D2.1

ECOSYSTEM MAP

INSTITUTE FOR SUSTAINABLE DEVELOPMENT AT EPLO

Funded by
the European Union

D2.1
ECOSYSTEM MAP

Due date	Month 6 (31-12-2022)
Submission date	29-12-2022
Deliverable lead	INSTITUTE FOR SUSTAINABLE DEVELOPMENT AT EPLO
Version	v0.4
Authors	Christina Deligianni, Spyros Kouvelis (EPLO)
Reviewers	Lola Lymberopoulou (EPLO), Claúdia Barbosa, Manuel Nina (HST)

Abstract

This deliverable reports on the European Innovation Ecosystem with a focus on the southern European countries that the S3E projects addresses, their strengths and weaknesses, and some next steps to be done. In creating this ecosystem mapping, we have considered the European Innovation Scoreboard 2022, research and reporting on innovation and entrepreneurship from various sources that are stated in the report.

.

Keywords

S3E, deep tech, science-based, entrepreneurship, technology commercialization, innovation ecosystem, southern Europe, open innovation, open call, innovation project, research, technology transfer officer, experts, innovation, entrepreneurship, knowledge exchange, research, accelerator, incubator, start-up, scale-up

Document revision history

Version	Date	Description of change	Contributor(s)
v0.1	09-09-2022	1st version of deliverable template	AUS
v0.2	15-09-2022	Document creation	EPLO
v0.3	21-10-2022	Content Revision	EPLO
v0.4	29-12-2022	Final Revision	ALL Partners

Disclaimer

Copyright notice

Project co-funded by the European Commission in the H2020 Programme

Nature of the deliverable		R
Dissemination level		
PU	Public, fully open. e.g., website	✓
CL	Classified information as referred to in Commission Decision 2001/844/EC	
SEN	Confidential to S3E project and Commission Services	

S3E Partners:

Table of contents

Funded by the European Union

List of Figures

Abbreviations

AUS	Australo Interinnov Marketing Lab SL
DoA	Description of Action
EPLO	The Institute for Sustainable Development is an initiative of the European Public Law Organization
HST	HiSeedTech
IDI	International Development Ireland Limited
S3E	Southern European Entrepreneurship (South3E)
SDG	Sustainable Development Goals
SME	Small and medium-sized enterprise
WP	Work Package
TTO	Technology Transfer Officer
VC	Venture Capital

1 Introduction

Deliverable 2.1. reports on the southern European and European at large start-up and deep tech ecosystem on which the work performed by the **S3E consortium** has relied on, both in the preparation of the S3E 1st Call for applications, which opened on November 7th, 2022, and on all other deliverables that are interconnected with this, including D5.1. "Stakeholder Collaboration Framework", D5.2 "Dissemination, Communication & Exploitation Plan", D2.2. "Tracks 2 And 3: Open Call Platform and Documentation", and D3.2 "Track 1: Open Call Platform and Documentation". Along with the database of more than 12,000 contacts in the southern European Ecosystem, it forms the basis for most work on **WP2 on Community and Platform** and informs other work packages.

In the scope of **Horizon Europe**, the **EU-funded Southern European Entrepreneurship Engine** project and in our **ecosystem mapping**, we have focused on southern European Countries, and more specifically on the following EU member state countries: Bulgaria, Croatia, Cyprus, Greece, Italy, Malta, Portugal, Romania, Slovenia, Spain, and the following Associated Countries: Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, Serbia, and Turkey.

In our ecosystem mapping as regards contacts that the project will reach out to and the database that has been created, we have focused on the following entities and researchers that promote innovation and that would benefit most from the services and calls the Southern European Entrepreneurship Engine project will be offering:

- Universities, Research Centers, Researchers and Tech Transfer Offices
- Business Development Support Services Providers (accelerators, incubators, intermediaries)
- Foundations, Chambers of Commerce and Associations
- Government, Banks, and Corporates
- Growth and scaling start-ups
- Horizon National Contact Points
- Investors

The present report is based on data, reports, and other resources that are publicly available, including press releases, company announcements, and news articles that are duly recorded in the references section. It has also been supplemented by informal interviews carried out with researchers, financial entities, academic institutions, and investors. The information we share is not meant to be exhaustive, but it is dynamic, as, throughout the duration of the project, the S3E consortium will be updating this ecosystem mapping.

1.1 The S3E project

Before elaborating on the southern European ecosystem, it is important to elaborate on the **S3E projec**t, and on the concept of **deep tech**, which is one of the pillars of the project. In this context, 'Deep Tech' refers to technologies that are grounded on a scientific discovery or meaningful engineering innovation. Deep tech supports the development of disruptive solutions built around unique, protected, or hard-to-reproduce technological or scientific advances, and embodies products, processes, or services that will fulfill unmet (or ill-met) market needs that can have a significant social and economic impact and contribute to achieving the United Nations Sustainable Development Goals (SDGs)[1].

Deep tech start-ups are fostered by research that, in most cases, is developed within the scientific ecosystem (e.g., universities and academic/research centers). Over the past two decades innovation was, essentially, based on novel (and sometimes disruptive) business models anchored on digital platforms and web and mobile-based apps and, thus, became synonymous with the so-called tech industry. Investors, companies, and governments are now looking more attentively to deep technological innovations (deep tech) that will drive the next (sustainable) industrial revolution. **European Startups**[2] is a project created by Dealroom and Sifted, supported by the European Commission and European Parliament, "aimed at facilitating informed conversation and collaboration among European tech ecosystem stakeholders to take Europe's startup economy to the next level". Its study "2021: the year of Deep Tech"[3] clearly provides evidence of the unbalance in Deep Tech VC investment (see Figure 1) between the group of countries with advanced innovation ecosystems ("Innovation Leaders" and "Strong Innovators") and the group of countries with developing innovation ecosystems ("Moderate Innovators" and "Emerging Innovators"), the only exceptions being Spain and Italy (Moderate Innovators) and Poland (Emerging Innovator).

An analysis of the Deep Tech clusters that contribute to these VC investments (right column of Figure 1) allows one to conclude that **most of Europe's top Deep Tech companies have their roots in Research and Development activities carried out in academia**. Analyzing the European Innovation Scoreboard (EIS) indicators related to each national research system, one can conclude that **this unbalance is partially justified by the lag in research intensity in the countries with developing innovation ecosystems**.

However, in these countries there are pockets of outstanding research that have potential commercialization value and **what is missing is the support to uncover this potentially valuable bench research and help bring it to the market**. Additionally, from the analysis of the EIS, one can see that investment in start-ups in developing innovation ecosystems is feeble and, thus, after uncovering the research and help the research teams develop a business case

[1] https://sdgs.un.org/goals

[2] https://europeanstartups.co (accessed on the 14th of December 2022)

[3] European Startups dealroom.co & Sifted (2021). "2021: the year of Deep Tech", available from https://europeanstartups.co/reports/2021-the-year-of-deep-tech (accessed on the 14th of December 2022)

supported by the ensuing deep tech products (or services), it will be necessary to showcase the resulting start-ups to investors in countries with a more advanced VC investment panorama.

Company	Category	University	Grants	VC funding
BIONTECH	Biotech	Mainz	European H2020 programs	€1.3b
onfido	Identity verification	Oxford	Eurostars SME Programme, Tech Nation	€192m
Aledia	Light-emitting diodes	CEA	European Innovation Council (EIC)	€171m
ICEYE	Satellites	Aalto	European Commission, Eurostars SME Programme	€123m
climeworks	Carbon sequestration	ETH Zurich	Eurostars SME Programme	€114m
XMOS	Edge AI chips	Bristol	EIC	€102m
Exscientia	AI-based drug discovery	Dundee	Bill & Melinda Gates Foundation	€96m
IQM	Quantum computing	Aalto	EIC	€68m
MAGAZINO	Intralogistics robots	TUM	EXIST	€41m
KALRAY	Intelligent microprocessors	CEA	Eurostars SME Programme	€34m
oxbotica	Autonomous vehicle software	Oxford	Innovate UK	€70m
wingtra	Professional drones	ETH Zurich	EIC	€27mp
ULTROMICS	AI-based diagnostics	Oxford	Government of the UK, NIHR	€24m
paragraf	Graphene-based electronics	Cambridge	ERDF	€23m
Recycling Technologies	Plastic recycling	Warwick	EIC, UKRI	€20m
river lane	Quantum computing	Cambridge	Government of the UK	€4m
vaccitech	Biotech (Oxford's Covid vaccine)	Oxford	UKRI	€43m
ONI	Super resolution microscopes	Oxford	n/a	€27m

Figure 1. Deep Tech VC Investment in Europe
(Source: "2021: the year of Deep Tech"; European Startups; dealroom.co and Sifted; 2021)

For this reason, we have designed the S3E – Southern European Entrepreneurship Engine. This project aims to revolutionize the southern European deep tech ecosystem.

