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International Telecommunication Union

Regional Good Practices

Accelerating innovation, entrepreneurship and digital transformation in Europe

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Foreword

Innovation is at the core of sustainable development, and inclusive digital transformation. The International Telecommunication Union (ITU) gives special importance to innovation, which is one of its five strategic goals since 2018. ITU in collaboration with its members is working to ensure that by 2023, all countries have policies and strategies that foster telecommunication/ICT-centric innovation and contribute to the achievement of the United Nations Sustainable Development Goals, in particular SDG 9 on building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation. Digital innovation helps create jobs, improve services, strengthen economic growth, and foster a knowledge-sharing society.

This regional report, under the framework of the ITU Regional Initiative for Europe on "Information and communication technology-centric innovation ecosystems" provides a comparative analysis on countries, by using existing international rankings on ICTs, innovation and entrepreneurship. It highlights various good practices as well as policies in the European region that can inform decisive actions in nurturing entrepreneurship-driven innovation. These serve as useful lessons for stakeholders across the private and public sector. By providing such examples and analyses, the report equips stakeholders with instrumental know-how and offers them a starting point to create thriving ICT-centric ecosystems.

The COVID-19 pandemic has initiated a period of reflection on the role of innovation in advancing society. Strengthening collaboration and partnerships in this field is vital to move forward. I look forward to continuing to work with all stakeholders and supporting their innovation-led digital transformation journeys.

Doreen Bogdan-Martin
Director, ITU Telecommunication Development Bureau

Executive summary

The ITU Europe region is composed of 46 countries and is very diverse, with regional disparities reflected in the stages of development of the countries' ICT-centric innovation ecosystems. Historically, the European Economic Area (EEA) has scored well in digital transformation indicators, – facilitated by the European Commission drive towards the single market[1] and digital single market[2] with several regulations, directives and initiatives launched over the last decade. The most recent European Union (EU) Member States are, however, quickly catching up, not only by taking advantage of collaboration and exchange of best practices with the more developed ICT-centric ecosystems, but also by designing new innovative solutions to accelerate digital transformation. Thus, innovation in developing ICT-centric innovation ecosystems enables these countries to leapfrog the stages of development of advanced economies and bridge the persisting digital divide. Some countries, however, are more successful than others.

ICT-centric innovation ecosystems have a critical role to play in fostering digital transformation that leads to economic inclusion, positive externalities and sustainable growth for communities, cities and countries. However, ITU research on innovation shows that there is a digital innovation divide among Europe region countries. Non-Western European economies continue to underperform in some or all of the three engines of growth: the entrepreneurship, innovation and technology ecosystems. Despite recent efforts, such ecosystems are not yet successful in mobilizing entrepreneurs, entrepreneurial support organizations, academia, public and private sector stakeholders and financiers to a degree that is sufficient to foster digital transformation in society. Furthermore, although many Europe region countries have high rankings in certain aspects of innovation, entrepreneurship and technology, the region as a whole is still performing below its potential.

The good news is that all countries have recognized the importance of digital transformation and accelerated the implementation of policies to tackle persistent challenges, including countrywide digital agendas, Industry 4.0 strategies, investments in infrastructure, dedicated digital skills and innovation programmes, and facilitation of a more favourable environment for start-ups, researchers and innovators. Numerous good practices across the region are available for the benefit of the countries where gaps have been identified.

The COVID-19 pandemic has highlighted the ever-changing nature of the world and therefore the need for ongoing transformation of nations in light of new unexpected challenges. Although replicating and amplifying good practices in Europe can help countries strengthen their digital innovation ecosystems, it does not preclude them from proposing new innovative approaches in anticipation of the future.

This report is divided into five sections:

The Introduction summarizes the key findings covered in the report, lays out the report objectives, and provides an overview of the role of innovation in sustainable economic and social development. It also outlines recent ITU work on digital innovation, the key challenges

1 https://ec.europa.eu/growth/single-market_en
2 https://ec.europa.eu/digital-single-market/en/shaping-digital-single-market

to innovation in the Europe region and the steps that ITU Member States can take to turn their countries into thriving digital innovation ecosystems.

Section 2 sets the stage for a comparative analysis among countries using existing international rankings, indicators and indexes and provides insights into the current status of the enabling environment for innovation capacity, the engines of growth, and digital transformation enablers.

Section 3 highlights good practices in the European region. It provides snapshots of 15 case studies that demonstrate one, two or all three of the building blocks of ICT-centric innovation: guiding innovation dynamics, building innovation capacity, and integrating ICT innovation into key sectors.

Appendix A explains the methodology. It also defines the language used in the report to help readers understand the research and analysis process. Understanding the research methodology is key to deciphering the relative rankings of countries' innovation capacity. This section also explains the three key building blocks of ICT-centric innovation needed to accelerate transformation

Appendix B provides full case studies of the practices identified in the report. Each practice demonstrates how a barrier has been successfully addressed and its potential to become a working good practice in any ecosystem.

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1 Introduction

This report provides an overview of the innovation capacity of the Europe region through ICT-centric innovation activity comparison and offers an insight into how good practices can strengthen capacity to integrate ICT innovation into national development agendas.

Overall, the development of the ICT-centric innovation ecosystem in the Europe region is not evenly spread. Although the region as a whole is well positioned in terms of the vison and strategy for the development of an innovation ecosystem fit for the digital era, some countries are far ahead of others in initiatives and programmes and are already competing successfully in the global arena. The remaining countries are catching up more or less successfully.

Across the seven enablers of digital transformation identified by ITU (vision and strategy, infrastructure and programmes, talent and champions, capital and resources, markets and networks, culture and communities, and regulation and policy), two-thirds of Europe region countries are struggling, without sufficient provisions for infrastructure, access to finance and resources, skilled talent or market sophistication. However, the biggest challenge for the Europe region lies in the scale of regulation and policies, as about two-thirds of countries lack an adequate environment of entrepreneurship and innovation to enable them to perform well in all four indicators (start-up time, start-up costs, protections against insolvency and intellectual property (IP) protection). The European region is nevertheless quite strong in its "networks and clusters", with 35 countries among the *Top 100 Science and Technology Clusters*[1] ranked in the 2020 Global Innovation Ranking.

This report uses international indexes to monitor aspects of growth and measure discrepancies by comparing the current state of innovation performance by developing and synchronising the three engines of growth and the current state of the seven enablers of digital transformation.

There are many good practices in the region. Each practice presented in this report has been analysed based on its impact on the Ecosystem Maturity Map. Each stakeholder group, at each of the five stages of the entrepreneurial journey, was evaluated on its level of engagement to assess the maturity of the ecosystem. For example, the first stage of the journey for entrepreneurs is entrepreneurial interest, while, for the public sector, the first stage is having a vision and strategy. The Monitor enables stakeholders to visualize the maturity of the ICT-centric innovation ecosystem and identify which practices to maintain, improve or replace.

Many of the traditional national innovation agencies responsible for guiding innovation dynamics can benefit from expanding their mandate to include the building of innovation capacity and integration of ICT innovation into key sectors. Otherwise, they will be restricted to relying on other ecosystem stakeholders.

The importance and relevance of isolating good practices to replicate or scale up – as well as identifying the bad practices to replace – to create a thriving and mature ICT-centric ecosystem is made clear throughout this report. However, understanding digital innovation and learning about the importance of good practices is only the first step of the innovation journey.

[1] https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII-2020/cluster-rankings.pdf

Vibrant ecosystems require stakeholders to organically leverage existing resources and continuously update their policies and programmes to remain competitive. Building an innovation culture at the country level is a journey in which ecosystems develop in stages, and at each stage stakeholders have actions to take and roles to play.

The 2017 ITU digital innovation framework, updated in 2020 with *Bridging the Digital Innovation Divide: A toolkit for developing sustainable ICT-centric ecosystem projects*,[2] offers the tools to develop good practice[3] In addition, Member States can request technical assistance to develop a national profile (see South Africa's report, Digital Innovation Profile: ICT-centric innovation ecosystem snapshot[4]) and interested stakeholders can map policy monitors at the country level, either through holistic country review, such as the Moldova report (ICT-centric Innovation Ecosystem[5]), or a digital innovation profile (see Digital Innovation Profile – Montenegro[6]). Stakeholders can also engage in capacity-building courses, such as the Ecosystems 101 series, where they receive training and certification on the ITU innovation framework.

This report presents a selective overview of the policies, programmes and best practices in the Europe region and offers a starting point for regional stakeholders to understand the dynamics of ICT-centric innovation. For technical assistance from ITU in developing a thriving ICT-centric innovation ecosystem in your country, please contact eurregion@itu.int.

Background

In the digital age, technology use and innovation are ubiquitous. However, countries and regions with limited capabilities contend with challenges and require support in order to be competitive in the global market. Entrepreneurs who find opportunities worth exploring must undertake a journey to turn these opportunities into businesses and deliver products and services to the market. A successful journey results in entrepreneurs delivering problem-solving innovations to their communities and in regional or global markets. But this success depends on many enabling building blocks: talent, infrastructure, capital, market, culture, policies and an overarching vision and strategy alignment that provides the key ingredients of robust and vibrant digital innovation ecosystems.

In many regions, innovators are still struggling. The ingredients needed to facilitate this journey are often missing. Without the required support, they are unable to compete on a regional scale, let alone globally, contributing to a growing digital divide both within and among countries. To close this gap, it is necessary to provide stakeholders, such as policymakers, private sector executives and entrepreneurs with evidence-based guidance relevant to their regions, enabling them to design innovation policies and programmes for their organizations and countries.

Digital innovation is essential for a country to remain competitive in the global market. The ITU digital innovation ecosystems thematic priority identifies and amplifies relevant good practices to build countries' capabilities to become thriving members of the emerging knowledge economy.

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2 The report is available at https://www.itu.int/dms_pub/itu-d/opb/inno/D-INNO-TOOLKIT.2-2020-PDF-E.pdf

3 ITU first toolkit on the subject, Bridging the digital innovation divide: A toolkit for strengthening ICT centric ecosystems is available at https://www.itu.int/en/ITU-D/Innovation/Documents/Publications/Policy_Toolkit-Innovation_D012A0000D13301PDFE.pdf

4 https://www.itu.int/en/ITU-D/Innovation/Documents/Publications/Brochure%E2%80%93DIP%20South%20Africa.pdf

5 https://www.oecd-ilibrary.org/docserver/pub-810fd87d-en.pdf?expires=1588179691&id=id&accname=ocid54015561&checksum=F57F3808A2FB7FC11B5CC250C9E229F2

6 https://www.itu.int/dms_pub/itu-d/opb/inno/D-INNO-PROFILE.MONTENEGRO-2020-PDF-E.pdf

Objectives

ITU Member State priorities (detailed below) entail important provision of evidence-based guidance on measuring innovation capacity for each region. This report provides insights, as well as good practices that can be modified and replicated by innovation champions in local communities to help mainstream vibrant digital innovation ecosystems conducive to a national digital transformation.

This report builds on the first such regional report, *Accelerating Digital Transformation: Good practices for developing, driving and accelerating ICT-centric innovation ecosystems in Europe*, which was published in 2018.[7] That report focused on good practices in Europe which can be examined, replicated and adapted to local contexts to develop thriving digital innovation ecosystems. Based on that previous report and enhancements to the ITU digital innovation framework, the present report is part of a series that will focus on good practices from each ITU region. Sharing and implementing good practices is crucial to improving the performance and productivity of entrepreneurship-driven innovation.

This report offers an overview of the opportunities inherent in accelerating digital transformation in the European region. It provides an understanding of the critical enablers and linkages needed to foster ICT-centric innovation in Europe and examines good practices that can serve as a basis for strengthening digital innovation ecosystems. It also promotes regional and international cooperation, and partnerships in building ICT-centric innovation ecosystems.

Mandate

With innovation increasingly prioritized by policymakers, and in addition to the outcomes of the 2017 World Telecommunication Development Conference and the 2018 ITU Plenipotentiary Conference, the Telecommunication Development Bureau (BDT) has embraced innovation as one of the priorities of the ITU Development Sector (ITU-D).

At the ITU 2018 Plenipotentiary Conference (PP-18) in Dubai, the ITU membership established the Connect 2030 Agenda for Global Telecommunication/ICT Development, a shared global vision for the sustainable development of the telecommunication/ICT sector. Through this agenda, technological advances contribute to accelerating the achievement of the Sustainable Development Goals by 2030. Goal 4, in particular, is to enable innovation in telecommunications/ICT in support of the digital transformation of society.[8] Target 4.1 aims at all countries having policies and strategies that foster digital innovation by 2023.

The main objectives of the ITU Development Sector, defined at the ITU World Telecommunication Development Conference, are to strengthen ITU membership capabilities to integrate ICT innovation into their national development agendas and promote a culture of innovation. This mandate was further developed at the World Telecommunication Development Conference 2017, with an additional goal of developing strategies to promote innovation initiatives, including through public, private and public-private partnerships.[9] Relevant ITU regional initiatives have been incorporated for each region.

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7 https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2018/WSIS/Accelerating%20Digital%20Transformation.pdf

8 https://www.itu.int/en/mediacentre/backgrounders/Pages/connect-2030-agenda.aspx#:~:text=The%20'Connect%202030%20Agenda%20for,Goals%20(SDGs)%20by%202030

9 https://www.itu.int/en/ITU-D/Conferences/WTDC/WTDC17/Documents/WTDC17_final_report_en.pdf

2 ICT-centric innovation: Europe region

The ITU Office for Europe provides assistance to the 46 Member States of the region. The office also acts as the main focal point for ITU Sector Members, associates and academia headquartered in the region, covering the following countries: Albania, Andorra, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Republic of North Macedonia, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, San Marino, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, and the Vatican.

2.1 Engines of growth

Without coordinated and comprehensive intervention, countries are at risk of further widening the digital innovation divide. The current state of innovation ecosystems illuminates opportunities to develop and synchronize the three engines of growth: the technology ecosystem, the entrepreneurial ecosystem, and the innovation ecosystem. International indexes help to measure aspects of growth:

- the ICT Development Index (IDI)[10] published by ITU;[11]
- the Global Innovation Index[12] published annually by Cornell and the World Intellectual Property Organization (WIPO);
- the Global Competitiveness Index[13] published annually by the World Economic Forum;
- the Global Entrepreneurship Index[14] published annually by the Global Entrepreneurship Development Institute.

While each index is useful for measuring individual engines of growth and aspects of the engines of growth in an ICT-centric innovation ecosystem, ITU has extrapolated this data to assess the digital innovation ecosystems in the Europe region. This information is presented in the Table 1.

10 https://www.itu.int/net4/ITU-D/idi/2017/index.html
11 https://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis/methodology.aspx
12 https://www.globalinnovationindex.org/Home
13 http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf
14 https://thegedi.org/global-entrepreneurship-and-development-index/

Table 1: Key engines of growth indicators

Country	ITU IDI Ranking (2017)[15]	Global Innovation Index Ranking (2020)[16]	Global Competitiveness Index Ranking (2019)[17]	Global Entrepreneurship Index Ranking (2018)[18]
Albania	89/176	83/131	81/141	83/137
Andorra	30/176	-	-	-
Austria	21/176	19/131	21/141	14/137
Belgium	25/176	22/131	22/141	17/137
Bosnia and Herzegovina	83/176	74/131	92/141	95/137
Bulgaria	50/176	37/131	49/141	69/137
Croatia	36/176	41/131	63/141	54/137
Cyprus	28/176	29/131	44/141	32/137
Czech Republic	43/176	24/131	32/141	38/137
Denmark	4/176	6/131	10/141	6/137
Estonia	17/176	25/131	31/141	23/137
Finland	22/176	7/131	11/141	12/137
North Macedonia	69/176	57/131	82/141	66/137
France	15/176	12/131	15/141	10/137
Georgia	74/176	63/131	74/141	77/137
Germany	12/176	9/131	7/141	15/137
Greece	38/176	43/131	59/141	48/137
Hungary	48/176	35/131	47/141	50/137
Iceland	1/176	21/131	26/141	7/137
Ireland	20/176	15/131	24/141	8/137
Israel	23/176	13/131	20/141	16/137
Italy	47/176	28/131	30/141	42/137
Latvia	35/176	36/131	41/141	44/137
Lichtenstein	-	-	-	-
Lithuania	41/176	40/131	39/141	29/137
Luxembourg	9/176	18/131	18/141	20/137

15 https://www.itu.int/net4/ITU-D/idi/2017/index.html
16 https://www.globalinnovationindex.org/Home
17 http://reports.weforum.org/global-competitiveness-report-2019/competitiveness-rankings/
18 https://thegedi.org/global-entrepreneurship-and-development-index/

Table 1: Key engines of growth indicators (continued)

Country	ITU IDI Ranking (2017)[15]	Global Innovation Index Ranking (2020)[16]	Global Competitiveness Index Ranking (2019)[17]	Global Entrepreneurship Index Ranking (2018)[18]
Malta	24/176	27/131	38/141	–
Moldova	59/176	59/131	86/141	92/137
Monaco	19/176	–	–	–
Montenegro	61/176	49/131	73/141	60/137
Netherlands	7/176	5/131	4/141	11/137
Norway	8/176	20/131	17/141	21/137
Poland	49/176	38/131	37/141	30/137
Portugal	44/176	31/131	34/141	31/137
Romania	58/176	46/131	51/141	46/137
San Marino	–	–	–	–
Serbia	55/176	53/131	72/141	74/137
Slovakia	46/176	39/131	42/141	36/137
Slovenia	33/176	32/131	35/141	25/137
Spain	27/176	30/131	23/141	34/137
Sweden	11/176	2/131	8/141	9/137
Switzerland	3/176	1/131	5/141	1/137
Turkey	67/176	51/131	61/141	37/137
Ukraine	79/176	45/131	85/141	73/137
United Kingdom	5/176	4/131	9/141	4/137
Vatican	–	–	–	–

Source: Adapted from ITU IDI, Global Innovation Index, Global Competitiveness Index, Global Entrepreneurship Index

ITU has also developed a colour-coding system using the following parameters:

- Green indicates strong performance and presence of good practices. The threshold was set for a country in the top quartile (the top 25 per cent) based on the overall index ranking.
- Yellow indicates insufficient performance but presence of some good practices. The threshold was set as a country within the middle quartiles of the ranking (between 26 and 75 per cent).
- Red indicates poor performance with absence of or very few good practices. The threshold was set as a country falling within the bottom quartile (the bottom 25 per cent).

Each index rankings are calculated to provide a snapshot assessment of the engines as follows:

- **Global Entrepreneurship Index**: countries that rank 1–34 have a strong performance (green), 35–102 indicates insufficient performance (yellow) and 103–137 indicates poor performance (red).
- **ITU Development Index (IDI)**: countries that rank 1–44 have a strong performance (green), 45–132 indicates insufficient performance (yellow) and 133–176 indicates poor performance (red).
- **Global Innovation Index**: countries that rank 1–32 have a strong performance (green), 33–96 indicates insufficient performance (yellow) and 97–129 indicates poor performance (red).
- **Global Competitiveness Index**: countries that rank 1–35 have a strong performance (green), 36–105 indicates insufficient performance (yellow) and 106–141 indicates poor performance (red).

Table 2 uses these indexes as a proxy for the engines of growth. The entrepreneurial ecosystem is represented by the Global Entrepreneurship Index, the technology ecosystem is represented by the ITU IDI and the innovation ecosystem is represented by the Global Innovation Index. Using the data presented above and the colour-coding scheme, the performance monitor for the three engines of growth is presented in Table 2.

2.2 Europe region ICT-centric innovation performance

The information in Table 2 demonstrates the performance of the three engines of growth in countries in the European region. There is a distinct division between European Union countries and the United Kingdom, and non-European Union country performances. With the exception of Bulgaria, Hungary, Slovakia, and Romania, all European Union countries (and the United Kingdom) demonstrate a high level of performance and good practices in at least one of the three engines of growth, whereas all but one (Macedonia) non-European Union countries underperform in all three engines of growth, although they demonstrate some good practices. Nevertheless, the level of performance is insufficient to take the region's ICT-centric innovation to its full potential.

Among European Union countries, Italy and Greece score lower in performance on two of the three engines of growth, and the Czech Republic, Croatia, Latvia, Lithuania, and Poland, underperform in one or two engines of growth. Bulgaria, Hungary, Romania and Slovakia perform less well in all three engines of growth.

