RIS>JMK

2021-2027

Regional Innovation Strategy for the South Moravian Region, 2021–2027

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Abbreviations

CAS	Czech Academy of Sciences
CSR	Corporate Social Responsibility
ESIF	European Structural and Investment Funds
UH	University Hospital
SAUH	St. Anne's University Hospital
FTE	full-time equivalent
HC	headcount (physical persons)
GDP	Gross Domestic Product
GVA	Gross Value Added
ICT	Information and Communication Technologies
ISCO	employment classification in the CZ-ISCO system
IT	Information Technology
SMR	South Moravian Region
SM RCC	South Moravian Regional Chamber of Commerce
MENDELU	Mendel University in Brno
SMEs	small and medium enterprises
MUNI	Masaryk University
NACE	The CZ-NACE system for classifying economic activities
SM RDA	South Moravian Regional Development Agency
RCC	The Regional Chamber of Commerce for Brno
RIS	Regional Innovation Strategy
SDGs	The UN's Sustainable Development Goals
CoB	The City of Brno
AD MEP	Administrative District of a Municipality with Extended Powers
SS	secondary schools
STEAM	Science, Technology, Engineering, Arts, Mathematics
R&D	Research and Development
VPU	Veterinarian and Pharmaceutical University
RO	Research Organizations
U	Universities
BUT	Brno University of Technology
PS	primary schools

INTRODUCTION

The Regional Innovation Strategy for the South Moravian Region (RIS SMR, or RIS) is the **basic policy of the South Moravian Region (SMR) and the City of Brno (CoB) for developing economic competitiveness and adding value by introducing innovation**. It is aimed at every actor in the innovation ecosystem who has an interest in helping, through their actions, to increase the region's standard of living – to share and to make coordinated decisions. The partnership approach is absolutely key for the RIS – both for meeting its goals and for implementing them well.

The RIS is meant to stimulate good conditions for innovative enterprise in the region, primarily by raising the quality of education, encouraging researchers to get more involved in collaboration with companies and the local environment, boosting the region's image, or directly supporting business activities in places when the market has failed.

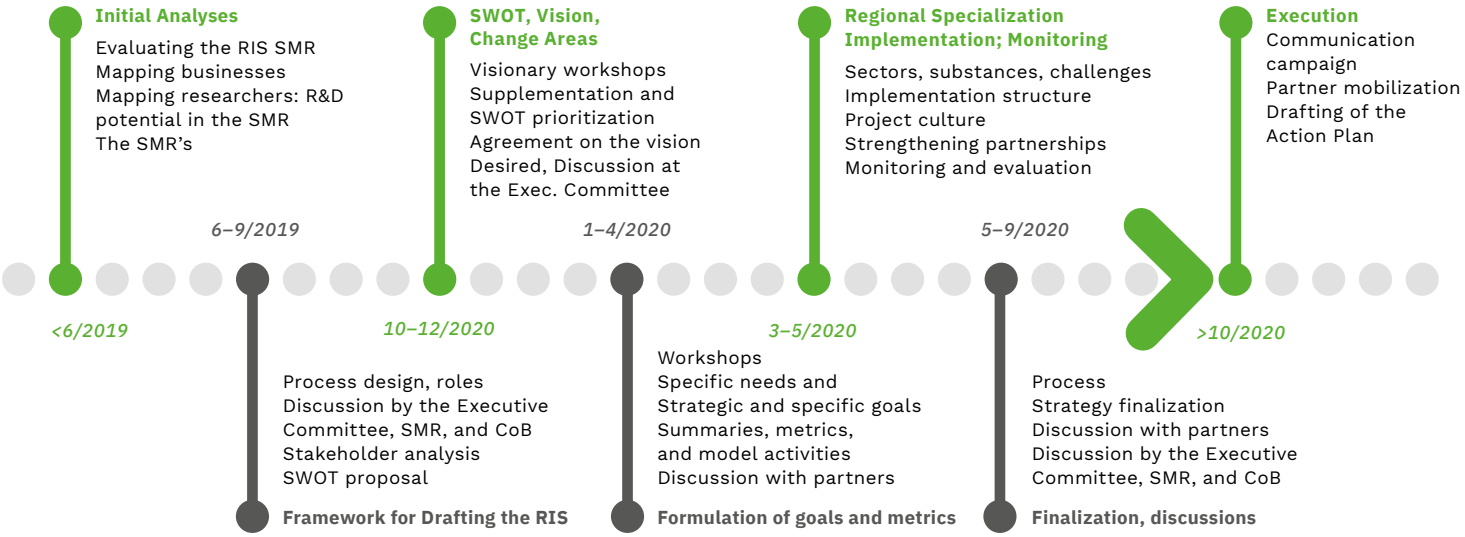
The strategy presented for the 2021–2027 period represents the fifth generation of this RIS. The SMR and the CoB are thus developing their innovation environment systematically and in the long term. **The RIS strives to coordinate all of the region's innovation-policy activities, regardless of their source of funding and implementation.** It meanwhile points out the importance of any other circumstances (externalities) that fall beyond its own competencies into those of other policies of regional administrations or the national authorities.

The RIS also acts as the so-called "intelligent specialization strategy" for the SMR[1]: **it identifies the region's specialization profile and a set of horizontal goals that, as a group, focus attention on the region's main development opportunities.** It thus fulfills a basic condition[2] for the financing of research and innovation from the European Structural and Investment Funds for 2021–2027. RIS SMR contributes with its regional topics to the National Research and Innovation Strategy for Smart Specialisation of the Czech Republic, and it indirectly serves as an implementation tool for selected priorities of the Czech Republic's Innovation Strategy for 2019–2030, The Country for the Future.

The shaping of the RIS relied upon robust analyses, valuable input, and feedback gained thanks to the participation of key personalities within the innovation ecosystem. Facilitation and consolidation work was performed by JIC, z. s. p. o. as the RIS author.

The RIS SMR is structured into two sections: analysis and proposals. The analysis section summarizes the SMR's basic starting positions in terms of its economic situation, the traits of its innovation ecosystem, and its key actors. A SWOT analysis then synthesizes these inputs and provides a bridge leading to the proposal section. The Regional Specialization chapter identifies the region's key economic sectors, global challenges, and cross-sectional competencies (vertical priorities). The proposal section formulates the vision and the strategic and specific goals (horizontal priorities) of the RIS. The strategy's goals will be met using the portfolio of projects congregated in the Action Plan. This portfolio will be updated on the fly during the strategy's implementation.

Figure 1: The Drafting Process for the 2021–2027 RIS SMR



Note: Main RIS drafting milestones and indicative deadlines are stated. Work by JIS and discussions with SMR and CoB representatives took place simultaneously.

[1] Research and Innovation Strategy for Smart Specialisation

[2] Regulation of the European Parliament and of the Council COM(2018) 375

INITIAL ANALYSES

2.1 The Region's Situation and Financial Structure

The South Moravian Region (SMR) contains the Blansko, Brno-město, Brno-venkov, Břeclav, Hodonín, Vyškov, and Znojmo districts. Its area of 7,188 km² and **population of 1.192 million people put it in fourth place within the nation**. As for its location, it has an advantageous position on the main transportation arteries toward two capital cities in surrounding states: Bratislava and Vienna.

The region can thus be characterized as **well-developed, but with large internal differences** in terms of economic performance and situations on local job markets. Its performance is driven by the economic power of Brno and its metropolitan region. Brno, with its 381,000 inhabitants, represents **the nation's second most important economic and knowledge centre**. The region contains six additional regional population centres (Blansko, Břeclav, Hodonín, Vyškov, Znojmo, and Veselí nad Moravou) and five economically and socially disadvantaged territories (the Znojmo AD MEP, Moravský Krumlov, Hodonín, Kyjov, and Veselí nad Moravou).[3]

In 2019, the population's level of economic activity remained just slightly below the national average, as did its average wage level. However, in its share of unemployment (3.5%), the SMR was among the most afflicted regions in the nation. The GDP per capita (PPP based) remained at 96.9% of the national level, and 87.7% of the level for the EU28 (with a year-to-year change of 3.5 percentage points (p.p.).

Its 2018 GDP output represented 10.8% of the nation's output, which nearly corresponded with the region's share of the population (11.2%). Despite the region's agricultural and industrial tradition, these sectors lost ground to the rising service sector. In the **share of services in the generation of gross value added (GVA – 64.1%)**, the SMR placed second among the regions, just behind Prague. Information and communication activities are concentrated into the SMR the most strongly (6.4 vs. 5.5% nationally), along with public administration, education, and health care (16.9 vs. 15.5%). **Manufacturing has a lower representation (22.0 vs. 25.7%)**, to the benefit of construction (6.7% vs. 5.6%) among others. In terms of revenues from sales of industrial products, the following sectors rank among the leaders: manufacturing of computers, electronic, and optical devices (29.5%), manufacturing of machinery (14.3%), and manufacturing of electrical equipment (7.2%). Unlike the nationwide situation, local enterprises are rather underrepresented in motor vehicle manufacturing (9.1%).

Table 1: The SMR's Standing in Selected Indicators

Indicator	South Moravian Region	Comparison with the Czech Republic	Year-to-year Change
Area (2019)	7,188 km²	9.1% of CR	unchanged
Population (2019)	1,191,989	11.2% of CR	+0.4%
Number of foreigners (2018)	50,351	8.9% of CR	+8.1%
Live births per 1,000 citizens (2019)	11.3‰	10.5‰ in CR	-0.02 p.p.
Number of municipalities (2019)	673	10.8% of CR	unchanged
Share of urban population (2018)	61.7%	69.0% of CR	+0.1%
Gross Domestic Product (2018)	575,378 mil. CZK, at current prices	10.8% of CR	+8.3%
Gross Domestic Product per 1 inhabitant (2018)	485,662 CZK	96.9% of CR level	+2.5 p.p. relative to CR
Employment (2019)	583,400,000 persons	11.0% of CR	+0.9%
Employment in agriculture, forestry, and fishing (share in GDP)	2.8% (2.4%)	2.8% of CR	-8.4%
Employment in industry and construction (share in GDP)	36.3% (33.5%)	37.5% of CR	-0.7%
Employment in market and non-market services (share in GDP)	60.9% (64.1%)	59.7% of CR	+2.4%
Level of economic activity (2019)	60.1%	60.9% of CR	+0.1 p.p.
Unemployment rate (2019)	3.5%	2.9% in CR	-0.2 p.p.
Employment seekers registered with a state job centre (2019)	29,087	13.5% of CR	-9.2%
Employees' average gross monthly wage (Q4 2019)	35,178 CZK	36,144 CZK in CR	+7.0%
Registered companies (2019)	58,069	11.6% of CR	+4.9%
Registered physical persons (2019)	232,948	10.9% of CR	+0.7%
Revenue from the sale of products and services (businesses with 100+ empl., 2018)	269,828 mil. CZK, at current prices	7.1% of CR	+10.0%
Construction work performed within the region (2018)	32,859 mil. CZK, at current prices	12.0% of CR	+21.2%
Apartments completed (2019)	4,447	13.1% of CR	+5.0%
Share of households with an internet connection (2018)	80.6%	80.5% of CR	+1.3 p.p.
Registered criminal offenses per 1,000 inhabitants (2018)	16.5	18.1 in CR	-2.6%

[3] Czech Regional Development Strategy 2021+

Indicator	South Moravian Region	Comparison with the Czech Republic	Year-to-year Change
Income from public budgets after consolidation (regions and municipalities, 2018)	57,381 mil. CZK	2.9% of CR	+11.9%
Pupils at primary schools (482 primary schools in 2019)	103,570	11.0% of CR	+0.8%
Students at secondary schools (123 secondary schools in 2019)	44,607	11.2% of CR	-0.0%

Source: Czech Statistical Office, Annual Statistics Report for the SMR and Latest Indicators

2.2 Innovation Environment

The SMR's conditions for the knowledge economy are among the best-developed in the nation. In its absolute extent of research and development (R&D) capacities, it is surpassed by Prague alone. In relative terms, the SMR has been the **region with the highest knowledge intensity in the Czech Republic** continuously since 2012. **In 2018, a total of 16.5 bil. CZK was spent on R&D in the SMR, representing 2.9% of the region's GDP** and a full 16% of the funds invested in R&D nationwide. The SMR's knowledge intensity is one of the highest among the regions of Central and Eastern Europe (the EU28 average is 2.1%), and this despite the high growth of the GDP itself (+8.3% year-to-year).

The structure of the SMR's R&D system is characterized by a fairly high share for the university sector (33.2%), due to the university-oriented nature of Brno. **A full 9 bil. CZK (54.9% of the overall expenses in the SMR) goes toward R&D performed in the enterprise sector.** Additionally, the enterprise sector's share has been growing long-term in both relative and absolute terms (unprecedentedly so in 2010–2014). The government sector, represented by the Czech Academy of Sciences and other non-university research organizations, accounts for 11.7% of total R&D expenditure. For R&D financing, legal entities in the SMR have been acquiring funding from the EU successfully. Between 2010 and 2018, 21.3 bil. was cumulatively invested in the region, amounting to 30% of the value for the nation. After the implementation of major investment projects, the importance of structural funds gradually receded, and so in 2018, enterprises' sources (50.5%) and state budget expenses (38.5%) dominated entirely.

A total of 21,839 employees were employed in R&D in the SMR in 2018. In the enterprise sector this was 10,168 persons; in the university sector, it was 9,287. Their count as full-time equivalents (FTE) was 13,772, representing 18.4% of the R&D employees in the Czech Republic. The SMR was distinctive for its significant concentration of researchers (2.1% of total employment). Additionally, they included the largest share of foreign researchers out of all the Czech regions.

The concentration of enterprise R&D into Brno comes from its economic strength and the availability of qualified staff. **Roughly two thirds of the enterprise R&D within the SMR is performed in Brno.** To this is added the vast majority of R&D capacities in the public sector. Other than the Blansko and Brno-venkov districts, no other district exceeded an annual R&D spending volume of 250 mil. CZK. The companies focused on higher-order technological innovations represent examples of successful economic transformation. They are an inspiration in the areas of both technological innovation and modern management practices. They stimulate innovation among local suppliers through their exacting demands and their pressure for process efficiency.