S3E is a project funded by the European Commission that focuses on **accelerating deep tech projects, start-ups, and SMEs** that aim at providing solutions towards a more sustainable society and economy in line with the SDG. The S3E project mission is to develop an engine of growth that contributes to improve the connectedness and efficiency of the entrepreneurship ecosystems in Southern European countries (all of them Moderate or Emerging innovators).

Considering this, we have designed a program built around three tracks of bespoke services tailored to researchers and innovators' varying levels of maturity (i.e., early, growth, and scaling stages):

- **S3E Start:** For research teams and technology transfer officers, S3E offers a hands-on training program to hone their commercial skills and secure early funding for development.

- **S3E Charge**: For growth start-ups, S3E provides mentoring and networking to develop an investment-ready business plan and facilitate access to non-dilutable and dilutable funding.
- **S3E Reverse:** For scaling start-ups and SMEs, S3E will set up an Open Innovation ecosystem to broker, connect and match corporates to scaling start-ups through a challenge-solution duality.

Figure 2. S3E Tracks

Research teams, technology transfer officers, growth startups and scale startups will be selected through an open call. This open call targets science and technology excellence in these fields: agricultural sciences, engineering and technology, life sciences, and natural sciences. **This document focuses on the S3E Charge and Reverse Tracks and their open calls and documentation.**

2 Southern European Ecosystem in Detail

According to the European Innovation Scoreboard 2022, the research by the European Commission on innovation and entrepreneurship has shown that the EU's innovation divide amongst EU member states persists despite the efforts of the European Union and national administrations to promote entrepreneurship, innovation, and a start-up culture. The four identified performance groups, namely *Innovation leaders*, *Strong innovators*, *Moderate innovators,* and *Emerging innovators*, tend to be geographically clustered, with most of the Moderate and Emerging Innovators being in southern and eastern Europe (see below the Summary of the European Innovation Index 2022).

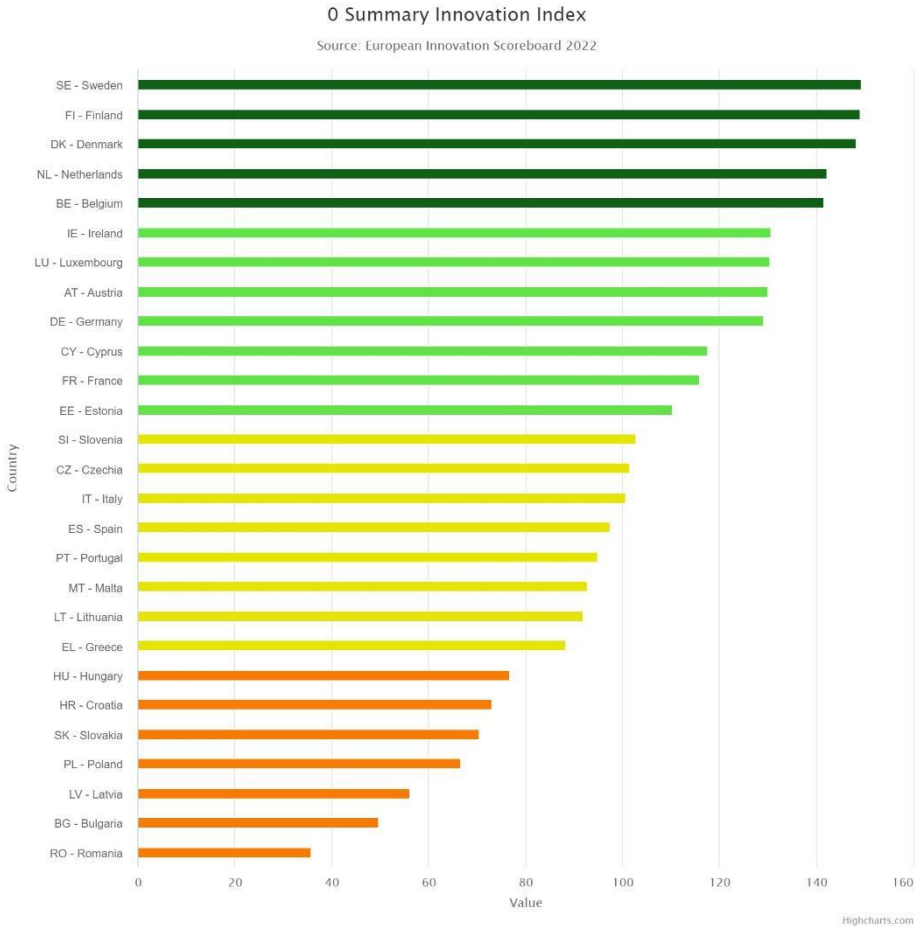

Figure 3. 2022 Summary Innovation Index
(Source: European Innovation Scoreboard 2022)

Cyprus is the only country in the southern and eastern Europe region to be considered a *Strong* innovator performing above the EU average, a shift from last year's European Innovation

Scoreboard, whereas Slovenia, Italy, Spain, Portugal, Malta, and Greece are considered *Moderate* innovators. Croatia, Bulgaria, and Romania, on the other hand, fall, under the *Emerging* innovators category. It is worth noting, however, that almost all EU countries have improved their innovation performance over the period 2015-2022, with Cyprus and Greece having improved the most overall and Croatia having grown its performance faster than the EU average. Compared to its global competitors, the EU has improved its relative position towards all except China.

In the scope of **Horizon Europe**, the **EU-funded Southern European Entrepreneurship Engine** project, and in our **ecosystem mapping**, we have focused on southern European Countries, and more specifically on the following EU member state countries: Bulgaria, Croatia, Cyprus, Greece, Italy, Malta, Portugal, Romania, Slovenia, Spain, and the following Associated Countries: Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, Serbia, and Turkey.

In our ecosystem mapping as regards contacts that the project will reach out to and the database that has been created, we have focused on the following entities and researchers that promote innovation and that would benefit most from the services and calls the Southern European Entrepreneurship Engine project will be offering:

- Universities, Research Centers, Researchers and Tech Transfer Offices
- Business Development Support Services Providers (accelerators, incubators, intermediaries)
- Foundations, Chambers of Commerce and Associations
- Government, Banks, and Corporates
- Growth and scaling start-ups
- Horizon National Contact Points
- Investors

In the present document that accompanies the database created, a short snapshot of each country in alphabetical order is presented along with highlights of its ecosystem landscape based on desktop research with data that is publicly available, and interviews carried out with researchers, financial entities, academic institutions, and investors during the first six months of the project and during the Roadshow of the S3E project in Athens and Thessaloniki, Greece, in November 2022.

2.1 Albania

Global Innovation Index 2022: 84th among the 132 economies featured

Albania is considered an *Emerging Innovator* that performs lower than the EU category average (41.7% vs 50.0%). The country has a lower per capita income, but a faster growing economy in which manufacturing takes up the lion's share. Albania's response toward the development of technology and innovation has not been in proportion with the country's objective of becoming a member of the EU. Production sector composition is heavily skewed towards traditional low-technology activities, based on labor costs rather than high value-added products or services, and competitiveness remains low generally. Foreign Direct Investment net inflows add positively

to the innovation climate, entrepreneurial activity and the absence of top R&D spenders add negatively, whereas governance and policy framework indicators are below the EU average as drivers of research and innovation.

Albania's relative strengths include environment-related technologies and the lifelong learning of its population. The agricultural sector is strong and a sector that provides innovation and much needed entrepreneurship. On the other hand, its relative weaknesses include, among others, the limited number of people with above basic overall digital skills and the limited R&D expenditures in the public and business sectors. One might also add that the restrictive visa regulations also hinder scientific exchange and temporary employment abroad. To increase entrepreneurship, Albania had a new law on start-ups that was tabled and voted on through its Parliament by the Ministry of Economics and Finance and the Ministry of Entrepreneurship; Law no. 25/2022 "On the support and development of start-ups" aims to facilitate the creation and development of start-ups and supportive ecosystem as a motor of innovation and economic development. To this end, a new agency, the Albanian Investment Corporation (AIC)[4], has been established to: promote economic development through investment projects at central, local and regional level, in support of state development policies; make more efficient use of state property; and make investments by mobilizing state and / or private capital.

