradually increasing. The revenue projections include the assumption that the firms (and the City) will be mainly interested in sponsoring student competitions for innovative solutions (the local business also indicated high interest in access to the ProtoLab as part of their recruitment strategy). The model projects relatively small (PLN 30-50 thousand annually) subscriptions for those stakeholders to stay involved with the ProtoLab.

³⁸ Transactions for companies that have typically reached the revenue stage

5.3 Funding model for 2018–2027

The funding model assumes continuous movement towards the self-sustainability. The first five years (2018–2022) of PCI operations will be 100% funded from the ROP (any revenues accruing into a Trust Fund set up to provide funding for future years). The subsequent five years (2023–2027) will see an increasing reliance on self-funding, while the financing needed from the MO will continue, but decrease in importance. It is recommended, when designing the next EU financial perspective, to secure the future predicted outlays for the PCI.

PCI’s budget for the period of 2018–2022 assumes 100% level of public funding. This will be made possible by the changes introduced to the Podkarpackie ROP. Most probably one cannot count on such high levels of public funding (both in absolute and percentage terms) in subsequent years. Any revenues generated by the PCI during this initial period will be therefore set aside to provide a funding cushion for the future periods of operation. In essence, it is recommended that a Trust Fund is established during the first five-year period. The purpose of the Trust Fund would be to provide as much PCI funding for years 2023–2027, as possible. In essence, all PCI revenues generated in the first five years will be used to fund future operations. The existence of the Trust Fund should not be conditional to the size of public financing in the subsequent years and should be developed regardless of its value.

It is expected that other regional stakeholders will help finance the PCI’s activities. After the PCI’s initial start-up period, as a newly established player in the Rzeszow technology ecosystem, it could expect some level of funding from the City of Rzeszow (such additional funding would be in excess of any funding provided for city-sponsored projects in the ProtoLab). PCI could become an ambassador to the Rzeszow positioning it as the “City of Innovation”.

Obtaining financing from companies from the region and beyond will be key to strengthen the revenue stream and develop relationships. After the initial five years, one can expect significantly increased involvement in the funding of PCI from the Podkarpackie companies. If the program execution proceeds as planned, local firms will see many reasons to stay involved, be continuously informed about interesting R&D projects originating at the local universities, participate in funding, and influence the strategic direction of PCI. As a result, one can expect a significant decrease in the level of funding required from the MO during years 2023–2027.

Table 5. PCI funding model for years 2023–2027

Year of Operation	1	2	3	4	5	6	7	8	9	10		
PCI Costs	12.8	13.2	14.1	15.2	16.6	71.9	11.7	11.7	12.2	12.2	12.2	60.0
PCI Revenues	0.3	1.1	2.2	3	4.4	10.9	4.3	4.2	5.6	6	6.5	26.6
PCI Funding Sources												
Coverage %	2%	8%	16%	20%	26%	10.9	37%	36%	46%	49%	53%	
FUNDING SOURCES												
1. PCI Revenues						10.9	4.3	4.2	5.6	6	6.5	26.6
2. Trust Fund after 2022							2.1	2.2	2.2	2.2	2.2	10.9
3. Marshal Office after 2022							4	3.6	3.3	2.9	2.5	16.3
4. Others (City, firms, etc.) after 2022							2.6	3.5	2.6	2.9	3.1	14.7

Source: The World Bank

As a result, by the end of the second five-year budgeting period the PCI will be able to finance close to 50% of its expense base from its revenues. This objective is in line with the experience of the well-performing Western European TTOs.

5.4 Getting to break-even past 2027

It is important to take into account experiences of the best Western European technology transfer offices when forecasting the PCI revenues. For example, the Leuven LRD (a TTO at the KUL Leuven university) has been in existence since 1970s. The almost two decades of the LRD's initial operations were a period of gradual, but slow, growth in its revenues. The inflexion point came in mid 1990s; since then the LRD's revenue growth significantly accelerated, resulting in the center's being responsible for about EUR 250 million in revenues generated for the university KUL Leuven from contract research, licenses, and proceeds from start-ups. The LRD team attributes this pattern of long-term revenues to the phenomena of building critical mass and the center's brand. In their opinion (supported by a body of research on TTOs), it takes years of perseverance to build a sustainable TTO.

The PCI is likely to reach break-even around 15th year of operations. Table 6 below presents a possible path to reach this point.

