



JRC TECHNICAL REPORTS

Place-Based Innovation Ecosystems

*Ljubljana Start-up
Ecosystem and the
Technology Park Ljubljana
(Slovenia)*

Maja Bučar, Gabriel Rissola

2018



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EU Science Hub

<https://ec.europa.eu/jrc>

JRC114454

EUR 29502 EN

PDF ISBN 978-92-79-98264-4 ISSN 1831-9424 doi:10.2760/717413

Print ISBN 978-92-79-98265-1 ISSN 1018-5593 doi:10.2760/328073

Luxembourg: Publications Office of the European Union, 2018

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How to cite this report: Bučar M. and Rissola G., *Place-Based Innovation Ecosystems: Ljubljana Start-up Ecosystem and the Technology Park Ljubljana (Slovenia)*, EUR 29502 EN, Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-98264-4, doi:10.2760/717413, JRC114454.

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Foreword

This research publication is part of a series on *Place-based innovation ecosystems* that was born in 2017 from a fruitful collaboration between the Committee of the Regions (CoR) and DG Joint Research Centre of the European Commission (JRC) on promoting the importance of evidence-based policy development for regional and urban policy makers.

In particular, this case study focuses on the catalyser role played by the Technology Park Ljubljana and other intermediary bridging organisations for the cohesion and development of a collaborative innovation ecosystem that supports the nurturing of new innovative companies – notably start-ups, but also scale-ups and spin-offs – in Ljubljana (Slovenia) and beyond.

Gabriel Rissola

Editor of JRC's *Place-based innovation ecosystems* series

Acknowledgements

The authors of this report wish to thank all the local experts who have kindly contributed to this report by participating in targeted interviews: Marjana Majerič (Technology Park Ljubljana), Prof. Stane Pejovnik (Slovenian Innovation Hub), Prof. Ales Pustovrh (ABC Accelerator), Prof. Miro Rebernik (University of Maribor), Matej Rus (Venture Factory), Matej Gojčič and Tina Pezdirc (Regional Development Agency of the Ljubljana Urban Region), Prof. Jadran Lenarčič (Jozef Stefan Institute), Zlatka Ploštajner and Staška Mrak (University of Ljubljana), Igor Milek (SPIRIT), Maja Tomanič Vidovič (Slovenian Entrepreneurship Fund), Simona Rataj (Chamber of Commerce and Industry of Slovenia), Boštjan Lipnik, (Terra Nullius), Janko Burgar, Cosylab (Control System Laboratory).

The authors also wish to acknowledge the valuable input of Aleš Gnamuš (JRC), who helped to shape the report and contributed with inspiring suggestions based on his direct knowledge of the concerned ecosystem, as well as the thorough critical reading by Jürgen Haberleithner (University of Colima, former JRC research visitor).

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Abstract

This case study focuses on Ljubljana/ Slovenia's start-up ecosystem and its main actors and orchestrators (or "innovation process entrepreneurs") like the Technology Park Ljubljana. While Slovenia has kept its place as a strong innovator (EIS, 2017), the only CEEC in this group, it lacks an effective governance structure for research and innovation and true collaboration between actors. Taking advice from more experienced countries and applying policy and funding instruments prescribed by the EU could have speeded up the process of developing a more advanced innovation system, but frequent changes of the instruments and the support provided to different stakeholders did not help. Against this background, one of the interesting phenomena that can be observed in Ljubljana's start-up environment is a growth of various kinds of new initiatives, some bottom-up from entrepreneurial activity, others stimulated by public policy, but all aimed at providing stimulating support to start-ups, from co-working spaces, geek house, Hackathon, etc. All together they create a dynamic network, which spreads beyond Ljubljana's Region across Slovenia, but also much wider across Western Balkans and to EU and USA. This network is developing in parallel, with or without the support of formal institutions and/or governmental support.

1 INTRODUCTION

This case study is part of a series aimed to study the functioning of territorial innovation ecosystems and the role of individual key players in a set of regions, which have adopted a quadruple helix stakeholder's model (4H) in their regional smart specialisation strategies (RIS3), in order to understand their specific contribution to the Entrepreneurial Discovery Process. The latter requires a strong multi-stakeholders' engagement as a pre-condition for successful implementation of regional operational programmes.

In particular, this case study focuses on Ljubljana/ Slovenia's start-up ecosystem, its main actors and orchestrators (or "innovation *process* entrepreneurs") like the Technology Park Ljubljana. Slovenia has kept its place as a strong innovator (EIS, 2017), the only CEEC in this group. Its performance in several input indicators has been above EU average, yet the innovation output and its impact on economic results has often been criticised. One of the commonly noticed barriers to a more efficient innovation ecosystem is the innovation policy harmonisation. Thus, the 2017 European Semester Country Report for Slovenia has acknowledged (p. 42) that Slovenia lacks an effective governance structure for research and innovation (R&I) in view of weak coordination across responsible departments and collaborative links between major stakeholders in innovation policy. This would suggest that the quadruple helix stakeholder's model has not been fully adopted. So as a part of the case study, the assessment of 4H approach in the region/ country is carried out, both through the analysis of key documents and governance system as well as through discussions with various types of ecosystem stakeholders.

First, the basic facts on Ljubljana and its economy are presented. Ljubljana's innovation ecosystem is inherently determined, and is determining, the Slovenian innovation ecosystem: one cannot be defined without the other. Therefore, the Slovenian innovation ecosystem is presented next, to give the overall picture of the state of affairs. In particular, the governance structure and key policy documents, as they shape the current ecosystem, are presented. Slovenia as a transition country and a member of EU from 2004 has developed its eco-innovation system under strong influence of the EU innovation policies as well as inspired by the good practices observed in other, more advanced innovation systems. This evolution had an important impact both on the policies and instruments, as well as on the main stakeholders and the development of their role. While taking the advice from more experienced countries and applying the prescribed instruments could speed up the process of developing a more advanced innovation system, this process also requires a careful adaptation of the "imported" solutions to the specific country/region's situation and localisation of the solutions, if the optimal results were to be achieved. As the case study shows this was not always the case, leading to frequent changes of the instruments and the support provided to different stakeholders.

Main stakeholders have been mapped to present the diversity of intermediary institutions and the complexity of the Slovenian ecosystem: both the official institutions, supporting innovation and entrepreneurship as well as non-traditional, emerging territorial innovation enablers/catalysers. Selected stakeholders have been interviewed to see how they perceive their role and the interactions within the ecosystem and test the existing form of cooperation through a prism of 4H. The analysis scrutinises key enabling factors, drivers and dynamics, connections and synergies with Slovenia's smart specialisation strategy, governance and sustainability models.

Since it is aimed at testing the concept of place-based innovation ecosystem, the local actors and their interactions are analysed in more detail. Yet with Slovenia being relatively small country, Ljubljana itself cannot be approached in isolation from the country system as such. Central Slovenia and Ljubljana as the capital host the biggest Slovenian university, University of Ljubljana with a high concentration of academic researchers. In addition, some of the largest public research institutes are located in Ljubljana. Several important intermediary institutions, like Technology park

of Ljubljana, University incubator, Regional development agency, ABC accelerator etc., are located in Ljubljana¹. Main governmental agencies have their headquarters in the city. Yet, we can also identify several strong innovators, especially at the enterprise level, outside the capital, suggesting it is reasonable to talk about the interaction of the local, regional and national innovation system. To show this polycentric network, the case study includes the interviews with several stakeholders beyond Ljubljana, among them the Slovenian Enterprise Fund, a key government agency providing start-up support and Venture Factory in Maribor, the organiser of annual Start-up competition and PODIM conference.

One of the interesting phenomena, which can be observed in Ljubljana's start-up environment, is a growth of various kinds of new initiatives, some bottom-up from entrepreneurial activity, others stimulated by public policy, but all aimed at providing stimulating support to start-ups, from co-working spaces, geek house, Hackathon, etc. All together they create a dynamic network, which spreads beyond Ljubljana's Region across Slovenia, but also much wider across Western Balkans and to EU and USA. This network is developing in parallel, with or without the support of formal institutions and/or governmental support. We will present more closely how this "system" has evolved and where it overlaps with the official public institutions, aimed at supporting start-ups.

¹ See map in Chapter 4.

2 CONCEPTUAL NOTES

This case study is based on the concepts applied in Rissola et al (2018) study on *Place-Based Innovation Ecosystems: Espoo Innovation Garden and Aalto University (Finland)*. That study emphasised the territorial dimension of innovation, following the concept developed by Oksanen and Hautamaki, 2014, where the definition of the innovation ecosystem consists of a group of local actors and dynamic processes, which together produce solutions to different challenges. The ambition of the present case study is to identify respective local agent(s) who influenced the formation of Ljubljana/Slovenia ecosystem. A possible facilitator or orchestrator in this case study is the entrepreneurial technology park (Technology Park Ljubljana), which can represent the key enabling role by facilitating the start-up environment, support knowledge transfer and commercialisation of products and build local/regional network. So, instead of focusing on the sources of innovation (universities, research organisations, business), the role of the coordinator is examined as potentially the decisive one in setting the process of ecosystem development.

The analysis performed within this case study is in line with the findings on the entrepreneurial innovation put forward by Aautio et al. (2014) and analysed in Espoo/Aalto. As the following pages show, in spite of the efforts of the government in setting the institutions and structures to promote innovation and build national innovation system top-down, it was the softer forms of innovation, brought forward by individuals and open intermediary organisations, which enabled much more dynamic bottom-up innovation ecosystem, at least for the start-up community. The latter group takes account of the fact that innovation is co-created by multiple actors, who operate in multi-dimensional, multi-level and multi-actor processes. This case study through the interviews performed and the analysis of the business and regulative environment provides ample evidence of this bottom-up approach with the central role of entrepreneurial technology park(s). Still, even among the main players in Ljubljana's/Slovenia context one can observe different views on the prevailing mode of operation in development of national innovation system versus entrepreneurial innovation.

Some of the actors still firmly believe that it is the role of the government to set the innovation policy and foster research and development (R&D), provide subsidies and financing for knowledge production and transfer². There is, however, an alternative group of more entrepreneurial agents, where multi-level and multi-actor processes are the norm of the day. Their approach is based on wide networking, flexibility and co-creation of new ideas, based on new opportunities and motivation of individuals. One of such actors is no doubt the Technology Park of Ljubljana, as well as Venture Factory and ABC accelerator, each contributing its part in the ecosystem network. Yet even in this bottom-up initiative, the role of Slovenian Enterprise Fund in providing the seed capital to start-ups proved to be essential. This way one can see the combination of both approaches, the government one setting the policy supporting start-ups on one hand, and the entrepreneurial one providing the motivation and supportive business environment on the other hand, successfully collaborating each other.

² From the ones interviewed, the Slovenian Innovation Hub, Institute Jozef Stefan, University of Ljubljana and the Public Agency for Entrepreneurship and Foreign Investments certainly adhere to this definition.

3 TERRITORIAL CONTEXT

3.1 Ljubljana: history, economy, research & innovation

Ljubljana is the capital and largest city of Slovenia with 288,000 inhabitants. It has been the cultural, educational, economic, political, and administrative centre of independent Slovenia since 1991, as well as an important regional centre for many years due to its geographical location on the way from East to West and North-South. Its central geographic location within Slovenia, transport connections, concentration of economic activity, scientific and research institutions, and cultural tradition are contributing factors to its strong economic position.

The Ljubljana Urban Region unites 26 municipalities and communities in central Slovenia. The Central Slovenian region comprises of 2,555 km² (or 12.6% of Slovenian territory) and 542,306 inhabitants (26% of entire Slovenian population). The region's share is 36.5 % of total Slovenian GDP. The region is home to 33% of Slovenian businesses and the same share of fast growing enterprises (SURS, 2018). The share of population with achieved higher education is 29.1% for Central Slovenia and as such surpasses overall ratio of highly educated in Slovenia (22.4%). The economic structure reflects the dominance of service sector, which contributes nearly 80% of GDP, with 19.5 for industry and minor 0.9 share of agriculture.

From the perspective of innovation ecosystem, the Central Slovenia with Ljubljana as its centre has high concentration of higher education and research institutions. Sixty percent (60%) of Slovenian researchers (in FTE³) work in Ljubljana's region, reflecting this strong human resource concentration. University of Ljubljana, established in 1919, with its 5,898 employees and 40,110 students, is the central higher education institution in Slovenia. In addition, the largest research institutions (Institute Jozef Stefan, Chemical Institute, Science and Research Centre of Slovenian Academy of Science & Arts, National Institute of Biology, etc.) are located in Ljubljana, additionally contributing to the new knowledge creation. The concentration of R&D and higher education institutions means also that Ljubljana has a significant influence on the R&D policies and measures undertaken by the government.

Early on in developing Slovenian innovation ecosystem, one of the important activities of science community was also providing support to the intermediary institutions, be it through active participation in their establishment or through pressuring the policy makers. This is how the Institute of Jozef Stefan was among the founding fathers of Technology Park of Ljubljana in 1994. University of Ljubljana was instrumental in establishing a university incubator (Ljubljana University Incubator) in 2004. Both institutions are important players in transferring the research ideas to entrepreneurial practice and active members of Start:up Slovenia Initiative.

3.2 Basic facts on Slovenia's Research, Development & Innovation (RDI) system

Slovenia's total R&D expenditure rapidly increased in the period 2008-2012 both in nominal values (up to €928.3m in 2012) and as percentage of *gross domestic product* (GDP) (2.58% that same year). The contribution of the business sector was essential here, since their investment grew in real terms by 47.4%. However, *gross domestic expenditure on research and development* (GERD) stalled in 2013 at the level of the previous year and continued a decreasing trend until 2016. In 2016,

³ Full-time equivalent

Slovenia moved further away from its research and development (R&D) intensity target, which is set at 3% of GDP in its strategic documents.⁴

Table 1: R&D investment by sectors, 2009–2016

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|----------------------|------|------|------|------|------|------|------|------|
| GERD (as% of GDP) | 1.82 | 2.06 | 2.42 | 2.57 | 2.58 | 2.37 | 2.2 | 2.0 |
| GERD in million € | 656 | 745 | 894 | 928 | 935 | 890 | 853 | 809 |
| BERD in million € | 424 | 505 | 660 | 703 | 715 | 688 | 650 | 562 |
| GBOARD (as % of GDP) | 0.68 | 0.6 | 0.59 | 0.53 | 0.48 | 0.43 | 0.41 | 0.4 |
| GBOARD in million € | 245 | 218 | 219 | 190 | 174 | 161 | 160 | 163 |
| R&D funded by abroad | 0.11 | 0.12 | 0.17 | 0.22 | 0.23 | 0.22 | 0.23 | |
| R&D funded by EC | 0.06 | 0.07 | 0.08 | 0.1 | 0.11 | 0.1 | 0.11 | |

Source: Eurostat

A decline in *government budget appropriations or outlays on R&D* (GBOARD) during the period 2012 until 2015 can be explained by harsh austerity measures, adopted by the Slovenian government to reduce the high budget deficit. If in the first years after the economic and financial crisis it was hoped that RDI sector would be able to avoid the cuts, yet the years after 2012 show a steep decline in funding, co-occurring in 2015 with the end of the support from structural funds.

The business sector's share in total R&D expenditure has declined in nominal terms, but remained high at 69% of the total GERD in 2016 and is as such significantly higher than in the EU. The share of researchers in the business sector, at 55% in 2016, is also considerably above the EU average (2015: 48.7%). The business sector increased R&D investment was partly a result of the funding from the European Commission under H2020 (where co-funding by enterprises was required) as well as structural funds' co-financing of various support instruments, including the centres of excellence and competence and development centres in 2010–2013 (IMAD, 2017). In relation to GDP however, *business enterprise R&D expenditure* (BERD) started to decrease as well by (1.84% of GDP), again in 2015 (1.69% of GDP) and even more dramatically in 2016 (1.51%).

Throughout the period, an R&D tax relief favourably affected BERD. In 2009–2015, companies in the pharmaceutical industry claimed one-third of the total amount, manufacturers of motor vehicles and of electrical equipment claimed one tenth each, and one-fifth was claimed by various service activities, primarily knowledge-intensive services (IMAD, 2017). These are also the most R&D intensive sectors.

The business sector allocated in 2016 less than 3% of its total R&D expenditure for financing research undertaken by the public sector (HEIs⁵ and PROs⁶), but in their budgets this covered 8.4% of their R&D activity. The small share of R&D cross financing is hindering cooperation between sectors and the transfer of R&D results, which is vital to reach synergies and increase the efficiency of R&D investment (IMAD, 2017).

In spite of increased business allocations for R&D, the innovation indicators have changed in a negative direction according to Community Innovation Survey (CIS). In 2014–2016, almost 40% of observed enterprises in Slovenia had innovation activity. Data show⁷ that compared to 2012–2014 innovation activity of the enterprises in 2014–2016 was 6.1 percentage points lower. Small

⁴ Preliminary figures for 2017 (as of November 2018) confirm the observable trends in Table 1: GERD (as % of GDP): 1.9; GERD (in million €): 801; BERD (in million €): 504; GBOARD (as % of GDP): 0.4; GBOARD (in million €): 184; R&D funded from abroad (as %): 0.2.