In 2019, the SMR had the **highest relative frequency of companies engaged in R&D** (37 companies performing own R&D per 100,000 inhabitants). 113 companies invested more than 10 mil. CZK a year in R&D, while for 87 it was less than 1 mil. CZK. One key investor type for R&D in the SMR was **foreign-controlled companies, whose R&D expenditure amounted to 69.1%** of the overall business R&D expenses in the region, although, after years of growth, 2018 was a turning point here – the expenses of domestic companies grew faster. The SMR is a prestigious address for development centres and high-tech manufacturing by global technology leaders from a variety of sectors. Among the 20 companies that are the top R&D spenders, 16 are multinationals (Red Hat, Thermo Fisher Scientific, Honeywell, ABB, Garrett Motion, Synthon, etc.), but one can also find locally owned firms (TESCAN ORSAY, BioVendor, etc.).

Table 2: The Innovation Environment in the SMR in 2018 (*2019)

Indicator	South Moravian Region	Comparison with the Czech Republic	Year-to-year change
Total R&D expenditure	16,475,000,000 CZK = 100.0%	16.0% of CR	+6.4%
R&D expenditure in the business sector	9,043,000,000 CZK = 54.9%	14.2% of CR	+1.8%
R&D expenditure in the university sector	5,474,000,000 CZK = 33.2%	24.8% of CR	+14.1%
R&D expenditure in the government sector	1,932,000,000 CZK = 11.7%	11.5% of CR	+8.0%
Total number of FTE employees in R&D	13,772 = 100.0%	18.4% of CR	+5.8%
Number of FTE employees in R&D in the business sector	7 357 = 53.4%	17.4% of CR	+0.7%
Number of FTE employees in R&D in the university sector	4,607 = 33.5%	25.3% of CR	+13.5%
Number of FTE employees in the government sector	1,784 = 13.0%	12.6% of CR	+8.7%
Total number of R&D sites	518 = 100.0%	16.7% of CR	+2.2%
Number of R&D sites in the business sector	441 = 85.1%	16.9% of CR	+1.8%
Knowledge intensity (R&D expenditure/GDP)	2.9%	1.9% of CR level	-0.0 p.p.
Knowledge intensity in the business sector	1.6%	1.2% of CR level	-0.1 p.p.
University students (of which Ph.Ds)*	62,456 (5,125)	21.6% (24.5) of CR	
University graduates (of which Science and Technology)	15,312 (7,191)	23.9% (26.8%) of CR	
Innovation performance of the Southeast region (incl. Vysočina)	129 out of 238 EU regions		

Source: CSO, Research and Development statistics (https://www.czso.cz/csu/czso/statistika_vyzkumu_a_vyvoje), detailed data from the CSO, MEYS; University Performance Indicators (https://dsia.msmt.cz); EC, Regional Innovation Scoreboard (https://ec.europa.eu/growth/industry/policy/innovation/regional_en)

The region's industrial tradition, the quality of its engineers, and the capacities of its universities – which produce highly qualified people – boost the capacities of its business R&D and create good conditions for the development of technologically demanding fields in manufacturing and knowledge-intensive services. A sectoral view of **R&D in private companies shows their distinct concentration**. In 2018, the largest sectors in terms of the number of workplaces were: IT services (77 companies with R&D); manufacturing of computers and electronic and optical devices (70); manufacturing of machinery and equipment (62).

R&D expenses followed a similar structure, but with a far higher dominance – **IT services (3,335 mil. CZK); computers, electronic and optical devices (1,628 mil. CZK); machines and equipment (755 mil. CZK)**. Together, the product groups listed above were responsible for two thirds of the business-sector R&D expenses in the SMR. The first two sectors are characteristic for the SMR (precisely **two thirds of Czech R&D for the production of measurement and testing devices** is performed in the SMR), while machines and devices have a strong standing nationwide.

The public R&D sector was dominated by **universities, which accounted for 73% of all public-sector expenses in the SMR in 2018**. This was also reflected in the structure and dynamics of scientific publication output. **Publication performance in the SMR grew significantly faster than the overall publication activity of the public sector nationwide.** Universities – where the growth in the number of scientific publications in recent years was generally higher than in the government sector – played a significant role in this. As judged by citation response (a quality indicator) and number of publications, the most important fields in the SMR were bio-medicine and biological fields, and specifically **molecular biology and genetics, botany, zoology, environment and ecology, clinical medicine, and chemistry**.

In the 2018/2019 school year, a total of 62,456 university students were studying in the SMR. This group also included 5,125 Ph.D. students. **In the same year, 15,312 students also graduated from local universities; 7,191 (47%) of these graduated from science and technology schools.** Since 2013, lower-population birth years have been reaching university age, and this has significantly contributed to the mild reduction seen in graduate counts. In light of the region's economic structure, the strong representation of students of IT-oriented faculties (7,283 students; 1,534 graduates) is advantageous. Since 2005, the share of foreign students has tripled, reaching 22%, although roughly two thirds of these students are from neighbouring Slovakia.

The SMR, forming the **NUTS 2 Southeast region along with Vysočina, is in the top half of the ranking of European regions (129 out of 238) in terms of overall innovation performance**[4]. The regions' standings exhibit high stability over time. NUTS 2 Southeast juts high above the EU average in the representation of advanced industry, and slightly above in e.g. the number of scientific publications (not, however, the most highly cited ones) and the volume of R&D spending. The traditionally weak aspects of our innovation performance relate to e.g. the frequency of use of

[4] EC, Regional Innovation Scoreboard 2019 (https://ec.europa.eu/growth/industry/policy/innovation/regional_en)

intellectual-property protection (patents and copyrights), the share of companies' revenues from innovated products, and the number of co-publications between academia and companies.

The data-based evidence for the SWOT analysis provides an in-depth analysis of the strong and weak sides of the SMR's innovation environment. Its inputs included analyses, mapping, and evaluations of the RIS SMR's performance to date. These are included as separate appendices.

2.3 Main Actors

Public Administration

Since its very first generation in 2002, the RIS has been a guideline for the implementation of the SMR's competitiveness policy. Since its third generation (i.e. since 2009), the **RIS has been drafted and approved as a joint strategy of the CoB and the SMR**. Its essence lies in improving conditions for doing business, which are enhanced by a specific set of competencies, institutions, and links within the local innovation ecosystem. **It strives to coordinate all interventions in innovation policy irrespective of the source of financing.** It forms a specific contribution to the growth of the region's wealth and standard of living. Meanwhile, it elaborates on and supplements the relevant topics earmarked in the generic strategic documents of the SMR and the CoB (SMR Development Strategy 2021+, the Brno 2050 Strategy) – an alignment with them is ensured on an ongoing basis during the strategies' creation.

Both administrative units (the SMR and CoB) are thus implementing innovation policy within their scopes actively and long-term, and they often take part in joint projects. The goals of the four RIS generations gradually responded to the region's identified needs. The spectrum of regional actors whose needs were reflected by the RIS grew over time.

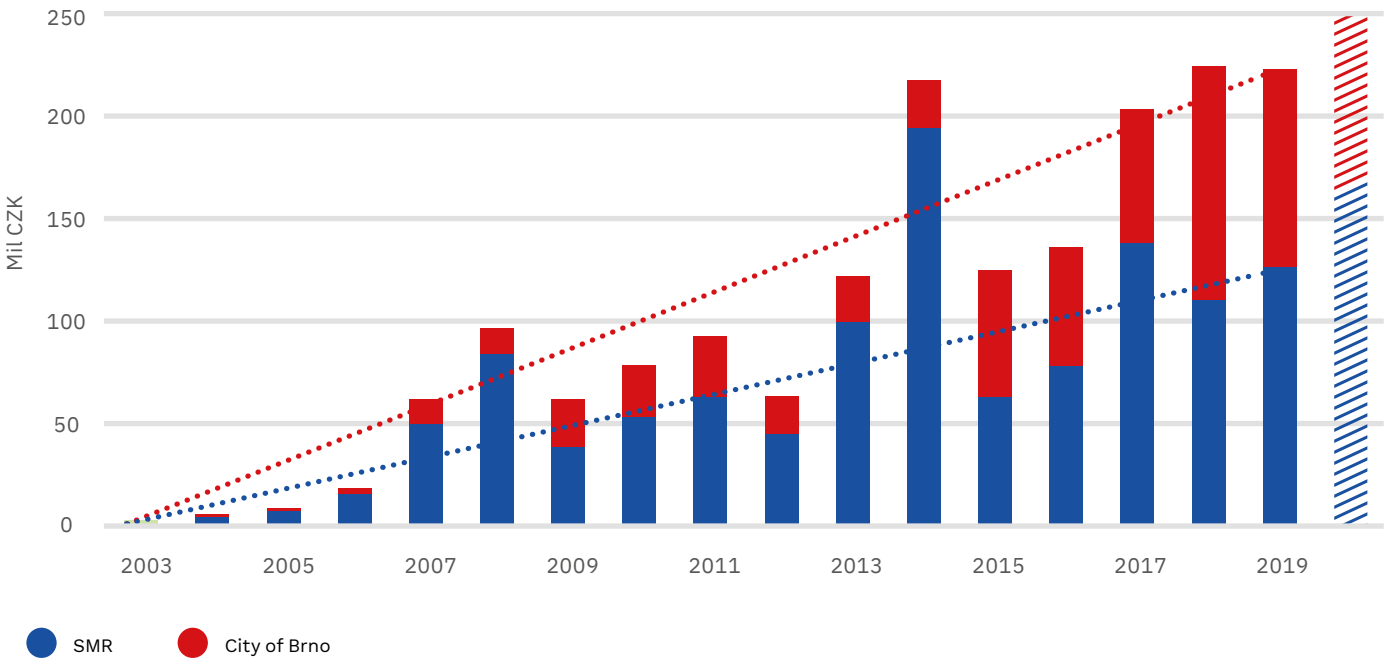
- RIS 1 (2002–2005) was aimed primarily at setting up the institutional infrastructure for the strategy's implementation (the founding of JIC), at technology startups, and at the transfer of knowledge among research organizations and firms.
- RIS 2 (2005–2008) was oriented more toward covering a broader spectrum of innovation companies, while still promoting the transfer of knowledge among research organizations and companies.
- RIS 3 (2009–2013) more strongly emphasized the fulfillment of research organizations' needs in connection with newly created research centres. With the inclusion of the area of education, RIS 3 expanded the spectrum of actors to also include universities and SS institutions.
- RIS 4 (2014–2020), in line with the principles of European regional policy, embraced the need for "smart specialization" in the domains exhibiting the greatest comparative advantage. It increased the emphasis on the development of unique research centres and on promoting the region as an attractive place for knowledge-intensive and creative activities. The development of business competencies in various stages of companies' development represented another new, important area. It was expanded with the engagement of companies into not only the strategy's preparation, but newly the management of its implementation and the approval of new projects as well.

One key value in the SMR's innovation ecosystem is the main actors' ability to reach consensus on the region's development priorities, a characteristic that gradually created a positive cumulative mechanism wherein the results achieved produce a favourable climate. This is evidenced by the long-term **readiness of the public administration (SMR and CoB) to invest funds into activities supporting regional innovation policies**[5], including the financing of (co-)founded organizations (JIC, JCMM, the South Moravian Regional Development Agency, Moravian Science Centre Brno, the Brno Observatory and Planetarium, and Intemac Solutions). In sum, the SMR and CoB have invested around 200 mil. CZK per year in this way in recent years. To this can be added the individual projects of universities and other research organizations that also fulfill RIS goals. The sponsoring of leading businesses in the region that support RIS projects materially and financially can also be regarded as an important milestone.

The SMR co-financed numerous investments into innovation infrastructure (INTECH, INMEC, and INBIT incubators), INTEMAC research & competence centre, and the construction of the Vida! Science Centre. It also shares in the implementation of the Smart Accelerator project, which systematically develops capacities for RIS implementation and the preparation of new interventions. The CoB has built a 3D digitarium at the Brno Observatory and Planetarium, and it is investing together with the SMR into the reconstruction and opening of KUMST, a creativity hub. Establishment of a creativity centre in the spaces of Brno's former jailhouse building is among the city's long-term projects. The SMR and CoB additionally support individual ecosystem projects and grant schemes.

[5] Blažek et al. (2019): South Moravia: from a quick fix by foreign investments toward a bottom-up policy learning? In: Koschatzky, K., Stahlecker, T. (eds.) Innovation based regional change in Europe: Chances, risks and policy implications, Fraunhofer-Verlag, pp. 93–118.

Figure 2: Expenses for RIS Activities from the SMR and CoB Budgets in mil. CZK



Note: Support for institutions; ecosystem projects; subsidy schemes. Source: Internal data of the SMR, CoB, JIC.

Knowledge-intensive Companies

In 2018, 441 companies performed R&D activities in the SMR with a total volume exceeding 9 bil. CZK. In light of the limitations of the typically used classifications, a combination of sectors and product groups has been used for describing each business sector's focus, with the classifications of several companies having been corrected with an eye to their portfolios located in the SMR. The list of companies presented is meant to merely illustrate[6] and help to portray what activities we consider, from the standpoint of the RIS, to be the driving sectors with the potential to most visibly contribute to the region's competitiveness. The key economic sectors are described in detail in the section on regional specialization.

- The highest frequency of knowledge-intensive companies and the strongest overall dynamics are displayed by software and services in information technologies (IT), specifically **software and programming** (Red Hat, Y Soft Corporation), **cybersecurity and network monitoring** (Avast Software, Flowmon Networks), **consulting and services in IT** (SolarWinds, Infosys), **IT platforms and services in e-commerce** (Kentico Software, Webnode), and **video game development** (MADFINGER Games, BOHEMIA INTERACTIVE).
- One characteristic sector for the SMR is the manufacturing of electronic measuring and imaging devices and equipment, specifically **measurement, display, and analytical equipment** (Thermo Fisher Scientific, TESCAN ORSAY) and **communication equipment, sensors, and semiconductors** (ON Design, Konica Minolta).
- Traditionally, the most diversified sector (in terms of both products and location) has been the manufacturing of advanced machinery and engineering equipment, specifically **motors, turbines, and hydraulic equipment** (Siemens Industrial Turbomachinery, Garrett Motion), **metalworking machines, and precision engineering** (TOS KUŘIM, Šmeral), **investment engineering and equipment** (UNIS, ASIO), and **special machinery** (ZETOR TRACTORS, MINERVA BOSKOVICE).
- Large companies that link to a historical tradition are the prime representatives for the area of energy engineering and electrical components, specifically **electricity distribution and control equipment** (ABB, Baumüller) and **electrical motors and generators** (Siemens Electric Machines).
- The health and pharmaceuticals group is internally heterogeneous, yet interlinked by the area of public health and hygiene; it includes **health products** (HARTMANN - RICO, Lohmann & Rauscher), **pharmaceutical agents** (Synthon, Bioveta), and **diagnostics** (BioVendor, Erba Lachema).
- In terms of knowledge intensity and international visibility, integrators and suppliers in the **aerospace** segment require special notice; namely the development and production of **aeronautic and space technologies** (Honeywell, Frentech Aerospace).