Table 2: Three engines of growth for ICT-centric innovation of the Europe region

Country	Income level (2019)[19]	Entrepreneurial ecosystem performance (Global Entrepreneurship Index 2018)	Technology ecosystem performance (ITU IDI 2017)	Innovation ecosystem performance (Global Innovation Index 2019)	Innovation performance (2019)
Albania	Upper-middle income	Yellow	Yellow	Yellow	In line with expectations for level of development
Andorra	–	–	Green	–	–
Austria	High income	Green	Green	Green	In line with expectations for level of development
Belgium	High income	Green	Green	Green	In line with expectations for level of development
Bosnia and Herzegovina	Upper-middle income	Yellow	Yellow	Yellow	In line with expectations for level of development
Bulgaria	Upper-middle income	Yellow	Yellow	Yellow	In line with expectations for level of development
Croatia	High income	Yellow	Green	Yellow	In line with expectations for level of development
Cyprus	High income				In line with expectations for level of development
Czech Republic	High income	Yellow	Green	Green	In line with expectations for level of development
Denmark	High income	Green	Green	Green	Above expectations for level of development
Estonia	High income	Green	Green	Green	In line with expectations for level of development

[19] Adapted from the 2019 Global Innovation Index (https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2019.pdf)

Table 2: Three engines of growth for ICT-centric innovation of the Europe region (continued)

Country	Income level (2019)[19]	Entrepreneurial eco-system performance (Global Entrepreneurship Index 2018)	Technology ecosystem performance (ITU IDI 2017)	Innovation ecosystem performance (Global Innovation Index 2019)	Innovation performance (2019)
Finland	High income	Green	Green	Green	Above expectations for level of development
France	High income	Green	Green	Green	Above expectations for level of development
Georgia	Lower-middle income	Yellow	Yellow	Yellow	Above expectations for level of development
Germany	High income	Green	Green	Green	Above expectations for level of development
Greece	High income	Yellow	Green	Yellow	In line with expectations for level of development
Hungary	High income	Yellow	Yellow	Yellow	In line with expectations for level of development
Iceland	High income	Green	Green	Green	In line with expectations for level of development
Ireland	High income	Green	Green	Green	Above expectations for level of development
Israel	High income	Green	Green	Green	Above expectations for level of development
Italy	High income	Yellow	Yellow	Green	In line with expectations for level of development
Latvia	High income	Yellow	Green	Yellow	In line with expectations for level of development
Lichtenstein	–	–	–	–	–

Table 2: Three engines of growth for ICT-centric innovation of the Europe region (continued)

Country	Income level (2019)[19]	Entrepreneurial ecosystem performance (Global Entrepreneurship Index 2018)	Technology ecosystem performance (ITU IDI 2017)	Innovation ecosystem performance (Global Innovation Index 2019)	Innovation performance (2019)
Lithuania	High income	Green	Green	Yellow	Below expectations for level of development
Luxembourg	High income	Green	Green	Green	In line with expectations for level of development
Malta	High income	–	Green	Green	In line with expectations for level of development
Moldova	Lower-middle income	Yellow	Yellow	Yellow	Above expectations for level of development
Monaco	–	–	Green	–	–
Montenegro	Upper-middle income	Yellow	Green	Yellow	Above expectations for level of development
Netherlands	High income	Green	Green	Green	Above expectations for level of development
North Macedonia	Upper-middle income	Yellow	Yellow	Yellow	Above expectations for level of development
Norway	High income	Green	Green	Green	In line with expectations for level of development
Poland	High income	Green	Yellow	Yellow	In line with expectations for level of development
Portugal	High income	Green	Green	Green	In line with expectations for level of development
Romania	Upper-middle income	Yellow	Yellow	Yellow	In line with expectations for level of development

Table 2: Three engines of growth for ICT-centric innovation of the Europe region (continued)

Country	Income level (2019)[19]	Entrepreneurial ecosystem performance (Global Entrepreneurship Index 2018)	Technology ecosystem performance (ITU IDI 2017)	Innovation ecosystem performance (Global Innovation Index 2019)	Innovation performance (2019)
San Marino	–	–	–	–	–
Serbia	Upper-middle income	Yellow	Yellow	Yellow	In line with expectations for level of development
Slovakia	High income	Yellow	Yellow	Yellow	In line with expectations for level of development
Slovenia	High income	Green	Green	Green	In line with expectations for level of development
Spain	High income	Green	Green	Green	In line with expectations for level of development
Sweden	High income	Green	Green	Green	Above expectations for level of development
Switzerland	High income	Green	Green	Green	Above expectations for level of development
Turkey	Upper-middle income	Yellow	Yellow	Yellow	Below expectations for level of development
Ukraine	Lower-middle Income	Yellow	Yellow	Yellow	Above expectations for level of development
United Kingdom	High income	Green	Green	Green	Above expectations for level of development
Vatican	–	–	–	–	–

Source: Adapted from ITU IDI, Global Innovation Index, Global Competitiveness Index, Global Entrepreneurship Index

2.3 ICT-centric policy and strategy

While having separate policies on innovation, entrepreneurship and technology is a start, it is not enough to enable a digital innovation ecosystem. To enable the digital transformation of economies and ensure their global competitiveness, policies are needed that simultaneously

impact all three ecosystems. The existence of policies in itself does not reflect a complete picture of an ICT-centric innovation ecosystem. However, it is still necessary to assess the implementation and comprehensiveness of existing policies for the three engines of growth, as well as how they complement one another, to both understand the degree to which a country has prioritized ICT-centric innovation, and how effectively it can enable the ICT-centric innovation ecosystem.

To be successful, policies need to specifically target ICT-centric innovation. For example, an entrepreneurship policy may enable start-ups and small and medium-sized enterprises (SMEs) in specific sectors but overlook technology entrepreneurship, while a technology policy may focus solely on state-led technology development and fail to consider the role of start-ups in driving innovation. Table 3 indicates existing ICT-centric ecosystem policies in innovation, entrepreneurship and technology.

Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
Albania[20]	National Strategy for Development and Integration (2014-2020)[21]			x
	Business and Investment Development Strategy 2014-2020 (BIDS)[22]	x		x
	Digital Agenda for Albania 2015-2020[23]	x	x	x
	Action Plan 2017-2021: Support the development of innovative policies based on the Triple Helix approach[24]			x
	Women's Entrepreneurship Action Plan (2014-2020)[25]	x		x
	National Strategy for Science, Technology and Innovation (2017-2022)[26]		x	x
	National Employment and Skills Strategy (2014-2022)[27]	x		
Andorra	Andorra policy initiative in collaboration with MIT to become a smart country[28]		x	x
Austria[29]	Digital Austria 2019[30]	x	x	x
	Digital Roadmap Austria 2017[31]	x	x	x

20 https://www.itu.int/en/ITU-D/Innovation/Documents/Publications/Albania%20Country%20Review%20Innovation%20June%202016.pdf
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30 https://www.digitalaustria.gv.at/
31 https://www.digitalroadmap.gv.at/

Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
	Artificial Intelligence Mission Austria 2030[32]		x	
	Zuzugsbegünstigung (Policy on tax deduction on research income for immigrants working as scientists and researchers)[33]	x		x
	SME.digital (KMU Digital) 2017-2018[34]	x	x	
	Open Innovation Strategy for Austria[35]			x
	Industrie 4.0 Austria strategy (pilot factories)[36]	x	x	x
Belgium[37]	Federal strategy: Digital Belgium 2015[38] and regional strategies: Industrie 4.0, Digital Wallonia, beDigital. Brussels[39]	x	x	x
	Regulatory mobile health sandbox 2016[40]	x	x	x
	Digital Act 2016[41]		x	
	Open Data Strategy 2017[42]		x	
	StartUp Tax Shelter Regulation[43]	x		
Bosnia and Herzegovina[44]	Policy of Electronic Communications of Bosnia and Herzegovina (2017-2021)[45]		x	x
	Strategy for the Development of SMEs 2016-2020[46]	x		x
	BIH Strategic Framework 2015[47]	x	x	x
	Public Administration Strategy (2018-2022)[48]	x	x	
	Law on Bankruptcy 2016[49]	x		

32 https://www.ai4eu.eu/news/artificial-intelligence-mission-austria-2030

33 https://investinaustria.at/en/downloads/brochures/ABA-r-and-d-austria.pdfhttps://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20009641

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49 http://ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=104629&p_country=BIH&p_count=398

Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
Bulgaria[50]	Digital Bulgaria 2025[51]	x	x	x
	Industry 4.0 Bulgaria[52]		x	x
	Electronic Communications Networks and Physical Infrastructure Act 2018[53]		x	
Croatia[54]	eCroatia 2020 Strategy[55]	x	x	x
	Smart Specialization Strategy (S3) for the period 2016-2020[56]	x	x	x
	Strategy for Broadband Development (2016-2020)[57]		x	
	Digitizing Impulse 2020: Industry for Future (DIGIMP 2020-Industry4Future)[58]	x	x	x
	Israel and Croatia Fintech Collaboration Pact 2019[59]	x	x	x
Cyprus[60]	Cyprus Digital Strategy (2012)[61]	x	x	x
	National Strategy on Research and Innovation (2019-2023)[62]	x	x	x
	Startup Visa[63]	x		x
	New Industrial Policy (2019-2030)[64]	x	x	x
	Cyprus Investment Programme[65]	x		x

50 https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_bulgaria_-_final_2019_0D321A4A-044E-25BE-662DADCE68FAF893_61229.pdf
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Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
Czech Republic[66]	Innovation Strategy of the Czech Republic (2019-2030)[67]	x	x	x
	Digital Czech Republic 2018[68]	x	x	x
	Act on Investment Incentives[69]		x	x
	National Artificial Intelligence Strategy (NAIS) 2019[70]	x	x	x
	National Space Plan (2014-2019)[71]	x	x	x
	Smart Specialization Strategy[72]	x	x	x
	Digital Education Strategy 2020[73]	x	x	
Denmark[74]	Startup Denmark Visa[75]	x		
	Strategy for Denmark's Digital Growth 2018[76]	x	x	x
	Digital Strategy 2016-2020[77]	x	x	
	Digital Health Strategy 2018[78]		x	x
	National Strategy for Artificial Intelligence (2019-2023)[79]		x	x
	Denmark Digital First Approach[80]		x	
	Agile Business Regulation (Agil Erhvervsrettet reguler-ing)[81] 2018	x		x
	GovTech Programme Denmark[82]		x	x
Estonia[83]	E-Residency[84]	x		

66 https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_czech_republic_-_final_2019_0D3027BA-B726-834E-C0629C3CD9B202F0_61201.pdf
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84 https://e-resident.gov.ee/

Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
	Digital Agenda 2020[85]	x	x	x
	e-Estonia[86]		x	
	ICT Development Programme (2017-2020)[87]	x	x	x
	Estonian Entrepreneurship, Growth Strategy (2014-2020)[88]	x		x
	National AI Strategy (2019-2020)[89]		x	
	Estonian StartUp Visa[90]	x		
Finland[91]	National AI Strategy 2017[92]	x	x	x
	Finnish Startup Permit[93]	x		
	Digital Finland Framework 2018[94]	x		x
	Public sector ICT Programme 2015[95]		x	
	Government Action Plan (2018-2019)[96]		x	
France[97]	Action Plan for Business Companies' Growth and Transformation (Loi PACTE) and the "profit-with-purpose company" 2018[98]	x		x
	Passport Talent initiative[99] and the French Tech Visa[100] 2016	x		
	Stratégie Numérique du Gouvernement (Government Digital Strategy) 2015[101]	x	x	x
	Transformer notre Industrie par le Numérique (Transform our Industry through Digitalization Roadmap) 2018[102]	x	x	x

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102 https://www.gouvernement.fr/partage/10516-plan-d-action-pour-transformer-notre-industrie-par-le-numerique f

Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
	Tax Reduction Scheme for SMEs[103]	x	x	x
	Law for a Digital Republic 2016[104]		x	x
	Grand Plan d'Investissement (National Investment Plan) 2018-2022[105] *and Programme d'Investissement pour l'Avenir* (Investment Programme for the Future 3) 2010-2020[106]	x	x	x
	French Strategy for AI[107]		x	x
Georgia[108]	Georgia Enterprise IT Strategic Plan – 2025[109]		x	
	e-Georgia strategy (2014-2018)[110]		x	
	SME Development Strategy 2016-2020[111]	x		x
	Anti-corruption Strategy of Georgia[112]	x		
	Produce in Georgia Programme 2014	x		
	Unified Strategy for Education and Science (2017-2020)[113]	x	x	x
Germany[114, 115]	Digital (High-Tech) Strategy 2025 in 2016[116]	x	x	x
	National Industry Strategy 2030[117]	x	x	x
	Shaping Digitalization – Implementation Strategy of the Federal Government 2018[118]	x	x	x
	AI Strategy 2018[119]	x	x	x
	High-Tech Strategy 2020 Action Plan[120] in 2014	x	x	x
	Future of the German Mittelstand Action Programme 2017[121]	x		x

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Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
	National eGovernment Strategy (NEGS) 2010[122]		x	
	German Act on Tax Incentives for R&D[123] 2020	x	x	x
Greece[124, 125]	National Digital Policy (NDS) 2016-2021[126]	x	x	x
	National Research and Innovation Smart Specialization Strategy (RIS3)[127]	x	x	x
	National Action Plan: Digital Skills[128] 2018	x	x	x
	Income Tax Code (ITC): Tax Incentives for Patent-based Products[129]	x		x
Hungary[130]	Irinyi Action Plan 2017[131]	x	x	x
	Industry Development Strategy 2016 (IPAR 4.0 National Technology Platform)[132]	x	x	x
	Digital Educational Strategy[133] 2016	x	x	
	Digital Start-up Strategy[134] 2016	x		x
	Digital Export Development Strategy[135] 2016	x	x	
	National Infocommunication Strategy 2014-2020[136]	x	x	x
Iceland[137]	Iceland 2020[138]	x	x	x
	Science and Technology Council Action Plan (2017-2019)[139]		x	x
	Icelandic Government Policy on the Information Society (2008-2012)[140]	x	x	x

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Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
	Strategy on Innovation[141] (2019-2050)			x
	Innovation Policy 2019-2030[142]	x	x	x
Ireland[143]	Innovation 2020[144]	x	x	x
	National Development Plan (2018-2027)[145]	x	x	x
	Enterprise 2025 Renewed[146]	x	x	x
	Future Jobs Ireland 2019[147]	x		x
	National Digital Strategy 2019[148]	x	x	x
	Plan for Education Framework (2016-2019)[149]	x		
	Public Service Data Strategy (2019-2023)[150]	x	x	
	e-Government Strategy (2017-2020)[151] and Open Data Strategy (2017-2022)[152]	x	x	
Israel[153]	The National Digital Programme of the Government of Israel[154]	x	x	x
	Digital Israel 2014[155]		x	
	Investment Law[156]	x	x	x
	R&D Law[157] 1984 and Amendment 2016[158]	x	x	x
Italy[159]	Italia Startup Visa[160] and the Italian Start-up Act[161]	x		x

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150 https://www.gov.ie/en/publication/1d6bc7-public-service-data-strategy-2019-2023/
151 https://egovstrategy.gov.ie/
152 http://www.per.gov.ie/en/strategy-aims-to-make-ireland-a-leader-in-open-data-odonovan/
153 https://www.oecd.org/mena/competitiveness/MENA%20ministerial%20SME.pdf
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155 https://www.gov.il/BlobFolder/news/digital_israel_national_plan/en/The%20National%20Digital%20Program%20of%20the%20Government%20of%20Israel.pdf
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159 https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_italy_-_final_2019_0D30BC5E-A1EB-F818-A04F127DF5F84BBB_61209.pdf
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161 https://www.mise.gov.it/images/stories/documenti/Slides%20innovative%20startups%20and%20SMEs%2007_2019.pdf

Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-preneurial	Techno-logy	Inno-vation
	Piano Nazionale Industria 4.0 2016[162]	x	x	x
	Strategy for Digital Growth (2014-2020)[163]	x	x	x
	Tax credits for Research and Development: Italy 2020 Budget Law (Law No. 160 of December 27 2019)[164]	x	x	x
	Copyright Regulation 2017[165]		x	x
Latvia[166]	Data Driven National Action Plan 2017[167]	x	x	x
	Research and Innovation Strategy 3 (RIS3)[168] 2014		x	x
	Support for Start-ups and Micro-Enterprises Programme 2017[169]	x		
	The Information Society Development Guidelines for 2014-2020[170]	x	x	x
Liechtenstein[171]	Government programme (2017-2021) Digital Agenda[172]	x	x	x
	Blockchain Act 2019[173]		x	
	e-Government Strategy (2018-2021)[174]		x	
	Regulatory Laboratory[175]	x	x	x
Lithuania[176]	Startup Visa Lithuania[177]	x		
	Lithuania's Progress Strategy: Lithuania 2030 [178]	x		x
	Digital Agenda for the Republic of Lithuania (2014-2020)[179]	x	x	x

162 https://www.mise.gov.it/images/stories/documenti/guida_industria_40.pdf
163 https://www.sviluppoeconomico.gov.it/images/stories/pubblicazioni/Position_paper_on_DSM_ITALY_EN.pdf
164 https://www.globallegalinsights.com/practice-areas/corporate-tax-laws-and-regulations/italy
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166 https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_latvia_-_final_2019_0D30BE44-054B-C822-C8DEFA25536D65B0_61211.pdf
167 https://ec.europa.eu/growth/tools-databases/dem/monitor/sites/default/files/DTM_Latvia_vf.pdf
168 https://www.izm.gov.lv/en/smart-specialisation-strategy
169 https://www.em.gov.lv/en/support-start-ups-and-micro-enterprises-0
170 https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_latvia_-_final_2019_0D30BE44-054B-C822-C8DEFA25536D65B0_61211.pdf
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172 https://www.regierung.li/media/attachments/Regierungsprogramm_2017%E2%80%932021_www.pdf?t=636895549583835664
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179 https://e-seimas.lrs.lt/portal/legalActPrint/lt?jfwid=-33jzae4dj&documentId=033ccec007c411e687e0fbad81d55a7c&category=TAD

Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
	Programme for Investment Promotion and Industrial Development (2014-2020)[180]	x	x	x
	National Strategy on Artificial Intelligence 2019[181]		x	
Luxembourg[182]	Digital Luxembourg Strategy[183]	x	x	x
	Creating a Ministry of Digitalization 2018[184]		x	
	Creation of Business Development Agency: the Luxembourg House of Financial Technologies (The LhoFT) 2018[185]	x	x	x
	Strategic Vision for AI[186] 2019		x	
	Data-Driven Innovation Strategy for the Development of a Trusted and Sustainable Economy in Luxembourg[187] 2019	x	x	x
	Digital Education Strategy[188] 2014	x	x	
Malta[189, 190]	Digital Malta Strategy (2014-2020)[191]	x	x	x
	National eSkills Strategy for the period of 2019 to 2021[192]	x		
	Mapping Tomorrow: A Strategic Plan for the Digital Transformation of the Public Administration (2019-2021)[193] and Government mServices Strategy (2017-2018)[194]		x	
	Strategy and Vision for AI in Malta 2030[195]		x	
	National eCommerce Strategy[196] (2014-2020)	x		x
Moldova[197]	Digital Strategy Moldova 2020[198]	x	x	x
	Law on IT Parks Moldova 2016[199]	x	x	x

180 https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/27aceff00acc11e687e0fbad81d55a7c?jfwid=-1n2mj5esl
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184 https://digital.gouvernement.lu/fr/le-ministere.html
185 https://www.lhoft.com/
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187 https://gouvernement.lu/fr/publications/rapport-etude-analyse/minist-economie/intelligence-artificielle/data-driven-innovation.html
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189 https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_malta_-_final_2019_0D3133AC-ADD1-AB10-6A71F15503A6D9DF_61213.pdf
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191 https://digitalmalta.org.mt/en/Pages/Strategy/Digital-Malta-Actions.aspx
192 https://eskills.org.mt/en/nationaleskillsstrategy/Documents/National_eSkills_strategy.pdf
193 https://publicservice.gov.mt/en/Documents/MappingTomorrow_StrategicPlan2019.pdf
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197 https://www.itu-ilibrary.org/science-and-technology/ict-centric-innovation-ecosystem-country-review_pub/810fd87d-en
198 https://mei.gov.md/en/content/digital-moldova-2020
199 https://moldovaitpark.md/wp-content/uploads/2019/09/Law-77_2016.pdf

Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
	Moldova 2020 Strategy (2013)[200]	x	x	x
	Exceptions on taxes for workers in the ICT sector[201]	x	x	
	Strategic Programme for Governance Technological Modernization (E-Transformation) 2011[202]		x	
Monaco	Extended Monaco Strategic Programme for Digital Transformation[203]	x	x	x
	STO (Security Token Offering) Bill 2020[204]		x	
	Digital Identity[205] and Trusted Services Law[206] and Scheme	x	x	x
Montenegro[207]	Strategy of Innovative Activity (2016-2020)[208]	x	x	x
	Strategy for Information Society Development (2016-2020)[209]	x	x	x
	The Strategy of Smart Specialization (2019-2024)[210]	x	x	x
Netherlands[211, 212]	Digital Agenda 2016[213]	x	x	x
	Tax reimbursement for highly skilled immigrants[214]	x	x	x
	Dutch Startup Visa[215]	x		
	Dutch Digitalization Strategy 2018[216]	x	x	x
	Strategic I-agenda 2019-2021[217]		x	
	Open Government Vision and Action Plan 2018[218]		x	

200 https://cancelaria.gov.md/sites/default/files/document/attachments/1100271_en_moldova_2020_e.pdf
201 https://www.itu.int/dms_pub/itu-d/opb/inno/D-INNO-MD-2018-01-PDF-E.pdf
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213 https://www.government.nl/documents/reports/2017/04/11/digital-agenda-for-the-netherlands-innovation-trust-acceleration
214 https://business.gov.nl/regulation/employing-highly-skilled-migrants/
215 https://business.gov.nl/coming-to-the-netherlands/permits-and-visa/startup-visa/
216 https://www.government.nl/documents/reports/2018/06/01/dutch-digitalisation-strategy
217 https://www.rijksoverheid.nl/documenten/rapporten/2019/01/01/rapport-strategische-i-agenda-rijksdienst-2019-2021
218 https://www.rijksoverheid.nl/documenten/rapporten/2013/09/01/actieplan-open-overheid

Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
	Dutch Digital Delta Knowledge and Innovation Agenda (KIA) ICT, 2017[219]	x	x	x
Norway[220, 221]	Digital Agenda for Norway[222] (2015-2016)	x	x	x
	Digital Agenda for Norway[223] 2015	x	x	x
	Powered by Nature: Norway as a data centre nation[224] 2018		x	x
	Digitalization strategy for the HE sector (2017-2021)[225]		x	x
North Macedonia[226]	Strategy and Action Plan for Open Data (2018-2020)[227]		x	
	Strategy for Public Administration Reform (2018-2022)[228]		x	
	Law for Procurement[229] 2015	x	x	
	Entrepreneurial Learning Strategy and Action Plan (2014-2020)[230]	x		
	National SME Strategy (2018-2023)[231]	x		x
	Competitiveness Strategy and Action Plan (2016-2020)[232]	x	x	x
Poland[233, 234]	Operational Programme Digital Poland (2014-2020)[235]	x	x	x
	The National Integrated Informatization Programme 2020 (PZIP)[236]		x	

219 https://dutchdigitaldelta.nl/en/actionplan
220 https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Norway_2019.pdf
221 https://www.oecd.org/science/oecd-case-study-of-norway-s-digital-science-and-innovation-policy-and-governance-landscape-20f80fa1-en.htm
222 https://www.regjeringen.no/en/aktuelt/digital-agenda-for-norway-digitisation-vital-for-welfare-and-jobs/id2484184/
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231 http://www.economy.gov.mk/Upload/Documents/SME%20Strategy%20EN%20FINAL.pdf
232 https://www.vicepremier-ekonomija.gov.mk/sites/default/files/pdf/07.Competitiveness_Strategy.pdf
233 https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_poland_-_final_2019_0D31398C-9ADF-2298-6271E3F8A62388F2_61217.pdf
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Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
	Start in Poland[237] 2016	x		x
	Constitution of Business[238]	x		
	Innovation Act[239] 2018	x		x
Portugal[240]	ICT Strategy 2020: Public Administration Digital Transformation Strategy (TIC)[241]		x	
	Digital Agenda Portugal[242]	x	x	x
	Industry 4.0 Programme (*Programa Indústria 4.0*)[243]	x	x	x
	StartUp Portugal Programme[244]	x		x
Romania[245]	National Strategy on Digital Agenda for Romania (2014-2020)[246]	x	x	x
	National Strategy for Research, Development and Innovation[247] (2014-2020)		x	
	Strategy for Romania's Industrial Policy[248] Clusters: 2013	x	x	x
	Tax incentives for start-ups and employees in IT sector; Tax Code and Tax Procedure Code[249]	x	x	
San Marino	Decree on Provisions on Blockchain Technology for Business:[250] Distributed Ledger Technology	x	x	x
	Blockchain Entities Registry[251]	x	x	x
	San Marino 2030[252]	x	x	x
	Digital Agenda[253] 2018	x	x	x

237 https://pfr.pl/start-in-poland.html
238 https://www.biznes.gov.pl/pl/ulatwienia-dla-biznesu/konstytucja-biznesu
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240 https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Portugal_2019_vFINAL.pdf
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242 https://www.fct.pt/dsi/agendaportugaldigital/index.phtml.pt
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249 https://www2.deloitte.com/content/dam/Deloitte/ro/Documents/tax/english/Tax%20Legal%20Alert_EN_final.pdf
250 https://www.sanmarinoinnovation.com/sanmarinoblockchain;; https://www.sanmarinoinnovation.com/eng-blockchain
251 https://www.sanmarinoinnovation.com/eng-blockchain
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Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
Serbia[254]	Strategy for the Development of Electronic Communication (2010-2020)[255]		x	
	Strategy on Science and Technological Development of the Republic of Serbia (2010-2015)[256]	x	x	
	Strategy on Development of E-Government in the Republic of Serbia for period (2009-2013)[257]		x	
	Competitive and Innovative Small and Medium Enterprises' Development Strategy (2008-2013)[258]	x		x
Slovakia[259, 260]	National Strategy and Action Plan:[261] Smart Industry for Slovakia	x	x	x
	Digital Transformation Strategy[262] (2019-2022) and Action Plan[263]	x	x	x
	Strategic Document for Digital Growth and Next Generation Access Infrastructure (2014-2020)[264]		x	
Slovenia[265, 266]	Digital Slovenia 2020[267]	x	x	x
	Slovenian Smart Specialization Strategy: S4[268]	x	x	x
	Digital Innovation Hub Slovenia[269] 2018	x	x	x
	Strategic guidelines for further implementation of ICT in Slovenian education up to 2020[270]	x		x
	Information Society Development Strategy up to 2020[271]	x	x	x
	Blockchain Action Plan 2018[272]		x	

254 https://www.itu.int/en/ITU-D/Innovation/Documents/Publications/eBAT_Brochure%e2%80%93DIP%20Serbia_432746_.pdf
255 http://www.gs.gov.rs/english/stampa-eng/strategije-vs.html
256 Idem.
257 Idem.
258 Idem.
259 https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_slovakia_-_final_2019_0D31C79C-EC95-A759-9A4EFF789FEB2FB2_61219.pdf
260 https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Slovakia_2019.pdf
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271 https://www.gov.si/en/policies/state-and-society/information-society/
272 https://sloveniatimes.com/govt-adopts-action-plan-to-implement-blockchain-technology/

Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
Spain[273]	Digital Strategy 2025[274] in 2020	x	x	x
	Spanish RDI Strategy in Artificial Intelligence[275]	x	x	x
	Fourth National Action Plan (2019-2021)[276]		x	
	Digital Agenda for Spain[277] 2013	x	x	x
	State Plan for Scientific and Technical Research and Innovation (2017-2020)[278]		x	x
	Strategy of Connected Industry 4.0 (*Estrategia Industria Conectada 4.0*)[279] 2015	x	x	x
	Spanish Entrepreneurs Visa[280]	x		
Sweden[281]	A Sustainable Digitalized Sweden: A Digitalization Strategy[282] 2017	x	x	x
	Digital First Implementation Plan (2015-2018)[283]	x	x	x
	National Approach to AI[284] 2018	x	x	x
	Smart Industry[285] 2016	x	x	x
	Swedish Innovation Strategy[286]	x	x	x
Switzerland[287]	Digital Switzerland[288] 2018	x	x	x
	Information Society in Switzerland Strategy[289] 2007	x	x	x
	Federal Administration's ICT Strategy (2016-2019)[290]		x	

273 https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_spain_-_final_2019_0D31CE69-E569-D4F3-80FD117CBBD43C8D_61222.pdf
274 https://www.dataguidance.com/news/spain-government-adopts-digital-strategy-2025-addresses-cybersecurity-data-economy-ai
275 https://www.ciencia.gob.es/stfls/MICINN/Ciencia/Ficheros/Estrategia_Inteligencia_Artificial_IDI.pdf
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286 https://www.government.se/contentassets/cbc9485d5a3446729632258581182 73b/the-swedish-innovation-strategy
287 https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Switzerland_2019.pdf
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289 http://www.ict-21.ch/IMG/pdf/ict21-en-v2.pdf
290 https://www.isb.admin.ch/isb/en/home/themen/strategie_planung/ikt-strategie_bund_2016-2019.html

Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
	Action plan for the development of Smart Cities, Smart Villages and Smart Regions[291]		x	x
	Federal Act on the Promotion of Research and Innovation (RIPA)[292]	x		x
Turkey[293, 294, 295]	Tenth Development Plan (2014-2018)[296]	x	x	x
	National eGovernment Strategy and Action Plan (2016-2019)[297]		x	
	Digital Turkey[298]	x	x	x
	National Artificial Intelligence Strategy[299]	x	x	
	2023 Education Vision[300]	x		
	SME Strategy (2015-2018)[301]	x		x
Ukraine[302, 303]	Anti-Corruption Strategy (2018-2020)[304]	x		
	Digital Agenda for Ukraine 2020[305306] (2018-2020) 2018	x	x	x
	SME Development Strategy 2020[307]	x		x
	Concept on e-Governance 2017[308]		x	
	Bankruptcy Code of Ukraine 2019[309]	x		
	New Ukrainian School Government Reform 2016[310]	x		

291 https://houseofswitzerland.org/swissstories/science-education/switzerlands-smart-cities-valuable-export
292 https://www.admin.ch/opc/en/classified-compilation/20091419/201801010000/420.1.pdf#:~:text=Federal%20Act%20on%20the%20Promotion%20of%20Research%20and
293 https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Turkey_2019.pdf
294 https://www.oecd-ilibrary.org/docserver/g2g9fa9a-en.pdf?expires=1606693045&id=id&accname=guest&checksum=330DFEE95F679509D84D4D56AF1486C7
295 https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Turkey_2019.pdf
296 https://sbb.gov.tr/wp-content/uploads/2018/11/The_Tenth_Development_Plan_2014-2018.pdf
297 https://bilgem.tubitak.gov.tr/en/urunler/2016-2019-national-e-government-strategy-and-action-plan
298 https://cbddo.gov.tr/en/digital-turkey
299 https://cbddo.gov.tr/en/artificial-intelligence
300 https://www.aa.com.tr/en/todays-headlines/turkey-announces-new-education-vision/1290812
301 https://www.mondaq.com/turkey/corporate-and-company-law/435888/2015-2018-sme-strategy-and-action-plan-issued-by-small-and-medium-enterprise-development-organization-in-turkey
302 https://www.oecd-ilibrary.org/docserver/8b45614b-en.pdf?expires=1606685305&id=id&accname=guest&checksum=476A260BD8FF0D0B62C464721D7B2B52
303 https://joinup.ec.europa.eu/sites/default/files/inline-files/SC64_D05.01_Digital_Government_Factsheets_Ukraine_vFINAL2_0.pdf
304 https://www.kmu.gov.ua/en/news/uryad-shvaliv-proekt-zakonu-ukrayini-pro-antikorupcijnu-strategiyu-na-2018-2020-roki
305 https://issuu.com/mineconomdev/docs/digital_agenda_ukraine-v2__1_
306 http://www.e-ukraine.org.ua/media/Lviv_Minich_2.pdf
307 https://www.me.gov.ua/Documents/Detail?lang=en-GB&id=e7c3c93a-cdf4-405a-ad29-46dead91bddf&title=ProcedureToImplementTheStrategyForSmeDevelopmentInUkraineUntil2020
308 https://uacrisis.org/en/62177-e-democracy
309 https://eba.com.ua/en/novyj-kodeks-ukrayiny-z-protsedury-bankrutstva-z-tochky-zoru-finansuvannya-ta-borgovoyi-restrukturyzatsiyi/
310 https://mon.gov.ua/eng/tag/nova-ukrainska-shkola

Table 3: ICT-centric innovation ecosystem strategies and policies in the Europe region (continued)

Country	Policy	Policy type (engine of growth)		
		Entre-pre-neurial	Techno-logy	Inno-vation
	Public Procurement Law 2015[311]	x		
	Strategy for Innovation Development up to 2030 in 2019[312]	x	x	x
United Kingdom[313, 314]	UK Digital Strategy 2017[315]	x	x	x
	Making Tax Digital[316] 2018	x		
	Innovator Visa, Startup Visa and Entrepreneur Visa[317]	x		x
	Scotland's Digital Future Strategy, Digital Wales Strategy and Digital Northern Ireland 2020[318]	x	x	x
	Government Digital Inclusion Strategy[319] 2014	x	x	
	Innovation Strategy[320] for Government 2019		x	x
	Fintech Regulatory Sandbox[321] 2015	x		x
	AI Review (2017)[322] and Sector deal (2018)[323]	x	x	x
	Industrial Strategy 2017[324]	x	x	x
	Seed Enterprise Investment Scheme[325] Tax Incentive Scheme	x		
Vatican	–	–	–	–

Source: ITU

This snapshot of the policies and programmes across the Europe region reveals that all countries launch policies related to all three engines of growth. However, ICT-centric innovation ecosystem policies could be strengthened, in particular in non-European Union countries.

311 https://e-tender.ua/en/training-tenders/teoriya-zakupivel-3/zakonodavstvo-ukrayini-v-sferi-publichnih-zakupivel-8
312 https://www.researchgate.net/publication/339299598_The_Strategy_of_Innovative_Development_of_Economy_of_Ukraine_till_2030
313 https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_UK_2019.pdf
314 https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_united_kingdom_-_final_2019_0D31D080-AFF6-8DCD-1996688E8402B426_61223.pdf
315 https://www.gov.uk/government/publications/uk-digital-strategy
316 https://www.gov.uk/government/publications/making-tax-digital-how-vat-businesses-and-other-vat-entities-can-get-ready/making-tax-digital-how-vat-businesses-and-other-vat-entities-can-get-ready
317 https://www.gov.uk/browse/visas-immigration/work-visas
318 https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_UK_2019.pdf
319 https://www.gov.uk/government/publications/government-digital-inclusion-strategy/government-digital-inclusion-strategy
320 https://gds.blog.gov.uk/2018/11/09/how-were-developing-an-innovation-strategy-for-government/
321 https://www.bis.org/publ/work901.htm
322 https://connect.innovateuk.org/documents/2903012/16074728/RAS%20UK%20Strategy?version=1.0
323 https://www.gov.uk/government/publications/artificial-intelligencesector-deal/ai-sector-deal#executive-summary
324 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/611705/building-ourindustrial-strategy-green-paper.pdf
325 https://www.seis.co.uk/

2.4 Enablers of digital transformation

This section provides an overview of the current state of the seven enablers of digital transformation for the European region. The enablers are: (a) vision and strategy, (b) infrastructure and programmes, (c) talent and champions, (d) capital and resources, (e) markets and networks, (f) culture and communities, and (g) regulation and policy.

Given that each enabler is part of a whole and is crucial for successful innovation activities, the combined efficiency of the enablers can be taken together to give a sense of the overall efficiency of the ecosystem. For countries interested in this deeper level of insight, qualitative interviews can be conducted to generate a colour-coded table of the enablers, similar to those used in Table 3.

2.4.1 Vision and strategy

All countries across Europe have launched strategic policies and initiatives to drive digital transformation and develop ICT-centric innovation ecosystems. Two countries, however, (Lithuania and Turkey) ranked below expectations for their level of development according to the 2020 Global Innovation Index[326] and 24 countries are ranked in line for their level of development.[327] One-third of the Europe region countries performed above expectations for their level of development (Denmark, Finland, France, Georgia, Germany, Ireland, Israel, Moldova, Montenegro, Netherlands, North Macedonia, Sweden, Switzerland, Ukraine, and the United Kingdom), which indicates that overall, the Europe region countries have a clear vision and strategy, and are well positioned to reap the benefits of their innovation capacity. Some of the examples of the initiatives include the Cyprus Digital Strategy,[328] e-Estonia,[329] Digital Finland Framework 2018,[330] Law for a Digital Republic 2016, France,[331] Digital Agenda for Ukraine 2020,[332] and the Montenegro Strategy for Information Society Development 2016-2020.[333]

2.4.2 Infrastructure and programmes

Around two-thirds of the Europe region countries have strong hard ICT infrastructure (e.g. connectivity, roads and electricity) according to the ITU IDI ranking.[334] The remaining 14 countries (Albania, Bosnia and Herzegovina, Bulgaria, Georgia, Hungary, Italy, Moldova, North Macedonia, Poland, Romania, Serbia, Slovakia, Turkey and Ukraine) demonstrate insufficient levels of hard ICT infrastructure development and thus need to focus on attracting further significant public and private sector investments needed for balanced and equitable ICT access and usage in each of the countries.

At the same time, the state of the soft infrastructure (e.g. technology hubs, training resources and research institutions) is at a much lower level in Europe, as assessed by using the innovation

326 https://www.globalinnovationindex.org/gii-2020-report
327 Following countries were not ranked: Andorra, Lichtenstein, Monaco, San Marino, Vatican
328 https://ec.europa.eu/info/sites/info/files/2017-european-semester-national-reform-programme-cyprus-en.pdf
329 https://e-estonia.com/
330 https://www.businessfinland.fi/496a6f/globalassets/julkaisut/digital-finland-framework.pdf
331 Loi du 7 octobre 2016 pour une République Numérique. Available at: https://www.legifrance.gouv.fr/affichLoiPubliee.do?idDocument=JORFDOLE000031589829&type=general&legislature=14
332 http://www.e-ukraine.org.ua/media/Lviv_Minich_2.pdf
333 https://mid.gov.me/en/library/strategije
334 Following countries were not ranked: San Marino, Vatican.

linkages pillar of the 2019 Global Innovation Index[335] as a proxy for soft infrastructure. The pillar assesses university and industry collaboration, the state of cluster development, R&D financial investment from abroad, joint-venture strategic alliances and the number of patent families filed by residents in at least two offices. Albania, Bosnia and Herzegovina, Georgia, North Macedonia, Moldova and Romania perform poorly in the innovation linkages pillar and another 15 Europe region countries demonstrate insufficient performance (Bulgaria, Croatia, Estonia, Greece, Hungary, Latvia, Lithuania, Montenegro, Poland, Portugal, Serbia, Slovakia, Spain, Turkey and Ukraine), despite the existence of some good practices. For instance, Israel established the Incubators Incentive Program[336] aimed at cultivating selected incubator projects through investment and strategic partnerships and offering an incubator licence for a technological incubator. The ultimate goal is to create a robust incubator ecosystem that stimulates entrepreneurship by investing in new start-up companies and providing them with technological, business and administrative support.

Europe region countries need to create stronger linkages between academia and industry, and build further cross-industry partnerships, collaboration and clusters.

2.4.3 Talent and champions

Concerning talent, the majority of the Europe region countries rank moderately in talent, in both hard and soft skills. Only one-third of the countries indexed by the 2020 Global Innovation Index[337] performed well in this area. The remaining 21 countries (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Estonia, Georgia, Hungary, Latvia, Lithuania, Luxembourg, Latvia, Montenegro, North Macedonia, Poland, Moldova, Romania, Serbia, Slovakia, Turkey and Ukraine) do not have a sufficient number of people with the skills to allow countries to compete effectively on a global level, as a result of either a mismatch between academic institutions' curricula and the needs of the markets, or the exodus of skilled people from the country.

Many countries have difficulties with retaining talent, especially in light of the incentives aimed at attracting skilled ICT and R&D immigrants and entrepreneurs that more advanced Western economies have introduced. For instance, the United Kingdom introduced the Innovator Visa and the Startup Visa to attract innovative entrepreneurs, and the Global Talent Visa for exceptional talent in academia or research, arts and culture, or digital technology.[338] Austria and the Netherlands are offering tax deductions for highly skilled immigrants.[339][340]

The challenge of a lack of sufficient talent can be partially addressed by increased effort to provide training in hard ICT skills (e.g. the UK Digital Skills Partnership,[341] which brings together public, private and third sector organizations to boost skills for inclusive digital economy). The training should also cover entrepreneurial and soft skills at all levels of the education system. However, these efforts will not bring value unless countries put measures in place to retain trained talent at home or attract new talent from abroad. The latter could take the form of the entrepreneurship support programmes that make it easy for talent to create start-ups and

335 http://innovation-israel-en.mag.calltext.co.il/magazine/45/pages/22
336 https://innovationisrael.org.il/en/program/incubators-incentive-program
337 https://www.globalinnovationindex.org/gii-2020-report
338 https://www.gov.uk/browse/visas-immigration/work-visas
339 https://investinaustria.at/en/downloads/brochures/ABA-r-and-d-austria.pdf
340 https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_netherlands_-_final_2019_0D31373F-EEDB-493C-6014AE7DC2FC1E6A_61214.pdf
341 https://www.gov.uk/guidance/digital-skills-partnership

innovate or, as in the case of Albania, which ranked first in the 2019 Global Competitiveness Report[342] in ease of hiring foreign labour, for companies to hire people from abroad. Another good practice is the Human Capital Agenda ICT undertaken by the Dutch Government which, among other goals, focuses on facilitating "better connection of (professional) education to the (regional) business community" to engage private sector in the training of ICT professionals.[343]

2.4.4 Capital and resources

The Europe region, historically, has been underperforming in access to finance for entrepreneurs and SMEs. The availability of venture capital has increased over the last several years with the European Union initiatives aimed at stimulating the market. Yet, the levels of available financing are far below the US or Asian benchmarks, despite the introduction of public policies and programmes in all of the countries. Again, around one-third of the countries (Austria, Belgium, the Czech Republic, Denmark, Finland, Germany, Iceland, Israel, Luxembourg, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom)[344] are strong in the provision of financing for SMEs according to the Global Competitiveness Report 2019.[345] At the other end of the spectrum, five Europe region countries are underperforming vis-à-vis the provision of sufficient financing to enable start-ups to grow and scale up, namely Bosnia and Herzegovina, Ukraine, North Macedonia, Italy and Greece. Over half of the countries[346] perform moderately with regard to effectiveness of financing initiatives.

These initiatives can take many forms, such as a national fund of funds to stimulate the venture capital market (e.g. the Bulgarian Fund of Funds (FMFIB) launched in 2015[347]), tax incentives for entrepreneurs (e.g. Belgian tax shelter for start-ups[348]) and business angels (e.g. Business Angels in Spain[349]). Europe region countries should also explore innovative financing schemes (e.g. the Austrian Research Promotion Agency (FFG) innovating financing programmes[350]), co-financing programmes (e.g. the co-financing programme of the Fund for Innovation and Technological Development (FITD) in Macedonia[351]), innovation vouchers (e.g. Sweden's digitalization vouchers[352]) or attracting investments from the foreign and domestic private sector.

Beyond financing, start-ups should be provided with other non-financial resources, such as office space, mentorship, networking opportunities and legal and business expertise (e.g. the Development Agency of Serbia's (RAS) mentoring programme for SMEs[353]).

