

S5

Slovenia’s Sustainable Smart Specialisation Strategy

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**List of abbreviations and acronyms**

AI artificial intelligence

CF Cohesion Fund

DESI Digital Economy and Society Index

DMS Distribution Management System

EAFRD European Agricultural Fund for Rural Development

EC European Commission

ECP EU Cohesion Policy

EDP Entrepreneurial Discovery Process

EIS European Innovation Scoreboard

EIT European Institute for Innovation and Technology

EMS energy management system

EOCIC European Observatory for Clusters and Industrial Change

ERDF European Regional Development Fund

ESF+ European Social Fund Plus

EU European Union

EUSAIR EU Strategy for the Adriatic and Ionian Region

EUSALP EU Strategy for the Alpine Region

EUSDR EU Strategy for the Danube Region

FoF Factory of the Future

GDP gross domestic product

GIS Geographic Information System

HN horizontal network; managed cluster of KETs (e.g. ICT KETs) or clusters of non-technological innovations (e.g. Networks for the Transition to a Circular Economy)

HPC high performance computing

I3 Interregional Innovation Investments Instrument

ICT information communication technologies

IoS Internet of Services

IoT Internet of Things

JRC Joint Research Centre

JTF Just Transition Fund

KET Key Enabling Technologies

KIC Knowledge and Innovation Communities

KOC Competence Centre for Human Resources Development

KTO Knowledge Transfer Offices

MATPRO Materials as End Products

MDDSZ Ministry of Labour, Family, Social Affairs and Equal Opportunity

MFF multi-annual financial framework or EU long-term budget for the period 2021–2027

MGRT Ministry of Economic Development and Technology

MIZŠ Ministry of Education, Science and Sport

MJU Ministry of Public Administration

MZ Ministry of Health

MZZ Ministry of Foreign Affairs

NDC FoF National Demo Center Factories of the Future

NpUI National Programme on the Development and Uptake of Artificial Intelligence by 2025

OECD Organisation for Economic Cooperation and Development

OP 2014-2020 Operational Programme for the Implementation of the EU Cohesion Policy 2014-2020

PA1 Priority Axis International competitiveness of research, innovation and technological development in line with smart specialisation for enhanced competitiveness and greening of the economy (OP 2014–2020)

PA3 Priority Axis Dynamic and competitive entrepreneurship for green economic growth (OP 2014–2020)

PA10 Priority Axis Knowledge, skills and lifelong learning to enhance employability (OP 2014-2020)

PMiS Smart Cities and Communities

PO1 Policy Objective 1 – A more competitive and smarter Europe by promoting innovative and smart economic transformation and regional ICT connectivity (Programme ECP 2021-2027)

PO6 Policy Objective 6 – Just Transition Fund (Programme ECP 2021-2027)

PSiDL Smart Buildings and Home, including the Wood Chain

R&D research and development

RDI research, development and innovation

RRP Recovery and Resilience Plan

RS Republic of Slovenia

S3 smart specialisation strategy

S4 Slovenian Smart Specialisation Strategy

S5 Slovenian Sustainable Smart Specialisation Strategy

SAŠA Savinjsko-šaleška region

SBE Sustainable Blue Economy

SDS 2030 Slovenian Development Strategy 2030

SIS Slovenian Industrial Strategy 2021-2030

SME micro, small and medium-sized enterprises

SPIRIT Slovenian Public Agency for Entrepreneurship, Internationalisation, Foreign Investments and Technology

SPOT Slovenian Business Point

SRIP Strategic Research and Innovation Partnership

SRIPT SRIP Tourism

SURS Statistical Office of the Republic of Slovenia

SVRK Government Office for Development and European Cohesion Policy

TRL Technology Readiness Levels

TRP Target Research Programme

UMAR Institute of Macroeconomic Analysis and Development

V2I vehicle-to-infrastructure communication

ZRISS 2030 Slovenian Scientific Research and Innovation Strategy 2030

ZZrID Scientific Research and Innovation Activities Act

5G fifth generation of wireless communication technologies

6G sixth generation of wireless communication technologies



# Introduction S3 – S4- S5

The European Commission (EC) introduced the concept of smart specialisation strategy (also known as **S3**[[1]](#footnote-1)) already in the 2014-2020 programming period due to lack of collaboration and investments in joint projects between industry and institutions in the field of research, development and innovation with a view to stimulating and concentrating the investments of members states and regions in research and innovation under the European Regional Development Fund (ERDF). The purpose of this powerful instrument is to support the regional/national priorities in the field of research, development and innovation (RDI) and technological progress in the framework of the entrepreneurial discovery process (EDP), a bottom-up process aiming to identify the competitive advantages of each region/member state, improve innovation activity in the economy and boost the competitiveness of small and medium-sized enterprises (SMEs). S3 has thus gained a place among the strategic documents that set out a vision for the development of each country and region and a path to get there. In this context, the EC has also designed a set of processes to underpin interregional collaboration with a view to establishing European partnerships in the areas where a critical mass has been demonstrated to sustain the competitiveness of research and innovation at the European level.

In the 2014-2020 programming period, Slovenian Smart Specialisation Strategy (also known as **S4**[[2]](#footnote-2)) pursued the two fundamental goals of EU policy orientation, i.e. the transition to a green and digital society, and was designed as a tool facilitating the economic transformation to improve the ecosystem and step up the funding of actions in the field of RDI, human resources, entrepreneurship and internationalisation. In Slovenia, the EDP built on the principle of quadruple helix, a concept implying the collaboration between businesses, research sphere, government and civil society. New strategic development and innovation partnerships (SRIPs) were formed as development clusters at the start of the S4 implementation and remain the central mechanism of S5, dictating the focus on breakthrough, competitive economic areas in Slovenia and, as such, the driving force behind the ongoing EDP also in the 2021-2027 programming period.

The upgraded Smart Specialisation Strategy for the 2021-2027 programming period puts green transition at the heart of its agenda. This concept is understood as an innovation-driven, low-carbon, digital and knowledge-based transformation of the economy and society. The stakeholders in the areas where Slovenia boasts comparative advantages and are part of the S5 play a leading role in this process. The concept has also taken on a sustainable character at the EU level in the wake of the recent adoption of the EU Taxonomy Regulation. The orientation towards sustainability is reflected in the name given to the strategy (Slovenia’s **Sustainable** Smart Specialisation Strategy – **S5**) which constitutes the main and comprehensive basis for the allocation of the ERDF part of the funding under Policy Objective 1 – A smarter Europe.

The 2021 Productivity Report 2021 (UMAR, 2022a) defines productivity as the main element driving the recovery from the pandemic and stresses that the transition to a low-carbon circular economy is not only an environmental imperative, but is becoming an increasingly recognised factor in ensuring long-term productivity growth and the resilience of the economy and society. The post-pandemic recovery of the economy will therefore be inextricably linked with the goal of significant reduction of net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels, with the main goal of achieving climate neutrality by 2050. Also, to make the transition to the ‘new normal’ a success, the report outlines a set of recommendations, or rather orientations, that are also observed in the design of S5 and comprise the following (i) the development of human resources and skills of the future, (ii) the role of public finance in fostering a smart, digital and innovation-driven transformation, and (iii) a sustainable transformation to a low-carbon and circular economy.

The S5 was designed on the basis of a partnership approach, which was reflected in the strong involvement of the relevant ministries, research organisations, businesses, the non-governmental sector and local/regional actors. The S5 design process built on the good practices identified in the S4 implementation to date: integrated/interdisciplinary nature of the relevant policy mix, proactive approach to the stakeholder dialogue (upgrading the development of SRIPs) and multi-level governance.

The basic structure of the strategy, in terms of prioritisation, governance and policy mix and the monitoring and evaluation process remains stable but a number of changes are visible at lower, more detailed levels. One of the central, easily recognisable changes is the stronger and more noticeable role of horizontal networks (HN) and key enabling technologies (KETs) that have so far been part of the following S4 priority areas: Smart Cities and Communities (PMiS), Networks for the Transition to a Circular Economy (Circular Economy) and Factories of the Future (FoF) and have been interwoven across all priority areas. S5 keeps the network structure of value chains, horizontal networks and KETs and takes it to the next level through a more robust mainstreaming of green technologies, digitalisation and circular economy while coupling this with a more focused and targeted policy mix. Slovenia has comparative advantages in the field of digitalisation technologies, industrial modernisation (control technologies, robotics, plasma technologies, photonics, advanced manufacturing technologies for materials, nanotechnologies and quantum technologies), transition to a green, circular and low-carbon society (including a sustainable blue economy), where S5, through carefully selected priority areas, makes a decisive contribution to the transition to a sustainable society and to the European Green Deal and EU Missions, such as the New European Bauhaus and 100 Climate-Neutral and Smart Cities through its contribution to improving the energy, material and carbon emission efficiency.

In order to successfully carry out the industrial transformation and bolster further economic and social development, the country needs to improve the science, research and innovation ecosystem and to ensure **coordinated, stable and integrated investments** in RDI, digital transformation, competitiveness of SMEs and skills for smart specialisation.

Only market realisation turns investments in RDI and digitalisation into worthwhile investments, that is why the entrepreneurial mindset and innovation should be encouraged and embedded in all walks of life. Investments should be targeted and focused to increase entrepreneurial activity and enhance competitiveness. To strengthen the knowledge-based society and boost innovation and creativity, it is necessary to accelerate the transfer, use and integration of new knowledge emerging in all disciplines, be it technological and non-technological, as well as of social innovations, cultural and creative industries and art-thinking supported research.

Digitalisation of the economy, public sector and society as a whole is no longer a competitive advantage – it is an inevitable reality. That is why it is necessary to continue the already launched measures targeting the promotion of digital transformation of the businesses and public sector, boost investments in this area and support the further development of the supportive environment. Citizen science and citizen engagement will be fully promoted as the aim is to allow the public to participate in analysing and solving the most pressing problems linked to the green and digital transition. A smart regional ecosystems should be developed at the same time to extend the offer of smart and mobile digital public services for citizens, businesses and public sector.

Any investment in research and development, new technologies, products and processes and digitalisation as well as in fostering entrepreneurship and innovation activity and competitiveness of businesses remains an untapped opportunity without the corresponding investment in knowledge and skills. Ensuring the right set of skills for smart specialisation thus requires fully stepping up investments in the acquisition of skills needed for the future society. In particular, the work of the competence centres for human resources development should be upgraded and human resources strengthened for gaining the skills of the future already at the stage of regular education processes, to facilitate the transition from the education process to the labour market and ensure the continuous skills building and sharing of skills of the stakeholders involved in the implementation of S5.



# Background, purpose and goal

## Background

Slovenia managed to gradually narrow the gap with the EU average in terms of economic development in the period of economic growth between 2014 and 2019, reaching 89% of the EU average in 2019. The employment rates in the country were record high, which resulted in higher household income and a significant improvement in public finance after it had deteriorated during the previous economic and financial crisis. Social and societal development gradually grew more inclusive and stronger on the back of stronger economic growth and favourable labour market developments.

Despite high employment levels that were recorded in that period, Slovenia’s catching up with most developed EU counterparts in the past years built on enhanced productivity only to a small extent, notably due to underinvestment in research and development (R&D), digitalisation and skills training that importantly shape the productivity of modern economies. That is why the recovery measures should be complemented with structural reforms for greater resilience of the economy and society to shocks and more sustainable development in the long term (UMAR, 2021).

In 2020, the economy was sharply curtailed by the covid-19 epidemic and various domains of quality of life were massively affected by the crisis. Yet, some new opportunities emerged in its aftermath. The covid-19 crisis disrupted several years of economic growth and favourable labour market developments. Unresolved development challenges and structural disparities further increased the vulnerability of Slovenia during the covid-19 epidemic, and some of them were exacerbated by the epidemic.

Over the past decade, Slovenia has narrowed the productivity gap to the EU average in most sectors, but productivity growth was abruptly stopped by the covid-19 epidemic. The low level of investments had in fact been considerably slowing productivity growth already in the pre-epidemic period. In 2022, competitiveness was further impacted by cost pressures, including those ensuing from energy and commodity price increases. The timely response of the government and adoption of measures helped mitigate the pressure on competitiveness, but businesses in the services sector recorded the sharpest decline. Micro enterprises and SMEs continue to boast strongest productivity growth (UMAR, 2022a).

While businesses have managed to cope with the rising cost pressures considerably successfully so far, sustainable transformation will need to be significantly accelerated, both at the business sector level and at the level of the government. Slovenian businesses are lagging far behind as regards fostering sustainable investments and embracing a sustainable business transformation in terms of diversifying products, using advanced sustainable technology solutions or innovating sustainable business models. Full-scale digital transformation of businesses has been slow, and the covid-19 epidemic failed to make a noticeable contribution to its progress; the crisis manifested in particular in the increased use of basic digital tools. To secure faster productivity growth, Slovenian businesses will have to accelerate the deployment of individual (complex) technologies and address the (digital) transformation in a more integrated and ambitious way, which will call for significantly stepping up their RDI investments (UMAR, 2022c).

Intangible capital has been increasingly gaining ground as one of the drivers of productivity. Moreover, the epidemic has further underlined the importance of such investments (with an emphasis on innovation, digital transformation and knowledge, and other so-called soft forms of intangible capital, such as design, branding and organisational capital). The wider context in which businesses operate and which can make an important contribution to their growth and development is made up of certain forms of social and institutional capital, such as international embeddedness and openness, a country’s attractiveness to talents, entrepreneurial mindset, collaboration and trust and quality of governance of the country (UMAR, 2022a).

Slovenia has been classified as a moderate innovator for the fourth time in a row (EC, 2022a), having been classified among the strong innovators before 2018 according to the European Innovation Index (EII). Broken down by EII components, Slovenia scored worst on firm investments relative to the EU average in 2021, which was mainly a result of low non-R&D innovation expenditure. Here the gap with the EU average widened the most between 2014 and 2021. Significant deterioration was also recorded for the component of finance and support, where the traditionally low values for risk capital stand out. The poor performance is also a result of the negative contribution of RDI investment by public sector, which was declining between 2012 and 2016 and amounted to 0.52% of GDP in 2019.

As regards R&D and investment in information and communication technologies (ICT), Slovenia lags behind the innovation leaders by one percentage point of GDP per year. Slovenia earmarks by 0.5 percentage point of GDP less than the EU average and by 2 percentage points of GDP less than the top five countries, with the gap increasing year-on-year.

RDI investments have been on the rise in the past three years in Slovenia, but the country is still one percentage point of GDP behind top performers. According to provisional data, the volume of RDI investments reached an all-time high in 2020 in nominal terms; however, in relative terms (expressed as % of GDP) it has lagged behind the EU average since 2016, the lag behind the leading innovators being even more pronounced. Amid the relatively modest public sector investments, the business sector made an important contribution to the overall R&D expenditure in the 2008-2019 period, for the most part surpassing 60%, which made the figure one of the highest at the international level (the respective share in innovation leaders stood at 58.4% in 2017) (UMAR, 2022a).

Slovenia has not (yet) managed to substantially increase the volume of public investments in science, research and innovation activities through the implementation of the national scientific research and innovation policy as well as S4, which is one of the pressing challenges to be addressed in the future. Nevertheless, by upgrading in particular the scientific research and innovation ecosystem through the Research and Innovation Strategy of Slovenia 2011-2020 and S4, the country has managed to considerably improve the conditions that will, in case investments increase, directly contribute to increasing impact. Thus, without increasing investments, it is virtually impossible to expect the achievement of the set goals and enhanced innovation activity in the country.

The key variable that S5 revolves around is productivity. At the same time, S5 focuses on reducing the pressure on natural resources to advance the transition to a green economy that was highlighted in the introductory chapter. The strengthening of scientific research and innovation activity has been linked to the implementation of S4 after several years of decline. Since 2016, over EUR 1 billion in EU funding has been made available under 100 calls for proposals and programmes[[3]](#footnote-3). Nearly half of this funding was earmarked for the RDI programme, the rest going to projects that either directly or indirectly support the implementation of S4 in the field of entrepreneurship and human resources. In order to keep productivity and innovation at high levels and remain competitive and integrated in national and international value chains, Slovenia needs to make sure that financial instruments are coherent, consistent and complementary, both content-wise and in financial terms[[4]](#footnote-4).

## Strategic goal

The flagship strategic goal of S5 is the green transition that is to be understood as **innovation-driven, low-carbon, digital and knowledge-based transformation of the economy and society.**

Table 1: Indicators measuring strategic goal of S5**[[5]](#footnote-5)**

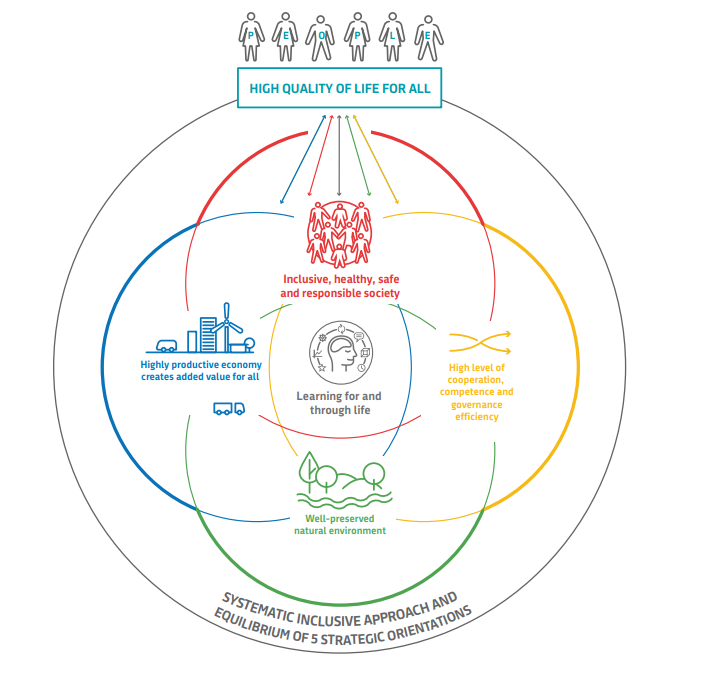
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Indicator | Baseline value | Reference year | Target value 2030 | Source of data |
| Labour productivity (GDP per person employed in purchasing power standards), EU = 100 | 84 | 2021 | 95 | SURS |
| European Innovation Index (EII), EU=100 | 93.5 group of moderate innovators | 2022 | 125 group of innovation leaders | EC |
| Material productivity, SKM/kg | 2.03 | 20201 | 3,5 | ARSO, Eurostat |
| Digital Economy and Society Index (DESI), ranking | 11th place | 2022 | 9th place | EC |
| Share of population in the 30–34 age group with tertiary education, in % | 46.9 | 20201 | 50 | UMAR, Eurostat |
| Share of participants in lifelong learning in the 25-64 age group, in % | 8.4 | 20201 | 19 | UMAR, Eurostat |

1Source: Last data – 2022 Development Report (UMAR, 2022b).

The ambition of S5 in identified niche areas remains to support the shift from the follower to the co-creator of global trends, from the supplier of components to an important and trusted development partner and engine of research and innovation activity as well as manufacturing activity with high added value within global value chains.

The strategic goal of S5 is linked and aligned with the objectives set out in other relevant sectoral strategies. S5 is therefore a document that acts as a platform connecting the already adopted strategic documents and addressing the development goals of the Slovenian Development Strategy 2030 (SDS 2030) as seen below:

Figure 1: Primary objective and strategic orientations of Slovenian Development Strategy 2030



Source: SDS 2030 (SVRK, 2017).

Besides S5, the key sectoral strategies that aim to advance science and drive the improvement of Slovenia's competitiveness include the Scientific Research and Innovation Strategy 2030 (ZRISS 2030), the Slovenian Industrial Strategy 2021–2030 (SIS), the new Digital Slovenia, the National Programme on the Development and Uptake of Artificial Intelligence by 2025 (NpUI) and the Guidelines for the Implementation of Slovenia’s Skills Strategy. In addition, several sector-specific documents play an important role in this context, i.e. the National Energy and Climate Plan and other strategies in the field of environmental protection, energy, a fair transition to a climate-neutral economy and society, education, etc. S5 integrates the relevant directions and makes them more concrete, translating them into a uniform and comprehensive framework that allows for the implementation of targeted, focused and complementary actions.

S5 will contribute to delivering on the European Green Deal and the national Recovery and Resilience Plan (RRP) by fostering the green (and digital) transition. Last but not least, the just territorial transition plans outlining the measures to support coal phase-out and restructuring of Slovenia’s coal regions of Savinjsko-Saleška (SAŠA) and Zasavje[[6]](#footnote-6) and the investments funded under the Just Transition Fund (JTF) will also be aligned with S5.

## Purpose

The purpose of S5 is to set the framework:

1. and to integrate a broader set of development policies related to innovation, in particular policies fostering science, research and innovation, industrial policy, policies fostering entrepreneurship and innovation, policy for digital transition, policies fostering natural resources and environmental protection, policies fostering the development of relevant skills, including the education system, rural development policies, international relations policies, policies fostering legislative environment improvement, etc.;
2. for the areas that Slovenia’s development policy will prioritise and address through a targeted policy mix (e.g. calls or other forms of selecting and funding projects in the field of research and innovation, entrepreneurship, human resources, digitalisation);
3. for the supportive research, innovation and entrepreneurship ecosystem (diagram in Annex 1) that must be horizontal in nature and whose effectiveness conditions the competitiveness of priority areas (e.g. in supporting business creation);
4. for the transfer of knowledge and promotion of technology commercialisation, testing of technologies and innovations (technological, non-technological and social) in demonstration environments; for the transfer of knowledge and new insights from R&D environments back to all education levels;
5. for the actions supporting the industrial, green and digital transition;
6. for international cooperation with European and global partners in S5 priority areas and for internationalisation, and, through a policy mix at all technology readiness levels (TRL), for a more prominent role of research and economic actors in innovation environments and their collaboration, which are key for consolidating the competitiveness of European products and services in global value chains;
7. for the scope of public financial support for priority areas and technologies and the non-financial part of its support services to be delivered in close cooperation between the country and the strategic partnerships;
8. for the key role of and the result-oriented approach of Strategic Research and Innovation Partnerships (SRIP);
9. for the strategy governance, monitoring and evaluation to track the progress towards achieving its goals, monitoring the achievement of quantified goals of priority areas identified through EDP and monitoring the achievement of the results of strategic partnerships.

The purpose of the strategy is to accelerate the development of competitive products and services and contribute to a faster green (and digital) transition through accelerated deployment of horizontal networks and KETs in priority areas where Slovenia has comparative advantages and has built a critical mass of skills.



# S5 design process

The biggest challenge in the design of the upgraded smart specialisation strategy was how to strike a balance between the identified Slovenia's potentials (thematic focus), the role of the innovation system actors and of their collaboration and the financial capacity to implement the identified potentials (policy mix).

Identification of potentials and the subsequent prioritisation process[[7]](#footnote-7) were carried out in two stages :

* the first stage involved the review of **empirical evidence** (through data use and analysis);
* the second stage was carried out in the framework of the **Entrepreneurial Discovery Process** (EDP).

Both stages were carried out in close collaboration with SRIPs, while EDP, as an open process, also involved all other relevant stakeholders. The process has been documented in more detail in the supporting documents of S5.

## Empirical bases

The design of the Slovenian Smart Specialisation Strategy for the 2014-2020 period (S4) built on the Expert Analysis as a basis for the Smart Specialisation Strategy (Burger and Kotnik, 2014) that was conducted to feed the design of the document. The study aimed to delve into the empirical bases for a qualitative approach to designing the smart specialisation strategy and was based on the method recommended by both the OECD and EC. The study looked into various statistical data that allowed the authors to make comparisons between different countries in a specific period of time. The study revealed that Slovenia’s manufacturing industries acted as a supplier of intermediate inputs to foreign producers of final consumption goods, suggesting that one cannot talk about exclusive specialisation in the intermediate stages of global added value chains in Slovenia. Nevertheless, the study showed that exports of intermediate products were massive, concluding that the integration of Slovenian economy in the global added value chains was decisive.

The document Analytical Bases for the S4 Revision in 2018 (Burger et al., 2017) was prepared in 2017. The document used the latest available data to offer updated figures on Slovenia’s comparative advantages in technology and exports. It also provided the relevant methodological approaches and a list of data sources that allowed a better insight into the competitiveness of Slovenian economy and research activity. The updated calculations showed that the intervention logic of the smart specialisation strategy plays a crucial role as, unlike traditional industrial policy, smart specialisation is not about supporting priority industries but essentially boils down to being a springboard for identifying the competitive economic and research activities through the entrepreneurial discovery process or in dialogue with the stakeholders. It is precisely this dialogue that constitutes the institutional innovation in the strategic orientation of Slovenia.