[6] Two companies are listed for illustration with each product group. These are companies that, according to the available information, invest significant funds into R&D and are significantly export-oriented, and whose presence in the SMR has international visibility.

Public Universities and Research Organizations

Five public universities reside in the SMR (**Masaryk University, the Brno University of Technology, Mendel University in Brno, Brno's Veterinarian and Pharmaceutical University, and University of Veterinary and Pharmaceutical Sciences Brno), as well as one state university (the University of Defence**). The portion of their R&D capacities with direct relevance for the RIS has, thanks to significant infrastructure investments, been concentrated into **R&D centres created with contributions from ESIF** in the 2007–2013 program period (the actual investment projects continued until 2015). These centres operate autonomously to some degree, but they are still organizational units of universities. Thanks to the size of the investments and the robust selection mechanism, these excellence centres along with 11 application-oriented regional centres have strongly spurred the development of Czech research. Meanwhile, some of them retain distinctive visibility within the SMR's research. This primarily concerns the following centres:

- CEITEC – the Central European Institute of Technology, focused on life sciences and on advanced materials and technologies, connecting the teams of six Brno universities and research institutions,
- The Czech Academy of Sciences' CzechGlobe Global Change Research Centre – focused on issues of environmental sciences and global change; its focus being on the functioning of the atmosphere, ecosystems, and society;
- FNUSA-ICRC at the St. Anne's University Hospital performs clinical, translational, and basic research for the timely diagnosis and treatment of cardiovascular diseases and neurological diseases;
- The Brno-based portion of IT4Innovations, at the Brno University of Technology's Faculty of Information Technologies, focuses on identifying and presenting information from multimedia data and on secure and reliable network architecture;
- The AdMaS centre at the Brno University of Technology's Faculty of Civil Engineering performs research and development for advanced construction materials, constructions, and technologies'
- The ALISI centre at the Czech Academy of Sciences' Institute of Scientific Instruments (ISI) develops applied diagnostic methods;
- CETOCOEN, as a part of the Recetox centre at Masaryk University, researches the toxic effects of chemical substances and natural toxins on organisms and assesses environmental risks; and
- The NETME Centre at Brno University of Technology's Faculty of Mechanical Engineering develops advanced engineering technologies.

Non-university public research organizations are primarily represented through the institutes of the Czech Academy of Sciences. A total of nine institutes are headquartered in the SMR, and another 15 are branches – generally of Prague-based institutes. Among the most important are **Institute of Scientific Instruments, Institute Global Change Research Institute (CzechGlobe), Institute of Physics of Materials, and Institute of Biophysics**. They focus on basic research, but in some cases their outputs have led to direct use in applications. Both basic and applied research are generally performed by the public research organizations funded by ministries, primarily **the Veterinary Research Institute, the Transport Research Centre, the Masaryk Institute of Oncology, and also university hospitals (the Brno University Hospital and St. Anne's University Hospital)**.

Additionally, there have been successes in bringing into the region important projects that expand the possibilities for cooperation with domestic and international partners to strengthen excellence in selected topics and for upgrading research infrastructures. This namely means, for example, the coordination of **national competence centres** (mechatronics and smart technologies for engineering – BUT, aerospace and astronautics – BUT, electron and photon optics – ISI CAS, cybersecurity – MUNI), involvement in **teaming projects** (CETOCOEN Excellence – Recetox MUNI, RICAIP – CEITEC BUT), and **major research infrastructures** primarily in the physical and environmental sciences and health-oriented research (CZECRIN, CEPLANT, CzechNanoLab, ACTRIS-CZ, CzeCOS, RECETOX RI, BBMRI-CZ, CIISB, Czech-BioImaging, CZ-OPENSCREEN, EATRIS-CZ, ELIXIR-CZ, NCMG, LINDAT/CLARIAH-CZ, and e-INFRA CZ).

Support Infrastructure for Innovation

Support infrastructure for research and innovation in the SMR can be differentiated by form of ownership (public/private) or by target groups (entrepreneurs, researchers, students, or the general public). In comparison with the other Czech regions, the network of public institutions is well-developed, thanks to long-term and stable support for innovation policies.

- **JIC** is an innovation agency founded by the SMR, CoB, MUNI, BUT, MENDELU, and VPU. It focuses on support for entrepreneurship and the development of enterprise and entrepreneurs, it tends to the development of the innovation ecosystem, and it coordinates implementation of the RIS.
- **Intemac Solutions** operates the INTEMAC research & competence centre and provides expert services in manufacturing digitalization and access to advanced technologies with the goal of strengthening companies' competitive position. It is a subsidiary of JIC.
- **CzechInvest** – the regional office provides information and services for national programs for supporting companies, and it assists incoming foreign investors into the region. This is a national agency established via a corresponding law.
- **JCMM** is focused on supporting talented students at secondary schools and universities in the SMR and the inflow of research staff from abroad, along with activities for science popularization. JCMM was established by the SMR and four universities.
- The **South Moravian Regional Development Agency** (SM RDA) aids the region's sustainable growth by implementing development projects and cross-border cooperation projects, as well as support for investments and smart solutions. The SM RDA unites the municipalities and cities of southern Moravia, the SMR, and the South Moravian Regional Chamber of Commerce.

- **The Brno Observatory and Planetarium**, established by the city, coordinates an entire network of popularization projects and activities. It promotes space technologies and industry and plays a role in activities connected with the ESA BIC incubator.
- **Moravian Science Centre Brno**, established by the region, operates a science-based entertainment park – the Vida! science centre – for popularizing science through an interactive exhibit, presentations with science experiments, and lectures for schools and the public.
- **Lipka – School Facility for Environmental Education** takes part in education and awareness-raising in the areas of environmental education, entrepreneurship support, and science popularization.
- The **SMR's Centre for Foreigners** is an SMR organizational unit that supports effective integration of foreigners into society (incl. care for foreign workers' family members) and educates the professionals who work with foreigners.
- The **Centres for Technology Transfer** (CTT) at public universities in the SMR (MUNI, BUT, MENDELU) play a special role in support for the utilization of R&D outputs. These centres carry out similar activities in the areas of identifying and managing the university's intellectual property and mediating it for the application sphere.

Private institutions carry out support activities with funding from the regional administration or subsidy programs. Some of them work on a purely commercial basis.

- The **South Moravian Regional Chamber of Commerce** (SMR CC) unites the chambers in the SMR's individual districts. Its goal is to support and fulfill the needs of its members in relation to business entities and the public administration. The **Regional Chamber of Commerce for Brno** (RCC Brno) has a unique position among the chambers assembled in the overall RCC; it is the largest chamber in the region, and it provides consulting to companies and performs activities oriented toward export support.
- **Brnopolis** implements the Brno Expat Centre project, with the goal of supporting the siting and development of knowledge-intensive companies in the SMR by integrating expats.
- **IMPACT HUB Brno** is part of a global network of coworking centres. It offers shared spaces and offices, organizes events for the entrepreneurial community, and offers accelerator programs.
- Individual investors and risk-capital funds can also be counted among the elements shaping a dynamic innovation environment. **Y Soft Ventures** and **Garage Angels** are among the most active of these. **JIC Ventures**, a JIC subsidiary, plays a special role here; it administers public funds and invests, among other things, into early-stage projects.
- One important connecting element among companies, the academic sector, and public administration is that of **cluster organizations** (CREA Hydro&Energy; Network Security Monitoring Cluster; INDUSTRY CLUSTER 4.0; the Cluster of Czech Furniture Manufacturers).

2.4 Externalities and Guiding Principles

From the RIS standpoint, "externalities" means **conditions or preconditions that fundamentally affect the development of the innovation environment and the fulfillment of the RIS goals, yet by their nature remain difficult to influence through the RIS**. These are typically activities and environmental parameters defined on the national level and matters under the direction of other regional policies and structures. Despite this, RIS aspires to call attention to their seriousness and direct incentives toward the responsible institutions, be they regional or national. Among the most important externalities registered while designing the RIS include[7]:

- adequate transport accessibility for the region on inter-regional and international routes (backbone transport infrastructure, accessibility of important flight nodes).
- adequate transport interconnection of towns, cities, and locations inside the region (transport infrastructure; connectivity).
- affordable housing; well-planned, people-friendly urban development;
- the area's digital readiness and coverage by high-capacity communication networks;
- predictable spatial planning of functions within the territory (the CoB's land-use plan; the SMR's Spatial Development Principles);
- good, predictable, and effectively enforceable regulations;
- a safe, multicultural society;
- a good environment, including high-quality, calling-card construction.

The **guiding principles as imprinted into the behavior of local society** are also important, in a similar role as the externalities affecting RIS implementation. From the RIS standpoint these are external influences; however, they predetermine the willingness to build partnerships in favour of shared interests, i.e. a basic principle for the fulfillment of RIS goals. RIS aspires to cultivate these guiding principles in the region and considers them an implicit part of its activities. We consider the following to be guiding principles:

- openness, responsibility, trust, cooperation, cohesiveness, a pioneering spirit, leadership, creativity, self-confidence, a positive approach, and joy.

[7] Certain externalities were also marked in the course of supplementing the SWOT; nevertheless, we made a point of avoiding this (they may be underestimated in terms of the marked priorities),

SWOT

The draft of the global SWOT analysis was prepared by the plan-drafting team. It was supplemented, and priorities in it were set, at a workshop with key persons from the SMR and the nation (representatives of companies predominated among them). The SWOT served as an input for discussion on the proposal section, used for gaining awareness of the region's starting situation and the factors that enter into its future development. The SWOT was not divided up by topic, so that it would not predetermine the delineation of the key change areas. The factors we consider as externalities from the RIS standpoint were, except for the most pressing exceptions, removed from the SWOT (they are listed in the section above). The numbers in parentheses indicate priorities as scored by the workshop participants, i.e. how serious and influenceable the described circumstances are perceived to be from the standpoint of the region (for added/subsequently-merged statements they are accompanied with a + sign). Evidence providing data support for the SWOT's statements is given in a separate appendix.

STRENGTHS	WEAKNESSES
The main actors' ability to **reach a consensus on the region's development needs**. The ability to deliver agreed outputs at good quality and with verifiable results. The public administration's preparedness to invest into desired activities. (14)	Weak entrepreneurship in society (incl. among pupils and students), **subdued initiative**. A resulting inadequate use of local people's potential. A deep-seated fear of mistakes. Low tolerance for failure. Insufficient support for personal growth. (7+5+4+2)
Brno's growing **identity as a centre of the knowledge economy** (R&D and innovation-based enterprise) – Brno is starting to be seen this way by its own citizens, the nation, and neighboring countries. (13)	The weak presence of companies with **full autonomy** to take strategic decisions (both formally and due to dependence on a dominant supplier). Pressure for savings limits opportunities to proactively diversify portfolios in favour of products with higher margins. (11)
The existence of a good knowledge base and a critical mass of highly qualified **technically educated people**. The dissemination and development of knowledge via the mobility of experts among companies, fields, and sectors. (11)	The limited capability for **accumulating capital and know-how** in the region. The growing share of foreign companies (50% of employment, 70% of capital and 75% of R&D expenses), outflow of our own intellectual property and dividends abroad. (11)
Good organization and a good selection of **informal education** in science and engineering; popularization of science and technology (e.g. Lužánky SVČ Brno; Czechitas; Vida SC; Observatory and Planetarium Brno, FabLab Experience; Lipka). (11)	Merely **average performance by the educational system** (PS and SS level) compared to abroad, e.g. in the areas of digital literacy, language skills, soft skills (PISA and PIAAC results show a downward trend). (11)
Concentration of talents and university-educated persons in Brno as a trans-regional **tertiary education centre**. The annual production of tens of thousands of graduates – an attractive human-resources pool. (10)	Limited readiness for welcoming, integrating, and adequately utilizing **talented people from abroad**, non-systematic care for their family members, opacity of responsibilities, and a lack of strategic governance across the phases of this process. (9)
A high quality of life and quantity of economic opportunities. A good size ratio between Brno and its hinterland (transportation; environs; safety). (+5+5)	Limited international visibility. The absence of elements that might visibly distinguish the region. The image of the CR/SMR/ Brno in the developed world depending on a cheap workforce, and not as a place for sophisticated activities. (8)
Rising internal **interconnectedness of the innovation ecosystem**, i.e. density of links both among companies and between them and the academic sector. An active community of technical experts (meet-ups, brokerages, open innovations, informal meetings among representatives of companies and the public sector). (9)	Weak support for **events to publicize** the city and the region (incl. conferences); disunity in the marketing of the region and the city abroad (incl. cooperation at the national level). (+6+2).
The presence of **respected organizations** for supporting innovations in companies and human-resources development, incl. corresponding tools and programs. Interconnections within the innovation infrastructure. A high level of communication and openness among partners in the region. (0+6 +3)	The low prestige of local universities in comparison with countries ranked as innovation leaders. The absence of first-rate universities, in the top 200 of the global rankings. Low attractiveness for engaging international science personalities and thus educating visionaries with a global mindset. (7)
The presence of foreign corporations (incl. tech leaders) that are increasingly embedded in the region. This embeddedness is expressed through activities with higher added value and **the attraction of strategic functions** (incl. R&D). (8)	The failure of the **relationship between universities and companies** to work systematically. Both sides' unpreparedness for cooperation (in terms of processes and personnel, with scarce exceptions); a prevailing distrust. A lack of institutions stimulating R&D at the regional level. (6+1)
The existence of locally owned firms in fields with a tradition and a top-rate level of technical competencies that are on par with the globally most significant producers in their market segments (e.g. precise measuring and scientific instruments). (7)	A thematic discrepancy between academic and business environments in a part of our regional specialization, lowering the opportunities for interconnection and the potential for creating and applying breakthrough technologies whose final production is in the CR. A lasting isolation of research/teaching from practice. (6)
The ability of locally owned firms to achieve a world-class level in the dynamically developing **new non-industrial fields** (e.g. cybersecurity, the games industry, and creative sectors). (7)	Poor **connection with the world**. Insufficient transportation infra-structure and accessibility of the region for international journeys and low internal connectivity of certain parts of the region. (+4+2)