342 http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf
343 https://dutchdigitaldelta.nl/en/hca-ict
344 Following countries were not indexed: Andorra, Lichtenstein, Monaco, San Marino, Vatican.
345 http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf
346 France, Estonia, Spain, Slovenia, Montenegro, Slovakia, Bulgaria, Latvia, Malta, Turkey, Hungary, Serbia, Poland, Ireland, Albania, Portugal, Cyprus, Georgia, Lithuania, Romania, Moldova, Croatia, Germany.
347 https://www.fmfib.bg/en
348 https://startuptaxshelter.be/en/
349 https://gmtaxconsultancy.com/en/residents-irpf-pit/business-angels-in-spain-deductions-requirements-and-more/
350 https://www.ffg.at/en
351 https://www.oecd-ilibrary.org/docserver/b8aaa569-en.pdf?expires=1606678743&id=id&accname=guest&checksum=17982A71BD5E6EDBA79D8B21EE49843C
352 https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_sweden_-_final_2019_0D31CD45-D0FB-2939-D1FCA789F52B754F_61221.pdf
353 https://www.jica.go.jp/balkan/english/office/topics/190607.html

2.4.5 Market and networks

Due to low market sophistication, the Europe region is not strong in the market and networks dimension. Market sophistication (measured by factors such as ease of obtaining credit, credit available to the private sector, market capitalization and trade, competition and market scale in the 2019 Global Innovation Index[354]) is relatively moderate in the region with two countries facing the biggest challenges (Bulgaria and Serbia) and 23 countries[355] demonstrating performance insufficient to be competitive in the global markets. Among the 13 frontrunners (Belgium, Estonia, France, Israel, Luxembourg, the Netherlands, North Macedonia, Norway, Spain, Sweden, Switzerland, Turkey and the United Kingdom), the Western European economies dominate with the exception of two countries: Turkey and the North Republic of Macedonia.

The Europe region is, nevertheless, quite strong in the "networks and clusters" dimension. Thirty-five European clusters found their way to the Top 100 Science and Technology Clusters[356] of the 2020 Global Innovation Ranking. The EEA countries, having already focused on cluster policies for the last decade, dominated the ranking, with Paris as the only European cluster in the top 10, and only Ankara and Istanbul as two clusters from non-EEA countries.

Non-EEA countries should focus on building clusters and partnerships, learning from many good practices already developed in the region.

2.4.6 Culture and communities

Forty per cent of Europe region countries need further improvement in the "entrepreneurial culture and communities" dimension according to the Global Entrepreneurship Index 2019.[357]Although these countries have implemented policies and programmes promoting entrepreneurship, and are launching incubation, acceleration and innovation programmes, entrepreneurial culture remains at an insufficient level.

Using the Global Entrepreneurship Index,[358] it is possible to develop an understanding of entrepreneurial culture in the region, taking an average of Pillar 1 (opportunity perception), Pillar 3 (risk acceptance), Pillar 5 (cultural support) and Pillar 6 (opportunity start-up) to assess the level of entrepreneurial culture among underperforming countries. The situation among the countries differs but overall risk acceptance levels are low in most of them, followed by opportunity. In Albania, Bosnia and Herzegovina, Bulgaria, Georgia, North Macedonia, Serbia, and Ukraine, people struggle to identify start-up opportunities.

To improve the entrepreneurial culture, countries should further invest in entrepreneurial education at secondary school level, as well as vocational training and additional spaces to ignite entrepreneurial activity. Promoting role models, strengthening the entrepreneurial ecosystem through measures including grants and subsidies for innovative ideas, and creating an insolvency regulatory framework will decrease risk aversion and encourage more people to embark on the entrepreneurial journey.

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354 https://www.globalinnovationindex.org/gii-2020-report

355 Albania, Austria, Bosnia and Herzegovina, Croatia, Cyprus, Czech Republic, Finland, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, Montenegro, Poland, Portugal, Moldova, Romania, Slovakia, Slovenia.

356 https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII-2020/cluster-rankings.pdf

357 Slovakia, Turkey, Czech Republic, Italy, Latvia, Romania, Greece, Hungary, Croatia, Montenegro, North Macedonia, Bulgaria, Ukraine, Serbia, Albania, Moldova, Bosnia and Herzegovina, Georgia.

358 Following countries are not included in the ranking: Andorra, Monaco, Lichtenstein, San Marino, Vatican.

2.4.7 Policy and regulation

The Global Competitiveness Report 2019[359] allows for an analysis of the impact of enabling the policy and regulatory environment on entrepreneurship and innovation. Indicators 1.15 (IP protection), 11.01 (cost to start a business), 11.02 (time to start a business) and 11.04 (insolvency regulatory framework, which assesses how easy it is to recover from a failed business venture) are used as a proxy to assess the regulatory environment for entrepreneurship and innovation.

Overall, Europe region countries do not have an adequate environment for enabling entrepreneurship and innovation and there is unequal performance across the indicators. Slovenia and the United Kingdom are top-ranking in the cost of starting a business, and Bosnia and Herzegovina, Germany, and North Macedonia are leaders in the regulatory framework for insolvency protection. Finland tops the world's ranks in protecting IP rights but many Europe region countries have yet to strengthen their IP protection enforcement regimens. For instance, Bosnia and Herzegovina introduced an IP protection law in 2010. However, it ranks 134th of 141 countries on the IP protection indicator, which suggests that existing laws and enforcement mechanisms are not compatible with the digital age. In addition, Albania (ranked 130), North Macedonia (ranked 121) and Serbia (ranked 118) perform poorly in the area of IP protection rights.

Regarding time to start a business, cost to start a business and insolvency regulations, Europe region countries rarely perform well in all such areas. In fact, only Denmark and Estonia ranked high in all indicators. Only 20 per cent of the ranked Europe region countries have low costs to start a business, and in the majority of the countries, procedures are still in place that are too cumbersome to allow for the opening of a business. Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Poland, Romania and Slovakia perform particularly poorly in this respect. However, in terms of the insolvency regulatory framework, the overall European performance is much more positive, with around 35 per cent of the countries still not demonstrating sufficient performance.

Table 4: Policy and regulation indicators

Country	Cost to start a business	Time to start a business	Insolvency regulatory framework	IP protection
Albania	Yellow	Green	Green	Red
Andorra	-	-	-	-
Austria	Yellow	Yellow	Yellow	Green
Belgium	Yellow	Green	Yellow	Green
Bosnia and Herzegovina	Yellow	Red	1st	Red
Bulgaria	Green	Red	Green	Yellow
Croatia	Yellow	Red	Green	Yellow
Cyprus	Yellow	Green	Yellow	Yellow
Czech Republic	Green	Red	Green	Yellow

[359] http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

Table 4: Policy and regulation indicators (continued)

Country	Cost to start a business	Time to start a business	Insolvency regulatory framework	IP protection
Denmark	Green	Green	Green	Green
Estonia	Green	Green	Green	Green
Finland	Green	Yellow	Green	1st
France	Green	Green	Yellow	Green
Georgia	Yellow	Green	Yellow	Green
Germany	Yellow	Yellow	1st	Green
Greece	Yellow	Yellow	Green	Yellow
Hungary	Yellow	Yellow	Yellow	Yellow
Iceland	Yellow	Green	Yellow	Yellow
Ireland	Green	Green	Yellow	Green
Israel	Yellow	Yellow	Green	Green
Italy	Yellow	Green	Green	Yellow
Latvia	Yellow	Green	Green	Yellow
Lichtenstein	-	-	-	-
Lithuania	Green	Green	Yellow	Yellow
Luxembourg	Yellow	Yellow	Yellow	Green
Malta	Yellow	Yellow	Red	Yellow
Moldova	Yellow	Green	Green	Yellow
Monaco	-	-	-	-
Montenegro	Green	Yellow	Green	Yellow
Netherlands	Yellow	Green	Yellow	Green
North Macedonia	Green	Yellow	1st	Red
Norway	Yellow	Green	Green	Green
Poland	Yellow	Red	Green	Yellow
Portugal	Yellow	Yellow	Green	Green
Romania	Green	Red	Green	Yellow
San Marino	-	-	-	-
Serbia	Yellow	Green	Green	Red
Slovakia	Green	Red	Green	Yellow
Slovenia	1st	Yellow	Yellow	Yellow
Spain	Yellow	Yellow	Green	Yellow
Sweden	Green	Yellow	Green	Green
Switzerland	Yellow	Yellow	Green	Green

Table 4: Policy and regulation indicators (continued)

Country	Cost to start a business	Time to start a business	Insolvency regulatory framework	IP protection
Turkey	Yellow	Yellow	Yellow	Yellow
Ukraine	Green	Yellow	Yellow	Red
United Kingdom	1st	Green	Yellow	Green
Vatican	-	-	-	-

Source: *2019 Global Competitiveness Report*.

Note: Countries that rank between 1 and 35 have a strong performance (green); 36–105 indicate insufficient performance (yellow) and 106-141 indicate poor performance (red).

Overall, European economies should focus on strengthening their policies and regulations, and improving enforcement mechanisms to allow European entrepreneurs to thrive, take risks and innovate without burdensome administrative procedures.

3 Good practices accelerating digital transformation

This section highlights good practices that fuel digital transformation in the region by providing a brief snapshot of each case study. Every chosen case impacts at least one building block of ICT-centric innovation or "type": innovation dynamics, innovation capacity and ICT innovation in key sectors. Please see Appendix B for full case study samples.

3.1 Be-Code (Belgium)

Be-Code is a private initiative established in 2016 in Belgium, operating within a partnership model. It is an ecosystem of five campuses that helps to bridge the gap between motivated job seekers and the employment market. Its mission is "to grow today's talented – and especially vulnerable – job seekers into tomorrow's best developers".[360] The initiative impacts two building blocks of innovation:

- **innovation capacity**, by training entrepreneurs and job seekers in IT skills and creating linkages with the private-corporate partnership model; and
- **ICT innovation in key sectors**, by providing companies with tech-skilled talent.

3.2 Challenge Driven Innovation Programme (Sweden)

The Challenge-Driven Innovation (CDI) Programme[361] of VINNOVA, the Swedish Innovation Agency,[362] aims to foster collaborative, cross-sectorial and transformative innovations and solutions for societal challenges by providing grant funding to selected projects. The initiative impacts all three building blocks of innovation:

- **innovation dynamics**, by promoting innovation for societal challenges as a part of the broader innovation policy mandate of the Swedish Innovation Agency;
- **innovation capacity**, by providing funding to transformative, novel projects and promoting cross-sectorial collaboration of actors; and
- **ICT in key sectors**, by funding projects in the area of "information society" to tackle cross-disciplinary and cross-sectorial challenges.

3.3 De-Hub Digital Hub Initiative (Germany)

De-Hub Digital Hub Initiative[363] is a network of 12 digital hubs launched in 2017 by the German Ministry for Economic Affairs and Energy. Its purpose is to build a nationwide network for digital innovation. This practice impacts all three building blocks of innovation:

- **innovation dynamics**, by providing policy programming aimed at instigating digital innovation in Germany;

360 https://becode.org/about/
361 https://www.vinnova.se/en/m/challenge-driven-innovation/this-is-cdi/
362 https://www.vinnova.se/en/
363 https://www.de-hub.de/en/

- **innovation capacity**, by creating a nationwide network of digital hubs that build bridges between investors, start-ups, private sector companies, experts/talent and academia; and
- **ICT innovation in key sectors**, by enabling digital innovation across sectors, such as health, finance and media.

3.4 Innovation and Technology Agency (Georgia)

Georgia's Innovation and Technology Agency (GITA)[364] was created under the Ministry of Economy and Sustainable Development in 2014 with the goal of promoting innovation and technology, and creating an innovation ecosystem in Georgia.[365] This practice impacts all three building blocks of innovation:

- **innovation dynamics**, by creating a policy environment to instigate innovation;
- **innovation capacity**, by facilitating an innovation ecosystem which improves all kinds of innovations and technologies, promoting commercialization of knowledge and innovations, building collaboration among stakeholders and providing financing for innovation; and
- **ICT innovation in key sectors**, by supporting integration of new technologies across sectors.

3.5 GovTech Poland/GovTech Centre (Poland)

GovTech Poland[366] is a cross-ministerial task force operating in the Chancellery of the Prime Minister of Poland.[367] It was initiated in 2017 as a new way of bringing innovations to the Polish public sector. The initiative impacts all three building blocks of innovation:

- **innovation dynamics**, by coordinating digital and innovation policy in the public sector with a focus on deployment of the ICT solutions;
- **innovation capacity**, by creating design competitions, encouraging the dialogue between the public sector and innovators, academia and citizens in order to foster creation of innovative solutions for the public sector;[368] and
- **ICT innovation in key sectors**, by advising on integrating technology into public sector institutions and creating new innovative IT solutions for the sector.

3.6 Heath Tech Lab (Serbia)

Heath Tech Lab (HTL)[369] is an active health-tech ecosystem of Serbia, guided by a vision of health innovation without borders. The core mission of HTL is to identify health challenges, facilitate innovative, technological solutions and support their sustainable growth and development, with the patient always at the core. The initiative impacts two building blocks of innovation:

- **innovation capacity**, by providing mentorship, training and e-learning opportunities in the health technology sector, facilitating creation of new health-tech ecosystems across Europe and beyond, and fostering collaboration between existing and new health-tech ecosystems; and
- **ICT innovation in key sectors**, by supporting start-ups in the field of health by promoting the implementation of multiple emerging technologies in the health sector.

364 https://gita.gov.ge/eng
365 https://gita.gov.ge/eng/static/3
366 https://www.gov.pl/web/govtech-en
367 https://www.civtechalliance.org/govtech-polska
368 https://www.gov.pl/web/govtech-en/administracja
369 https://htl.rs/

3.7 Icelandic Startups (Iceland)

Icelandic Startups[370] is the largest private start-up community organization in Iceland, providing customized support for entrepreneurs and start-ups ranging from the seed of an idea to the first and second round of funding.[371] This practice impacts one building block of innovation: **innovation capacity**, by creating an entrepreneur community that provides support and resources for innovative start-ups, connecting them with industry experts, investors and leading start-up hubs abroad.

3.8 Industry 4.0 Pilot Factories (Austria)

The Industry 4.0 Platform, including Pilot Factories,[372] is the Austrian Government instrument designed to help Austrian companies operating in a diverse range of industry segments to improve their knowledge and adoption of Industry 4.0 technologies. The programme impacts all three building blocks of innovation:

- **innovation dynamics**, by providing policy programme and initiative supporting digital transformation of Austrian industry;
- **innovation capacity**, by facilitating collaboration and exchange of knowledge between academia, start-ups and the private sector, and increasing innovative capabilities of the industry; and
- **ICT innovation in key sectors**, by improving adoption of new technologies across industrial sectors.

3.9 Italian Startup Act and Startup Visa (Italy)

The Italian Startup Act[373] introduced a comprehensive legislative framework aimed at fostering the creation and growth of its start-up ecosystem in 2012, with the Italian Start-up Visa[374] established in 2014 as a streamlined process for non-European Union talent to found innovative start-ups in Italy. This practice impacts two building blocks of innovation:

- **innovation dynamics**, by creating policy framework conducive to innovative start-ups; and
- **innovation capacity**, by promoting a new entrepreneurial culture, encouraging greater social mobility and injecting innovation into the business ecosystem.

3.10 Startup Visa Lithuania (Lithuania)

Startup Visa Lithuania[375] is a governmental instrument launched in 2017 that provides a streamlined entry process to the Lithuanian start-up ecosystem for innovative non-European

370 http://www.icelandicstartups.com/
371 http://www.icelandicstartups.com/about-us
372 https://ati.ec.europa.eu/sites/default/files/2020-06/DTM_PI4_AT_v2.pdf;; https://investinaustria.at/en/news/2017/07/smartfactory.php;; https://www.advantageaustria.org/zentral/business-guide/investieren-in-oesterreich/forschung-und-entwicklung/schwerpunkte/ABA_Industry_4.0_2018_EN.pdf
373 https://www.mise.gov.it/images/stories/documenti/Executive-Summary-of-Italy-s-Startup-Act-new-format-23_02_2017.pdf
374 http://italiastartupvisa.mise.gov.it/
375 https://startupvisalithuania.com/

Union entrepreneurs with a goal of attracting talent to Lithuania and boosting innovation. This programme impacts two building blocks of innovation:

- **innovation dynamics**, by providing a regulatory framework that makes it easier for non-European Union entrepreneurs to set up start-ups in Lithuania; and
- **innovation capacity**, by fostering the national start-up ecosystem by bringing innovative non-European Union entrepreneurs to Lithuania and enabling knowledge spillover.

3.11 Station F (France)

Station F[376] is the world's biggest start-up campus, opened in 2017 in Paris as a private initiative. It provides 51 000 m^2 of space for office accommodation and a whole entrepreneurial ecosystem for up to 1 000 start-ups and early-stage businesses, as well as for corporate partners such as Facebook, Microsoft or Naver.[377] This practice impacts two building blocks of innovation:

- **innovation capacity**, by facilitating the start-up ecosystem in France; and
- **ICT innovation in key sectors**, by enabling and supporting high-tech start-ups.

3.12 UK-Albania Tech Hub (Albania)

UK-Albania Tech Hub[378] is a programme established in 2017 by the British Embassy in Tirana and British Council Albania that promotes partnership in technology and entrepreneurship skills between Albania and the United Kingdom and focuses on skill building in Albanian tech start-ups by organizing exchange visits for them in the UK. This practice impacts three building blocks of innovation:

- **innovation dynamics**, by providing a partnership programme aimed at the growth of high-tech start-ups in Albania, and at their contribution to the growth of the UK economy;
- **innovation capacity**, by sharing innovation, skills and business opportunities between the two countries; and
- **ICT innovation in key sectors**, by supporting high-tech start-ups with training and exchange of knowledge.

3.13 UK Fintech Regulatory Sandbox (UK)

The UK Fintech Regulatory Sandbox[379] was launched by the Financial Authority (FCA) as the first regulatory sandbox for financial services in the world - a tailored regulatory environment for performing small-scale, live tests of innovative FinTech products and business models with the ultimate goal of fostering innovations that benefit customers.[380] The initiative impacts all three building blocks of innovation:

- **innovation dynamics**, by identifying areas to adapt regulatory frameworks in order to facilitate innovation in the financial sector;
- **innovation capacity**, by providing a test bed for companies looking to deliver new innovation that challenges the existing regulatory framework; and

376 https://stationf.co/
377 https://www.wired.co.uk/article/station-f
378 https://ukalbaniahub.com/
379 https://www.fca.org.uk/firms/innovation/regulatory-sandbox
380 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/701847/UK_finanical___regulatory_innovation.pdf

- **ICT innovation in key sectors**, by enabling innovative, technology-driven solutions in the area of finance.

3.14 UNDP Accelerator Lab (Serbia)

The UNDP Accelerator Lab in Serbia[381] was officially launched in collaboration with the President's Office of Serbia in Belgrade in 2019, recognizing the need to use new approaches to design and test a portfolio of experiments, focusing on circular migration and measures for retaining skilled and unskilled workers in Serbia. It is part of the wider UNDP innovative network of 60 Accelerator Labs that are being launched worldwide.[382] The project impacts all three building blocks of innovation:

- **innovation dynamics**, by designing experiments that feed into future policy actions regarding circular migration and measures for retaining skilled and unskilled workers in Serbia;
- **innovation capacity**, by promoting collaboration between stakeholders in order to retain talent and foster innovative capabilities of start-ups; and
- **ICT innovation in key sectors**, by integrating the use of new technologies into policy-making.

3.15 Yozma Group (Israel)

Established by the Government in 1993, the Yozma Group[383] is credited with creating the venture capital market in Israel. It was established with the goal of catalysing the venture capital industry by stimulating foreign venture capitalists' investments and bringing their expertise and network to the country. The initiative impacts all three building blocks of innovation:

- **innovation dynamics,** by designing the governmental programme aimed at stimulating the financing sector for high growth SMEs;
- **innovation capacity**, by providing funding for start-ups and creating linkages and networks with foreign investors and, thus, bringing their expertise and support to the Israeli ecosystem; and
- **ICT innovation in key sectors**, by supporting high-tech start-ups across sectors.

381 https://www.rs.undp.org/content/serbia/en/home/blog/2020/serbian-repats-stories-return.html
382 https://www.rs.undp.org/content/serbia/en/home/stories/1st-year-undp-serbia-accelerator-lab.html
383 http://www.yozma.com/overview/

Appendix A: Methodology

This section describes the project research methodology. The first part explains the research goals and methods of the report as a whole. Each subsequent part explains (a) the necessary definitions to understand the report, namely the engines of growth, enablers of digital transformation, the Ecosystem Maturity Map and good practices, and (b) the data collection and analysis methods used for each section.

A.1 Research goals and methods

The goals of this research were to (a) understand the state of the Europe region's ICT-centric innovation ecosystem; (b) understand the state of the region's ICT-centric innovation capacity based on the three engines of growth (technology ecosystem, entrepreneurial ecosystem and innovation ecosystem); (c) provide a comparative ranking of the region's ICT-centric innovation ecosystems; and (d) identify good practices from the Europe region that can be used to build sustainable digital innovation ecosystems with the ITU digital innovation framework.

This framework, first introduced in *Bridging the digital innovation divide: A toolkit for strengthening ICT-centric ecosystems*[384], enables countries to understand their digital innovation ecosystem challenges, opportunities to create ICT start-ups, nurture talent, and develop specific guidelines, recommendations, initiatives, programmes and projects to help create new jobs and new growth based on best practices.

This report was compiled primarily using desktop research and some survey methods. ITU collected evidence on the overall digital innovation ecosystem in the region using sources including peer-reviewed academic journal articles; books; government websites; reports from government, intergovernmental and non-governmental agencies and the private sector; and national and regional newspapers. In some cases, surveys were sent to collect additional information where possible, for example, on details of a good practice.