Finally, a most recent study (Šušteršič, Burger, Kotnik, Breznik, 2020) was conducted in 2020 and provided an update of both abovementioned documents. It suggested that Slovenia is stable in sectors considered to be most competitive, i.e. the sectors that have competitive advantages in technology and exports. The study further revealed that several sectors remain competitive at the level of intermediates and not final products (in the lower tiers of the value chains), with the exception of two sectors, namely pharmaceutical industry and wood processing, both of which are competitive in terms of exports of final products (in the higher tiers of value chains). In addition, the analysis highlighted that competitive advantages in terms of technological investments and exports do not necessarily translate into high productivity and export growth in the sector under question. In other words, competitiveness should be understood as the potential to increase productivity and exports in the coming years, with the top performing enterprises in a specific industry set to play a key role. The analysis also corroborated the links between the research sphere and the economy in Slovenia, in particular in the framework of internationally renowned research groups. This is true for all priority areas defined under S4 except for sustainable tourism, where no strong linkages with research groups are observed. Contrary to sustainable tourism, priority areas of Materials as End Products and Health-Medicine record the strongest research activity. Finally, the study underscored the importance of cooperation with SRIPs in the exercise of delivering the strategy on the ground.

Another European-level study that aimed to uncover the potentials of Slovenia’s internationalisation was conducted in 2020 (Crescenzi and Kogler, 2020). The study investigated the Slovenian knowledge space, tax policy and foreign direct investments as well as integration in global value chains. The study summed up that Slovenia can be considered one of the better functioning Research and Innovation Strategies for Smart Specialisation (RIS3) examples among European countries considering that the nation-state has set up consistent priorities with an adjusted policy mix and an especially well functioning governance structure that takes into account the different governance levels at the national level[[8]](#footnote-8). In addition, the study revealed that compared to the rest of the world, Slovenian industries are slightly more involved in global value chains in terms of providing intermediate inputs and being more reliant on their suppliers for value-added content. This is especially true for materials, and the study encouraged Slovenian industries to work towards reducing dependence on global value chains and becoming more self-reliant. Moreover, the study found that medical sciences may be a fruitful area for innovation and trade. As a takeaway, the study concluded that due to the size of the country's market, its geographic location and limited transport connections, Slovenia needs to pragmatically diversify in order to integrate into new knowledge networks and learn from peers. This should help S4 increase added value per employee.

The Commission staff working document Country Report Slovenia 2020 (EC, 2020) highlighted that further investment in innovation and infrastructure (environmental, transport and energy) remains necessary to keep Slovenia on a sustainable growth path. It noted that the innovation potential of the economy is hampered in particular by rather low public investment in research and innovation as well as by limited science-industry cooperation and uneven innovation and digital capacities among firms. The report also found that the share of renewable energy remains low.

Already the 2020 Development Report (UMAR, 2020a) drew attention to the implications of the covid-19 pandemic for the R&D and innovation activity. The 2021 Development Report (UMAR, 2022a) went one step further and put productivity at the heart of the recovery exercise, highlighting the importance of pursuing an integrated transformation agenda both on the side of investments and in terms of structural change. It put spotlight on digital transformation and all forms of intangible capital, including design and organisational capital, as well as on all aspects of digital transformation that are of growing importance for productivity and have come to the forefront because of the pandemic. The latter helped accelerate in particular informatisation and digitalisation at initial stages, but is expected to slow down the pace of roll-out of more complex digital projects, including digital transformation. As regards digital transformation, Slovenia performs well. According to the Eurostat’s Digital Intensity Index[[9]](#footnote-9) which measures the use of different digital technologies by enterprises and tracks progress in informatisation and digitalisation of enterprises, a quarter of Slovenian enterprises, i.e. 25%, reached a high or very high level of digital intensity in 2021. This puts Slovenia’s business sector in a relatively strong position as it ranks 10th among EU counterparts, in particular large enterprises among which as many as 77% are digitally advanced, which is the fourth highest share in the EU. Among medium-sized enterprises, 40% are digitally advanced, and the share for small enterprises is 20%, which puts Slovenia in 12th place in the EU. According to UMAR findings (2022a), the impact of the covid-19 pandemic has been highly uneven across industries, generally hitting harder the industries with lower productivity levels due to the nature of the crisis. The pandemic caused major disruptions to Slovenia’s flagship services exports, i.e. travel and transport services, the sectors where Slovenia performs best in terms of comparative advantages and market shares along with construction industry.

The findings of an independent evaluation of SRIPs (Bučar M. (ed.) 2019 and Bučar M. (ed.) 2022) that act as the key motor of S4 implementation, underlined the heterogeneity of the nine priority areas in terms of both the baselines and the priorities set out in the Action Plans of SRIPs. The systemic government support to strategic development clusters is crucial for increasing the productivity of the economy. In this context, the evaluation particularly highlighted the need for additional support to the deployment of KETs and non-technological innovations and their integration in vertical value chains.

The Study on Prioritisation in Smart Specialisation Strategies in the EU[[10]](#footnote-10) (EC, 2021c) was completed in 2021. The study explored whether strategies, by deploying the ERDF support, really acted as catalyst for innovation at the regional level. In assessing how priority areas were formulated through the entrepreneurial discovery process, the study highlighted Slovenian SRIPs as an example of good practice. In this context, the study revealed that priority areas were not formulated by the government but by key stakeholders in line with the bottom-up approach. In terms of how prioritisation was carried out as part of S4, the study noted that the strategy was not highly correlated with the economic indicators, but that empirical-analytical research was conducted to underpin prioritisation, which helped in formulation of priority areas. Slovenia was mentioned as a country with a high degree of integration of technological areas in the S4 priority areas.

As regards upgrading or updating S4, the study underscored the importance of continuing the entrepreneurial discovery process to help tackle the challenges of sustainable development and recovery of the economy after the pandemic, while focusing on effective prioritisation.

**Empirical bases thus confirm that S4 should be upgraded and that its priority areas should not be designed anew but kept and reformulated instead to accommodate the empirical evidence and the new entrepreneurial discovery process while fully addressing the challenges linked to the post-pandemic recovery and facilitating the green (and digital) transition.**

## Entrepreneurial discovery process in Slovenia

Kicking off in 2012 and growing stronger between 2014 and 2015, a deep interactive and inclusive process of consultations that brought together the stakeholders[[11]](#footnote-11) was carried out for the purpose of conceiving and designing Slovenian Smart Specialisation Strategy for the 2014-2020 period and for identifying priority areas within the strategy where Slovenia has built a critical mass of knowledge, capacities, skills and innovation potentials to position itself in global markets in which Slovenia could increase its visibility. The priority areas were therefore not formulated following a top-down approach but rather in line with a collaborative quadruple helix innovation model that brought together the business sphere, knowledge institutions, government and other stakeholders.

The entrepreneurial discovery process that was undertaken to feed the design of Slovenian’s Sustainable Smart Specialisation Strategy (S5) by 2030 and help identify its priority and focus areas consisted of several stages[[12]](#footnote-12):

1. **Stage one: kick-off meeting with SRIPs**

This stage kicked off in June 2020 with a meeting between the body responsible for coordinating the drafting of the document, i.e. Government Office for Development and European Cohesion Policy (SVRK), and the existing SRIPs. The aim of the meeting was to reach an agreement on how to revise and update the existing Smart Specialisation Strategy (S4) and upgrade its priority areas.

1. **Stage two: updating Action Plans of SRIPs and inter-ministerial coordination**

Building on the outcomes of stage one, SRIPs updated their respective Action Plans and presented the updated documents to the line ministries and to a wide group of stakeholders that were involved in the implementation of S4 and in the design of S5. EDP at the SRIP level was not only carried out at this second stage; rather it was a continuous process carried out throughout the previous period. As a matter of fact, SRIPs carry out activities with their members, i.e. businesses and research institutions, on an on-going basis. These activities are designed to help SRIPs identify development needs, map development potentials and build on these to update their Action Plans. One major revision of the Action Plans took place before the third phase of implementation of SRIP activities in the summer of 2020. Between October 2020 and February 2021, a series of nine bilateral workshops with individual SRIPs was held with a view to defining priority areas. This interactive participatory process revealed that there were certain overlaps between the focus areas and product directions, which called for additional meetings to discuss and tackle the overlaps. Once the priority areas, focus areas and product directions had been aligned, further coordination exercise with the key line ministries took place.

1. **Stage three: public consultation**

Open public dialogue took place in March and April 2021. The process was held through a series of online events that were organised by SVRK in close cooperation with SRIPs in a virtual format due to the pandemic. The online events brought together over 1,000 participants from the economy, research organisations, chambers, associations, non-governmental organisations (NGOs), ministries, support institutions, municipalities and other actors[[13]](#footnote-13).

Draft S5 was discussed at the end of 2021 by the Working Group of State Secretaries that was responsible for overseeing the process of S4 updating. Draft document was submitted to the Commission services for informal consultation in January 2022. Throughout 2022, dialogue was held with the Commission services on prioritisation of S5 priority areas, S5 governance system and funding of policy mix. Consequently, another round of prioritisation took place as part of EDP with stakeholders and specifically with SRIPs between July and October 2022.

## Establishing strategic research and innovation partnerships

SRIPs[[14]](#footnote-14) are long-term strategic partnerships between the business community, the research sphere and knowledge institutions, the government and regional and local authorities, as well as the intermediaries, users and non-governmental organisations, one in each of the nine priority areas of S4.

Working hand in hand, the government and SRIPs jointly shape the development and innovation policy (e.g. by jointly identifying national strategic development priorities, which is by no means a one-off process, but rather a continuum) and build a comprehensive innovation ecosystem in individual S4 priority areas. Essentially, this means that their aim is to set up and upgrade value chains at home and support their integration in international value chains, develop complex joint RDI projects, open the door to international development and innovation platforms for innovation actors, organise joint appearances at shows and fairs, and support lobbying and promotion in other regions, countries and networks. Moreover, SRIPs make an important contribution to long-term human resources and competences planning in line with the needs observed and forecast.

SRIPs carry out the abovementioned activities in line with the action plans that are considered to be living or dynamic documents, i.e. documents that will be continually updated and edited during S5 implementation.

The evaluation of the performance of SRIPs in the 2017-2021 period (Bučar M. (ed.), 2022) found that strategic partnerships are an effective instrument to bring together business and science. The instrument has lived up to the expectations, but its real value and effectiveness can really manifest over time, in the medium and long run. The key results of SRIPs are the effective operation of most of these partnerships, linkages within and between SRIPs, building of new partnerships and building trust between SRIP members, joint applications under national and international calls for proposals, employee education and training efforts and joint activities on a global scale.



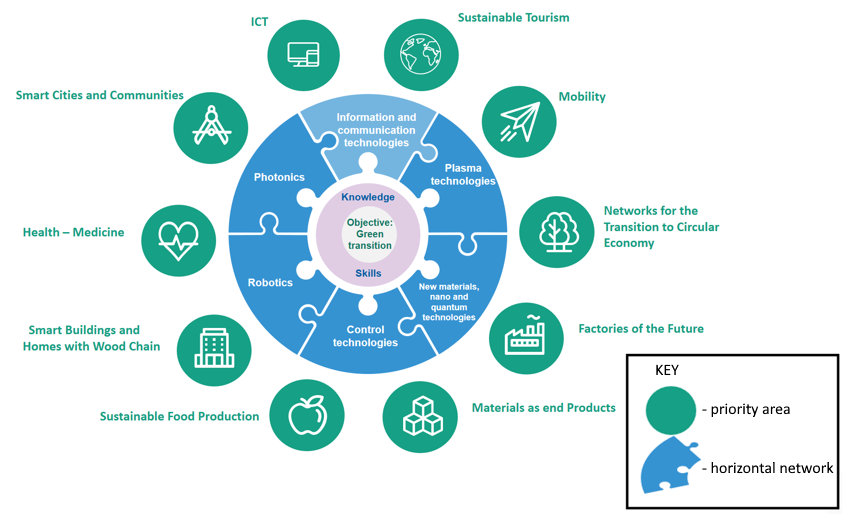
# Setting the stage for S5 prioritisation

## Building a three-level prioritisation through the entrepreneurial discovery process and the role of ZRISS 2030

Originally, S4 was structured around three priority areas (Healthy Living and Working Environment, Natural and Traditional Resources for the Future and (S)Industy 4.0) and nine areas of application (Smart Cities and Communities, Smart Buildings and Home with Wood Chain, Networks for the Transition to a Circular Economy, Sustainable Food Production, Sustainable Tourism, Factories of the Future, Health – Medicine, Mobility, Materials as End Products) within which the focus areas, technologies and product directions were identified.

As part of the exercise of prioritisation and to underscore the important and continuous nature of priority areas, the empirical bases and EDP[[15]](#footnote-15) provided a rationale for a leaner three-level structure of S5 priority areas with a clearly defined goal and the means and conditions to achieve the set goal.

Figure 2: Architecture of S5



Source: SVRK

In the figure above, the innermost circle shows the flagship goal, i.e. the green transition that cannot be realised without the appropriate knowledge and skills-base nor without the adequate and sufficiently developed tools, i.e. KETs, including ICT, depicted as the blue pieces of puzzle in the large inner circle that represent horizontal networks (HN). The areas where Slovenia has managed to build a critical mass of skills and capacities to reach this flagship goal are represented by the 10 priority areas of S5, depicted by 10 icons and pictographs in the outer circle. The majority of horizontal networks and KETs from the inner circle are part of the priority area Factories of the Future, whereas KETs in priority area ICT are part of the priority area ICT, which is addressed in S5 as a stand-alone priority area. Priority area Networks for the Transition to a Circular Economy plays a special role as it most directly addresses the flagship goal of green transition both through vertical value chains and product directions and through cross-cutting technological and non-technological innovations (e.g. circular business models).

1. **Level one: S5 priority areas**

The main, umbrella level of the S5 architecture is represented by the 10 priority areas which make up the first prioritisation level: Smart Cities and Communities (PMiS), Horizontal Network of Information and Communication Technologies (ICT Horizontal Network), Health – Medicine, Smart Buildings and Homes, including the Wood Chain (PSiDL), Sustainable Food Production, Networks for the Transition to a Circular Economy, Sustainable Tourism, Mobility, Factories of the Future and Materials as End Products.

The priority areas correspond to the SRIP domains**[[16]](#footnote-16)**. These are the areas where Slovenia has the innovation potential to continue building competitive advantages and to position itself in global markets, thereby increasing its visibility. At the level of each priority area, key performance indicators (KPI[[17]](#footnote-17)) and result indicators are monitored, whereas evaluation and co-financing of joint activities of the priority area are carried out in parallel[[18]](#footnote-18).

Horizontal networks as the motor of key enabling technologies and the driver of transition to a green, circular economy

Smart specialisation strategy is about pooling the skills and capacities throughout the entire RDI cycle which allows for an appropriate push and inflow of new knowledge and solutions from research groups in research institutions and for a complementary pull of development departments in business sphere to launch new products into markets.

EDP dictated a change to the architecture of S5 to allow for more visibility of the horizontal networks and KETs, both in terms of the set of priority areas and of the S5 policy mix and its governance. Accordingly, the structure of S5 priority areas reflects this in a much clearer concentration of ICT verticals on the one hand and ICT with KETs on the other, under a single priority area of ICT. Besides ICT Horizontal Network, other five cross-cutting or horizontal networks, all part of the priority area Factories of the Future (advanced manufacturing technologies for new materials and nano and quantum technologies, plasma technologies, robotics, control technologies, photonics) make up S5 KETs. The strategic nature of horizontal networks lies in their mission, which is the green technological and digital transformation of all S5 priority areas and the economy as a whole, including the development of skills and profiles. Horizontal networks are the key driving force behind the strategy, integrating new knowledge and initiatives in the innovation cycle of all value chains from TRL 3 on. In doing so, horizontal networks allow for cross-cutting interactions in interlinkages of enabling technologies and product directions in the framework of all SRIPs, thus paving the way towards new cross-cutting technology areas and new cross-cutting product directions. The planned cross-cutting areas are incorporated in the Action Plans which already have individual horizontal networks included and are further developed in line with the skills concentration and business strategies.

S5 reflects the strong integration of priority area Networks for the Transition to a Circular Economy, which acts as a vertical and cross-cutting area at the same as it aims to cluster product directions designed to be taken up across entire economy. In fact, EDP revealed that the focus areas and product directions (as identified in the Action Plans of SRIPs) are largely focused on fostering the transformation of production processes. Particularly in traditional industries (automotive industry, construction industry, materials industry) manufacturing processes are being rethought and revamped to embrace circular, low-carbon, green and ground-breaking Industry 4.0.

The findings of EDP relating to KETs and horizontal networks are taken on board as follows: (i) the proposal to formulate a stand-alone priority area ICT Horizontal Network was taken on board as regards ICT, (ii) the proposal to keep the business model that promotes homogeneity as regards KETs in SRIP FoF was taken on board, (iii) the area of Networks for the Transition to a Circular Economy was kept as a stand-alone area, (iv) the chapter on policy mix specifically highlights the orientation towards a stronger support for the uptake and deployment of KETs and horizontal networks as a horizontal, cross-cutting orientation. The latter is corroborated by the evaluation of the impact of SRIP performance at their transition into the third phase of operation (Bučar M. (ed.) 2019), where the lowest average score was achieved on the third out of five criteria, i.e. the level of uptake and deployment of horizontal enabling technologies in vertical value chains.

The revamped S5 thus retains the basic architecture of S4 but underscores the reinforced role of all KETs and horizontal networks and singles out ICT Horizontal Network. The latter acts as a stand-alone area in the newly structured set of priority areas, whereas KETs in SRIP FoF retain the network status they had in the S4 predecessor. KETs in areas ICT and FoF address the technology areas that were identified as crucial for delivering the green technological and digital transformation. KETs will thus better support further development of green technologies in all S5 priority areas through a tailored policy mix. The latter, as a priority area, complements the cross-cutting nature of the area Networks for the Transition to a Circular Economy that contains a spectrum of green technologies facilitating the transition to a low-carbon society: technological processes underpinned by energy and material efficiency, hydrogen, batteries, biorefineries, carbon capture and storage, biofuels, biomaterials and circular business models.

The distinct feature that separates S5 from its predecessor S4 is the way KETs are being taken up and deployed in vertical value chains. The new approach makes sure that KETs not only drive technological disruption but also deeply affect the way work is organised, the way business is done, the way markets are conquered and the role of people in the entire process of creating a new value chain. This calls for integration of the relevant know-how and experience in the field of KETs along the entire value chain spanning TRL 3 through TRL 9.

Table 2: Identification of priority areas where key enabling technologies will be applied in accordance with EDP (Source: SVRK)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Horizontal network** | | | **Smart Cities and Communities** | **Health –Medicine** | **Smart Buildings and Homes, including the Wood Chain** | **Sustainable Food Production** | **Networks for the Transition to a Circular Economy** | **Sustainable Tourism** | **Mobility** | **Factories of the Future** | **Materials as End Products** |
|  |  | Circular business models |  |  |  |  |  |  |  |  |  |
| ICT HN | ICT.1 | Digital transformation |  |  |  |  |  |  |  |  |  |
| ICT.2 | IoT |  |  |  |  |  |  |  |  |  |
| ICT.3 | IoS |  |  |  |  |  |  |  |  |  |
| ICT.4 | Cybersecurity |  |  |  |  |  |  |  |  |  |
| ICT.5 | AI, HPC & Big Data |  |  |  |  |  |  |  |  |  |
| ICT.6 | GIS-T |  |  |  |  |  |  |  |  |  |
| FoF HN | FoF.1 | Advanced manufacturing technologies for new materials, nano and quantum technologies |  |  |  |  |  |  |  |  |  |
| FoF.2 | Plasma technologies |  |  |  |  |  |  |  |  |  |
| FoF.3 | Robotics |  |  |  |  |  |  |  |  |  |
| FoF.4 | Control technologies |  |  |  |  |  | () |  |  |  |
| FoF.5 | Photonics |  |  |  |  |  |  |  |  |  |

1. **Level two: Focus areas and technologies**

The already established **value chains, focus areas** and technologies represent the next organisational and conceptual breakdown of S5 architecture (second level of prioritisation).According to the Action Plans of SRIPs[[19]](#footnote-19), it is at this very level of S5 architecture that a critical mass of stakeholders is built to achieve development breakthrough.

Value chain is a concept encompassing a whole spectrum of different activities, processes and actors that are involved in the creation of new final products or services (i.e. spanning initial reception of materials, design of intermediates, delivery to market and actual use of end products or services).

Focus area refers to an area where market potential is strongest and where stakeholders (in terms of organisation) work together towards creating a value chain. It is in focus areas that knowledge creation and concentration on the one hand and build-up of market potential on the other take place. Focus areas give birth to clearly defined and articulated business ideas which have clearly identified (i) commercialisation actors (in other words, capability to be integrated in global value chains and to sell in global markets), (ii) critical mass of skills (including R&D potential and excellent development capability), (iii) the capability to combine product directions with concrete business ventures and potentials in TRL 1–9. Focus areas can either be technological or non-technological and, when it comes to actions in TRLs, they dictate the different approaches to be adopted depending on the level of granulation. Science, research and development or infrastructure as such do not constitute a focus area.

Focus technology is a sub-priority concept describing an area where Slovenia boasts a high RDI excellence and a concentration of knowledge needed for the development of KETs, in particular in lower TRLs, and the demonstrated capacity to integrate these technologies into the value chains (in higher TRLs).

1. **Level three: Product directions and directions of technology development**

Individual focus areas are broken down into product directions (third level of prioritisation) at the level of focus areas and into directions of technology development at the level of focus technologies / horizontal networks through actors that demonstrate commercialisation capabilities. Prospects and potentials are identified at this level (direct market potential or, in the case of horizontal networks, capability of being integrated in global value chains) through identified actors that demonstrate comparative advantages for commercialisation. This is also the first level that undergoes operational change in respect of EDP and Action Plans of SRIPs. S5 shows its ability to respond swiftly to change by modifying the third level of its architecture through its governance structure[[20]](#footnote-20). The latter, unlike in S4, on the one hand reflects a greater influence of the stakeholder level following the incorporation of the Development Council of the Republic of Slovenia in the governance structure as a stakeholder representative body established in accordance with the Scientific Research and Innovation Activities Act (ZZrID), and on the other, the ability to rapidly reflect the developments and change in the innovation ecosystem in the framework of the Action Plans of SRIPs that are approved by the Core Working Group of State Secretaries of the Republic of Slovenia as part of the S5 governance structure.

1. **Coherence with the Scientific Research and Innovation Activities Act (ZZrID) and the Slovenian Scientific Research and Innovation Strategy 2030 (ZRISS 2030)**

The architecture of S5 is coherent with the normative framework of the innovation ecosystem that is established by the ZZRiD and the ZRISS 2030[[21]](#footnote-21) that is derived from the ZZRiD and lays down national strategic development priorities[[22]](#footnote-22) encompassing the priorities of all sectoral policies that are relevant for the development and implementation of smart specialisation. No further level is introduced to the S5 architecture that would show the coherence with national strategic development priorities set out in the ZRISS 2030. The table below depicts how these priorities are coherent and aligned with S5 priority areas.