A relatively high representation of small **knowledge-intensive companies** (<50 employees) within the CR with their own research and development (R&D). The advancement of knowledge, especially in IT and advanced engineering. (4+2)	Weakly developed **market competencies** at most companies, the absence of strategic information from customers, and weak ability to work proactively with the needs of customers and end markets. Limiting opportunities for "upgrading". (5)
A high **intensity of R&D expenses** in the business and public sector. Long-term positive growth dynamics for financial and human resources; in certain cases, good complementarity of business and public R&D. (5)	A growing **disproportion between strong demand on the job market** (people with good technical education, businessmen) and weak supply (due to demographic factors, the structure of graduates, and low attention to acquiring new work skills and habits). (5)
The existence of research teams that can generate **globally unique results** (e.g. speech processing, robotics, cryptography, materials research, imaging and analytical methods, and molecular processes). (5)	Research organizations' poor ability to staff top positions via **open hiring processes**. Low readiness to accept elites from abroad. (+4+1)
The continuing **internationalization of the job market** for qualified staff, especially thanks to the presence of multinationals' shared-services centres covering global markets out of Brno. (5)	A limited number of truly **ambitious startup projects** with founded aspirations to become global firms. An expanding base of entrepreneurial projects, but without a corresponding growth in quality. (4)
The presence of top-rate **research infrastructure** (equipment, labs, and related facilities). Attractive infrastructure for the further development of competencies and increasing the quality of R&D. (4)	The choosing of research topics with **insufficiently ambitious goals and low relevance** for applicability in companies and for addressing society's challenges. The absence of tools for long-term financing of ambitious problem-oriented research. (4)
A diversified economic structure, increasing resistance to external economic shocks. **A promising sectoral composition** with a high share for ICT (a growth sector for added value and employment). (3+1)	Weak internationalization at small and medium businesses with their own final products. A limited **ability to expand abroad**, especially onto distant developed markets, often despite an established position in the CR. (3)
The presence of dynamically, continuously **growing companies** with international visibility (>10 employees, year-to-year growth on the order of dozens of percent). (3)	A low number of **spin-off** companies being founded, low importance for commercialization in researchers' mindsets, lacking practical motivation to valorise generated know-how (ownership interest, licensed intellectual property). (3)
A high share of PhD students studying technical or science fields with the prerequisites for expanding the region's foundation for R&D. (3)	Low investments into radical innovations, prioritization of incremental changes (due to pressure for savings). Weak competencies for **strategic management** of innovation and for changes in general; a merely reactive approach by domestic small and medium businesses. (2)
The individual quality of certain **university study fields**, making them the first choice of students from the CR/SR. The pattern of fields enables the creation of interdisciplinary study programs. (3)	The absence of a developed capital market. (+1)
A dynamically developing overall system of support for pupils and students to build **creativity, initiative, and entrepreneurial spirit**. The introduction of coordinated education for educators. (1)	A lack of land for the development of companies that suits the location's character and conditions and existing demand. (+1)

OPPORTUNITIES	THREATS
Timeliness in **catching tech trends** (e.g. artificial intelligence, blockchain, virtual reality, Internet of Things, robotization, and quantum technologies) and shaping them into a transformation of key company processes and an opening up of market opportunities. (16)	**A decline in the number of talented people** and suitably qualified employees due to a slow-to-react education system incapable of reflecting the tempo of changes in today's world and the phenomena connected with it. (17)
The heightened **interest of foreign talents** (experts, researchers, and talented students) in employment and study in the CR and the SMR. Active **involvement of expat families** and the creation of a single contact point that expats in the SMR can turn to for aid. Systematic support for expats. (5+9 +2)	A worsening of the favourability and predictability of the **entrepreneurial atmosphere**. Instability in the public administration, tax system, and legislative order, political instability, and a reduction in trustworthiness for foreign partners. (16)
The creation of new business opportunities and **new markets in response to global challenges** (e.g. in the areas of climate, energy, mobility, and society). Adaptation strategies as a business opportunity. The use of an interdisciplinary approach. The development of creative competencies. (12+1 +1)	**Brain drain** into other countries or Czech cities as a result of difficulties in integration, a reduction in standard of living, and the broader perception of the region's attractiveness. (13)
Highlighting **people's development among society's key priorities**. The creation of conditions and a cultural configuration of society that support people's individual development. Openness, differentness, and talent instead of prejudices and stigmas. (9)	The inability to reflect societal, economic, and technological **milestones related to global challenges** (e.g. climate, energy) and technological trends (digitalization, sharing, cybersecurity). (12)

The engagement of the trade-fair company, Veletrhy Brno, into the ecosystem (a new direction, prestigious international events). Raising **awareness of innovations** and support for innovations within the region. Support for pride. Support for the social esteem of successful and educated people. (+4+3 +2)	**The absence of a shared vision** for the development of the CR that reflects the regions' specifics and positions in Europe and the world. Ill-considered changes that induce randomness into the environment and reduce trust among the individual levels of government. (12)
An open community of local managers of foreign corporations with the ambition of following good practices in **attracting strategic functions** and integrating branches more into the local ecosystem, including rising cooperation with universities. (8)	The growth in differences in the quality of education provided. Insufficient support by schools for the creation of the conditions for inclusive education and high-quality support for all pupils. Stagnation in innovations and the quality of PS and SS. A lasting problem with low teacher remuneration. (6+3+2+1)
Advancement of the **trend toward digitalization and robotization** at companies, with an emphasis on small and medium businesses. Investments into technologies as the road to higher productivity and fulfillment of people's capacity for activities with higher added value. (8)	Local companies' stagnating at **low rungs within value chains**. An inability to replace lost supply links during shifts of higher-order foreign firms' manufacturing into other countries. Neocolonialism on the part of corporations. (9+2)
The new **EU programming period** (2021–2027), with a high concentration of resources for innovation, for addressing global challenges, and for digitalization – assuming that it will make the investment of resources more efficient. Harmony between regional priorities and financing opportunities. (7+1)	Uncertainty in the **financing of high-quality research teams** created in the 2010–2015 period in connection with the termination of the sustainability program. (6)
A school system focused on skills that makes it easier to **adapt to future changes** in demand on the job market. Education as an ongoing process of re-skilling, rather than as one project culminating in an exam. (7)	The lasting trend of **stagnation in financial and human resources for R&D** in the business sector vs. comparable regions of the CR (recession after the period of dynamic growth up to 2014/2015). The **loss of the region's dynamism**. (0+6)
Timely response by the region to the **intertwining** of formal/informal education and practical training at all school levels. Broader involvement of non-educational experts, especially professionals from practice. (6+1)	**Low social responsibility** by (foreign) corporations toward the region. (+3+3)
The creation and development of **tech and innovation centres**; the concentration of opportunities of international significance built upon the coexistence of tech firms, research centres, and generated supply of related services. (6)	The **fragmentation of R&D** performed in the region and the simultaneous failure of research teams to reach critical mass (i.e. there are no synergies among sites/teams/businesses). (5)
The utilization of active people **nearing the end of their productive lives** who are capable of engaging in activities within economic and social life. (5)	A lasting distrust between companies and R&D institutions (and also within both sectors); **weak cooperation** by regional actors. (5)
The harnessing of the potential coming from the change in preferences of the rising **Gen Y / Millennials**, focused on intellectual labour with added value and innovation. (4)	**The perception of the local public administration** as an unreliable/incompetent partner. (4)
Engaging the potential of women at all levels of companies and organizations, including women on maternity/parental leave. Making use of **flexible forms of work** (free companies). (+2+2 +1)	The escalated **imbalance of economic development** widening the gap in standards of living within the region. The extensive growth of Brno, to which infrastructure conditions and the palette of public services will not respond quickly enough. (4)
The concentration of a wide range of research fields; the potential for the **development of multidisciplinary R&D**. The interconnecting of social sciences, humanities, and arts with technical fields; support for interdisciplinarity. (3)	The aging of the population; an unfavourable age structure and growing pressure on the provision of public services. **Unfavourable demographic developments**. (+2+2)
The use of local tech leaders to localize **a greater portion of the value chain within our region** (e.g. by increasing the quality of the suppliers for globally successful finalists, or the outsourcing of development to local firms). (2)	The transition of Technologický park Brno into purely private ownership. The prioritizing of commercially attractive tenants instead of sustainable support for smaller tech companies. (+3)
The utilization of opportunities based on the **diversity and current overlaps in the structure of studied fields** of university education for the creation of unique interdisciplinary fields in partnership with practice. (2)	Ill-considered investments into the development of **R&D infrastructure** with no strategy for their future sustainability and renewal. Failure to maintain top-rate R&D infrastructure. (+2)
Increased attention paid toward **identifying promising R&D outputs** and targeted support for them, including support for piloting and testing capacities; the introduction of a mechanism for founding spin-offs. (1)	Irresponsible **handling of political power**. (+1)
The improving availability of high-quality R&D structures **that are also open to business** clients (especially core facilities). Support for **shared research and manufacturing infrastructure**. (0+2)	

REGIONAL SPECIALIZATION

The delineation of the specialization shows in what domains a competitive advantage exists in the region and where the largest space can be expected to exist for the creation of new innovation opportunities. The specialization has a guidance role. It informs those who make decisions with support from the RIS as to where the region has distinctive qualities (actors and competencies) that open up development opportunities. The delineation of specializations leans upon three perspectives; meanwhile the most innovation opportunities can be expected at their intersection.

- **The key economic sectors** are defined as the concentration of enterprises in sectors or product groups with a high knowledge intensity and simultaneously a high wage level that is linked with greater added value. Looking back on the basis of the available data, they describe the knowledge economy's focal points in the enterprise sector.
- **The relevant global challenge**s are defined on the basis of research on trends and risks as seen by leading world organizations. They direct attention toward changes in society. These are, meanwhile, perceived as an opportunity for harnessing new solutions. The challenges have a high relevance for all types of regional actors across sectors and fields.
- **Cross-sectional competencies** are of a generic nature. They are an important contribution toward increasing the added value of existing sectors. Catching hold of them properly increases the ability to adapt to changes related to global challenges.

4.1 Key Economic Sectors

In light of the limitations of typically used classifications, a combination of sectors and product groups is used for describing each business sector's focal point (the classifications of certain companies needed to be corrected with a view to their portfolio of activities within the region). The illustrative listing of companies helps to indicate what activities are considered, from the standpoint of the RIS, to be the driving sectors with the potential to most visibly contribute to the region's competitiveness. When defining them, we relied on the amount of R&D spending per employee and the level of personnel costs, which together indicate the wage level within the industry. Also serving as an indicator is a comprehensive index of the industry's size, combining the number of employees and the revenues and profits of companies in the given group. The data-based justification is summarized in the graph in the appendix.

Software and IT Services

A plurality of the businesses with their own R&D in the SMR is involved in the development of software and IT services. **In terms of R&D expenses, this field is entirely dominant** – it has double the score of the second-ranking field, and currently 40% of the enterprise R&D spending in the CR in this sector is concentrated in the SMR. However, the typical representatives here are locally owned small and medium businesses. The sector **exhibits a high wage level along with an enormous dynamism** tied to a competitive job market. The development of the sector is spurred by a large base of graduates and cooperation between companies and university students during their studies. The focal point of this sector lies in the divisions CZ-NACE 62, 63, and a portion of 58.

Alongside development branches of global leaders in the field of **enterprise software** (Brno is home to the largest development centre of Red Hat, as well as NetSuite within the Oracle concern, and the German giant SAP), a number of locally owned firms have been founded in the region, often with close ties to university sites. Due to **occupying specific market niches**, these companies have relatively intense growth (Y Soft Corporation combines hardware and software for print solutions; Phonexia is a world leader in the area of speech technologies and voice biometry).

The region is renowned for its extensive know-how in **cybersecurity**, as underscored by the presence of two important development centres of global leaders in endpoint security (Avast Software thanks to its acquisition of AVG; ESET Software). The concentration of experts, the public research base, and the presence of important state institutions (incl. those assembled in the National Centre of Competence of Cybersecurity) provides the conditions for the founding and growth of tech startups (e.g. Flowmon Networks and Safetica Technologies).

The large representation of major multinationals is typical for the area of "**shared service centres**," with a large portion of them in the SMR concentrating on **IT consulting and services** (typified by IBM, Infosys, AT&T etc.). Alongside this stands a variegated group of companies combining the development of software and related services (SolarWinds and RWS Moravia) or advanced data processing (Mycroft Mind). Their portfolio overlaps into specific segments as well.

In connection with the massive spread of the web, a market for **content management and web page creation systems** (the Kentico Software and Webnode platforms) has opened up as well. On the basis of technologically advanced web services, Brno startups with rocketing growth have made their names in e.g. e-commerce and travel services (Notino and Kiwi.com).

Video game development is another unique specialization, one for which a combination of IT competencies and the presence of large groups of experts in cultural and creative fields is vital. Besides small local studios (2K Czech), major global players (GIANTS Software) have their branches here as well.

Sector	Software and IT Services	Companies with revenues of 100+ mil. CZK = 73 | Companies with R&D expenses = 77
Product groups	Software and programming	Red Hat, Y Soft Corporation, Oracle, SAP, ARTIN, Solitea, CAMEA, Phonexia, Lingea, IDEA RS, ZONER software
	Cybersecurity, network monitoring	Avast Software, Flowmon Networks, ESET software, Safetica Technologies, GreyCortex, AXENTA, Novicom, TrustPort a. s.
	IT consulting and services	IBM, Infosys, AT&T, RWS Moravia, SolarWinds, GoodData, Embedit, Tieto, IBA, Hewlet Packard Enterprise, AGORA plus, Mycroft Mind, UNIS COMPUTERS, Mavenir
	IT platforms and services in e-commerce	Kentico Software, Webnode, Kiwi.com, Notino, Purple Technology
	Video game development	2K Czech, BOHEMIA INTERACTIVE, MADFINGER Games, GIANTS Software, Amanita Design

Source: Bisnode MagnusWeb; detailed data from the CSO; internal research by JIC

Measurement and Sensing Devices and Equipment

The production of precision electronic devices and equipment is a characteristic sector for the SMR. Meanwhile, this is also a very knowledge-intensive sector, and **a full two thirds of Czech R&D in the area of measurement and testing device manufacturing takes place in the SMR**. This sector is relatively unconcentrated. Its development dynamics are also different from those of IT fields; a gradual growth in the headcount in R&D and in the volume of expenses can be seen for the entire period since 2010 – **with even representation for different company sizes and ownership**. Scientific instrument technology builds from a long tradition, high expertise, and well-developed supplier links in the areas of precision engineering and electrical engineering in combination with IT. A number of small companies have sprouted here, with a growth dynamic based on technological innovations. This is one of the few sectors where there are major global integrators ranking as global leaders residing in the SMR. The focal point of this sector is the division CZ-NACE 26.