A.2 Monitoring ICT-centric ecosystems

A.2.1 The three engines of growth

Key to a country's digital transformation journey are the three engines of growth: (a) the national innovation ecosystem, (b) the entrepreneurial ecosystem, and (c) the technology ecosystem.

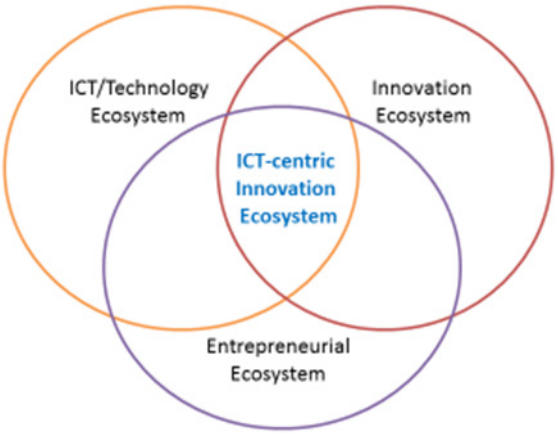
- **National innovation ecosystem**: this system – which includes research institutions, academia and public sector entities, such as national innovation agencies and public sector financial institutions – plays an invaluable role in the national innovation journey, particularly in kick-starting innovation.
- **Entrepreneurial ecosystem**: this includes the entrepreneurs, their support systems and the organizations that initially nurture the formation of enterprises through the "valley of death" and subsequently nurture their growth as SMEs. Often, tech start-ups that have the potential to become high-growth firms end up as SMEs because of the lack of a market or

[384] https://www.itu.int/en/ITU-D/Innovation/Documents/Publications/Policy_Toolkit-Innovation_D012A0000D13301PDFE.pdf

appropriate business models. These support networks enable them to achieve their full potential.

- **Technology ecosystem**: this system includes high-growth technology companies and the ecosystems that support them, such as high-tech companies, their original equipment manufacturers, system integrators, firms in ICT sectors and business-to-business (B2B) technology platforms that support SMEs. These companies and their ecosystems are integrated into local or global value chains. This ecosystem's development is critical to a country's ability to leverage technological innovation and create high-growth industries and jobs.

Figure A.1: The three engines of growth



Source: ITU

A country's ICT-centric ecosystem is where the three engines of growth intersect. In an immature ecosystem, the three engines of growth lack synergy: ecosystem stakeholders operate in silos and do not align their initiatives towards a common vision. By contrast, in a mature ecosystem, members of the three engines of growth understand their roles and perform them individually while also working together to create policies and initiatives that enable a thriving digital innovation environment. Understanding and assessing the ecosystem makes it possible to identify the enablers needed to achieve the national vision. Enablers include programmes, policies and initiatives that foster digital transformation.

A.2.2 Data collection and analysis

With this understanding, data were collected by consulting published global indexes, which can serve as a proxy for the three engines of growth. The indexes are published by reputable academic institutions, international organizations and non-profit organizations.[385]

The Global Innovation Index measures and ranks countries' efforts and success in innovation. The ICT Development Index measures ICT infrastructure and access, the level of ICT use in society and the impact of efficient and effective ICT use. The Global Competitiveness Index is published the in World Economic Forum's Global Competitiveness Report. This index measures 12 pillars that the organization has identified as essential to national competitiveness, namely:

[385] As mentioned previously, the indexes are: (a) the ICT Development Index (IDI), published by ITU; (b) the Global Innovation Indexpublished annually by Cornell and the World Intellectual Property Organization (WIPO); (c) the Global Competitiveness Indexpublished annually by the World Economic Forum (WEF) and the (d) Global Entrepreneurship Indexpublished annually by the Global Entrepreneurship Development Institute.

(a) institutions; (b) infrastructure; (c) ICT adoption; (d) macroeconomic stability; (e) health; (f) skills; (g) product market; (h) labour market; (i) financial system; (j) market size; (k) business dynamism; and (l) innovation capability. Lastly, the Global Entrepreneurship Index measures 14 entrepreneurship-enabling pillars: (a) opportunity perception; (b) start-up skills; (c) risk acceptance; (d) networking; (e) cultural support; (f) entrepreneurship by choice (rather than necessity); (g) technology absorption; (h) human capital; (i) competition; (j) product innovation; (k) process innovation; (l) high growth; (m) internationalization; and (n) risk capital. ITU analysed and colour-coded the information from these major indexes to create the ICT-centric Innovation Performance Monitor. The Monitor provides a comparative assessment of the ecosystem's performance according to the three engines of growth both within and among countries in the region. This way, the Monitor can be used to reflect a set threshold for action by decision-makers.

A.3 Monitoring the enablers of digital transformation

A.3.1 The seven enablers of digital transformation

The ITU toolkit, Bridging the digital innovation divide: A toolkit for strengthening ICT-centric ecosystems, introduces the ecosystem canvas that helps stakeholders understand the environment that innovators and entrepreneurs face when undertaking the journey to bring their ideas to market. The ecosystem canvas has seven pillars, each of which is a crucial component of an ICT-centric innovation ecosystem.

The pillars are:

- **Vision and strategy**: this pillar asks: How is the ecosystem currently performing? What vision do the stakeholders have for its performance? What needs to be done to take the ecosystem from its current state to its ideal future state?
- **Infrastructure and programmes**: this includes both hard infrastructure (e.g. connectivity, roads, electricity and public transportation) and soft infrastructure (including knowledge-sharing mechanisms, such as tech hubs, training resources and research institutions). Within programmes, advantage can be taken of this infrastructure to support the ecosystem.
- **Talent and champions**: talent is the ecosystem's human capital. Individuals should possess hard skills, such as engineering and programming, as well as soft skills, such as management, communication and administration. A champion is a person who plays a leadership role in the ecosystem by initiating change, building cornerstone institutions and encouraging the contributions of new actors.
- **Capital and resources**: start-ups cannot succeed without capital and resources. In the early stages, they need risk capital (such as from angel investors). As they mature, venture capital and private equity funds help them grow. The majority of this funding should come from private investors. To complement the work of financing start-ups directly, support networks and other ecosystem-building programmes need resources in order to operate successfully.
- **Markets and networks**: start-ups need markets to serve. It is important for innovators and entrepreneurs to understand the depth of market need and access locally, regionally and internationally. Governments are often a significant purchaser of products and services, and a source of contracts for up-and-coming enterprises. Transparent public procurement processes are useful for start-ups. Networks and clusters are also needed in ecosystems to ensure that innovators have access to all resources and connections needed.

- **Culture and communities**: an innovative, entrepreneurial culture has key values, such as risk-taking, an appreciation for failure and a willingness to persist and learn. These values create a blueprint for behaviour across ecosystem stakeholder groups, exhibited by communities of innovators and champions through events and activities.
- **Regulation and policy**: supportive policies and regulations can provide fertile ground for the efforts of entrepreneurs and innovators, while poorly developed policies can stifle innovation. There are a number of areas of policy and regulation that are critical to the success of the innovation ecosystem, including taxation, trade policy, IP law, financial regulation and business regulation.

Within a country, these pillars provide the necessary ingredients to nurture digital entrepreneurship and innovation, looking at a more granular level when the three engines of growth come together.

A.3.2 Data collection and analysis

For this report, desktop research was conducted using this framework to examine what is happening in an ecosystem, and identify problems and possible solutions. The pillar framework identifies countries' performance in each of the seven pillars, contributing to an understanding of their individual performance and their performance relative to the region.

A complementary quantitative and qualitative approach can also be used to obtain the information needed for this framework. However, due to the complexity of collecting this data for all countries, this report is limited to desktop research.

Any country interested in a comprehensive analysis of its ecosystem should request technical assistance from ITU to develop a profile of its digital innovation ecosystem.

A.4 Monitoring the Ecosystem Maturity Map

Once there is an understanding of global and regional performance indicators, and an understanding of the enablers and indicators of digital transformation, it is crucial to understand the entrepreneurial life cycle, which helps to explain how innovation can move from ideas to the creation of small and medium businesses, high-growth firms and, ultimately, world-class exports.

A.4.1 The job-to-be done framework

Harvard economist Clay Christiansen, while studying the theory of disruptive innovation by companies, realized that the traditional ways in which companies deliver products and services to serve market can be ineffective in creating competitive solutions and lasting companies.[386] The job to be done is the need described by the customer that the product or service fulfils. If a product or service does not answer a need or desire, it is unlikely to sell, no matter how innovative it is.

In the context of the innovation journey, most statistics will show that 90 per cent of small and medium businesses fail because they cannot sustainably deliver the right products and services to market. Yet, they are expected to be the engine for job creation and to grow into mature firms. What is the job to be done by stakeholders to ensure that innovation flourishes?

[386] https://hbr.org/2005/12/marketing-malpractice-the-cause-and-the-cure

The entrepreneurial life cycle shown below describes what must be done to create growth and economic inclusion. Therefore, for an innovation-driven economy to be competitive, the job to be done is to nurture innovators on this journey to develop ideas into businesses.

Figure A.2: The entrepreneurial life cycle

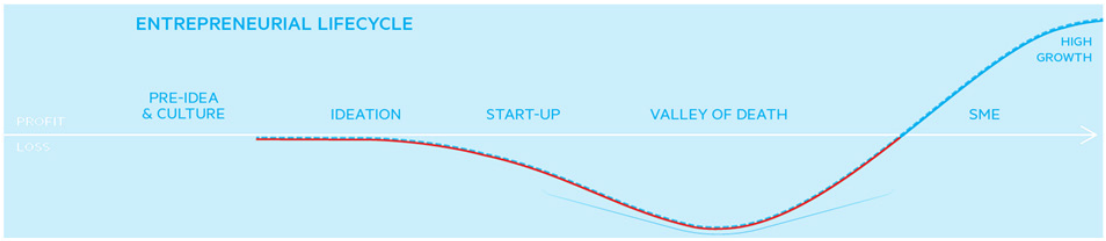


Figure A2 shows the different stages of the entrepreneurial life cycle with a horizontal line following the cycle from left to right. Above the line indicates profit and below the line loss. From left to right, this line is labelled pre-idea and culture, ideation, start-up, valley of death, SME and high growth. A graph line begins just after pre-idea and culture, begins to dip at start up, slopes to the bottom of the graph for valley of death, rises at SME to high-growth. It indicates that profits are only made once the life cycle has passed the valley of death.
Source: ITU

The job to be done does not change from country to country, or from community to community. However, the approach to any given job, and the ways this job is done, can change based on the context (such as opportunities) and stakeholders' actions. For example, in Silicon Valley, financiers have a strong appetite for high growth and collaboration, which means that they will support innovators much longer through the valley of death until they can determine a strong global business model that creates high-growth firms.[387] In locations with fewer resources and less collaboration, stakeholders' actions may lead to the creation of barely sustainable innovations which never grow. Without access to the right resources and collaboration, innovators will lack appropriate talent to create strong businesses, enabling policies that nurture them or access to value chains from established companies.

The question now remains: who is doing what job on this journey?

This is why ITU has developed the Ecosystem Maturity Map (also known as the Stakeholder Interface Canvas), which is adapted from the "valley of death" curve. This tool helps to map the roles and actions of stakeholders at each stage of the start-up life cycle. Once the map is completed, it offers some guidance on how relevant a practice may be to a country or community. Failure to focus ecosystem interventions on the right practice element can waste valuable ICT investment and offer no relief to the competitiveness of a country's ICT ecosystem.

The figure below represents a colour-coded version of the Ecosystem Maturity Map for Country A.

[387] Blitz-scaling book, Reid Hoffman, founder, LinkedIn

Figure A.3: Colour-coded Ecosystem Maturity Map for Country A

Entrepreneurship Phase	Pre-Idea	Ideation	Startup	The "Valley of Death"	SME
Entrepreneurs	Entrepreneurial Interest	Engage with problems	Develop Business Models	Build Collaboration	Expand
Finance	Research Funding	Seed Funding	Angel Investment	Venture Capital	Business Finance & Loans
Entrepreneurial Support	Entrepreneurial Events	Hackathons & Competitions	Co-working & Support	Incubators & Accelerators	Business Association
Private Sector	Success Stories	Research Programs	Lab programs	B2B & Support Services	Skill Training Programs
Academia	Entrepreneur Community	Basic Research	Spin Offs	Soft skill trainings	Human capital
Public Sector	Vision & Strategy	IP & R&D Support	Tax Support	Public Procurement	Trade Policy

Source: ITU

In this country's ICT-centric ecosystem, most stakeholders are not sufficiently performing the necessary roles to enable a thriving ecosystem. While the entrepreneurial support networks are performing quite well, entrepreneurs, academia and the public sector must significantly improve their work in each stage of the entrepreneurial life cycle. The private sector and the finance sector have some practices that are working but, for the most part, need to improve significantly if the country is to develop a competitive ecosystem with world-class firms and high-growth exports.

For more information about this canvas, download the Ecosystem Maturity Map.[388]

A.4.2 Data collection and analysis

Due to time constraints, the ICT-centric innovation policy monitor introduced in Section 2 has only been done on the country level due to the extensive level of engagement with stakeholders required to determine the maturity level of an ecosystem.

However, for the purpose of this report, it is necessary to understand how each good practice impacts each of the micro jobs to be done. For detailed, country-level information, Member States are invited to contact ITU to develop a Digital Innovation Profile for their country.

A.5 Monitoring good practices

A.5.1 Why use good practices?

A good practice is a proven process or action that yields an evidence-based impact and successful results and can be scaled up and replicated. Good practices are needed to help to:

- develop flagship projects,
- comparatively assess the strengths and weaknesses of a practice, and
- undertake evidence-based policy or programme development.

Good practices enable actors to effortlessly add value to their ecosystems' initiatives. However, a good practice should not be replicated exactly as is, because every ecosystem and project is different.

[388] https://www.itu.int/en/ITU-D/Innovation/Documents/Ecosystem%20Maturity%20Tool.pdf

ITU has developed the Good Practice Canvas, a framework for understanding the blueprint of any practice. Practices examined through the canvas can then be replicated in other ecosystem projects, where they can add value and increase their chances of success.

A.5.2 Good practice canvas

Figure A.4: Good practice canvas

Source: ITU

This tool, composed of seven core pillars, helps the user extract the blueprint of working practices (including key function breakdowns of these practices, along with their corresponding key performance indicators and success stories). The result is a promising blueprint that will enable stakeholders to choose the specific building blocks of a good practice that they would like to adopt, replicate and share. The seven pillars of the Good Practice Canvas are explained below:

- **Practice**: a short description of a practice, the country or city where it is used, a tagline for a practice (if any) and an elevator pitch, or a description of one to three lines.
- **Type**: this refers to the building blocks of ICT-centric innovation: (a) guiding innovation dynamics, (b) building innovation capacity, and (c) integrating ICT innovation in key sectors.
- **Goals**: this refers to the specific objectives and target stakeholders of the practice, and desired outcome for the ecosystem.
- **Key activities**: this refers to events, related initiatives, processes and other activities to offer insights into the operating processes of the practices.
- **Governance**: this pillar asks for relevant information about organizational structure (such as flat or hierarchical), management (leadership structure and long-term driver or vision) and institutional frameworks (such as non-governmental organizations, government agencies, etc.), and the competencies (skills and functional roles) required to perform the practice.
- **Resources**: this refers to critical elements, such as financial and non-financial resources, including human capital, equipment and processes. Additionally, an understanding of key partnership for the practice is also helpful as many non-financial resources are derived from partnerships. Knowing the funding sources for a specific practice is also useful when

replicating it, as it can help to identify suitable stakeholder groups that can provide the required resource.

- **Achievements**: this is where the practice is evaluated based on the following criteria:
  - replicability, or how easily it can be copied to a different context;
  - scalability, or the scope of the practice to achieve its goals; and
  - evidence of impact on the ecosystem, or the effectiveness of the practice in achieving its goals and results, which refers to outcomes based on key performance indicators set by the practice.

A.5.3 Types of good practices

As mentioned throughout this report, good practices are organized around three key types which denote how they impact the overall ecosystem: (a) guiding innovation dynamics, (b) building innovation capacity, and (c) integrating ICT innovation into key sectors. To have a competitive ecosystem, it is necessary to have a combination of all these practices.

Guiding innovation dynamics

- Is innovation on the map? How supportive of innovation is the general environment?

This first category, **guiding innovation dynamics**, refers to practices that enable digital innovation to exist. They support the general innovation environment.

Innovators need a suitable business environment, enabling policies and key programmes to develop appropriate technology solutions. Often, there are many policies and incentives in the general environment that promote entrepreneurship or sectors, but that are only for non-digital innovators. Thus, existing practices may need to be updated while new policies are developed to close the gaps.

A dynamic innovation environment requires regulatory and organizational settings which are coherent and which guide, facilitate and promote innovation culture, mindset, projects and programmes. Countries need a clear roadmap, vision and strategy, and key initiatives, created through "enabling policies, regulations, and rules balancing the old analogue and the new digital economy".[389]

Each stakeholder in the ecosystem must be able to benefit from their country's environment and work together rather than in silos. Entrepreneurs, for example, must have the means and knowledge to create appropriate solutions for their communities.

Good practices that guide innovation dynamics balance stakeholder collaboration and market forces in a way that will drive innovation, public-private partnerships and access to international markets. For example, policies such as reductions in the cost of investment, and fiscal and financial policies can attract international start-ups, while start-up visas can attract talent. Start-up policies for growth could include tax incentives and funding incentives.

Often, practices have a regulatory basis to guide innovation dynamics but they may not be effective, inclusive or operational. The practices may be missing mechanisms for execution, competing against each other instead of creating synergies through collaboration. Traditional

[389] https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2018/WSIS/Accelerating%20Digital%20Transformation.pdf

innovation agencies are an example of these types of practices because they mostly operate in the innovation ecosystem – one of the engines of growth. Newer organizations are needed to tackle the problems of coordination, trust and cooperation that currently confront lagging ecosystems. Such organizations need to work across the three engines of growth to nurture cross-stakeholder collaboration in countries.

Building innovation capacity

- Are innovators equipped with the right tools, skills, know-how and resources to succeed?

The second type of good practice is **building innovation capacity**. This type of practice enables a sufficiently well-developed infrastructure and talent pool with access to resources in the ecosystem to solve problems in their community. They equip innovators with the right tools, skills, spaces and resources to succeed.

There is a need to provide adequate skills and knowledge, as well as programmes that encourage success. In globalized digital economies, access to skills and know-how has been democratized through, for example, the many online MOOCs from reputable organizations. Yet many communities still struggle to access knowledge and resources. Lack of access to decent skills development initiatives and content, as well as the absence of spaces and programmes that enable innovators, inhibit the innovation capacity of entrepreneurs, especially in developing countries.

Innovation hubs, tech parks, lab programmes and other similar arrangements involving multiple stakeholders have sprung up around the world over the past few years to address the growing needs of ecosystems. Whether formal or informal, innovation infrastructures - which are essential for building an ecosystem's innovation capacity - are usually clustered around higher-learning institutions. When domestic capacity is insufficient, access to regional or global networks and resources becomes necessary.

Lastly, innovators need a continuum of funds to bootstrap and develop their ideas. Without these resources, much of the ecosystem struggles. Collaborative models with academic institutions, and among entrepreneurial support institutions and private sector companies, are essential in developing such capacity to ensure that talent is well equipped.

Integrating ICT innovation into key sectors

- Is ICT innovation integrated across key sectors?

The third and final category is good practices that help to **integrate ICT innovation into key sectors** so that start-ups and SMEs can realize their full potential and scale up beyond their niche, enabling transformation across other industries.

Ecosystems must focus on national development priorities and make linkages to other ecosystems. Without such focus and linkages, innovators will struggle with entry and scale-up to unlock opportunities. One place where they can find quick alignment is in the public sector. This is particularly important for start-ups, which can take advantage of government demand. This helps innovators with product testing, validation, establishing credibility, and growth, while also helping the government to digitalize its services.

Innovative entrepreneurial ICT ventures realize their full potential when they can tap into other industries beyond ICT. This is where the potential for digital transformation is greatest. Here,

collaboration with the private sector plays a vital role. By partnering with start-ups, corporations benefit from new ideas, circumvent corporate red tape to test new innovations, rapidly create prototypes and benefit from the flexibility of entrepreneurial culture. At the same time, start-ups benefit from this partnership by accessing resources and infrastructure.

Another example is a cluster development initiative in which the ICT sector can drive innovation in non-ICT sectors. Cluster focus in a sector can help SMEs and large businesses digitally transform their value chains by enhancing their ability to create and deliver value in the marketplace. Here, the linkages between ecosystems and global networks of collaboration are important.

A.5.4 Data collection and analysis

Good practices were identified through pre-existing knowledge, desk research and networks. Data on each practice were collected through desk research, interviews with the practice owners and/or surveys, and analysed according to the pillars of the canvas. Using the Good Practice Canvas (introduced in 4.5.2), the pillars of each practice are presented in the full case studies.

Appendix B: Full case study samples

This section provides full case studies of the good practices in the Commonwealth of Independent States (CIS) region identified earlier in the report. The case studies highlight the pillars of the Good Practice Canvas[390] by providing:

- an overview of the **practice**, including its **goals** and **target stakeholders**;
- the **type** of case study;
- its **governance** structure;
- its partners and **resources**; and
- its **achievements**.

To access all case studies in their entirety, please contact the ITU Digital Ecosystems Thematic priority at eurregion@itu.int.

B.1 Be-Code (Belgium)

Be-Code[391] is a Belgian non-profit organization established in 2016 to bridge the digital divide in Belgium by offering a new way of learning. It is an ecosystem of five campuses offering inclusive coding boot camps for job seekers to meet the needs of companies for coding and problem-solving skills.