The Ecosystem

AlbaniaTech - the first platform of the Albanian Startup and Innovation Ecosystem. A platform that is dedicated to sharing success stories and an overview of active startups in Albania, bringing together the local innovators and entrepreneurial community.

EU for Innovation – A programme funded by the EU with additional support from the German Federal Ministry for Economic Cooperation and Development (BMZ) and the Swedish International Development Cooperation Agency (Sida). It aims at strengthening the eco-system for innovation and start-up promotion in Albania and at intensifying linkages within the Albanian innovation ecosystem and internationally. It also assists innovative start-ups and growing businesses in further scaling up their business and in growing through capacity development and funding.

Chamber of Commerce and Industry of Gjirokastra – Features a unique innovation hub incorporating holistic services for start-ups, SMEs, Enterprises and Local Stakeholders, through a series of projects co-financed by the EU and national sources. The hub offers incubation facilities, acceleration services, a training academy and funding support.

Yunus Social Business – It provides new entrepreneurs with the skills and tools to design, test, build and grow startup initiatives that have the potential to positively impact the lives of people in the Western Balkan countries. Among other things, this Tirana-based NGO runs incubation and acceleration programs; investment readiness programs; provides coaching and mentoring to

[4] https://selegalalliance.com/regional-legal-news-q4-2019/

social and impact entrepreneurs; and facilitates access to financing for social and impact-oriented start-ups.

Tirana Inc - An initiative of Albanian universities established in the framework of EU for Innovation programme, implemented by GIZ and Preneurz. Amsterdam, and supported by the City of Tirana. Its mission is to become the number one destination for ambitious Albanian student entrepreneurs to kickstart their companies. It provides hands-on support on how to start and run a successful company; individual mentoring sessions with local and international seasoned entrepreneurs and business experts; access to a vibrant community of passionate founders; and prize money.

2.2 Bosnia and Herzegovina

Global Innovation Index 2022: 70th among the 132 economies featured

As a newly integrated country within the Western World, Bosnia and Herzegovina (BiH) is still behind its EU counterparts in terms of economic innovation. BiH is considered a small, middle-income country, suffering from under-development regarding its human capital in the science and technology sectors. This has been accompanied by low levels of research and development investment (R&D) in both public and private sectors. The issue lies in the low numbers of scientists and R&D centers, poor commercialization of R&D, and poor funding. According to the executive summary for the Western Balkans Regional R&D Strategy for Innovation, the stakeholders with the most potential to ameliorate the situation in BiH are international organizations. The country produces less innovation outputs relative to its level of innovation investments, thus putting the economy a bit behind in comparison to other middle-income group economies. It is therefore among the top priorities for creating a higher-functioning and more sustainable BiH (2021 UNDP SDG ranking of 59 out of 163 countries) to stimulate innovation in the country by funding the right organizations, projects, and start-ups.

The Ecosystem

Sarajevo School of Science and Technology (SSST) — A private institution with an entrepreneurship program (est. 2017) aimed at training the next generation of entrepreneurs by increasing students' understanding of the relationship between entrepreneurship and innovation, global trends in new technologies and the new skills required for future businesses. SSST also recently introduced the "Innovation Lab" aimed at providing technical and administrative support to students in developing innovations and business start-ups.

International University of Sarajevo (IUS)— IUS features a Research and Development Center, which is composed of laboratories specializing in bioengineering, genetics, chemistry, physics, and mechanical and electrical engineering. The aim of the department is to provide academics and scientists support for completing projects in the afore-mentioned fields as well as support for "industrial cooperation" purposes.

International Burch University — IBU's initiative titled "IBU Incubator" is committed to fostering a creative environment for the development of young entrepreneurs in BiH. Students showing

interest in entrepreneurship (incubation) or already possessing a solid business plan (acceleration) can apply to the start-up program to gain access to its educational initiatives, funding, and networks of industry mentors.

City Development Agency of Banja Luka — Established by the City of Banja Luka, the Agency is a not-for-profit focusing on the implementation of development projects facilitating the development of local economy and investments. It provides assistance in finding local project partners (suppliers, institutions), facilitates collaboration with the Local Government, researches, faculties, schools, companies, and NGO sector, and offers partnership for the preparation and implementation of projects in all sectors.

International Fund for Agricultural Development (IFAD) — IFAD issues loans to the low income, rural population to improve food security and increase incomes by supporting subsistence and commercial farmers, as well as on- and off-farm enterprises. One of its priorities is to ensure that smallholders, farms, and enterprises have access to sustainable technological innovation, business development and financial services. “Rural Enterprises and Agricultural Development Project”, one of IFAD’s ongoing projects, assists poor farmers in developing business plans, farmers’ organizations, and the necessary infrastructure to support the business plans.

2.3 Bulgaria

Global Innovation Index 2022: 35th among the 132 economies featured

Bulgaria, with a lower per capita income, but a faster growing economy than the EU average is considered an *Emerging Innovator* with performance falling behind the EU category average. The country’s performance gap to the EU is becoming larger as its performance is increasing at a rate lower than that of the EU (1.6%-points vs 9.9%-points). Amongst its overall relative strengths, Bulgaria has a higher number of trademark applications, design applications, and product innovators to show for herself. However, lifelong learning, government support for business R&D, and innovation expenditures per employee are below par compared to the rest of the EU.

The Ecosystem

The **Bulgarian Academy of Sciences**, **Agricultural Academy**, and **Universities** are the key players in the Bulgarian research and development ecosystem. There are also several private players such as private universities, private research organisations, and research and development business. **Sofia Tech Park**, **Gabrovo Tech Park**, technology transfer offices, clusters, and networks in Bulgaria are involved in the dissemination of information and research results. They facilitate the search for partners in Bulgaria and the EU for joint innovation and research projects and promote cooperation and the development of scientific, technological, and business collaborations.

The national policy and funding for R&I in Bulgaria fall under the responsibility of the Ministry of Education and Science, Ministry of Economy, Ministry of Finance, National Science Fund and National Innovation Fund. Recently a State Agency for Applied Research and Innovations was created, a single body for the implementation and coordination of policies in R&I. Despite underfunding, there are some strong centers and scientific groups in the country. Bulgarian scientists are still among the leading scientists in a number of traditionally strong sectors, such as physics and chemistry, nuclear physics, engineering, material science, mathematics, astronomy, biotechnology and microbiology, environmental sciences, and zoology. The country has also made numerous contributions to space exploration.

Mapping of Bulgarian research infrastructures and research equipment carried out by the Ministry of Education and Science revealed there are 161 research infrastructures and facilities, most of which are in physics, material science, engineering, medical and agro-bio sciences. Of them 15 are significant at an EU and 84 at a national level.

In comparison to other SEE countries, Bulgaria ranks 5th — ahead of the Czech Republic, Hungary, Romania, Slovakia, and Poland — according to its number of start-ups per capita, according to the Bulgaria Innovation Hub. The case study conducted by the innovation hub found that the major progress of Bulgaria has many indicators: a fast internet infrastructure; major research and development centers; a thriving innovation ecosystem; a growing start up ecosystem (210 start-ups raised 74 million in USD in 2016, a great increase from 20 companies and 4 million USD in 2012); highly skilled IT professionals; successful exits to foreign investors; and a leading destination in business process outsourcing (#1 business process outsourcing destination in Europe and #3 in the world).

Bulgaria's top industries are energy and environment, transportation, and marketing and sales. Some of its notable start-ups include SMSBump, Ucha Se, and Kanbanize. These qualities make Bulgaria a regional leader in innovation. The accelerators with the highest traction in the country are as follows: 1) Starfleet, 2) Equinox Partners, 3) LaunchHub Ventures, 4) Accelerator Start-up Sofia, 5) Start It Smart, 6) Climate-KIC Accelerator Bulgaria and 7) Eleven Accelerator Venture Fund. The top two cities for start-ups in Bulgaria as ranked by StartupBlink are Sofia and Varna.

2.4 Croatia

Global Innovation Index 2022: 42nd among the 132 economies featured

Croatia has a lower per capita income, but a faster growing economy than other EU Member States. Overall, enterprise births, entrepreneurial activity, and Foreign Direct Investment net inflows add positively to the innovation climate, although the absence of top R&D spender's, add negatively. Croatia is considered an *Emerging Innovator* that performs better than the EU average and that shows a considerably higher rate of increase. The country's relative strengths include a large number of product and business process innovators, and people with above-basic overall digital skills, while its relative weaknesses include amongst others weak government support for

business R&D and low Innovation expenditures per employee. One might also add to Croatia's relative weaknesses is falling behind the EU average on ease of starting a business, entrepreneurial training, and government procurement as drivers of research and innovation as well as lack of risk capital.