Table 3: Coherence between ZRISS 2030 and S5

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No** | **Area and sub-area** | **Smart Cities and Communities** | **Health - Medicine** | **Smart Buildings and Homes, including the Wood Chain** | **Sustainable Food Production** | **Networks for the Transition to a Circular Economy** | **Sustainable Tourism** | **Mobility** | **Factories of the Future** | **Materials as End Products** | **ICT HN** |
| **1** | Environmental research, sustainable management and conservation of natural environment, resources, biodiversity, agriculture, forestry and food and sustainable and rational use of resources |  |  |  |  |  |  |  |  |  |  |
| **2** | Quality of life and health and security for all generations |  |  |  |  |  |  |  |  |  |  |
| **3** | Sustainable management of energy, food and water sources amid climate change pressures |  |  |  |  |  |  |  |  |  |  |
| **4** | Challenges of sustainable economic transformation, particularly energy-related challenges (including energy storage and sources) and |  |  |  |  |  |  |  |  |  |  |
| challenges of sustainable mobility of the future |  |  |  |  |  |  |  |  |  |  |
| and the associated challenges of transition to a circular economy and sustainable society by taking into account the principles of just transition |  |  |  |  |  |  |  |  |  |  |
| **5** | Digital transformation of the economy and society backed up by and through the development of high-performance computing for data-intensive modelling and its use through integration in EU and global development flows |  |  |  |  |  |  |  |  |  |  |

Source: SVRK

## S5 and the orientation towards sustainable green economy and sustainable blue economy and challenges of a longevity society

**i. S5 and orientation towards sustainable green economy**

In line with the conducted EDP and the flagship strategic goal of S5, the orientation towards sustainable green economy has been embedded in most horizontals and verticals (also through the deployment of KETs for the transition to a circular and low-carbon economy). That is why the bulk of **product directions and directions of technology development** in S5 target modernisation of industries and sustainable production in individual priority areas. Priority area Networks for the Transition to a Circular Economy has additionally been designed as both a vertical and a cross-cutting area as it encompasses product directions that are meant to be taken up across the entire economy. This is precisely what the last, i.e. **fifth S, stands for in the acronym S5, and that is *sustainable*.** The sustainability dimension is underpinned by a set of output indicators that include the key targets of the European Green Deal (net zero emissions of greenhouse gases by 2050 and decoupling economic growth from resource use).

**ii. S5 and sustainable blue economy[[23]](#footnote-23)**

Sustainable blue economy (SBE) and SBE-related research and innovation offer a variety of solutions to reduce pollution, thus alleviating pressure on climate and natural resources, and to achieve the objectives of the European Green Deal (EC, 2021b), notably through the development of offshore renewable energy, decarbonisation of maritime transport and greening of ports, conservation and restoration of marine biodiversity, development of green infrastructure in coastal areas, better and more sustainable use of marine resources and alternative food and feed sources, the development of new circular models and other solutions.

While SBE per se is not identified as a stand-alone priority or focus area in S5, it is inextricably linked with and present in many focus areas and product directions, notably in the framework of priority areas Networks for the Transition to a Circular Economy (algal technologies, biomass and alternative raw materials), Materials as End Products (sustainable materials, recycling of waste fishing nets for new materials), Health – Medicine (herbal medicines, biocosmetics, sea salt), FoF, Mobility, Sustainable Food Production and Sustainable Tourism[[24]](#footnote-24) as well as in the framework of KETs. In the last quarter of 2022 and the first half of 2023, the strategic project Blueair that is co-financed by the Interreg Adrion Programme has looked into the research, development and innovation activities and explored the potentials for integration in global value chains both in Slovenia and in the remaining countries/regions of the Adriatic and Ionian Region with a view to developing a proposal for a joint macro-regional smart specialisation strategy on blue growth. The outcomes of this process will not only be directly applied to SBE, but will possibly also feed into S5. The abovementioned activities will create synergy effects on investments in conservation and restoration of marine and freshwater ecosystems, pursuing the zero pollution agenda. It should be pointed out in this context that investments in climate neutrality under, for example, EU Mission: Restore Our Oceans and Waters act as catalyst for green transition according to the EC.

In S5, the area of SBE is implicitly addressed by the entire policy mix because of its very nature. SBE is much more prominent in cross-regional international cooperation projects and in the context of relevant macro-regional strategies.

**iii. S5 and addressing the challenges of a longevity society – developing the silver economy, promoting social innovations**

Population ageing is, beside technological advances and digitalisation of the society, one of the key megatrends that shape today’s lives. As such, it should be strategically tackled[[25]](#footnote-25). Addressing the societal challenges that come with a long-lived society involves adaptations and changes to the living and working environments, mobility, healthcare and long-term care, which is complementary to the actions tackling the challenges of innovation and employment, social inclusion and increased resilience of an ageing society (UMAR, 2017).

Given the data on the ageing of the population in Slovenia and the related development, innovation and economic potentials that population ageing brings, Slovenia aims to intensify future work on addressing this issue in the field of RDI and skills also in the context of S5 in accordance with the policy recommendations set out in the final report on the silver economy and its development (EC, 2018) and the Social Economy Action Plan (EC, 2021a) which underscores social innovations.

Similarly to SBE, the silver economy and social innovations are addressed in S5 in a cross-cutting manner, virtually in all priority areas, including KETs (massive untapped potential of the longevity economy). Regardless of the cross-cutting potentials, the area is particularly addressed by the following S5 priority areas: Smart Cities and Communities (vertical Health), ICT Horizontal Network (focus areas AI, HPC & Big Data), Health - Medicine (focus areas Translational Medicine, Active and Healthy Ageing, etc.), FoF (focus area Intelligent Laser Systems for Clinics and Factories of the Future) and Sustainable Food Production.

S5 addresses the development of the silver economy and the promotion of social innovations notably through measures for improving innovation activity of businesses and the subsequent enhancing of innovation and SME competitiveness through incentives for (i) social innovations (products, services and/or new models that support social development) by taking into consideration the economic and environmental constraints and the opportunities for creating a new social value and better (sustainable) social impact, and (ii) the development of the silver economy (development and promotion of innovative products and services for seniors in certain areas, training for seniors, promotion of entrepreneurship and innovation among seniors).

## Priority areas

S5 identifies 10 priority areas. Unlike in S4, priority areas ICT Horizontal Network and Smart Cities and Communities are treated in S5 as stand-alone priority areas. S5 singles out the set of horizontal or cross-cutting enabling technologies (ICT KETs)[[26]](#footnote-26) and makes them the tenth priority area[[27]](#footnote-27). This decision was dictated by (i) the findings of the evaluation of performance of SRIPs in the first and second phases of their operation (Bučar M. (ed.), 2019) which suggested that the roll-out of digitalisation should be stepped up and the policy mix and business models accordingly adjusted, (ii) the proposal of ICT Horizontal Network to manage ICT KETs separately in the updated S5, (iii) EDP which made a case for a more pronounced role of KETs and horizontal networks along with a tailored policy mix, and (iv) the positions of the Ministry of Education, Science and Sport, the Ministry of Economic Development and Technology, the Ministry of Public Administration and the Government Office for Digital Transformation once the latter was established and the relevant responsibilities and areas of work were transferred to it from the Ministry of Public Administration.

Considering that the membership has stayed the same to date and that the relevant calculations were made jointly for the two areas, i.e. ICT Horizontal Network and Smart Cities and Communities, the chapters below outline the same, i.e. common empirically demonstrated competitive advantages and targets by 2027 for the two areas.

### Smart Cities and Communities

**Empirically demonstrated competitive advantages of Slovenia**

Slovenia has a strong ICT sector with a comparatively high R&D intensity compared to leading European countries. The activities Data processing, hosting and related activities, web portals (J63.1) and Computer programming, consultancy and related activities (J62) have seen a sharp export and productivity growth. Comparative advantages in terms of technology are demonstrated in the subsector Information service activities (J63). Slovenia also performs well and has comparative advantages in Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus(C27) (Šušteršič, Burger, Kotnik, Breznik, 2020).

As regards Smart Cities and Communities verticals[[28]](#footnote-28), the highest productivity growth in 2020 was recorded for the combination of areas Energy and utilities and Mobility, logistics and transport, whereas verticals Urban life quality and Smart city ecosystem are expected to see relatively high sales growth and the highest annual R&D investment growth rates.

**Targets by 2027 for verticals and horizontals**[[29]](#footnote-29): increase the revenue of businesses in priority area from EUR 6.2 billion to EUR 7 billion; increase the value of exports from EUR 2.39 billion to EUR 2.70 billion; increase the number of employees to 24,600 to reach a one percent annual increase in employment or 1,590 employees more compared to 2020; increase labour productivity to EUR 68,000 or by 2.9% per year or by 15% compared to 2020 when the figure stood at EUR 61,000. Compared to 2020, the annual volume of R&D investment is expected to grow to EUR 55 million or by EUR 10 million per year, reflecting an average annual growth rate of 2.9%.

Data show that both priority areas, i.e. verticals and horizontals of Smart Cities and Communities, boast high RDI intensity, i.e. a high correlation between RDI investments and performance indicators.

**The most promising focus areas and technologies identified in the entrepreneurial discovery process** (see Annex 2 for a list of product directions)

* *Health*

The vertical Health focuses on the use of ICT with a view to providing smart support to all segments of healthcare. The relevant focus areas complement priority area Health – Medicine by focusing on delivering technology solutions for the healthcaresystem, whereas the latter puts patients themselves and their health in focus.

**Smart devices, sensors and telemedicine:** focus area with product directions allowing for remote monitoring of the patient’s functional health parameters and quality of life, also through the use of wearable sensors; person-centered and personalised long-term care for patients, the elderly and other target groups.

**Smart integrated healthcare and patient care system**

* *Energy and utilities*

The vertical Energy and utilities is focused on providing solutions for all systems leading to end users and ensuring complementarities with the solutions designed under SRIPs Smart Cities and Communities, Circular Economy, Mobility and FoF.

**Energy transformation, distribution and management:** focus area with product directions for harnessing the increased flexibility of generation, consumption, storage and transformation of energy (DR/DSM/EMS); distribution automation (DMS); comprehensive energy management (EMS); products and services for gas and heat supply and other supply; products and solutions for decarbonising cities and communities.

**Comprehensive support for water services:** focus area with product directions for the preparation and distribution of drinking water and management of risks relating to water supply; targeted management of water quality standards; services and technologies for optimised water use and advanced water services; services and technologies for control and management of extreme water events; water services for target end users.

* *Mobility, transport and logistics*

The vertical Mobility, transport and logistics is focused on delivering solutions for smart, green, reliable and streamlined urban and suburban mobility, transport and logistics services and ensuring complementarities with priority area Mobility.

**Carbon-neutral society:** focus area with solutions involving the use of aggregate mobility data for a better understanding of migration dynamics within and between individual municipalities; smart urban traffic management; multimodal mobility platform.

**A more connected Europe – Advanced infrastructure of a smart city or region:** installation of smart signalisation in cities and regions, urban vehicle-to-infrastructure (V2I) communication.

**A more connected Europe – Smart Region concept – Coordinated and adaptive operation of the transport system at the level of the whole region:** this focus area includes ICT solutions for a macro surveillance monitoring of individual areas through a regional surveillance centre; emergency vehicle priority system for the entire region allowing ambulances, fire engines, police cars, civil protection vehicles and diplomatic vehicles to reach their destination safely and more quickly.

* *Security*

**Operations and control systems of a safe city:** next generation operations centre systems providing security to cities and local communities; systems, services and applications for emergency services and citizens; critical ICT infrastructure and services for security organisations.

* *Quality of life in a smart city ecosystem*

The vertical includes focus areas **Management of quality of life in urban areas** and **Platforms for urban device, data and service management**.

**SRIP Smart Cities and Communities**

The membership structure by type of organisation taking part in the partnership has not changed significantly in the 2018-2022 period. Out of a total of 109 members (June 2022), around 70% are businesses and over 17% are knowledge institutions. Associations, roughly accounting for 5%, represent the third most frequent type of organisation taking part in the partnership.

Vision and goals:

1. SRIP members will improve their competitive position among actors in the field of state-of-the-art technologies of smart cities and communities that are a pre-requisite for innovative approaches and advanced solutions for the wider economy.
2. SRIP members will ensure a high quality of life for the people living in cities and communities by designing, developing and rolling out innovative products and services.
3. The development-oriented activities of SRIP members are chiefly geared at joint development of products that are deemed competitive in the European market and beyond.

**The main achievements** of the SRIP in the 2014-2020 programming period are listed in the supporting document Rationale for priority areas.

### ICT Horizontal Network[[30]](#footnote-30)

**Empirically demonstrated competitive advantages of Slovenia**

Slovenia has a strong ICT sector with a comparatively high R&D intensity compared to leading European countries. The subsectors Data processing, hosting and related activities, web portals (J63.1) and Computer programming, consultancy and related activities (J62) have seen a sharp export and productivity growth. The subsector Information service activities (J63) has shown comparative advantages in technology and technological knowledge. Slovenia has also performed well and has attained comparative advantages in Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus(C27) (Šušteršič, Burger, Kotnik, Breznik, 2020).

ICT Horizontal Network[[31]](#footnote-31): the highest indicator values are recorded for the combination of areas Internet of Services (IoS) and HPC and Big Data and Cybersecurity, and areas Internet of Things (IoT), embedded systems and sensors and Internet of Services that also account for the largest share of added value and volume of R&D investments.

Data show that both priority areas, i.e. verticals and horizontals of Smart Cities and Communities, boast high RDI intensity, which mirrors the high correlation between RDI investments and performance indicators.

**Targets by 2027 for verticals and horizontals**[[32]](#footnote-32): increase the revenue of businesses in priority area from EUR 6.2 billion to EUR 7 billion; increase the value of exports from EUR 2.39 billion to EUR 2.7 billion; increase the number of employees to 24,600 to achieve a one percent annual increase in employment or 1,590 employees more compared to 2020; increase labour productivity to EUR 68,000 or by 2.9% per year or by 15% compared to 2020 when the figure stood at EUR 61,000. Compared to 2020, the annual volume of R&D investment is expected to grow to EUR 55 million or by EUR 10 million per year, reflecting an average annual growth rate of 2.9%.

**The most promising focus areas and technologies identified in the entrepreneurial discovery process** (see Annex 2 for a list of product directions)

* **Digital transformation:** digital transformation encompasses new business models and promotion of entrepreneurship that is connected to digital transformation and green transition at the level of industry, healthcare, cities and communities, economy and public administration. The transformation manifests itself in the embracing and diffusion of digital technologies both for inward and outward operations and involves the development and implementation of ICT solutions in business processes and the development of digital products and services, whereas the cross-cutting focus areas of the remaining S5 priority areas focus chiefly on domain-specific processes (e.g. manufacturing processes).
* **IoT (Internet of Things, Embedded systems and sensors):** mobile, wireless and edge infrastructure and communications for IoT (including 5G and 6G); IoT platforms and services and IoT sensors and embedded systems. The area is focused on the development of new business models, technologies and innovative solutions and services in the areas that are considered crucial for building capabilities and establishing connectivity and communication between the material world and people and among the things themselves. The challenges are tackled through joint work and integration of knowledge and skills from various IoT-specific domains (e.g. infrastructure, factories, smart homes, energy, healthcare, smart cities, agrifood, circular economy).
* **IoS (Internet of Services, platforms):** innovative cross-cutting IoS services; business process innovation and IoS-related digital business models; open urban data platforms; innovative blockchain-based IoS services. The area will pursue the common goal of developing a comprehensive service platform for IoS that will allow the organisations to move from the traditional multitier architecture to cloud-based architecture and enable the efficient development of new digital services for all actors involved.
* **Cybersecurity**: developing security products and services that support state-of-the-art security standards and ensuring cybersecurity in vertical and cross-cutting products throughout their lifecycle are the cornerstones of achieving a high level of cyber maturity that directly contribute to delivering on the objectives of digital transformation of businesses and public sector. Cybersecurity companies will join forces with the providers of domain-specific solutions to develop new products and services (e.g. in automotive industry, food production and processing, defence industry, smart homes, etc.).
* **AI, HPC & Big Data:** Slovenia is internationally recognised for its achievements in the field of AI research and development but needs to take a more decisive step towards its uptake in the economy for the purpose of harnessing its potentials to support both business and manufacturing processes and upgrade products and services. SRIP domains will work together to pinpoint the areas ready to allow for potential new joint products, i.e. AI-driven solutions for smart cities and communities, AI-driven solutions for the transition to a circular economy, AI-driven solutions for health and medicine and development and implementation of AI in business processes.
* **GIS-T:** this is primarily a horizontal enabling technology allowing for the exploitation of geospatial data in big data analytics and in innovative user services. Increased demand for GIS solutions has been driven by the evolution of smart cities and the use of GIS in spatial planning, spatial management, infrastructure, transport networks and logistics. The focus area includes the systems and platforms for capturing and processing spatial data; integration platforms for spatial data linking and transmission and advanced geospatial data solutions and location services.
* **Vertical product directions:** working in synergy with KETs, vertical product directions include digital economy, data economy, destination earth and space, digital solutions for the twin transition (Fit for Green).
* **Digital infrastructures of the future:** development and integration of cross-cutting quantum technologies, 6G and cybersecurity.

**SRIP Smart Cities and Communities**

Out of a total of 109 members (June 2022), around 70% of the partners come from the business sphere and over 17% of them are knowledge institutions. Associations, roughly accounting for 5%, represent the third most frequent type of organisation taking part in the partnership**.**

Goals of ICT Horizontal Network:

1. Mainstreaming technologies in other areas of S5; SRIP members will boost the uptake of new solutions in value chains of other areas of S5 and beyond in line with the new business model that singles out the horizontal network (with ICT KETs).
2. Systematically raising digitalisation skills, establishing digital infrastructures, platforms and ecosystems for the economy and society.
3. Increasing international visibility and enhancing the competitiveness of Slovenia’s ICT sector in global markets.

**The main achievements** of the SRIP in the 2014-2020 programming period are listed in the supporting document Rationale for priority areas.

### Health - Medicine

**Empirically demonstrated competitive advantages of Slovenia**

The subsector Manufacture of basic pharmaceutical products and pharmaceutical preparations (C21) has maintained its comparative advantages in technology and exports and has recorded high export and productivity growth. Manufacture of medical and dental instruments and supplies (C32.5) has likewise kept its competitive advantages, but has not recorded high productivity and export growth in the recent period. On the contrary, the subsector Manufacture of irradiation, electro medical and electrotherapeutic equipment (C26.6) has seen high export and productivity growth recently.

Priority area Health – Medicine is one of the two areas that show the strongest research activity. Research teams in this area rank among the top 20 performers in terms of the funding received and in terms of scientific excellence (number of citations on an international scale). Cutting-edge research teams tend to be more involved in international collaboration projects than other research teams (Šušteršič, Burger, Kotnik, Breznik, 2020).

**Targets by 2027**[[33]](#footnote-33): increase the revenue of businesses in priority area from EUR 1.5 billion to EUR 2.2 billion; increase the value of exports from EUR 1.4 billion to EUR 2.1 billion; increase added value from EUR 743 million to EUR 965 million; increase the added value per employee from EUR 105,000 to EUR 126,000; increase the number of employees in priority area from 11,700 to 12,600; increase RDI investment from EUR 56 million to EUR 250 million.

**The most promising focus areas and technologies identified in the entrepreneurial discovery process** (see Annex 2 for a list of product directions)

* **Translational medicine:** development of drugs for neurodegenerative diseases, development of drugs for rare diseases, regenerative medicine (advanced cell therapy), advances in existing bacteria detection methods and development of advanced drugs and new drug delivery systems tailored to the needs of older patients.
* **Active and healthy ageing:** keeping the elderly active and healthy is of immense importance for the society and for the benefit of all. The silver economy has seen a sharp growth amid the recent rapid population ageing. Global markets are projected to shift to this market with tailor made, customised products and services catering to the needs of older users. As such, the silver economy is opening windows of opportunity for innovative economy. Early detection and timely diagnosis of neurodegenerative diseases are becoming increasingly important as they allow that the patients receive appropriate treatment early on in the disease, which improves their prospects of living independently for longer. Potentials for development and growth have also been identified in the area of development of services and hybrid materials for an ageing population and new senior housing models that may serve as trial environments for the development of smart medical devices and supply that play a key role in rendering the life of seniors more quality and safer.
* **Biopharmaceuticals:** this has been the fastest-growing market of the pharmaceutical industry, where the competitiveness of Slovenian businesses on a global scale has, in large part, been sustained by large investments in R&D. The development of biological medicines has pushed for new frontiers in contemporary medicine as it has opened the door for major advancement in treatment of patients diagnosed with complex, difficult diseases. The number of Slovenian businesses that have penetrated global markets to sell development and manufacturing services in the field of biopharmaceuticals, gene therapy, cell treatment and vaccines has been on a constant rise. The country plans to establish a Cell and gene therapy centre with the National Institute of Chemistry as the lead partner.
* **Herbal medicinal products and natural cosmetics:** Slovenian businesses have the potential to shift tomore innovative forms, applications and combinations of active ingredients in the area of pharmaceutical products that come in the form of herbal medicinal products, but this requires large clinical trials, which sets them apart from the competition. Natural cosmetics has been the fastest-growing segment of cosmetics. Slovenia boasts immense potential for the development of natural organic cosmetics thanks to its abundance of raw materials, product-oriented businesses, the well- established wellness segment as well as the know-how and equipment that underpin the development of such products and services. This sector, coupled with spa resorts, tourism offer and outstanding culinary offer, could make an important contribution to the development of the silver economy in Slovenia.
* **Cancer treatment:** Slovenian research teams show massive potential for cancer treatment innovations with leading institutionsdemonstratingoutstanding scientific excellence and innovation thus importantly shaping the global trends.The various research that is done mostly at the preclinical studies level and has huge market potentials is at the cutting edge in the field of development of delivery, testing and therapeutic systems with an emphasis on heavy-particle radiation therapy.

**SRIP Health - Medicine**

SRIP Health – Medicine brings together a range of actors that are active within individual focus areas. Members of this SRIP are dynamic high-tech businesses, many of them already active in global markets. The partnership is specific as most of the partners consider the health system as end customer. Through its activities, SRIP will contribute to a more efficient use of public funds, starting with personal data processing (Big Data), personalised medicine, modern diagnostics, new treatment methods, prevention and faster recovery.

In order to achieve the objectives in individual verticals, SRIP members work together within the partnership and beyond its boundaries, joining forces with other stakeholders in complementary SRIPs and horizontals, such as robotics, nanotechnologies, ICT, AI, biosensors and advanced materials.

**The main achievements** of the SRIP in the 2014-2020 programming period are listed in the supporting document Rationale for priority areas.

### Smart Buildings and Homes, including the Wood Chain

**Empirically demonstrated competitive advantages of Slovenia**

The market for Smart Buildings and Homes, including the Wood Chain products is projected to grow between 10% and 23% in the coming years, the growth being the highest in the segment of cogeneration installations. Total annual sales in all relevant areas are expected to grow to EUR 8 billion. The largest contribution to revenue growth totaling EUR 2 billion is expected in the focus area Building supply and management, including connectivity with smart communities, i.e. EUR 1.1 billion. Smart nearly zero energy buildings are expected to see the highest annual growth of R&D investment (5%)[[34]](#footnote-34).

Slovenian businesses have recorded competitive prices as regards exports of builders’ joinery and carpentry of wood and various building materials made of wood. The subsector Manufacture of furniture (C31) has demonstrated competitive advantages in exports and has recorded high productivity and export growth. Manufacture of electrical equipment (C27) as a whole has also shown comparative advantages in terms of technology and exports. Similarly, services, for example Repair and installation of machinery and equipment (C33) have acquired comparative advantages in technology and exports. Technology and exports have been a source of stable competitive advantages in the subsector Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials (C16). The subsectors Manufacture of other builders’ carpentry and joinery (C16.23), Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials (C16.29), Forestry, logging and related service activities (020) have shown high and stable competitive advantages in terms of exports (Šušteršič, Burger, Kotnik, Breznik, 2020).

According to the most ambitious scenarios, the wood-based industries could see a 5.89% increase in GDP in the coming decade, the share of employees in the sector could increase by 17.25% to 2,608, whereas sales and labour productivity could grow by 66.67% or 9.8% respectively. The savings generated from the positive effects of CO2 use in products could amount to 7,464,413 tonnes of CO2.[[35]](#footnote-35)

**Targets by 2027**[[36]](#footnote-36): increase the revenue of businesses in priority area from EUR 5.9 billion to EUR 8 billion; increase the value of exports from EUR 3.7 billion to EUR 5 billion; increase the number of employees by 2,400 to 23,000; step up R&D investments in R&D by EUR 24 million to EUR 114 million compared to 2020; increase labour productivity by 12% to EUR 58,000 compared to 2020 when the figure stood at EUR 52,000.

**The most promising focus areas and technologies identified in the entrepreneurial discovery process** (see Annex 2 for a list of product directions)

The focus areas and product directions involve building-related solutions in complementarity with the solutions designed in priority areas Smart Cities and Communities, Mobility and Circular Economy. The focus areas are characterised by a high degree of integration along value chains to KETs-based products and across focus areas.