Table 6. Getting to break-even

PCI Revenue Projection – Gross Amounts (PLN M)															
ROP-covered period	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15
Category	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
P1 - Revenues															
Licensing	0	0	0.52	0.77	1.03	1.45	1.76	2.07	2.38	2.7	3.2	3.5	3.8	4.3	5.5
Start-ups	0	0	0	0	0.5	0	0	1	1	1	1.5	2	2.5	3	3.5
Grant acquisition (retainers)	0.1	0.2	0.25	0.25	0.25	0.25	0.1	0.1	0.1	0.1	0.25	0.25	0.25	0.25	0.35
Grant acquisition (success fees)	0	0.3	0.6	0.6	0.6	0.6	0.2	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.8
P2 - Revenues															
Contract research commissions	0.2	0.4	0.6	1	1.5	1.5	1.5	1.6	1.6	1.7	1.8	1.9	2	2.3	2.5
P3 - Revenues															
Company subscriptions	0	0.15	0.23	0.35	0.5	0.5	0.6	0.6	0.7	0.8	0.9	0.9	1	1	1
PCI Cost base	12.8	13.2	14.1	15.2	16.6	11.7	11.7	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2
PCI revenues	0.3	1.05	2.2	2.97	4.38	4.3	4.16	5.57	6.08	6.7	8.15	9.15	10.15	11.55	13.65
% coverage	2%	8%	16%	20%	26%	37%	36%	46%	49%	53%	67%	75%	83%	95%	112%

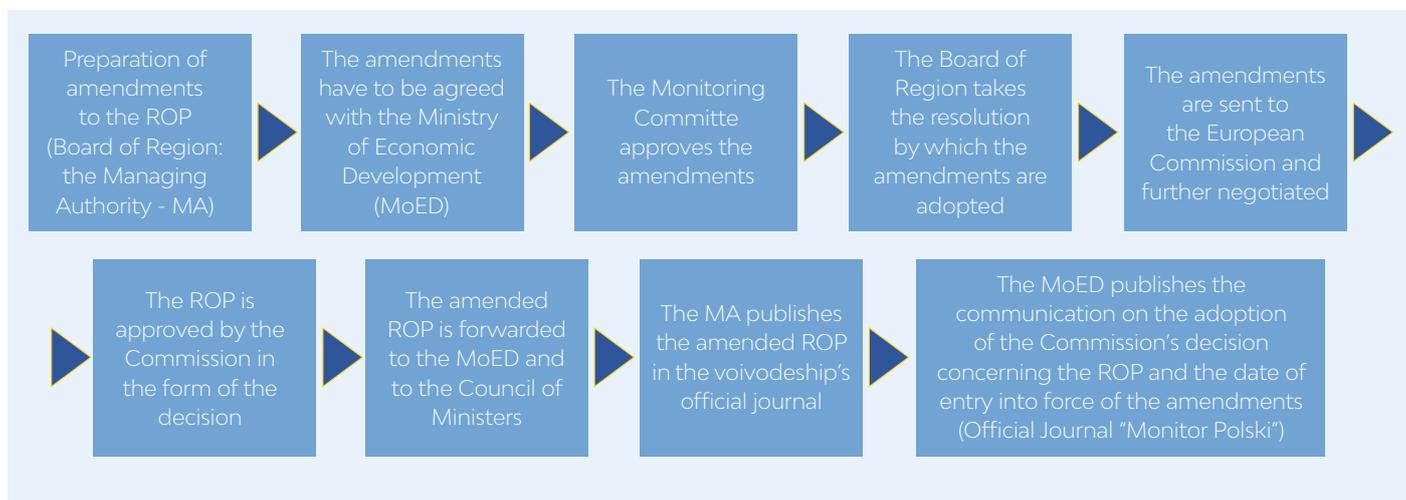
The length of time for PCI to get to the break-even point depends on the number of local stakeholders. The above estimates assume that PCI budgets have not been significantly cut in the period past the 10-year planning horizon presented in this section, and that the PCI maintains and strengthens its relationship with key the local stakeholders (MO, universities, City of Rzeszow, and local businesses). It is conceivable that the time to break-even may be shortened if the universities come to see PCI as a valuable extension of their core activities, and if the ethos of entrepreneurship becomes much more widespread in the academic environment (as has happened, for instance, at KU Leuven). If that happens, a more substantial portion of the PCI revenues could come even sooner from the services provided by PCI to universities, thus decreasing the time needed to reach break-even point.