⁵ Higher Education Institutions

⁶ Public Research Organizations

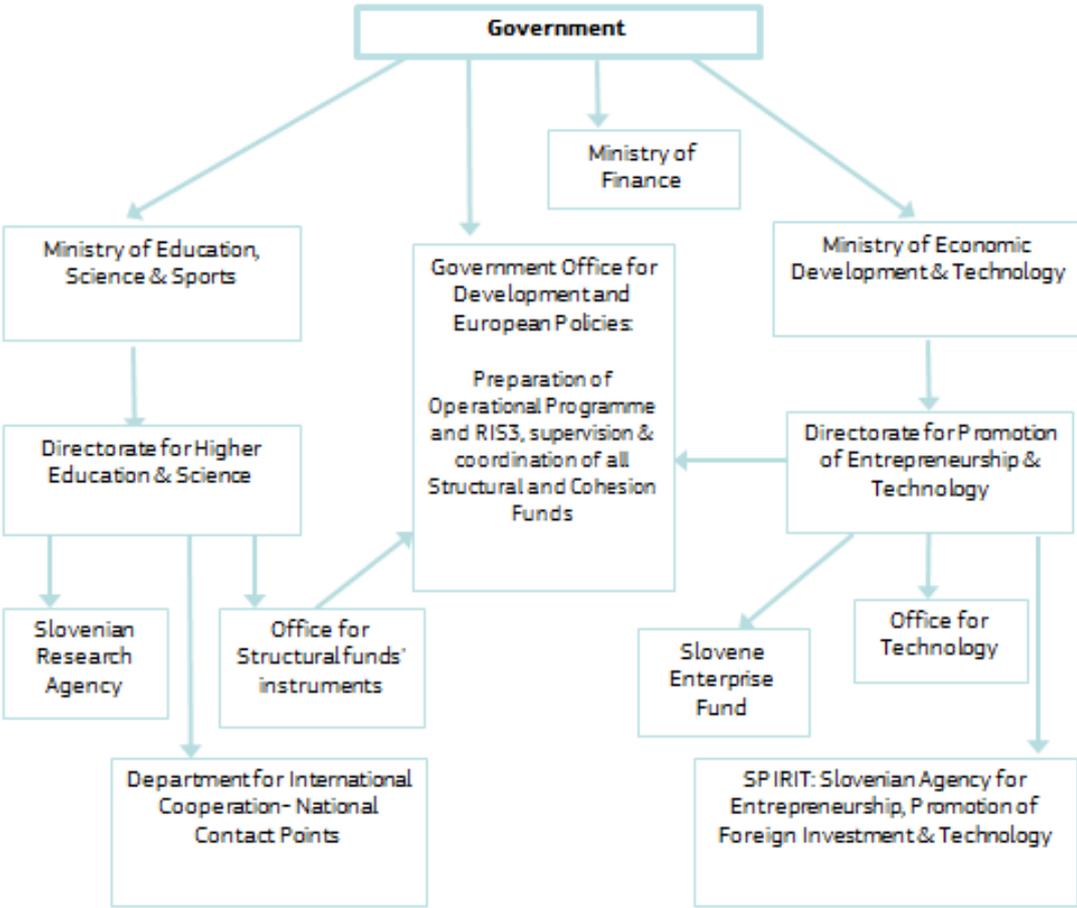
⁷ <http://www.stat.si/StatWeb/en/News/Index/7359>

enterprises (10-49 persons in paid employment) are the least engaged in innovation activity; in 2014-2016, 34% or 1,767 of small enterprises were innovation active. A higher share was observed among medium-sized enterprises (50-249 persons in paid employment) – 56% or 452 enterprises – and the highest share was observed among large enterprises (more than 250 persons in paid employment) – 83% or 141 enterprises. What is encouraging is that the innovation activity in service sector is increasing, which is important, considering the high share of services in Slovenian GDP (65.8%).

3.3 Main actors of Slovenian Research & Innovation (R&I) system⁸

The basic organisational scheme of Slovenian R&I system has not changed in recent years. The key actor in setting the research policy is the Ministry of Education, Science and Sports (MESS). Technology development and innovation activities are in the hands of the Ministry of Economic Development and Technology (MEDT). With being in charge of the coordination of the Smart Specialisation Strategy, the Government Office for Development and European Cohesion Policy (GODC) is increasing its role in R&D policy, since all the instruments co-financed by the European Structural & Investment Funds (ESIF) need to be approved by them. The multiple-actor framework makes smooth coordination imperative, and here are still issues to be solved.

Figure 1: Organogram – governance of RDI



Source: RIO Country report 2017

⁸ Based on Bucar et al, 2018.

At the implementation level, Slovenia took inspiration from the Scandinavian model of agencies and established the Slovenian Research Agency (SRA), which is in charge of the distribution of public research funding according to the policies decided by the MESS and the government.

On the other hand, the Ministry of Economic Development and Technology finances partly the Slovenian Enterprise Fund and runs the Public Agency for Entrepreneurship, Internationalisation, Foreign Investments and Technology (SPIRIT), established in 2014. SPIRIT is their executive agency for the calls directed to innovation and technology development promotion, but focuses primarily on the promotion of entrepreneurship.

MEDT also runs several programmes on its own, such as EUREKA, EUROSTARS, etc. The Ministry of Education, Science and Sports is in charge of specific programmes, aimed at research and funded by the European structural and investment funds (ESIF). Slovenian coordination of participation in H2020 and the ERA-Nets is implemented by the MESS directly.

3.4 RDI policy background

The current national research programme, called Research and Innovation Strategy of Slovenia (RISS), was adopted in 2011⁹. RISS defined the R&D priorities for the next decade (2011–2020) as follows:

- Better integration of research and innovation;
- Publicly funded sciences and scientists shall contribute to economic and social restructuring;
- Enhancing/ensuring closer cooperation between PROs and the business sector;
- Increasing scientific excellence, partly by increasing competitiveness within S&T stakeholders and partly by providing necessary resources (both human and financial).

The political changes contributed to relatively slow implementation of RISS. While RISS 2011–2020 planned for a continuous increase of public financing of RDI activities, the austerity measures in the last years decreased the level of RDI finance. In addition, according to the implementation report, prepared in 2016, only 10 of the 69 measures planned in RISS have been implemented so far, 41 are in the implementation process, and 18 have not been started (RISS implementation report, 2016).

One of the most important framework conditions for RISS implementation is the new Law on RDI, as foreseen in the strategy. The ex-government¹⁰ appointed by the end of 2015 a new expert group (second one) in order to finalise the new draft for the Law on RDI. Yet, the progress of the working group was slow, also due to the disagreement between the MESS and MEDT, related to the need to combine research and innovation within the same legal text. Finally, the draft text was harmonised between the ministries and the stakeholders and the law was to enter government procedure, when the prime minister stepped down. This means that the draft law will have to wait for the elections and the decision of a new government as to its implementation.

⁹ See detailed description of RISS in ERAWATCH Country Report 2012: <https://rio.jrc.ec.europa.eu/en/library/erawatch-country-report-slovenia-2012>

¹⁰ On March 14, 2018 prime minister Miro Cerar stepped down due to conflicts among the coalition parties. Slovenia had new parliamentary elections on June 3, 2018.

After a prolonged process of the preparations, caused by the political instability, Slovenia adopted its Smart Specialisation Strategy (RIS3) in 2015.¹¹ Goals include:

- Increasing the value added per employee
- Improving Slovenian competitiveness on global markets with an increased share of knowledge and technology in exports¹² and
- Increasing the overall entrepreneurial activity (from current 11 % to the EU average of 12.8%).

The smart specialisation strategy (RIS3)¹³ has been built on the process of entrepreneurial discovery with considerable involvement of business sector. The three priority pillars (a) *Digital*, (b) *Circular Economy* and (c.) *Industry 4.0* have nine areas of application:

- i. Smart cities and communities,
- ii. Smart buildings and homes, including wood chain,
- iii. Networks for transition into circular economy,
- iv. Sustainable food production,
- v. Sustainable tourism,
- vi. Factories of the future,
- vii. Health-medicine;
- viii. Mobility;
- ix. Development of materials as products.

Selected priority areas correspond with the most active industries in research, development and innovation (RDI).

RIS3 tries to develop a supportive business-innovation ecosystem, which aims to be horizontal, and whose performance aims to affect the competitiveness of priority areas (e.g. in promoting the establishment of new enterprises, spurring their development, introducing lean innovation, supporting the introduction of design thinking, promoting joint discussion on the long-term development of markets and the role of consumers within). It aims at enhancing synergies in R&I and is expected to improve access to finance and reduce the administrative burden of SMEs. This will help support approximately 8,500 SMEs with the goal of boosting growth and jobs (2017 European Semester country report).

RIS3 became recognised as development priority that needs to be harmonised with other policies. With the adoption of RIS3, the structural funds have been released to co-finance the measures planned in Operational Programme 2014-2020. Over the period 2016 – 2018, Slovenia plans to invest €1.9b through the Operational Programme in accordance with the thematic priorities of the RIS3: €1b on RDI, €0.8b on entrepreneurship and €0.05b on human resources. All the programmes in the field of R&I require co-funding from the beneficiary and are expected to trigger private investment as well. Several calls that support implementation of RIS3 were launched in 2016 and 2017 (Bučar et al, 2017).

Important actors in the implementation of the RIS3 are so called Strategic Research & Innovation Partnerships (SRIPs), which should be promoting long-term collaboration in all relevant priority areas. These partnerships (Bučar et al, 2017) are in some cases not newly established structures but enhanced existing cooperation structures, now transformed into new, mostly larger networks

¹¹ The government adopted smart specialisation strategy of Slovenia on 20th September 2015 and approved by the European Commission in the first week of November 2015 (Bucar et al, 2017- RIO Slovenia Country Report, 2016).

¹² Increasing the share of high-tech-intensive products in exports from 22.3 % to the EU-15 average of 26.5 %; and the share of export of knowledge-intensive services in total exports from 21.4 % to 33 %, which means cutting in half the lag behind the EU average.

¹³ In Slovene documents, it is called S4: Slovenian Smart Specialisation Strategy.

(previous clusters of centres of excellence, etc.). In some areas however new networks were established to fit to the priority areas (like tourism, for example). The cooperation between stakeholders in the individual SRIPs should build on coordination of R&D activities, sharing research capacities and human resources, exchange of knowledge and experience, networking and collective representation of interest abroad. Each SRIP should have a specified structure: there should be a certain number of SMEs participating as well as bigger companies and public research organisations.

By April 2017, each SRIP was called to develop roadmap as a part of the action plan. The Action plans were approved by the SRIPs and adopted by the Government (GODC) by July 2017 and the implementation has started. Based on the yearly action plans, the stakeholders' events of the SRIPs were launched in September 2017 and are planned to continue throughout the RIS3 implementation period in 2018-19.

3.5 Formal governance model: ministries and agencies

Slovenia was rather successful in preserving its R&D system after the transition¹⁴ from socialist to market economy and its independence in 1991. Some decrease in funding was experienced only in the first years due to the collapse of large industrial conglomerates. The state picked up the financing of R&D, which enabled the survival of most of the major public research units. The side effects of the increased share of public funds for R&D were a reorientation of academic and public research institutions in the direction of incremented fundamental research and looser ties with the business sector.

During the accession to the EU period (1994 -2004), one can observe numerous new initiatives, mechanisms and programmes being prepared: in fact, nearly every suggestion given by consultants¹⁵ or instrument observed in EU countries was introduced. However, the follow-up activities and the functioning of the mechanisms introduced were hampered due to lack of resources. Budget allocation to innovation/technology development programmes was inadequate, reflecting poor awareness and a low priority attributed by decision makers to the implementation of innovation policy.

The accession meant also compliance with the relevant EU policies. In November 2005, a National Reform Programme for Achieving the Lisbon Strategy Goals (NRP) was prepared by Slovenia¹⁶. The Slovenian NRP was based on several national strategic documents, adopted in 2005. The most important among them were the Slovenian Development Strategy 2006–2013 and the National Research and Development Programme 2006–2010¹⁷. All the documents put an emphasis on the restructuring of the Slovenian economy to high-technology value-added production through increased innovation activity.

¹ Maja Bučar and Peter Stanovnik, 'Some Implications for the Science and Technology System in a Transition Economy: the Case of Slovenia,' in: *Reconstruction or Destruction? S&T at Stake in Transition Economies*, eds Claes Brundenius *et al.* (Hyderabad, 1999), pp. 97–125.

¹⁵ GOPA, *A Science and Technology Strategy for Slovenia. PHARE Operational Programme* (Ljubljana, 1994); Coopers & Lybrand, *Country Reports on RTD - Extended Management summary Slovenia* (Luxembourg, 1997).

¹⁶ *Program reform za izvajanje Lizbonske strategije v Sloveniji* available at http://www.mgrt.gov.si/fileadmin/mgrt.gov.si/pageuploads/DPK/SI_NRP_2005_SLO_kon_na_verzija_28.10.2005.pdf (23 December 2013).

¹⁷ *Resolucija o nacionalnem raziskovalno-razvojnem programu 2006–2010*, Official Gazette 3 (2006), available at <http://www.uradni-list.si/1/content?id=67936> (23 December 2013).

The Slovenian government initially committed itself to the Lisbon/Barcelona 3% of GDP target until 2010, but extended this commitment until 2012 in 2008 and later to 2020¹⁸.

In terms of institutional set up, nearly each parliamentary election brought forward new ideas and views on how to best organise the government to be supportive of science, technology and innovation. Most common reorganisations were in the area of technology/innovation: this field has been moved between the ministry responsible for science and the ministry of economy back and forth several times. Up to 1999, Slovenia had a Ministry for Science and Technology. In 2000, the government was reorganised and the department for technology development was moved to the Department for Entrepreneurship under the Ministry of Economy. Since then, the department has been moved back and forth twice, each time losing some of its staff and resources.

Following the practice observed in some successful EU member states¹⁹, the Research and Development Act (2002)²⁰ provided for the establishment of two relevant implementation agencies: the Slovenian Research Agency (SRA) and the Agency for Technology Development. The underlying rationale was that the agencies (each in its own sphere) would be responsible for a permanent, professional and independent selection process of projects and programmes that would benefit from public financing.

The *Slovenian Research Agency* (SRA) was established relatively quickly and was given a significant level of autonomy with regard to the programmes it runs, the evaluation criteria it puts in place as well as its management/expert staff. The SRA provides the funding to public research organisations and has a relatively stable range of instruments.

The establishment of the *Technology Development Agency* (TIA) took longer, since the formal establishment was followed by a change in the organisation structure of the government. At the time when the R&D law was passed (2002), TIA was under the Ministry of Economy, but it was then first debated that it should belong to the Office for Growth, established in 2004, and just before its formal establishment the agency was moved under the Ministry of Higher Education, Science and Technology. TIA was supposed to carry out the 'expert development and executive tasks which are to advance the technological development and innovation in accordance with the adopted national research and development program and other national programmes supporting enterprises and competition'. However, moving it from one ministry to the other meant complex processes in negotiating annual programmes and financial support. It thus frequently happened that a measure entrusted to TIA was shifted to another agency or implemented independently by the Ministry until the agency was finally dismantled and the tasks and few of the remaining staff were moved to SPIRIT. In practice, this means that Slovenia does not have an independent agency, dedicated to innovation and technology development. During its short life, TIA has struggled to make a difference, as a funding agency for business R&D and innovation as well as a bridging institution between business and PROs. Yet, most of its "life" it struggled for financial support every year, jeopardising its efficiency.

Already in 1992, with the Small Business Development Act, the government of Slovenia established the Fund for small business development, later transformed into the public funding agency named the *Slovene Enterprise Fund* (SEF). The fund was established with the purpose of improving access to financial resources for different kinds of development – business investments of micro, small and medium-sized enterprises (SMEs) including financial resources for SME start-up and micro financing in the Republic of Slovenia. Apart from the resources received from the state budget, the Fund has been financed from the European Investment Fund since 2001 (post-guarantees) and this

¹⁸ Ministry of Higher Education, Science and Technology, *Research and Innovation Strategy of Slovenia 2011–2020*, available at <https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/103975>.

¹⁹ Like INNOVA in Sweden or TEKES in Finland.

²⁰ *Zakon o raziskovalni in razvojni dejavnosti*, Official Gazette 96 (2002), available at <http://www.uradni-list.si/1/objava.jsp?urlid=200296&stevilka=4808>.

cooperation expanded significantly during the financial perspective 2007–2013. Moreover, the Fund is a full member of the European Mutual Guarantee Association²¹. Over the years, the Fund has been given a high level of independence and financial stability, which is reflected also in the relatively constant set of support measures available to SMEs in the area of technological restructuring, start-ups and various guarantees for investment credit.

Under the same act, the *Centre for Support of Small Business* was established and it was later transformed into the *Public Agency for Entrepreneurship and Foreign Investment* (JAPTI). Again, the provision of support to SMEs has always been high on the EU agenda and thus the establishment of such an agency was supported by EU policies as well as through technical aid. The agency operated under the Ministry of Economy. Even though it was primarily oriented towards supporting entrepreneurship, JAPTI also introduced certain innovation support measures. With government's restructuring, both TIA and Slovenian Tourist Organisation were added to JAPTI's portfolio and a new agency named *SPIRIT* for supporting and promoting internationalisation, entrepreneurship, technology development, and tourism was established in 2013. Its programme was simply pasting together some of the previous programmes of the individual agencies. The ambition to achieve better policy coordination and more effective support to the business sector has not materialised, partly also due to severe budget cuts for support measures.

3.6 Intermediary/ bridging institutions

EU innovation policy had its most direct impact on the introduction of various 'bridging' institutions: Slovenia first introduced *technology centres* (from 1994 onwards) and *technology parks*. Technology centres were independent legal entities established by several companies for the purposes of R&D in a specific field or branch, as well as for the provision of R&D equipment, subsequently made available to companies for their development projects. The official support for them was stopped, but some have survived, being able to generate their own resources through the services provided to their founders.

Another measure introduced early (1994), *Technology parks*, is still supported by the Ministry of Economic Development and Technology. The modes of financing have changed several times since their establishment. Until 2005, the services that the parks offered to SMEs located within the parks were subsidised, but in 2005 and 2006, a special public call for applications, supported by the European Regional Development Fund, provided substantially higher resources for construction of new facilities and new research infrastructure investments. This is how Ljubljana TP got its (new) premises, which mark an important stepping stone in their development. Another boost was given to technology parks by the requirement installed by the Enterprise fund (SEF), where the start-up subsidy was conditioned by an alliance of a start-up with the technology park (either locating the office within TC or at least coordinate the business plan with the staff of TP). In 2013, a new way of financial support to technology parks was introduced by SPIRIT via a programme of supporting innovation infrastructures. Four parks are functional, the biggest being the Technology Park Ljubljana, where more than 300 enterprises are located.

Directly following the EU example of establishing European Technology Platforms (ETP), a measure supporting the formation of *technology platforms* was introduced by the Ministry of Higher Education, Science and Technology in 2005 in cooperation with the Chamber of Commerce and Industry. The ministry offered a subsidy for the establishment of platforms and their participation at the EU level. Twelve technology platforms were formed in 2005. In 2008 and 2009, technology platforms were supported through two measures: one directed specifically to their functioning and

²¹ Slovenski podjetniški sklad, 'Mednarodno in nacionalno sodelovanje', available at <http://www.podjetniskisklad.si/mednarodno-in-nacionalno-sodelovanje.html>

the other, considerably larger, to joint research projects, initiated by the technology platforms; however, direct support to platforms ceased afterwards.

The *cluster initiative*, again following the recommendations of the EU innovation policy, was launched in 2000 as one of the top priority measures. By 2004, 29 projects related to clustering were being supported altogether: 3 pilot cluster projects, 13 early-stage clusters and an additional 13 cluster initiatives. After the change of government at the end of 2004, the cluster support programme was discontinued. The clusters that had developed sufficiently by the time the programme was stopped (like the automotive cluster) were able to apply for R&D project support but not for their own operational costs. Some networks resulting from the days of cluster initiative, however, were able to initiate the SRIPs under the framework of RIS3.

Following recommendations of an EU PHARE study, *University incubators* were introduced in 2004 at the three main (public) universities. They were in part supported by the Ministry of Economic Development and Technology through its innovation infrastructure measure. Nevertheless, sporadic funding over the years has led to a continuous struggle for survival, diminishing the activities focusing on incubation of new spin-offs.

Following the EU innovation policy as well as copying best practice from other EU countries, various other bridging institutions were established (economic-business-logistical centres, technology networks etc.), but with the lack of stable financing, a number of them either disappeared or changed their field of work substantially (regional development agencies, business incubators, technology transfer offices etc.).