**The most promising focus areas and technologies identified in the entrepreneurial discovery process** (see Annex 2 for a list of product directions)

* **Construction of buildings:** this focus area includes (supporting) structural elements and systems; multi-functional elements and systems for building envelope; special, protective and finishing materials; wooden doors and windows; wooden pannelling; timber, wood and wood-based composites, forest inventory management services.
* **Interior elements:** thisfocus area includes home appliances (major appliances – white goods and small appliances and consumer electronics), lighting solutions and interior furniture.
* **Building supply and management, including connectivity with smart communities:** this area includesthe devices, systems and services that, combined with interior, allow the building to be fully operational and managed in accordance with the requirements of the user or the given environment, while at the same time ensuring that the building is fully connected to the built environment surrounding it and the urban infrastructure. The focus area includes energy production, storage and use, water management, waste management and integrated building management.
* **Smart nearly zero buildings:** this focus area includes interior and architectural design and construction solutions for wooden houses and conventional buildings. Rapid population growth and increasingly growing GHG emissions are dictating the need to construct buildings that provide a pleasant living environment while curbing CO2 emissions.

**SRIP Smart Buildings and Homes, including the Wood Chain**

SRIP Smart Buildings and Homes, including the Wood Chain, is a partnership that brings together 79 partners (June 2022) active in this priority area. Nearly 70% of the SRIP members are businesses and over 11% of them are knowledge institutions (8.9% educational institutions, 2.5% research organisations – institutes). Another very important type of organisation participating in the partnership are associations (over 7%). The members of the partnership work in the broad area of smart and sustainable buildings that covers, inter alia, sub-areas such as construction products, wood and wood as building material, components, devices and systems meant both for installation and building fit-out, including the solutions for smart building management and the associated advanced infrastructure for smart neighbourhoods.

The vision of SRIP is to establish a permanent partnership that will deliver comprehensive solutions for building a smart, sustainable, healthy, user- and environment-friendly, connective and energy self-sufficient living and working environment of the future. This vision is based on the long-term development of a smart and sustainable home of the future that is built in line with sustainable net zero carbon construction and features integrated intelligent management functions for all building segments while providing a maximum degree of comfort and a healthy living and working environment.

**The main achievements** of the SRIP in the 2014-2020 programming period are listed in the supporting document Rationale for priority areas.

### Sustainable Food Production

**Empirically demonstrated competitive advantages of Slovenia**

The subsector Manufacture of dairy products (C10.5) has continued to perform strong in terms of exports. The areas that have recorded comparative advantages in technology and have seen fast growth include Manufacture of vegetable and animal oils and fats (C10.4), Manufacture of bakery and farinaceous products (C10.7) and Manufacture of beverages (C11).

The latest situation analysis for the subsector Manufacture of agricultural and forestry machinery (C28.3) has shown that exports are a source of competitive advantages of the subsector. Two areas, i.e. Manufacture of metal forming machinery and machine tools (C28.4) and Veterinary activities (M75) have experienced a rapid growth (Šušteršič, Burger, Kotnik, Breznik, 2020).

In line with the potentials identified for 2019 and 2020, the production of a variety of agricultural commodities has seen growth, i.e. cereals, oil plants, potatoes, hops, vegetables, fruit, beef, poultry, sheep and goats, milk and honey. It is worth mentioning in this context that the yield per hectare of various agricultural products also increased in this period[[37]](#footnote-37).

Many sectors participate in different quality schemes that have already yielded good results. These schemes further strengthen the potential of actors allowing them to better position themselves and boost sales of agricultural and food products.

Individual sectors have already made considerable progress towards delivering on the commitments and meeting the responsibilities set out in the EU Farm to Fork Strategy and EU Code of Conduct on Responsible Food Business and Marketing Practices. The sectors are committed to further stepping up their action to deliver on the objectives set out in the two documents[[38]](#footnote-38).

**Targets by 2027**[[39]](#footnote-39): increase the revenue of businesses in priority area that covers the primary sector of Agriculture, Forestry and Fishing (A), Manufacture of food products (C10) and Manufacture of beverages (C11)[[40]](#footnote-40) from EUR 2.8 billion to EUR 3.1 billion; increase the value of exports from EUR 780 million to EUR 850 million; increase the number of employees in priority area from 17,700 to 19,400; increase R&D investment from EUR 762,000 to EUR 837,000. Productivity gains are expected to fluctuate between 7% in subsector Manufacture of beverages (C11) (here, productivity gains are by far the highest, standing at EUR 78,500) and 10% in subsector Manufacture of food products (C10) (productivity gains are the lowest in this sector, standing at EUR 37,600).

**The most promising focus areas and technologies identified in the entrepreneurial discovery process** (see Annex 2 for a list of product directions)

* **Optimisation of agri-food supply chains:** the development of new products will play a key role in the framework of already established sectoral value chains as well as optimisation of agri-food supply chains in connection with the development and advancement of the entire sector in terms of sustainable food production. The sectoral value chains that were formed in the past years (milk, meat, fruit, cereals, beer) today find themselves at different stages of development and cooperation with knowledge institutions. Strategic governance of supply chains calls for investments in the IT systems, quality assurance processes and integration of technological processes, whereas supply and demand are managed depending on the market needs for final products.
* **Providing quality raw materials in agri-food industry:** investments in technological advancements and innovation in agriculture are pivotal for the development of the entire agri-food system in Slovenia. While guaranteeing that the country is self-sufficient in raw materials, the goal is also to make sure that the food produced is as safe and of as high quality as possible, which also applies to the use of quality input materials or raw materials. Therefore, attention will be placed on progress in the area of improving plant and meat processing while increasing the share of organic production and other quality schemes. The aspects that are coming to the fore are, inter alia, efficient and sustainable use of resources, care for the environment, animal welfare and resilience of agriculture to climate change.
* **Expansion of food supply:** to grow and stay competitive, the businesses in the agri-food sector need to continuously adapt to consumer trends, improve the existing products while expanding the range of their products. While focusing on the sensory properties and nutritional values of food products, the consumers are increasingly paying attention to the functional properties of food products. Thus, alternative raw materials for food products are being increasingly utilised and food supplements are on the rise.

**SRIP Sustainable Food**

SRIP Sustainable Food is a long-term strategic research and innovation partnership for sustainable food production. It acts as the national hub seeking to bring together ambitious and development-oriented actors in the fields of agriculture, food industry, food science and technology and other agriculture and food industry-related sectors while fostering their collaboration. The partnership consists of three leading sectoral organisations for agriculture, food and nutrition, three Slovenian universities, 15 faculties, 4 research institutions and 23 other organisations active in the field of agriculture, food and nutrition. The partnership thus brings together a total of 305 members (November 2022), of which 257 are businesses that are members of the Chamber of Commerce and Industry of Slovenia - Chamber of Agricultural and Food Enterprises, of which 231 are SMEs and 26 are large enterprises. SRIP Sustainable Food has been actively working together with SRIP Sustainable Tourism, SRIP Circular Economy, ICT Horizontal Network, SRIP Smart Cities and Communities, SRIP FoF and SRIP Materials as End Products.

The vision of the partnership is to evolve and grow into the largest innovation network of actors in the agri-food industries in the next 10 years that will guide the development of Slovenian agricultural and agri-food sectors through disseminating new technologies and embracing digitalisation while delivering solutions to face the challenges of the future global food market.

**The main achievements** of the SRIP in the 2014-2020 programming period are listed in the supporting document Rationale for priority areas.

### Networks for the Transition to a Circular Economy

**Empirically demonstrated competitive advantages of Slovenia**

A great deal of added value in this priority area is created in the fields Green technologies and processes (44%) and Sustainable energy and Secondary raw materials (31%). Total R&D investment stood at EUR 139 million, with as much as 90% of investment made in the field Green technologies and processes. The expected growth rates in the period 2021-2027 in individual areas are as follows: 3.8% growth in revenues, 3.7% increase in exports, 3.4% growth in added value, 0.9% increase in employment, 2.4% rise in labour productivity and 4.1% increase in R&D investment[[41]](#footnote-41).

While circular economy is, in essence, an explicitly horizontal process that is expected to spread to all sectors should the positive trend of growing investment in domains of transition to a circular economy continue, the most promising domains for growth are the ones grouped in economic activities between E37 and E39 according to the List of NACE codes as they leverage technology to attain competitive advantage (Sewerage; Waste collection, Treatment and Disposal activities, Materials recovery; Remediation activities and other Waste management services). The subsectors Waste collection (E38.1) and Waste treatment and disposal (E38.2) have recorded persistently high growth rates. The subsector Manufacture of paper and paper products (C17) has attained competitive advantages in technology and exports (Šušteršič, Burger, Kotnik, Breznik, 2020).

The strategic importance of SRIP focus areas is reflected in the important role they play in ensuring raw material and energy self-sufficiency, in providing critical materials and through the high degree of independence and autonomy in developing new, locally and regionally supported sustainability-oriented supply chains based on the principles of a closed-loop material flow (source: SRIP Circular Economy).

**Targets by 2027**[[42]](#footnote-42): increase the revenue of businesses in priority area from EUR 6.5 billion to EUR 7.4 billion; increase the value of exports from EUR 4 billion to EUR 4.4 billion; increase the added value per employee from EUR 61,000 to EUR 68,000; increase the number of employees from 23,000 to 24,600; increase RDI investment from EUR 46 million to EUR 56.7 million. In addition, the goal in the priority area is to contribute to improving the circular use of materials in Slovenia and increasing the rate of circular material use from 12.3% (2020) to 15.5% by 2027[[43]](#footnote-43).

**The most promising focus areas and technologies identified in the entrepreneurial discovery process** (see Annex 2 for a list of product directions)

* **Sustainable energy:** this area involves the energy recovery of waste streams through so-called waste-to-energy solutions where waste materials and residues that are discarded at the end of cascading use under circular economy are eventually used as a suitable source of energy. As these are not nearly enough, renewable sources of energy can be tapped into, in particular water energy, geothermal energy and solar energy. However, the volatile nature of renewable energy sources requires carefully designed approaches through the deployment of tailor-made technologies and horizontal systemic tools to optimise energy and material efficiency (i.e. waste heat recovery systems, tackling renewable energy’s fluctuating capacity with hydrogen, synthetic fuel and battery technologies, optimisation of heat transfer in industrial processes, horizontal sector coupling models, core technologies for electrochemical plants).
* **Biomass and alternative raw materials:** this focus area aims to facilitate innovation and market breakthrough in the field of innovative (bio-based) products derived from renewable raw materials. The focus area seeks to develop the following technology fields and product directions: sustainable mobilisation of forest biomass potential, utilisation of lignocellulose biomass for the development of integrated biorefineries and design of a new generation of value chains based on alternative raw materials (biorefineries for alternative raw materials).
* **Secondary raw materials:** industrial partners have joined forces to work together in five distinct technology fields that address the main groups of waste. The partners are focused on emerging disruptive technologies for the recovery, reuse and recycling of waste, the technologies for the development of secondary raw materials (recovery of industrial, construction and biological waste), the technologies for process water treatment (sludge recovery) and the technologies for drinking water management.
* **Sustainable functional materials:** this focus area aims to develop the next generation of advanced composites and functional systems that will incorporate the building blocks of biomass waste or other waste as well as nanoparticles. New export-competitive, sustainable products with high added value will be developed for the traditional markets of the paper and paper processing industry, textile industry, automotive industry, security industry, construction industry, polymers and plastics industry, packaging, adhesives and coatings industry and medicine.
* **Green technologies and processes:** the vision of the focus area is to spur the development of bio-based low-carbon industry that will improve the use of vegetated land and food supply in Slovenia. This can be achieved through the sustainable and efficient use of renewable raw materials sources in industrial processing and production of bio-based products where only small volumes of waste are generated. Besides new or improved raw materials processing and production processes, the production of new bio-based/green chemicals and harnessing the potentials of conversion of CO2 and hydrogen into fuels is of significant importance.
* **Circular business models:** the focus area is mainly centered on the development of an open computer platform, IT-supported approaches and tools that can be harnessed for optimal and sustainable decision-making to increase the competitiveness as well as energy and environmental efficiency of the businesses, regions, country and society. The focus area aims to create the relevant supportive environment for circular economy-related decision-making processes by taking into due account the economic, environmental and social aspects.

Actors in the various focus area seek to connect and work together to create new value chains for the development of core technologies to be taken to the market as reflected in the product directions and their market potential (SRIP acting as a vertical). At the same time, these actors are committed to sharing their expertise and integrating with other SRIPs (SRIP acting as a horizontal). The horizontal areas are represented by a spectrum of green technologies that facilitate the shift to a low-carbon society, i.e. energy efficient and material-efficient technological processes, hydrogen, batteries, biorefineries, CO2 capture and storage, biofuels, biomaterials and circular business models.

**SRIP Circular Economy**

SRIP Circular Economy brings together 88 members, of which 54 are companies, 15 are knowledge institutions (including the University of Ljubljana and the University of Maribor) and 17 are NGOs,including two chambers of commerce and the Chamber of Commerce and Industry of the Štajerska Region which manages SRIP (November 2022). The vision of the SRIP is to permanently increase the efficiency and competitiveness of the Slovenian economy in the transition to a circular economy.

As a priority, SRIP Circular Economy will continue to build new value chains to facilitate the entry in global markets by focusing on mobilising its members for a joint action for technological advances and development of industrial processes leading to the production of high-quality products while curbing the use of resources, switching to renewables, reducing the volume of unused waste and contributing towards a carbon-neutral economy.

In order to achieve this goal, SRIP will continue to:

1. co-design the government measures for the green and digital transition;
2. feed the decision-making process by submitting regulatory proposals and providing advisory services while supporting internationalisation efforts of its members through integration in R&D projects and international platforms;
3. carry out human resources development activities and raise awareness of the importance of the transition to a circular economy and of the avenues to get there among expert community and general public;
4. work towards establishing a zero-carbon technologies demonstration and training centre.

**The main achievements** of the SRIP in the 2014-2020 programming period are listed in the supporting document Rationale for priority areas.

### Sustainable Tourism

**Empirically demonstrated competitive advantages of Slovenia**

Fast growth has been observed in the following activities:Camping grounds, recreational vehicle parks and trailer parks (I55.3), Renting and leasing of personal and household goods (N77.2), Other reservation service and related activities (N79.9), Organisation of conventions and trade shows (N82.3) (Šušteršič, Burger, Kotnik, Breznik, 2020).

**Targets by 2027**[[44]](#footnote-44): increase the revenue of businesses in priority area from EUR 2 billion to EUR 2.5 billion; increase tourism exports or international tourism receipts from EUR 2.75 billion to EUR 3.3 billion; increase the added value per employee from EUR 38,000 to EUR 45,000; increase the number of employees in the tourism industry from 58,730[[45]](#footnote-45) to 65,000. Considering the specificities of the industry for which no net figure can be obtained, RDI investment has been estimated on the basis of own calculations to stand at EUR 15.5 million. The key goal of priority area Sustainable Tourism remains to firmly position Slovenia as the leading destination for sustainable tourism and to secure its ranking among the top five EU countries in terms of the digital and sustainable transformation of tourism along the entire value chain.[[46]](#footnote-46)

**The most promising focus areas and technologies identified in the entrepreneurial discovery process** (see Annex 2 for a list of product directions)

Over the past strategic period, Slovenia has managed to successfully position itself on the global map as a recognisable green destination oriented towards environmental sustainability and the green, active and boutique tourism. Slovenian tourism is geared towards the development of a sustainable tourism offer with a strong green agenda that is planned to be further strengthened. The ambition of S5 is to take the green and sustainable tourism agenda to the next level and pave the way for responsible tourism of the future.

* **Regenerative tourism:** going beyond the concept of tourism that is focused on neutralising the negative social, economic and environmental impacts of tourism, regenerative tourism is based on fostering the positive impact of tourism and tourism-related activities on the local community and environment. Similarly to the concept of zero -waste food, it offers a framework that departs from over-consumption and shifts towards a more qualitative development that fosters human health and well-being through ecosystems’ health and brings about positive change in economic, social and environmental dimensions. The focus area builds around the following product directions: (i) Regenerative accommodation, (ii) Regenerative gastronomy, and (iii) Mice 5.0. – a way of organising events with maximum process efficiency and in a sustainable manner.
* **S(LOVE)NIA SPA:** the value of the wellness market worldwide is forecast to grow between 5% and 10% annually. The rich natural capital has provided for competitive advantages of the country in this field. Slovenia has been developing and rolling out new products:
* i) Climate resort that builds around a new concept of experiences in nature underpinned by the healing effects of forests on human health and well-being. Essentially, climate resorts are about evolving green tourism products into travel therapy. The second product direction that has been conceived in this focus area is ii) Health and well-being that is focused on market products that increase the awareness of health, well-being, immunity, good mental health and physical health condition, longevity and the importance of active and healthy ageing.
* **Culture and tourism:** tourism and cultural and natural heritage work hand in hand. They make up the specific segment that caters to the needs of demanding guests looking for unique and meaningful experiences to enrich their lives. Both tourism and cultural and natural cultural heritage can contribute to reversing seasonality trends while directing tourism flows and adding value to both sectors. This focus area has two product directions: (i) Immovable cultural heritage that can be/is an important reason for travel and for increasing the visibility and added value of tourism products, and (ii) Interpretation of cultural heritage that shapes the way cultural heritage is valorised and increases added value in tourism.

**SRIP Tourism**

SRIP Tourism (SRIPT) acts in the priority area and represents the expert support backbone catering to the needs of the tourism industry. The partnership has 74 partners - 52 businesses, one knowledge institution – a faculty, 19 public institutions, one chamber and the Slovenian Tourist Board (November, 2022). Businesses that are members of SRIPT account for over 70% of the revenue generated in Slovenian tourism which is a testament to the strength of the partnership. The vision of SRIPT is to become the key driver of development and knowledge in sustainable tourism in Slovenia. It is focused on creating the solutions for a low-carbon, green and responsible tourism of the future. Digitalisation, higher quality of services and training and education activities will be key in helping deliver sustainability on the ground.

**The main achievements** of the SRIP in the 2014-2020 programming period (and development activities driving the post-covid-19 recovery) are listed in the supporting document Rationale for priority areas.

### Mobility

**Empirically demonstrated competitive advantages of Slovenia**

Even though Slovenia has no car manufacturers of its own, with the exception of Revoz, Renault's assembly plant, the Slovenian automotive supplier industry contributes around 10% to the country's GDP and makes up over 20% of total Slovenian exports. Coupled with goods transport and mobility, automotive industry represents over 15% of Slovenian GDP. The enterprises in the area of mobility and automotive industry come from a variety of very different sectors as the members of SRIP Mobility (ACS+) fall under nearly 70 five-digit codes or 56 groups (three-digit code) of the statistical classification of economic activities (NACE codes). This fragmentation reflects the immense complexity of the area of mobility where a plethora of activities has found its market potential and opportunities for growth. The enterprises in the mobility sector have recognised the advantages of clustering and joining forces (primarily enterprises in subsectors C22.1, C24.1, C24.5, C25.6, C27.1, C27.2, C28.9, C52.2, C62.0, etc.), which is reflected in the strength of automotive industry that provides strong incentives to the enterprises involved in the entire mobility ecosystem thanks to its strong export-orientation (roughly 85% of sales are generated in foreign markets) and explicit development-orientation.

The area of transformation of the automotive industry towards electrification is very promising as the industry has been undergoing significant change, redirecting its focus on the manufacture of electric and electrified vehicles whose sales have soared from a couple of percentage points in 2020 to nearly 10% in 2021, and is expected to reach a staggering 50% of all vehicles sold in 2030 according to estimates.

The technologies and the exports are the two major sources of comparative advantages recorded in this priority area. Slovenian automotive industry actors in specific technological domains are one of the leading suppliers for European and global car manufacturers. The strong integration of these actors in the European supply value chains allows them to keep pace with the trends and even to dictate the trends in certain areas where businesses have been recognised as strong pre-development suppliers (source: SRIP Mobility).

**Targets by 2027**[[47]](#footnote-47): increase the revenue of businesses in priority area from EUR 10.3 billion to EUR 13.1 billion; increase the value of exports from EUR 5.2 billion (52% of total revenue generated) to EUR 7.15 billion (55% of total revenue generated); increase the added value of SRIP members from EIR 1.836 million to EUR 2.250 million and the added value per employee (productivity per employee) from EUR 63,343 to EUR 75,000 EUR; increase RDI investment from EUR 500 million per year to EUR 600 million per year; increase the number of employees from 26,000 (2021) to 30,000.

**The most promising focus areas and technologies identified in the entrepreneurial discovery process** (see Annex 2 for a list of product directions)

* **Transformation of the automotive industry:** battery electric vehicles or all-electric vehicles will become one of the key building blocks of the transformation, leading to a significant reduction of the negative environmental impacts caused by mobility and transport sector. Hybrid (electrified) electric vehicles and fuel cells vehicles will play an important role. The trends dictating the development of connected vehicles go hand in hand with the trends shaping the development of highly automated and autonomous vehicles. In this context, the efforts to develop and diffuse technology upgrades and new technologies pushing for energy-efficient practices and facilitating the shift of energy wasteful manufacturing to green manufacturing will be equally important. Slovenian automotive industry is built around a clear and well-articulated development vision setting the course of action in the following directions (i) Electric propulsion systems and their components, (ii) Energy storage systems and their components, and (iii) Lightweighting initiatives – materials and technologies to reduce the weight of electric and electrified vehicles. The production of components and systems will be backed by above-average investments in digital transformation, robotics and automation of manufacturing and business processes as well as the development and deployment of solutions leading to a lower environmental footprint of manufacturing and business processes.
* **Advanced infrastructure for the new mobility:** automated and autonomous vehicles, electric vehicles, smart navigation systems as well as safer, more durable and longer-lasting roads offer many opportunities for innovations that bring about sustainable solutions, improve safety and contribute to reducing harmful emissions. Emphasis will also be given to developing solutions through smart and tailored charging infrastructure solutions for electric and electrified vehicles.
* **Mobility transformation:** the advances and the pace of emerging solutions in mobility offer different combinations of technological and regulatory solutions to address transport and traffic challenges both in urban and rural areas. Cities across the globe are increasingly turning their attention to reviving public transport systems to augment the quality of services, improve access and connectivity by providing both public transportation and rolling out shared mobility solutions. The novelty in this context is the BIM-supported design, construction and infrastructure management. Special attention will be given to advanced logistic solutions (including internal logistics) to increase the competitiveness of businesses in terms of enhanced flexibility and supply optimisation in the framework of global supply chains.

**SRIP Mobility (ACS+)**

The priority area of mobility is overseen by SRIP Mobility (SRIP ACS+). The partnership has seen its growth soar in the period 2017-2022, with the number of members growing by 48% to 95 members. In 2019, the structure of the partnership was as follows: micro and small enterprises - 45%, medium-sized and large enterprises 22% and 21% respectively, public research organisations, educational institutions and institutes, development centres and development agencies - 12%. The partnership is focused on the development of products, services and solutions that will put Slovenia on the global map as a reference country for green mobility in line with the vision of the partnership. The focus areas and the product directions are geared towards the following:

1. keeping Slovenian automotive industry on the global map as a trusted tier 1 and tier 2 supplier involved in the design and development processes of major car brands and characterised by business excellence and state-of-the-art production capacities,
2. enabling the diffusion of new technologies and electrification, safety and digitalisation of mobility,
3. cutting harmful emissions from the transport sector, enhancing the productivity of logistics in industry, meeting the environmental objectives of the country and delivering on the European Green Deal.

The slogan GREMO (*GREenMObility*; *green and digital transformation of Slovenian automotive industry*) clearly encapsulates the vision and strategy of the Slovenian automotive industry. The establishment of the Working Group GREMO has sent a clear signal of political backing for the work of Slovenia’s automotive industry.

**The main achievements** of the SRIP in the 2014-2020 programming period are listed in the supporting document Rationale for priority areas.

### Factories of the Future

**Empirically demonstrated competitive advantages of Slovenia**

The subsector Manufacture of machinery and equipment (C28) has retained its competitive advantage in exports of final products; the same goes for the activity Manufacture of other special-purpose machinery (C28.9) and other activities in the NACE group C28. Fast growth in productivity and exports has been recorded in the subsector Manufacture of metal forming machinery and machine tools (C28.4) (Šušteršič, Burger, Kotnik, Breznik, 2020).

The vertical value chain Intelligent control systems represents the largest share of added value in terms of indicator values, followed by vertical chains Robotic and laser systems and components and Advanced sensors (source: SRIP FoF, July 2021).