5.5

Amendment of the ROP

Amendment of the ROP takes place in a formal procedure. This procedure is governed by the provisions of the Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013, laying down common provisions on the European Regional Development Fund, European Social Fund, Cohesion Fund, European Agricultural Fund for Rural Development, and European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, European Social Fund, Cohesion Fund, and European Maritime and Fisheries Fund and repealing Council Regulation (EC) No 1083/2006³⁹ and the Act of 6 December 2006 on the principles of development policy (Figure 9).⁴⁰

Figure 9. Procedure of introducing amendments to the ROP



Source: The World Bank

Once the ROP is amended, other documents will require amendments to remain in line with the ROP. One of these documents is the "Detailed Description of Priority Axes within the Regional Operational Program of the Podkarpackie Region for years 2014-2020" (in Polish "SZOOP"). The procedure for the adoption of these amendments is governed by the Minister of Development and Infrastructure's Guidelines⁴¹ on the detailed description of priority axes of national and regional operational programs for years 2014-2020 (Figure 10).⁴²

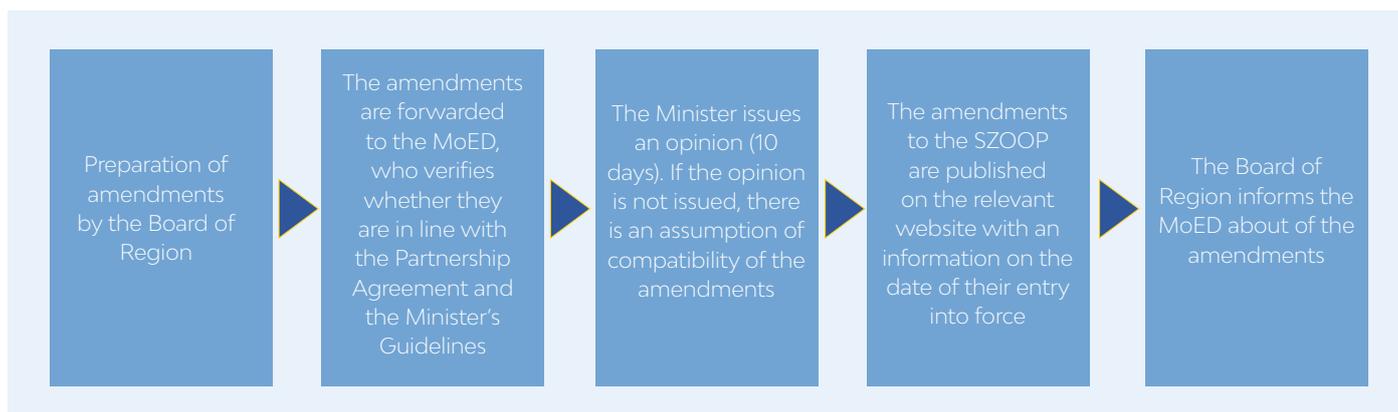
³⁹ OJ L 347, 20.12.2013, p. 320-469

⁴⁰ Journal of Law of the Republic of Poland of 2016, item 383 as amended

⁴¹ Minister of Development and Infrastructure's Guidelines of 30 January 2015 (MIR/H 2014-2020/2(01)/02/2015).

⁴² https://www.funduszeuropejskie.gov.pl/media/1204/wytyczne_SZOOP_2014_2020_300115.pdf

Figure 10. Procedure of introducing amendments to SZOOP



Source: The World Bank

The PCI's management team will be selected in an open tender, based on objective criteria. The selection criteria will be subject to the approval by the Monitoring Committee. The contest's documentation must be published on the Board of Voivodship's website 30 days before the start of call for applications. Each tender must be governed by a specific set of rules that also have to be published.⁴³

To achieve the initiative's objectives, the PCI must be given the right to support individual projects (valorization) within Platform1, without an obligation to select beneficiaries in open tenders. The ROP and SZOOP should therefore include a project, consisting of the creation of the PCI with the function of the microgrant operator. Further beneficiaries (to which the PCI will pass public funding in the process of project valorization), should not be required to submit their applications in an open call.

The PCI should be given right and financial means to acquire research services from the universities' SPCs (Platform2). The PCI will acquire research services to further market them (therefore acting as an agent to facilitate commercial use of the freed-up infrastructure capacity). It is foreseen that the PCI will participate in the costs of preparation of standard research procedures and costs of necessary infrastructure's upgrade.