The innovation support environment is a clear reflection of the eagerness to introduce the institutions observed in the EU or suggested in EU policy documents as important elements of any national innovation system and, on the other hand, of the institutional instability and lack of long-term vision with regard to innovation policy in the country (Bučar and Stare, 2011).

3.7 Start-up ecosystem

Start-up initiative

With the instruments described above, Slovenian innovation ecosystem has evolved over the years, with support to RDI as well as support to entrepreneurship. Main characteristic of the system was its fragmentation and uncertainty, which contributed to mixed effectiveness of intermediary institutions and lack of systematic support of young entrepreneurs. This has changed significantly with the Start-up initiative, resulting from the document Start:up Manifest (Rebernik and Jaklič, 2014), prepared by couple of professors and a team of like-minded from various organisations across Slovenia. In the Manifest²², they set themselves a set of very ambitious goals until 2020:

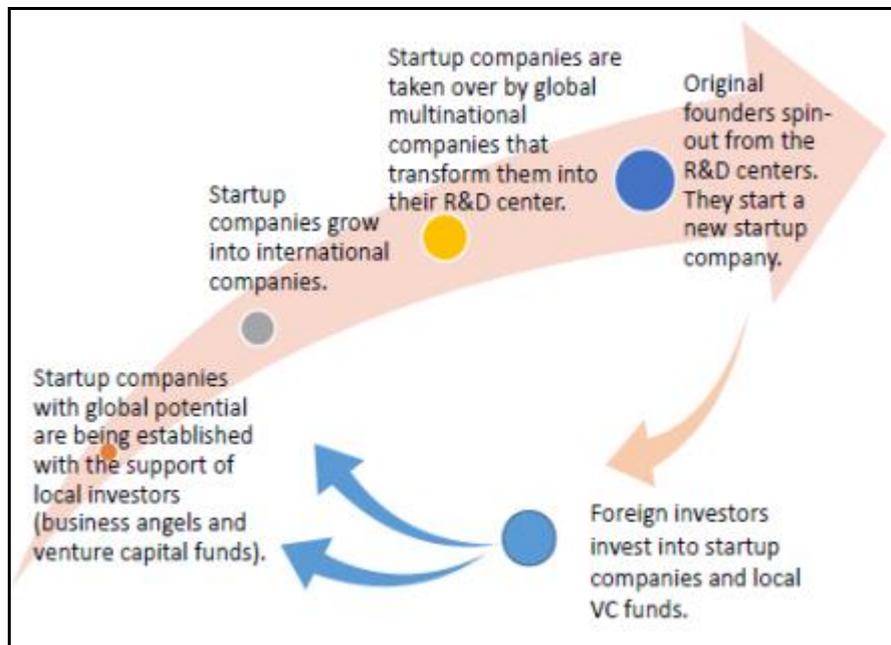
- Create 1,000 new jobs in start-up companies in Slovenia
- Connect at least 50 start-up companies with the most important start-up ecosystems in the world;
- Create or attract at least 150 start-up companies with global potential.

These goals are to be achieved through Start-up Initiative, where all of the relevant stakeholders should cooperate and contribute, from the governmental institutions to knowledge institutions, enterprises and other subjects of the innovative environment.

²² https://www.startup.si/doc/Start-up-Manifest_SI.pdf

Their key ambition was to create a successful start-up support ecosystem, in line with the needs of ecosystem of a small country, which need to be integrated early on in the international environment.

Figure 2: Start-up ecosystem



Source: Start:up Manifest, 2014.

The document ends with a set of measures and key success indicators in the areas which the authors singled out as most problematic for start-ups: access to finance; business talent activation; implementation of comprehensive support programmes (from entrepreneurship education to media) promotion; faster commercialisation of knowledge and technologies; growth stimulation of start-ups on global markets with connections across the world; and, finally, consistent, comprehensive and strategic governance of the start-up support environment.

While Slovenia has a number of different strategies with ambitious goals, what made a determining difference this time was a formation of a Start-up Initiative, a network of several dedicated partners with a clear objective to implement the Manifest. Members of the network include Venture Factory and Technology Park Ljubljana as the lead partners, two more technology parks (Primorska and Pomurje), two incubators and a research centre on ICT. The Ministry of Economic Development and Technology, SPIRIT and Slovene Enterprise Fund are public members of the Initiative, while as many as 15 different types of institutions are ecosystem partners. They include venture capital funds, accelerators, business angles, etc.²³. In collaboration with them, the Initiative carries out and promotes national programmes for supporting innovative entrepreneurship.

The core programmes of the Initiative are:

- Programmes for talent activation (Motivational meetings, student competitions, start-up weekends, accelerators for the idea development);
- Programmes for accelerated launch (GeekHouse accelerator, Start:up roadshow events; Competition “Start:up of the year” as well as other workshops and events)

²³ <https://www.startup.si/en-us/about-the-initiative-/who-we-are,-our-offer>

— Programmes for global growth (Go:Global accelerator; 1:1 mentorship events; Entering accelerators abroad; Other programmes for global growth)

The ambition of the partners in Start:up Initiative is to cover the whole spectrum of support activities, from help in developing the initial idea and turn it into a business proposal to establishing an enterprise and finding appropriate form of financial support for a particular stage of the enterprise. The cooperation of a wide range of complementary partners has resulted in effective support system. The role of some of the main actors is described in the next chapter and is also reflected in the interviews with the main players.

The role of the partners in Start:up Initiative

The core activity in the Initiative is support to new start-ups. Here, a cooperation between on one hand, the two parks – Venture factory in Maribor and Technology Park Ljubljana – and, on the other, the Slovene Enterprise Fund (SEF), is essential. In its early times, SEF had prepared a programme for the support of start-ups, but they were not satisfied with their own selection process. Venture factory launched in parallel a start-up competition²⁴ as a part of PODIM conference. Through start-up initiative, these two activities merged in a highly productive manner. The Venture Factory, together with LTP organises the annual competition for start-ups and provides a platform for the selection of the good ones, who can apply for the financial support from SEF (instrument called P2)²⁵. The instrument is designed so that a start-up can receive a grant of 54,000€, to be distributed over a period of three years (10,000 during the first year, 12,000€ in the second evaluation period and 32,000 during the last) and spend on pre-described activities. These include participation in the start-up programmes developed by LTP and Venture Factory, selection of a mentor from the Start:up Initiative database and implementation of the business plan. Therefore, a start-up gets money to pay for some of the services it needs on the way to success and support organisations receive funds for the work they do and is not covered by the government grant.

Should a start-up successfully complete this phase, they can further apply for bigger funds, for what is called convertible loan (K75 & K250), given by SEF. In addition, since the partners in Start:up Initiative are also accelerators and investors, some of the start-ups can be invited by them into their programmes and funding.

What is an interesting element of this platform is that it is open, transparent and very dynamic. It cooperates with public authorities, but the activities do not depend on government financing, which is a key novelty from previous initiatives or even behaviour of the support organisations. This new dynamic changed the start-up ecosystem significantly and resulted in a very different climate: instead of complaining that there are insufficient funds provided by the government and waiting for things to change, the platform is a source of a lot of inspiration and possibilities. This is not to say that the support provided through SEF and SPIRIT is not valid, but it is no longer the only determinant of the level of activity.

In terms of cooperation with the government, it is important to mention that the Start:up initiative was also successful in setting up a special workgroup at the Ministry of Economic Development and Technology on start-ups. The WG, where representatives of different stakeholders were involved, prepared a list of obstacles to a more successful environment for start-ups and one by one, the government officials promised to address them. Among them were issues like obtaining visas for

²⁴ Start: up Slovenia seeks to identify the best start-up companies in the earliest development phase (problem – solution) and offers professional and media support. To participate in the pre-selection process is required to submit requests until tender deadline. All participating companies are evaluated by an expert committee, with the help of the application documentation submitted and the required personal presentation at DEMO day.

²⁵All instruments of SEF start with P2, P5, P75... Sometimes the number means the amount of capital provided, sometimes the numbering reflects the stage, when the Product was introduced. P2 is one of the early instruments of SEF.

potential foreign employees, easier way to recognise formally their educational attainment, several tax issues, etc.

...

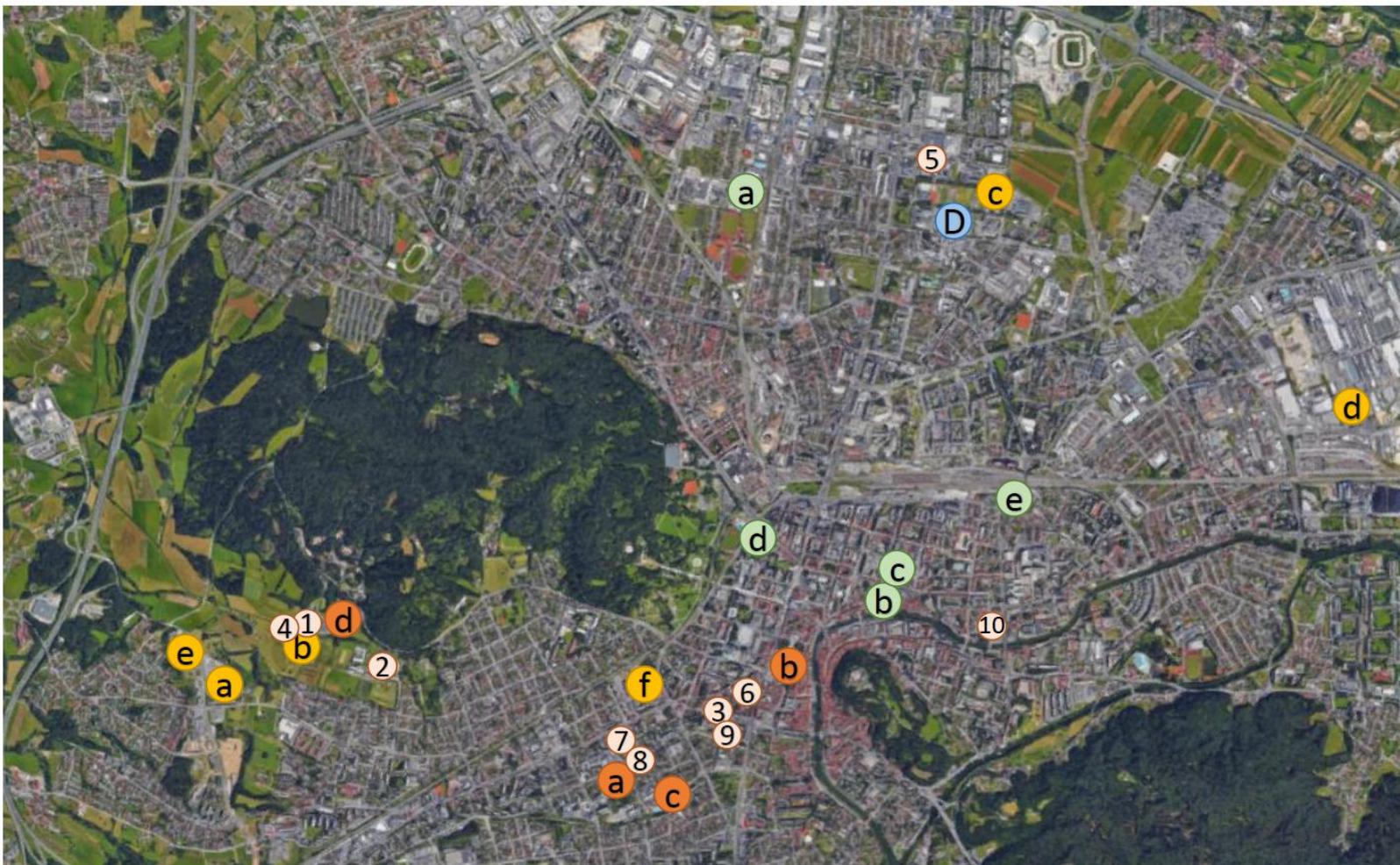
As we have seen before, Ljubljana and its position within Slovenian innovation ecosystem contributes significantly to the environment for start-ups, yet it is important to recognise the fact that it is not an isolated player. In fact, the real dynamics started once the closed local circles opened up and the cooperation at various levels started. Essential was the bottom-up drive of various institutions who felt that without creating an open cooperation platform bringing together a complete “value-chain” of services to start-up community, the innovation ecosystem is incomplete and non-sustainable.

Local ecosystem is thus closely integrated in the national one and on one hand, stimulates its development, both through the official channels as well as through creating an environment, friendly to individual initiatives from different sources: be it university students, established researchers or other creative groups or individuals.

4 ACTORS OF THE INNOVATION ECOSYSTEM

Slovenian innovation ecosystem comprises of many different stakeholders, as described in the first part of our analysis and illustrated in the map below.

Figure 3: Ljubljana's innovation ecosystem map



Source: own elaboration (legends below)

- a) **Intermediary institutions**
 - a. Ljubljana Technology Park
 - b. Slovenian Innovation Hub- at the Faculty of Chemistry
 - c. Ljubljana University Incubator
 - d. ABC accelerator (private in BTC)
 - e. Regional Development Agency of Ljubljana Region
 - f. Heckovnik, Tobačna tovarna <http://hekovnik.com/location2/>

- b) **Research and innovation main players:**
 - a. Institute Jozef Stefan
 - b. University of Ljubljana: University Headquarters: 1. Faculty of Chemistry and Chemical Technology, 2. Biotechnology Faculty, 3. Faculty of Pharmacy, 4. Faculty of Computer and Information Science, 5. Faculty of Economics, 6. Faculty of Mechanical Engineering, 7. Faculty of Electrical Engineering, 8. Faculty of Mathematics and Physics, 9. Faculty of Natural Sciences and Engineering, 10. Faculty of Medicine;
 - c. Institute of Chemistry
 - d. National Institute of Biology

- c) **Government institutions**
 - a. SPIRIT (World Trade Centre)
 - b. Government Office for Cohesion Policy and Development
 - c. Ministry of Economic Development and Technology
 - d. Slovenian Research Agency
 - e. Ministry of Education, Science and Sports

- d) **Chamber of Commerce and Industry**

To understand the dynamics of the system, a selection of stakeholders from different organisation types (mostly business' intermediary institution and government agencies) were interviewed by the authors of this report with support of targeted questionnaires. For each case, information on respondent's background was collected, as well as a description of their current activity, their collaborations in the ecosystem and their views on regional/ national/ local innovation and entrepreneurship ecosystem.

The following stakeholders per typology were interviewed:

Intermediary institutions:

- Technology Park Ljubljana (TPL)
- Slovenian Innovation Hub (coordinator of one SRIP)
- ABC accelerator (private)
- Venture Factory (university incubator)
- Regional Development Agency of Ljubljana Region

Research and innovation main players:

- Institute Jozef Stefan: largest Slovenian research institute, with experience in setting-up spin-offs, technology transfer, also coordinator of two SRIPs)
- University of Ljubljana: largest higher education institution and second largest research institution in terms of resources received from the Slovenian Research Agency and number of researchers

Government institutions

- SPIRIT: agency with a task to promote entrepreneurship, foreign direct investment and technology; Slovenian Enterprise Fund: financing of start-ups, young companies, technology upgrading, etc.
- Slovenian Enterprise Fund: agency for financing SMEs.

Chamber of Commerce and Industry

Enterprises, involved with TPL:

- Terra Nullius (Ribiške karte)
- Cosylab

Since the focus of this case study is in particular on intermediary institution, the number of stakeholders from that group is the most numerous. We selected each of them so that at least in their basic orientation there should not be an overlap, but complementarity. Yet, as analysis shows, due to the necessity to secure funding, they do sometimes compete against each other.

4.1 Technology Park Ljubljana

Background

First idea to establish a technology park was a result of discussions back in 1994 within some of the Slovenian public research organisations, especially Institute Jozef Stefan (IJS) and National Institute of Chemistry. Initially, the Park was located within the premises of IJS. With the entry of

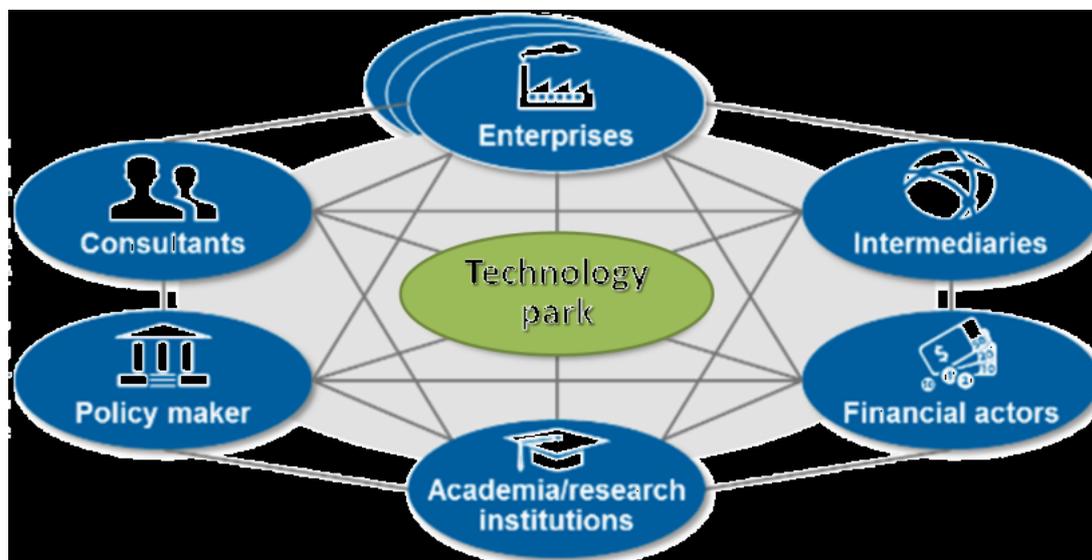
Municipality of Ljubljana²⁶ as one of the key founding members in 2003, the possibilities to expand to better accommodate the needs of start-up companies significantly improved. The TPL was able to apply for the structural funds' support²⁷, since one of the priorities of Slovenia during the period 2004-2007 was the establishment of innovation infrastructure. This enabled the TPL to open 4 new buildings in 2007 and offer space to new arrivals. With the merger with Centre for the Development of Small Industry, TPL has fortified both in terms of staff and its operations. In 2011, more intensive partnership was established with Tovarna podjetov (Venture factory), resulting in several new initiatives in the area of entrepreneurship and start-ups. The most important one is definitely the Start:up Slovenia Initiative, where the two organisations play a central role.

TPL today

Today the park has more than 300 members²⁸, who provide employment for more than 9000 people. The 75.000 m² of premises of high quality infrastructure represent what they like to call "Smart city": not only due to the high concentration of start-ups and high tech SMEs, but also due to provision of adjoining services like pharmacy, kindergarten, restaurant, tourist agency, etc.