The manufacturing of measurement, display, and analysis devices, and specifically electron microscopes, is the flagship of high-tech industry in the region. Three global manufacturers (Thermo Fisher Scientific, Tescan Orsay Holding, and DELONG INSTRUMENTS) reside in the SMR, producing 30% of the global revenues for electron-microscopy manufacturers. Alongside microscopes, special **scientific instruments** are produced in the region; they are used in biological applications (PSI (Photon Systems Instruments)) and material applications (the startups NenoVision and AtomTrace) and for measuring radiation (Georadis and VF).

Alongside the above-mentioned firms, the SMR is home to an assortment of companies from the electrical engineering industries developing e.g. **communication equipment, sensors, semiconductor components, and solutions for industrial automation** – from integrators (Konica Minolta has its innovation centre here) to manufacturers of basic components, integrated circuits, and processors (ON Design, Gatema, and Codasip).

Sector	Measurement and Sensing Devices and Equipment	Companies with revenues of 100+ mil. CZK = 40 | Companies with R&D expenses = 70
Product groups	Measurement, display, and analytical devices	Thermo Fisher Scientific, TESCAN ORSAY, DELONG INSTRUMENTS, PSI (Photon Systems Instruments), VF, MEATEST, GEORADIS, SEIKO Flowcontrol, GMW-měřicí technika, LABTECH, NenoVision, AtomTrace, MESING
	Communication equipment; sensors; semiconductors	Konica Minolta, Tyco Fire & Integrated Solutions, Gatema, ON Design, Sewio Networks, ABB/B+R automatizace, Arkon Flow Systems, Codasip

Source: Bisnode MagnusWeb; detailed data from the CSO; internal research by JIC

Advanced Machines and Engineering Facilities

Advanced manufacturing of machines and engineering facilities is traditionally the most diversified sector (both in terms of products and from the standpoint of locations within the SMR). One shared trait here is a focus on products distinguished by a high demand for precision and the use of advanced engineering technologies.

From the standpoint of absolute **employment and export performance, as well as the number of companies with their own R&D**, this is a leading sector in the region (and the country). Additionally, it is interlinked in terms of suppliers with a large portion of the region's other domains (manufacturing programs for electron microscopy, the aerospace industry, etc.). For historical reasons, important manufacturers are often located in non-metropolitan parts of the region, and their success has a significant driving effect on local suppliers. R&D activities are less concentrated from the standpoint of businesses' size and ownership; expenses display no striking dynamic in one or the other direction. The focal points of this sector are the divisions CZ-NACE 28 and 33.

The SMR has a tradition of successful exporters of e.g. **motors, turbines, and hydraulic equipment**. A portion of them has gradually become a part of leading global concerns (Siemens Industrial Turbomachinery, Garrett Motion – formerly a development division of Honeywell, Bosch Rexroth). Global firms' reach makes it possible to push local solutions onto a variety of foreign markets.

One traditional product group, and the most widespread overall, is represented by companies from the field of **precision engineering** (typified by STARTECH, STROJÍRNA OSLAVANY, and ELAKOV), including **manufacturers of metalworking machines** (TOS KUŘIM – OS, Šmeral, and BOMAR). This sector is tightly connected with materials research, especially for high-stress components (e.g. ZKL bearings).

One special group comprises companies from the area of investment **engineering and manufacturers of industrial equipment** for various other sectors. In our region, the final links in the value chain are enjoying success in this field; they are capable of delivering large industrial plants and equipment from engineering to assembly and full operation. In this the companies can lean upon the CR's renown, which still endures on developing markets with a high growth potential and a need to renew aging works. A major part of this group of companies is made up of project design and engineering for water management equipment, some of which are assembled in existing clusters.

Dozens of companies of various sizes in the SMR are involved in the development and production of **special production machines**, from tractors (ZETOR TRACTORS) to mining technology (T Machinery) to machines for the textiles industry (MINERVA BOSKOVICE and Novibra Boskovice) to the processing industry for non-metal materials (LAC and SKLÁŘSKÉ STROJE ZNOJMO).

Sector	**Advanced Machines and Engineering Facilities**	Companies with revenues of 100+ mil. CZK = 102 | Companies with R&D expenses = 62
Product groups	Motors, turbines, and hydraulic equipment	Siemens Industrial Turbomachinery, Garrett Motion, Daikin Device, Bosch Rexroth, ČKD Blansko Holding, Litostroj Engineering
	Metalworking machines; precision engineering	TOS Kuřim – OS, Šmeral, Fermat, BOMAR, STARTECH, STROJÍRNA OSLAVANY, PEGAS - GONDA, Miroslavské strojírny, ELAKOV, ZKL, ANTREG, OMOS, Strojírny Bohdalice
	Large industrial works; industrial facilities	UNIS, OTIS, ASIO TECH, EKOL, IN - EKO TEAM, LIKO-S Industry, Adast Systems, ATOMA – tepelná technika, CB&I, TENZA, Thermona, ORGREZ, AQUA PROCON, EVECO, ENERGOCHEM, AQUATIS
	Special manufacturing machines	ZETOR TRACTORS, MINERVA BOSKOVICE, LAC, T Machinery, ATRIMA, SKLÁŘSKÉ STROJE ZNOJMO, GF Machinery, Kornfeil, Novibra Boskovice

Source: Bisnode MagnusWeb; detailed data from the CSO; internal research by JIC

Energy Engineering and Electrical Components

The SMR has a strong industrial tradition in the manufacturing of electric motors, distributors, circuit breakers, and other products **used in the power engineering and the distribution of electrical energy**. The global technology leaders Siemens Electric Machines and ABB have significant manufacturing capacity in the region and are also developing R&D capacities here. This sector is primarily typified by large companies under foreign control, which also have a dominant share in its R&D expenses. Similarly as with engineering, R&D expenses do not exhibit a significant growth dynamic – they tend to be stable over time. The focal point of this sector is the classification CZ-NACE 27.

Important production capacities of e.g. the ABB and BAUMÜLLER concerns are supplemented by locally owned in the area of **electrical distribution and control equipment** bordering with measurement devices (e.g. MEgA – Měřící Energetické Aparáty). One special segment here, with a high relative representation in the SMR, is the production of **electric motors** for various uses (Siemens Electric Machines, JULI Motorenwerk, Moog Brno).

Sector	**Energy Engineering and Electrical Components**	Companies with revenues of 100+ mil. CZK = 25 | Companies with R&D expenses = 32
Product groups	Electricity distribution and control equipment	ABB, BAUMÜLLER, IVEP, AXIMA, Eaton Elektronika, MEgA – Měřící Energetické Aparáty
	Electrical motors and generators	Siemens Electric Machines, JULI Motorenwerk, Moog Brno, EMP, Kollmorgen, AVEKO, EM Brno

Source: Bisnode MagnusWeb; detailed data from the CSO; internal research by JIC

Medical and Pharmaceutical Products; Diagnostics

One fairly internally heterogeneous group is that of companies whose products and services are applied in health care – this primarily means the producers of e.g. **medical and pharmaceutical products and products for diagnostics**. By nature, this sector has a higher knowledge level compared to other fields. The frequency of companies with their own R&D is on the low end among the region's key economic domains; however, there are many major enterprises among the companies present. The concentration of high-quality research in the biological and medical sciences and the presence of top hospitals make it possible to fill job positions with high-quality graduates (including Ph.D.s) and interlink educational, research, and clinical practice. From the global standpoint, the companies in the SMR – and elsewhere in the CR – are not key players; however, the relative concentration and the need to ensure supply in crisis situations justify our earmarking of this sector for regional specialisation. Additionally, anticipated changes in health care technologies may be followed by further sectors. The focal point of this sector is the classification CZ-NACE 21.

Health care product manufacturers are represented in the region by two large concerns (HARTMANN - RICO and Lohmann & Rauscher), supplemented by smaller domestic producers focused on products made from specific materials (the RESPILON Group etc.). The special-textiles segment (e.g. PFNonwovens) is very tightly bound to end producers.

The production of **pharmaceutical agents** is represented primarily by activities ranging from the development and production of medicinal substances (Synthon) to the production of end products for human (oncomed manufacturing) and veterinary medicine (Bioveta).

One special segment lying at the border among the production of medical instruments (BioVendor), products (Erba Lachema), and services (GeneProof) is **diagnostics** (BioVendor, Erba Lachema). It relies upon the region's tradition for the manufacturing of scientific and analytical instruments and its extensive research infrastructure in the medical, biological, and chemical sciences.

Sector	**Medical and Pharmaceutical Products; Diagnostics**	Companies with revenues of 100+ mil. CZK = 14 | Companies with R&D expenses = 16
Product groups	Health care products	HARTMANN – RICO, Lohmann & Rauscher, BMT Medical Technology, BIOSTER, RESPILON Group, DINA - HITEX, PFNonwovens
	Pharmaceutical agents	Bioveta, Synthon, oncomed manufacturing, RosenPharma, Enantis, Bohemia Pharmaceuticals, Angelini Pharma
	Diagnostics	BioVendor, Erba Lachema, GeneProof, TestLine Clinical Diagnostics, ELISABETH PHARMACON

Source: Bisnode MagnusWeb; detailed data from the CSO; internal research by JIC

Aerospace

In terms of knowledge intensity and international visibility, integrators and suppliers in the aerospace segment – that is, the development and production of **aerospace and space technologies** – are also among the key sectors. Strong supplier links in high-precision engineering and electronic equipment contribute to the whole field's development. In view of the nature of the activities (major R&D and engineering inputs, individualized production, a high share of innovations for the sector as a whole), this sector has the highest per-unit level of R&D expenses and wage level. The focal point of this sector is the division CZ-NACE 30.

Aerospace is represented in the SMR by e.g. a Honeywell global development centre focused on avionics and instrumentation for airplanes and industrial sensors. Alongside this, the suppliers and development offices of certain other integrators (EVEKTOR) reside here as well. The production of hot-air balloons is a special niche here, in which Balóny Kubíček ranks among the global leaders.

The development and supplying of **space technologies** are enabled by the fulfillment of extremely strict demands upon both the products themselves and accompanying processes. Due to the field's high demands on knowledge and technology, this is an important (albeit small) group of firms – from the standpoint of the region's marketing as well (e.g. Frentech Aerospace, Sobriety, S.A.B. Aerospace, Honeywell).

Sector	**Aerospace**	Companies with revenues of 100+ mil. CZK = 10 | Companies with R&D expenses = 18
Product groups	Aeronautic and space technologies	Honeywell, Frentech Aerospace, Sobriety, L.K. Engineering, S.A.B. Aerospace, EVEKTOR, OHB Czechspace, BALÓNY KUBÍČEK

Source: Bisnode MagnusWeb; detailed data from the CSO; internal research by JIC

4.2 Relevant Global Challenges

The relevant global challenges have been selected based on **research on trends and threats as seen by leading world organizations**[8]. The overviews of megatrends produced by multinational institutions and consulting firms frequently agree on three basic societal changes (explicitly or as accompanying factors)[9]. These are seen by the RIS as opportunities for applying new solutions (the forward-looking strategic overview). These are multi-dimensional matters that do not have purely technological solutions. They demand a transformation of the entire system and a partnership of actors across sectors[10].

By definition[11], the challenges have an aspirational dimension; they are highly socially relevant, with a clear course and **relevance for all types of regional actors** – e.g. for companies (new products), research organizations (higher research relevance and impact), PS/SS (comprehension of trends), and the public sector (timely adaptation measures). **Addressing these challenges makes room for the rise of new innovation opportunities as well as for cooperation across sectors** (public/private/academic) during the identification of needs – and when designing and implementing concrete solutions.

During RIS implementation, the challenges named here can practically imprint themselves into the topic content of activities fulfilling horizontal goals – in a different scope and form for each of them. **It is possible to look upon the proposed RIS interventions through the logic of these challenges and attempt to reflect the topics within projects** (where it makes sense to do so). To formulate innovation demand from the position of the public administration, to initiate demonstration projects, and also to promote successes when applying pilot solutions.

Similar logic in the form of missions or oriented R&D programs is, with growing intensity, imprinting itself into prepared policies at the national and European level (Horizon Europe Framework Programme 2021–2027).