The PCI should be able to finance modernization of the ProtoLab's premises even if it will not own them. It is preliminarily envisaged that the PCI might operate the ProtoLab that will be housed in a building owned by another entity, i.e. one of participating universities or a private undertaking. The conditions attached to the rules on financing should not restrict the PCI to cover costs of investments in third party's assets.

5.6 State aid considerations⁴⁴

Public funding for this initiative has to comply with State aid rules. Pursuant to Article 107.1 of the Treaty on the Functioning of the European Union (TFEU), "Save as otherwise provided in the Treaties, any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favoring certain undertakings

⁴³ Cf. the Act of 11 July 2014 on the rules of programs in the field of cohesion policy financed in the 2014-2020 financial perspective (Journal of Law of the Republic of Poland of 2016, item 217 as amended) and the Minister of Development and Infrastructure's Guidelines of 31 March 2015 (MliR/H 2014-2020/9(01)/03/2015) on the procedure of selection of projects (https://www.funduszeuropejskie.gov.pl/media/1995/Wytyczne_w_zakresie_trybow_wyboru_projektow_2014_2020.pdf)

⁴⁴ Detailed formal requirements, such as reporting and monitoring obligations, remain outside the scope of the present report

or the production of certain goods shall, in so far as it affects trade between Member States, be incompatible with the internal market.” State aid might nevertheless be considered admissible if it fulfills certain conditions.

In the case at hand presence of State aid should be assessed with respect to a number of entities. This is due to the fact that State aid may be present on various levels, not only the PCI, which will be the direct recipient of the ROP’s funding. The table, below, presents potential State aid beneficiaries broken down by Platforms with an identification of where State aid will be present.

Table 7. State aid in Platform 1

PLATFORM 1	
Entity	Presence of aid
PCI	It will not be considered as a beneficiary of State aid, since it will act as an intermediary (pass-through) to direct public funding to final beneficiaries.
Research teams (natural persons)	As long as research teams do not conduct economic activity, they are not considered State aid beneficiaries.
Spin-offs	Spin-offs conduct economic activity; any advantages granted to them will therefore constitute State aid.
Other undertakings	Since they conduct economic activity, any advantages granted to them will constitute State aid.

Source: The World Bank

Table 8. State aid in Platform 2

PLATFORM 2	
Entity	Presence of aid
PCI	It will not be considered as a beneficiary of State aid. The PCI will receive public funding to cover specific costs incurred (and passed through the PCI) by the universities (or their SPCs), i.e. costs of development of research procedures. The PCI will only withhold a premium for the marketed research services that will constitute the PCI’s market remuneration.
SPCs	These entities fall within the definition of “Research Organization” (cf. para 15 (ee) of the Communication from the Commission – Framework for State aid for research and development and innovation ⁴⁵ ; “the Framework”) and their predominant activities are of non-economic character.
Universities	Since the scope of their economic activity will not exceed “the ancillarity threshold”, they will not be considered as undertakings and therefore the advantages they will benefit from will not constitute State aid.
Contractors of research services	It is envisaged that research services will be marketed at prices covering direct costs plus margin (as required by para. 25 of the Framework), therefore no State aid will be granted to the contractors of research services.

Source: The World Bank

Table 9. State aid in Platform 3

PLATFORM 3	
Entity ⁴⁶	Presence of aid
PCI	It will not be considered as a beneficiary of State aid. The PCI will receive public funding to cover specific costs incurred in connection with the development and operation of the ProtoLab. The activity conducted by the ProtoLab should be considered as constituting part of a system of “education for more and better skilled human resources” (cf. para 19 (a) of the Framework), which is of non-economic character. The financing withheld by the PCI will be considered as a market remuneration for its services.

Source: The World Bank

⁴⁵ OJ C 198, 27.6.2014, p. 1–29

⁴⁶ It has been assumed that collaborating undertakings will not receive other advantages than better access to prospective employees

Where State aid is not present, maximum admissible funding intensities stemming from the ROP may be applied. It has been assumed that since the PCI will act as an intermediary in passing public funding to the final beneficiaries, the rate of public financing should be 100%, at least in the first couple of years of the PCI's operation. Although State aid rules do not apply, it will still be required that funding is granted in accordance with respective rules of the ROP concerning inter alia eligibility of expenses,⁴⁷ etc.