Type

This practice impacts two building blocks of innovation: innovation capacity and ICT innovation in key sectors.

Goal(s)

Be-Code aims to bridge the gap between available talent and the employer market currently at war for digital talent. Its mission is "to grow today's talented – and especially vulnerable – job seekers into tomorrow's best developers".[392]

Target stakeholders

Be-code's main stakeholders are job seekers: the disadvantaged population, young people not in not in education, employment or training (NEET), low-skilled people with a maximum of a secondary school degree, the long-term unemployed, immigrants, people with autism spectrum disorder and women, who are largely under-represented in trades related to new technologies. In addition, it targets private sector companies and public sector institutions through dedicated programmes.

390 In a few of the case studies, detailed information was not available on some Good Practice Canvas pillars.
391 https://becode.org/
392 https://becode.org/about/

Governance

As it is an association, its highest governing body is the General Assembly, which appoints the Board of Directors. The current Board of Directors consists of representatives of the co-founders and a number of independent experts. The General Assembly consists of the Board members as well as remaining co-founders.

Resources and partners

Public-private partnerships have become Be-Code's trademark, and Be-Code has a wide network of public, private and educational partners.

Be-Code combines three major resource streams: philanthropy; public funding (including two Social Impact Bond projects) and private sector revenues through strategic partnerships; and a Pay as You Hire model for companies hiring Be-Code graduates, as well as reskilling programmes for employees.

Several companies and foundations, including Telenet, Orange, 4Wings Foundation and the Degroof-Petercam Foundation, helped to kickstart the project by providing seed capital. *Bruxelles Formations* certified the junior web developer training programme. In 2019, Accenture became the first company to sign a framework agreement, committing to hire at least 20 graduates each year.

The first artificial intelligence school in Belgium was created in collaboration with Cronos, Delaware, Faktion, KPMG and Xylos as founding partners, and with the support of Microsoft and Simplon.[393]

Be-Code also collaborates with governmental institutions on specific projects. Examples include Digital Walonia,[394] ESF Vlaanderen[395] or the EU-funded project Free to Code.[396]

Activities and events

Be-Code provides basic and advanced training for individuals over 18 years, regardless of their previous education and background, using methodology developed by the French coding school Simplon, licensing the active pedagogy as well as the training content. The training costs are fully covered by Be-Code's partners and sponsors, and participants are not subject to tuition fees.

Th main training provided by Be-Code is: (1) Junior Web Developer; (2) System Administrator, Security Specialist, DevOps or DevSecOps; (3) AI Data operator (AI Bootcamp); and (4) SAP training.[397] All training courses take seven months to complete (with the exception of SAP training, which lasts from 4 to 10 weeks).

Be-Code offers individuals and job seekers job placements with its partners. It offers companies the opportunity to train and hire talent, as well as outplacement programmes for employees.

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393 https://becode.org/about/mission-history/
394 https://becode.org/about/projects/digital-wallonia/
395 https://becode.org/about/projects/esf-vlaanderen/
396 https://www.free2code-initiative.eu/
397 https://becode.org/companies/hire/

Be-Code also organizes Open doors, information sessions, code initiations and Coderdojo workshops, where children and teenagers can learn how to code in a fun atmosphere.

Achievements

Be-Code has 18 classrooms across five campuses in Belgium and to date has trained 1 257 participants through 53 training classes (26 per cent of which were for women).

Infobox

Impact on the Entrepreneurial Lifecycle

The Be-Code Belgium initiative has instigated good practices in building collaboration, success stories, skills training programmes and human capital.

B.2 Challenge Driven Innovation (CDI) Programme (Sweden)

The CDI[398] Programme was launched by VINNOVA, the Swedish Innovation Agency[399] in 2011. The Programme, designed as "an important and unique component of Swedish growth – and the innovation engine",[400] funds visionary projects, challenging existing models and dealing with systemic issues by developing sustainable solutions to tackle societal challenges identified in the framework of Agenda 2030.[401] The challenges addressed include future healthcare, competitive industries, sustainable attractive cities and transport systems, information society, spanning the climate crisis and the transition to renewable energy, sustainable consumption and production, and reduced inequality and social vulnerability.[402]

The emphasis is placed on the demand and user-driven project innovative solutions that go beyond "silo-thinking",[403] requiring cross-sectorial cooperation from diverse actors from the private and public sectors. Its criteria comprise the following:

- funded projects must be based on the societal challenges addressed in Agenda 2030;
- solutions must be transformative and demonstrate international appeal; and
- gender equality must be promoted in terms of the project's participants, and the design and implementation of the solutions.[404]

Type

This practice impacts all three building blocks of innovation: innovation dynamics, innovation capacity and ICT innovation in key sectors.

398 https://www.vinnova.se/en/m/challenge-driven-innovation/this-is-cdi/
399 https://www.vinnova.se/en/
400 https://www.vinnova.se/en/m/challenge-driven-innovation/this-is-cdi/
401 https://sustainabledevelopment.un.org/post2015/transformingourworld
402 https://www.vinnova.se/en/m/challenge-driven-innovation/this-is-cdi/
403 https://www.stippsweden.com/news/case-study-report-on-vinnovas-challenge-driven-innovation-program
404 https://www.vinnova.se/en/m/challenge-driven-innovation/this-is-cdi/

Goal(s)

The CDI Programme was designed to foster collaborative transformative innovations and solutions for societal challenges.

Target stakeholders

All types of stakeholders: private and public sector, academia and industry, innovators and entrepreneurs.

Governance

The CDI Programme, launched in early 2011, is governed by the Swedish Innovation Agency, VINNOVA. Established in 2001, VINNOVA is a government agency under the Ministry of Enterprise and Innovation serving as the Swedish Government's expert authority in innovation policy. With its head office in Stockholm and affiliates in Brussels, Silicon Valley and Tel Aviv, it employs over 200 people and invests approximately SEK 3 billion in research and innovation annually. VINNOVA engages in five main types of activities: (1) investing in research and innovation; (2) improving the innovation capacity of SMEs and facilitating their promotion in international partnerships; (3) promoting global links; (4) policy development; and (5) utilizing the country's innovation infrastructure.[405]

Other government agencies are involved in some projects, depending on the scope of the challenge. For instance, the Swedish Transport Administration (Trafikverket) is involved in traffic and city-related projects. VINNOVA is advised by an externally appointed programme committee that provides recommendations on strategic development and assesses grant applications.[406]

Resources and partners

VINNOVA awarded around SEK 243 million (USD 27 million) in grants in 2020 to CDI-funded projects.[407]

Activities and events

Project organizers can apply for funding at one of three stages:

(1) The initiation stage (80 per cent of project cost, up to SEK 500 000), aimed at refining the idea and developing a network of collaborators around a defined societal challenge, lasting from six to nine months.
(2) The collaboration stage (up to 50 per cent of total project cost, up to SEK 10 million), aimed at development of (partial) solutions, lasting from 24 to 30 months; and
(3) The implementation stage (25-40 per cent of the total project cost, up to SEK 20 million), aimed at testing, implementation and disseminating results, lasting up to 24 months.

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405 http://www.niassembly.gov.uk/globalassets/documents/raise/publications/2011/enterprise-trade-investment/14311.pdf
406 https://fkg.se/wp-content/uploads/2019/05/OECD_Review_of_Innovation_Policy_Sweden_2016_prel_ver.pdf
407 https://www.vinnova.se/publikationer/arsredovisning-2019/

In order to apply for the next stage, the project must have been completed and approved in the previous stage. VINNOVA is actively involved in all meetings to select projects and in project follow-ups. Project proposals are evaluated by external experts but the final decision is taken by VINNOVA.[408]

Achievements

Up to 2020, 530 projects had reached stage one, 163 had reached stage two and 46 went on to stage three. VINNOVA currently lists 71 ongoing project profiles on its website.[409]

Infobox

Impact on the Entrepreneurial Lifecycle

The Challenge Driven Innovation (CDI) Programme instigates good practices in entrepreneurial interest, engaging with problems, developing business models, building collaboration, expansion, research funding, co-working and support, success stories, research programmes, entrepreneur community, spin-offs, human capital, vision and strategy.

B.3 Digital Hub Initiative (De-Hub) (Germany)

De-Hub[410] Digital Hub Initiative, was launched in 2017 by the German Ministry for Economic Affairs and Energy with the purpose of building a nationwide network for digital innovation. The umbrella brand, De-Hub, consists of 12 digital hubs, with each functioning as an innovation centre for future business sectors of the German economy. De-Hub Digital Hub Initiative connects medium-sized businesses and larger companies with new innovation partners from the scientific and start-up communities through accelerators, incubators and networking events. It provides support to innovative companies to develop their business models for digital products which they test until they are ready for the market.[411]

Type

This practice impacts all three building blocks of innovation: innovation dynamics, innovation capacity and ICT innovation in key sectors.

Goal(s)

De-Hub Digital Hub Initiative aims to establish Germany as a pioneer of digitalization and a world-leading digital ecosystem.[412]

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408 https://fkg.se/wp-content/uploads/2019/05/OECD_Review_of_Innovation_Policy_Sweden_2016_prel_ver.pdf
409 https://www.vinnova.se/en/m/challenge-driven-innovation/inspired-by-our-projects/
410 https://www.de-hub.de/en/
411 Idem.
412 https://www.de.digital/DIGITAL/Redaktion/EN/Downloads/digital-hub-initiative-in-brief.pdf?__blob=publicationFile&v=5

Target stakeholders

De-Hub's stakeholders are investors, start-ups, private sector companies, experts/talent and academia.

Governance

The Digital Hub Initiative is the German Government's instrument to strengthen connectivity and cooperation among start-ups in the digital age. Implementing agencies are Germany's Federal Ministry of Economic Affairs and Energy, and the Advisory Council that is completely independent of the Federal Ministry of Economic Affairs and Energy. The latter consists of high-ranking representatives of corporates, investors, digital enterprises and economic associations.

Resources and partners

A network has been formed enabling the exchange of technological and business expertise, programmes and ideas among 12 Digital Hubs: Hamburg (logistics), Berlin (IoT and Fintech), Potsdam (Mediatech), Dortmund (logistics), Dresden, Leipzig (smart systems and smart infrastructure), Cologne (Insurtech), Frankfurt, Darmstadt (Fintech and cybersecurity) Manheim, Ludwigshafen (digital chemistry and digital health), Nuremberg, Erlangen (digital health), Karlsruhe (artificial intelligence), Stuttgart (future industries) and Munich (mobility and insurance technology).[413]

Activities and events

By bringing together the expertise of established companies with innovative start-up concepts and scientific excellence, the Digital Hub Initiative promotes new digital business models and a culture of innovation. In addition, De-Hub Initiative offers the following online services:

- Start-up Finder, providing access to more than 450 start-ups through Digital Hubs all over Germany;
- Programme Finder;
- Job Finder in Adtech, cybersecurity, digital health, logistics, mobility, Mediatech, and similar industries; and
- Expert Finder, especially for mentors, programmers or consultants in the abovementioned industries.

The Digital Hub Initiative also organizes awards and programmes, informational events, keynotes and panels, fairs and conferences, networking events and workshops.

Achievements

Since its inception in 2017, De-Hub has connected start-ups, SMEs, corporates and talent to promote new technologies. The network was joined by more than 600 start-ups, over 100 SMEs, more than 100 research institutes and over 200 international companies.

[413] https://www.linkedin.com/company/dehubinitiative/about/

Infobox

Impact on the Entrepreneurial Lifecycle

De-Hub Digital Hub Initiative has instigated good practices in the building of collaboration, entrepreneurial interest, engaging with problems, developing business models, success stories, hackathons and competitions, incubators and accelerators, B2b and support services, vision and strategy, skills training programmes and human capital.

B.4 Georgia's Innovation Technology Agency (Georgia)

Georgia's Innovation and Technology Agency (GITA)[414] was created under the leadership of the Ministry of Economy and Sustainable Development in 2014 as the implementation agency for the Government's innovation programme. Its purpose is to create an ecosystem that improves all kinds of innovations and technologies in the country and to create an environment conducive to the growth of innovations and high-tech products.[415]

Type

This practice impacts all three building blocks of innovation: innovation dynamics, innovation capacity and ICT innovation in key sectors.

Goal(s)

GITA's mission is to stimulate all kinds of innovations and technologies in the country, promote a commercialization of knowledge and innovations in all fields of the economy, and develop high-speed Internet nationwide.

Target stakeholders

GITA's main stakeholders are entrepreneurs, financiers, the private and public sectors, and academia.

Governance

GITA is governed by the Ministry of Economy and Sustainable Development. Its activities are defined in Georgia's Rural Development Strategy Action Plan.[416]

Resources and partners

Georgia's Rural Development Strategy 2017-2020 and Action Plan 2018-2020 envisaged a budget of GEL 4 million[417] for the Innovation and Technology Agency for 2019.

414 https://gita.gov.ge/eng
415 https://gita.gov.ge/eng/static/3
416 https://mepa.gov.ge/En/PublicInformation/6346
417 Around USD 1.2 million.

Activities and events

The agency invests in the development of the infrastructure for innovations (technological parks, innovation centers and industrial laboratories), provides technological commercialization support to increase Internet access across the country, designs financing mechanisms, facilitates the growth of venture capital and private companies' participation in the research and commercialization process for innovations, performs educational activities to support innovations and entrepreneurship, and provides technical support for innovation and entrepreneurship. GITA also engages in international cooperation to design innovations for technology and research development.[418]

In addition to the above activities, the agency is responsible for the Technology Transfer Pilot Programme, which aims to support commercialization of the outcome of scientific studies carried out in Georgia that respond to market needs. The duration of the Programme, which started in April 2019, is approximately three years. It is implemented by the World Bank Group and Georgia's Innovation and Technology Agency.

Achievements

Between 2017 and 2019 financing was provided for 992 SMEs in rural areas. In the same period, entrepreneurship skill-building programmes were provided for 1 800 beneficiaries, of whom 300 achieved sales growth and 20 established a new SME.[419]

Infobox

Impact on the Entrepreneurial Lifecycle

Georgia's Innovation and Technology Agency (GITA) has instigated good practices in entrepreneurial interest, engaging with problems, developing business models, success stories, building collaboration, research funding, seed funding, entrepreneurial events, hackathons and competitions, incubators and accelerators, research programmes, business finance and loans, skills training programmes, entrepreneur community, soft skills training and human capital, vision and strategy, IP and R&D support, and human capital.

B.5 GovTech Poland/GovTech Centre (Poland)

GovTech Poland[420] is a cross-ministerial task force that has been operating in the Chancellery of the Prime Minister of Poland[421] since 2018. The initiative started as a pilot project in the Ministry of Finance in 2017 and became the chief governmental digitalization programme with a wide mandate to facilitate the adoption of innovative policies and technical solutions across the public sector in 2018. Its mission is to build bridges between the Government and the private sector and civil society organizations, enabling them to provide solutions suitable for the needs of the public administration and stimulating entrepreneurship and job creation by facilitating access

418 https://gita.gov.ge/eng/static/3
419 https://www.gita.gov.ge/eng/static/95
420 https://www.gov.pl/web/govtech-en/
421 https://www.civtechalliance.org/govtech-polska

for SMEs to government public procurement.[422] At the end of November 2020, the GovTech Poland programme evolved into the GovTech Centre (Centrum GovTech),[423] with a mission to build a digital state in Poland.[424]

Type

This practice impacts all three building blocks of innovation: innovation dynamics, innovation capacity and ICT innovation in key sectors.

Goal(s)

The initial goal of GovTech Poland was to create a digital consulting hub for the public administration and improve dialogue between the public sector and innovators, in connection with the implementation of best practices and coordination of State innovation policy.[425] With the transformative growth of GovTech Poland into the GovTech Centre, its mandate grew to building a Polish digital state, supporting the adoption of innovative disruptive technologies in the public sector, and teaching public servants how to use them.

Target stakeholders

The direct recipient of GovTech Poland services are government bodies (local and central administration and other institutions performing public tasks, such as hospitals, schools, or transport companies). The initiative also builds bridges between government, innovators (entrepreneurs, private sector and academia) and citizens – characterized as the programme's ultimate recipients.

Governance

GovTech Poland has been strongly aligned with Polish Public Procurement Law and procedures.[426] Institutionally, GovTech Polska, and now the GovTech Centre, is an integral part of the Chancellery of the Prime Minister, managed by the Prime Minister's High Representative for Government Technology (Justyna Orłowska) reporting directly to the Prime Minister.[427]

Resources and partners

The consulting and advisory services are financed by the Chancellery of the Prime Minister, with the official budget of around USD 1.35 million only established in 2020. Competitions and hackathons are financed by the public institutions themselves.[428]

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422 https://govinsider.asia/innovation/govtech-poland-procurement-reform-hackathons-justyna-orlowska-antoni-rytel/
423 https://www.gov.pl/web/govtech/polska-cyfryzacja-zyskuje-nowe-oblicze---w-kancelarii-premiera-powstalo-centrum-govtech
424 https://www.gov.pl/web/govtech/polska-cyfryzacja-zyskuje-nowe-oblicze---w-kancelarii-premiera-powstalo-centrum-govtech
425 https://oecd-opsi.org/innovations/govtech-poland-programme/
426 https://www.uzp.gov.pl/__data/assets/pdf_file/0019/40177/Public_Procurement_Law_2018_consolidated.pdf
427 https://www.gov.pl/web/govtech/polska-cyfryzacja-zyskuje-nowe-oblicze---w-kancelarii-premiera-powstalo-centrum-govtech
428 https://www.gov.pl/web/govtech-en/administracja

The initiative works in partnership with the offices of the entire central public administration, the Polish Office of Public Procurement (UZP), Polish software associations and business associations within the IT sector, including the *Polska Agencja Prasowa* (Polish Press Agency), *Bank Gospodarstwa Krajowego* (Polish National Development Bank), Internet Governance Forum Poland and Allegro Tech.[429]

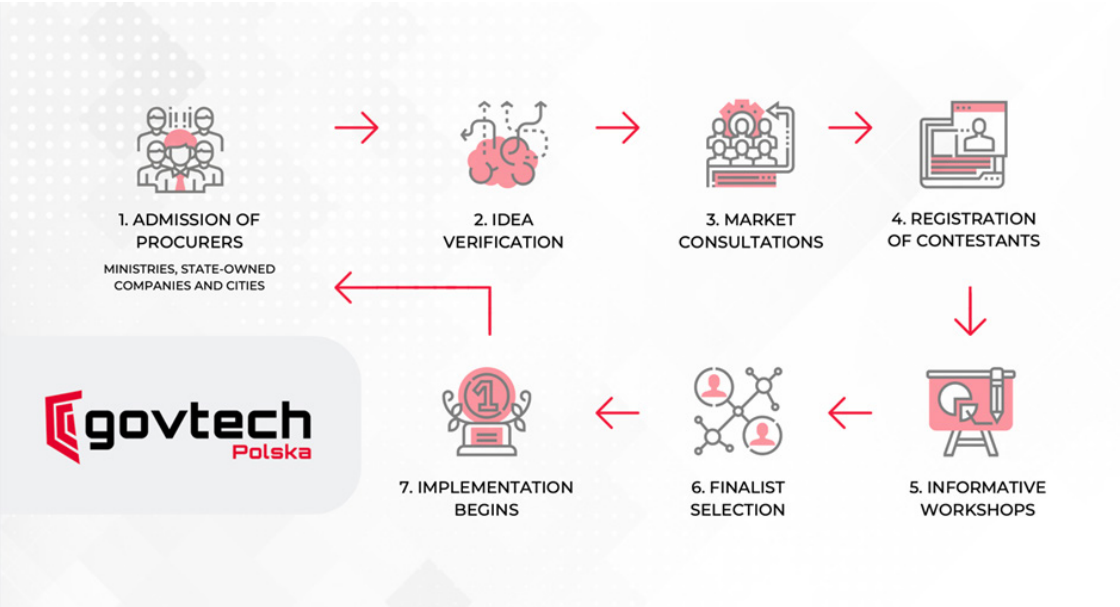
Activities and events

Beyond coordination of digital and innovation policy in the public sector, GovTech focuses on deployment activities providing:

- advisory and consulting services for the central public sector;
- GovTech competitions for innovators (so called "design contests") in the preparation of public procurement in IT;
- hackhatons; and
- non-technical, civic brainstorming ("Service Jams").[430]

The **design contests** are open to citizens, companies, start-ups or teams from academia, and operate with less restrictive criteria for who can submit ideas than those relating to a traditional public procurement process. The contests use a dedicated software tool[431] and deal only with the creative component of solving a specific challenge rather than dealing with administration and details.[432] All participants are required to build a minimum viable product (MVP) and design a plan for scaling up their solutions, and finalists continue on to prototyping in a targeted public sector environment. The winner is awarded with an immediate contract.[433]

Figure B.1: The overview of GovTech Poland's design contest model



Source: GovTech Poland

[429] https://www.govtechfestival.com/en/
[430] https://www.gov.pl/web/govtech-en/administracja
[431] https://konkursy.govtech.gov.pl
[432] https://pie.net.pl/wp-content/uploads/2019/05/PIE-GovTech-EN.pdf
[433] https://www.uzp.gov.pl/__data/assets/pdf_file/0015/40533/Dobre-praktyki-w-zakresie-pozyskiwania-innowacyjnych-rozwiazan-technologicznych-w-procedurze-konkursowej-Wersja-angielska.pdf

GovTech Poland also designs digital tools to support its mission, such as the fake news detection portal, FakeHunter,[434] created in collaboration with the Polish Press Agency (PAP), online tools to facilitate the participation of SMEs in public tenders, and an online platform to enable entrepreneurs to incorporate the Government's e-services into their products.[435]

Lastly, the centre organizes the GovTech Festival, a gathering of digital, technology-driven, and innovative initiatives, solutions and tech-enthusiasts from Poland and abroad.[436]

Achievements

- GovTech Poland organized 12 large hackathons with up to 3 000 participants each;
- On average, 50 SMEs participated in the design contest, resulting in 20 times more SME participants than in a traditional procurement process;
- The FakeHunter platform and hackathon designed together with the Polish Press Agency to tackle misinformation on the pandemic resulted in 100 reported news items per week on average and 600 submissions during the final challenge; and
- More than five joint projects were organized under GovTech Polska.[437]

Infobox

Impact on the Entrepreneurial Lifecycle

GovTech Poland/GovTech Centre promotes good practices in entrepreneurial interest, engaging with problems, developing business models, building collaboration, expansion, hackathons and competitions, success stories, skills training programmes, entrepreneur community, human capital, vision and strategy and public procurement.