The activities of the TPL are wide and spread from providing support to members in all phases of their development to overall promotion of entrepreneurship in Ljubljana, Slovenia and the region. They define themselves as leading regional innovation hub for knowledge and technology transfer.²⁹ TPL is cooperating with several stakeholders in Ljubljana's and Slovenia's innovation ecosystem in design of start-up policies (they are co-founder of Start:up Initiative and have also actively participated in government working group on start-ups), policies in the area of entrepreneurship promotion (cooperation with SPIRIT, SEF and the MEDT), was actively involved in EDP through cooperation with Chamber of Industry and Commerce, is involved in a number of EU projects (especially several Interreg projects) as well as in cooperation with public research organisations (PROs). They provide advice to foreign investors as well as seek actively for investors for their start-up community.

Figure 4: The role of Technology Park Ljubljana



Source: Majerič, M. Presentation of TPL at Western Balkan Countries workshop/training seminar, April 2018.

²⁶ The Municipality contributed with the ground on which the current premises are located.

²⁷ €8 million were provided through European Regional Development Fund, with additional resources from commercial loans (€33 million for phase II. and €15 million for phase III.)

²⁸ <http://www.tp-lj.si/en/members/members-list>

²⁹ <http://www.tp-lj.si/en/about-us/tp-ljubljana-in-2020>

Their ambition is to be the central enabler of the innovation ecosystem, locally as well as nationally and act as the main integrator (see picture below). With their model, they have the ambition to expand also regionally, especially in the Western Balkan.

According to the interview³⁰, TPL is legally a public association³¹, but is in fact run very much like a business entity, since it supported only in about 20-25% of its activities with the public money.³² Other resources need to be generated through various projects³³, be it national, EU or international and services they offer to the companies. This mix is needed if they want to survive and grow, but has proven important source of new ideas and opens opportunities not only to TPL, but its members as well. On the down side, it means that sometimes the projects they undertake do not contribute to their core activity. In view of the relatively small staff³⁴, such strategy is recognised by themselves as not optimal.

TPL includes a co-working space called Tobogan, where young entrepreneurs can rent office space and a Geek-house, both being a part of Start:up Slovenia Initiative programme.

TPL provides consultancy services to its members: most of the services are provided free of charge to the individual enterprise, if they are covered within the programmes supported by SPIRIT and SEF. TPL is engaged also as an intermediary when a particular service is being needed by one of the members: with their network of consultants and mentors they can suggest an appropriate help. One of their regular activities is preparation of different type of workshops and conferences for their members as well as hosting workshops and conferences for other institutions (needing only the infrastructure support).

TPL's collaborations

TPL's network is extensive, from cooperation with the government in designing appropriate entrepreneurship policy and internationalisation to cooperation with other stakeholders in specific projects and programmes. They work closely with all the partners in Start:up Slovenia Initiative, especially Venture Factory (Start-up Competition, PODIM) as well as with ABC accelerator, located in BTC (Business Trade Centre), on individual projects of scaling-up start-ups, born in TPL.

They provided platform for several meetings on S4, especially in collaboration with Chamber of Industry and Commerce, but also with the Government Office for Cohesion Policy and Development. In view of the progress made on S4, their opinion is that Strategic Research and Innovation Partnerships (SRIPs) work better if led by industry.

Their cooperation with public research organisations is developed mainly on project basis, when individual researchers from units within PROs or University have the ambition to engage in start-ups and TPL helps them in initial phases. Otherwise, the systematic collaboration is established with the National Institute of Biology.

At international level, the collaboration of TPL is extensive in various Interreg projects, especially with partners from Italy, Austria and Germany. A specific line of their activity is promotion of TPL as a location for foreign partners and providing support to potential foreign investors, seeking contacts in Slovenia. They have engaged in establishment of contacts with selected foreign partners from China and India, which could support the growth and internationalisation of their members. The experience and the model of TPL is being actively promoted in several Western Balkan states, from Montenegro, Macedonia, Serbia and Bosnia and Herzegovina, both by inviting representatives of

³⁰ Interview by Gabriel Rissola and Maja Bučar was held on May 10th with deputy manager Marjana Majerič.

³¹ Majority owner is the Municipality of Ljubljana with 70% share, IJS with 21, the remainder spread among several institutions.

³² SPIRIT/ MGRT programme for the support of innovation infrastructure and SEF support for the Start:up Initiative.

³³ <http://www.tp-lj.si/en/projects>

³⁴ Currently, TPL employs 17 people all together.

these countries to TPL for workshops and by offering their consultancy services directly or through EU to the governments of these countries.

Concluding remarks

TPL sees itself as a promoter of network building and sees its role as a bridge between its members and the government as well as with other relevant stakeholders in the local/ Slovenian ecosystem. Their flexibility is considered as a good practice they have developed over the years. Ability to adjust to different external environment enabled them to not only survive, but develop. Looking for the possibilities to cooperate as widely as possible led them to the current wide partnerships, which often result in positive synergies, opening doors to further collaborations nationally and internationally.

The specific draw back that they see in the ecosystem is the attitude, commonly present in the local culture, which is highly risk averse. Even young entrepreneurs are often hindered in their growth by this: they rather stay small than risk external capital participation if fear of losing the control. But with an improved support network which has been developing in recent years, gradually, this is changing. Here lies an important role for TPL and other intermediaries to provide tailor-made assistance to start-ups.

4.2 Slovenian Innovation Hub

Background

Although the idea of pulling together various partners in establishing an innovation hub has been growing for several years, its actual implementation upon the initiative of the University of Ljubljana and some of the leading research institutes received additional boost with the construction of the new premises for two faculties (Faculty of Chemistry and Chemical Technologies and Faculty of Informatics and Computer Sciences) in between the Technology Park Ljubljana and Faculty of Biotechnology, thus opening the possibility of University campus. In the beginning of 2016, 21 different organisations, from large corporations to research institutions, intermediary organisations and University of Ljubljana, established Slovenian Innovation Hub – European Economic Interest Grouping (SIH). Six other institutions joined later, including couple of centres of excellence. The statutes specify that membership fees depend on the size of the member- number of employees.

Partners in the Slovenian Innovation Hub from academia, business, research, public sector, NGO's co-create state-of-the-art business models, which enables "Multihelix" members of the SIH pursuing excellent research, technological and business advancement.

According to official documents, SIH is active in the areas of³⁵:

- strengthening collaboration with partners between businesses, academic environment and other organizations in the innovation ecosystem nationally and abroad to create critical mass and synergies needed for successful breakthrough in international environment,
- organizing regular meetings in vast areas and scopes of interest for the members,
- advising government on policy issues affecting the innovation activities of members,
- observing and reporting to the members about best practices with the innovative activities worldwide,

³⁵ <http://www.sis-egiz.eu/en/activities/about/>

- reporting on existing and developing new instruments in support for the innovation,
- provide guidelines necessary for new development policies in Slovenia in particularly the ones directly related to the technological or non-technological innovation,
- initiates and implements projects and programs for developing specific areas of innovation and encouraging the use of the key enabling technologies for the industry of the future,
- communicating internationally and nationally on best innovation results of its members, on their networks and successful international collaboration.

The Hub is not funded from the government and its income are primarily membership fees, paid on annual basis.

SIH today

The main activity of SIH today³⁶ is building networks in specific areas of strategic technologies. Since their main aim is to overcome the innovation ecosystem's fragmentation, their focus is on building partnerships for bigger innovation projects in the areas identified as crucial for the strategic development of Slovenia. They acknowledge a number of intermediary institutions already established and have no ambition to replace any of them, but see lack of cooperation between all these relevant stakeholders as the main draw-back. With their membership, personal contacts and the approach, which stresses partnerships in every step, the Hub believes that this fragmentation can be overcome.

One of the key activities since 2017 is hosting of the SRIP Health, which is complementary to their ambition of establishing a Medical valley, connecting the business, research and higher education institutions in wide area of health. SRIP connects small, medium and large companies, leading educational institutions from three national universities, public health care organisations, centres of excellence, leading national research centres, non-governmental associations (including patient associations), intermediary organizations (municipality and regional development agency), a technology park and financial institutions. All together there are 60 legal entities that jointly employ over 4000 people, operating in the fields of health and medicine, life sciences and related industries in Slovenia.

The members of SRIP identified the following six areas of strategic importance for the transformation of the health and medicine: translational medicine, biopharmaceutics, resistant bacteria, cancer treatment, active and healthy aging, herbal and natural cosmetics.

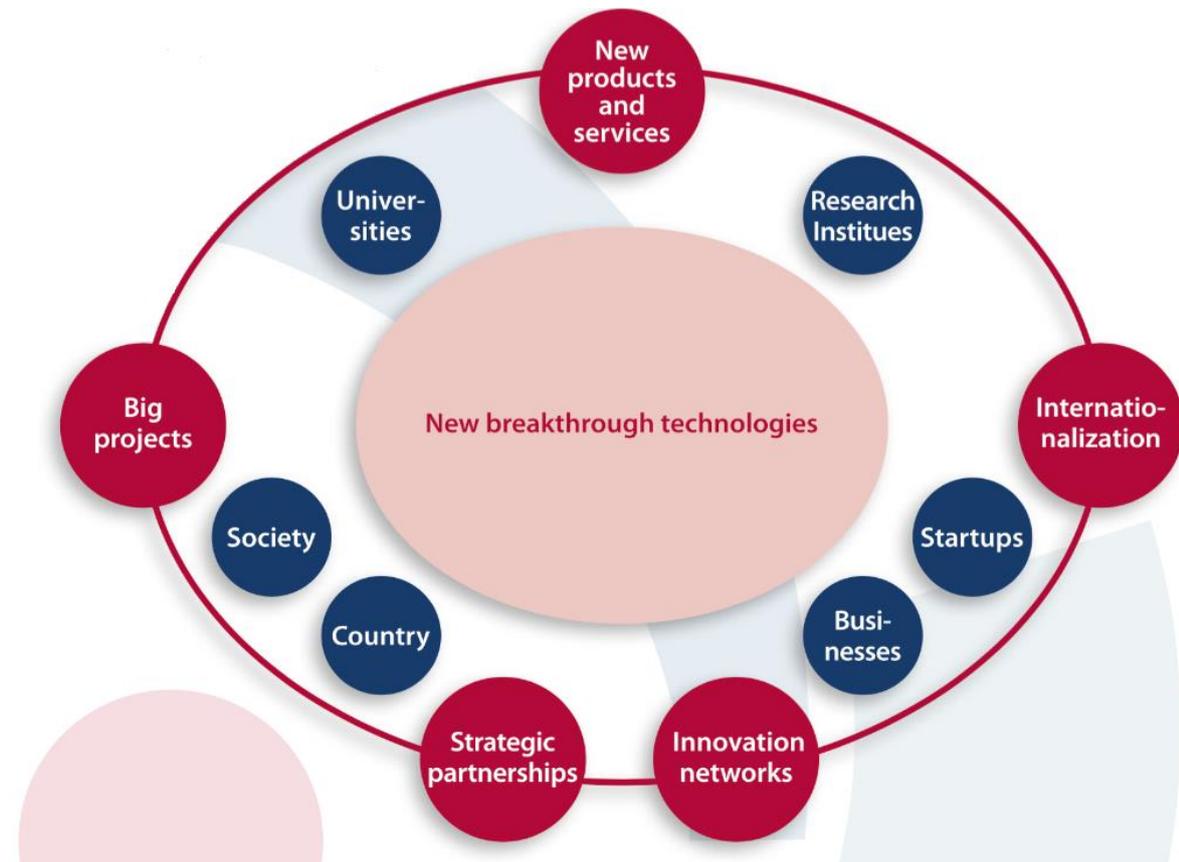
During the interview, other activities were also highlighted. Strategic group, appointed by the members of the Hub, meets regularly and prepares proposals for various larger projects for which Hub then tries to find the funders. Their main idea is already mentioned Medical valley, so project ideas are saturated around technologies and research in this field. Such is their idea, called "medical body" where they are working on establishing a new company based on scientific work in the area of modern prosthetics and bionics. Yet another initiative is construction of elderly community for senior academics and researchers (memory village), where they could live and still actively participate as mentors to younger generation in the fields of their expertise. With this and other ideas they hope to become a focal point in AHA (Active and Healthy Ageing), for the programmes on aging across EU, especially in the area of big data analysis (ICT company Arctur with its supercomputers could be a key player here).

Several other ideas are circulating in the Hub, but the key approach of the management is to get the private enterprises interested in the projects they are initiating. What they are missing is a long-term strategy of the government in terms of priorities and instruments like clusters, centres of

³⁶ Based on the interview with Professor Stane Pejovnik, one of the key initiators of the Hub, was held by Gabriel Rissola and Maja Bučar on May 11th, 2018.

excellence/ competencies, or now SRIPs. These kind of cooperation forms can only exist if there is sufficient government support for a sufficiently long period of time to develop trust among the cooperating partners. Who should be the lead partner, depends on a type of cooperation, according to Prof. Pejovnik. His believe is that industry is not necessary ideal lead partner, since it often happened that they are primarily concerned with their own interests.

Figure 5: Slovenian Innovation Hub's model of collaborative network



Source: Slovenian Innovation Hub³⁷

The Hub's collaborations

As already identified, the main focus of the Hub is on preparation of various large cooperation projects, so by very nature of this activity, it is normal that Hub is involved in cooperation with research institutions and corporations, as well as with the government trying to enlist governmental support for their ideas. They see themselves as mediator between business, research and potential funders: both foreign investors (for example, Japanese investors) as well as Slovenian banks (SID bank, for example³⁸) and capital funds were mentioned during the interview.

Based on the past experience of various forms of cooperation- from clusters, centres of excellence and centres of competencies they estimate that collaboration is a difficult process in Slovenia, primarily because of lack of trust. Yet, the Hub due to the fact that it is formed solely on the principle of partnerships and no government funding should have a better chance to survive.

³⁷ <http://www.sis-egiz.eu/en/activities/work-areas/>

³⁸ SID Bank (SID – Slovenska izvozna in razvojna banka, d.d., Ljubljana) is a promotional development and export bank 100% owned by the Republic of Slovenia.

Through hosting of SRIP health, Hub is involved in S4, yet is relatively critical of the concept. Their belief is that the priorities selected are still not defined precisely enough, due to a lot of conflicting ideas and interests, reflecting the fragmentation of innovation system. The expectations that the S4 will be able to solve all problems of research and business priorities are too optimistic.

Concluding remarks

While the members of the Hub are mostly experienced partners from research and business community, they formally exist for relatively short time. Their contribution to Slovenian and local innovation ecosystem is at the moment felt more indirectly- they do generate government's attention in the policy field and they have released several interesting initiatives, where they have the backing of the research and business community, but lack more decisive support of the government through provision of co-financing of their ideas. The concept they are pursuing depends significantly on obtaining government endorsement (for example to tackle the Junkers' fund), which they have received on a very generalised level.

4.3 ABC Accelerator

Background

The first call for potential investors to join in the initiative to establish an accelerator was issued in the spring of 2015 by the BTC headquarters. The support provided to ABC Accelerator at the beginning came from BTC, XLab, AMCham and newly created ABD Tim company. Among other strategic partners in the project were IBM and University of Ljubljana.

First programmes offered by the ABC were three months long programmes for potential start-ups with international mentors, infrastructure/ technical/ financial support. In exchange for 8% share in the ownership the new-born company received €15,000 cash, access to all the infrastructure available at BTC City for testing the product/ application and up to €250,000 of services offered by IBM over the period of three years. The business model was copied from the USA, in particular from the accelerators observed in Silicon Valley, but adopted to Slovenian legal system. The accelerator is exclusively based on private initiative and is funded by private companies and their goodwill.

ABC today

In three years since their establishment, ABC accelerator has helped more than 100 start-ups.³⁹ Start-ups entering their three + three months programmes, need to be at least 80% ready with their product/ service, so that their market potential can be estimated. During the first three months, the selected start-ups are taken under the wing of selected mentor(s) and receive a lot of training and advice on where to take their business. After the first three months of "learning", the start-up can decide to participate in the next stage, where mentorship is offered to develop contacts with potential investors, distributors, other needed support organisations and potential partners to access global markets successfully. This should give the newly-established company a possibility to build as wide as possible network within a relatively short time. Often, the second three- month period takes start-ups outside Slovenia to various other locations, like USA, UK. During this phase, they need to search for investors to support the scale-up growth of the best in the programme. The ABC is thus a "middle man" picking potential winners, upgrading their business skills and introducing them to potential investors.

The start-ups from Slovenia are invited to join their programmes, but also start-ups from all over the world. They are actively looking for the kind of start-ups, fitting their profile, both at PODIM as

³⁹ Based on the interview with Ales Pustovrh, team member of ABC accelerator, held by Maja Bucar on May 15, 2018.

well as through the networks at home (Start:up initiative) as well as abroad. Here they cooperate with all other partners, including TPL, Venture Factory and other incubators to identify potential start-ups. The start-ups can be developed also from innovative projects in larger companies, where the policy of the main company is to spin-out potentially profitable ideas, which may bear more risk.

At the moment, they have 6 start-ups in regular programme, in the cooperation with Slovenian Tourist Organisation they are working with 3 start-ups in the tourist sector, a new programme is developed for start-ups in energy sector.

The corporations backing the accelerator are financing their activity, expecting to cash in on the exits out of an enterprise, when this enters the stock-exchange or is being sold to the bigger company. Currently only very few exits have occurred, none out of ABC yet. But the first exits identified significant problems in the fiscal measures, especially the way the income generated by sale of stock is taxed. The inflexibility of Slovenian Tax authorities led several companies to move abroad to avoid taxation. The funders of the ABC accelerator so far have not yet raised the question of exists, since it is understood that it takes usually up to six years for the start-up to grow the business to the level of exit.

ABC's collaborations

ABC is an active partner in Start:up Initiative, where they have very good contacts with the main two players, Venture Factory and TPL. The Initiative itself is an excellent example of all Slovenian They help in the organisation of PODIM, especially by announcing the conference in their investors' circles. They see this cooperation as essential to their own activity, since all of the intermediary structures, which support entrepreneurship directly or indirectly, contribute to better entrepreneurship environment. Therefore, they search for the ideas also in public research institutions, universities, and other entities, yet their problem often is, that high-tech ideas born in PROs are not yet at the development stage appropriate to accelerator (they still need to first go the incubators or technology parks). An interesting line of cooperation is with larger corporations in Slovenia, who have even started their own incubators (for example, company Kolektor, who is on one hand their funder, has also established their own incubator).

The key approach, undertaken by the ABC, has always been support of the bottom-up ideas. They do cooperate with the government, but have not received any financial support yet and have managed to develop their activities without it. The flexibility and openness are key working principles.

ABC's view on innovation ecosystem

Slovenia has extensive national innovation ecosystem, with several different types of institutions. The country is too small to have a specific regional (local) innovation system. Already today, one of the problems is lack of cooperation among them. Rather, they compete against each other for the limited public funds available. This means that a lot of energy is wasted on own survival instead on the services they should be providing to entrepreneurs. A strong innovation ecosystem should be broad-based, spaced across the country, combining different types of services and organised in a complementary way- each stage of entrepreneurial development needs specific support. What is according to them the most deficient segment is high-quality capital support to start-ups to enable them to scale-up their activities. For these type of services, the door need to be opened to foreign investors, since only they will open the doors to global markets.