**Targets by 2027**[[48]](#footnote-48):increasethe revenue of businesses in priority area from EUR 3.71 billion to EUR 4.48 billion; increase the value of exports from EUR 3.31 billion to EUR 4.16 billion; increase added value from EUR 712 million to EUR 848 million; increase the added value per employee from EUR 51,321 to EUR 58,534; increase the number of employees from 13,875 to 14,479; increase RDI investment from EUR 219.12 million to EUR 265.15 million.

**The most promising focus areas and technologies identified in the entrepreneurial discovery process** (see Annex 2 for a list of product directions)

* **Robotic and laser systems and components:** robotics is one of the main areas under factories of the future. Personalisation of manufacturing and the subsequent agility/flexibility of the manufacturing process requires highly adaptive robots that have already been overtaking Europe through a global industrial modernisation propelled by smart factories of the future. Design of user adaptive and personalised robots will be facilitated by the deployment of advanced robotic components, such as intelligent sensors and actuators. Long-standing tradition of photonic technology which has been characterised by a unique and efficient blend of research and development activities has evolved through the decades into an industry where Slovenia boasts the development, manufacturing and marketing of high-tech products for end users.
* **Advanced green technologies:** plasma technologies are the unique environment-friendly technological procedure for high added value products as they replace the classical wet chemistry methods. Sensor technologies, along with computer technologies, underlie the development of autonomous and smart systems. Sensor technologies are the gateway to the intelligent manufacturing systems and smart end products as they enable the manufacturing of complex products that have new functions and capabilities built in. The development of new materials will play an important role in improving the quality of life. Modern inorganic materials (magnetic and oxide materials) have been an important area of research focus in Slovenia. The relevant development activities range from electronics through energy sector to engineering materials.
* **Intelligent control systems for the Factories of the Future:** the concept of smart factory has evolved and grown more mature. From the initial general enthusiasm and abundance of buzz words that were interpreted in many ways, the enterprises have finally put the actual use of technologies and expertise at the forefront to gain concrete benefits. In the future, the development is expected to focus on the use of artificial intelligence to control and optimise processes, digital twins, predictive maintenance and prognostic health management while fully tapping the industrial IoT-driven opportunities and upgrade of MES systems. In this context, special attention will be given to both the manufacturing processes and optimal management of energy infrastructure.
* **Smart mechatronic tools:** efficiency of smart machinery and smart automated factories cannot be ensured without advanced and smart industrial tools. The latter have already turned into complex mechatronic systems featuring the functions of process parameters monitoring, operation control and communication with machines and other external devices. Without smart tools, smart machines cannot be fully usable. The main goal in this focus area is to convert tools from passive elements to active networked elements with own artificial intelligence and able to be fully integrated in the IT ecosystem of the businesses.
* **Smart factories:** a smart factoryintegrates smart products, processes and systems to form a single physical-cyber system. It builds on increasing efficiency through flexibility, agile approaches and robustness, which makes it more resilient to internal change or disruptions across the entire value chain. In a smart factory, humans, machines, products and other resources communicate with each other, including with customers and suppliers, thus enabling shorter throughput times. A smart factory makes up what is an integrated supportive environment that allows the businesses to embrace the process of their transformation towards a factory of the future at different stages of their digital and technological maturity.

On the basis of concentrating the skills geared towards the achievement of climate goals, the following cross-cutting focus areas have been identified: (i) Process laboratory for green process technologies (cutting across SRIP Circular Economy and SRIP MATPRO in the framework of the National Demo Center Factories of the Future); (ii) Hydrogen technologies for energy storage, conversion, distribution and use and for decarbonisation (cutting across SRIP Circular Economy, SRIP Smart Cities and Communities, SRIP Smart Buildings and Homes, including the Wood Chain and SRIP Mobility); (iii) Systems for hydrogen production, storage and use in micro-grids (cutting across SRIP Circular Economy and SRIP Smart Cities and Communities); (iv) Systems for smart grid management allowing for integration of renewable energy sources -water, solar and wind energy - (cutting across SRIP Circular Economy and SRIP Smart Cities and Communities), and (v) Proton therapy delivery processes (cutting across SRIP Health - Medicine).

**Horizontal networks (key enabling technologies)**

Besides ICT Horizontal Network, other five cross-cutting or horizontal networks, all part of the priority area Factories of the Future make up S5 KETs. The strategic nature of horizontal networks lies in their mission, which is the green technological and digital transformation of all S5 priority areas and the economy as a whole, including the development of skills and profiles. Horizontal networks are the key driving force behind the strategy, integrating new knowledge and initiatives in the innovation cycle of all value chains from TRL 3 on. In doing so, horizontal networks allow for interactions in interlinkages of enabling technologies and product directions in the framework of all SRIPs, thus paving the way towards new cross-cutting technology areas and new cross-cutting product directions. These are incorporated in the Action Plans which already have individual horizontal networks included and are further developed in line with the skills concentration and business strategies.

* **Advanced manufacturing technologies for materials, nano technologies and quantum technologies:** this technological area brings together processing, structural and functional properties of materials and final product quality. The area plays a key role in numerous vertical value chains where the development and manufacturing of various materials take place, e.g. electronic components, magnets, batteries, insulation, etc. This technological area is focused on nanotechnology as a basis for the next generation of high added value products in multiple areas of application.
* **Plasma technologies:** plasma technologies enable **innovative products that cannot be manufactured without the use of plasma**. These technologies are characterised by ecological integrity and high added value. **Plasma technologies were initially established in microelectronics, later in tooling, chemical and automotive industries. Currently, the application of plasma technologies in medicine and agronomy is being explored.**
* **Robotics:** robotics, including automation, is one of the most important enabling technologies and the basic building block of the concept of Industry 4.0. Today’s level of robotic technology enables the automation of many industrial processes, allowing flexibility, interoperability, connection with humans and other devices in the system.
* **Control technology:** control technology (automation, informatisation, cybernetics) is a distinct infrastructural enabling technology embedded in virtually all modern devices, processes, machines and systems to ensure their functionality, reliability, security and efficiency. The goal of bringing together the stakeholders under the cross-cutting area of control technology is to achieve the concentration of skills for the joint implementation of research and innovation projects whose results will enable new products, technologies and services needed to realise the concept of Factories of the Future.
* **Photonics:** technological innovation directed toward finding new ways to miniaturise and the growing need for flexibility, reliability and digitalisation of processes open up new opportunities for the development of laser micro and nano-processing systems. The goal is to integrate the newly developed technologies into intelligent devices whose key features will be the result of combining robotics and laser processes and will enable and complement the factories of the present and the future.

**SRIP Factories of the Future**

SRIP FoF as the umbrella partnership in the priority area brings together a total of 97 members; 60 of them are businesses, 27 partners are representatives of research organisations and their bodies and 10 partners come from other areas (November, 2022). SRIP FoF also acts as a platform for 66 research groups and a total of 1,430 researchers. Research organisations account for 80% of Slovenian research capacities for key technologies of SRIP FoF, while 777 researchers altogether make up SRIP development teams/departments in the business sphere. The partnership creates and supports business and research synergies for the penetration of new products, services and technologies in global market with concentration on niche areas, thus putting Slovenia among the prominent European providers of FoF solutions. Supportive environment has been created under SRIP auspices to provide support services to domestic businesses that are tailored to their level of development and desired growth dynamics as they embark on the path of transformation to environment-friendly and sustainable factories of the future.

**The main achievements** of the SRIP in the 2014-2020 programming period are listed in the supporting document Rationale for priority areas.

### Materials as End Products

**Empirically demonstrated competitive advantages of Slovenia**

Economic activity Manufacture of basic metals (C24) has retained competitive advantage in exports as a whole only as regards intermediates, but has lost technology as a competitive advantages. High productivity and export growth levels have been observed in Manufacture of basic precious and other non-ferrous metals (C24.4). The subsector Manufacture of fabricated metal products, except machinery and equipment (C25) has retained competitive advantages in exports but not in technology. Manufacture of tanks, reservoirs and containers of metal (25.2) has seen high export and productivity growth and the area Manufacture of man-made fibres (C20.6) has retained exports of end products as a source of competitive advantage.

The activities that are related to this priority area tend to show comparative advantages as well. Thus, for example, Manufacture of textiles (C13) as a whole has recorded exports and technology as a source of comparative advantage for intermediates. The same is true for Manufacture of other textiles (C13.9), whereas Preparation and spinning of textile fibres (C13.1) have seen signs of rebound and strengthening. The subsector Finishing of textiles (C13.3) has seen a two-fold increase in exports and productivity. Similarly, Manufacture of wearing apparel (C14) and Manufacture of leather and related products (C15) show comparative advantages in technology. Manufacture of wearing apparel, except fur apparel (C14.1) and Manufacture of knitted and crocheted apparel (C14.3) have recorded high productivity and export growth levels.

Slovenia also boasts the necessary skills and capacities in complementary activities, e.g. Manufacture of basic chemicals, fertilizers and nitrogen compounds, plastics and synthetic rubber in primary forms (C20.1) that has seen high export and productivity growth. Slovenian businesses also perform strongly in the area of coatings, where Manufacture of paints, varnishes and similar coatings, printing ink and mastics (C20.3) continues to demonstrate comparative advantages in exports.

Moreover, the related activities that have exports as a source of comparative advantage and have seen high export and productivity growth should be underlined in this context. These are Manufacture of clay building materials (C23.3) and Manufacture of cement, lime and plaster (C23.5). High comparative advantages in exports have been recorded in related activities Manufacture of rubber and plastic products (C22), Manufacture of bricks, tiles and other construction products, of baked clay (264), Manufacture of paints, varnishes and similar coatings, printing ink and mastics (243), Manufacture of plastic products (252), Manufacture of basic iron and steel and ferro-alloys (271), Manufacture of glass and glass products (C23.1) (Šušteršič, Burger, Kotnik, Breznik, 2020).

Competitiveness and development-oriented activity remain high in the manufacture of composite materials and complex finished products containing composites (e.g. vessels, vehicles, aircraft, sports and safety equipment). The Slovenian coatings and binders industry has maintained exceptionally high levels of exports and productivity and plays a vital role in the chemical industry (source: SRIP MATPRO).

**Targets by 2027**[[49]](#footnote-49): increasetherevenue of businesses in priority area from EUR 4.9 billion to EUR 5 billion; increase the value of exports from EUR 3.2 billion to EUR 3.3 billion; increase the added value per employee from EUR 50,810 to EUR 57,047; increase RDI investments from EUR 52 million to EUR 57 million. The priority area is expected to employ 22,000 people. Over the next 7 years (by 2027), added value is expected to grow by EUR 186 million, with the steel and special alloys sector accounting for 40% of this growth, the area of technologies for 28% of the increase and the areas of multicomponent smart coatings and aluminium both contributing 12% to the expected growth in added value.

**The most promising focus areas and technologies identified in the entrepreneurial discovery process** (see Annex 2 for a list of product directions)

* **Steels and special alloys:** achievement of high standards of quality, reliability and safety depends on the purity of steel and alloys and the efficient control of non-metallic inclusions, defects and anomalies in the microstructure. The automotive industry requires a reduction in consumption and environmental impact, which dictates the need to use advanced high-strength steels and lightweight metallic materials that, in addition to extreme mechanical properties, also ensure 100% recyclability.
* **Aluminium:** in addition to automotive and aerospace industries, aluminium alloys have a great potential in a wide range of other areas, such as medicine, pharmaceuticals, military industry, interiors, etc. This calls for the development of new high-strength and corrosion-resistant aluminium alloys that should combine 100% recyclability, low weight, high load-bearing capacity and maximum energy absorption capacity.
* **Technologies:** traditional manufacturing technologies have seen a radical evolution towards optimisation and technological improvement of machining processes, development of new tools and manufacturing technologies, with the recycling of both basic and auxiliary materials and by-products becoming an increasingly important segment of the manufacturing process of metallic and non-metallic materials. The biggest technological advances and change can be attributed to the disruptive effects of additive manufacturing or 3D printing technologies. The ever-growing demand has driven groundbreaking advances in recycling technologies for plastics and polymer-based composite materials where chemical recycling has increasingly been gaining ground.
* **Multicomponent smart materials:** intelligent integration of different components into a single material exceeds the existing properties frame and opens the way for completely new materials with previously unavailable properties. The multicomponent structure of new materials has a very wide size ranging from molecular mixtures (blends) in nanostructured blends to macro (reinforced) composites as well as assemblies of bonded parts made of different materials (e.g. structural components of vehicles or aircraft). Rapid development has taken place in biocomposites that incorporate natural fibres, and in biomaterials for biomedical applications which offer high added value. Nanostructured materials for pollution prevention and environmental remediation, e.g. materials for water treatment and CO2 capture, have also been gaining ground.
* **Functional coatings and advanced binders for metals:** functional coatings are extremely important as they go beyond their original purpose combining the basic function of effective protection of the substrate being coated with new properties featuring energy efficiency, durability and lower emissions. A thin layer of coating, from just a few microns to less than a millimeter thick, gives the object its appearance and protects it from external influences, and, in the case of advanced materials, gives it additional functionality. The resins and binders, including adhesives, make up Slovenia’s polymer production which is specifically oriented towards special materials and characterised by a high diversity of product ranges, advanced manufacturing technology and smaller-scale production capacities typical for the production of main groups of (thermoplastic) polymers. The use of bio-based polymers made from materials derived from renewable raw materials and components that lower the environmental footprint of products has been on the rise.

**SRIP Materials as End Products (MATPRO)**

SRIP MATPRO is a strategic research and innovation partnership that brings together 58 businesses from various economic activities, primarily metal industries, non-metallic industries and chemical industries, one association, two institutes, three faculties, three institutions, two development centres, one institute and one sole proprietor (altogether 71 members, November 2022). The main objective of SRIP MATPRO is to create value chains with a focus on the production of materials that can be used for complex products with a high added value and a strong potential for integration in global value chains. The partnership also puts spotlight on the environmental aspects of production, seeking to reduce the environmental and energy burdens of the manufacturing processes and waste management, while promoting efficient use of sources and recycling.

In order to ensure comparable conditions for R&D activities of Slovenian businesses, the partnership will, among other things, continue to:

1. work towards setting up and launching the SiPCAST and SiPCOMAT pilot centres and drawing up proposals for similar pilot centres and their establishment in the fields of composite materials, steel industry and foundry industry;
2. implement the EduCOMP employee training programme and actively participate in shaping the formal education system and the associated long-term forecasting of future skills and jobs needs;
3. provide the relevant support to its members in the area of international collaboration, especially as regards the involvement in the Vanguard Initiative, and support its members in joining the European Space Agency projects.

**The main achievements** of the SRIP in the 2014-2020 programming period are listed in the supporting document Rationale for priority areas.



# Planned measures

While green transition is the main S5 goal, stable development and economic activity are the key factors in ensuring a high standard of living and quality of life.

To achieve the abovementioned, we need financially supported investment in the four main pillars of A Smarter Europe, namely in RDI, digital transformation, entrepreneurship and skills, as well as complementary improvement of how the economic and social ecosystem works by implementing non-financial measures that foster development, and involving and using the main international mechanisms and incentives to support industrial transformation.

Slovenia should strengthen its scientific research and innovation ecosystem[[50]](#footnote-50). Several support measures, implemented by various institutions, combine national and international mechanisms. However, these measures are not sufficiently integrated and coordinated. Thus, certain structural reforms should be implemented, particularly by establishing an integration mechanism to promote cooperation of the key line ministries involved in S5 implementation and other stakeholders of the scientific research and innovation ecosystem. This would improve cooperation between ministries, knowledge institutions and the economy, and the transfer and use of knowledge and innovation.

Slovenia’s slow digital transformation hinders productivity growth and innovation. After making some progress, Slovenia has now found itself in a situation where it is failing to reach the set 2020 R&D spending target, when it should actually be increasing investment in R&D if it wants to accelerate its recovery and strengthen its growth potential. Digital transformation measures should be targeted at the identified S5 priority areas.

Slovenia is a material- and energy-intensive economy, which may affect its competitiveness in the long term. We should, thus, support instruments that facilitate circular transformation and low-carbon transition of the economy, and focus these measures on S5 priority areas.

In order to make progress in achieving the SDS 2030 targets, to fulfil the 2019 and 2020 Council Recommendations, and to build on the UMAR 2020, 2021 and 2022 Productivity Reports, we list below the key challenges, including the corresponding policy mix.

The measures mentioned in the first subchapter follow the specific objectives identified in the European Cohesion Policy regulatory framework for ERDF, which is the main source of funding. In order to maximise synergies, they should be complemented by measures financed in the framework of other policies identified in relevant documents, in particular (i) the RRP (directly connected measures are listed in Table 6), (ii) the Just Transition Fund action plans, (iii) complementary measures under European Cohesion Policy, related to human resources development policy (in particular the horizontal areas of education, career centres and lifelong career guidance, adult education, scholarship policy, the establishment of the Competence Forecasting Platform, etc.) that are financed by the European Social Fund Plus (ESS+), (iv) EU Rural Development Policy, (v) national development policies, (vi) European centrally managed policies (e.g., Horizon Europe).

At the level of measures, the areas of promoting basic science, social innovations and innovativeness, connecting the business sector with the cultural and creative industries, sustainable blue economy, silver economy and joint regional projects will also be addressed in a complementary manner.

The second subchapter, Measures fostering development, briefly describes some of the areas or non-financial incentive measures that have a significant indirect impact on the competitiveness and success of Slovenia’s business and other entities.

The third subchapter describes the three key areas of financing industrial transformation measures.

In the grant award procedures and the implementation of the policy mix, supporting innovation under S5 priority areas and KETs, the criteria for the selection of operations and projects, applied in the calls for proposals, will include the criteria of excellence and innovation for TRL 3-9, and for TRL 6-9 the horizontal criterion of demonstrating market potential[[51]](#footnote-51) of the individual focus areas and technologies, and product directions and directions of technology development, as explained in section 3.1.i. Two criterion levels are:

* excellence through the selection of operations with a highlighted sub-criterion on the state-of-the-art of research in the global context (or beyond state-of-the-art requirements), where applicants or beneficiaries will have to demonstrate the innovativeness of the proposed product directions and directions of technology development and the competence of the R&D team; and
* impact, where the proposed operations or projects must demonstrate commercialisation capability and market potential.

The number of focus areas and technologies and/or product directions, identified within a priority area, will therefore have no impact on the amount of funds available or allocated.

## Financial part: RDI, digital transformation, entrepreneurship, and skills

The policy mix is divided into four areas of investment, namely investment in:

**a. Enhancing research and innovation capacities and the uptake of advanced technologies**

Slovenia’s investment in R&D is below the EU average[[52]](#footnote-52). Previously classified as a strong innovator, Slovenia slipped into the moderate innovator group in 2019, where it remains in 2022 (EC, 2022a). The decline in Slovenia’s innovation performance is mainly a result of the relatively poor public investment in RDI and the resulting limitation in human resources engaged in research and innovation activities, reduced cooperation between stakeholders in the scientific research and innovation ecosystem, and the declining innovation capacity of enterprises. The lack of public funding for R&D results in insufficient investment in research and innovation activities, research infrastructures (facilities and equipment), and human resources. Inadequate research infrastructure[[53]](#footnote-53) results in the absence of an enabling environment that would foster entrepreneurship and innovation and, consequently, the inability to increase the entrepreneurship index.

Planned measures:

Slovenia will strengthen its investment in research infrastructure, especially public, and research capacity, in particular in relation to national strategic development priorities, which is of key importance for scientific excellence and cutting-edge research. S5 priority areas will support innovation clusters (SRIPs) and research programmes and projects, in particular at TRL 3-9, as well as individual instruments at lower TRLs (e.g., funding of proof-of-concept as a funnel for follow-up funding of selected projects, e.g., Centre for Creativity). Support will be given to the activities of pilot-demo centres that promote higher levels of technological sophistication (TRL 6-9). Particular attention will be given to enhancing the role of horizontal networks and KETs, which will receive additional financial support to allow for higher penetration of technologies in all S5 priority areas. In this context, concrete measures to support the deployment and development of KETs will need to build on a continuous entrepreneurial discovery process and identification of technological competences and capacities, taking into account indicators that point to successful results in the previous technology cycle and demonstrate high potential (technology validation in a suitable environment) for market transfer and new added value.

Knowledge Transfer Offices (KTOs) will be upgraded, and the long-term stability of the acceleration of the spill-over of research results into society will be ensured. Closer cooperation between KTOs, the Slovenian Business Point (SPOT) and the Slovene Enterprise Fund will be established. Investments will be prioritised to strengthen research infrastructure. Investments in research infrastructure (facilities and equipment) will support the upgrade of the scientific research and innovation ecosystem to ensure adequate knowledge transfer between academia (universities and institutes) and the economy and to society as a whole in the key S5 breakthrough areas. A state-of-the-art research infrastructure will facilitate cooperation with the economy, creating new innovative products and technologies, which will ensure greater competitiveness of the economy and integration into international research and innovation networks. This will create new jobs with a high added value per employee and intensify innovation activity. The measures will be complementary to those of Policy Objective 4, which addresses educational infrastructure. The recruitment of young researchers in public research organisations and in the industry will also be promoted. Horizontal integration of research and innovation measures will also be ensured through complementary EU funding instruments (e.g., Horizon Europe) and activities for the development of the European Research Area.

Across all S5 priority areas, particular attention will be paid to promoting the principles of innovation, a low-carbon, circular economy and fostering digitisation, the deployment of KETs, relevant knowledge and skills and supporting investments that successfully integrate the principles of sustainability, aesthetics and inclusiveness, in line with the New European Bauhaus initiative. Given the sustainability orientation of S5, upgraded with the policy mix, integration with the measures of Policy Objective 2 will also be ensured at horizontal level.

**b. Digital transformation**

In the DESI index 2021, Slovenia ranks 13th among EU Member States (EC, 2021d). Slovenia has made significant progress in digital public services in recent years; the country, however, remains below the EU average. Slovenia has a medium-low level of penetration, with an average level of digitisation of public services, and public digital services for businesses remain an issue to be addressed. Slovenia is lagging in productivity growth due to insufficient use of advanced technologies, in the use of internet services and in investments related to advanced digital technologies, in particular artificial intelligence, which is the area where Slovenia ranks among the bottom three EU Member States, despite demonstrating scientific and innovation potential. We are also lagging in the provision of digital skills.

In the DESI index, Slovenia’s position among the EU Member States remains unchanged but moves further away from the the relevant SDS target (UMAR, 2020b). In the DESI index 2022 (EC, 2022b), Slovenia has moved to 11th place, and the country’s relative progress is in line with the EU average. There is a recognised need for investment in the country’s core digital infrastructure, digital skills and digital capacity of businesses.

Planned measures[[54]](#footnote-54):

Integrated and safe digital transformation of SMEs will be supported, both by upgrading the supportive and business environment (strengthening the existing and new mechanisms and institutions for digital transformation) as well as through targeted instruments for SMEs (e.g., digital vouchers, incentives for digital transformation, e-business) due to the poor integration of digital technologies in SMEs’ business processes. Measures will also address promoting the development and use of artificial intelligence and other advanced digital technologies in the economy and society. We will also support investments in common standardised architectures and digital infrastructures for the deployment of new technologies (Internet of Things, big data, artificial intelligence/machine learning, blockchain and cybersecurity), providing users with better access to digital services.

Slovenia will support the digitisation of public administration services and processes for businesses and citizens/society as a whole, taking into account modern principles of co-creation with the user, making full use of data and advanced digital technologies, and providing the building blocks for the development of smart digital services. Measures will address smart cities, communities and villages (we will monitor local communities in Slovenia, and measure the participation of local communities, i.e., municipalities in the sharing or using data within a common data infrastructure). We will address digitalisation of the Slovenian language (including through the provision of modern digital resources and language technologies with the help of artificial intelligence), including adaptations for vulnerable groups and the established, publicly available Slovenian language corpuses for algorithmic processing for the economic and the public sector and academia, digital innovations in the field of culture accessibility[[55]](#footnote-55), the integration of digital content in the education system or e-education, assistance in the transfer of innovation and developed technologies to the economic sector and public administration, e-space (development of the ‘geospatial digital twin’ e-justice, etc.). We will also address increasing digital inclusion and digital competences of the society and the economy.