In cases where State aid will occur, maximum flexibility should be ensured. Therefore, solutions based either on the Commission regulation (EU) No 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty⁴⁸ (GBER) or the Commission Regulation (EU) No 1407/2013 of 18 December 2013 on the application of Articles 107 and 108 of the Treaty on the Functioning of the European Union to de minimis aid⁴⁹ should be taken into consideration. Aid granted under conditions established in the GBER or de minimis regulation does not require formal notification under Article 108 (3) TFEU. Since the limit for de minimis aid is relatively low, the primary solution with respect to State aid compatibility should be based on the GBER. Only when the beneficiary does not meet eligibility criteria de minimis aid should be taken into consideration.⁵⁰

Table 10. Two types of public aid used in the PCI

State aid objective	Legal basis	Eligible beneficiaries	Eligible costs	Aid intensity or maximum amount
Aid for start-ups	Article 22 GBER	Small enterprises up to five years following their registration, which have not yet distributed profits and have not been formed through a merger	no specified costs	Up to 100%, maximum grant amount EUR 0.8 million (EUR 1.6 million with respect to innovative enterprises, as defined in Article 2 (80) GBER). If aid is granted in other forms (i.e. loans), the maximum amount is higher
De minimis aid ⁵¹	De minimis regulation	No specified beneficiaries	No specified costs	Total amount of de minimis aid granted to a single undertaking shall not exceed EUR 200,000 over any period of three fiscal years

Source: The World Bank

5.7 The uncertainties

The collaborative nature of the process of designing PCI (the design was developed with active participation of the local innovation system stakeholders) will help mitigate risks and uncertainties related to its future implementation. Since supporting R&D collaboration is a multidimensional and multistakeholder endeavor, its implementation bears risks typical for such complex initiatives. When developing the PCI model, three specific risks were raised. Their mitigation will require coordinated remedial action and commitment from key stakeholders of the local innovation ecosystem. First risk is that the universities' TTCs and SPCs may consider the PCI as a competitor and will not be willing to collaborate with it. Secondly,

⁴⁷ However, on further stage of this project certain modifications should be introduced in order to address the specificity of the PCI

⁴⁸ OJ L 187, 26.6.2014, p. 1

⁴⁹ OJ L 352, 24.12.2013, p. 1

⁵⁰ For this reason two possible solutions should be included in the amended SZOOP

⁵¹ De minimis aid should be granted only in cases where the beneficiary does not fulfill eligibility criteria for aid covered by Article 22 GBER

university researchers may not be willing to change their attitude toward responsiveness to business' expectations (e.g., compliance with R&D project deadlines). Thirdly, universities may continue with their generally unenthusiastic view of applied research, preferring instead to concentrate on basic research and education. While these challenges will need to be tackled one by one when implementing the PCI concept, they have already been addressed by the PCI design itself and by the fact that all key stakeholders have been involved in the design process. Subsequent paragraphs offer a short explanation of how these risks can be managed during upcoming stages of the detailed PCI design and implementation.

The PCI will perform activities that are not delivered by the TTCs and SPCs. Thanks to performing complementary tasks in all three platforms (valorization, structured contract research, ProtoLab), the PCI will eventually be viewed as a partner and not a competitor of the universities and their entities. The PCI cannot replace the existing TTCs or SPCs, and they will be actively involved in the PCI operations via such mechanisms as the Supervisory Board, Resource Allocation Committee etc., where the universities will play an important role. By providing hands on training, the PCI will also help build capacity of the universities' TTCs and SPCs beyond what they are currently doing. Moreover, the TTCs, SPCs and PCI will share an objective of making R&D collaboration a success, because this will build their joint brand within the universities and businesses. Finally, the PCI will not compete for resources with the SPCs and TTCs, because it will be financed mostly by the Marshal Office funds, and these funds could be partially used to enhance capacity of the TTCs and SPCs.

The PCI will provide university researchers with an opportunity to better communicate with their corporate clients. R&D work is a naturally risky endeavor and its outcome and timeliness cannot be always guaranteed. The researchers and entrepreneurs are aware of that, yet they often have differing, sometimes contradictory, expectations toward R&D collaboration (both in terms of the process of such collaboration and its outcomes). These varying perspectives may potentially lead to disagreements if clear engagement and communication principles do not exist or are not adhered to. The PCI will help manage expectations of both researchers and businesses by facilitating communication processes and putting in place procedures that are acceptable to both parties. Such rules will be a part of service level agreements (SLAs) signed by the universities, SPCs and the PCI; they will be also reflected in contracts signed with companies. The facilitating role of the PCI will also allow stakeholders to pursue tasks where they have comparative advantage, i.e. researchers will focus on performing R&D work, companies on their business, while the PCI (in collaboration with SPCs and TTCs) will deliver support services for R&D work and technology transfer.