B.6 Health Tech Lab (Serbia)

Created in 2018, Health Tech Lab (HTL) Serbia[438] is an active health-tech ecosystem of Serbia, guided by the vision of health innovation without borders. HTL Serbia is connecting the Serbian health-tech ecosystem with ecosystems of developed countries (the United States, the United Kingdom and Israel) and regions (the EU) for mentoring, learning exchanges and funding, thereby enabling knowledge transfer and co-creation. Initially operating from Serbia, Health Tech Lab plans to expand to the health-tech ecosystems of other developing countries of Africa, South America and Asia.

Type

This practice impacts two building blocks of innovation: innovation capacity and ICT innovation in key sectors.

434 https://fakehunter.pap.pl/en
435 Idem.
436 https://www.govtechfestival.com/en/
437 https://www.gov.pl/
438 https://htl.rs/

Goal(s)

The primary goal of the Health Tech Lab is to create a global network of the local health-tech ecosystems collaborating for impact:

- facilitate digitalization of health systems through new emerging technologies into medicine through telemedicine, robotics and other technologies for health-tech innovations in all developing countries;
- support and connect all health-tech ecosystems of developed countries that wish to develop ICT-centric health solutions; and
- promote existing innovative health-tech solutions and support their sustainable growth and development.

Target stakeholders

Patients organizations and citizens, health-tech start-ups and accelerators, academic and research institutions, private sector companies, financiers, governments and public health organizations.

Governance

Health Tech Lab is a private initiative and non-governmental organization, driven by health-tech ecosystem stakeholders. In addition, Health Tech Lab Serbia is supported by an international Advisory Board, composed of seven prominent international experts from the United Kingdom, Israel, the United States, the European Union and Serbia. The Board supports the organization with mentorship, advice on technology transfer, business and entrepreneurship, and health-tech innovation activities.

Resources and partners

HTL relies mainly on non-financial sources, developing the local, Serbian network of partnerships with institutions, health and tech professionals and students, building further connections, novel solutions and projects based on their skills and knowledge. The Advisory Board is crucial in that respect. HTL considers its partners and network one of its biggest assets.

Local Serbian partners include Swiss Contact**,** Bel Medic**,** Roche Serbia**,** Epsilon, Data Science Conference, Polyhedra, Kliker ICT for kids, InCentar, Friedrich Naumann Foundation for Freedom, Institute for Molecular Genetics and Genetics Engineering, USAID Serbia, UNDP Serbia, Digital Serbia Initiative and ICT Hub International.

International partners include MASHAV (Israel), European Youth Award, World Summit Awards, Science Park Graz (Austria), cLAB Ventures (the United Kingdom), and Governmental Blockchain Association (the United States).

HTL has been an active member of the European Connected Health Alliance since 2018.

Activities and events

Health Tech Lab Serbia organizes heath-tech meetups, conferences, workshops, start-up competitions and acceleration programmes in order to foster the health tech-ecosystem. HTL is meant to be the core, foundational health-tech ecosystem that enables creation of new health-tech labs in other countries. Through local HTL chapter partnerships, other HTL ecosystems

of other developing countries will be established that will be coached/supported by the HTL Serbia. HTL is currently at the stage of gathering requests from other countries.

Achievements

During the first two years, HTL organized several events and supported many start-ups by:

- (co-)organizing eight health-tech meetups and health-tech start-up competitions with Startup Jerusalem;
- co-organizing a pre-acceleration programme for 24 health start-ups in collaboration with the Innovation Forum Cambridge (the United Kingdom) and the Science and Technology Park Belgrade; and
- co-developing 50 Serbian based health-tech start-ups, including Srem-Cath (innovative catheter), Anora technology (glove for the blind), and Herbelixa (innovative drug for treatment of *Helicobacter pilori*).

HTL was also recognized as one of the four finalists of the Science and Research for Women In Tech programme in Paris, and was one of the top three winners of the 2020 ITU Innovation Challenges.

Infobox

Impact on the Entrepreneurial Lifecycle

Health Tech Lab Serbia has promoted good practices in entrepreneurial interest, engaging with problems, developing business models, building collaboration, entrepreneurial events, hackathons and competitions, co-working and support, incubators and accelerators, success stories, lab programmes, R&D programmes, B2B and support services, skills training programmes, entrepreneur community, IP and R&D support, spinoffs, soft skills training and human capital.

B.7 Icelandic Startups (Iceland)

Established in 1999, Icelandic Startups[439] is a community-driven start-up organization, which serves as one of the key builders of the Icelandic start-up ecosystem. It is the largest private start-up community organization in Iceland. Its services are free of charge, providing customized support for entrepreneurs and start-ups, ranging from the seed of an idea to the first or second round of funding.[440]

Type

This practice impacts one building block of innovation: innovation capacity.

[439] http://www.icelandicstartups.com/
[440] http://www.icelandicstartups.com/about-us

Goal(s)

Icelandic Startups' goal is to help start-ups grow within and outside of Iceland by accelerating their businesses and connecting them with industry experts, investors and leading start-up hubs abroad.[441]

Target stakeholders

Icelandic Startups' main stakeholders are entrepreneurs, investors, the private sector, public sector organizations and academia.

Governance

Icelandic Startups serves as a non-profit and is jointly owned by Origo, the University of Iceland, Reykjavik University, NSA Ventures and the Federation of Icelandic Industries. Its Board of Directors represents the shareholders and includes seasoned entrepreneurs and executives.

Resources and partners

Icelandic Startups was established in 1999 when Nýherji, one of the largest IT companies in Iceland, founded an incubator as a way to support the local start-up scene. In 2007, three university students founded Innovit, a student-driven not-for-profit identity, to help university students start their own companies with initiatives such as the *Gulleggið* business plan competition, Start-up Weekends Workshops, Global Entrepreneurship Week and TEDxReykjavik as a celebration of innovation and entrepreneurship.

In 2013 the two companies merged after launching the first accelerator programme in Iceland. Initially named Klak Innovit, the company rebranded as Icelandic Startups in 2016 emphasizing the importance of international relations by connecting Icelandic start-ups to leading experts and start-up communities abroad.

The *Gulleggið* programme of Icelandic Startups has 12 global and 35 local partners.

Activities and events

Icelandic Startups runs *Gulleggið*, a competition for entrepreneurs through which they can start transforming their business ideas into a real start-up.[442]

Icelandic Startups operates three seed-stage, mentorship-driven accelerator programmes:

- **Startup Reykjavik**: a 10-week programme for tech and creative industries companies that focuses on the business model, customer validations, product market fit, sales, marketing and international growth. The start-ups that are selected each year receive USD 22 000 in funding from Arion bank;[443]
- **Startup Energy Reykjavik**: a mentorship-driven seed-stage investment programme with a focus on energy-related business projects;[444] and

441 http://www.icelandicstartups.com/
442 https://www.gulleggid.is/english
443 https://startupreykjavik.is/
444 https://www.startupenergyreykjavik.com/

- **Startup Tourism**: a mentorship-driven business accelerator initiative for companies in the tourism sector.[445]

During all the programmes, selected start-ups have access to a fully equipped office space, support and networking opportunities.

Icelandic Startups also offers three main tools for the development of new ideas and business planning:

- *Gulleggid* or "The Golden Egg" represents the first step an entrepreneur should take in developing a business idea and is a platform for getting started;[446]
- Start-up Weekend Workshops provide knowledge on how to build a business in 54 hours;[447]and
- thirty-minute consultations.

Gulleggið[448] is the biggest incubation competition in Iceland. Through the process participants are invited to submit their business idea to a group of judges and have the chance to be selected among the top 10 finalists. Additionally, the winner receives ISK 1 million[449] and a trophy.

Achievements

To date, around 2 665 business ideas and 201 participants without an idea have participated in the *Gulleggið* programme.[450]

Infobox

Impact on the Entrepreneurial Lifecycle

Icelandic Startups has instilled good practices in entrepreneurial interest, engaging with problems, developing business models, building collaboration, expansion, success stories, entrepreneurial events, hackathons and competitions, seed funding, accelerators and incubators, entrepreneur community, soft skills training and skills training programmes.

B.8 Industry 4.0 Pilot Factories (Austria)

The Industry 4.0 Pilot Factories,[451] established in 2015 by the Ministry for Transport, Innovation and Technology, is the Austrian Government's instrument under the sectoral initiative Industry 4.0.[452] It was founded to strengthen connectivity and cooperation among companies and start-ups, and increase transformation of the industry and of new production methods. Current pilot factories include a demonstration plant for smart production and cyber-physical production

445 https://www.startuptourism.is/
446 https://www.gulleggid.is/
447 http://www.icelandicstartups.com/idea
448 https://www.gulleggid.is/english
449 Around USD 8 000.
450 Idem.
451 https://www.advantageaustria.org/zentral/business-guide/investieren-in-oesterreich/forschung-und-entwicklung/schwerpunkte/ABA_Industry_4.0_2018_EN.pdf
452 https://plattformindustrie40.at/

systems operated by the Vienna University of Technology (TU Wien), a smart factory at the Graz University of Technology (TU Graz) and the LIT Factory at Johannes Kepler University Linz (JKU).

Type

This practice impacts all three building blocks of innovation: innovation dynamics, innovation capacity and ICT innovation in key sectors.

Goal(s)

Pilot Factories are designed to help Australian companies, operating in a diverse range of industry segments, to improve their knowledge and adoption of Industry 4.0 technologies.

Target stakeholders

The target group are companies (especially SMEs), industry, academia, and the public and private sectors.

Governance

The Industry 4.0 Pilot Factories are established by the Ministry for Transport, Innovation and Technology (BMVIT). Pilot factories are jointly governed by the BMVIT, the universities housing the pilot factories (TU Wien, TU Graz and JKU), and participating companies. They are established through a public tender launched by BMVIT and the Austrian Research Promotion Agency.

In the future, all pilot factories are to be cross-networked in order to strengthen collaboration among regions.

Resources and partners

Industry 4.0 Pilot Factories is a programme created by the Austrian Government and partnered with the most powerful Austrian companies. Funding is provided by the BMVIT, the universities housing the pilot factories, and companies.[453]

Activities and events

Pilot factories conduct basic research and application-oriented research in collaboration with industry.[454] The following Industry 4.0 priority technologies were identified for the first three pilot factories as a result of the Pilot Factories working group consultation process: smart electronic-based systems, discrete manufacturing and process engineering.

For instance, Industry 4.0 Pilot Factory at TU Wien is a joint venture to showcase next generation production management and technology and, at the same time, provide a first-class platform for future research projects, teaching and exchange with academia and practitioners. It provides research, education and knowledge transfer needed to determine what the industry of tomorrow should look like.[455]

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453 https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_austria_-_final_2019_0D3204BD-9F89-F6DD-1A7E1A4E2A02FA42_61227.pdf

454 https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_austria_-_final_2019_0D3204BD-9F89-F6DD-1A7E1A4E2A02FA42_61227.pdf

455 https://www.pilotfabrik.at/?page_id=980&lang=en

Achievements

The programme has successfully brought together different regional and national stakeholders. Three pilot factories have been set up so far (in JKU,[456] TU Graz,[457] and TU Wien[458]) and two others are being launched in Upper Austria and Styria.[459]

Infobox

Impact on the Entrepreneurial Lifecycle

Industry 4.0 Pilot Factories Programme in Austria has instilled good practices in engaging with problems, building collaboration, co-working and support, lab programmes, R&D programmes, B2B and support services, IP and R&D support, and vision and strategy.

B.9 Italian Startup Act and Startup Visa (Italy)

Italia Startup Visa[460] was established in 2014 as a streamlined process for non-European Union talent to found innovative start-ups in Italy. It was based on the ground-breaking Italian Startup Act[461] to encourage the creation and development of innovative start-ups. In late 2012, Italy introduced a comprehensive legislative framework aimed at fostering the creation and growth of its start-up ecosystem.

Type

This practice impacts two building blocks of innovation: innovation dynamics and innovation capacity.

Goal(s)

The Italian Government is seeking to attract new talent and retain existing talent to foster sustainable growth, technological development and employment. The goal is to promote a new entrepreneurial culture, encourage greater social mobility, inject innovation into the business ecosystem and promote Italy as a global hub for international investment and talent.[462]

Target stakeholders

The target stakeholders are non-Italian immigrant entrepreneurs and innovators, start-ups, investors and private sector companies.

456 www.jku.at
457 www.tuwien.ac.at
458 www.tugraz.at
459 https://www.advantageaustria.org/zentral/business-guide/investieren-in-oesterreich/forschung-und-entwicklung/schwerpunkte/ABA_Industry_4.0_2018_EN.pdf
460 http://italiastartupvisa.mise.gov.it/index.php#ISVhome
461 https://www.mise.gov.it/images/stories/documenti/Slides%20innovative%20startups%20and%20SMEs%2007_2019.pdf
462 http://italiastartupvisa.mise.gov.it/index.php#ISVhome

Governance

The Italian Startup Act is a legislative framework established by Decree Law No. 179 of 18 October 2012.[463] Italia Startup Visa is a fast track start-up procedure managed by the Italia Startup Visa technical committee, which is chaired by the Director General for Industrial Policy of the Italian Ministry of Economic Development.

Resources and partners

The Italia Startup Visa programme is funded by the Italian Ministry of Economic Development. The Italia Startup Visa technical committee consists of representatives of the main five associations of the Italian innovation ecosystem:[464][465] PNICube representing university incubators, IBAN for business angels, AIFI for venture capital investors, APSTI for science and technology parks, and Netval for technology transfer offices.[466]

Activities and events

The Italian Startup Act introduced the definition of the "innovative start-up": newly established companies with a strong nexus to technological innovation. It allowed for free and digital incorporation, introduced flexible staff remuneration, remuneration through equity instruments and tax incentives for equity investors, and enabled fundraising through equity crowdfunding campaigns. The measures apply to innovative start-ups from their date of registration in the special section of the Business Register, and for a maximum of five years from their date of incorporation.[467]

The Startup Visa facilitates the issuance of self-employment visas to non-European Union citizens establishing an innovative start-up company in Italy, as defined by the Italian Startup Act. It introduces a procedure that is:

- fast tracked: it takes no longer than 30 days;
- centralized: communication is through a single contact point;
- digital: the procedure takes place entirely online;
- bilingual: applications can be submitted in both Italian and English; and
- free of charge: there are no fees for the application.[468]

Achievements

The Italian Startup Act and Visa have raised great interest among Italian entrepreneurs. By 2019, there were over 10 000 registered start-ups. The Act "has significantly improved the growth perspectives and the propensity to innovate of the affected firms, compared to companies with similar characteristics that did not enter the policy". [469]

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463 https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legge:2012-10-18;179!vig=
464 https://www.italianvisa.it/start-up-visa-program/
465 https://www.mise.gov.it/images/stories/documenti/Rapporto_ISV_Survey_ENG.PDF
466 https://www.mise.gov.it/images/stories/documenti/ISVH-4th-quarterly-report-2019-29_01_2020.pdf
467 https://www.mise.gov.it/images/stories/documenti/Executive%20summary%20ISA%2007_2019.pdf
468 https://www.mise.gov.it/images/stories/documenti/ISVH-4th-quarterly-report-2019-29_01_2020.pdf
469 https://www.mise.gov.it/images/stories/documenti/Executive%20summary%20ISA%2007_2019.pdf

As of 31 December 2019, Italia Startup Visa had received a cumulative total of 481 applications, of which around 52 per cent received a positive evaluation from the Italia Startup Visa technical committee.[470]

Infobox

Impact on the Entrepreneurial Lifecycle

The Italian Startup Act and Startup Visa have instigated good practices in entrepreneurial interest, building collaboration, business finance and loans, tax support, vision and strategy, seed funding and venture capital, tax support building collaboration, B2B and support services, vision and strategy and human capital.

B.10 Startup Visa Lithuania (Lithuania)

Startup Visa Lithuania[471] was launched in 2017. It is the Lithuanian Government's instrument, a procedure providing a streamlined entry process to the Lithuanian start-up ecosystem for innovative non-European Union entrepreneurs. Startup Visa Lithuania is coordinated by Startup Lithuania, the national start-up ecosystem facilitator.

Type

This practice impacts two building blocks of innovation: innovation dynamics and innovation capacity.

Goal(s)

The goal of Startup Visa Lithuania is to attract innovative non-European Union entrepreneurs and facilitate their entry into the Lithuanian start-up ecosystem.

Target stakeholders

The stakeholders in Startup Visa Lithuania are investors, start-ups, incubators and accelerators, corporations and talents.

Governance

Startup Visa Lithuania is governed by Startup Lithuania of Enterprise Lithuania, the governmental organization established by the Ministry of Economy of the Republic of Lithuania.[472] The applications submitted to Startup Visa Lithuania are evaluated by an independent evaluation committee. The committee is composed of 10 to 15 public and private sector representatives with a background in start-ups.

Startup Lithuania is responsible for the programme, with two project managers responsible for communication between applicants and visa receivers.[473]

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470 https://www.mise.gov.it/images/stories/documenti/ISVH-4th-quarterly-report-2019-29_01_2020.pdf
471 https://startupvisalithuania.com/
472 https://www.startuplithuania.com/about-us/
473 https://www.interregeurope.eu/policylearning/good-practices/item/4195/startup-visa-lithuania/

Resources and partners

The Startup Visa permit is issued by the Migration Department and approved by the Ministry of Economy. The evaluation committee is composed of representatives of local start-up accelerators and venture capital funds, and delegates from Startup Lithuania and the Agency for Science, Innovation and Technology.[474]

Activities and events

In order to attract innovative non-European Union entrepreneurs, Start-up Visa Lithuania offers them:

- a streamlined migration procedure for a temporary residence permit;
- initial capital requirements that are 10 times lower than standard and no specific employment requirements for three years;
- support during the relocation process;
- soft-landing and engagement in the Lithuanian start-up ecosystem;
- European Union company status; and
- the right to bring family members.[475]

Start-up Visa Lithuania has organized a number of activities and events, including:

- Nordic-Baltic Women Innovation Sprint;
- Tech Rocketship Awards Europe;
- Global DefTech Hackathon;
- GovTech Demo Day;
- Wrap Up of 2020 and Startup Museum Awards;
- Startup Grind Europe-Asia Connect;
- sTARTUp; and
- ROCKIT Impact accelerator.

Achievements

Startup Visa Lithuania has received more than 750 applications since the beginning of the programme in 2017. More than 350 founders were accepted for relocation and more than 61 per cent raised funding while operating in Lithuania.[476]

474 Idem.
475 https://startupvisalithuania.com/startup-visa-lithuania/benefits/
476 https://startupvisalithuania.com/

Infobox

Impact on the Entrepreneurial Lifecycle

The Startup Visa Lithuania programme promotes good practices in entrepreneurial interest, engaging with problems, developing business models, building collaboration, expansion, entrepreneurial events, hackathons and competitions, success stories, skills training programmes, co-working and support, incubators and accelerators, B2B and support services, entrepreneur community, vision and strategy.

B.11 Station F (France)

Station F is a business incubator and the world's biggest start-up campus, which opened in 2017 in Paris. It is a space measuring 51 000m^2 that provides office accommodation and a whole entrepreneurial ecosystem for up to 1 000 start-ups and early-stage businesses, as well as corporate partners.[477]

Type

This practice impacts two building blocks of innovation: innovation capacity and ICT innovation in key sectors.

Goal(s)

The ambition of Station F is "not only to create the largest startup campus in the world but also create a space that houses an entire startup ecosystem under one roof",[478] brings the ecosystem together and provide services and space, especially to young start-ups.[479]

Target stakeholders

Station F's target stakeholders are entrepreneurs, corporates and financiers.

Governance

Station F is a private initiative run as a private company, established by telecom entrepreneur Xavier Niel. It is managed by the director, Roxana Varga.

Resources and partners

It was established and funded with EUR 250 million.[480] Today, Station F has more than 30 partners hosting start-up programmes, including companies such as Facebook, Google, Microsoft, Ubisoft, L'Oréal and Thales.

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477 https://www.wired.co.uk/article/station-f
478 https://thespaces.com/station-f-worlds-largest-startup-campus-paris/
479 The idea was therefore to create a big emblematic space to bring the ecosystem together and provide services and space, especially to young startups that often struggle to find space and resources within their budget.
480 https://www.ft.com/content/2b4a6fc8-9838-11e9-9573-ee5cbb98ed36

Activities and events

The idea of creating Station F evolved from a massive incubator to a university campus with various programmes for start-ups, event spaces, services and, soon, housing.[481]

Today, Station F offers more than 30 start-up programmes for more than 1 000 start-ups. It hosts 35 public administrations, 100 venture capital funds, four mentorship offices and 600 events per year. It has 3 000 work stations and a building capacity of 9 000 people.