From the RIS standpoint there is reason to expect that a number of opportunities will arise for actors in the SMR in connection with the addressing of these global challenges (an illustrative list of topics is given here):

- **Climate Change and Environmental Sustainability**

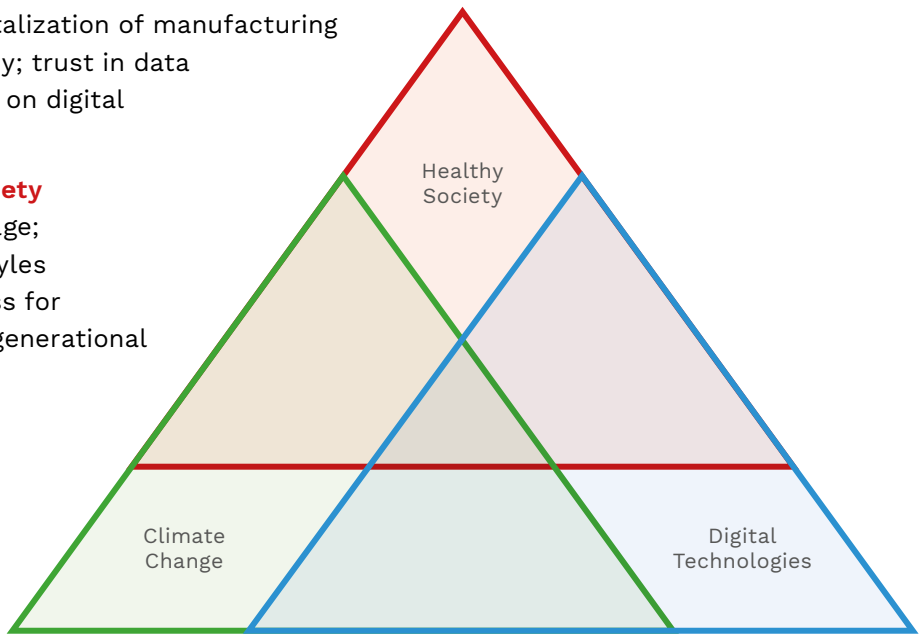
  water management and adaptation to increasing temperatures reduction of emissions; reduction of energy demands reduction of materials consumption; circular-economy principles sustainable production of safe foods

- **Ubiquitous Computing and Content**

  the rise of artificial intelligence; digitalization of manufacturing and services; open data cybersecurity; trust in data and digital technologies dependence on digital technologies; ethics of digitalization

- **Demographic Aging and Healthy Society**

  lengthening of independence in old age; assistive technologies; healthy lifestyles illness prevention, including readiness for epidemics and crisis situations intergenerational solidarity and adaptation to aging



[8] E.g. WEF 2019, The Global Risks Report, EC 2019 Strengthening Strategic Value Chains for a future-ready EU Industry
[9] SAMI Research, Huw Williams (2020): Meta-Megatrends: Review of different approaches
[10] Foray et al. (2019): The Role of Smart Specialisation in the EU R&I Policy Landscape. European Commission, Region and Urban Policy
[11] Stated in greater detail in e.g. Mazzucato, M. (2018) Mission-oriented research & innovation in the European Union. European Commission

4.3 Cross-cutting Competencies

Cross-cutting competencies are of a generic nature. They are an important contribution toward increasing the added value of existing sectors. Meanwhile, approaching them correctly can strengthen the ability of key actors (companies, the public sector, researchers, and individuals) to respond to changes connected with global challenges, adapt to the demands of a changing society and economy, and create new innovation opportunities. We see their essence in the practical grasping of these competencies so that they bring specific benefits for the functioning of companies and people's lives. These are primarily the following competencies:

- **Creative competencies** include activities whose foundation lies in creativity, skills, and talent. They are often based on cultural values and artistic expressions[12]. They give products in propulsive economic sectors a greater symbolic and functional value and allow companies to approach potential customers effectively. They are most strongly utilized in creative sectors such as design, architecture, advertising/marketing, audiovisuals, fashion, and e.g. video game development.
- **Competencies for digital transformation** include the ability to actively respond to ascendant technological trends in digitalization, understand their possibilities, and harness them in areas where they can streamline, automate, or even replace human activities. With the development of digital technologies, an entirely new market space is currently arising – as well as the risk stemming from sluggish responses to this trend. This especially means functionally grasping trends in the development of artificial intelligence and automation, in data processing, in virtual and augmented reality, and in the utilization of blockchain technology. It additionally means the ability to adapt to new forms of work and communication in digital space.
- **Competencies for sustainable growth** group together those skills that enable companies and individuals to deal with the need to limit immediate impacts on the environment (to comply with regulations and satisfy new customer preferences). This principally means reducing carbon footprints and energy and materials demands, plus skills that lead to this (application of circular-economy principles, etc.). Selected goals of the UN's Sustainable Development Goals (SDGs) outline the basic framework for these competencies.

[12] Theatre Institute, 2016 Methodology for Mapping Cultural and Creative Industries at the Local and Regional Levels

PROPOSAL SECTION

Our formulation of visions and goals relied upon the extensive collection of impulses from our environment, a multi-level discussion with key stakeholders at workshops, and individual meetings. It is based on partnership and stakeholders' readiness to share in the strategy's formation and the implementation of its specific activities. The proposal section pursues the following logic:

The vision represents the basic compass for decision-making, and all goals and activities should contribute toward its fulfillment. The interpretation of its key words (the vision's essence) is an integral part of it, and it stresses authentic regional elements.

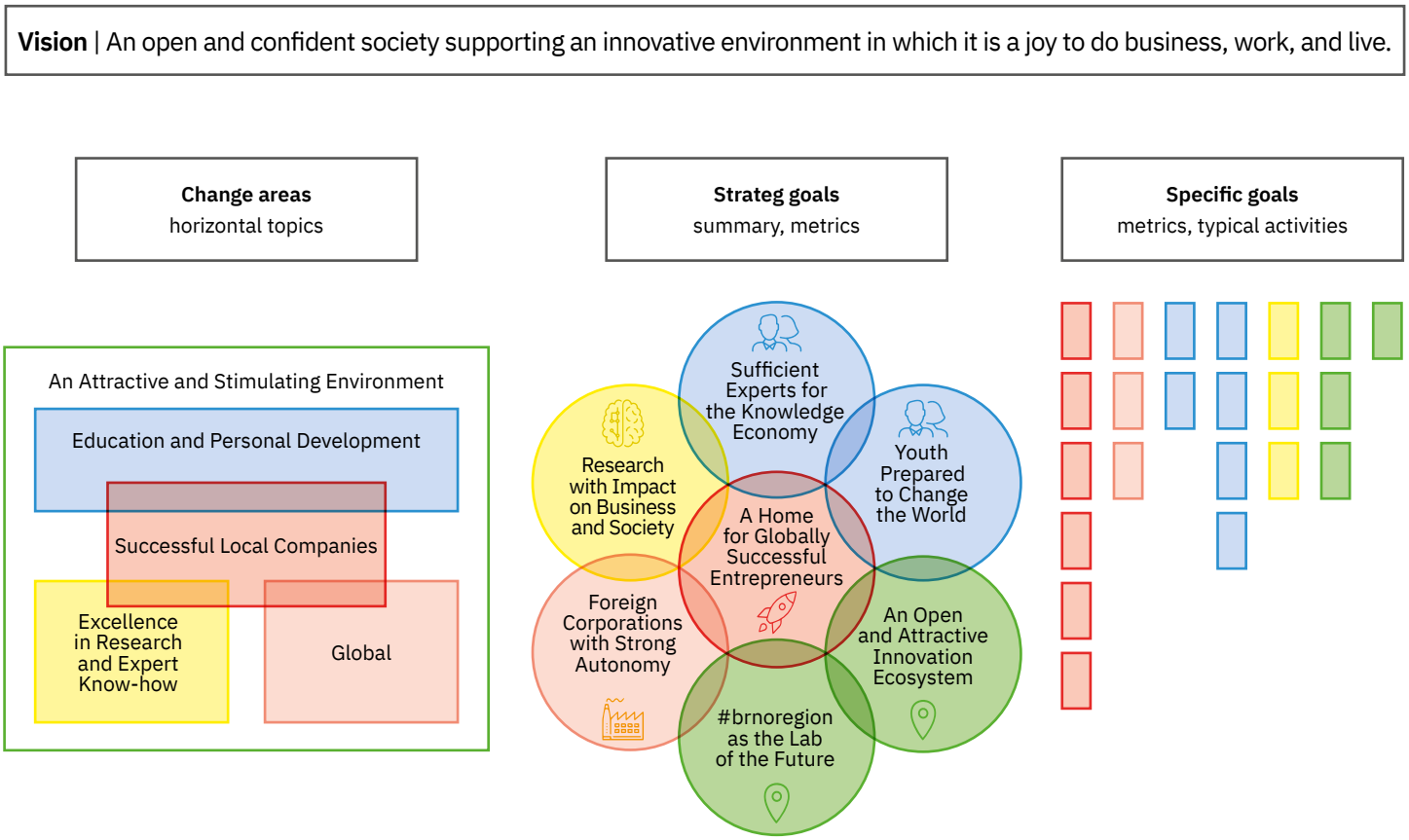
The change areas delineate horizontal topics in which the RIS has the ambition to bring about a change. The starting points for its delineation were the priority-marked SWOT, the vision and its essence, and the desired phenomena named by key personalities at the topic workshops. Unlike in previous generations of RIS SMR, two groups of businesses were distinguished by reason of their differing roles and needs; the topic of education and personal development is receiving considerably broader attention, and internal and external relationships in the ecosystem and other elements contributing to the environment's attractiveness are bolstered through the RIS. Five change areas were delineated: Successful Local Companies; Embedded Global Companies; Education and Personal Development; Excellence in Research and Expert Know-how; Attractive and Stimulating Environment.

Strategic goals were formulated, based on the change areas and inputs acquired at the thematic workshops. They are simultaneously formulated so that various types of stakeholders will be able to identify with them well and that their logic will immediately imply what achievements are desired, and through whose action they should come. The distribution of goals within the scheme evokes where the strategy's focal points lie and the fact that intersections exist among the goals. In two cases, a change area gives rise to not one but two different strategic goals. Highlighting these strategic goals within the hierarchy of goals is meant to focus attention on the new topics. The summary of strategic goals provides justifications for their formulation and describes how we are approaching their fulfillment. Every goal is linked with a metric providing an indicative overview of what progress is being achieved in the goal's fulfillment (direction and intensity of the change).

Specific goals are likewise furnished with summaries, metrics, and indicative, listings of typical activities. These list (but not exhaustively) ways in which the actors can help with meeting goals in the RIS implementation phase.

The **action plan** is a portfolio of project plans. It will be prepared and updated during the strategy's implementation.

Figure 3: Structure of the Proposal Section of RIS SMR



5.1 Vision

An open and confident society supporting an innovative environment in which it is a joy to do business, work, and live.

- open society = people who have an unforced approach and are open to new ideas; cooperation inside and outside the region; tolerance toward diversity; awareness of one's place in the world
- self-confident society = a responsible society built on education and individuals' personal development, leadership, and innovation; people proud of their skills and success
- supporting an innovative environment = partnership; a shared vision; infrastructure for the development of people and companies; the courage to be an innovator
- a joy to do business, work, and live = positive mindset; proactivity; safety; accessibility; prospering companies of all sizes; creative people

5.2 Strategic and Specific Goals

Strat. goal 1 | **A Home for Globally Successful Entrepreneurs**

Summary

- **Locally owned** businesses represent the basic pillar of the region's **economic stability**. Their **owners and directors** make **strategic decisions** here autonomously due to none other than their local ownership and ability to take risks upon themselves.
- **Home** is connected with a feeling of togetherness and a link to the place a person comes from. Entrepreneurs often take on **the role of local leaders**. They seek chances to strengthen their position thanks to cooperation within the ecosystem. Presence on **global markets** and the achieving of critical mass provide proof of their business success.
- The majority of the South Moravian economy is made up of foreign firms, whose autonomy and bond to the locality where they do business is usually weak. A major portion of their dividends flows out to their parent companies past our borders. Locally owned companies **accumulate know-how and capital** and are inclined to reinvest both of these within the region.
- The chosen approach is **based on a funnel analogy. Work with company leaders** is crucial for all of its levels. Through it, their businesses can be improved and a positive impact can be made on the outside world. We are aiming for a situation wherein examples of successful entrepreneurs will live in the region and will share their stories to the benefit of the whole.
- We are led forward by the vision that awareness and celebration of our successes will make entrepreneurship more prestigious. It will be viewed by young people as a potential **career choice**. It will become a visible part of **the region's DNA**.
- We consider it fundamentally important to reach out to the broadest possible base of people with a desire to do business and give them a chance to verify their plan with the support of experienced experts. A constantly improving **system of consultation support** for both beginning and established firms with distinctive products and an ambition for growth ties into a high-quality **pre-incubation infrastructure**. It will seamlessly cover all phases, from the initial growth phase to scaling up and international expansion.
- The building-up of expert **communities, interconnection, and mutual inspiration** among company leaders will be stimulated beyond the bounds of direct support – in the spirit of strengthening trust, sharing, and harnessing the community to the benefit of its members. Links within the community will make it possible to address leading global players.
- Care for the entrepreneurial ecosystem will also reside in support for its other key elements – we aspire to increase activities by experienced **local investors** and the systematic formation of **business hubs** where the proximity of e.g. innovation companies, academic sites, and infrastructure for creative competencies will naturally give rise to both agglomeration effects and useful encounters.

Metrics

- Number of globally successful companies coming from the SMR (with revenues of 500+ mil. CZK in selected sectors)
- number of domestic companies performing R&D in the region

Spec. goal 1.1 | **Heighten the Number of People with Entrepreneurial Drive Who Found Their Own Company**

Summary

- We will address the largest possible base of people with entrepreneurial desires. We will set up a system for the development of enterprising persons who will be a wellspring of well-prepared business projects, and we will give them the opportunity to validate their plans with support from experienced experts and low-threshold pre-incubation services.