The PCI will help the universities, researchers and TTCs/SPCs achieve benefits that can be reinvested for their further development. These benefits can take both tangible and intangible form, for instance: increased revenues, more research grants, strengthened brand among prospective students and researchers (already mentioned in Table 1). Financial revenues are often perceived as the most tangible result; currently universities' revenues from the R&D collaboration are low, due to the limited scope of such activity. This, in turn, causes that universities (as well as researchers, TTCs and SPCs) do not put a high priority on this area. In the mid-term, one can expect that the PCI will contribute to generating additional and growing revenues resulting from the R&D collaboration. Additional resources will help increase even further the research potential of the universities. Such a financial incentive, reinforced by intangible benefits, are expected to strengthen the universities' interest in collaboration with business on the R&D. Since the universities will not bear additional financial burden of these collaborative efforts, they are expected to continue with the program.

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6. Implementation Plan

This section presents an envisaged timeline of implementing the PCI. The timeline encompasses the period from April 2017 (when a new set of activities is started to launch the PCI concept) until approximately December 2017, when it is expected that the modified Podkarpackie ROP will become effective (Table 11). The modification of the ROP is crucial, because its change will ensure stable financing and sustainability for the PCI.

The activities presented hereby do not constitute an exhaustive list but rather illustrate key elements to be pursued during that period. Since these activities will be performed in close collaboration with all the relevant stakeholders, their implementation will also depend on collaboration of the parties involved. The World Bank team will ensure that continued structured communication processes are implemented at the regional and national level, including the Marshal Office, universities, local agencies, European Commission, Ministry of Economic Development, Ministry of Science and Higher Education, PARP, etc.

Individual stakeholders will be responsible for selected activities. Since the PCI is a joint effort of the stakeholders creating the Podkarpackie innovation ecosystem, it is recommended that each activity have its own local leader. Such an approach would ensure a strong buy-in by key players, but it would also allow them to closely monitor the implementation progress. Moreover, their involvement would ensure that PCI addresses critical shortcomings of the current system, and that it does not duplicate already existing structures.

Table 11. The envisaged implementation plan for the PCI concept March - December 2017

Activity / Działanie		2017.0		
Assistance to MO Wsparcie dla UM				
1	Support to the MO in amending the ROP <i>Wsparcie UM w zmianie RPO</i>			
2	Support to the MO in selecting the PCI management team <i>Wsparcie UM przy wyborze zespołu zarządzającego PCI</i>			
2.1	Create a long list of potential candidates for the PCI management team <i>Stworzenie długiej listy kandydatów na zespół zarządzający PCI</i>			
2.2	Support in organizing a road show in Poland to meet candidates for the PCI management team <i>Wsparcie przy organizacji road-show w Polsce w celu spotkania zespołów kandydujących do zarządzania PCI</i>			
2.3	Support in organizing a road show in Poland to meet candidates for the PCI management team <i>Wsparcie przy organizacji road-show w Polsce w celu spotkania zespołów kandydujących do zarządzania PCI</i>			
2.4	Help prepare bid documents (ToR) for the PCI management team <i>Pomoc w przygotowaniu dokumentów konkursowych (SIWZ) na wybór zespołu zarządzającego PCI</i>			
2.5	Help negotiate with the candidates for the PCI management team <i>Wsparcie w negocjacjach z kandydatami na zespół zarządzający PCI</i>			
2.6	Set framework for the agreement between the PCI and the UM			
3	Help negotiate with the candidates for the PCI management team <i>Wsparcie w negocjacjach z kandydatami na zespół zarządzający PCI</i>			
4	Help negotiate with the candidates for the PCI management team <i>Wsparcie w negocjacjach z kandydatami na zespół zarządzający PCI</i>			
5	Help negotiate with the candidates for the PCI management team <i>Wsparcie w negocjacjach z kandydatami na zespół zarządzający PCI</i>			
Assistance to Universities Wsparcie dla Uczelni				
6	Assist universities in preparing a monitoring system for use of the "20% capacity" that will be freed-up <i>Wsparcie dla Uczelni w przygotowaniu systemu monitorowania dla wykorzystania uwolnionych "20% wydajności" sprzętu B+R</i>			
7	Set framework and documentation for the SLA agreements between universities, SPCs and PCI <i>Przygotowanie ram i dokumentacji dla umów SLA między uczelniami, SC i PCI</i>			