Concluding remarks

ABC accelerator is an important element of innovation ecosystem, especially since lack of financial support has often been cited by SMEs and start-ups as a draw-back to their development. The combination of financial support with mentoring programme and a possibility to build networks both nationally and globally is very important. What is novel for Slovenian environment is that such

an initiative was developed and supported by private corporations. This is essentially different from the approach more common in the country, where different intermediaries have been established as a response to measures and instruments, introduced by the government.

4.4 Venture factory

Background

The initiators of the project were in the beginning of nineties a university professor of entrepreneurship at the Faculty of Economics and Business at the University of Maribor and his assistant who wanted to introduce something similar to the university incubators seen abroad into their university environment. Under the sponsorship of the University of Maribor they first established a non-profit private Institute for Entrepreneurial Research, where part of the activity was the university incubator. The team of the Institute had, through Venture Factory, taken under their wing the organization of the annual scientific conferences on entrepreneurship and innovation PODIM, gradually transforming the event not only towards scientific conferences but also an entrepreneurial event, thus gaining much higher media visibility. In 2007, they launched a competition on the best Slovenian start-up company named Start:up Slovenia. They were also key driver behind Start:up Slovenia Manifesto and Initiative.

Venture Factory today

Venture Factory⁴⁰ is a combination of a university incubator, an entrepreneurship support centre, an organizer of various promotional and scientific events in the area of entrepreneurship and innovation, a small business network, and so on. As the university incubator, Venture Factory offers initial counselling, premises at reduced rates, certain administrative services and specified amount of consultancy to the selected start-ups. Teams can find their work spot in the co-working space called Geek House or rent their own office under very favourable conditions.

Venture Factory⁴¹ is involved in start-up support, competence development for SMEs, policy initiatives, incubation and attracting of investors, especially through the organisation of PODIM, which has become the biggest start-up conference in the region⁴² various training and workshops for entrepreneurial skills. A wide spectrum of activities of Venture factory has been developing through various partnerships, adjusting to the interests of the public and private partners as well as to the challenges in the entrepreneurial environment in the region and the country. This is reflected also in their income, which is generated from various sources. As part of the innovation infrastructure, they receive support from SPIRIT, through the Start:up initiative their services are partly funded by the SEF and partly by the start-ups themselves through the funds they receive from SEF. Important source of income is the PODIM conference with a number of sponsors and partners. They are involved in several EU projects as well as in some projects for particular partners.

The basic principles of operating are flexibility, openness, cooperation and networking. These are expected also from their partners and users of their services.

⁴⁰ <https://www.tovarnapodjemov.org/>

⁴¹ Based on the interview with prof. Miro Rebernik, Faculty of Economics and Business, University of Maribor and Matej Rus, head of Venture Factory, conducted by Maja Bučar on May 22nd.

⁴² In 2018, PODIM had over 1100 participants, with 500 applications of start-ups for Marketplace. 160 most promising start-up were included in the catalogues and had a special Demo day where they could present their activities to potential investors. PODIM attracted distributors like Amazon, Nital, Cylla, Blue Green Group, QoQa and many others. To promote the conference, nine Roadshow events were organised (Zagreb, Belgrade, Sarajevo, Tirana, Priština, Skopje, Podgorica, Klagenfurt and Graz.

Venture Factory's collaborations

Venture Factors is one of the drivers of the Start:up Initiative, where they have very good contacts with TPL and ABC Accelerator. The Initiative itself is an excellent example of all Slovenian endeavour, where a number of partners cooperate very successfully. Through the organisation of PODIM, Venture Factory has entered into collaboration with a wide network of investors, sponsors, regional entrepreneurship agencies and other intermediary structures, which support entrepreneurship directly or indirectly. They cooperate within the RAZ:um, the research and development centre of Maribor University⁴³, stimulating students and staff of the Uni to engage in entrepreneurial activity. In addition, they have close collaboration with the TTO of the University.

Since their main activity is support to start-ups, they are not engaged in research collaborations, but only indirectly cooperate with various departments of the university in transfer of knowledge to incubator. With public authorities they cooperate in shaping the entrepreneurial environment. The Ministry of Economic Development and Technology, SPIRIT and SEF are their partners in several activities, most notably in PODIM and Start:up Slovenia Initiative. They also collaborate in several Interreg projects, which are related to their main activity- promotion of start-ups and entrepreneurship.

Venture Factory's view on innovation ecosystem

Venture Factory has since its beginning been actively involved in shaping the national innovation ecosystem. They were able to adapt to various changes in government's policy as to the financing of intermediary institutions. One of the key problems that they still observe is the lack of cooperation among different stakeholders. This has slightly improved with the Start:up initiative, yet there is still a high level of competition among them for the limited public funds available. Better cooperation and coordination would enable development of more sophisticated and focused services for the entrepreneurs.

Good practice in their eyes is the Start:up Initiative and PODIM conference. What the national policy on entrepreneurship and innovation should avoid is current practice of changing support instruments with every financial perspective and every government. They believe that their activities are organised according to a quadruple helix collaboration principle, since they involve university students and staff, municipality and national government, industry and media in promotion of entrepreneurship and innovation. They were only indirectly involved in S4, through some of their partners.

Concluding remarks

Venture Factory is an important actor in the innovation ecosystem, to which they have contributed with several initiatives. Their specific mode of operation, combining the public and private funding for the services they have developed enabled them to develop early on as a bridge between the two communities. On one hand, they were always close to business initiatives and thus could help their clients to get in touch with private investors. On the other hand, they managed to cooperate with public authorities both at local (municipality) and national level, through attracting the funding and impacting policy. Yet they never depended on the measures and instruments, financed by the government, which gave them the independence and flexibility to develop their own business model.

⁴³ <http://www.raz.um.si/>

4.5 Regional Development Agency of the Ljubljana Urban Region (RRA LUR)

Background

RRA LUR⁴⁴ is the regional Development Agency of the Ljubljana Urban Region⁴⁵ established in 2001 that unites 26 municipalities and communities in Central Slovenia. In the initial stage, the RRA LUR was created as a sort of a platform for supporting the development of the Municipality of Ljubljana, however, it soon after developed into a strong hub with lots of creative ideas that also influence the development of other 25 municipalities of the Ljubljana Urban region. The basic idea of the RRA LUR is to enhance business, infrastructural, social, cultural and creative activities within the LUR. As such, it serves as a platform for enhancing ideas and projects, while at the same time helping the 26 municipalities to achieve a more sustainable development in all abovementioned branches.

RRA LUR today

Today's financing consists of about 20 % of the total budget, disbursed by the state (defined with the law), 10 % by municipalities and other partners of the RRA LUR, while 70 % of the overall budget is obtained on a competitive basis, applying for national and international projects.

Among their activities is the support of the start-ups, mostly by projects in which they are involved. The projects are giving them the possibility to discover new, creative industries that are becoming relevant for the development of start-ups. Related to start-ups, they also offer consultancy, different programmes, summer schools and support for internationalisation; importantly, they are focused mostly on start-ups that are dealing with creative industries. The focus on creative industries started in 2012 (during the economic crisis), when they realised that something should be done for a breakthrough. Because they realised during their previous activities that the creative industries focus in the LUR is missing, they opted for the development of such a centre. Nowadays they are the most prominent institution at the national level that enhances the development of cultural economics/cultural industries. Related to the mentioned activities of RRA LUR, they run strategic projects (cultural industries), develop competences and present policy initiatives to local communities and to the state.⁴⁶ With regard to the strategic research, they prepared the first mapping of cultural industry in LUR and they also financed the development of the creative industry sector in LUR. In respect of industry mobilisation: in the past they coupled together enterprises in the field of wood and wood material and in the field of sanitary protection. What came out as an advantage is that they presented a platform for different institutions to start to "talk to each other". Such spill over effects are important, since different analyses (RIO reports 2014 onwards) clearly stated that one of the weaknesses of the Slovenian RDI system is the lack of coordination and lack of cooperation among different actors. Here, the scholarship system should be mentioned as well (as part of developing competences); RRA LUR with its partners offers different scholarships, which are intended to build competences in different fields.⁴⁷

Regarding the premises: years ago, the RRA LUR had its seat in the premises owned by the Municipality of Ljubljana but some years ago they moved to the Technology Park of Ljubljana, where they rent their premises.

RRA LUR's collaborations

While some projects are launched by the RRA LUR and some others by municipalities, priorities and decisions are taken consensually which means that all priorities done under the umbrella of the RRA

⁴⁴ Based on the interview with Matej Gojčič, deputy director and Tina Pezdirc, project department on May 23rd, 2018.

⁴⁵ In Slovenia there are 12 Regional Development Agencies (RRAs).

⁴⁶ Some of such policy initiatives revolved around how to spend EU funds; how to accelerate the development of cultural industries within a country; how to develop different competences etc.

⁴⁷ The financing of scholarships is as follows: one-half is given by the ESS, one-fourth by the municipality and one-fourth by the enterprise in which the student/pupil will be after the end of his/her school-enrolment employed.

LUR are adopted by the 26 members. Such was also the project on cleaning the river Ljubljanica, which was launched in 2003. This project then evolved into a big project on the renewal of the sewage system that was approved for Ljubljana and some neighbouring municipalities. Outside Slovenia, RRA LUR is involved in EU initiatives and projects. They frequently collaborate in cross-border projects (e.g. INTERREG), especially with CEECs and Alpine states (IT, AT). Most intensive is the cross-border collaboration with Austria. Ultimately, the main idea of RRA LUR is to be part of programmes that are not only focused on current events or research issues, but have a larger context or impact on the region and beyond. The approach adopted by the RRA LUR is a combination of bottom-up/top-down, meaning that they are combining different approaches regardless of who decides to adopt them. Sometimes the proposals come from the “below”, other times they develop the proposal.

RRA LUR’s view on innovation ecosystem

The main factors that influence the regional innovation ecosystem are (a) combination of top-down and bottom-up approaches; establishment of creative (value) chains, finding out the main niches where somebody can perform their ideas; connection of actors, platforms and performers. An added value for the formulation and development of the local innovation ecosystem consists in the role of “critical mass” and “connections among different institutions” and the role of knowledge. One of their advantages is that they (LUR) are of “the right” size to allow experimentation, which is hardly achieved in larger cities. According to them one of the most important development is when the regional development platform grows from “awareness raising” to “practical models”, which can serve as a model for other/similar regions. On the other hand, there are also some things that should be avoided or improved regarding their possibility to help the development of the LUR: (1) stable support from the government, instead that sometimes contracts stipulated by the state have a clause “if there will be funds available”. This often leads to insecurity and problems in the implementation of projects; (2) absence of coordinated state-policies with the budgetary priorities, meaning that in Slovenia it is often the case that priorities set in national documents are then not reflected in the budget or only some of them are. This hinders the predictability of the financing and research/project management; (3) at the state level RRA LUR misses the long-term strategy, which is reflected in the non-coordination of policies conducted by the ministries and government officials.

They support S4, but at the same time they think that there are too many priorities (and therefore the main focus can be lost).

Concluding remarks

The RRA LUR is an important regional institution that strongly influences the local/regional innovation ecosystem. Since it is established by the local/regional municipalities, they also have the interest to support its activities. As it performs different activities (from scholarship scheme to concrete creative industry projects), RRA LUR is trying to support also a different range of actors in the local/regional innovation ecosystem. What is becoming clear is that RRA LUR is becoming more and more independent and the perspective is that in future years the RRA LUR will be a prototype of a regional agency promoting the development of technology/innovation.

4.6 Jozef Stefan Institute (Inštitut Jožef Štefan; IJS)

Background

Founded in 1949, Jozef Stefan Institute (IJS) is the leading (and the biggest) public research organisation in Slovenia, where 824 employees (in FTE) in 2016 led 949 projects and provided a revenue of 47 million €. The main research areas of IJS are physics, chemistry and biochemistry, electronics and information science, nuclear technology, energy utilization and environmental

science. The institute not only collaborates with research actors in Slovenia, but also strongly cooperates with the business/private sector in the field of natural sciences. Among its 'clients' we can find the most prominent Slovenian enterprises (and transnational companies) such as Iskratel, Lek, etc. What should also be noted is that the Technology Park Ljubljana was co-established by the IJS.

IJS today

Being a public research organisation IJS⁴⁸ has an important role in the formation of start-ups. They have their own start-ups, which are not built as spin-offs but rather as spin-outs, since the 1994 Act does not allow public institutions to own their own spin-offs. Spin-outs are developed with long run lasting programmes by forming a contract between IJS and the spin-out, in which the IJS transfers its IPR to the spin-out. Approximately 4 such spin-outs are created per year, one or two remain operational a year after. Nevertheless, since IJS is the founding member of the Technology Park Ljubljana (whose IPR were later transferred to the TPL), it can be understood as para-former of start-ups. In respect of strategic research, IJS cooperates in the field with akin faculties from the University of Ljubljana and with the Institute of Chemistry (sometimes understood as a 'younger brother' of IJS). Strong cooperation between both institutes is also visible in the case of test environments, which are – for IJS – mostly located at the Institute of Chemistry.

The development of competences is an important part of work of IJS both in respect of research and the education process. However, as a research institution, IJS does not offer development of competences for external actors. On the other hand, it has a strong system of competence development for its own staff within the institution itself.

IJS is also the biggest (and most powerful) PRO in Slovenia. Since it has around 950 employees (HC), it also has a strong impact on the developments in the Slovenian research-development and innovation system. Its director usually has a direct link to the minister of science; he is a member of different policy making bodies; his public appearance has an impact and finally, IJS is a sort of a trend-setter in the Slovenian RDI system. Taking this into consideration, it is possible to conclude that IJS exerts a stronger influence on policy initiatives, measures adopted by the Slovenian Research Agency and Ministry of Education, Science and Sport and also on the interconnectivity between the political sphere and the research system.

For IJS, industry mobilisation means that their expertise and results are translated into practice. 80 % of their activities are led by researchers; mobilisation exist, however, it is not based on a systemic approach but rather on a case by case approach. Here, an important role plays personal connections and cooperation.

With regard to incubators, accelerators and science parks, the institute has its own system of incubating; according to the law, the institute cannot be a member of an accelerator, however, IJS is collaborating with the TP Ljubljana since it is also one of its founding fathers. At the same time IJS is also collaborating in trans-border initiatives, mainly with the Science park of Trieste.

IJS is composed of 26 departments, its founder is the state. It generates its revenue through research projects – one-fourth on the national market, one-tenth on foreign markets and the other amount through national research projects and programmes. The owner of its premises is according to the current Law on R&D the state.

IJS' collaborations

As mentioned, IJS's main partners are domestic and foreign enterprises and PROs. In this field, the institute does not attract the "investment attraction", since from 1994 the public research

⁴⁸ Based on the interview with Jadran Lenarčič, CEO, conducted by Gabriel Rissola and Boštjan Udovič on May 10th, 2018.

organisations are not entitled to enrol in the investment attraction. The spin-outs can be sold to domestic or foreign entities. In the past, one spin-out was bought by an American company that still today pays an annual fee for research intellectual property. Nowadays, the spin-outs are 'on market', but the problem are the intellectual property rights which are not just transferred to the spin-out, but a separate contract has to be prepared where the royalties are defined.⁴⁹ In respect of investment attraction, the technology transfer office has to be mentioned as it plays an important role in the structure, covering around 90 % of technology transfer activities in Slovenia. They meet regularly with companies and they also stipulate further cooperation in the field of TT, if it is needed. Finally, while they rarely sell patents and they do not establish joint ventures, they do focus on joint projects (99%) in which they collaborate with companies, especially the abovementioned big Slovenian multinational companies. With regard to the cooperation with SMEs or even small/micro companies, IJS collaborates in joint programmes/projects financed by the state. Thereby, IJS serves as a sort of innovation performer, responding to the needs of these companies. In the past, such collaboration was stipulated by national supporting measures, especially by the innovation voucher that ceased to exist in 2012 and was renewed in 2015 (now known as Process improvements measure, see SPIRIT).

IJS's view on innovation ecosystem

The main contribution of the territorial innovation system is *not* merely territorial since IJS also carries a 'national power'. In this case IJS is influential at home and abroad. Romania, for example, asked the IJS how to organise its own TT. Secondly, some actors are cooperating through IJS on EU projects (IJS acts as a platform). Thirdly, IJS also spreads the knowledge on the relevance of natural sciences, research, technology etc. in grammar and other high schools. Furthermore, IJS also has its own post-graduate school and merges together different faculties from the University of Ljubljana and other. IJS is also raising awareness on different societal challenges (such as air quality in kindergartens; responses at radioactive accidents – IJS has its own nuclear research reactor).

The problem with the S4 are the complex procedures that have to be fulfilled to perform S4 activities, which is also why enterprises are "not interested" in S4. On the other hand, IJS is involved in S4 through its research centres. There, the S4 is mostly a complementary version of previous activities such as centres of excellence and centres of competence, where IJS participated actively and also had a strong impact.

Concluding remarks

In sum, it has to be taken into consideration that the regional ecosystem is strongly linked with the NIS when talking about regional innovation. In Ljubljana, BTC accelerator is quite a strong player in the field of creating interactive moments for firms. IJS thus also cooperates with ABC accelerator. On the other hand, what can exert strong influence on the regional innovation system is the lack of appropriate coordination that should be left to public institutes, which do not see just particular interests, but have a broader picture of what is going on in the field. By establishing a platform led by a public institution, the innovation system can gain a more horizontal and more holistic approach towards the needs of society and can react with the respect of societal issues.

4.7 University of Ljubljana (Univerza v Ljubljani)

Background

The University of Ljubljana (UL) was established in 1919. It has 26 members (23 faculties and three academies). In 2016, its annual budget was 304 million €, it employed 5,730 persons, it had more

⁴⁹ They rarely sell patents.

than 40,000 students and was participating in 428 European projects, 174 research programmes, and 650 projects with industry. Since UL is the biggest, oldest and the only university in Slovenia offering all fields of study (the University of Maribor, Primorska, Nova Gorica etc. are more 'specialised') its role cannot be measured only in the frame of the Ljubljana region because it also has a strong national impact.

UL today

Even though UL is a national university, it is strongly embedded in the local environment in Ljubljana⁵⁰. They not only invest in the preparation of regional development programmes for Ljubljana and strongly collaborate with the Municipality of Ljubljana, but also support the idea of building university campuses, which will support the regional/local innovation ecosystem. One such campus has been built in Brdo/Ljubljana, where UL has three faculties. They are close to the TP LJ and they also cooperate with it through the Slovenian Innovation Hub (Slovensko inovacijsko stičišče - SIS). SIS is extremely important because it presents a sort of an orchestration between businesses, the academic environment and other organizations in the innovation ecosystem nationally and abroad. UL therefore tries to translate their research into practice/application and vice versa. Because the Slovenian Higher Education system is rather complex and faculties have relatively high level of autonomy, UL strives to create a one-stop-point for the cooperation with organisations outside of UL. This would be an important step towards a further integration of processes and a systemic approach within the University, since most activities today are done on a personal basis. Therefore, there is a lack of strategic approach towards the development of regional/national ecosystem cooperation.