**c. Enhancing growth and competitiveness of SMEs and job creation in SMEs**

The potential of the entrepreneurial activity of early-stage enterprises, especially SMEs, remains untapped. Start-ups with more than ten employees pose a particular challenge. Since 2010, the innovation activity of enterprises has been steadily declining and moving further away from the EU average. Slovenian SMEs are particularly lagging in the introduction of innovative products and services, as well as in process and organisational innovation.

Slovenia should, thus, enhance the competitiveness of the economy by creating high-added value products and services, and strengthen corporate social responsibility to accelerate the transition to a climate-neutral society. Creating high-added value will, therefore, be supported by innovation, fostering creativity and seizing all the opportunities of the fourth industrial revolution. Slovenia should also focus on ensuring a supportive and predictable environment for business and investment, taking into account the specificities of small enterprises, promoting integration with the cultural and creative sectors and the internationalisation of enterprises.

Planned measures:

To achieve the set objectives, the very wide range of different measures will be designed and concentrated in four main investment clusters to enhance the growth and competitiveness of SMEs and job creation in SMEs, namely (i) the development and optimisation of the ecosystem to support entrepreneurship and innovation, through measures such as upgrading and implementing comprehensive services to support enterprises in their creation, growth and development as well as in their transition to a low-carbon circular economy, upgrading the SPOT Global system for domestic exporters and foreign investors, upgrading the economic and business infrastructure towards RDI, improving governance, strengthening cooperation and synergy effects between companies, setting up the economic and business infrastructure for incubators, smart management of Slovenian tourism destinations, and measures to integrate and promote the potential of culture, cultural and natural heritage for entrepreneurship and tourism, support for the national platform for cultural and creative industries, strengthening the administrative capacity of companies in the field of e-procurement, etc., (ii) the transition of new business ventures and start-ups to a faster growth phase (start-ups and companies in transition to the next growth phase) and various measures for fast-growing companies (scale-ups), (iii) the area of business growth and development (various incentives, for example incentives for innovation, including social incentives, etc.) with measures to introduce innovative approaches in different segments of the operation of companies, as dictated by global trends (transition to a low-carbon society, ageing population, etc.), (iv) internationalisation and cooperation in the macro-regional and trans-regional cooperation area by establishing partnerships with companies in foreign markets, the promotion and branding of Slovenian companies’ products and services abroad, and joint ventures in foreign markets, focusing on measures to facilitate and ensure easier and more successful integration of companies into global value chains, including the promotion of pilot and demonstration projects.

**d. Developing skills for smart specialisation, industrial transition and entrepreneurship**

If compared to other EU Member States, Slovenia has an above-average share of highly educated population. However, demographic change, rapid technological progress and the structure of employment have led to a growing mismatch between the supply of skills on the one hand and the needs of society and the economy on the other (25% of jobs are highly exposed to automation and 27% to marked changes, which is well above the OECD average). The lack of relevant skills is found among those with secondary and tertiary education and those already in employment. Adaptation to the changes in the workplace brought about by Industry 4.0 and other development challenges is also hindered by the decreasing involvement of employees in lifelong learning.

In order to foster further economic development, Slovenia should develop the skills needed for smart specialisation, industrial transition, and green and digital transformation across the innovation cycle from development, deployment and use of technologies and processes, as well as for the companies that use these technologies to develop new innovative products and services in all segments of the economy and society. The latter includes everyone from business entities, knowledge institutions to the stakeholders of the smart specialisation supportive environment, including SRIPs and the public sector, which should support R&D by developing innovative policies and regulations, and which should be the first to purchase such innovative products (innovative, green, pre-commercial public procurement).

Planned measures:

The main sets of measures will focus on strengthening skills for smart specialisation and the industrial transition and supporting innovativeness of businesses and other stakeholders in the economy, chiefly by upgrading the measure for promoting competence centres for human resource development in the S5 priority areas and horizontal topics towards greater openness and flexibility. We will support the design and implementation of flexible study programmes for the upskilling of graduates in S5 areas to close the gap between graduates’ skills and employers’ expectations more quickly, and ensure longer-term effects by updating regular study programmes. We will also consolidate skills for all systemic smart specialisation providers at stakeholder (SRIPs, social partners, etc.) and institutional levels (ministries, services, agencies, etc.). We will also develop social and systemic innovation skills by creating a hub to tackle social challenges and piloting the transition to a low-carbon circular economy, which is a horizontal S5 topic. A new systemic tool, the Foresight Competence Platform (in the field of human resources development and the investment in skills, the platform acts act the key enabling technology), which, like other measures of a more systemic nature, is relevant to S5 (education system, career centres and lifelong career guidance, scholarship policy, etc.) and is being developed and financed in a complementary manner by the European Social Fund, plays a key role in the implementation of measures to promote the development of skills.

## Non-financial part: Measures fostering development

An important part of the policy mix, which is not directly connected to financial incentives, are measures that support the development and functioning of the Slovenian scientific research innovation and entrepreneurial ecosystem, innovative and green public procurement, economic diplomacy, removing or reducing administrative barriers, faster issuance of permits, and efficiency of the justice system.

1. **Slovenian scientific research and innovation and entrepreneurship ecosystem (see diagram in Annex 1)**

To unlock Slovenia’s innovation potential, we should strengthen the supportive environment that facilitates cooperation between innovation actors and contributes to increasing the share of innovation-active companies. We will support the measures related to promoting innovation clusters, knowledge transfer offices and investigative arts centres, which complement the services of the innovation ecosystem. The services of the Digital Innovation Hubs[[56]](#footnote-56) focus on creating an ecosystem for the deployment of digital transformation, supporting the development and upgrade of competences and digital skills, networking and cooperation at national, local and international level (especially EU), transfer of good practices, providing access to testing environments, and promoting and raising awareness on digitisation and digital transformation.

We should also mention (i) upgrading of business and social support services, also at the local level, and of the innovative environment (innovative environment entities: university and business incubators, technology parks, accelerators, co-working areas, learning labs, Centre for Creativity), (ii) the development and implementation of services for specific target groups (e.g., young people, women, culture and creative sectors) and individual priorities (e.g., restarts, transfer of business ownership) (iii) development of measures for smart management of macro destinations and leading destinations of Slovenia’s tourism, (iv) improvement of the environment in economic business zones to stimulate local businesses and the entrepreneurial ecosystem to be more productive and innovative.

1. **Economic diplomacy**

Economic diplomacy plays an important role in supporting international cooperation and promoting S5 areas. Measures to support businesses are designed in the framework of intergovernmental commissions, economic delegations, economic presentations abroad, advice to companies on selected foreign markets, provision of information on foreign markets and other services of diplomatic missions and consular posts (such as priority issuance of visas), with a focus on strengthening the network of economic advisers. Certain activities will also be regulated through the involvement and participation in international organisations.

1. **Modernising the digital environment of public administration and digital public services for businesses**

In the extent relevant to S5, Slovenia will create an ecosystem for building and delivering digital services for businesses and citizens. This will include the introduction of advanced artificial intelligence tools and the introduction of a flexible platform for the autonomous creation of digital services and mobile applications by competent authorities, to make services user-driven and interconnected. Slovenia will accelerate the deployment of secure, unique and user-friendly solutions, such as electronic identifiers and electronic signatures, to encourage the take-up of digital public services, increase trust in online transactions and enable mobile and cross-border access. Proactive and connected public digital services will be established to support life events (in line with the EU Regulation establishing a single digital gateway) and users, involving process owners and other stakeholders (co-creation). A common framework for data and data space management with algorithmic tools will be established to make the country’s data services legal, secure, reliable, exchangeable and transparent.

Across the public sector, Slovenia will pursue:

* digitisation of administrative processes and services,
* consolidation of entry points for easier and simpler access to e-services,
* the introduction of mandatory e-delivery for business-to-state transactions,
* the introduction of e-identity for easy and trusted use of digital public services,
* opening up and promoting the use of government data for the development of the economy and the whole ecosystem.

1. **Innovative and green public procurement**

Innovative and green public procurement promotes the development of innovative and/or less environmentally damaging products and services. They represent an essential non-financial incentive for the most propulsive businesses and also stimulate R&D activity in the region. This is why the RRP plans to modernise the public procurement system to raise the level of professionalism, digitisation and competitiveness of the public procurement system. In addition to other measures, the objective will be achieved by establishing a Public Procurement Academy, which will ensure continuous and high-quality education and training of stakeholders involved in public procurement and higher level of professionalism of all stakeholders involved. Specific emphasis will also be placed on better use of additional environmentally friendly criteria, open competitions and other innovative public procurement tools. We will draw knowledge and support from the activities foreseen for green public procurement in the framework of the Care4Climate project and the Integrated Strategic Project for the Decarbonisation of Slovenia through the Transition to a Circular Economy. We will also support the creation of innovation partnerships for those S5 priority areas where the public sector is the contracting authority.

1. **Removing and reducing administrative barriers and speeding up the process of granting permits**

Based on the proposals received and prepared in the framework of strategic partnerships, Slovenia should remove regulatory barriers and speed up the process of granting/processing of permits and consents under its competence for investments and projects within the identified priority areas. Slovenia will develop modern approaches using policy labs to create a space where relevant stakeholders are given the opportunity to share their views and opinions and support the prototyping of regulatory solutions.

## Measures fostering industrial transformation

1. **National Demo Centre Factories of the Future (NDC FoF)**

NDC FoF is a strategic instrument with a distributed operation that will enable companies, especially SMEs, to effectively access new technologies, receive hands-on training and transfer knowledge from R&D environments to the real industrial environment, respecting the principle of good practice. NDC FoF will provide a demonstration environment for the application and implementation of Industry 4.0 principles and key enabling technologies, as well as a development and testing environment for high-tech products, technologies and services for manufacturing and start-up companies and research institutions. NDC FoF will present prototypes of those smart factories that operate close to the real environment at the level of prototypes or demonstrators of processes, services and products developed up to TRL 7-8, and at the same time, provide services for businesses, education, acquisition of technological competences and demonstration of the performance of new technologies.

The conceptual bases for the preparation of the project (criterion 6) are based on the European Commission Country Report 2020 (EC, 2020), the UMAR Productivity Reports 2019 and 2020 and the OECD study[[57]](#footnote-57). The OECD study was based on the findings of the EC Pilot Action on Regions in Industrial Transition, which was carried out in cooperation with all relevant EC Directorates, Joint Research Centre (JRC) and the European observatory for clusters and industrial change (EOCIC). Slovenia participated in the programme as a region and, following the example of many other countries and regions, developed an HIA[[58]](#footnote-58) project with SRIP Factories of the Future which is the basis for the NDC FoF. The project has been tested with pilot vouchers and is ready for implementation.

Activities:

* training of industrial stakeholders for demonstration and application of new technologies,
* promoting the transition of the Slovenian industry to a circular economy through I4.0 technologies,
* development of new production cells, production processes for various technological fields,
* support to companies in product development, testing of solutions with the help of a qualified team of experts and mentors,
* fostering technological and business networking between companies, research institutions and the supportive environment in national and EU projects and in the emergence of companies on global markets.

1. **Just Transition Fund**

Analytical bases, action plans and territorial just transition plans have been prepared for the two regions (SAŠA and Zasavje) eligible to Just Transition Fund (JTF) support. Slovenia plans to implement measures that consider S5 priority areas, for areas predominantly dependent on coal and energy, i.e., the most GHG-intensive industries that point to the need for comprehensive restructuring/modernisation of the economy to reach climate neutrality. The RDI instruments under the JTF will support national strategic development priorities and the corresponding focus areas and product directions as defined in S5. The S5 horizontal priorities for ensuring a green transition and sustainable industry and services of the future through digitalisation, as well as the instruments to strengthen the entrepreneurial and innovation ecosystem, will also be considered.

1. **Demonstration project for the transition to a low-carbon society**

In the area of low-carbon energy transition, Slovenia has, together with EIT and KIC Climate and KIC Raw Materials, set out an ambitious and comprehensive strategic project on decarbonising Slovenia called A Deep Demonstration of a Circular, Regenerative and Low-Carbon Economy. The key measures of the project derive from and are complementary to S5, in particular with regard to support for the decarbonisation and transformation of selected value chains, which are based on S5 priority areas and which will include and build on the findings of SRIP Circular Economy and other relevant SRIPs. Slovenia will also put great emphasis on connecting value chains with SMEs and start-ups and on establishing a smart and circular economy hub, which will provide a space for continuous learning, networking and cooperation of relevant stakeholders. The transformation of cities into climate-neutral cities is already identified under the new financial perspective and EU missions. The SRIP Smart Cities and Communities action plan also identifies relevant measures that create synergies with addressing circular regions, circular and smart cities and communities.



# International cooperation

Given the increasing complexity of the scientific research and innovation process and taking into account Slovenia’s small size, achieving the critical mass of knowledge, capacities and skills to develop innovative and breakthrough products, services and processes, and ensuring the needed investment in research, development and innovation, in particular in research infrastructure, depends on the international involvement of both Slovenian state/public authorities (i.e., ministries, agencies, etc.) and Slovenian innovation stakeholders (i.e., companies, knowledge institutions, NGOs and other stakeholders).

For successful S5 implementation, Slovenia should ensure adequate involvement of Slovenian state/public authorities in international multilateral and bilateral (public-public) partnerships. Slovenia will, thus, co-create international and European R&D and innovation policies, programmes and measures. In addition to promoting the so-called market internationalisation, based on the export of innovative Slovenian products and services, the country should also strengthen the so-called internationalisation of development, i.e., the involvement of Slovenian innovation stakeholders in regional, European and global R&D and technology networks, platforms, projects, etc. Developmental internationalisation of Slovenian companies and knowledge institutions is crucial for their integration and positioning in European and global value chains (outward internationalisation), for strengthening their R&D departments, their employees’ skills and for attracting foreign top-quality staff and high-tech companies (inward internationalisation), as well as for their integration into international infrastructures.

In the 2014-2021 period, Slovenia significantly enhanced its activities in international multilateral and bilateral cooperation, which enabled Slovenian innovation stakeholders to become more involved in regional, European and global R&D and technology networks, platforms, projects, etc. A detailed presentation of international cooperation is given in S5 supporting documents.

To increase the scope and quality of international multilateral and bilateral cooperation with the aim of strengthening market internationalisation and, in particular, internationalisation of the development of Slovenia’s economy and other innovation stakeholders (hereafter: stakeholders), Slovenia will continue to:

* strengthen its membership in **public-public partnerships in the field of research and innovation** and participation in joint international calls for proposals to coordinate national and regional policies, programmes and measures in various fields of research and innovation and to foster stakeholders’ development internationalisation;
* strengthen its participation in **European and international networks of research infrastructures**, focusing on S5 priority areas, where membership, conditioned by the achievement of international standards (e.g., provision of adequate national research equipment, human resources, ethical norms, European data handling standards, etc.), provides stakeholders with access to state-of-the-art research infrastructures and the opportunity to participate in research projects;
* promote **stakeholder involvement in public-private partnerships** in the field of research and innovation by informing the general and interested public, (co-)organising information events, etc.;
* foster integration and synergies between different source of funding to achieve a more significant impact and excellence in research and innovation;
* promote stakeholder engagement **with the EIT KICs** through the establishment and operation of regional innovation hubs or the so-called EIT KIC Hubs;
* promote stakeholder involvement **in S3 thematic partnerships** by informing the general and interested public, (co-)organising information events with JRC, letters of support, etc.;
* promote active participation, networking and involvement of stakeholders, and international R&D and innovation projects in the frame of Slovenia’s membership in international groups (Eureka, ESA, etc.);
* promote active stakeholder participation in the EU **Interregional Innovation Investment Instrument** (I3 instrument), which supports concrete international demonstration projects;
* maintain its membership in the **Vanguard Initiative** and strengthen cooperation at the strategic and project level, in particular by promoting stakeholder involvement in the Vanguard Initiative pilot and demo projects by informing the general and stakeholder public, (co-)organisation of information events, etc.
* enhance the number and quality of stakeholder applications to **Horizon Europe** programme by informing the general and interested public about Horizon Europe and advising (potential) applicants on how to apply, on project management, etc., through the national network of contact points (NCPs) for Horizon Europe implementation;
* enhance the number and strengthen the quality of applications by Slovenian consortia or other stakeholders and applicants to the Digital Europe Programme (DIGITAL), which will as a priority focus on digital transformation (HPC, AI, TEFi dataspaces, sovereign digital infrastructure, cybersecurity, skills, EDIH, etc.) The DIGITAL programme will serve as a key European document to promote digital transformation, where a 50% national contribution is expected. This means that funding for a selected purpose is doubled and, thus, has a significant effect on achieving the desired results and impacts.
* participate in the three **macro-regional strategies** (EUSDR, EUSAIR and EUSALP), in particular in the field of research, development and innovation, digitisation, circular economy and industry, SMEs and skills for S5;
* participate in trans-regional joint calls in selected S3 areas of the participating regions;
* promote the involvement of stakeholders in **cross-border cooperation** projects, in particular in the field of research, development and innovation, digitisation, SMEs and skills for S5, by informing the general and interested public about the European territorial cooperation programmes and by providing advisory support in the framework of the national contact points of the European territorial cooperation programmes and the management of the cross-border and transnational Interreg programmes;
* strengthen support to Slovenian stakeholders to participate in European and international programmes, partnerships and initiatives by **promoting science and business abroad** and **supporting economic and research representations** in Brussels and other key countries;
* strengthen support to stakeholders to participate in standardisation bodies and associations related to the key S5 orientations and KETs;
* promote stakeholder involvement in various platforms, such as the European Clustering Platform[[59]](#footnote-59).



# Governance

The integrity of governance is based on ZZrID, which is designed to go beyond the silos understanding of sectoral policies and address various activities and development phases that lead to the commercialisation of market solutions.

At the time of the adoption of S5, ZZrID was not yet in force and will be fully implemented with the adoption of the new Government of the Republic of Slovenia Act and the State Administration Act, which will further reorganise the competences in the field of innovation policy, also taking into account the recommendations of the EC-funded project Reform[[60]](#footnote-60) – Strengthening the Innovation Ecosystem in Slovenia. Until the reorganisation is completed, S5 governance will be carried out within the current Core Working Group of State Secretaries and the Programme Committee for the Operational Coordination of Scientific Research and Innovation Policy (Programme Committee for RDI Policies), established to support the Recovery and Resilience Plan (RRP) governance. This ensures the unitary nature of the governance system and the unified coordination of RDI measures across all sectoral strategies, as well as the coordinated and optimal functioning of the line ministries and the relevant agencies in the pursuit of the objectives of individual strategies.

After the abovementioned reorganisations, S5 will be revised and updated in Q4 2023.

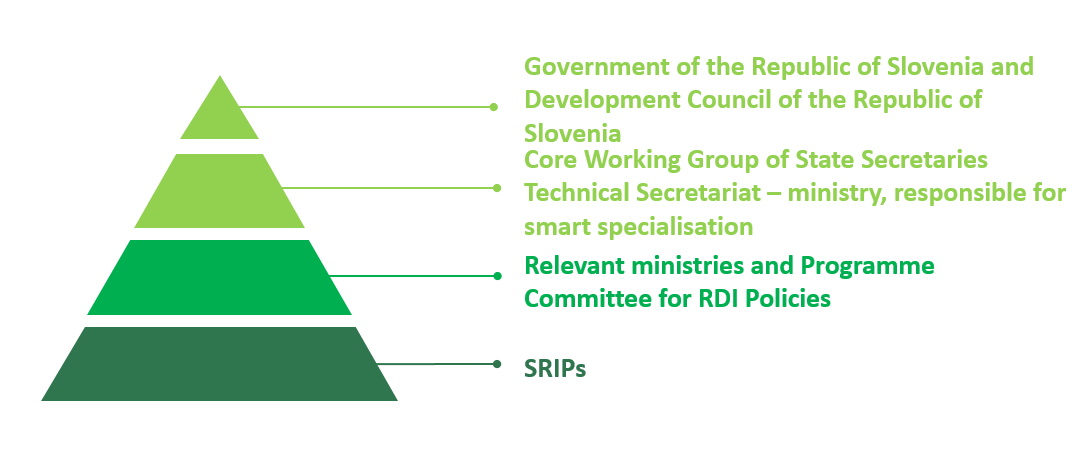
The three-level S5 governance model reflects the concept of a quintuple helix model[[61]](#footnote-61):

1. **Decision-making level and implementation of measures: the Government of the Republic of Slovenia** adopts the ZRISS 2030 proposal and takes note of the S5. The National Assembly of the Republic of Slovenia adopts the ZRISS 2030 and ZZrID. The Government implements the S5 policy mix within its competence. The **Development Council of the Republic of Slovenia**[[62]](#footnote-62)is the expert advisory body to the Government in the field of scientific research and innovation activity.

* At the operational level, S5 governance is carried out by a Core Group of State Secretaries (line ministries, responsible for Cohesion Policy, economy, science and information society). Until the reorganisation is completed, S5 governance will be carried out also within the Programme Committee for the Operational Coordination for RDI Policies[[63]](#footnote-63), which was established to support the RRP governance.
* The Government of the Republic of Slovenia takes note of the reports on the evaluation of S5 implementation proposed by the Core Working Group of State Secretaries.
* The Smart Specialisation Coordination Division at the line ministry responsible for Cohesion Policy acts as the Technical Secretariat of the Core Group of State Secretaries.

1. **Implementation of measures:** The policy mix measures shall be implemented by line ministries and the relevant agencies. The Programme Committee for RDI Policies shall coordinate the formulation and implementation of the RDI policies.
2. **Stakeholder implementation level and the entrepreneurial discovery process – SRIPs**

Figure 3: Levels of governance



Source: SVRK

The above-presented organisation ensures continuity of governance, all the while preserving the most vital element of the continuous entrepreneurial discovery concept, namely the dynamic characteristic of SRIPs’ action plans, which are the gravity centre of the entrepreneurial discovery process and are introduced into the governance system as soon as they are adopted. As the upper level of governance involves all relevant ministries, a **Core Working Group of State Secretaries** (responsible for RDI, entrepreneurship, digitalisation and Cohesion Policy) has been established to discuss the action plans on an ongoing basis. Competent State Secretaries of other ministries are also involved, depending on the priority areas of the action plans (i.e., agriculture, labour, tourism, health, foreign affairs, environment and space, development, etc.).

ZZriD defines how to ensure **coherence between** **ZRISS 2030**[[64]](#footnote-64) **and S5** and how to ensure unified governance. Article 7 of ZZriD sets out how to align the process of identifying national strategic development priorities and how to set up and align the mechanism for their implementation, including the governance system according to the provisions and procedures on S5 drafting and implementation. Article 8 of ZZriD sets out the tasks of the Development Council of the Republic of Slovenia, the government sector-specific consultative body in the field of scientific research and innovation activities, and Article 9 sets out its composition. Members of the Development Council, listed in the order of their position within the Council, are the presidents of the Slovenian Academy of Sciences and Arts, the Slovenian Engineering Academy, the Slovenian Rectors’ Conference, the Coordination of Independent Slovenian Research Institutes, the Board of SID Bank and the Chamber of Commerce and Industry of Slovenia, and directors of the Slovenian Research Agency, the agency responsible for technological development, the Slovene Enterprise Fund and the ministers responsible for science, education, technology, finance, information society, energy, environment, space, agriculture, development and Cohesion Policy. The appointed members are the representative of representative trade unions, nominated by representative trade unions in the field of science and higher education, a representative of the Strategic Research and Innovation Partnerships, supportive innovation environments, doctoral students and young PhDs, two representatives of researchers and one representative of researchers of Slovenian origin living and working abroad.

At the level of the Government of the Republic of Slovenia, the ministry responsible for Cohesion Policy is responsible for the coordination of S5. Coordination is carried out in close cooperation with government stakeholders: (i) closest to the ministries, responsible for the economy, science and the information society by establishing close cooperation with those State Secretaries of the Core Working Group of State Secretaries, responsible for the listed areas; (ii) with ministries that make a key contribution to achieving the S5 goals in their respective areas of competence (green transition, education, agriculture, infrastructure, public administration, culture and foreign affairs), and (iii) with representatives of implementing institutions, in particular the Slovenian Research Agency, the Slovenian Public Agency for Entrepreneurship, Internationalisation, Foreign Investment and Technology, the Slovenian Tourist Board, the Slovenian Export and Development Bank, the Slovene Enterprise Fund, the Public Fund of the Republic of Slovenia for Regional and Rural Development, the Public Scholarship, Development, Disability and Maintenance Fund of the Republic of Slovenia, and the Employment Service of Slovenia.