The Ecosystem

The Act on Improving Entrepreneurial Infrastructure in Croatia classifies support institutions and serves as a basis for different types of support schemes. A Unified Registry of Entrepreneurial Infrastructure has also been established by the Ministry of Entrepreneurship and Crafts. The Registry records and systematizes the entrepreneurial infrastructures that have received grants, incentives, or benefits. Three types of incubators and accelerators exist mostly in Zagreb: Entrepreneurial incubators that provide space for start-ups, as well as a growing range of business-development services to incubate companies; Incubators that have a thematic focus (e.g. information and communication technology, biotech) and that provide thematic relevant services to start-ups and also link them to each other; and Entrepreneurial accelerators that provide much more focused support services to entrepreneurs in the post-incubation stage of development.

Croatia has 36 entrepreneurial centers, 31 incubators and 8 technology parks, most of them linked to regional or local development agencies. Most of these mechanisms are not specifically focused on supporting social entrepreneurs or innovators; rather, they provide support to all new entrepreneurs that satisfy certain (primarily administrative) criteria.

As regards industries in the Croatian start-up ecosystem, verticals range from automotive to agriculture, and from cybersecurity to telecommunications with one of the key competitive advantages of the ecosystem being the availability of good and affordable engineering talent, especially true for hardware, where a rather low-cost base for engineering talent and services in Croatia allows for setting up an EU-based operation that is competitive to Asian counterparts. One interesting point is that while tourism represents a very big and important part of the overall economy, there is a small number of Croatian start-ups focused on tourism.

2.5 Cyprus

Global Innovation Index 2022: 27th among the 132 economies featured

Cyprus, a lower per capita income EU Member State and a slower growing economy, has nonetheless achieved the biggest improvement in innovation at the European level since 2015. Having improved its performance by 38% since 2015 – the highest across the EU, it ranks 10th between Germany and France. In fact, Cyprus is one of only two member states to have moved into a higher category (from the "Moderate Innovators" category to the "Strong Innovators" according to the European Innovation Scoreboard in 2022) and is the only state that joined the EU after 2004 to perform above the EU average (106.9%). Its performance lead over the EU is becoming larger as it increases at a much higher rate. Cyprus' relative strengths include

innovative SMEs collaborating with others, public-private and International scientific co-publications, and trademark applications. Its relative weaknesses, on the other hand, concern a lack of government support for business R&D, R&D expenditure in the public and business sectors, and innovation expenditures per employee.

There is a clear effort on behalf of the government and key ministries to improve the progress and implementation of research and innovation within Cyprus. There is a collaboration with the EU, the UK, and other donors to allow funding and sharing of resources for the growth of sustainable innovation. Improvement in the development of innovation has been seen in the last 7 years due to the change of great innovation input to greater innovation output. This demonstrates Cyprus' greater capability to develop and produce its own innovation. Cyprus places also great effort into the education, awareness and implementation of the SDGs. The collaboration with United Nations Institute for Training and Research (UNITAR) in executing the SDGs and coordinating efforts to implement projects, initiatives and actions reflect its commitment to achieving the vision of the 2030 UN Agenda.

The Ecosystem

Cyprus' vision is to become a dynamic and competitive economy, driven by research, scientific excellence, innovation, technological development, and entrepreneurship, and a regional hub in these fundamental areas. Its Innovation Ecosystem is comprised of:

- Research and Innovation Stakeholders responsible for Strategy, Policy and Policy Implementation, such as the Research & Innovation Foundation
- 10 Universities & Education Organizations
- 15 Research Institutes, Research Performing Organizations and Centers of Excellence
- Public Research Institutions
- 7 Incubators/Accelerators/Co-working spaces/Makerspaces
- Start-ups & Innovation Communities
- Industry Associations

The Cypriot Government's mission is to develop a modern and efficient state, competitive at the European and international levels, by supporting scientific research, investing in innovative entrepreneurship, and implementing an ambitious digital transformation reform. This is mainly achieved through:

The Deputy Ministry of Research, Innovation and Digital Policy – The Directorate for Research and Innovation (R&I) within the Deputy Ministry focuses on the support and operation of the National Research and Innovation system and on the design, coordination, and monitoring of the implementation of the National Strategy for Research and Innovation, aiming to promote scientific excellence and innovative entrepreneurship.

The Research & Innovation Foundation (RIF) cultivates the R&I Culture within Cyprus, namely the importance of research and innovation to the advancement of society as well as their contribution to economic growth and improving the quality of life of the citizens. Moreover, RIF promotes and supports a culture of research and innovation in young people for new/better paid jobs.

2.6 Greece

Global Innovation Index 2022: 44th among the 132 economies featured

Greece, a *Moderate Innovator* performing below the EU category average (80.2% vs 89.7%), boasts an improvement of more than 25% in the period 2014-2021, thus rapidly closing on the performance gap to the EU. Featuring a lower per capita income and a slightly slower growing economy, when it comes to innovation Greece's relative strengths these include product innovators, employment in innovative enterprises and sales of innovative products. On the other hand, the country shows relative weaknesses in medium and high-tech goods exports, lifelong learning, and government support for business R&D. Structural differences with the rest of the EU Member States include increased difficulty in starting a new business and below the EU average entrepreneurial training and government. On the positive side, Greece enjoys a higher share of in-house product innovators with market novelties and a much higher share of non-innovators with the potential to innovate.

The Ecosystem

Reborn as an emerging innovation hub after years of economic turmoil, Greece today appears to be on the road to becoming a regional tech hub by focusing on the innovation ecosystem. As any modern innovation ecosystem, Greece's ecosystem is composed of Science & Technology Parks, innovation clusters, various venture capital funds, multiple incubators and accelerators, co-working spaces, and supportive federations. Although the country's tech sector is still lagging long-established rivals, Greece shows signs of benefit from the kind of virtuous circle that fueled exponential growth elsewhere. The Greek government is responding positively to the challenges of fostering regional growth and employment in a competitive global economy, and Greece's reputation as an up-and-coming tech hub is crucially backed by successful deals such as the recent acquirement of a minority stake in Viva Wallet by JP Morgan, bringing the pioneering payments company to a reported $2bn valuation and giving the country its first unicorn (a tech start-up with a$1bn-plus valuation). It is estimated that Greece's total tech evaluation has grown from $340m in 2014 to $8.5bn today.

There are still some weaknesses to be overcome: Greek universities do not always equip students with strong business skills, which is partly explained by the apparent disconnect between universities and the market. Therefore, bringing start-ups and students together is an area that should be worked on. Another area is the enhancement of commercialization efforts by Greek

universities: Greece has over 20 universities and technical colleges, but limited numbers of university-linked products, patents, and tech transfer offices. The new legislation of university spin-offs is expected to change this. Finally, Greece could also benefit from the opening start-up scene to more women and foreign talent (for every 10 Greek-funded start-ups, less than two are female-led).

2.7 Italy

Global Innovation Index 2022: 28th among the 132 economies featured

Italy belongs to the *Moderate Innovators* category and boasts a performance marginally higher than the EU average (91.6% vs 89.7%). Italy's performance is increasing at a rate higher than that of the EU (17.4%-points vs 9.9%-points) meaning that the performance gap to the EU is becoming smaller. The country's relative strengths include the government's support for business R&D, a high number of design applications as well as of public-private co-publications. Relative weaknesses on the other hand include lower R&D expenditure in the business sector and lower venture capital expenditures.

The Ecosystem

Italy continues to be at the forefront of innovation, with more than 105,000 high-tech companies. It has the fastest-growing life science sector in Europe and is also considered to be a leader in renewable energy, the pharmaceutical industry and robotics. From its esteemed research centers to its pioneering tech sector, Italy is perceived as a global hub for innovation. The country relies on a critical mass of excellent research institutions such as the Italian Space Agency, the National Research Council, the Italian Institute of Technology, the Italian Institute for Nuclear Physics, and National Agency for Energy and the Environment.

Regarding knowledge exchange and innovation, Italian Higher Educational Institutes (HEIs) have developed a broad understanding, which goes well beyond the traditional emphasis on technology and research linkages with the business sector, start-ups, and spin-offs.