UL's collaborations

UL has a specific position, when it comes to the collaboration on RDI with local partners because: it is the biggest national authority in different fields; it has the best specialists on different topics; it offers a platform for development activities and also has its own incubator, meaning that ideas can be tested in practice. Moreover, UL is also linked to other national prominent public research organisations. However, analysis shows there is still not enough cooperation between UL and business enterprises. That is why so much effort is devoted to the development of a single, stable and active technology transfer office. With regard to the field of cooperation, it is possible to say that UL strongly cooperates with the most prominent Slovenian enterprises all around Slovenia (Lek, Krka, Gorenje, Iskra etc.), and thereby disseminates its knowledge and research results to the enterprises. However, this collaboration is usually a combination of top-down and bottom-up approaches, meaning that sometimes the faculties are proposing possible cooperation, while at other times proposals come from the business sector.

UL covers different fields embedded in strategic research. Faculties also have the possibility of being the test environment. Taking into consideration the fact that the primary role of the university is education, UL also develops competences of its members – students and professors alike. Two such projects should be mentioned, where the University is developing competences of its members – PKP and SIPK, both supported by EU Social Fund. PKP is an acronym for the programme where support is provided to the project in which the students and their mentors cooperate with business enterprises on a certain research project. Within the SIPK programme, focus is more on society topics and covers cooperation of students and professors with NGOs or non-commercial partners on joint projects. By enrolling in these two projects, UL enables the spill-over effects not only in the education process, but also in the social and business sector. What is to be noted is that by such projects the UL also creates a source of network capital among future “workers” and “employers”, which is in the modern era condition *sine qua non* for the development of new jobs. There are lots

⁵⁰ Based on the interview with Zlatka Ploštajner, head of projects and Staška Mrak, Head of international office, University of Ljubljana, May 25, 2018.

of other forms of competence improvement such as workshops organised by faculties, cooperation with design/creative industries, etc.

UL's view on innovation ecosystem

Since UL is the biggest university located in Ljubljana, it has lots of possibilities to influence political decision-makers. It does so directly (UL is member of different bodies at the state level) and indirectly (through the Rector's conference, which is a coordinative body for all rectors of Slovenian universities). In respect to cluster organisations, different faculties are members of clusters and other similar cooperation initiatives such as CE, CC, SRIPs, however, the problem is the instability of these measures at the state level. At the level of incubators, UL has its own incubator, known as LUI (Ljubljana University Incubator) that declares its mission as a platform for testing ideas of entrepreneurs in industry. Since UL is a public body they cannot be a member of accelerators, however, they strongly cooperate with the ABC accelerator. The view of UL is that the development of innovative ideas should follow the path: UL – LUI – TP LJ/ABC.⁵¹ Nonetheless, the problem still lies in finances, which are unpredictable and as such do not support long-term projects.

The problem with S4 is not a problem with the approach itself, but more with the development of an appropriate NIS, which has certain advantages as well as disadvantages. The most prominent disadvantage that should be addressed in the future is the lack of stability in the NIS. This means that the government proposes different measures for different EU financial perspectives, which are not interconnected. This means that every time the Government introduces new measures, researchers have to start from the point zero. On the other hand, the old measures are "forgotten" and also lessons learnt are not seriously taken into consideration. The next challenge is the fragmentation of activities among actors. Since there is no clear division among actors and because it is unclear who is dealing with what, there is a problem of duplication. This should be overcome by the establishment of network of TTOs among the biggest institutes and UL. Such connections could bring about different spill-overs.

Concluding remarks

In sum, it is possible to say that UL takes on different roles in the process of the local/regional/national innovation ecosystem: it is a proponent of ideas (faculties, laboratories, individuals), it chairs and/or organises different events (workshops, cooperation activities, etc.), it leads and orchestrates different activities, especially within the research system. Being the most prominent RDI institution in Slovenia, it is strongly embedded in national and international initiatives, especially in the field of basic and applied research.

4.8 National Agency for the promotion of entrepreneurship, FDIs and technology development (SPIRIT)

Background

The Law on Research and Development (OG 96/2002) provided for the establishment of two agencies: Slovenian Research Agency (SRA) and Slovenian Technology Agency (TIA). Whether the first was established soon after the adoption of the Law, TIA was established only in 2004. Parallel with TIA in 2004 the Agency for the promotion of Entrepreneurship and Foreign Direct Investments was formed (JAPTI). At the time, Slovenia's innovation system was based on three bodies – SRA, TIA and JAPTI. The reorganisation of the government as well as the 2008 economic crisis led to the decision that several agencies merged into a single one: in 2012, JAPTI, TIA and the Slovenian Touristic Organisation were merged into a new organisation named SPIRIT. From January 2013,

⁵¹ In 2016, the start-up for the year came from UL (LUI).

SPIRIT was entitled to promote entrepreneurship, innovation activities and tourism. The latter was re-established as independent agency in 2015. From then onwards, SPIRIT financially supports the activities in the field of entrepreneurship and innovation.⁵²

SPIRIT today

SPIRIT⁵³ is an intermediary organisation that serves as an executive agency of the Ministry for Economic Development and Technology (MEDT). The basic purpose of SPIRIT is to enhance the entrepreneurship and innovation/technology activities in Slovenia. SPIRIT launches different measures, among them measures supporting the development of competences; measures influencing policy initiatives; measures supporting industry mobilisation (SPIRIT is mostly focused on SMEs). As a public agency in charge of innovation/technology SPIRIT also supports the innovation infrastructure. Taking into consideration that SPIRIT also covers the area of internationalisation, it is quite clear that different measures are also employed for attracting FDI, but also measures promoting the internationalisation of Slovenian SMEs.

Regarding competences development, SPIRIT offers support through different tenders, enhancing the development of competences in SMEs. Particularly important are public calls for the implementation of trainings in the areas of 'soft entrepreneurship', being "women in entrepreneurship", "family entrepreneurship", "potential entrepreneurship". These instruments have evolved in the last years and are a sort of a novelty in the Slovenian business environment, since they are dealing with issues that were often neglected in the Slovenian RDI system. Taking in the support measures of incubators and technology parks, it is possible to observe that SPIRIT launches different projects; one of the most prominent ones for incubators and technology parks is the call for supportive environment for SMEs, which was last launched in September 2017. This call is open to all actors of the Slovenian innovation system that creates a business-friendly environment for Slovenian SMEs. However, there are also several calls that are opened to single enterprises, where the prominent one in the field of innovation/technology is the Process improvements/*Procesne izboljšave* (PRIZ)⁵⁴, last launched in October 2017. The main idea of PRIZ is to support the improvement of processes in the enterprises and to support the orientation towards (S)industry 4.0. The eligible firms are micro and SMEs that would like to change their processes towards more proactive and lean activities.

The above description demonstrates that SPIRIT is indirectly involved in the Start-up initiative, since it is focused mostly on SMEs, and support of technology parks/incubators. However, what is linked directly to start-ups are the demonstration projects linked to the S4 strategy of Slovenia. One such project was done in the field of energy.

Regarding evaluation,⁵⁵ there are complaints that the evaluation system is linked to the cohesion funds and limits the proper evaluation. This means that the ex-ante evaluation plays an important role, while mid- or ex-post evaluation has a minor impact. The only evaluation that is done is the final evaluation of projects, where it is only inspected whether the applicants have fulfilled their tasks. What is important is that the evaluators/employees of SPIRIT try to perform also in the "in field" evaluation since they are interested in whether the measure launched has achieved its objective adequately. This is also their major role, since they serve as an executive agency of the ministry. As pointed out by some interlocutors, it would be important to have as much information as possible from practice as to allow them circulating also the information to political decision-makers at the MEDT.

⁵² Five people work on technology/innovation issues.

⁵³ Based on the interview with Igor Milek, SPIRIT's department on technology, conducted on May 23, 2018.

⁵⁴ Similar instrument existed in the past as well under the name "process voucher".

⁵⁵ Each tender/call includes its own evaluation system.

SPIRIT's collaborations

As previously mentioned, SPIRIT's partners are mostly SMEs, technology parks and incubators; partners are also involved in different workshops organised by SPIRIT enabling the latter to obtain important information that can be then communicated to the public authorities/decision-makers. Being an executive agency, SPIRIT collaborates with other agencies/actors only when the MEDT decides to do so, since they do not have their own action plan – their action plan must always be confirmed by the MEDT/Government. As such, SPIRIT is therefore a channel for MEDT funds that are mostly linked to the S4 priorities and defined by the Government Office for Development and Cohesion Policy (GODC). However, the complexity of the system in Slovenia hinders the quick reaction to the needs of the innovation/technological environment. This is especially visible after the adoption of S4, where all the priorities have to be in accordance with the S4. This demands a lot of coordination between GODC and MEDT, while SPIRIT is in-between. An observation here is also that compared to the H2020, the calls supported by the cohesion funds are far more complicated.

SPIRIT's view on innovation ecosystem

Factors creating a strong regional environment are: quick responsiveness, stable financial structure, clear priorities and systemic approach towards innovation (not ad hoc). The case in Slovenia is that there are certain disadvantages hindering the development of the system, especially for the SMEs and start-ups. Among them is the complicated system of reporting (appropriate for large amounts but too complicated for small amounts). The next issue are the S4 priorities. Everything in Slovenia is to be linked to S4 and there are too many areas of S4. The result is that sometimes there are no applications for certain tenders because the cost/benefit is not favourable for the applicants. The next weakness is that support organisations (Technology parks/incubators) are 'dependent' on public funds, meaning that they can hardly be independent or develop their main tasks. This could be overcome with a stronger impetus by the state, which could offer a more stable system of financing (a constant share of funds), since it is in the state's interest that support organisations promote the development of innovation and technology.

On the other hand, there are certain strengths that should also be enhanced. The first is that SPIRIT always tries to provide feedback regarding the calls, projects, criteria etc. while also monitoring the development of the project internally. Furthermore, SPIRIT enhances the cooperation among start-ups, even if in a more informal way – they organise meetings among start-ups where they can meet each other, exchange ideas, contacts etc. Here, the idea is that Slovenian SMEs enhance their collaboration and do not perceive themselves as competitors but as possible collaborators.

Concluding remarks

It is possible to say that SPIRIT is an important intermediary agency for executing projects in the field of entrepreneurship and innovation/technology development that are conveyed by the MEDT. As such it is an important player (some of their projects were pointed out also by the IJS director), but to be frank SPIRIT is still predominantly focused on entrepreneurship and FDIs and less on technology/innovation activities. Here are some critical voices that argue that we should re-establish the national technology agency, as Slovenia had between 2004 and 2012. Nevertheless, SPIRIT plays an important role as a national agency and offers a platform for the performance of workshops, which can be a sort of networking tools for Start-ups and other SMEs.

4.9 Slovenian Entrepreneurship Fund

Background

Slovenian Enterprise Fund (SEF)⁵⁶ was established by the government of Slovenia in 1992 as a Fund for Small Business Development, later transformed in the legal format of public fund with the prime focus to support SMEs in their growth and technological upgrading. Significant upscale of their activities happened after Slovenia was able to access structural funds and boost its instruments with these funds. One of the characteristics of SEF is the stability of their measures, which is valued highly by the entrepreneurs. Since the establishment of Start:up initiative, SEF has been instrumental in providing financial support to start-ups directly and indirectly, by supporting some of the services provided by Venture factory and TPL.

In 2017, for example, SEF managed €69 million of their own funds as well as another €240 million of funds from external sources, of which 80% were EU funds.

SEF today

The Fund offers financial instruments in the form of:⁵⁷

- **Start Up Incentives** to young enterprises (start-ups less than 12 months old) in the first development phase;
- **Seed Capital** to young enterprises (less than 5 years old) in the second development phase and their entrance on the market;
- **Venture Capital** for the fast-growing innovative enterprises in the third development phase in the form of capital investments and mezzanine loans together with private investors through venture capital companies;
- **Microcredits** represent direct credits of the Fund at an affordable contractual interest rate;
- **Guarantees** as collateral for bank loans with interest rate subsidy that represent the largest share of the approved funds of the Fund.

Besides these core activities⁵⁸, the SEF is engaged in policy initiatives on behalf of their clients and the events they observe in entrepreneurial sector. They are also involved in restructuring of “their” firms.

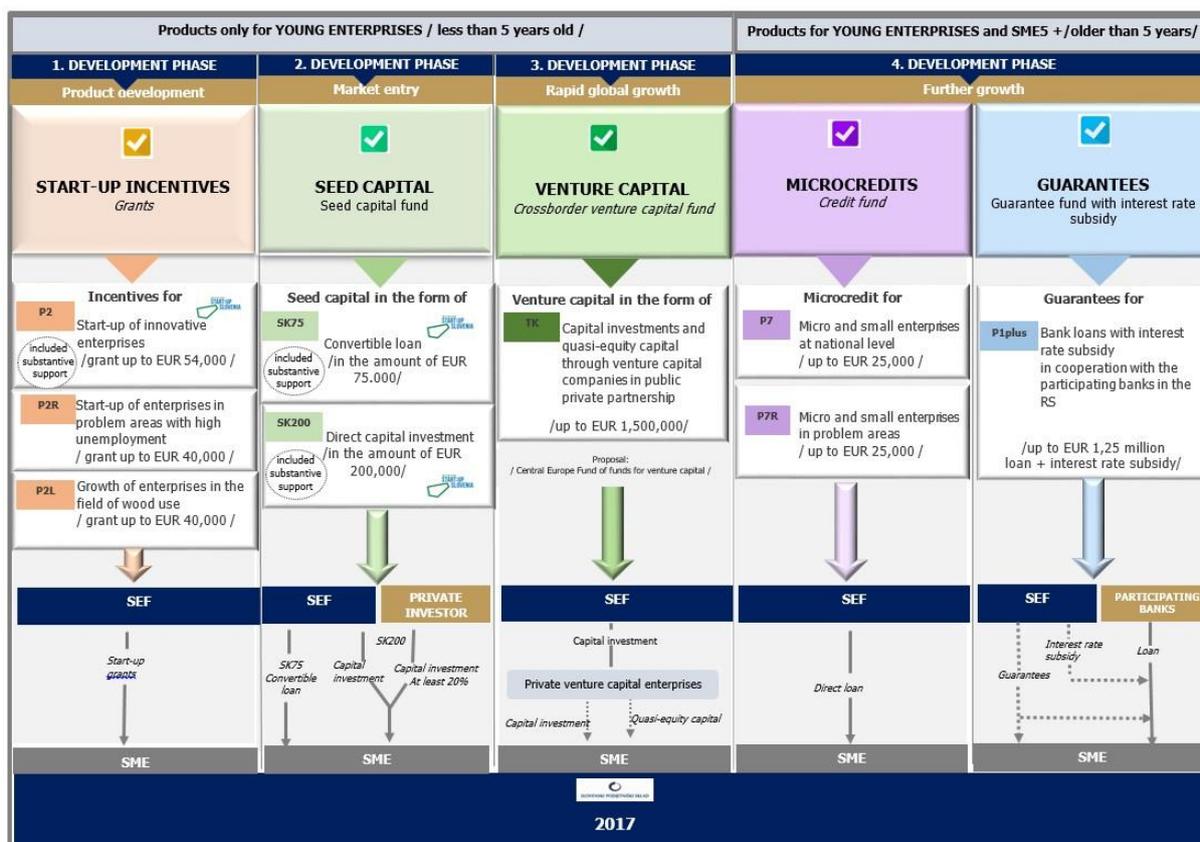
A wide range of formal products that they finance is not sector –based: even if in start-up community many are from ITC sector, they are developing software solutions in many thematic areas, from health to household services. The evaluation process is mostly carried out in house, except for the start-ups, where they cooperate closely with the Start:up Initiative and PODIM, where the competition is used as a selection process.

⁵⁶ <http://www.podjetniskisklad.si/en/about-us>

⁵⁷ See details in Table 2.

⁵⁸ Based on information provided during the interview with Maja Tomanič Vidovič, head of SEF, by Maja Bučar on May 22, 2018.

Table 2: Main products of SEF



Source: SEF web page

They see their major role as an intermediary between the SMEs and start-ups and the financial sector, where with their intervention (guarantees) they lower the risk for the banks at the same time as make the borrowing less expensive for the SMEs.

SEF's collaborations

In particular, SEF sees its collaborative role in Start:up initiative as an example of very good networking, where the decision was made to join forces to bring the best possible support to start-ups and all the partners are keeping their part of the bargain. The open and intensive collaboration, which has developed here is in their opinion something relatively novel for Slovenian ecosystem, where traditionally there was little willingness to step together. The key to success of the Initiative was the common goal of the participating organisations, a lot of open cooperation by several very different players and especially actors from business sector. The Initiative is successful in their opinion also because it has not been mainly driven by the government or public agencies.

The collaboration with other actors should be modelled from the philosophy of Start:up Initiative. The innovation ecosystem should be more transparent and focused on networking between different institutions.

SEF cooperation is developing also towards PROs, mostly through joint workshops where they explain to research staff how financing for start-ups can be arranged. They are closely involved with the Ministry of Economic Development and Technology in shaping the policies and measures, since they are regularly invited to make comments and give suggestions. Through their international network they are able to influence also the EU networks. Their limit is the availability of human resources to cover all these different areas. Their prime goal is promotion of entrepreneurship. Some of the changes Slovenia has introduced with the current financial perspective are affecting

their work- especially the concentration of microcredits from EU structural funds at SID and afterwards distribution both through SEF and the commercial banks. Should this have happened, the SEF's position of being a most favourable credit may change and will not be so popular with the SMEs. They see no reason why the money needs to be channelled to the banks as well. The products of SEF worked well, so they should not be changed or if at all, very carefully.

Collaboration in external programmes is especially intensive in COSME, EU Special Initiatives and as a member of the European Mutual Guarantee Association (AECM). In addition, regional initiatives are numerous, and they are often invited to share their experience. To most of them, they respond, yet they regret that often such participation has limited feedback. SEF has not yet developed a large enough team to cover all the invitations and participate.

Good practices that they see in their own work are especially all the start-ups, which have been selected as start-ups of the year are their "products". As far as the bad practice goes, the most problematic issue is closing in own little "garden" instead of cooperation at the broadest level.

SEF's view on innovation ecosystem

The quadruple helix collaboration has not been developed yet, at least not systematically. Some cooperation beyond the classical triple helix has happened spontaneously, yet for their start-ups the contact with public and market would be beneficial and should evolve more systematically.

S4 was not felt in their projects. They participated in the initial stages, but what has happened later they are not involved. They feel that there has not been sufficient information down to the enterprise level, and at least their clients have received very limited amount of information on the current state of affairs. Even the SRIPs and their activities are not known enough. Someone should take care of the dissemination of information about S4 and possible linkage with start-up communities.

Concluding remarks

SEF is one of the most important players in Slovenian innovation ecosystem. Access to finance is of significant importance and a scheme by which start-ups receive the support in different phases of their development is a unique form of support. This scheme, developed within the Start:up Initiative and implemented in cooperation with other partners, especially by Venture Factory and TPL and other incubators, has changed the start-up scene in Slovenia dramatically.