The Core Group of State Secretaries approves amendments to the SRIP action plans and additional focusing of S5 at the level of focus areas and product directions. The Government of the Republic of Slovenia is responsible for approving amendments at a higher level of prioritisation – at priority areas.

Technical support to the Core Group of State Secretaries is provided by Smart Specialisation Coordination Division at the line ministry responsible for Cohesion Policy. It also coordinates the monitoring and evaluation system supported by a consortium of independent evaluators selected in the frame of a public call.

The **stakeholder implementation level** is - in the form of a continuous Entrepreneurial Discovery Process open to all interested stakeholders (civil society, knowledge institutions, culture and creative sector, economy, environment, media, etc.) who submit initiatives and proposals regarding S5 implementation and content to the Smart Specialisation Coordination Division or directly to SRIPs.

## The role of Strategic Research and Innovation Partnerships

Strategic Research and Innovation Partnerships (SRIPs) are the main institutional form of S5 governance at S5 priority area level. SRIPs were established at the end of 2016 and are financially supported by the state, with part of the funds coming from stakeholders. SRIPs have managed to bring together most breakthrough R&D institutions and companies of different sizes and establish close cooperation in the development of new products, technologies, services and processes. In November 2022, SRIPs had a total of 958 members[[65]](#footnote-65). Membership in SRIPs has no direct impact on the allocation of funds to projects, as the funds are allocated on a competitive basis.

SRIPs allow for systemic and long-term cooperation between stakeholders in individual areas, externally and with the country, making long-term and continuous support for such strategic development clusters thus more important. The latter was also underlined by the evaluation of SRIPs for the 2017-2021 period (Bučar M. (ed.), 2022).

In the new 2021-2027 programming period, the activities of SRIPs will be supported with a tailored-made policy mix under Policy Objective 1 in synergy with RRP measures. The supportive policy mix will primarily focus on concentrating the relevant experts in development clusters for the creation of new business models and industry transformation, on knowledge transfer in the quintuple helix and on ensuring the availability of integrated demonstration, innovation and experimentation equipment in S5 priority areas. In this respect, the structures of intermediary organisations in the supportive environment for promoting entrepreneurship and innovation (intermediaries*[[66]](#footnote-66)*) established or planned by the Republic of Slovenia in the 2014-2020 programming period will be appropriately integrated.

SRIPs operate on the basis of action plans which are regularly amended in accordance with the dynamics of development activities in international value chains. Together with the state, SRIPs co-design Slovenia’s development policy by jointly defining national strategic development priorities, through a continuous entrepreneurial discovery process. This means creating and upgrading value chains at home and integrating them in European value chains, developing more complex joint R&D projects and opening doors to international development and innovation platforms.

The core task of financing SRIPs involves identifying (mapping) the competitive advantages and competences of individual actors (members and non-members of SRIPs) in value chains, which is the basis of the entrepreneurial discovery process. Action plans are, therefore, constantly updated and modified.

The key functions of strategic partnerships are:

* **integrating and developing joint RDI initiatives**: including focusing research capacities for developing and marketing more complex, comprehensive and integrated products and services;
* **internationalisation**: market internationalisation is based on the export of innovative Slovenian products, services and processes, focusing on positioning innovative Slovenian products, services and processes in global value chains, while development internationalisation implies the involvement of Slovenian innovation stakeholders in European and global R&D and technology projects and platforms, enabling Slovenian companies and knowledge institutions to participate in European and global value chains. Closer cooperation between SRIPs and the state, i.e., the relevant ministries (in particular, the ministries responsible for Cohesion Policy, entrepreneurship, RDI, foreign affairs, health and labour) is crucial;
* **human resource development**: there is a growing awareness of the need for SRIP members to play an active role in education and training, as both research and business organisations face an increasing shortage of adequately qualified staff. Pilot activities are currently being carried out in long-term planning of human resources and skills needs. As providing adequately qualified staff is an issue for all SRIPs, they should cooperate in the area of human resources development (including awareness raising and training of human resources professionals for twin transition) and cooperate with the state (training in the public sector for those directly involved in S5 implementation);
* **representing common interests of SRIP members vis-à-vis the state**: initiatives for innovative public procurement, needed amendments of sector-specific legislation, proposals for economic diplomacy priorities, establishing conditions for calls for proposals and state instruments to support S5, preferential treatment when issuing consents for investments, etc.;
* **supporting twin (digital and green) transition and industrial transformation**: SRIPs play a key role in ensuring a successful twin transition. ICT and the transition to a low-carbon circular economy have two roles in this process. In addition to finding breakthrough solutions within vertical integration, their horizontal operation and the integration of the content of both areas is essential to support the transformation of other SRIPs.

**Cooperation between SRIPs**

SRIPs have different knowledge and technologies and if they cooperate, crucial synergies are created. Cooperation between SRIPs facilitates the identification of promising areas, technologies and products and the development of the area. It brings multiplying effects that benefit companies and increase their competitiveness by creating complex value chains. Finding common areas of interest enhances their performance and visibility and attracts new members, which all impacts the success of S5 implementation.

The evaluation of the performance of the SRIPs for the period 2017-2021 (Bučar M. (ed.), 2022) stresses that SRIPs should enhance their cooperation, especially in the area of horizontal enabling technologies and in the fields they have in common (e.g., mainstreaming sustainable development as a starting principle for all priority areas).

The priorities and resources earmarked for green and digital transformation in the next period strengthen the interest and need for cooperation. **Table 2** in Chapter 3.1 shows that cooperation is inevitable in the areas and technologies covered by horizontal networks and KETs. The concept of the transition to a circular economy is already embedded in the modus operandi of the individual priority areas of application and in the activities of relevant SRIPs (sustainable food production, sustainable tourism), which are committed to improving various sustainability indicators through strategies and investment incentives. Individual SRIPs have identified areas where they could cooperate with other SRIPs, and a set of common areas where solutions could be found more quickly by joining forces: human resources, internationalisation, promotion, environment, enabling technologies[[67]](#footnote-67). Systemic support for cooperation[[68]](#footnote-68) needs to be established, which would include SRIPs from the start-up phase.



# S5 monitoring and evaluation

An effective system of monitoring and evaluating S5 implementation is essential for identifying the progress made towards achieving the set S5 goals and indicators, and for evaluating whether S5 is being implemented effectively, efficiently and adequately. Based on experience and identified gaps (one of which is to identify the ways and forms of integration and cooperation between SRIPs, in particular in connecting all focus areas with horizontal networks and KETs, and in common areas, including the development of skills), Slovenia will build on the system already in place and ensure the continuity of the process in both substantive and financial terms.

S5 goals and monitoring indicators are based on the SDS 2030 objectives, the analytical bases for S5 design and upgrade, and the consultations with stakeholders within the entrepreneurial discovery process, in particular with SRIPs. They relate and correspond also to the objectives and indicators of other relevant strategic documents of the Republic of Slovenia (e.g., ZRISS 2030, the Slovenian Industrial Strategy 2021-2030, Digital Slovenia 2030, NpUI, the Integrated National Energy and Climate Plan of the Republic of Slovenia, etc.).

The S5 monitoring and evaluation system is based on the so-called theory of change and the results chain model and, thus, includes a strategic objective (at the S5-wide level) and specific objectives (at the level of S5 priority areas), which will be monitored and evaluated with input indicators, activity indicators, output and result indicators[[69]](#footnote-69). S5 monitoring and evaluation focus on:

* the implementation of the S5 policy mix (i.e., the whole set of measures and individual measures),
* the processes in the context of the (follow-up) focus on the ten S5 priority areas and their governance, in particular on SRIP activities.

Monitoring the progress and achievements of S5 implementation and governance is in line with the system in place for EU Cohesion Policy. The system is upgraded with the reporting on S5 performance. **The first report is prepared at the S5 update phase, scheduled for the last quarter of 2023** after the planned institutional changes in the innovation ecosystem have been implemented. S5 monitoring is done in the framework of the periodic national reporting and reporting to the European Commission regarding EU Cohesion Policy implementation, as well as in the framework of the (special) evaluation reports on S5 performance. The frequency of the latter will be defined in the planned update of S5.

Evaluating whether S5 is being implemented effectively, efficiently and adequately will be based on mid-term and final evaluations of the policy mix and the individual measures. S5 evaluation shall take place through:

* evaluations of individual innovative, new and strategically important measures implemented under EU Cohesion Policy;
* continuing the engagement of a consortium of external evaluators financed by the partner ministries (MGRT, MIZŠ, SVRK) since 2015, together with the Slovenian Research Agency, through the Targeted Research Programme instrument. A final evaluation of SRIPs’ performance in the 2017-2022 period will be prepared (Bučar M. (ur.) 2022), which will also provide recommendations for improvements. The Operational Programme indicators related to S4, Research and Innovation Strategy of Slovenia, the Slovenian Industrial Strategy and SRIPs’ action plans will be consolidated. Data flows will be analysed, structured and integrated, taking into account the final evaluation of SRIPs. The effectiveness and efficiency of the measures implemented under PO1, PO3 and PO10 of the Operational Programme for the Implementation of the EU Cohesion Policy 2014-2020 will be evaluated. A methodology for monitoring the PO1 policy mix under the Cohesion Policy Programme 2021-2027 will be prepared.

The indicators for monitoring S5 goals, listed in the supporting document, will be updated[[70]](#footnote-70) according to the methodology for monitoring the overall policy mix under PO1.

S5 monitoring and evaluation involves the use of various tools to gather data on the identified S5 indicators, namely the e-MA information system, publicly accessible databases (SURS, Agency of the Republic of Slovenia for Public Legal Records and Related Services, Eurostat, etc.), databases and records of national and public authorities, databases and records of stakeholders involved in S5 governance (SRIPs) and data obtained from external contractors – evaluators, which includes capturing qualitative data.

The management of the S5 monitoring and evaluation system takes place at the national level and the stakeholder level:

The state monitors S5 implementation and commissions, contracts and informs the interested public about evaluations carried out by external contractors:

* Regular, periodic monitoring: Cohesion Policy Office of the ministry responsible for Cohesion Policy prepares reports on EU Cohesion Policy implementation, which also cover areas relevant for the monitoring and evaluation of S5 implementation:
  + national reporting on EU Cohesion Policy implementation, focusing on monitoring the progress regarding the use of the available EU Cohesion Policy funding for the entire PO1 and part of PO6;
  + annual reporting to the European Commission[[71]](#footnote-71) on EU Cohesion Policy implementation, which is more qualitative and in-depth, including a brief description of the measures implemented under PO1 and part of PO6, a definition of the progress made regarding the implementation of measures according to output and result indicators, and a brief description of the plan and implementation of the evaluations of the individual measures under PO1 and part of PO6;
* Periodic evaluation reports on S5 implementation[[72]](#footnote-72): the S5 division within the ministry responsible for EU Cohesion Policy collects data on the identified S5 indicators, prepares (specific) reports which include an overview of the progress made regarding the achievement of the S5 goals and indicators, and the S5 policy mix, the S5 governance model and international cooperation relevant to S5. The division provides technical and substantive support to the Core Working Group of State Secretaries, which reports to the Government of the Republic of Slovenia on the implementation of S5, adopts guidelines for drafting proposals for S5 amendments and updates, takes note of the results of evaluations, guides the policy mix accordingly, and monitors the activities of SRIPs and considers and approves their action plans. The Government of the Republic of Slovenia takes note of the evaluation reports on S5 implementation.
* Ministries and competent (implementing) institutions monitor the implementation of measures under their responsibility and evaluate selected innovative, new and strategically important measures with the help of external contractors.

Stakeholder participation in S5 monitoring and evaluation takes place in the frame of the entrepreneurial discovery process, which includes the definition of S5-wide goals and indicators, and the definition of objectives and indicators at the level of individual priority areas. Stakeholders are also involved in carrying out evaluations of certain S5 measures and in the drafting of S5 amendments and upgrades.

* Through their action plans and annual reports, SRIPs provide the national level with information on their functioning and certain data on S5 monitoring indicators.
* External contractors/evaluators prepare evaluations for specific innovative, new and strategically important measures.
* The Monitoring Committee for the Cohesion Policy Programme 2021-2027 comprises representatives of ministries, services and offices, economic and social partners, non-governmental organisations, local communities, urban development, the Council of Regions and disability organisations. The Monitoring Committee takes note of the S5 implementation progress and S5-relevant evaluations.



# Sources of funding

The financial plan outlines the different sources of funding that contribute in a complementary manner to achieving the set S5 goals.

In the framework of EU Cohesion Policy, which is Europe’s key investment policy for growth and jobs, ERDF is the key source of funding for investments under Policy Objective 1 – A smarter Europe. Thus, ERDF funding is identified separately in **Table 4**, which breaks down the financing of this main objective by outlining national co-financing, the already provided funding for the same or similar measures financed under the integral part of State budget, and the estimated value of business investments. Taking into account the EU part of **EUR 707 million**, the total funding equals **EUR 2,055 million**, meaning that Slovenia needs to commit additional funding that is twice the amount invested by the EU.[[73]](#footnote-73)

**Table 5** outlines the funding from other complementary sources or measures, which are divided into four main sources, namely measures of other policy objectives under EU Cohesion Policy, measures under the Common Agricultural Policy Strategic Plan, Just Transition Fund resources, and resources for measures financed from the integral part of the State budget, which are not directly covered in Table 4 under the integral part of the State budget, as these are complementary measures which cannot be considered as measures, financed under EU Cohesion Policy, but which contribute to S5 goals. As in Table 4, the national co-financing (where applicable), the funds already provided for the same or similar measures financed from the integral part of the State budget, and the estimated value of business investments are added to these resources. The table shows that the total funding is estimated at a minimum of **EUR 647 million**, bearing in mind that not all measures/resources are yet taken into account, as only measures which have already been agreed on and for which resources have already been earmarked are identified.

The funding available under the Recovery and Resilience Plan is also added to EU Cohesion Policy funding and the complementary sources, in particular financing of integrated strategic project on the decarbonisation of Slovenia, the digital transformation of industry/businesses, and, indirectly, the modernisation of the digital environment of public administration and public e-services for businesses by sector (e.g., the green Slovenian location framework, consolidation of entry points to facilitate and simplify access to e-services, opening and promoting the use of state data to develop the economy and the entire ecosystem), financing of research and innovation projects for the transition to a green and digital society, etc.). Table 5 lists only the measures of the components most directly connected to S5 implementation.

**Complementarity of measures, described in S5, between the MFF and the RRP**

Measures planned under the MFF 2021-2027, Policy Objective 1, to support RDI, entrepreneurship, skills, and digitalisation will also receive funding available under the Recovery and Resilience Facility. The description of the delimitation and complementarity is partly addressed in the RRP, and in more detail in the MFF 2021-2027 programming documents. For S5, the key areas of complementarity with the individual components of the RRP development areas are Smart, Sustainable and Inclusive Growth; Digital Transformation; Green Transition; and Health and Welfare. **Table 6** identifies RRP measures that directly contribute to S5 implementation, and **Table 7** the RRP measures that contribute indirectly to S5 implementation.

These are calls for proposals and other forms of support that, together with the RRP, either (i) address other target groups than PO1 (e.g., larger companies in the case of digital transformation of the economy; under PO1, mainly SMEs), (ii) support larger investments in the form of subsidies (e.g., increasing productivity, competitiveness, resilience and decarbonisation of the economy, and preserve jobs, under PO1 small-scale investments by SMEs, incentives for SMEs under financial instruments), (iii) address green research investments (e.g., RDI demonstration and pilot projects, under PO1 all S5 focus areas), or in terms of the timing component of the availability of funds, provide funding stability (e.g., research and innovation projects in support of the green transition and digitisation (TRL 3-6 and TRL 6-8), in line with S5 as in PO1).

In addition to investments, we should also mention the reforms outlined in the RRP which will have a significant indirect impact on enhancing the efficiency of the research and innovation ecosystem, the effectiveness and stability of measures, creating a more business-friendly environment, and improving the efficient use of the different sources of funding. Other reforms (in the areas of de-bureaucratisation, reform of the public procurement system, strengthening of capital markets and reform of construction and land-use legislation), key to S5 measures that foster development, the so-called non-financial incentives, will also contribute to improving Cohesion Policy implementation.

Funding will also be available under complementary policies such as rural development policy (included in Table 5), maritime, fisheries and aquaculture development policy, EU central programmes (e.g., Horizon Europe, Digital Europe, I3), national development programmes (e.g., for funding basic research), etc.

Table 4: ERDF funding, EU Cohesion Policy 2021-2027 in EUR million[[74]](#footnote-74)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Area**  **EU Cohesion Policy 2021-2027**  **Policy Objective 1** | **ERDF**  **(EU part)** | **National co-financing** | **Total EU Cohesion Policy** | **State budget – planned integral budget resources (2023-2027)** | **Complementary business investments (estimate 2023-2027)** | **TOTAL** |
| 1.1. Developing and enhancing research and innovation capacities and the uptake of advanced technologies | 413.90 | 149.05 | 562.95 | 195.92 | 410.75 | **1,169.62** |
| 1.2. Digital transformation | 87.92 | 50.30 | 138.22 | 208.20 | 8.68 | **355.10** |
| 1.3. Enhancing sustainable growth and competitiveness of SMEs and job creation in SMEs, including by productive investments | 183.18 | 47.51 | 230.69 | 0.00 | 257.00 | **487.69** |
| 1.4. Developing skills for smart specialisation, industrial transition and entrepreneurship | 22.52 | 9.40 | 31.92 | 3.94 | 7.00 | **42.86** |
| **TOTAL (EUR million)** | **707.52** | **256.26** | **963.78** | **408.06** | **683.43** | **2,055.27** |

Source: SVRK and ministries, November 2022

Table 5: Other sources of funding for Policy Objective 1 in EUR million

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Area** | **ERDF**  **(EU part)** | **ESF+**  **(EU part)** | **CF**  **(EU part)** | **JTF**  **(EU part)** | **EAFRD**  **(EU part)** | **National co-financing** | **Total**  **EU + national co-financing** | **State budget – integral budget resources (planned 2023-2027)** | **Complementary business investments (estimate 2023-2027)** | **TOTAL** |
| Other Policy Objectives under EU Cohesion Policy 2021-2027 | 55.65 | 2.92 | 5.00 |  |  | 19.63 | 83.20 | 0.00 | 21.04 | **104.24** |
| Just Transition Fund (JTF) |  |  |  | 248.77 |  | 43.88 | 292.65 | 0.00 | 36.38 | **292.65** |
| Common Agricultural Policy Strategic Plan 2023-2027 |  |  |  |  | 72.21 | 129.41 | 201.62 | 0.00 | 0.00 | **201.62** |
| Other measures that contribute to S5 goals – integral budget resources |  |  |  |  |  |  |  | 48.40 |  | **48.40** |
| **TOTAL (EUR million)** | **55.65** | **2.92** | **5.00** | **248.77** | **72.21** | **192.92** | **577.47** | **48.40** | **21.04** | **646.91** |

Source: SVRK and ministries, November 2022[[75]](#footnote-75)

Table 6: RRP sources of funding (in EUR million) – direct connection to RRP measures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Development area** | **Component** | **Measure** | **Code[[76]](#footnote-76)** | **Value in EUR million** |
| **Smart, sustainable and inclusive growth** | RDI – research, development and innovation | Co-financing of research and innovation projects in support of green transition and digitalisation (TRL 3-6) | C3 K1 U2 (C3K1.I.B) | 20.0 |
| Co-financing of research and innovation projects in support of green transition and digitalisation (TRL 6-9) | C3 K1 U3 (C3K1.I.B) | 45.00 |
| Co-financing of investments in RDI and pilot programmes of international RDI | C3 K1 U4 (C3K1.I.D) | 30.00 |
| Establishing the National Food Institute as the cornerstone of an innovation ecosystem in food supply chains | C3 K1 U6 | 5.30 |
| Raising productivity, a business-friendly environment for investors | Ensuring innovation-driven business infrastructure ecosystems | C3 K2 U2 | 19.00 |
| **TOTAL in EUR million (VAT-exclusive)** | | | | **119.30** |

Source: Adopted RRP (SVRK, 2021) and ministries, 2022

Table 7: RRP sources of funding (in EUR million) – indirect connection to RRP measures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Development are** | **Component** | **Measure** | **Code[[77]](#footnote-77)** | **Value in EUR million** |
| **Green transition** | Renewable energy and energy efficiency in the economy | Investing in increasing energy efficiency in the economy | C1 K1 U3 (C1K1.I.G) | 5.00 |
| A clean and safe environment | Centre for Seeds, Nurseries and Forest Protection | C1 K3 U3 (C1K3.I.G) | 5.10 |
| Circular economy | Integrated strategic project for the decarbonisation of Slovenia through the transition to a circular economy | C1 K5 U1 (C1K5.I.B) | 20.00 |
| Increasing environmentally-friendly wood processing to accelerate the transition to a climate-neutral society | C1 K5 U2 (C1K5.I.C) | 28.00 |
| **Digital transformation** | Digital transformation of the economy | Industrial/business digital transformation agenda – call for proposals | C2 K1 U1 (C2K1.I.B) | 44.00 |
| Industrial/business digital transformation agenda – cross-border projects (grants) | C2 K1 U2 (C2K1.I.D/E/F) | 10.00 |
| Digital transformation of the public sector and public administration | Modernising the digital environment of public administration | C2 K2 U1 (C2K2.I.G) | 62.05 |
| Digitalisation of internal security | C2 K2 U2 (C2K2.I.I) | 23.63 |
| Digitising education, science and sport | C2 K2 U3 (C2K2.I.J) | 66.73 |
| Green Slovenian location framework | C2 K2 U4 (C2K2.I.K) | 33.50 |
| The digital transition in agriculture, food and forestry | C2 K2 U5 (C2K2.I.L) | 24.06 |
| Digitalisation in the field of culture | C2 K2 U6 (C2K2.I.M) | 9.90 |
| Digitalisation in the field of culture | C2 K2 U7 (C2K2.I.N) | 10.31 |
| Gigabit infrastructure | C2 K2 U8 (C2K2.I.H) | 30.00 |
| The digital transition in agriculture, food and forestry | C2 K2 U9 (C2K2.I.L) | 24.06 |
| **Smart, sustainable and inclusive growth** | RDI – research, development and innovation | Operation of governance of the RDI system[[78]](#footnote-78) | C3 K1 U1 | 14.70 |
| Raising productivity, a business-friendly environment for investors | Support investments that focus on raising productivity, competitiveness, resilience and decarbonisation of the economy, and on the preservation and creation of new jobs | C3 K2 U1 (C3K2.I.C) | 138.50 |
| Sustainable development of Slovenian tourism, including cultural heritage | Enhancing the sustainable development of tourism | C3 K4 U1 (C3K4.R.A) | 1.00 |
| The sustainable development of tourist accommodation offer to raise the added value of tourism | C3 K4 U2 (C3K4.I.B) | 69.00 |
| Strengthening competences, in particular digital competences and those required by the professions of the future and the green transition | Reform of higher education for a green and digital transition into Society 5.0 (a system that is responsive to labour market needs and creates a highly skilled workforce for professions of the future) | C3 K5 U2 (C3K5.R.B) | 2.02 |
| Pilot projects to prepare the ground for higher education reform for a green and resilient transition into Society 5.0 | C3 K5 U6 (C3K5.I.F) | 56.98 |
| **Health and welfare** | Health | Health digital transformation | C4 K1 U2 (C4K1.I.C) | 83.00 |
| **TOTAL in EUR million (VAT-exclusive)** | | | | **630.49** |