The National Plan Industria 4.0, now known as Enterprise (Impresa) 4.0, is a large-scale policy initiative promoting innovation, skills, and digital technologies in Italy. To achieve this, the policy initiative has put in place a series of tools and instruments including the creation of digital innovation hubs and competency centers. Competency centers are public-private partnerships providing technology transfer services, guidance, and technologies training. They specialize in different technology supply chains and involve networks of universities, acting as providers of R&D capabilities, training, and digital awareness. Within competency centers, universities work together with the private sector offering technology consulting to firms, including SMEs, launching, and accelerating projects and technological development, and coordinating with European competency centers.

2.8 Malta

Global Innovation Index 2022: 21st among the 132 economies featured

Malta has a lower per capita income and is a slower growing economy than the rest of the EU Member States. Malta is trying to establish itself as one of the most innovative European countries with a successful economic narrative and a big pool of promising start-ups and venture capital providers, however overall, it is a *Moderate Innovator* performing at 84.7% of the EU average. Although Malta's innovation performance is historically increasing, the rate of increase is lower than that of the rest of the EU thus increasing the country's performance gap to the other Member States. Malta appears to be relatively strong in areas such as foreign doctorate students' Trademark applications, employment in knowledge-intensive activities, enterprises providing ICT training and the number of people with above basic overall digital skills, however it also shows relative weaknesses in certain key areas such as R&D expenditures in the public and business sectors, Government support for business R&D and Venture capital expenditures. In fact, the country's performance in Finance and Support, and in intellectual assets has dropped over the years.

The Ecosystem

Venture Rocket - A collaboration with Malta Enterprise aimed at helping Maltese start-ups plan, execute, and support their successful introduction to the Maltese and European Union ecosystems. Venture Rocket is comprised of business and technology professionals that assist start-ups, companies, investors, and other ecosystem members in their path to success, and help them apply to different support plans, and accelerate their business and technology activities.

L' Universita Ta Malta – Features the Knowledge Transfer Office whose mission is to enhance the University's commercial, environmental, and socio-economic impact on a national and international level. The Office aims to facilitate the technology commercialization process of putting new knowledge and the generated research results into practical use for the benefit of our society and industry. It manages University generated intellectual property and provides support for Industry-Academia collaborations, such as identifying the right technical expertise required for contracted research or consultancy. Through the University, it regularly applies for funding for research projects and seeks to partner with public and private entities to collaborate on such proposals.

London School of Commerce Malta (LSC Malta) – Features six LSC Research and Innovation Clusters (RIC) -including Entrepreneurship; Technology & Innovation Management; and International Business- of which all LSCM academic staff are associate members. LSCM is committed to encouraging and supporting academics, researchers and professionals who are engaging in research in the strategic management of technology & innovation, entrepreneurship, marketing, and competitiveness among others.

Queen Mary University of London in Malta – Its Business Hub is engaging in making new discoveries and important connections by inviting the right partners to develop research outputs

and, where appropriate, take them to the marketplace. The Hub boasts a strong track record on research spinouts and student start-ups, as well as a number of notable successes through Queen Mary Innovation, the commercialization arm of Queen Mary.

JA Malta - a non-governmental, non-profit organization that has been in Malta since 1989. It aims to provide entrepreneurship education programmes at all levels of the educational system.

2.9 Montenegro

Global Innovation Index 2022: 60th among the 132 economies featured

Montenegro, a young state in the Western Balkans with a relatively small population and a slower growing economy, is considered an *Emerging Innovator* performing close to the EU category average (47.5% vs 50.0%). The country's performance gap to the EU is becoming larger, however (6.5%-points increase rate vs 9.9%-points). Montenegro's relative strengths include above average product and business process innovators, and employment in innovative enterprises as well as a lack of adequate legislative framework for developing a vibrant innovation ecosystem to systematically promote business, research, innovation, and entrepreneurship activities. More specifically, not having the framework to regulate legislative property rights of new innovations. On the other hand, the country is performing weakly in design applications, Government support for business R&D, and R&D expenditure in the business sector. Overall, the available data suggest that business enterprises invest little in R&D, limiting their possibilities of developing new products and processes and absorbing technologies from abroad.

The Ecosystem

Montenegro, having only recently exited the transition from a planned to a market economy, has embarked on a learning path to build elements of its innovation ecosystem. The Montenegrin government has taken up the challenge to create a legislative framework favorable to innovation and entrepreneurship, although a lack of adequate legislative framework for developing a vibrant entrepreneurial innovation ecosystem is still apparent. Silos are still prevalent in the country, with no current programmes stimulating collaboration and its grassroots, start-up communities are still underdeveloped.

As a result of its 2012 'Strategic Plan for the Establishment of STP in Montenegro' (2012), the country developed its national science and technology park with an additional three decentralized units – innovation and entrepreneurship centers. In 2014, work also started on setting up 'Technopolis', the first center for innovation and entrepreneurship in Montenegro. The country boasts two business incubators: BSC Bar and the 'Regional Business Centre' Berane LLC. The Montenegro's Chamber of Economy, Union of Employers, Association of Managers, the American Chamber of Commerce, and the Montenegro Business Alliance all provide general business development support to companies.

The Ministry of Science is the main state administration body for implementing research, development, and innovation policy through national and international programmes of general

interest. The funding is provided mainly through calls for projects. It also negotiates and implements bilateral agreements on science and technology (S&T) cooperation, and concludes memoranda, protocols, and cooperation programmes with ministries and foreign organisations.

As far as numbers are concerned, Montenegro boasts:

- 1.766 registered **researchers** within the Ministry of Science. Most R&D activities are performed at universities, where research is a side activity to teaching.
- 58 **research institutions** registered with the Ministry of Science, most of which are in the higher education sector. Only three research units are registered by companies.
- **universities**: the biggest is the state-owned University of Montenegro, and there are three private ones. There are also individual private faculties, but they are too small to be engaged in research.

2.10 North Macedonia

Global Innovation Index 2022: 66th among the 132 economies featured

North Macedonia is considered an *Emerging Innovator* performing below the EU category average (45.6% vs 50.0%). Its performance gap to the EU is becoming smaller due to its relatively higher performance increase rate (12.0%-points vs 9.9%-points). North Macedonia boasts higher than average volume of medium and high-tech goods exports and higher non-R&D innovation expenditures. On the other hand, it scores relatively weakly in design applications, R&D expenditure in the business sector and government support for business R&D.

The Ecosystem

As North Macedonia strives to continue growing economically, it is crucial for the country to develop the competitiveness of its private sector through knowledge and innovation. Its strategy of 'smart specialization' provides a sound basis for building up the national system of innovation aiming to transform the country into a knowledge-based economy. Smart specialization entails encouraging investment in programmes that will complement the country's productive assets to foster the future domestic capability and interregional comparative advantage in line with the European Research Area priorities. The strategy, which was designed within the framework of the Regional Competitiveness Initiative, entails that instead of trying to artificially develop high technology sectors, the innovation policy of the country will take a neutral stance regarding sectors. It is up to complementary policies (related to areas such as education, science, industry, clusters, and regional development) to direct resources toward sectors where endowments and capabilities offer the greatest potential for moving up the value chain, thereby facilitating smart specialization.

National Centre for Development of Innovation and Entrepreneurial Learning Skopje (NCDIEL) - Established in November 2009, is designed as a center open for innovative, technology-based and profit orientated ideas. It has a selection system that starts with on-line

application of business ideas, followed by selection of the best 80-90 ideas, training in 13 modules on entrepreneurship and small business management topics, business plan competition and finally ending with at least 10 newly founded companies. The Centre activities continue with provision of seed capital for start-ups, counselling and coaching of the established companies, all in direction of strengthening the capacities of newly established companies to successfully sustain and grow in the market.

2.11 Portugal

Global Innovation Index 2022: 32nd among the 132 economies featured

Portugal is a *Moderate Innovator* performing below the EU average (85.8% vs 89.7%) and witnessing an ever-growing performance gap to the EU (6.4%-points increase vs 9.9%-points). The country's relative strengths include the governmental support for business R&D and the number of public-private co-publications, whilst its relative weaknesses include the innovation expenditure per employee and the lack of collaboration of innovative SMEs collaborating with others. Nonetheless, Portugal has a higher share of in-house product innovators with market novelties and a higher share of non-innovators with the potential to innovate. Governance and policy framework indicators as drivers of research and innovation are at par with the EU average.