Metrics

- the number of people with high-quality business plans who have used pre-incubation services and rate their benefits at 8/10 or more

Typical activities	▶ tools for picking up the basic principles of doing business (courses and summer schools) ▶ the activation of the startup community (meetings and lectures); increasing the awareness of successful local companies and their interconnection ▶ a practical incubation environment; infrastructure for free creativity; prototyping workshops (creative hubs/centres and open workshops)
Spec. goal	1.2 | **Increase the Number of Dynamically Growing Startup Companies**
Summary	▶ A graded system of individualized consultation support will tie in to a high-quality pre-incubation infrastructure. We will support business competencies and interconnection with entities bearing complementary know-how (experts, investors, and creative sectors). We have the ambition of increasing the number of startup companies in general, and among them especially startups with a scalable product or technology and an ambition for growth aiming at addressing global challenges. We will continue to develop the nation's best environment for startup companies.
Metrics	▶ number of companies that have been in business for less than 4 years and have used consultation support and rated it 8/10 or more
Typical activities	▶ acceleration and incubation services, consultation support, competence centres, digital innovation hubs, and cluster initiatives ▶ specialized consultation services (including interconnection with creative sectors, digitalization, and incorporation of sustainability principles) ▶ popularization of innovations as paths to growth for companies (meetings, lectures, sharing of examples of good practice) ▶ strengthening the mobility of students and researchers between the academic and company environments ▶ initiating capital and grant support for prototype creation and verification; activities for increasing the success rates of grant requests ▶ public-administration activities stimulating demand for innovation-based solutions (open data; public administration in the role of a pilot customer)
Spec. goal	1.3 | **Increase the Number of Companies That Can Go International with Their Own Product**
Summary	▶ We will bolster the availability of specific expertise for companies that are capable of scaling their business long-term. We will offer companies coming from the region tools for supporting internationalization and international expansion (arranging access to expert consulting and access to global players). We will support established companies in their quests for opportunities to increase their added value (digitalization principles; connecting them with e.g. representatives of creative sectors and tech leaders).
Metrics	▶ number of companies with 10+ employees and/or 10 mil. CZK revenue that have used consultation support for boosting growth or international expansion and rated its benefits 8/10 or more
Typical activities	▶ competence centres, digital innovation hubs, consultation support in company leadership and their development for global business ▶ support for strategic planning ability; management of innovations and productivity in companies; coaching programmes ▶ integration into international platforms for the support of business and innovation; arranging access to global players ▶ activities for connecting companies with partners across sectors, segments, and company sizes, open-innovation tools, creative vouchers, connecting startups with corporations, making use of cluster initiatives and other forms of partnership for the development of innovation cooperation ▶ sharing of experiences; mobility for experts and interconnection in such areas as business strategy and product marketing ▶ support for the education and mobility of experts for international expansion (ability to work with risks; knowledge of markets)

Spec. goal 1.4 | **Expand the Community and Deepen Cooperation among Local Entrepreneurial Leaders**

Summary	▶ We will strengthen support for entrepreneurs in mutual sharing within the community of owners and leaders of local companies. We will strive to use the community's potential to the benefit of more of its members. We will strengthen networking, mutual trust, and possibilities for sharing know-how and innovation partnerships.
Metrics	▶ the number of individual representatives of companies active in organized entrepreneurial communities with defined parameters
Typical activities	▶ facilitation of networking and establishing of innovation partnerships among companies (networking events, communities, and community events) ▶ activities for interconnecting startups and established firms or corporations; open innovation events ▶ facilitation of the sharing of experienced entrepreneurs' know-how with beginners; support for personal engagement by local leaders ▶ strengthening companies' awareness about social responsibility and development – "culture of giving back" ▶ organizing events to strengthen the entrepreneurial community and raise awareness about successful local companies

Spec. goal 1.5 | **Raise Awareness among Local Investors and Investor Clubs**

Summary	▶ We will make the know-how and capital of the local investor community and experienced entrepreneurs more visible and accessible. We will increase the availability of smart investments for companies. We will raise awareness, general knowledge, and trust among the community of company owners and investors so that the resources and experience within it make their way into new projects. Where there is not enough local capital, we will strive for connections to foreign capital resources.
Metrics	▶ the number of functional platforms or investor clubs with visible activity and openness toward the ecosystem
Typical activities	▶ facilitation of investor interconnection and the founding of, and activities by, investor clubs ▶ financial and consulting tools for the development of innovation startups (in cooperation with angel investors and investment funds) ▶ raising awareness general knowledge, and trust among the community of company owners and investors ▶ activities leading to interconnection between local companies and investors abroad (esp. when there is not enough local expertise and specialized capital). ▶ the existence and outputs of a survey among investors in the region with the cooperation of relevant partners; sharing of information

Spec. goal 1.6 | **Develop the Infrastructure for the Creation of Business Hubs**

Summary	▶ We will create the prerequisites for the founding of business hubs, wherein the proximity of e.g. innovation companies and research centres or the concentration of members of creative industries will naturally give rise to agglomeration effects and useful random encounters (especially at university campuses and sites where the public sector has the power to plan the given territory – e.g. Czech Technology Park, the Bohunice University Campus, KUMST, the former jailhouse building, and CERIT SC). We will strengthen opportunities for expansion of deep-tech companies and the development of creative industries.
Metrics	▶ the existence of the sites thus defined and the number of projects for infrastructure development
Typical activities	▶ readiness of the territory and infrastructure at the defined sites with the best prerequisites for the founding of business hubs ▶ competence and creative centres, open workshops, digital innovation hubs, specialized infrastructure (e.g. appropriate spaces for companies with a link to specialized R&D infrastructure with open access; pilot, testing, and test-bed facilities) ▶ tools for effective interconnection of the academic, business, and creative sectors focused on businesses' growth

Spec. goal 2 | **Embedded Foreign Corporations with Strong Autonomy**

Summary

- Large companies are a fundamental part of the majority of advanced innovation ecosystems. **Foreign corporations "propel" the knowledge economy** in many places, including the SMR. From the position of integrators, they demand a high technological level and high efficiency; they export the solutions they produce worldwide. Because of this, we find it important to strengthen their bonds **to local companies and research capacities**.
- It especially makes sense to strive to **localize strategic functions** within the value chains of which corporations are a part. Especially those functions that precede and follow on from manufacturing and bring the highest added value (R&D, design, sales, and marketing). The presence of such functions represents one form of **embedding in the region**.
- The leading global companies exude **prestige and strengthen the region's visibility** abroad. They have **knowledge of global markets** supported by efficient organization processes, including employee training. The mobility of their employees represents a strong channel for **know-how transfer**.
- Tech leaders create long-term roadmaps; they are able to identify essential topics and business opportunities and are an **attractive partner for universities and startups**. Connection to corporations can make **international expansion** significantly easier for local companies.
- We perceive the explicit selection of this goal as a means of **identification with the region for local managers** of foreign companies, whose position we wish to strengthen. It places them in the role of local leaders who can strengthen connectedness to the ecosystem – and within companies' hierarchies, they are an important way to anchor corporations in the region.
- We will strengthen their community and harness growing trust and willingness to open up to the ecosystem. Thanks to this, **more opportunities are created for entering into strategic partnerships** (with public research, startups, etc.) and pulling in strategic functions. By doing this, we wish to support branches in gaining **greater decision-making autonomy** and capturing a greater share of added value within the region.
- In fields with strong research expertise (e.g. biological and medical fields) and weak presence of companies with this type of focus, it makes sense to **reduce the structural disharmony between knowledge supply and demand** and strive for the influx of new investors or the diversification of existing businesses' portfolios.

Metrics

- number of foreign companies with their own R&D spending in the region
- number of companies from the EU Industrial R&D Investment Scoreboard present in the region (contextual metric)

Spec. goal 2.1 | **Strengthen Cooperation by the Managers of Foreign Innovative Corporations and Their Involvement in the Ecosystem's Development**

Summary

- We are striving for closer interconnection of key representatives of corporations and the creation of an atmosphere of mutual openness. In discussions with them, we will identify fundamental topics and seek solutions for strengthening their embedding in the region and capturing new roles within companies' global structures. We wish to offer opportunities and involve foreign companies in the cultivation of the local environment and strengthen their trust.

Metrics

- the existence and outputs of a survey on the degree of branch managers' involvement in the ecosystem's development

Typical activities

- cooperation with corporations present in the region in ensuring support for the making of further investments within the companies' internal structures; the sharing and use in communication of case studies on acquiring new roles, the creation of corporate spin-offs, etc.
- the creation of a sustainable platform for interconnection; strengthening trust and the sharing of experience among corporate managers (mentoring, shadowing) and between the managers themselves and other actors (small and medium businesses; research organizations)
- strengthening co-responsibility for the ecosystem's development (communication on corporations' needs, CSR possibilities, etc.)
- sharing projects from abroad, as well as information and advice arising from knowledge of global markets and comprehension of customer problems

Spec. goal	2.2 | **Stimulate the Formation of Valuable Strategic Partnerships**
Summary	▶ We identify and mobilize valuable bonds (content comes from shared interest and active involvement) between corporations and other entities in the innovation ecosystem (startups, universities, and high-tech suppliers). We thereby open up opportunities for attracting strategic functions within the structures of multinationals. We will strive to shift the focal point of branches' activities toward more sophisticated activities and qualified jobs, including the harnessing of opportunities for re-shoring knowledge-intensive activities.
Metrics	▶ the existence of and results from research that tracks the number of partnerships with content and defined parameters
Typical activities	▶ strengthening the culture and mutual benefit of the relationship between corporations and research organizations in the region (cooperation, mobility for Ph.D. students, mentoring, sponsored positions, cooperation with universities in education, scholarships, and the use of corporations' insights in global technological and market opportunities) ▶ activities for interconnecting startups and established companies or corporations; open innovation events; sharing experience ▶ activities for the development of large companies' supplier chains (upgrading suppliers); mapping opportunities for cooperating on innovation projects (making use of their insight on global trends, products, and technologies)
Spec. goal	2.3 | **Strive for the Diversification of Global Companies' Activities in the Region to Harness Available Knowledge Potential**
Summary	▶ Further development of certain knowledge-intensive fields (e.g. biological and medical) in SMR is restricted by the absence of strong companies with global reach and the capacity for absorbing the experts and research outputs supplied by local research sites. We will devote our attention toward preparedness to acquire new investors in these fields or contribute to the diversification of already-present corporations toward activities more closely tied to the local knowledge base in life sciences.
Metrics	▶ comparison of the number of researchers in the business and university/government sector by research fields
Typical activities	▶ ensuring the readiness of sites nearby university campuses (especially in the life sciences) and the co-location of companies with their own R&D ▶ strengthening the valorisation of research institutions' outputs (the founding of academic spin-offs, research cooperation, mobility for Ph.D. students) ▶ activities for interconnecting startups (incl. spin-offs from universities) and established companies or corporations; open innovation events

Strat. goal 3 | **Youth Prepared to Change the World**

Summary

- The need for young people to be equipped with **competencies for solving today's and tomorrow's problems** is growing ever more palpable. We consider **active people motivated toward self-development** to be the foundation of an open and confident society that the RIS vision aspires to.
- They have to be capable of working with mistakes and unafraid of making them. That means **better students for the next phase of education** – and thus also better employees and more responsible citizens. The understructure is already arising here for the creation of globally successful local entrepreneurs.
- Namely this means the ability to **actively use opportunities**, come forth with creative solutions to problems, and think strategically. Alongside this it is essential to have a good grasp of the surrounding world and **acquire and critically assess information** with awareness of social and environmental responsibility and ethics. To have the needed communication skills, **social and emotional intelligence**, communicate in a global language, handle cooperation well, adapt well, and have the ability to learn constantly and identify and **develop one's strengths** and talents.
- The essence of this strategic goal is to **ensure comprehensive coverage throughout the environment**, so that all the youth in the region have an opportunity to pick up these skills up to their personal maximum (not just the basics), rather than this occurring only rarely or exceptionally. Not only in Brno, but within a wider territory – this is the goal with the widest geographical reach.
- For reasons of attainableness and prominence, we are **primarily aiming at the group of PS and SS students**. At universities, students should already find these skills routine. We do perceive the limits of the national school system, and our ambition is to both influence **primarily teachers and principals** through our offering of activities, and to inspire and motivate them. Because without changing teachers, we cannot change students. We are aiming for a collective commitment by the main regional institutions responsible for education that will **open the door to new approaches**.

Metrics

- the existence of a platform of organizations supplying additional content for the development of entrepreneurship and personal development skills (progress metric)
- the number of schools (PS and SS) that systematically develop entrepreneurship and personal development skills in their students

Strat. goal 3.1 | **Build up a System for Comprehensive Coverage of Awareness and Development of Entrepreneurship**

Summary

- A well-functioning system will offer the broadest possible group of PS and SS students in the SMR a chance to acquaint themselves with entrepreneurship, initiative, and creativity topics (a chance to "experience entrepreneurship"). By entrepreneurship here, we mean the set of skills needed for an active approach to work, social, and personal life. According to the European Reference Framework, it is the ability to bring in creative ideas, grasp them systematically, and create value for others from them. The essence of entrepreneurship is creativity, critical thinking and problem-solving, initiative and perseverance, and the ability to cooperate with others with the goal of planning and managing projects that have cultural, social, or commercial value. Entrepreneurship education (which borders with goal 1.1) with PS and SS students as its focal point can freely tie into the above.

Metrics

- the number of schools offering long-term systematic support for entrepreneurship with the defined parameters

Typical activities

- workshops, seminars, conferences, or study visits for sharing good practice to develop entrepreneurship (for students, educators, and principals)
- a system of methodology support for teachers based on networking among schools and teachers and the transfer of examples of good practice
- activities to strengthen entrepreneurship beyond the framework of teaching; talent-seeking (contests; support for students' own projects)
- presenting entrepreneurship as a possible career choice; creating encounters with the real stories of successful young entrepreneurs
- developing entrepreneurship and individual ambitions; willingness to try things and take on risks; ability to work with mistakes
- education on business basics as a part of universities' curriculum (university-wide subjects on doing business and commercialization)
- promoting and popularizing companies from the region, opening the doors to PS, SS, and universities for inspiring presentations

Spec. goal 3.2 | **Adapt the System for Educating Youth to Empower Them to Meet the Demands of Today's World**

Summary	▶ Within formal, hobby, and informal education, we push for holistically, globally, and practically led personal development as a method, and not simply the content of education. We wish to strengthen self-confidence, leadership, communication skills, teamwork, and the ability to work with mistakes. To develop social and emotional intelligence, social and environmental responsibility, and ethics. We will shape critical thinking, the ability to acquire and assess information, to communicate in English, and to take part in the international environment. All of these competencies must remain interlinked so that youth can develop comprehensively.
Metrics	▶ the number of schools that are implementing project education that has the defined parameters, has connections with the outside world and are addressing real-world problems
Typical activities	▶ workshops, seminars, conferences, or study visits for sharing good practice in education (for students, educators, and principals) ▶ a system of methodology support for teachers and instructors based on networking and the transfer of examples of good practice ▶ support for students' independence and responsibility; project support and integrated support connecting subjects ▶ education on civic responsibility; involvement of students into society-wide topics and projects influencing their immediate surroundings; schools as community centres ▶ managerial education for principals, teachers, and as appropriate other actors that shape and perform education in the region ▶ strengthening language competencies; support for exchange visits; international projects; understanding global contexts ▶ teaching how to work with mistakes; courage to experiment; perception of failure as a journey; work with feedback ▶ confidence, self-discovery, and responsibility as a part of growth and education at schools ▶ the existence of a system for students' self-assessment of how they feel in regard to the listed competencies; their relationship to education ▶ investments into corresponding ICT infrastructure and the adoption of new approaches for the confident use of digital technologies by both teachers and students

Spec. goal 4 | Sufficiency of Experts for the Knowledge Economy

Summary

- The SMR's successes to date have stood to a considerable degree on the number of well qualified experts. It is desirable to keep this advantage growing in spite of demographic trends that cause student counts to drop in absolute terms. The goal's purpose lies in **preparing experts for promising areas of the economy** and long-term growth in the share of highly qualified jobs.
- This especially involves the advanced skills assembled under the acronym STEAM. **STEAM (science, technology, engineering, arts, mathematics)** emphasizes the interlinking of areas of knowledge, the use of acquired skills, and the ability for creation and presentation.
- These skills are taken as being decisive for maintaining competitiveness and sustainable development. We meanwhile respect the approach that the knowledge economy does not rest solely on "hard" skills. We believe that the humanities, the social sciences, and creative fields are central to the development of people's imagination and adaptability as well.
- We strive for young people to love to learn and to have motivation and the best of conditions for practical discovery. The strategy is to develop STEAM skills and create a broad funnel with the ambition of a **quality education across the board in STEAM at PS and SS and supplement it with informal and hobby education**. To **deepen the provided expertise** at higher levels with greater selectivity. The point is to both boost the average student and train more top experts.
- We are aiming for **practical education** connected with involving people from practice into education and the shaping of curricula. Students must work with **real-world problems**; teaching should guide them toward interlinking their competencies and seeking solutions to practical problems.
- Additionally it is essential to **mobilize and support educators and principals as well as institutions providing hobby education and science popularization**. Establishing partnerships with the application sphere and experts from practice, and thanks to this, boosting the relevance and attractiveness of education, including the popularization of science and technology. This can be preconditioned by fortifying education staffing to include professionals in positions designed to meld formal, hobby, and informal education, or interconnecting schools with communities.
- The target group is **young people present in the region (primarily PS and SS students**), for whom we wish to develop the above-described competencies. A portion of them will further develop their acquired skills and passion for knowledge at a university. Concurrently, we are reflecting the direction taken by educational policy at the national level and its limits. We are attending to the part of education that contributes most to fulfilling the RIS vision and that can be influenced via individual measures at the regional level. The point is not to weaken schools' positions, but to appropriately supplement them.