Source: Adopted RRP (SVRK, 2021) and ministries, 2022



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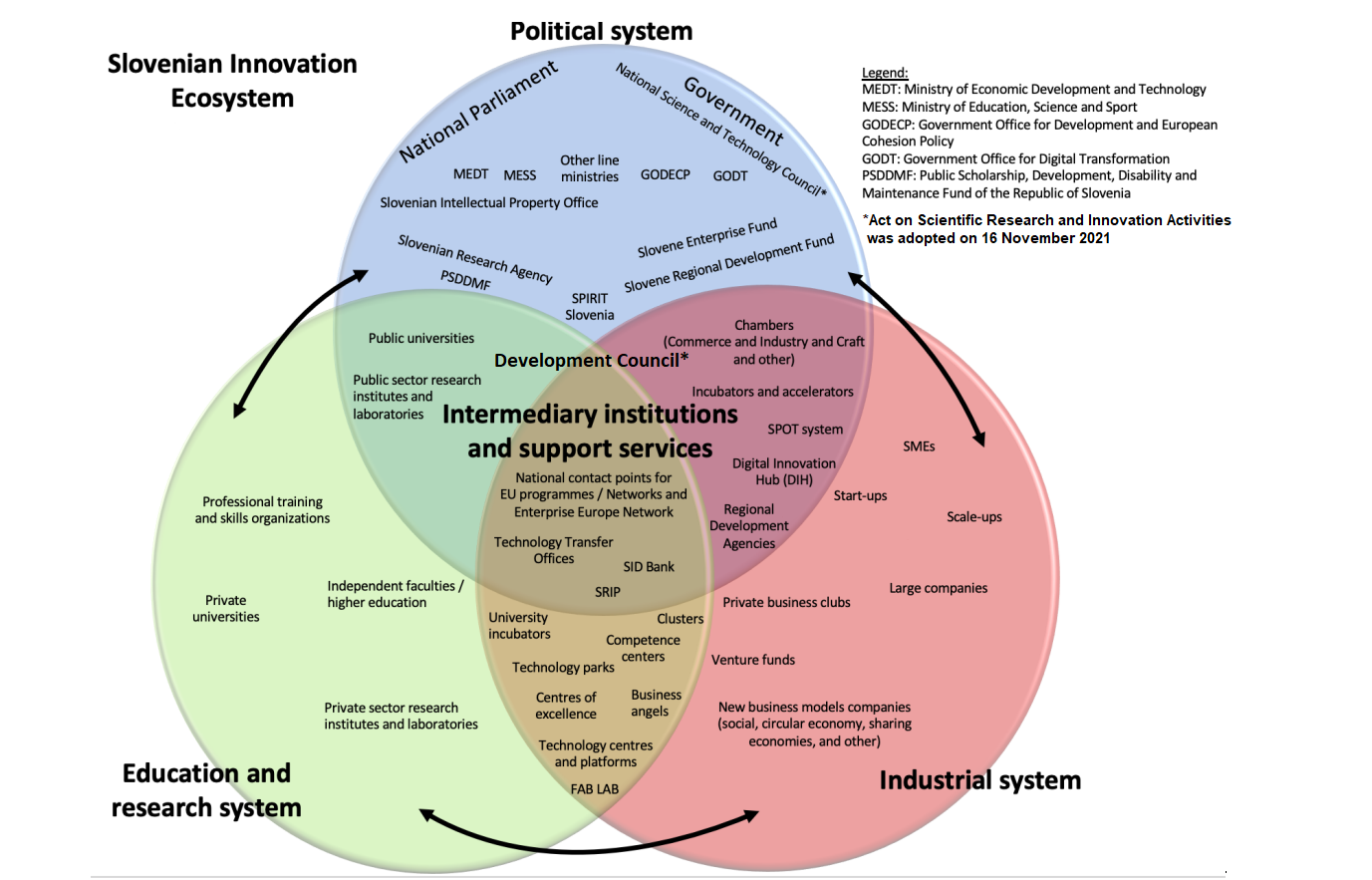
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* UMAR (2020b). Development Report 2020. UMAR, Ljubljana. Available at <https://www.umar.gov.si/fileadmin/user_upload/razvoj_slovenije/2020/slovenski/POR2020.pdf>.
* UMAR (2021). Development Report 2021. UMAR, Ljubljana. Available at <https://www.umar.gov.si/fileadmin/user_upload/razvoj_slovenije/2021/slovenski/POR2021_skupaj.pdf>.
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* UMAR (2022c). Productivity Report 2022. UMAR, Ljubljana. Available at [PoP\_2022.pdf (gov.si)](https://www.umar.gov.si/fileadmin/user_upload/sporocila_za_javnost/2022/Sporocila_za_javnost/Konferenca_PoP22/PoP_2022.pdf).
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* VVA et al. (2022). Report with actionable recommendations (contract REFORM/SC2020/100, Strengthening the Innovation Ecosystem in Slovenia). Valdani Vicari & Associati, N-able, OIKOS, KPMG. Available at <https://www.podjetniski-portal.si/uploads/gradiva/krepitev_inovacijskega_ekosistema/srss161sloveniaecosystem_d4_reccommendations_report.pdf>.
* ZZrID – Scientific Research and Innovation Activities Act (2021). Official Gazette of the Republic of Slovenia, No. 186/21. Available at Zakon o znanstvenoraziskovalni in inovacijski dejavnosti (ZZrID) (pisrs.si).



# List of supporting documents

|  |  |
| --- | --- |
| **Supporting document** | **Relation to S5 chapter** |
| [Report on the implementation of the Resolution on the Slovenian Scientific Research and Innovation Strategy 2011-2022 by 2020](https://www.gov.si/assets/ministrstva/MIZS/Dokumenti/ZNANOST/Strategije/Porocilo-RISS-2020-sprejeto.pdf), May 2021 | 1. Background, purpose and goal |
| Description of the Entrepreneurial Discovery Process (EDP) | 2. S5 design process |
| Study on the Slovenian knowledge space, tax policy and foreign direct investments and integration into global value chains: [Empirically Led Internationalisation of S3, Davies, Kogler, Crescenzi, March 2020](https://www.gov.si/assets/vladne-sluzbe/SVRK/S4-Slovenska-strategija-pametne-specializacije/Studija-o-slovenskem-prostoru-znanja-slovenski-davcni-politiki-in-tujih-neposrednih-investicijah-ter-vkljucenosti-v-globalne-verige-vrednosti.pdf) | 2. S5 design process |
| Study on the competitiveness of the Slovenian economy by industry and research activity, based on the latest data – [Expert analysis as a basis for the Smart Specialisation Strategy, Final Report, Šušteršič, Burger, Kotnik, Breznik, December 2020](https://www.gov.si/assets/vladne-sluzbe/SVRK/S4-Slovenska-strategija-pametne-specializacije/Studijakonkurencnosti-slovenskega-gospodarstva-po-panogah_dejavnostih-in-raziskovalnih-dejavnosti-na-podlagi-najnovejsih-podatkov.pdf) | 2. S5 design process  3. Setting the stage for S5 prioritisation |
| Table of focus areas and technologies, and products | 3. Setting the stage for S5 prioritisation |
| Rationale for S5 priority areas | 3. Setting the stage for S5 prioritisation |
| Research infrastructure mapping: Analysis of the state of play and rationale for investment needs in research infrastructure for the 2021-2027 programming period, February 2021 | 4. Planned measures |
| International cooperation analysis | 5. International cooperation |
| S5 performance indicators | 7. S5 monitoring and evaluation |

# Annex 1: Mapping of actors in the innovation ecosystem[[79]](#footnote-79)



Source: VVA et al. (July 2021). Current state of play of the Slovenian national innovation ecosystem – Report for the Strengthening the Innovation Ecosystem in Slovenia project – DG REFORM. Mapping of actors in the innovation ecosystem, applicable on 24 September 2021. SVRK upgraded the diagram by adding the Development Council of the Republic of Slovenia, which will replace the Council of Science and Technology of the Republic of Slovenia, in accordance with the ZZrID.

# Annex 2: Focus areas and product directions under the ten S5 priority areas











1. Smart Specialisation Strategy. [↑](#footnote-ref-1)
2. Slovenian Smart Specialisation Strategy. [↑](#footnote-ref-2)
3. Source: Government Office for Development and European Cohesion Policy. [↑](#footnote-ref-3)
4. The Scientific Research and Innovation Activities Act (ZZrID) that was adopted in November 2021 (Official Gazette of the Republic of Slovenia, No 186/2021 of 30 November 2021) sets out, inter alia, that RDI should see long-term stable growth in funding from the state budget. [↑](#footnote-ref-4)
5. The remaining indicators are identified in the supporting document S5 performance indicators. [↑](#footnote-ref-5)
6. Regulation (EU) 2021/1056 of the European Parliament and of the Council of 24 June 2021 establishing the Just Transition Fund. [↑](#footnote-ref-6)
7. The methodology for the evaluation of performance of SRIPs was prepared following the contract concluded with the consortium of evaluators under the 2016 Target Research Projects (project V5 1646 Strategic Research and Innovation Partnerships as a tool to strengthen innovation capacity of the Slovenian economy). The first evaluation was carried out in 2019. The findings of the evaluation were used a year later to feed the decision on the allocation of funding for the third phase of operation of SRIPs. [↑](#footnote-ref-7)
8. See Chapter 6. [↑](#footnote-ref-8)
9. UMAR cites SURS, 2020: Digital Entrepreneurship, detailed data. [↑](#footnote-ref-9)
10. Slovenia's approach to S4 planning and implementation places it in **the top third of European regions as a strong S3region** both from the aspect of level of focus on technological and non-technological areas and from the aspect of implementing S4 in terms of channelling available funding to S4 priority areas. [↑](#footnote-ref-10)
11. The entire process is documented in the supporting document of original S4 (https://www.gov.si/assets/vladne-sluzbe/SVRK/S4-Slovenska-strategija-pametne-specializacije/Podporni-dokumenti.pdf). [↑](#footnote-ref-11)
12. See supporting document Description of the Entrepreneurial Discovery Process (EDP). [↑](#footnote-ref-12)
13. Event recordings are available at: https://www.youtube.com/channel/UCpxrtna\_E2WY4kspbwGjmTg/videos. [↑](#footnote-ref-13)
14. The role of SRIPs in the governance structure is described in Chapter 6 Governance. [↑](#footnote-ref-14)
15. See also subchapters 2.1 Empirical bases and 2.2 Entrepreneurial discovery process in Slovenia. [↑](#footnote-ref-15)
16. Nine SRIPs were established on the basis of a call for proposals issued by MGRT in 2016. See sub-chapter 6.1 Role of SRIPs. [↑](#footnote-ref-16)
17. Key Performance Indicators. [↑](#footnote-ref-17)
18. See Chapter 7 for more information about monitoring and evaluation. Key performance indicators for each priority area are outlined in the S5 supporting document. [↑](#footnote-ref-18)
19. SRIP action plan is a programming document that was developed to support S4 and represents the basis for the implementation of SRIP activities. An individual action plan is drafted by the respective SRIP and approved by the Core Working Group of State Secretaries (see Chapter 6 Governance). At the same time, SRIP action plan acts as one of the central mechanisms propelling EDP. [↑](#footnote-ref-19)
20. See Chapter 6 Governance. [↑](#footnote-ref-20)
21. ZRISS 2030 (Official Gazette of the Republic of Slovenia, No 49/22) identifies the following core intervention areas: (i) Environmental research, sustainable management and conservation of natural environment, natural resources, biodiversity, agriculture, forestry and food, sustainable and rational use of resources; (ii) Digital transformation of the economy and society as a whole through the support and development of high performance computing for data-intensive modelling and its use through integration in EU and global development flows; ( iii) Quality of life, health and security for all generations; (iv) Sustainable management of energy, food and water sources amid climate change pressures; (v) Challenges of sustainable economic transformation, particularly energy-related challenges (energy storage and sources) and challenges of sustainable mobility of the future and the associated challenges of the transition to a circular economy and sustainable society by taking into account the principles of just transition. [↑](#footnote-ref-21)
22. Point 2 of Article 5 of ZZrID defines **national strategic development priorities** as priority areas for scientific research and innovation activity and, where relevant, priorities of other sectoral policies regarding the provisions and procedures for the preparation and delivery of smart specialisation as set out in Cohesion Policy regulations. [↑](#footnote-ref-22)
23. Blue economy encompasses all economic activities related to oceans, seas and coasts both offshore (e.g. maritime transport, fisheries and energy production) and inland (e.g. port activities, shipbuilding, aquaculture and inland production of algae, coastal tourism). [↑](#footnote-ref-23)
24. Analysis of links between technological areas of blue bioeconomy and S4 focus areas and product directions, Ljubljana Technology Park, internal documents of Blue Bio Med project. [↑](#footnote-ref-24)
25. Slovenia is below the EU-average, ranking 24th according to the Active Ageing Index for 2018. The ranking was low due to poor results under the indicator employment. The Index measures the level to which older people live independent lives, participate in paid employment and social activities as well as their capacity for active ageing. It comprises four domains (i) Employment (ii) Participation in society, (iii) Capacity and enabling environment for active ageing, and (iv) Independent, healthy and secure living (Source: AAI 2018, available at [ECE-WG-33.pdf (unece.org)](https://unece.org/DAM/pau/age/Active_Ageing_Index/ECE-WG-33.pdf)). [↑](#footnote-ref-25)
26. The remaining enabling technologies fall under priority area FoF. [↑](#footnote-ref-26)
27. SRIP Smart Cities and Communities encompasses vertical value chains and ICT Horizontal Network in S4, with each component coordinated by a different beneficiary on the basis of its own action plan. The evaluation addressed separately the implementation of each of these components. SRIP Smart Cities and Communities is wrapping up the third phase of operation, i.e. period 2020-2023, in accordance with the existing business model. The revamped business model involving two partnerships will be in place by the launch of S5. [↑](#footnote-ref-27)
28. Source: SRIP Smart Cities and Communities: Assessment of market potential of SRIP Smart Cities and Communities, Analytics of Chamber of Commerce and Industry of Slovenia, April 2021. [↑](#footnote-ref-28)
29. Source: SRIP Smart Cities and Communities: Assessment of market potential of SRIP Smart Cities and Communities, Analytics of Chamber of Commerce and Industry of Slovenia, April 2021. [↑](#footnote-ref-29)
30. The demarcation between horizontal networks and product directions of the remaining SRIPs is shown in the supporting document. [↑](#footnote-ref-30)
31. Source: SRIP Smart Cities and Communities: Assessment of market potential of SRIP Smart Cities and Communities, Analytics of Chamber of Commerce and Industry of Slovenia, April 2021. [↑](#footnote-ref-31)
32. Source: SRIP Smart Cities and Communities: Assessment of market potential of SRIP Smart Cities and Communities, Analytics of Chamber of Commerce and Industry of Slovenia, April 2021. [↑](#footnote-ref-32)
33. Source: SRIP Health - Medicine, October 2021 and October 2022. [↑](#footnote-ref-33)
34. Source: SRIP Smart Buildings and Homes, including the Wood Chain: Assessment of market potential of SRIP Smart Buildings and Homes, including the Wood Chain, Analytics of Chamber of Commerce and Industry of Slovenia, July 2021. [↑](#footnote-ref-34)
35. Source: Assessment of economic impacts of restructuring the wood-processing industry in Slovenia (presentation of the study). [↑](#footnote-ref-35)
36. Source: SRIP Smart Buildings and Homes, including the Wood Chain: Assessment of market potential of SRIP Smart Buildings and Homes, including the Wood Chain, Analytics of Chamber of Commerce and Industry of Slovenia, July 2021. [↑](#footnote-ref-36)
37. Source: <https://www.kis.si/f/docs/Porocila_o_stanju_v_kmetijstvu/ZP_trgi.pdf>. [↑](#footnote-ref-37)
38. Source: <https://www.gzs.si/zaveza-odgovornosti/>. [↑](#footnote-ref-38)
39. Source: SRIP FOOD, October 2021. [↑](#footnote-ref-39)
40. As classified in the statistical classification of economic activities (NACE codes).  [↑](#footnote-ref-40)
41. Source: SRIP Circular Economy: Assessment of market potential of SRIP Circular Economy, Analytics of Chamber of Commerce and Industry of Slovenia, April 2021. [↑](#footnote-ref-41)
42. Source: SRIP Circular Economy: Assessment of market potential of SRIP Circular Economy, Analytics of Chamber of Commerce and Industry of Slovenia, April 2021. [↑](#footnote-ref-42)
43. Source: SRIP Circular Economy: Eurostat, Circular material use rate. Available at <https://ec.europa.eu/eurostat/databrowser/view/CEI_SRM030__custom_354994/bookmark/table?lang=en&bookmarkId=c6638243-2f7f-4256-b2fd-6a5159b4b68a>). [↑](#footnote-ref-43)
44. Source: SRIP Tourism, October 2021. [↑](#footnote-ref-44)
45. Tourism industry and all tourism-related activities in Slovenia generate a total of 9.9% of GDP and employ nearly 7% of the workforce (58,730 employees in 2019). [↑](#footnote-ref-45)
46. These ambitious vision and goals are aligned with the vision of the development of Slovenian tourism set out in the new Slovenian Tourism Strategy 2022–2028 (May 2022). [↑](#footnote-ref-46)
47. Source: SRIP Mobility, August 2021 and November 2022. [↑](#footnote-ref-47)
48. Source: SRIP FoF July 2021. [↑](#footnote-ref-48)
49. Source: SRIP Matpro: Assessment of market potential of SRiP Matpro, Analytics of Chamber of Commerce and Industry of Slovenia, May 2021. [↑](#footnote-ref-49)
50. In particular (i) the measure Reform of the operation and management of the RDI system under the RRP, including the already-mentioned ZZrID, and (ii) the Recommendations of the Analysis of the innovation ecosystem in Slovenia, within the framework of the programme of the European Commission Directorate-General for Structural Reform Support (DG REFORM). Slovenia will strengthen the ecosystem by implementing the recommendations which are, together with other reports and project results, available on the website of the Slovenian Public Agency for Entrepreneurship, Internationalisation, Foreign Investment and Technology (SPIRIT) at <https://www.podjetniski-portal.si/programi/krepitev-inovacijskega-ekosistema>. [↑](#footnote-ref-50)
51. Market potential is assessed at the level of the measure, i.e., at the point of the assessment of the applications for approval of the operation or as part of the assessment of the applications submitted under a call for proposals. For the co-financing of development at different TRLs, the intermediate body takes into account the specificities of the uptake of the product direction or technology by target groups. At higher TRLs (6-9), the demonstrated ability to increase market share in comparable product groups is taken into account, while the key focus for the highest TRLs is on the financing capacity and the impact on GDP and productivity. [↑](#footnote-ref-51)
52. European Commission Country Report – Slovenia 2019 and 2020. [↑](#footnote-ref-52)
53. The mapping of research infrastructure can be found in the S5 supporting document Analysis of the state of play and rationale for investment needs in research infrastructure for the 2021-2027 programming period, February 2021. [↑](#footnote-ref-53)
54. The investments outlined below shall be in line with the Digital Slovenia 2030 Strategy and the Digital Public Services 2030 Strategy (both are being prepared), as well as with the Strategy of Digital Transformation of the Economy and NpUI guidelines. [↑](#footnote-ref-54)
55. The digitisation of cultural heritage, which is important for the sustainable development of both the economy and society as a whole, will take into account Commission Recommendation (EU) 2021/1970 of 10 November 2021 on a common European data space for cultural heritage. [↑](#footnote-ref-55)
56. European Commission. Smart Specialisation Platform, register of Digital Innovation Hubs. Available at <https://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool>. [↑](#footnote-ref-56)
57. Regions in Industrial Transition: Policies for People and Places. Regional Development Policy Committee CFE/RDPC(2019)11. [↑](#footnote-ref-57)
58. The centre was established in the framework of the project High Impact Action (HIA) Slovenian Pilot for an Industry 4.0. Transformative Mechanism on the basis for the Grant Agreement 2018CE160AT115 between TECOS – Slovenian Tool and Die Development Centre, MGRT and EC. [↑](#footnote-ref-58)
59. Websites: <https://ec.europa.eu/growth/industry/strategy/industrial-cluster-policy/cluster-internationalisation_en> and <https://clustercollaboration.eu/>. [↑](#footnote-ref-59)
60. Contract REFORM/SC2020/100 implementing framework contract No SRSS/2018/01/FWC/002. [↑](#footnote-ref-60)
61. The Green Deal demonstrated the need to use the quintuple helix model. The helix is based on the creation of knowledge that turns into innovation and knowledge in society (knowledge-based society) and in the economy (knowledge-based economy) as a result of cooperation and interaction between social subsystems. The quintuple helix model represents the collective interaction and exchange of knowledge with the help of five subsystems (helixes): (i) the education system, (ii) the economic system, (iii) natural environment, (iv) civil society, and (v) the political system. [↑](#footnote-ref-61)
62. Initially, S4 foresaw the establishment of the national Innovation Platform which, due to the long process of coordinating ZZrID, never became operational. [↑](#footnote-ref-62)
63. Established by Government Decision on the establishment of the Programme Committee for the Operational Coordination for RDI Policies No 01100-1/2022/9 of 10 May 2022, and amended by Government Decision No 01101-5/2022/3 of 6 October 2022. Members of the Programme Committee for RDI Policies are representatives of MIZŠ, MGRT, SVRK, the Slovenian Environment Agency – ARSO, SPIRIT, Ministry of Agriculture, Forestry and Food, and Slovenian Export and Development bank. [↑](#footnote-ref-63)
64. ZRISS 2030 is Slovenia’s strategic document, which, in line with Article 10 of ZZrID, sets out the long-term vision, measures and the planned structure of public financial investments supporting the implementation and promotion of the development of scientific research and innovation activities. ZRISS 2030 outlines the governance of scientific research and innovation system, including the support system for research and innovation, national strategic development priorities and the goals regarding the quality of research activities, knowledge resilience and knowledge transfer to ensure innovative and high-quality economy and society, popularisation of science, creativity and innovation in society, and internationalisation. [↑](#footnote-ref-64)
65. Source: Data, provided by SRIP offices. [↑](#footnote-ref-65)
66. See Annex 1 – Mapping of actors in the innovation ecosystem. [↑](#footnote-ref-66)
67. See supporting document Rationale for S5 priority areas. [↑](#footnote-ref-67)
68. The final version of the REFORM recommendations of the Strengthening the Innovation Ecosystem in Slovenia project has been published. It addresses the roles and participation of stakeholders in the innovation ecosystem. The ecosystem will be strengthened with the realisation of the recommendations. The recommendations also envisage the **establishment of a single platform of all SRIPs** and other relevant stakeholders of the ecosystem, which would, in the frame of working groups, address topics such as technology transfer, entrepreneurial competences, internationalisation and networks, access to infrastructure, national development and innovation policy. [↑](#footnote-ref-68)
69. A more detailed definition of S5 goals and indicators, including their baseline and target values, monitoring tools, data sources and the frequency of measurement is available in the supporting document S5 performance indicators. [↑](#footnote-ref-69)
70. In accordance with the contract with the consortium of evaluators under CRP2021, the methodology will be prepared in Q4 2023. [↑](#footnote-ref-70)
71. The Member State shall report to the EC on the values of the output and result indicators for the selected operations and the values achieved by the operations by 31 January and 31 July each year in accordance with Article 42 of the Common Provisions Regulation (EU) 2021/1060. [↑](#footnote-ref-71)
72. The first reporting is prepared at the S5 update phase, scheduled for the last quarter of 2023 when the frequency of future reporting will be defined. [↑](#footnote-ref-72)
73. The ratio between the three main sources, i.e., EU/national funding/private funding, is also balanced. [↑](#footnote-ref-73)
74. The table is based on Slovenia’s Cohesion Policy Programme 2021-2027, submitted to the EC on 28 October 2022. [↑](#footnote-ref-74)
75. Estimates of complementary funding (applies chiefly to the last two columns – integral budget and business investments) are partial and conservative; the actual funding will most likely be higher. [↑](#footnote-ref-75)
76. The measure code is given in brackets, as set out in the Analysis of the recovery and resilience plan of Slovenia, Accompanying the document Proposal for a Council implementing decision on the approval of the assessment of the recovery and resilience plan for Slovenia (SWD(2021) 184 final), 1 July 2021, Annex – Climate and Digital tagging. Available at <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021SC0184&from=EN>. [↑](#footnote-ref-76)
77. The measure code is given in brackets, as set out in the Analysis of the recovery and resilience plan of Slovenia, Accompanying the document Proposal for a Council implementing decision on the approval of the assessment of the recovery and resilience plan for Slovenia (SWD(2021) 184 final), 1 July 2021, Annex - Climate and Digital tagging. Available at <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021SC0184&from=EN>. [↑](#footnote-ref-77)
78. This part of the reform of the system deals with coordination (of policies, instruments from different sources, setting of state aids, etc.) within the Programme Committee. [↑](#footnote-ref-78)
79. The list of actors is not exhaustive. The ecosystem will be strengthened through the implementation of the Recommendations of the Strengthening the Innovation Ecosystem in Slovenia project, the implementation of the provisions of the ZZrID and the reforms outlined in RRP. [↑](#footnote-ref-79)