Table 11. The envisaged implementation plan for the PCI concept March - December 2017

Activity / Działanie		2017.0		
Other supporting activities <i>Inne działania wspierające</i>				
8	Support in organizing a study visit to Aalto Design Factory and potentially joining the Global Design Factory Network <i>Wsparcie w organizacji wizyty studyjnej w Aalto Design Factory i możliwym wstąpieniu do Global Design Factory Network</i>			
9	Contribution to the final conference of the first part of the Catching-up Regions Poland initiative <i>Wkład do konferencji podsumowująca pierwszą część projektu Catching-up Regions Poland</i>			
Proposed pilot projects <i>Proponowane działania pilotażowe</i>				
Platform 1: B+R project valorization <i>Platforma 1: Waloryzacja projektów B+R</i>				
10	Support creation of an initial list of the B+R project pipeline for valorization activities <i>Wsparcie w przygotowaniu wstępnej listy projektów B+R przygotowana do waloryzacji (pipeline)</i>			
11	Support the preparation of an B+R grant application submitted by at least one company and one university <i>Wsparcie w przygotowaniu wniosku o grant B+R składanego przez przynajmniej jedno przedsiębiorstwo i uczelnię</i>			
Platform 2: Structured Contract Research <i>Platforma 2: Wystandaryzowane Badania Zlecone</i>				
12	Prepare a framework for R&D equipment utilization set up (i.e., creation of a sample structured research offering, along with a list of potential clients) <i>Przygotowaniu ram dla wykorzystania aparatury B+R (tj. stworzenie przykładowej oferty wystandaryzowanych badań zleconych, razem z listą potencjalnych klientów)</i>			
13	Identification of potential clients <i>Identyfikacja potencjalnych klientów</i>			
Platform 3: ProtoLab <i>Platforma 3: ProtoLab</i>				
14	Support the design of the ProtoLab space requirements <i>Wsparcie w zaprojektowaniu wymagań dla przestrzeni ProtoLabu</i>			
15	Support in identification of suitable equipment for the ProtoLab building <i>Pomoc w opisaniu potrzebnego sprzętu dla ProtoLabu</i>			
16	Identification of suitable candidates for ProtoLab animators <i>Identyfikacja odpowiednich kandydatów na animatorów ProtoLabu</i>			
17	Consultation with student science circles on selection of the building and required equipment <i>Konsultacje z kołami naukowymi i ze studentami nt. wyposażenia i wyboru budynku</i>			

Source: World Bank

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7.

Conclusions and Recommendations

The Podkarpackie region is doing relatively well on some measures of innovation (e.g., total amount of R&D spending), but has a room for improvement in two key areas: intensity of business-university R&D collaboration (e.g., contract research, licensing) and start-up formation (especially for high-technology start-ups). The three local universities focus mainly on education and basic research. Applied research efforts are largely directed at expertise-based one-off contract research projects for the local companies, and not at standardized R&D services. Licensing activity has scope for improvement, alike the rate of R&D-oriented start-ups that originate at the local schools. R&D equipment, purchased by the universities mostly with the help of EU funds, could be more intensely used for commercial purposes. Building acceptance for the entrepreneurial ethos among researchers, university personnel and students, which is still at the early development stage at the universities should be one of the key challenges in the upcoming years.

The local innovation ecosystem appears to be well diversified, with a variety of public-sector players present, and the local corporate sector includes innovative, technology-driven companies gradually building strong R&D departments. Enhancing the effectiveness of some key elements that are important for the R&D collaboration is required to utilize the region's full potential. Technology parks, development agencies, and accelerators form a potential basis of support (at least in terms of infrastructure) for young, innovative companies. Podkarpackie has its share of technology champions – innovative, fast-growing companies that declare their willingness to significantly strengthen their ties to the local universities. Local students are winning national and international technology competitions. Elements that could enhance the effectiveness of the innovation ecosystem are: enhanced accumulation of R&D project valorization competencies, encouragement for local seed funding for promising R&D projects originating from the local universities, increase of the level of R&D equipment use for commercial purposes, and creation of a platform for the area's students to increase the intensity of their prototyping and entrepreneurial efforts. This report proposes solutions for these areas.