Not only is the scheme important for the start-ups, it has enabled a stable growth of services, which are provided by several intermediary institutions, also TPL. The environment has become much more proactive, combining several actors in a cooperating fashion not commonly found in Slovenia, be it at local, regional or national level.

4.10 Chamber of Commerce and Industry of Slovenia

Background

The Chamber of Commerce and Industry of Slovenia (CCIS)⁵⁹ is the biggest interest non-profit private organisation, based on non-compulsory membership. It represents business community in various areas of business cycle. CCIS was founded more than 160 years ago and now has 7,000 member companies of all sizes and from all regions. CCIS unites under its roof 24 branch associations representing all sectors of Slovenian Economy. CCIS operates a network of 13 regional chambers. In 2018, they have 120 employees.

⁵⁹ <https://eng.gzs.si/vsebina/About-Us>

CCIS today

CCIS is member of the Economic and Social Council in Slovenia. It has the status of a representative Chamber of Commerce and is thus partner for the government in preparing legislation and policy strategies. It is member in numerous government bodies, boards and committees, supporting them with know-how and expertise. CCIS is a social partner organization and signatory party of more than 20 branch collective agreements.

CCIS as a partner in innovation ecosystem

In their role as a social partner⁶⁰, CCIS sees itself as an indirect partner in the innovation ecosystem, connecting businesses with other partners: research organisations, government and other organisations. CCIS was the founder of the first venture capital organisation in Slovenia, which later attracted some of the larger partners from industry and after Slovenia adopted proper legislation for venture capital turned into a separate, independent venture- capital management company⁶¹.

Since CCIS' membership had changed from compulsory to volunteer, the CCIS has to engage in a number of projects to secure financial resources. About 40- 45% of their income is membership fees, the rest is earnings from national as well as EU projects. They host some of the new interest groupings, like for example, design thinking, circular economy, etc. The CCIS is coordinating two SRIPs (SRIP MATPRO⁶² and SRIP HRANA (FOOD)⁶³) and participates in several others. They were actively involved in EDP through motivating the members to participate in the process and in joining the SRIPs.

CCIS developed the Innovative Slovenia Programme to promote as well as nurture and support the entire process of innovation – from conception to implementation. The programme encompasses several activities, from information on innovation activity, to training courses, internationalisation promotion, counselling and mentorships to innovation awards. Especially the latter is something CCIS has been renown for. The CCIS Innovation Awards have a long tradition, and in 2018, the 19th edition is going to be taking place. New innovative and improved products and production technologies are awarded, as are innovations pertaining to organisation, service provision and marketing. Selection of the CCIS Innovation Award winners is a two-step process. Firstly, the regional chambers invite entries from local innovators, and their projects and innovations are assessed according to a set of criteria, which are applied both regionally and thence nationally. All innovations that meet the application criteria are considered, whilst the best within the individual competitions receive gold, silver and bronze awards. The outstanding innovations from Slovenia's thirteen regions are then considered and judged in the context of a national competition for the country's best innovation, at which it is far from easy to attain a golden award. All entries must meet three main criteria pertaining to originality, viability and contribution to the clean environment as well as several sub-criteria.

CCIS has signed a letter of partnership with TPL to help in establishing contacts between TPL start-ups and larger companies, which are CCIS members. They are involved as a member in the Start:up Initiative. They also cooperate with several other partners at regional and national level, including a whole range of government bodies (Ministry of Economic Development and Technology, Ministry of Education, Science and Sports, Ministry of Foreign Affairs, the agencies SPIRIT and Slovenian Research Agency – SRA).

⁶⁰ Information obtained during the interview with Simona Rataj, head of innovation division, held by Gabiel Rissola and Maja Bučar, May 11th, 2018.

⁶¹ <http://www.rsg-capital.si/en>

⁶² <https://matpro.gzs.si/vsebina/O-Sripih>

⁶³ https://www.gzs.si/zbornica_kmetijskih_in_zivilskih_podjetij/Novice/ArticleId/58639/srip-hrana

In all of these partnerships, the main interest of the CCIS is to promote the solutions which are favourable to their members. This is often done through the organisation of special workshops/ conferences on planned government policies or & instruments, where CCIS members wish to make their contribution to the establishment of innovation and entrepreneurship friendly environment.

CCIS' contribution to territorial innovation and development

For an operative innovation environment, CCIS' view is that the stability is the key issue. The policy and the measures should not change so often as they do in Slovenia, there should be a long-term vision present. The key experience that Slovenia/ CCIS can contribute to other regions is never to give up- if you keep pushing, eventually things can change.

As a good practice, openness and readiness for cooperation was singled out. Networking is the most important way forward, both at national as well as regional or EU level. The initiatives like Erasmus young entrepreneurs, EUREKA and EUROSTARS, etc. are all very valuable to stimulate networking, since often people/ enterprises continue to cooperate even once the project is over.

On the other hand, among things to be avoided, the frequent changes of the main instruments in entrepreneurial and innovation policies were stressed as very important. CCIS, as mentioned, had participated during the process of defining priorities for smart specialisation strategy. They assess that it is good to have a strategy, which is supporting the more propulsive sectors. On the other hand, there should be some space opened to other topics for the future developments. The benefit of S4 is also identification of the main players in each of the priority. The CCIS sees the benefit of its role as a lead partner in SRIPs in the fact that they are neutral player with sufficient competence to act cooperatively and build a community of common interest.

Concluding remarks

CCIS sees its role as a bridging institution, especially between start- ups and larger corporations. Their important contribution to the innovation ecosystem is the representation of business community towards the government in setting up instruments and policies to support entrepreneurship and innovation. Building networks locally, nationally, regionally is their task and a good practice.

4.11 Terra Nullius

Background

The company Terra Nullius⁶⁴ is a member of TPL since 2017. It got enrolled in the start-up support programme in 2012, when it obtained the support of Slovene Enterprise Fund (the product P2, aimed at initial support of Start-up). After successfully completing the programme, it entered TPL in 2017 with the support of next product of SEF, called SK75 (a convertible loan). They have created the web based platform, which helps fishermen in buying process of the fishing licences. On the other side, with the collected information, platform helps water managers to optimize their expenses, gives them opportunity for monitoring the work of the fishing guards and also information about the number of fish caught. The company was one of the start-ups, presented at PODIM 2018.

⁶⁴ <http://www.tp-lj.si/en/members/terra-nullius-d-o-o-3771>

Reflections on TPL

The decision to locate itself in TPL⁶⁵ was primarily based on the TPL's brand name, the advantage of being among other IT start-ups, access to several free workshops, possibility to use the mentorship service and other tailored support services. The connections and visibility, which TPL provided them are very important for the growth of the company.

The aforementioned elements are the key advantages of the location in TPL. With the support received from SPS through first grant (P2) they were able to develop their product enough to attract first clients. Especially mentorship programme, which was tailored to their specific needs, they managed to resolve several business problems and successfully completed the start-up programme. TPL helped them with preparation of the application for the SK75 scheme, offered by SEF, so they have received sufficient stable financial support to fully dedicate themselves to further development of the network in Slovenia as well as in neighbouring Austria. The service they focus on is a niche service, but they are in the process to expanding it beyond just fishing licences by attaching provision of other services to the platform (fishing equipment & clothing, lodging, restaurants, etc.).

In their development, some of the problems they feel are the lack of good software developers at reasonable price (here the Slovenian personal income tax policy was criticised). Availability of financial support is also very important: they preferred the support via SEF than ABC accelerator, which did not seem transparent enough to them in decision on who to accept in the programme and why. In their opinion, the ABC accelerator is more focused on marketing and scale-up possibilities of the companies, while TPL supports high tech ideas, even if only with the local/ regional potential.

They assess that similar entities could be developed in other regions across Slovenia, since they cannot all locate in Ljubljana. But the barriers to wider spread of start-ups are not only in location, but more broadly in the overall mind-set, where business success of small firms is often portrait in a relatively negative tone: as someone who is only interested in profit and quick money making. This attitude has already caused that some good ideas never took off as entrepreneurs. The failure is judged too harshly in Slovenia- everyone should deserve a second chance. In his specific niche, the problem is with the official issuers of the fishing licences- fishing "families" are voluntary organisations, quite commonly staffed with senior fishermen, who do not believe in on-line solutions. The most time consuming process for the firm so far has been to convince these people that it is worth paying a commission to someone who organises the sales of the licenses for them.

For a strong regional innovation environment, it is important that there is sufficient concentration of enterprises, support provided through services and workshops and even informal meetings. TPL organises few times a year so called coffee & wine sessions, where 40-50 companies come and discuss their developments. This creates possibility to develop new contacts as well as peer-to-peer learning.

Terra Nullius's collaborations

Since they are relatively young and small company, they do not have extensive network of collaborators. Many of the public institutions are in their opinion too slow, including the research organisations and universities. They are too academic, away from daily business practice and thus not a possible partner for a small start-up. The one good experience they had in collaboration was with CEED⁶⁶, especially with participation in their networks of companies organised in accordance with the level of development and thus similar problems. In addition, the support provided through their mentorship scheme is very good. Before coming to TPL, they tried to enter Ljubljana University Incubator, but never received any response.

⁶⁵ Text based on the interview with Boštjan Lipnik, CEO, conducted by Gabriel Rissola and Maja Bučar, May 10, 2018.

⁶⁶ <http://ceed-slovenia.org/what-we-do/our-programs/>

Contribution to territorial innovation & development

The good practice established by TPL is building of the community of like-minded enterprises. The support services are important, but the networking and sharing of experience equally so, if not more. This is something other regions could learn from TPL.

Many of the other official support institutions, including SPIRIT, are too slow and too complex. They have once tried to enter the Slovenian Innovation Forum, organised by SPIRIT and found the selection process completely non-transparent, so they no longer participate. Except for the SEF, they are not involved with the “official” institutions. Their assessment is that they lack the understanding of the business process and are too slow in their reaction time. This is affecting the overall attitude towards entrepreneurship, which is resulting in non-stimulating environment, additionally created by wrong reporting in the media. Often, start-ups are portrait as individual undertaking where it is easy to make a lot of money quickly. The reality is that success may take a long time, and only few really make it. On the other hand, the failure is not accepted as a normal part of business life.

They have no knowledge of the Smart Specialisation Strategy of Slovenia.

Concluding remarks

As a current member of the TPL and as a company who has enjoyed the support of the existing mechanisms for start-up support, provided by SEF, Terra Nullius is a good example of the company within local innovation/ entrepreneurial ecosystem. At their stage of development, the local system is of prime importance, since the instruments and the policies at the national level are less relevant for them.

4.12 Cosylab

Background

The company Cosylab (Control System Laboratory)⁶⁷ provides system integration and customer adapted products and solutions, covering the complete area of control systems and instrumentation. Cosylab employs over 180 people, in majority engineers and physicists. The company has its headquarters in Ljubljana, and branches in Sweden, Switzerland, USA, China and Japan. According to the latest unofficial count, they employ people from more than 15 different countries from 4 different continents. They are expert developers and integrators of state-of-the-art software and electronics. The history of the company goes back to beginning of the century when a group of young researchers was working under the wing of Jozef Stefan Institute on their projects. After a successful completion of one of these projects with significant market potential they decided in 2001 to establish their own company within the Technology Park Ljubljana, at the time still located in the vicinity of the IJS.

Cosylab’s reflection on TPL and regional innovation environment

As a spin-out from IJS, they were interested in finding location close to IJS, and with IJS being one of the founders of TPL it seems natural to locate there. The rent was relatively favourable for a start-up and so was the basic infrastructure. The location⁶⁸ is close to other relevant faculties (Faculty of Mathematics, Faculty of Physics, Faculty of Electro-technics and Faculty of Informatics and Computer Science). They did not use the support services, available at the TPL at the time.

⁶⁷ <https://www.cosylab.com/>

⁶⁸ The initial location of old TPL where it started its operation.

The drawbacks of the initial location were the relative age of the building, which needed renovation⁶⁹ and slow IT infrastructure. Instead of following the move of TPL, they have decided to move on another location and rented a new building near the first location so as to maintain tight links with the IJS and the pool of technical faculties.

For Cosylab, the local strengths and opportunities in terms of research and innovation are important. Several facts contribute to this. Ljubljana is the location of:

- the most important Slovenian research institutes and University;
- the government and relevant ministries (where they can cooperate in drawing the policies in the field of RDI and ICT);
- the financial sources, both public and private;
- complementary enterprise, with which they cooperate in different project;
- support environment (TPL, Chamber of Trade and Industry, accelerators, TTO, SPIRIT, etc.);
- numerous events, both business and well as research focused;
- concentration of students, which represents a pool of potential employees;
- provides good quality of living with plenty of opportunities to socialise and relax, which is also important for the successful business;
- attractive location for foreign experts;
- provides good logistics.

A strong regional innovation environment can be created where there is sufficient concentration of enterprises, human resources, higher education institutions, research capacity and sources of finance. In addition, availability of sufficiently modern infrastructure is expected. Very important is also the policy towards innovation and entrepreneurship, especially stability and predictability of available support programmes. Simple administrative rules, which allow for flexible and open communication between business partners without excessive red tape are also important. The innovation support environment should be transparent, with the support institutions having a clear mandate for their own specific field of expertise (without an overlap in what they engage in) and focused on the needs of the market. They should be supported at the beginning from the government, but at least some financing they should be able to obtain on the market as well- this way they will be more proactive.

TPL is in their opinion insufficiently active in providing the transfer from research to the business environment. For too long they were dealing with real estate issues and not focusing on facilitation of the start-ups. They see the TPL as too dependent on support of the government and other semi-public sources of financing to develop sufficiently attractive services for the market during its transformation in recent years.

Cosylab's collaborations

The company believes that they are very active in different innovation activities both locally as well as on Slovenian Level. They have several partnerships with other enterprises and research organisations, provide mentorships to start-ups and well as financial support and cooperate with various support institutions like TPL, ABC, SID, Business Angels. They regularly support PODIM. Cosylab is a partner in planning and developing various strategies at local level (city- Medical valley project, EDISON project) as well as at the national level (SRIPs, ScienceTech initiative⁷⁰ by the

⁶⁹ One of the reasons why TPL was looking for a new location.

⁷⁰ <https://www.gzs.si/sciencetech>

Chamber of Trade and Industry, The Slovenian Chamber of Engineers, ICT Technology Network, etc.). At the regional level, they are involved in projects like SEEIIST⁷¹, PODIM, ESA, CERN, CTA, etc.

Cosylab has regular collaboration with various departments of Ljubljana University in the education process, since this provides them with the human resource pool. At the same time, they involve both students and professors in their research projects. Similar type of cooperation is established with the main research institutes. Currently, especially active is their collaboration with the National Institute of Oncology and IJS on development of advanced Particle Treatment of cancer. Their role in collaborations depends on the project: they can be a lead organisation, a partner, mentor, (co) investor, integrator, as well as the one who takes the first initiative.

Their primary interest is to collaborate in the field of strategic research, but also test environments for some of their solutions. They are active in giving policy initiatives, within the business associations they mobilise other enterprises in their field (ICT Network) and participate in cluster-like organisations (SRIPs).

The main motivation behind different types of collaborations is the benefits for the business, sometimes also strategic long-term ones. The initiative may be undertaken by someone within the enterprise, sometimes also by the external partner. They regularly transfer the results into business processes. As mentioned, their collaborations expand beyond local and Slovenian borders, they cooperate both regionally and globally.

Contribution to territorial innovation & development

Other regions could learn from Slovenia/ Ljubljana's experience how to use EU Structural funds to build/ improve the innovation/ entrepreneurial infrastructure, including TPL. TPL was very successful in integrating the Municipality in its ownership and has thus open itself new possibilities for development. In part, their experience in establishing links with public research organisations can also be transferred as good practice. Their experience in setting up the TPL and integrate it within the entrepreneurial and innovation ecosystem may also be of interest to similar institutions in wider region.

A good practice of Slovenia's innovation policy was the use of systemic financing (Structural Funds) for the building of the infrastructure of TPL and relatively good coordination of government support programmes for the promotion of entrepreneurial ecosystem in some periods in the history. In addition, the development of specialised instruments for the support of start-ups (Slovenian Entrepreneurship Fund) can be considered as good practice.

On the other hand, too much stress on physical infrastructure without adequate provision of services, which attract start-ups and other companies to technology parks is something to be avoided. Better cooperation with the institutes and university, especially their incubators than what was the case in Slovenia should be developed. Very important is adequate legal framework for the IPR. The fragmentation of innovation/ research/ entrepreneurship infrastructure needs to be avoided, since benefits occur in particular from critical mass of such institutions and not by working in isolation. Last but not least important, if the intermediary institution of any kind is to succeed, it needs high quality management and team of experts.

A successful innovation ecosystem requires broad collaboration of various partners, also societal actors and public bodies. This is important for the strategic as well as operational programmes. The exchange of the opinions is transparent enough in Slovenia, but why certain ideas are taken on board and others not is less clear. A drawback for the national ecosystem is continuous changing of the form: establishing of various new entities to cooperate with, with limited evaluation what was good or bad of the previous type of integrating business and science (technology platforms,

⁷¹ Establishment of the South-East Europe International Institute for Sustainable Technologies.

clusters, centres of excellence, competence centres, development centres...). These changes lower the readiness of the business partners to enter such schemes, since they see little potential of a breakthrough.

S4 is highly relevant for Cosylab and for Slovenia, since the country needs priorities for long-term planning. Yet, we have already done similar things in the past and they did not get implemented. The S4 depends too much on the relatively short-term financing- structural funds and is focused on the absorption of the resources available during a particular financial perspective, while it should expand beyond and look more holistically on engagement of different resource mobilisation. The role of state from the triple helix is missing, while the science and business are well represented. It is unclear how S4 is integrated in the long-term development of the country.

Concluding remarks

Cosylab is a high-tech company, well integrated in various collaborations at local, Slovenian and international level. They have overgrown TPL as a support environment, participating in their own capacity as strong co-creator of the Slovenian innovation ecosystem. In spite of some critical comments referred to the lack of coordination and frequent changes of the official innovation policy, the company perceives the local ecosystem as beneficial for their development and have, while expanding internationally, decided to keep their HQ and main research activities in Slovenia.

5 CASE ANALYSIS

The analyses of the main stakeholders of the Ljubljana/ Slovenia's innovation eco-system, combined with the presentation of the governance, strategies and policies applied in development of research and innovation system have been undertaken as the preparation for this part of the study. The ambition here is to try to identify possible enabling/driving factors that may explain the emergence of the studied start-up ecosystem and the innovation agents/intermediaries that facilitate collaboration between the interested parties.

Ljubljana and its Technology Park Ljubljana (TPL) with their position within Slovenian innovation ecosystem contribute significantly to the environment for the start-ups. It is important to recognise the fact that their effectiveness depends significantly on the collaboration with others in the system. In fact, the real dynamics in innovation and entrepreneurial ecosystem started once the closed local circles opened up upon the issuing of Start:up Manifest, which resulted in Start:up initiative and the cooperation at various levels started.