The Ecosystem

The Portuguese start-up ecosystem is still young; however, Portugal has realized that in order to achieve its R&D objectives, it is imperative to build on Portuguese entrepreneurial capability and innovation performance. The country is positioning itself to become a global reference for scientific excellence by 2030. In recent years, Portugal has managed to attract the attention of talented engineers with a global mindset as a result of both the maturing of local investors and the arrival of international and experienced capital.

Portugal aims to improve its competitive industrial capabilities and increase the number of highly skilled jobs. This is in alignment with the country's top research priorities as defined in the partnership agreement between Portugal and the EU. In November 2021, Portugal's Economy Minister announced: a) the expansion of Portugal Tech, the government's investment programme, to fund Portuguese start-ups with an additional €250 million; and b) the launch of the Europe Start-up Nations Alliance (ESNA), a new entity to support EU countries and Iceland in their path to start-ups flourishing.

Overall, the Portuguese innovation ecosystem is relying on the Portuguese people's capacity to improvise and find unconventional solutions, as well as the desire of nascent start-ups to address international markets by design.

However, international investors estimate that Portugal is currently lagging behind mature ecosystems by almost a decade, while similar competing ecosystems (i.e., Poland, Romania and Baltic countries) are closing in fast. It is also being argued that the most relevant threats to the

Portuguese ecosystem are the same threats that start-ups face on a daily base: a) failing to embrace change; b) learn from their mistakes; and c) grow with a sense of urgency.

There are 36 universities and 62 polytechnics in Portugal[5], the main difference between the two is that the former focus more on academic research, while the latter focus more on preparing students for a specific career path. All in all, apart from offering students the required specific and technical skillsets, academia also plays a crucial role in teaching students about entrepreneurship and innovation. The formal academic offers show 59 courses dedicated to Entrepreneurship and/or Innovation throughout 32 institutions (universities, polytechnics, public, and private) all over the country. Equally important are Portuguese academia's efforts to bridge the gap between students and other ecosystem stakeholders, such as the 169 incubators distributed across the country. For this purpose and in the interest of rallying and engaging students further, most universities and polytechnics have specific offices or bureaus organizing contests, hackathons, events, or other specific activities.

2.12 Romania

Global Innovation Index 2022: 49th among the 132 economies featured

Romania, a lower per capita income but a faster growing economy than the EU average, is considered an *Emerging Innovator* performing considerably below the EU category average (32.6% vs 50.0%). At the current performance rate of increase (0.2%-points), the country's performance gap to the EU is only becoming larger. Romania has to show for itself relatively high medium- and high-tech goods and knowledge-intensive services exports, as well as high venture capital expenditures. On the other hand, its relative weaknesses include a low number of business process innovators, low employment in innovative enterprises and a reluctancy of innovative SMEs to collaborate with others.

Romania has a lower share of in-house product innovators with market novelties and a higher share of non-innovators with the potential to innovate. The challenges for R&I policy-making in Romania include: (1) increasing public R&I expenditure; (2) reducing the significant brain drain which leads to a lack of skilled human resources in the country; (3) improving the governance of the R&I system at national, regional and institutional level; (4) enhancing the efficiency of public expenditure in R&I and education, monitoring, and evaluation; (5) improving the framework for private RDI investment and collaboration with the public sector.

The Ecosystem

The responsibility for R&D policy in Romania lies with the Ministry of Research, Innovation and Digitalization which coordinates the country's R&D policy and system and is responsible for the overall implementation the main funding instrument of the National R&D Strategy: the competitiveness operational programme, for which it acts as an intermediary body. European

[5] https://www.dges.gov.pt/pt/pagina/ensino-superior-em-numeros?plid=371

Structural and Investment Funds (ESIFs) also play a role in financing much of Romania's R&D. The execution of the National Plan for Innovation and R&D is outsourced to the Executive Agency for Higher Education, Research, Development and Innovation Funding, the Romanian Space Agency, and the Institute for Atomic Physics.

Romania's R&D system consists of 263 public R&D organisations including universities (56 public and 46 private), national R&D institutes, and the Romanian Academy's research institutes and centers. The universities have full freedom to manage their research budgets, and to autonomously design research agendas and topics of research specialization but are limited due to budget constraints. The Romanian Academy has its own chapter in the national budget, distributing its budget across its research institutes and centers. Each of the branch academies (Academy of Agricultural Sciences and Forestry, and Academy of Health Sciences) operates 25 institutes. There are also centers of technological transfer and information, business and technology angels, and science & technology parks.

2.13 Serbia

Global Innovation Index 2022: 55th among the 132 economies featured

Serbia, with a lower per capita income but a faster-growing economy than the EU average, is considered an *Emerging Innovator* with performance considerably above the average of the EU Emerging Innovators. Its performance is also increasing at a rate higher than that of the EU, thus narrowing its performance gap. Serbia appears to be relatively strong compared to its peers in non-R&D innovation expenditures, product and business process innovators, and in employment in innovative enterprises. On the other hand, it appears relatively weak in design applications, Government support for business R&D, and R&D expenditure in the business sector. Serbia boasts a higher share of in-house product innovators with and without market novelties and a higher share of non-innovators with potential to innovate. The Smart Specialization Strategy of The Republic of Serbia[6] for 2020-2027 helps towards fostering innovation and economic competitiveness.

The Ecosystem

Serbia is one of the first countries in the region to adopt the so-called innovation imperative – the idea that successful participation in the world economy based on knowledge implies the ability to adapt and improve technological and research capacities based on cooperation between the public and private sectors. The country is building an economy based on science and innovation, and larger investments in scientific research and development. Governmental efforts towards an intensive connection of science and economy encourage young scientists to stay in the country.

[6] https://pametnaspecijalizacija.mpn.gov.rs/wp-content/uploads/2020/09/Smart-Specialization-Strategy-of-the-RS-for-the-period-2020-to-2027.pdf

The Innovation Fund of the Republic of Serbia – Active since 2011, this is the key state institution supporting innovative activities and managing funding for stimulating innovation. The Fund is a pioneer in the institutional implementation of this imperative - primarily by increasing the capacity of start-ups and available resources for their growth. It is therefore part of a broader state innovation strategy with the vision to contribute to the Serbia's economic development by supporting innovation, strengthening the link between science and economy, establishing new and strengthening existing companies with innovative potential, through various financial instruments. These may be achieved by: supporting innovative entrepreneurship, especially in the early stages of development; connecting scientific research organizations and private companies for the development and commercialization of innovations; enabling new products, technologies and services to enter the market; establishing long-term institutional support of the state for innovative entrepreneurship in cooperation with international financial institutions, organizations, donors and the private sector.

2.14 Slovenia

Global Innovation Index 2022: 33rd among the 132 economies featured

Slovenia ranks among the Moderate Innovators group and the country's performance gap to the EU is becoming larger due to its lower performance increase rate. Slovenia's relative strengths include a high number of public-private and international scientific co-publications, as well as lifelong learning. Its relative weaknesses on the other hand include low venture capital, innovation, and non-R&D innovation expenditures, as well as a relatively small number of design applications and low volume of knowledge-intensive services exports.

The Ecosystem

Slovenia's main issue in the past has been the high fragmentation of entrepreneurship support providers. Due to a lack of clear understanding where to turn for what sort of information and support Digital Innovation Hub (DIH) Slovenia was set up to create a one-stop-shop that would provide all the necessary support for companies looking into digital transformation. DIH is comprised of 48 cluster members of which 18 are Research Organisations, Universities, and Technology Centers. It is a central national one-stop-shop to provide, connect and support knowledge, business and technology expertise, technologies, experimental and pilot environments, best practices, methodologies, and other activities necessary to fully enable Slovene Industry in building digital competencies, innovation models and processes, support their digital transformation and raise their competitive advantages based on digital.

All in all, Slovenia portrays a high level of scientific excellence in artificial intelligence and ICT, health, and life sciences, advanced materials, advanced manufacturing, space technologies, and technologies for sustainable development. The Ministry of Education, Science and Sport (MESS) is responsible for the overall design and implementation of R&D policies in the country. The Council for Science and Technology, an advisory body made up of scientists and other S&I

stakeholders, supports the government in the design of R&D policies, while the Government Office for Development and European Cohesion Policy oversees the coordination of Smart Specialization Strategy (S4). The Slovenian Research Agency is responsible for the distribution of public research funding according to the policies decided by MESS and the government. Support for technological development and innovation is coordinated by the Ministry of Economic Development and Technology (MEDT), primarily through the Public Agency for Entrepreneurship, Internationalization, Foreign Investments and Technology (SPIRIT) and the Slovenian Enterprise Fund. Universities and higher education organisations, public research institutes and research units within business enterprises are key research performers in the country.