The report recommends that a regional Podkarpackie Center for Innovation (PCI) be created as a regional technology transfer office (TTO) to utilize full potential of the regional innovation ecosystem. PCI's mission will be to provide an effective bridge between the region's R&D providers (mainly local universities) and users of that R&D in a way that fosters the culture of entrepreneurship at the universities and is complementary to and supportive of work done by university technology transfer centers (TTCs) and special purpose companies (SPCs). PCI will do so by significantly strengthening R&D project valorization efforts at the local universities, resulting in increased revenues from licensing university-originated intellectual property (IP) and creation of university-originated tech start-ups that base on this IP. It will create and market structured contract research offers on the basis of universities' R&D equipment base. Finally, it will create a platform (ProtoLab) for local students to design and build prototypes of innovative products. The PCI design will be based on the best practices of European and Polish TTOs and complement and reinforce the existing innovation ecosystem of the Podkarpackie region; in particular, it will add to, not replace, the efforts of the existing university TTCs and SCs.

The PCI should be set up as a limited liability company (LLC), with mixed public-private shareholding, which is managed by the competitively selected team, chosen from among the most competent and experienced R&D commercialization experts. PCI's shareholding will include a private entity representing the management team, the MO, and possibly other parties (e.g., the City of Rzeszow or local companies). The team selected to manage PCI will enter into a 10-year agreement with the MO (which will have the option of backing-out of the agreement after five years, in case of the team's underperformance). The PCI will enter into contractual relationships with the university SPCs that will regulate scope of collaboration

regarding the commercial use of the R&D equipment and commercialization of the R&D results. It would be highly desirable for the PCI to be granted selected exclusivity to support universities in some areas (e.g., licensing IP or structured contract research, which constitutes a subgroup of a broader category of contract research).

The PCI will use a transparent process to allocate resources to valorized R&D projects (Platform 1) and create, market and re-sell a commercially attractive structured contract research offer (Platform 2). Decisions to fund R&D projects through microgrants (both at the Proof-of-Principle as well as Proof-of-Concept stages), as well as decisions to fund other initiatives (e.g., using the Enhancement Fund to add to the universities' R&D equipment in order to increase its commercial potential) will be made by the Resource Allocation Committee (RAC). The RAC will include members of the PCI management team, representatives of the universities and the local business, and the Marshal Office. Similarly, decisions to discontinue funding will be taken transparently and based on analytical materials gathered by the management team.

The ProtoLab (Platform 3) is a physical space equipped with basic tools and machines that offer students and researchers from all local schools an opportunity to learn and experiment with various manufacturing technologies in interdisciplinary teams, and gain experience in prototyping and entrepreneurship. The ProtoLab is designed to leverage some of the best practices of European and Polish universities (such as Aalto in Finland and KUL Leuven in Belgium). The report recommends that a 2000-3000 square meters building that is conveniently located, is selected and adopted to house the ProtoLab (initially, the space can be smaller at approximately 1000-1500 square meters and expand with growing demand for the facility). In the ProtoLab, students will be able to design and build prototypes reflecting their own ideas, as well as participate in design competitions sponsored by the corporations and other entities (e.g., the public sector, such as the City of Rzeszow).

Approximately PLN 70 million is needed to fund the launch and the initial five years of PCI operations (the report also recommends a funding solution for the subsequent five-year period). The PCI will be funded from the Podkarpackie ROP (which needs to be changed to accommodate the program). In the longer term (after some 15 years), the PCI is expected to reach a point (so-called break-even point) when its revenues cover the expense base. It is expected that during PCI's initial five-year period, revenues generated from its activities will amount to 15% of its expense base. That percentage will gradually increase, allowing the PCI reach a break-even point after approximately 15 years from its launch.

The PCI, as designed, stands a high chance of strongly and positively influencing the Podkarpackie innovation ecosystem. For the PCI to impact the region's economy in a significant way, several key success factors need to be present. First, the leadership at the top needs to be stable and strong. The MO, the rectors of the universities, and the mayor of the City of Rzeszow all should play the role of supporting the initiative, helping to overcome inevitable hurdles, and encouraging the stakeholders to stay the course. Second, all parties need to arm themselves with patience and realistic expectations. The best practice examples show that it takes time and commitment to build successful regional TTO organizations. Third, a strong commitment to select the best management team to operate the PCI as well as ensuring that the team itself is strongly committed to the program is crucial, because as experience of other successful TTOs indicates the "talent is key".