Achievements

Recognized as the world's biggest start-up facility, it is credited with significantly boosting the French tech ecosystem and putting it on the world's start-up map. The last TOP 30 Station F start-up list included fast-growing start-ups with over 100 per cent team growth in one year (average growth from 10 to 21 employees) and over 60 per cent revenue growth from December 2019 to March 2020.

Infobox

Impact on the Entrepreneurial Lifecycle

Station F promotes good practices in entrepreneurial interest, engaging with problems, developing business models, building collaboration, expansion, entrepreneurial events, hackathons and competitions, success stories, skills training programmes, co-working and support, incubators and accelerators, B2B and support services, entrepreneur community.

B.12 UK Albania Tech Hub (Albania)

UK Albania Tech Hub[482] promotes partnerships in technology and entrepreneurship skills between Albania and the United Kingdom. It was established in 2017 by the United Kingdom Embassy in Tirana in collaboration with the Albanian Government and focuses on providing support and networking opportunities in the United Kingdom to Albanian tech start-ups that have the potential to contribute to growth in the two countries.[483]

Type

This practice impacts three building blocks of innovation: innovation dynamics, innovation capacity and ICT innovation in key sectors.

Goal(s)

The hub aims to facilitate bilateral tech partnerships between Albanian and United Kingdom start-ups.

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481 https://www.wired.co.uk/article/station-f
482 https://ukalbaniahub.com/
483 Idem.

Target stakeholders

The main stakeholders are start-ups, investors, companies, accelerators and talents.

Governance

UK Albania Tech Hub is a governmental initiative, undertaken by the British Embassy in Tirana and British Council Albania. The project is based on identifying targeted solutions, partners and models of collaboration for tech start-ups engaging entrepreneurs with capacity-building events with key business experts leading to United Kingdom delegation to meet potential business and tech partners. It replicates the successful UK-Israel Tech Hub model.[484]

Resources and partners

The tech hub's partners are the British Embassy in Tirana, British Council Albania and the Albanian Government.

Activities and events

UK Albania Tech Hub support to entrepreneurs includes a three-step approach to supporting tech start-ups:

1. Training programme: 20 start-ups with high-growth potential participate in a workshop series in Tirana, which includes a training and mentoring session to help grow their ideas and develop their capacities using local and United Kingdom practices and expertise;
2. United Kingdom exchange programme: start-ups that have successfully completed the training programme are chosen to continue their training in London. The shortlisted start-ups embark on further training, mentoring and explore business opportunities in the United Kingdom's tech sector. Entrepreneurs have the opportunity to meet with accelerators, hub, tech networks, investors and potential clients;
3. Post training: follow-up support to further develop their businesses and acceleration programme for high potential start-ups to further grow their business, including high profile networking events, opportunities to be paired with United Kingdom mentors, opportunities for joint projects and opportunities to contribute to policy-making.

UK Albania Tech has organized a number of activities and events.

Achievements

For three consecutive years, UK Albania Tech Hub supported tech collaboration between Albania and the United Kingdom. Following the successful second round, the 2019-2020 hub has also accepted applications from the Western Balkan countries.[485]

[484] https://www.gov.uk/government/news/uk-albania-tech-hub
[485] https://invest-in-albania.org/startups-invited-to-apply-for-uk-albania-tech-hub-2019-2020/

Infobox

Impact on the Entrepreneurial Lifecycle

UK Albania Tech Hub has instigated good practices in building collaboration, engaging with problems, entrepreneurial events, incubators and accelerators, soft skills training, skills training programme, vision and strategy and human capital.

B.13 UK Fintech Regulatory Sandbox (United Kingdom)

The United Kingdom Financial Conduct Authority (FCA) launched the first regulatory sandbox for financial services in the world in late 2015, as "a tailored regulatory environment for conducting small scale, live tests of new Fintech products and delivery models",[486] with the ultimate goal of fostering innovations that benefit customers. The idea stemmed from the FCA Project Innovate, an Innovation Hub of the FCA, which was set up to provide direct support to innovative companies trying to launch new products into the market, and to create a centre for FCA innovation policy.[487]

Type

This practice impacts all three building blocks of innovation: innovation dynamics, innovation capacity and ICT innovation in key sectors.

Goal(s)

The primary purpose of the regulatory sandbox was to remove unnecessary regulatory barriers to innovation and facilitate the exploration of new innovative ideas that require changes to the regulatory system. It aims to reduce the time and cost of bringing new ideas to market while ensuring that appropriate consumer protection and safeguards are built into new products and services, and promote more effective competition by stimulating development of the entrepreneurs in the Fintech sector.[488]

Target stakeholders

Its main stakeholders are the private sector, authorized and unauthorized companies (small and large) that require authorization, and technology businesses "looking to deliver innovation in the United Kingdom financial services market".[489]

Governance

The regulatory sandbox is governed by the FCA under Project Innovate. The FCA has a strategic objective of ensuring that relevant markets function well and three operational objectives of

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[486] https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_united_kingdom_-_final_2019_0D31D080-AFF6-8DCD-1996688E8402B426_61223.pdf

[487] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/701847/UK_finanical___regulatory_innovation.pdf

[488] Idem.

[489] https://www.fca.org.uk/firms/innovation/regulatory-sandbox

protecting consumers, protecting and enhancing the integrity of the United Kingdom financial system, and promoting the interest of consumers. The innovation agenda developed by the FCA underpins Project Innovate and the Regulatory Sandbox.[490]

Project Innovate essentially began as a start-up within the FCA with a small team of two to three people in 2014. This team is now a substantial and growing number of many tens of people sitting across five different sub-units within the Strategy and Competition Department.

Resources and partner

The UK Fintech Regulatory Sandbox is financed by FCA as part of Project Innovate, with an overall estimated cost of FCA Project Innovate of around GBP 1 million a year.[491]

Activities and events

Project Innovate teams help admitted companies to understand and navigate the regulatory landscape in the United Kingdom by providing expert support to assess how the FCA regulatory framework applies to their business in the form of:

- a dedicated person for innovation-related queries;
- additional support for up to a year after authorisation;
- an ongoing programme of external engagement with innovators and other stakeholders; and
- supporting firms in trials of innovative solutions.[492]

Through a mutual learning process, FCA identifies areas to adapt the regulatory framework in order to facilitate innovation.

The companies' application form to the sandbox is assessed according to five evaluation criteria:

- scope: are you looking to deliver innovation that is either regulated business or supports regulated business in the United Kingdom financial services market?
- genuine innovation: is the innovation ground-breaking or does it constitute a significantly different offering in the marketplace?
- consumer benefit: does the innovation offer a good prospect of identifiable benefit to consumers?
- need for a sandbox: do you have a genuine need to test the innovation in our sandbox?
- ready for testing: are you ready to test the innovation on the real market with real consumers?[493]

The detailed process is depicted below.

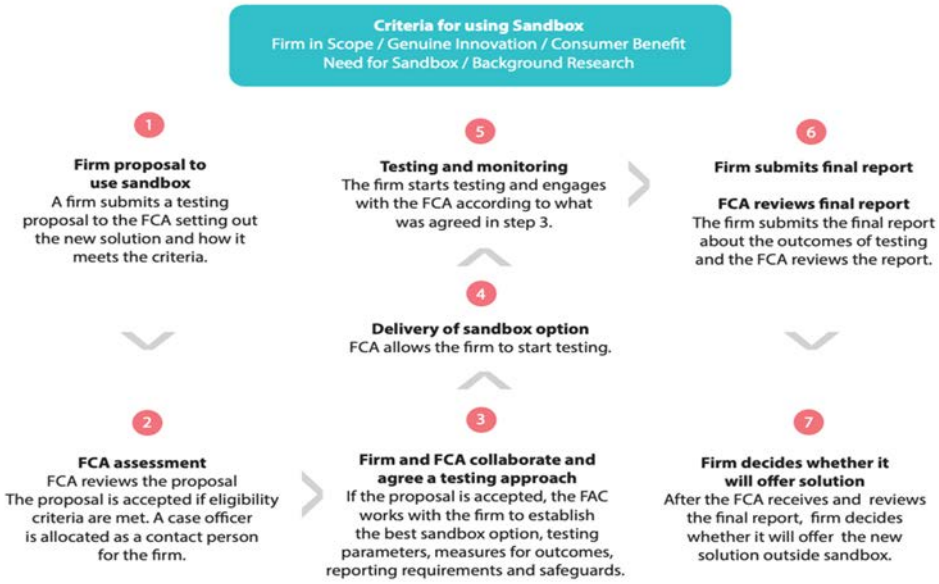
490 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/701847/UK_finanical___regulatory_innovation.pdf

491 https://www.simplifie.com/compliance-blog/how-much-has-project-innovate-cost-the-fca-to-date

492 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/701847/UK_finanical___regulatory_innovation.pdf

493 https://www.fca.org.uk/firms/innovation/regulatory-sandbox-prepare-application

Figure B.2: Structure and process of Regulatory Sandbox[494]



Achievements

The Innovate Sandbox programme and stemming from it, Fintech Sandbox, was one of a kind when it was established. It inspired policy-makers all over the world to launch similar initiatives. Currently, there over 70 Fintech sandboxes which are operational or in the process of being launched in 57 countries.[495]

As of 2020, six cohorts of companies have gone through the Fintech sandbox.[496] The post-implementation review of the sandbox, performed in 2018, revealed that the sandbox resulted in a higher number of tests than anticipated, across many sectors and product types, as follows:

- between 2016 and 2018, 89 companies were admitted to the sandbox to test innovations in the field of finance;[497]
- 75 per cent of firms in the first cohort successfully completed testing, over 40 per cent of firms received investment during or following their tests and around one-third of the companies in the first cohort used the learning to streamline their business model;
- around 90 per cent of firms completing testing in the first cohort continued to a market launch;
- 77 per cent of firms accepted into the second cohort have progressed toward testing; and
- sandbox firms have indicated that taking part in the sandbox programme provides a degree of reassurance to investors through the oversight of the FCA.[498]

494 Idem.
495 https://blogs.worldbank.org/psd/four-years-and-counting-what-weve-learned-regulatory-sandboxes#:~:text=The%20many%20benefits%20brought%20about%20by%20regulatory%20sandboxes
496 https://www.globalgovernmentforum.com/regulators-launch-global-fintech-sandbox/
497 https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/financial-services/deloitte-uk-fca-regulatory-sandbox-project-innovate-finance-journey.pdf
498 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/701847/UK_finanical___regulatory_innovation.pdf

Types of innovations tested in the sandbox include interfaces (APIs), biometrics, insurance mediation, mortgages, online platforms, personal savings tools, payments and remittance, and robo-advice.[499]

Building on the success of the first sandbox, the FCA is now piloting the Digital Sandbox,[500] as well as the Global Fintech Sandbox.[501]

Infobox

Impact on the Entrepreneurial Lifecycle

The UK Fintech Regulatory Sandbox initiative promotes good practices in entrepreneurial interest, engaging with problems, developing business models, building collaboration, expansion, success stories, skills training programmes, co-working and support, entrepreneur community, vision and strategy and IP and R&D support.

B.14 UNDP Serbia Accelerator Lab (Serbia)

The UNDP Serbia Accelerator Lab[502] was officially launched in collaboration with the President's Office of Serbia in Belgrade in 2019, in recognition of the need to use new approaches to better tackle complex development challenges. It is part of the wider UNDP innovative network of 60 Accelerator Labs[503] that are being launched worldwide to test and scale new solutions to global challenges like climate change and soaring inequality. The UNDP Accelerator Lab in Serbia is helping stakeholders to implement data-driven approaches to tackling depopulation and brain drain.[504]

Type

This practice impacts all three building blocks of innovation: innovation dynamics, innovation capacity and ICT innovation in key sectors.

Goal(s)

Serbia is among the world's 10 fastest shrinking populations due to its low birth rates, high outmigration and low immigration. The President's Office requested the Accelerator Lab to create actionable intelligence on the identified trend. The Lab in Serbia designs and tests a portfolio of data-driven experiments, focusing on circular migration and measures for retaining skilled and unskilled workers.

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499 Examples are directly cited from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/701847/UK_finanical___regulatory_innovation.pdf
500 https://www.fca.org.uk/firms/innovation/digital-sandbox
501 https://www.globalgovernmentforum.com/regulators-launch-global-fintech-sandbox/
502 https://serbia.un.org/en/14347-accelerator-lab-serbia
503 https://acceleratorlabs.undp.org/
504 https://www.rs.undp.org/content/serbia/en/home/blog/2020/implementing-a-data-driven-approach-to-tackling-depopulation.html

Target stakeholders

The main stakeholders are government and public sector organizations, the start-up community, private sector and academia.

Governance

The UNDP Accelerator Lab in Serbia is guided by the Country Programme Document (2021-2025),[505] and the UN-Serbia Development Partnership Framework for 2016-2020[506] in line with the priorities of the Government of Serbia. UNDP works in partnership with the Government of Serbia to identify local solutions to meet national and global development challenges in inclusive and sustainable growth; building and strengthening of accountable and representative governance institutions; low-carbon and climate-resilient development; and gender equality and lives free of violence.[507]

Resources and partners

UNDP works in partnership with the Government of Serbia, development partners, United Nations agencies, civil society and local communities.

Activities and events

The UNDP Accelerator Lab brings together grassroots ideas with new sources of real-time data and experimentation to meet the fast-changing realities of twenty-first century development. It is used to establish an almost three-dimensional view of the population and, following identification of the issues, to explore how they relate to each other in order to arrive at a solution. This allows for work to be carried out with governments and other actors to identify solutions that at first are not so obvious.

For instance, the Lab used data exploration of the Linkedin network as a new approach to unveiling labour dynamics in order to help various stakeholders in Serbia to map the under-represented skills in the country, design policies to attract workers with certain skills, or plan education programmes for new generations of skilled workers, using data as close as possible to real time.[508]

Achievements

An analysis of 2018 LinkedIn data by UNDP Serbia Accelerator Lab showed that Western European countries, the United States and the United Arab Emirates are the main destinations for Serbians working abroad, who export their skills and training in research, education, finance, engineering, medicine, dentistry, artificial intelligence and IT.[509]

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505 https://www.rs.undp.org/content/dam/serbia/docs/Operations/Legal%20Framework/undp_rs%20CPD%20For%20Serbia%202021%202025.pdf

506 http://www.rs.undp.org/content/dam/serbia/docs/Operations/Legal%20Framework/UNDP_SRB_DPF_ENG_30_May_2017_FINAL_SIGNED.pdf

507 https://www.rs.undp.org/content/serbia/en/home/about-us.html

508 https://acclabs.medium.com/a-glimpse-into-linkedin-data-to-understand-serbian-labour-out-migration-9d63f8046767

509 https://sdgintegration.undp.org/serbia-new-approaches-tap-talent-and-tackle-depopulation

The UNDP Serbia published a report on depopulation in October 2020.[510]

Infobox

Impact on the Entrepreneurial Lifecycle

The UNDP Accelerator Lab in Serbia instigates good practices in entrepreneurial interest, engaging with problems, vision and strategy, and human capital.

B.15 Yozma Group Israel (Israel)

The Yozma Group is said to have effectively created the venture capital market in Israel.[511] It was established in 1993 by the Government of Israel to use government funds to leverage foreign financing to stimulate the venture capital market in order to overcome the challenges of the domestic market, which is limited in size, and the limited access to capital for companies.

The formation of the government venture co-investment fund of funds (Yozma I), with a mixture of direct investments in technology start-ups, was complemented by loss sharing with no upside sharing. It is, for the most part, one of the main elements that made this programme appealing to foreign investors. At the same time, the Government presented guarantees for foreign investors (the INBAL programme), programmes matching companies with foreign business angels, and subsequent exits on foreign stock exchanges.[512]

After the success of the Yozma I fund, and the subsequent Yozma II (launched in 1998) and Yozma III (launched in 2002), which stimulated venture capital market to the point of maturity, the programme was phased out and the Yozma Group was privatized.[513] The Government still holds a very small investment in Yozma funds.

Type

This practice impacts all three building blocks of innovation: innovation dynamics, innovation capacity and ICT innovation in key sectors.

Goal(s)

The Yozma objective was to catalyse the establishment of the venture capital industry by stimulating foreign venture capitalists' investment and bringing their expertise and network to the country.[514]

[510] https://www.rs.undp.org/content/serbia/en/home/library/depopulation-as-a-policy-challenge-in-the-context-of-global-demo.html
[511] http://www.yozma.com/overview/
[512] https://www.oecd.org/israel/2491258.pdf
[513] http://www.yozma.com/overview/;; https://www.oecd.org/israel/2491258.pdf
[514] https://ec.europa.eu/research/openvision/pdf/rise/jakimowicz-osimo-mayer-mureddu-vigo_financial_instruments.pdf

Target stakeholders

Yozma target stakeholders are financiers: venture capital firms, foreign investors, business angels, and high-tech start-ups.

Governance

The Yozma Group was facilitated by the chief scientist of the Ministry of Infrastructure at the time, as a result of several months of consultations with experts of the Ministry of Finance, industry experts, investors and United States companies and bankers.[515] As for the modus operandi, once a potential investment is identified, it is reviewed and analysed by Yozma executives with regard to management, markets, business, technology and competition. In addition, Yozma has a network of operating companies, Advisory Board members and technology experts to evaluate certain aspects of the business.

Resources and partners

The initial Yozma I fund received USD 100 million in public funding and attracted private funds of over USD 150 million.[516] Within three years, the Yozma Group established 10 drop-down funds, each with more than USD 20 million in capitalization.[517] It invested USD 8 million (up to 40 per cent of the capital of the created fund) in each of the 10 funds that had to raise another USD 10-12 million from foreign partners, preferably an overseas venture capital firm.[518] Yozma I also reserved USD 20 million for direct investments into companies.

The YOZMA Group also developed working relationships with some of the leading academic institutions and technology incubators in Israel.[519] Yozma has collaborated with the Ofer Group, Israel's leading industrial technology conglomerate with global assets valued in excess of USD 6 billion, as well as the Bank Hapoalim, Israel's largest bank with a wide range of activities in the domestic investment banking arena.

Activities and events

Yozma I was a fund-of-funds that focused on investments in venture capital funds to stimulate the venture capital market. Yozma invested in venture capital funds (Yozma I) and made direct investments in technology companies (Yozma I, II and II) playing the role of a value-added investor, recruiting senior executives, shaping business strategies, raising follow-up rounds of capital and attracting strategic investors to its portfolio start-ups.[520]

Yozma I fund was designed to leverage returns by preserving intense performance incentives on the upside and a buyout option for management that incentivized high investment performance, motivating investors to closely monitor the portfolio companies. The Government return on investment was capped at a certain level, increasing the returns for the private investors in

[515] https://www.slideserve.com/monty/the-yozma-program-success-factors-policy-presented-by-yigal-erlich-the-yozma-group-tel-aviv-israel
[516] https://ec.europa.eu/research/openvision/pdf/rise/jakimowicz-osimo-mayer-mureddu-vigo_financial_instruments.pdf
[517] http://www.yozma.com/overview/
[518] https://ec.europa.eu/research/openvision/pdf/rise/jakimowicz-osimo-mayer-mureddu-vigo_financial_instruments.pdf
[519] http://www.yozma.com/investment/
[520] http://www.yozma.com/overview/

case of significant upside on the exit. However, Yozma I provided no guarantee for investors against losses. Private investors and the fund managers had to bear their share of risk in case of downside.[521]

Achievements

The Yozma Group effectively created a vibrant venture capital market in Israel that accounts for nearly USD 70 billion invested capital today and stimulated foreign private sector investments.

Although the numbers given by different sources vary, overall, the creation of Yozma funds led to:

- bringing over 30 foreign-based venture capital funds to Israel; [522]
- creating 10 venture capital funds through the Yozma fund-of-funds and bringing over 30 foreign-based venture capital funds to Israel;[523]
- direct investments in over 50 portfolio companies;
- substantial co-investment leverage – from the initial USD 100 million to over USD 170 million.[524]
- the acquisition of or investment in several portfolio companies by leading corporations (e.g. Cisco, ECI Telecom, General Instruments, Johnson & Johnson, Microsoft, Sequoia Capital and Benchmark);[525] and
- the Yozma principles serving as an example to other governments in the design of their own financial instruments (e.g. Australia, Croatia, the Czech Republic, Denmark, New Zealand, Korea, Russia, Singapore, South Africa and Taiwan).[526]

Infobox

Impact on the Entrepreneurial Lifecycle

The Yozma strategies have instilled good practices in Entrepreneurial Interest, Entrepreneurial Community, Expansion, Seed Funding, Angel Investment, Venture Capital, B2B and Support Services, and Vision and strategy of the Entrepreneurial Lifecycle.

521 https://ec.europa.eu/research/openvision/pdf/rise/jakimowicz-osimo-mayer-mureddu-vigo_financial_instruments.pdf
522 https://www.oecd.org/israel/2491258.pdf
523 https://www.oecd.org/israel/2491258.pdf
524 Amounts vary between USD 170-250 million across sources (https://socialimpactil.com/israel-took-the-initiative-in-innovation-with-project-yozma/;; https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2758198;; https://www.oecd.org/israel/2491258.pdf;; https://www.journals.uchicago.edu/doi/abs/10.1086/653755;; https://ec.europa.eu/research/openvision/pdf/rise/jakimowicz-osimo-mayer-mureddu-vigo_financial_instruments.pdf
525 http://www.yozma.com
526 https://ec.europa.eu/research/openvision/pdf/rise/jakimowicz-osimo-mayer-mureddu-vigo_financial_instruments.pdf

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