2.15 Spain

Global Innovation Index 2022: 29th among the 132 economies featured

Spain is categorized as a *Moderate Innovator* performing very close to the EU average. The performance gap however is gradually becoming larger as Spain's performance is increasing at a rate lower than that of the EU whilst Spain has a lower per capita income and a slower growing economy compared to EU average, while business services take up a larger share of the economy, with SMEs accounting for a larger share of turnover. Sales of innovative products, lifelong learning, and number of people with above basic overall digital skills are among the country's relative strengths, as opposed to weak government support for business R&D, low employment in innovative enterprises and low R&D expenditure in the business sector being its relative weaknesses. Overall, enterprise births and Foreign Direct Investment net inflows add positively to the innovation climate, whereas entrepreneurial activities and top R&D spenders add negatively.

The Ecosystem

In terms of research, although Spain has real strengths in various key areas such as energy, biomedical sciences and biotechnology, agriculture and food, materials, ICT, energy and the environment, its science and innovation ecosystem presents imbalances that curtail its ability to generate and apply new knowledge to boost economic competitiveness and address pressing social challenges. Businesses have on average limited experience of collaboration on innovation with Spain's research base. The principle of specialization leads to universities and PROs being associated with the generation of new knowledge, while businesses tend to be associated with application, with governments being assigned a mix of resourcing, framework setting and public service delivery functions. The country is working hard to increase investment in research and innovation, both through central government and through engagement with industry. The new 'Strategy for Science, Technology and Innovation 2021-2027' aims to increase Spain's public and private R&D investment to 2.1% of GDP by 2027. Based on promoting talent, research excellence, business leadership and addressing social challenges, and funded through a national agency for research, this strategy aims to create more opportunities for Spanish scientists to work in industry and engage in international collaboration.

According to a 2021 Dealroom report, “excluding outlier mega rounds, VC investment in Spanish start-ups grew faster than any other country in Europe besides the Netherlands in the first half of 2021”. Additionally, research shows that the Spanish start-up ecosystem has grown five-fold times in value since 2015, with the combined value of the Spanish start-up ecosystem reaching €46B in 2021, up from €10B in 2015. Some homegrown Spanish unicorns’ examples that drive this growth include Glovo, Wallbox and Flywire. It must be noted that as seen in other South European countries, the capital and one major city are hubs for this growth; that said, Barcelona and Madrid are the most established Spanish tech hubs, however start-ups are also raising capital in all regions of Spain.

2.16 Turkey

Global Innovation Index 2022: 37th among the 132 economies featured

Turkey is considered an *Emerging Innovator* with a performance marginally below the EU category average (47.7% vs 50.0%). However, its performance is decreasing (-0.5%-points) meaning that country’s performance gap to the EU is becoming larger. Turkey’s manufacturing activity takes up a larger share of the economy, itself growing faster than the EU Member States. The country has a higher share of in-house product innovators with market novelties and a higher share of non-innovators with potential to innovate, although the ease of starting a business and entrepreneurial training is below the EU average as drivers of research and innovation. Overall, one might say that Turkey’s relative strengths include a high volume of medium- and high-tech goods exports as well as innovative products sales, increased government support for business R&D, and high resource productivity. On the other hand, Turkey appears to be lacking in design and Trademark applications, as well as international scientific and public-private co-publications.

Structural differences with the EU are shown below:

The Ecosystem

After 2000, the start-up ecosystem can be clearly divided into three distinct periods:

- The first period (2000-2009) was known as the bootstrapping period since the lack of start-up investors forced most successful start-ups to emerge from the bootstrap model, pulling themselves up to success.
- The second period (2010-2017) saw a huge influx of supporting actors leading to a rise in start-ups achieving growth via external investment. These actors included angel investors, VCs, CVCs, and accelerator programs, who established themselves, gained experience, and made their first investments.
- The third period (2018-) is the take-off period during which Turkey’s first unicorn was established with more to follow.

Turkey boasts more than 69 accelerator programs, which have become more specialized over time either by focusing on individual sectors and themes or by aiming at scaleups and

internationalization. As far as incubators are concerned, most have been established by techno parks, bolstering a direct correlation between the number of techno parks and the number of incubation centers. The 82 currently existing pre-incubation and incubation centers serve as catalysts and support mechanisms for start-ups who need a longer ramp up time before getting to scale, thus making these centers invaluable players in the ecosystem. In terms of co-working spaces, they have become the most active hubs for entrepreneurship in the country either by organizing events and activities, or simply by providing higher chances of serendipity to interact with people across multiple disciplines. While most early-stage start-ups in Turkey tend to prefer incubation centers, co-working spaces, and accelerator programs, scaleups overwhelmingly tend to establish offices in technoparks. This demonstrates the important role that the 68 technoparks currently in existence play specifically in later-stage start-up growth.

Overall, the Turkish government is a very active and strong supporter of the innovation ecosystem, offering a variety of programs and policies to enable the establishment and growth of start-ups. The main actor in science, technology and innovation is the Scientific and Technological Research Council of Turkey (TUBITAK), which is an affiliated institution of Ministry of Science, Industry and Technology. Funding for strategic sectors and chosen technologies in academia and industry, innovation and entrepreneurship support schemes, special incentive packages, technology zones with tax advantages, and cluster formations are some of the main tools used to advance S&I.

3 In Conclusion

Recent research in innovation and entrepreneurship has shown that despite notable exceptions in the north and west of Europe, the **Southern European countries** are lagging, especially in areas of innovation such as genomics, quantum computing, and artificial intelligence. Most of these countries have been categorized as ***Moderate innovators*** **and** ***Emerging innovators***, and still have considerable ground to cover compared to the rest of Europe. For them to catch up, a new collaborative environment for business, higher education and research needs to be created as the South 3 Programme strives to develop and implement.

Without a doubt, Europe can compensate for its fragmentation with **openness and connectedness, entrepreneurially transforming its universities in the process**. Sustainable innovation ecosystems need to be strengthened and the innovation capacity of higher education needs to be boosted. Arguably, the **creation of new and the strengthening of existing Knowledge and Innovation Communities** is crucial in the development of a wide range of innovation and entrepreneurship activities across the region. This will not only spur economic growth, but also enable the region to identify and develop its own competitive advantages.

Funded by
the European Union

4 References

4.1 General

[1] European Commission (2022), *European Innovation Scoreboard*. Available at: https://research-and-innovation.ec.europa.eu/statistics/performance-indicators/european-innovation-scoreboard_en#country-profiles-eu [Accessed online on 05.10.2022]

[2] World Intellectual Property Organization (2022), *Global innovation Index 2022*. Available at: https://www.wipo.int/global_innovation_index/en/2022/index.html [Accessed online on 13.09.2022]

[3] UK Science and Innovation Network (2022), *UK Science and Innovation Network Country Snapshots*. Available at: https://www.gov.uk/world/organisations/uk-science-and-innovation-network [Accessed online on 19.09.2022]

4.2 Albania

[4] European Commission (2016), *Innovation, Technology Transfer and Automation Systems in Albania*. Available at: https://cordis.europa.eu/article/id/124456-innovation-technology-transfer-and-automation-systems-in-albania/es [Accessed online on 13.09.2022]

[5] European Commission, Directorate-General for Research and Innovation (2022), *R&I cooperation with Albania*. Available at: https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/europe-world/international-cooperation/albania_en [Accessed online on 13.09.2022]

[6] EU for Innovation. Available at: http://euforinnovation.al/about-us/ [Accessed online on 13.09.2022]

4.3 Bosnia and Herzegovina

[7] International Telecommunication Union (2018) *Digital Innovation Profile Bosnia and Herzegovina - ICT centric innovation ecosystem snapshot*. Available online at: https://www.itu.int/en/ITU-D/Innovation/Documents/Publications/eBAT_Brochure–DIP%20BosniaH_431106_.pdf

4.4 Bulgaria

[8] Bulgaria Innovation Hub. Available online at: https://www.bghub.io [Accessed online on 13.09.2022]

[9] Republic of Bulgaria, Ministry of Economy and Industry, *Innovation Strategy of the Republic of Bulgaria*. Available online at: https://www.mi.government.bg/en/themes/innovation-strategy-of-the-republic-of-bulgaria-14-287.html [Accessed online on 13.09.2022]