Essential was the bottom-up drive of various institutions who felt that without creating an open cooperation platform bringing together a complete "value-chain" of services to start-up community, the innovation ecosystem was incomplete and non-sustainable.

Local ecosystem is thus closely integrated in the national one and stimulates its development, both through the official channels as well as through creating an environment, friendly to individual initiatives from different sources: be it university students, established researchers or other creative groups or individuals.

The text also presents some of the barriers in the path to development of more effective innovation ecosystem, which are addressed by policy. The strength of the system lies in the fact that there is an in-build ability to diagnose where these weaknesses are and consequently take action to resolve them. However, one needs to acknowledge the time-factor issues; particularly the ones related to change of culture take time and a change from ex-socialist system to open market system with its stress on innovativeness is not accomplished overnight.

5.1 Key enabling factors

The formation of the start-up ecosystem, which we observe in Slovenia today and the broad network of different stakeholders, acting in a coherent manner, is a result of many factors. Slovenia started early on after its independence (see Chapter 3 for details) with support to different intermediary organisations like technology parks and technology centres, to be followed by incubators and regional development agencies. In addition, support provided by the Slovene Enterprise Fund and Centre for Promotion of Small and Medium Size Enterprises (a predecessor to SPIRIT) were there. But only once the collaboration of the intermediary institutions, government support agencies and business community was established through a Start:up Initiative, the comprehensive ecosystem started to flourish and is now creating a lively community within TPL, within Venture Factory, within ABC accelerator and several other entities across the country. By now, there is sufficient interest among business community to provide support through mentorship and funding of accelerators. The business angels are more active, so are several larger Slovenian corporations and investor funds from the region and wider.

One could therefore conclude that while it is important to have a network of different enabling institutions, establishing a working platform for their open collaboration – like Start:up Initiative – is of key importance. The bottom-up initiatives from the business community itself have provided

sufficient motivation for all other stakeholders to form a complementary support system, addressing the needs of start-up community not only through the lenses of their own activity, but through building a comprehensive systematic support in which each one of them played a specific role. This type of coordinated ecosystem provides room for each stakeholder to do what they do best in the mosaic of services start-up enterprise needs: from providing advice on development of creative idea in a business plan (a role of the incubator), providing basic entrepreneurial training and a place to (co-)work (TPL; Venture Factory), supporting the initial stages (SEF), taking a start-up on a growth path (ABC and other accelerators) to providing support to internationalisation (SPIRIT).

The platform got further engaged in policy-making by proposing the government what should be changed in the legal and fiscal system and how the support instruments could be better adjusted to the needs of SMEs in general, not only to start-ups, but also scale-ups⁷². Each of the key actors in the platform (TPL, Venture factory) are expanding their network, engaging business community, potential investors and international partners to further strengthen the entrepreneurial ecosystem. Unless some dramatic change in external environment occurs, one could say that the system established is self-sustainable, building on individual capabilities of each of its members and strengthening them through collaboration.

The coordination and the implementation of the start-up initiative is a good example of building network of stakeholders and creating space for new ideas. The networks are not only virtual, but have led to the creation of several physical spaces for collaboration. TPL has developed Tobogan, a co-working area at its location, ABC accelerator has introduced common space for workshops and meetings within a lively shopping and business mall, the Venture Factory has co-working possibilities. Interestingly enough, following their example several regional initiatives followed⁷³. As noticed in Aalto case study, this type of foundation provides facilitating and enabling factors to empower innovation and entrepreneurial spirit in practice. Provision of appropriate physical space with some knowledge support and advice from facilitators with flexible mind-set and attitude could significantly promote the culture of creativity, new values and business models. In addition, experienced entrepreneurs are attracted both as mentors as well as funders, providing support to start-ups as well as scale-ups.

The experience in creating the local start-up ecosystem could be further replicated in other innovation areas, including cooperation between public research organisations and business enterprises. Thus, for example, TPL sees itself as playing the strategic role in building collaboration space for all of the main stakeholders of the innovation ecosystem, interlinking all them in attempt to further develop the system, foster the commercialisation of knowledge and technologies to advance the competitiveness of the participating business entities. As depicted in the Graph 3 (p. 23), the flows are not one way only, but constant interaction among the actors is what builds a strong regionally based innovation ecosystem.

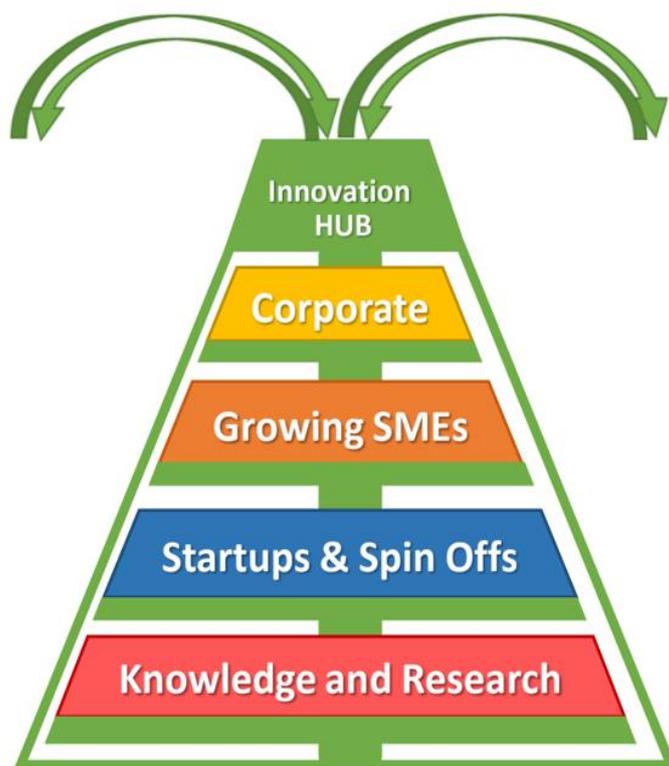
The challenge for TPL is to position itself as a leading actor in development of local ecosystem, especially in an environment where there is at least as much competition as there is readiness to cooperate. While the main mission of TPL, as stated by them, is to address challenges at all levels of the innovation ecosystem (see picture bellow) during the process of innovation and cooperation with each other, this long-term strategy is facing a number of barriers, most of them related to daily subsistence issues. While pursuing their role as a catalyst, TPL still needs to provide the

⁷² In 2018, an initiative was given to the Ministry of Economic Development and Technology to follow the good experience of the Working group on start-ups, establish a new Working group on scale-ups, where the necessary regulative and legal improvements could be discussed by government representatives, intermediary institutions, researchers and most importantly, representatives of scale-up community.

⁷³ All together there are now 11 co-working spaces registered across Slovenia, 20 so called »entities of innovation environment« registered with SPIRIT (most of technology parks or incubators), which are receiving partial support from the agency as well as six transfer of technology offices.

financial resources for their operation: the government support⁷⁴ covers at best 20% of total TPL's budget. Engagement in other activities and projects, where some may fit well within the overall strategy of the TPL, but many do not, may affect their ability to implement their mission. When analysing current activities of TPL, we can observe that in particular, the activities related to start-ups are well developed, increasingly also the SME's growth (through various workshops and business meetings) and gradually involvement of the corporate sector. The segment, which may still require a lot of effort and a specific strategy, is the collaboration of TPL with universities and public research organisations- traditionally less interested in entrepreneurial ideas.

Figure 6: Collaboration pattern in innovation ecosystem



Source: Majerič, M. Presentation of TPL at Western Balkan Countries workshop/training seminar, April 2018.

The active involvement of TPL in facilitating the EDP during the preparation of the Smart Specialisation Strategy could be considered as an important element of building the network with “generators of new knowledge” in the public sector. This may well prove to be the most complex task, since the insufficient collaboration of the PROs and business has often been identified as one of the main problems of Slovenian RDI system (Bucar et al, 2017, 2018).

5.2 Impact of Smart Specialisation Strategy

The Smart Specialisation Strategy, or S4, as it is called in Slovenia, may have an important impact on establishment of another platform(s), much needed in innovation ecosystem- a platform for sustainable collaboration of business entities and public research organisations (PROs). Its main instrument - Strategic research and innovation partnership (SRIP) aims at providing a collaboration space in each of the nine selected priorities of S4. The partners are coming from big business, but

⁷⁴ TPL is listed as one of the “entities of innovation environment” and is thus supported by SPIRIT.

also the SMEs and PROs⁷⁵. This way one of the key challenges of Slovenian innovation ecosystem is being addressed: insufficient collaboration of business sector with public research. The SRIPs are engaged in developing a joint R&D agenda within their specific priority and in doing so, the exchange on existing and planned research, industrial development and challenges, facing the business entities is occurring.

Already in the EDP many partnerships were formed, resulting in the proposals for joint projects in particular priorities. The monitoring of the process of formation of SRIPs confirms that thematic collaboration platforms are established. The dynamics of cooperation varies with regard to how much of the collaboration in particular area was developed already prior to SRIPs: in some areas businesses and research organisations have established contacts already during the cluster support policy⁷⁶, or through centres of excellence/ competitive centres, while in some other priority areas they start from scratch. Since the formal establishment of SRIPs was only implemented in mid-2017, it is too new to evaluate its impact, yet from the evidence available, there are several joint activities/ applications to public calls already in the pipeline.

The interviews to key actors in the ecosystem revealed some issues, which need to be addressed so as to enable further progress. The instrument and the concept of S4 is relatively less known among the start-up community- here the intermediary organisations could do more to promote S4 among their members, pointing out the opportunities collaboration with the priority platforms could offer to them. In addition, the discussions with those involved in the work of SRIPs there were different views as to who may be the most effective manager of SRIP. While currently established SRIPs have already decided on different solutions and have entrusted the management either to a business entity, a chamber of commerce or a public research organisation, additional proposals were that the government should be in charge of coordination or potentially intermediary organisations, like for example, TPL. With further development of SRIPs this issue will be answered automatically: the memberships of SRIPs will see who/ which format serves them best. What is important is to provide policy and financial support for the SRIPs at least long enough for them to become self-sustainable. This will be achieved once the members realise they benefit from working together enough to justify maintaining the platform by contributing both financially and through human resources.

The integration of S4 with Slovenian development strategy could take the impact of S4 even further, especially if the broader framework of quadruple helix is employed. In part this type of cooperation among different stakeholders exists already and was applied when discussing the social elements of development strategy. Yet, this type of citizens' involvement is still at rudimentary level and happens around a specific event, but is not yet systematically applied in policy design or in its implementation. What has by now become a more regular activity, is a triple helix collaboration, which could be best observed during the discussions around RIS3 (EDP), where the three main actors, the business community, researchers and government actively worked on the identification of the priorities.

More diversified collaborations can be identified in the innovation ecosystem as well, from different co-creative processes being developed within Start:up initiative, within various co-working spaces, hackathons, living labs, activities promoting circular economy. Especially the latter integrates the civil society on regular basis, be it through local communities or/ and environmental NGOs.

⁷⁵ Since SRIPs are also coordinating their activities with the government, we could consider them as an example of triple helix. In some cases, the SRIPs activities engage also civil society (like SRIP Health and SRIP Circular economy), entering thus already quadruple helix mode.

⁷⁶ See Chapter 3 for details.

5.3 Transfer of Slovenian experience to Western Balkan

The discussion on possible transfer of Slovenian experience of developing an innovation ecosystem, following the transition from ex-socialist to market economy has been lively for several years. In spreading the experience, especially to Western Balkan, there are a number of reasons why Slovenia has certain comparative advantages and not only because of the common history. Many of the barriers Slovenia had faced on its development path are similar and have to do with the factors, which take a much longer and subtler approach, like change of culture, attitude towards entrepreneurship or risk taking. This is something the country experienced both at the national as well as local level during the implementation of the policies and instruments, which were introduced, following the advice received from various channels.

As mentioned in the introductory text, Slovenia was quick to introduce a number of support institutions, following the good practices observed in other EU countries. But the institution (the building) without the required content and stable support can only have a limited effect. Here, the Slovenian experience can be instructive: developing effective innovation ecosystem takes time, clear agenda and systematic promotion among all stakeholders, but especially among the business community.

The promotion of innovation and entrepreneurship needs to be done by the governments, but to be successful, as the practice of TPL shows, it needs engagement of a broader community. The government can draw the strategy, can provide support to the institutions as well as improve the legislative framework for SMEs and start-ups and assures stability of policies. But it is the collaboration of many partners, which gradually brings about the change in the environment and even research and business culture towards a more innovative and entrepreneurial system.

Therefore, the lessons that Slovenia can share with Western Balkan states is precisely this experience. The barriers that Slovenian intermediary institutions and the government had to face are largely similar to those identified in the WB: lack of finance, lack of human resources, underdeveloped business R&D, lack of overall entrepreneurial culture, etc. As in many other less developed innovation environment, the problem of insufficient cooperation between the public research organisations and the business sector constitutes one of the serious obstacles in transferring the knowledge to innovative products and processes. In part, the business sector finds PROs too slow with lack of entrepreneurial sense. On the other hand, the PROs need to satisfy the expectations of their funders with regard to scientific excellence and internationalisation. In addition, there is an element of distrust present on both sides. So, some of the Slovenian experience may be much more relevant for them than the experience of a more advanced EU country. Still, one needs to adapt the good practices observed in other countries to its own situation and have a long-term plan on reforms and instruments needed to achieve the transition.

Since Western Balkan constitutes one of the priorities of Slovenian foreign policy as well as Slovenian international development cooperation, several Slovenian actors are actively present in these countries. This holds true also for the stakeholders in Slovenian innovation ecosystem, be it government offices, public non-profit organisations or even private investment funds. Among them, Technology Park Ljubljana is actively promoting their model to Western Balkans countries, both through direct bilateral contacts as well as through participating in broader regional initiatives. The experience of TPL in building local innovation ecosystem, especially the start-up ecosystem, is certainly valid for the Western Balkan countries, where a capable technology centre could play a mobilising role in setting the scene for entrepreneurial innovation process. Two issues, however, deserve to be mentioned here. First, while TPL's role may be considered as an important factor in enabling the emergence of the local innovation system, it could not be successful in a vacuum: several other elements and stakeholders need to be present as well. Second, building physical spaces for collaboration is important, yet not sufficient to create an innovation ecosystem. TPL's

premises provide productive environment for collaboration, but it is the facilitation services provided by TPL putting them on the innovation ecosystem map.

6 CONCLUSIONS

Ljubljana with its numerous actors in the innovation ecosystem contributes significantly to the shape and development of the Slovenian ecosystem. As corroborated through the interviews however, there are several stakeholders involved in creation and functioning of the Slovenian innovation ecosystem and the dynamics is shaped by cooperation among them. The system has not evolved instantly and some of its segments are still in the making. Local ecosystem in Ljubljana is closely integrated with the national one and it stimulates the development of the national one, both through the official channels as well as through creating an environment friendly to individual initiatives from different sources: be it university students, established researchers or other creative groups or individuals.

The transition from a previous mostly government led system to the current multi-stakeholder one, where the importance of the bottom-up initiatives has often proven to be a favourable factor of success, is not an easy one and could not be achieved by simply following good practices elsewhere. The most difficult part is the change of mentality of the institutions in many aspects. The universities and public research organisations need to see the collaboration with business as an integral part of their mission, while on the other hand the businesses need to recognise that there is important and useful knowledge available in public research organisations – a knowledge that is not always directly transferable to a marketable product or service but can certainly be further developed towards markets faster and less expensive than by covering the entire RDI on their own. Here many details need to function simultaneously in a harmonised way: from the promotion criteria at public research organisations to support measures like technology transfer offices and collaboration platforms (such as the Slovenian Innovation Hub, SRIPs, etc.).

Gradually, the collaborations within local/ national innovation ecosystem expand and deepen, especially if the support is provided in a stable and transparent manner over a longer time. The common communication language and reciprocal trust are the values that take time to be established as have been amply demonstrated by the examples of some intermediary institutions. It took Venture Factory and TPL years to create a framework for the Start:up initiative. In fact, the real dynamics started once the closed local circles opened up and the multilevel cooperation started. The essential factor for that was a bottom-up drive of various institutions who felt that without creating an open cooperation platform bringing together a complete “value-chain” of services to start-up community, the innovation ecosystem is incomplete and non-sustainable.

The progress in developing an effective innovation ecosystem often depends on the regulatory and institutional enabling factors. Here it is not enough to have high-quality strategic policy documents in place, even though they can help focusing government activity in specific areas of priority, like for example S4 has done for Slovenia. Often, it is the details in specific legal area, which makes it difficult to move forward at higher pace. Just to cite some examples from the previous Slovenian entrepreneurial policy development, which created certain draw-backs: the legal complications for PROs to form a start-up or spin-off, unfavourable tax system in the cases of scale-ups, excessive and time-consuming regulations, etc. Yet, in spite of problems with coordination and cooperation among the government entities, there are more and more cases where the initiatives given by the business community are taken up and gradually the barriers are being removed. The legal framework for the start-ups is one of such positive examples.

The successful build-up of the start-up ecosystem is a good example how important is the consensus among the main stakeholders and their commitment to joint action. With reaching the consensus (through Start-up Manifest⁷⁷) on importance of building a platform for start-up

⁷⁷ https://www.startup.si/doc/Start-up-Manifest_SI.pdf

community, with integrating all of the relevant stakeholders and through their commitment not only the support system has developed, but even the framework conditions were changed. This kind of consensus and commitment still needs to be developed for the overall entrepreneurial and innovation culture, where we can at times observe non-supportive attitudes towards collaboration, such as association of successful entrepreneurs with fraud or more business-oriented researchers with betrayal of higher goals of pure science. Here one needs to recognise that transition processes are lengthy and often frustrating.

The local (in Ljubljana) as well as Slovenian innovation ecosystem are thus developing progressively. An important role in both is played today by a lively young entrepreneurial class, which does not wait for the overall framework to develop. The favourable international environment for digital start-ups, together with the ambition and determination of newer entrepreneurs, are motivating the emergence of the more informal, bottom-up entrepreneurial support system, showcased by various actors - ranging from TPL, Venture Factory, ABC, SEF as well as from many other stakeholders out there, lately increasingly even from the international environment. Many of these start-ups are born-global, so while local is important, the Slovenian territory is not their only focus, nor do they allow any national hindrances in their development. This has increasingly become an important challenge also for the Slovenian policy-makers as they needed to respond to the changed environment much more quickly and in a flexible manner if they wish to build further entrepreneurial ecosystem in the country and avoid an exodus of the potentially fastest growing firms. The intermediary institutions like TPL and Venture Factory have realised this trend some time ago already and are increasingly offering a wide range of support services in the area of internationalisation, hoping that the core activity of their clients will remain in Slovenia, building thus an even more resilient and effective innovation and entrepreneurial ecosystem in the country.

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doi:10.2760/717413

ISBN 978-92-79-98264-4