[10] The Recursive (2022), *What's the Roadmap for Smart National Innovation Strategy? Lessons from Bulgaria*. Available online at: <https://therecursive.com/what-s-the-roadmap-for-smart-national-innovation-strategy-lessons-from-bulgaria/ [Accessed online on 13.09.2022]

4.5 Croatia

[11] Croatian Chamber of Commerce (2022), *Strategic Project for support of establishment of Innovation Network for Industry and Thematic Innovation platforms*. Available online at: https://www.ciraz.hr/en/o_projektu/ [Accessed online on 13.09.2022]

[12] HAMAG BICRO Croatian Agency for SMEs, Innovation and Investments (2022). Available online at: https://en.hamagbicro.hr [Accessed online on13.09.2022]

[13] OECD (2016), *Social Innovation Policy Framework for Croatia, Policy Handbook*. Available online at: <https://www.oecd.org/south-east-europe/programme/Social_Innovation_Policy_Framework_Croatia.pdf

[14] Sanja Pfeifer et al (2016), *Benchmarking of Business Incubators in Croatia*. Available online at: https://www.academia.edu/31405203/Benchmarking_of_Business_Incubators_in_Croatia

[15] The World Bank (2017), *Croatia Innovation and Entrepreneurship Venture Capital Project*. Available online at: https://projects.worldbank.org/en/projects-operations/project-detail/P152130 [Accessed online on 13.09.2022]

4.6 Cyprus

[16] Chief Scientist for Research and Innovation (2022), *Cyprus Research & Innovation Ecosystem*. Available online at: https://chiefscientist.gov.cy/research-innovation-in-cyprus/ [Accessed online on 14.09.2022]

[17] Chief Scientist for Research and Innovation (2022), *Cyprus Research & Innovation Strategy Framework 2019-2023, Innovate Cyprus*. Available online at: https://chiefscientist.gov.cy/wp-content/uploads/Innovate-Cyprus-CYRI-Strategy-Framework-2019-2023-NBRI-May-2019-2.pdf [Accessed online on 14.09.2022]

4.7 Greece

[18] Elevate Greece (2022). Available online at: https://elevategreece.gov.gr/innovation-ecosystem/ [Accessed online on 14.09.2022]

[19] EKT National Documentation Center (2021), *Greece among the countries with the greatest improvement in innovation performance in Europe*. Available online at: <https://www.ekt.gr/en/news/26308 [Accessed online on 14.10.2022]

[20] Innovation Greece (2022) Available online at: https://innovationgreece.com [Accessed online on 14.09.2022]

[21] Shifted (2022), *"Greeking Out. Greece bids for tech glory"*, Report. Available online at: https://sifted.eu/intelligence/reports/greeking-out [Accessed online on 24.10.2022]

4.8 Italy

[22] ICT Research & Development Center (2020), *Innovation in Italy in 2021*. Available online at: https://www.pmf-research.eu/en/innovation-in-italy-in-2021/

[23] OECD (2019), *Supporting Entrepreneurship and Innovation in Higher Education in Italy*, *Chapter 3. Knowledge exchange and collaboration in Italy*, Available online at: https://doi.org/10.1787/43e88f48-en

4.9 Malta

[24] Venture Rocket Malta (2022). Available online at: https://venturerocket.mt [Accessed online on 12.11.2022]

4.10 Montenegro

[25] European Commission (2018), *Specific Support for Montenegro - Towards Entrepreneurial Innovation Ecosystems / Background Report*. Available online at: https://ec.europa.eu/research-and-innovation/sites/default/files/rio/report/SS%2520Montenegro_Background%2520Report.pdf

[26] European Commission (2019), *Specific Support to Montenegro: Final Report - Towards Entrepreneurial Innovation Ecosystem*. Available online at: https://ec.europa.eu/research-and-innovation/sites/default/files/rio/report/SS%2520Montenegro_Final%2520Report.pdf

[27] Innovation Fund of Montenegro (2022). Available online at: https://fondzainovacije.me/en/home/ [Accessed online on 12.11.2022]

4.11 North Macedonia

[28] European Commission, Directorate-General for Research and Innovation (2021), *R&I cooperation with North Macedonia*. Available online at: https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/europe-world/international-cooperation/north-macedonia_en [Accessed online on 19.09.2022]

[29] Innovation Hub (2021), *North Macedonia: The Most Prominent New Ground for The Future Development of NATO*. Available online at: https://www.innovationhub-act.org/blog/north-macedonia-most-prominent-new-ground-future-development-nato [Accessed online 12.09.2022]

[30] National Center for Development of Innovation and Entrepreneurial Learning (2022). Available online at: http://ncdiel.mk/homepage/ [Accessed online on 22.09.2022]

[31] Ricardo Pinto (2015), *Innovation Strategy of the Republic of Macedonia for 2012-2020*, DO:10.13140/RG.2.1.2239.5600

4.12 Portugal

[32] ANI National Agency of Innovation (2022). Available online at: https://www.ani.pt/en/ [Accessed online on 14.09.2022]

[33] Porto Business School (2021), *"Portuguese Ecosystem is young, but its growth is stable"*. Available online at: https://www.pbs.up.pt/en/articles-and-events/artigos/portuguese-ecosystem-is-young-but-its-growth-is-stable/. [Accessed online on 05.11.2022]

[34] International Data Corporation & Startup Portugal (2021), *"Startup & Entrepreneurial Ecosystem. Report 2021"*. Available online at: https://portugaldigital.gov.pt/wp-content/uploads/2022/02/Portugal_the_best_place_to_startup.pdf

[35] Portugal Digital (2022), "Portuguese Startup Ecosystem". Available online at: https://portugaldigital.gov.pt/en/accelerating-digital-transition-in-portugal/entrepreneurship-and-startups/portuguese-startup-ecosystem/. [Accessed online on 05.11.2022]

[36] Euraktiv (2021), "Inside Portugal's bid to become a 'startups factory". Available online at: https://www.euractiv.com/section/digital/news/inside-portugals-bid-to-become-a-startups-factory/. [Accessed online on 05.11.2022]

4.13 Romania

[37] The Recursive (2022), *Mapping Romania's Most Innovative Cities: Who Is Shaping Tech*. Available online at: https://therecursive.com/mapping-romanian-cities-that-are-shapping-tech-innovation/ [Accessed online on 25.10.2022]

4.14 Serbia

[38] Republic of Serbia, Innovation Fund (2022). Available online at: http://www.inovacionifond.rs/en/fond/about-fund [Accessed online on 25.09.2022]

[39] Serbia Creates Opportunities (2022), *Emerging Tech Development Hub, Executive Summary*. Available online at: https://innovations.serbiacreates.rs [Accessed online on 28.10.2022]

[40] The World Bank (2022), *Serbia Accelerating Innovation and Growth Entrepreneurship*. Available online at: https://projects.worldbank.org/en/projects-operations/project-detail/P170185 [Accessed online on 28.10.2022]

4.15 Slovenia

[41] Digital Innovation Hub Slovenia (2022). Available online at: https://dihslovenia.si/en/about-us [Accessed online on 14.11.2022]

[42] European Cluster Collaboration Platform (2022), *Slovenian Innovation Hub, European Economic Interest Grouping*. Available online at: https://clustercollaboration.eu/content/slovenian-innovation-hub-european-economic-interest-grouping-sih-eeig [Accessed online 14.11.2022]

[43] Interreg Europe (2022), *Slovenian Digital Innovation Hub*. Available online at: https://www.interregeurope.eu/good-practices/slovenian-digital-innovation-hub [Accessed online on 14.11.2022]

4.16 Spain

[44] Dealroom Co (2021), *Spanish Tech Ecosystem*. Available online at: https://dealroom.co/uploaded/2021/10/Spain-tech-ecosystem-Dealroom-report-2021.pdf?x84064 [Accessed online on 07.11.2022]

[45] Ministry of Industry, Commerce & Tourism, Invest in Spain (2022), *Innovation*. Available online at: https://www.investinspain.org/en/innovation [Accessed online on 16.11.2022]

[46] OECD, Science, Technology & Industry Policy Papers (2021), *Improving knowledge transfer and collaboration between science and business in Spain*. Available online at: https://www.oecd.org/innovation/improving-knowledge-transfer-and-collaboration-between-science-and-business-in-spain-4d787b35-en.htm [Accessed online on 16.11.2022]

4.17 Turkey

[47] Invest in Turkiye (2021), *The State of Turkish Startup Ecosystem*. Available online at: https://www.invest.gov.tr/en/library/publications/lists/investpublications/the-state-of-turkish-startup-ecosystem.pdf [Accessed online on 26.10.2022]