Metrics

- the existence of functional platforms of organizations providing supplementary content for STEAM education and science popularization; a unified and communicated offering presented to schools (progress metric)
- the number of schools (PS and SS) that make active use of this offering and knowledgeably communicate it to their students

Spec. goal 4.1 | Ensure a High-Quality Education System for Youth in STEAM Subjects at PS and SS

Summary

- We will push for the formation of a positive relationship toward STEAM among the highest possible number of PS and SS students, primarily through work with teachers and opportunities created with a view to what educational plans and individual schools enable. We wish to spark a desire among a portion of students to focus on STEAM in greater depth, e.g. thanks to the available palette of hobby education. This concerns both educational methodology and content, equally.

Metrics

- the number of teachers actively engaged in sharing examples of good practice for STEAM education (e.g. methodological cabinets and other forms of sharing, including interdisciplinary or project-based forms)

Typical activities

- workshops, seminars, conferences, or study visits for sharing good practice to develop STEAM (for students, educators, and principals)
- a system of methodological support for teachers based on networking and the transfer of examples of good practice
- managerial education for principals, teachers, and as appropriate other actors that shape and perform education in the region
- centres of excellence for technical SS education
- introducing elements of polytechnical education interwoven through all subjects; interconnection among fields
- infrastructure for learning modern technologies; an opportunity for free creativity; modern technologies as a part of PS/SS education
- the creation of a network of inspirers for STEAM (scientists, people from practice, verified people lecturing at schools)
- support for SS teachers of mathematical and technical subjects on the part of companies and research institutions

Spec. goal 4.2 | **Introduce a Global System of Support for Popularizing Science and Technology and Developing Digital Literacy**

Summary

- We will provide every young person with an interest in STEAM opportunities to devote themselves further to science and technology topics, primarily thanks to informal education and hobby activities. We will also contribute toward confident and creative use of digital technologies and better orientation within the digital world. In both cases this is about increasing the clarity of what is offered and expanding its availability to all regional centres. It is therefore desirable to engage educators, people from businesses, and scientists into our work with enthusiasts.

Metrics

- the existence of a functioning platform of centres for formal and informal education in the SMR providing high-quality content (progress metric)
- the number of activities and of people served from the target groups that made use of organizations' offerings

Typical activities

- a system of methodological support for popularizers based on networking and the transfer of examples of good practice
- the framework for and expansion of technical hobby education; the interconnection and creation of logical continuities within what is offered throughout the region
- an infrastructure for learning current technologies; opportunities for free creativity; modern technologies as a part of PS/SS education
- the creation of a network of inspirers for STEAM (scientists, people from practice, etc.; verified people lecturing at schools)
- activities for popularizing science and acquiring talented youth for research careers (the Students' Professional Activities national competition; scholarships for talented students)
- activities for strengthening pride and allegiance toward prominent local fields (e.g. electron microscopy and astronautics)
- support and motivation for researchers to popularize science outputs and the importance of science overall
- the development of the activities of hobby education institutions and science popularization; modernization of facilities and meaningful programs
- investments into corresponding ICT infrastructure and the adoption of new approaches for the confident use of digital technologies by both teachers and students

Spec. goal 4.3 | **Stimulate the Use of Skills through Cooperation with the Practical Sphere**

Summary

- We will support the closest possible interlinking of education with practice, connected with excursions to companies and other institutions. We will engage people from practice into education. During their education, pupils and students will work on real-world problems and have a chance to see how the knowledge they gain can be applied in the solving of concrete practical tasks. The point here is to authentically show what in their lessons can be useful for future application, and how, and to acquire diversely applicable skills, rather than deepening narrowly profiled competencies for one specific position.

Metrics

- the number of schools that systematically combine lessons with excursions or inspiring presentations by verified people from practice

Typical activities

- creating a network of inspirers and providing an overview of how skills are put to work in practice (verified people lecturing at schools)
- activities for strengthening pride and allegiance to prominent local fields; acquainting students with role models
- cooperation between companies and other organizations on creating meaningful education programs
- increasing the quality and relevance of professional preparation of students through excursions, professional training, and practice
- improving the informedness of PS and SS regarding local business and the potential for making use of students

Spec. goal 4.4 | **Identify and Work Systematically with Exceptionally Talented and Motivated People**

Summary

- We will continue to improve the system for work with talented people across the different stages of education. We will expand the coverage of the tools for identifying talented and exceptionally motivated students to include diverse forms of talent (beyond solely cognitive talent).

Metrics

- the number of exceptionally talented or motivated students identified and engaged in the system for talent development

Typical activities

- a networking-based system for giving methodological support to teachers and transferring examples of good practice for supporting talented people
- activities for finding talent (diagnostics; student competitions; support for students' own projects) and follow-up consulting
- networking students to share a personal community; meetings between various students and other people about development, including cooperation between schools and students' volunteer organizations
- development of career and personal consulting and follow-on development of individual skills and talents
- an integrated regional scholarship program for talented students
- support for the ability of teachers and the education system to work with exceptional children

Strat. goal 5 | **Research with an Impact on Business and Society**

Summary

- Excellence in research represents the **mainstay of innovation performance** in the world's advanced regions and a magnet for talent. Excellence is necessarily bound to a high degree of internationalization and **international openness**, and it opens up opportunities for closer **interconnection with the application sphere**. We believe that these parameters are mutually reinforcing, not mutually exclusive.
- Research primarily influences business and society via innovations, i.e. results that imprint themselves into newly utilized solutions and deliver new value (someone is willing to pay for them). And so the core of this goal is to strengthen **research with an impact that changes the world, peoples' lives, and companies' products**. In the SMR we have no lack of research capacities, but sparse outputs that are usable in applications and embody research organizations' role as the driver of regional development (epitomized by a minimum of spin-offs founded despite a relatively high declared potential and investments into R&D).
- The intensity of cooperation between public research and the commercial sphere lags behind that of developed regions; meanwhile, **closer bonds between companies and research** bring a number of effects above and beyond the application of research outputs in practice (influencing of research topics; practice for students; mobility for experts).
- Educating young researchers simultaneously means educating professionals to meet the needs of knowledge-based companies. Leading **science personalities fundamentally shape modern society**.
- Our strategy is grounded in **strengthening the areas in which we excel** and in which local research has an international standing (quality and attractiveness). **Strategic profiling** is another way to achieve critical mass and international visibility for the region in research and university education.
- The local research environment must not remain closed to outside stimuli and new approaches. These are brought into it through human mobility. We consider **open personnel policy and systematically boosted international attractiveness** to be key for the inflow and retention of promising talent and the established research leaders.
- The point here is to achieve **a high degree of expertise in fields with relevance for the region's key economic sectors**, where the density of business actors offers the most innovation opportunities, **and also a strong impact on addressing global challenges**. To change the world and people's lives through a partnership of the best scientists and companies and the public sector.
- We believe that a strategic orientation of research and a culture of open cooperation in the innovation ecosystem is a part of how we can approach both innovation opportunities and growing challenges effectively to the benefit of the region's development. We simultaneously respect research organizations' broader mission and the role that the Czech research policy plays in shaping their profile.

Metrics

- the number of academic spin-offs (businesses founded for the purpose of commercializing intellectual property created at a research organization) founded during one year
- the number of ERC grant projects currently implemented by grantees present in the SMR (progress metric)

Spec. goal 5.1 | **Strengthen the International Attractiveness of Research and Education in Profiled Fields and Address the Challenges of Today's World**

Summary

- We strive to connect universities' two basic roles more closely and profile them more clearly, i.e. to build up professional education in areas in which the region simultaneously has the highest-quality research. Excellence in research creates a knowledge base in the long term (in the form of first-rate graduates and sought-after results) that the creators of innovation solutions can rely on. This suggests itself naturally in profiled fields with a clear connection to the most (regionally) important economic sectors and/or relevant global challenges. We see a springboard in a shared commitment by research organizations to actively develop a strategic specialization as well as links to application partners within their plans.

Metrics

- the existence of defined profiled fields at strategic universities and the existence of a relevant offering for foreign students or researchers (progress metric)
- the share of foreign researchers in these fields in the university and government sectors

Typical activities

- an agreement among leading universities in profiled fields for universities and the region as a whole; activities in strategic research management for closer interconnection with excellent research teams (Brno as a university complex; reduction of fragmentation; strengthening of visibility)

- the introduction of multilingualism as the standard in profiled fields; the creation of English curricula; joint university marketing
- the filling-in of high-quality support services for incoming foreign students and scientists
- long-term partnerships with leading research institutions abroad; systematic mobility support for eminent researchers and talented students; an ambassador program for Czech alumni abroad
- the modernization of research and education infrastructure – especially in profiled fields that have reached critical mass and financial sustainability
- a personnel policy that leads to reduced inbreeding; open hiring procedures; leadership positions for people with verifiable successes both in science and in connecting research with practice
- an accent on the perception of the responsibility and societal relevance of research among academics; pulling research areas closer to application sectors and global challenges; strengthening co-responsibility for the development of the innovation ecosystem
- interconnection of the regional scientific community; partnerships for multi-field education; sharing of experience and examples of good practice

Spec. goal 5.2 | **Mobilize Partnerships between the Best Research Teams and Companies**

Summary

- We will strengthen cooperation between public research and the application sphere. Research organizations' strategic orientation (both proactive and externally stimulated) is concretely reflected in the partnership of elites from both the academic sector and business. We will work on increasing the alignment of mutual expectations here. We will introduce tools for supporting mobility at sites that have international quality – and companies' interest. We will promote examples of successful cooperation between research organizations / universities and companies, and we will strengthen universities' perception of their responsibility for the development of the innovation ecosystem.

Metrics

- the existence and outputs of a survey mapping the intensity and quality of cooperation between companies and research organizations

Typical activities

- strengthening the relationship between research organizations and companies in the region (research cooperation, mobility for Ph.D. students, sponsored research positions, cooperation in guiding study programs and diploma/dissertation topics, study visits)
- an accent on the perception of the responsibility and societal relevance of research among academics; strengthening co-responsibility for the development of the innovation ecosystem, guiding research activities and outputs toward direct application in companies and the public sphere
- support for the preparation and implementation of joint projects by academic and application partners, especially in key application sectors and projects responding to global challenges within the regional context (connection to public-sector demand)
- activities for developing contacts and trust between research organizations and the business sphere (networking events etc.); harnessing of the know-how of respected professionals from practice for guiding research activities and outputs toward application
- activities for increasing the professional public's awareness of high-quality research performed in the region; strengthening of interaction and sharing of inspirations for the cooperation of scientists and companies; publicizing successes
- boosting the quality of management, culture and the perception of knowledge transfer; functioning platforms for interactions with the application sphere at university faculties
- interactions with the application sphere as a part of doctoral studies; tools for simplifying bidirectional mobility

Spec. goal 5.3 | **Produce Favourable Conditions to Increase the Founding of Spin-offs from Research Organizations**

Summary	▶ We will promote the establishment of clear processes for the support of commercialization and the founding of academic spin-offs. We will motivate researchers to found spin-offs and create support tools for bridging objective and subjective barriers. We will create dedicated support for tech spin-offs, from finances to a portfolio of experts with the needed market and technological knowledge. We will intensively develop entrepreneurship and business education among university students.
Metrics	▶ the number of academic spin-offs; of this, specifically the number with revenues of 10+ mil. CZK that are 4 years old or younger (companies founded for the purpose of commercializing intellectual property produced at a research organization)
Typical activities	▶ tools for picking up the basic principles of doing business, popularizing business among students (courses, contests, and workshops) ▶ a practical incubation environment, including field-specific equipment and infrastructure for prototyping, test-bed facilities, etc. ▶ development of entrepreneurial spirit and the willingness to try new things and take on risks; intellectual-property education ▶ the usage of micro-grants to stimulate students' entrepreneurship; acquisition of practical experience with work on one's own project ▶ functional proof-of-concept grants inside of universities supported by consultation services, pressure to pull projects all the way out to the commercialization phase, and an opportunity for reintegration into the research team after a project's completion ▶ financial and consulting tools for successful development of knowledge-intensive startups (support for the commercial potential verification phase; a seed fund; cooperation with angel investors; consulting for obtaining grants for the initial phase of commercialization) ▶ support for the university management's work to strengthen the culture of entrepreneurial and startup activities by employees and students ▶ ensuring readiness of sites nearby university campuses and co-location of companies with their own R&D

Strat. goal	6 | **An Open and Attractive Innovation Ecosystem**
Summary	▶ The innovation **ecosystem produces opportunities** in which the development of the preceding areas takes place and that universally stimulate it. The ecosystem's defining trait is that it is **internally interconnected**. We consider this to be essential so that the actors on our territory are able to cooperate effectively and align their intersecting goals. ▶ A high degree of trust and transparency and minimal barriers to entry for people who wish to participate are the basic prerequisites for cooperation and the starting steps for strengthening **a sense of togetherness and co-responsibility for the success of the whole**. ▶ A distinctive **identity** is a reflection of allegiance to the whole. It is preconditioned by **well-managed internal and external relationships**. **Unified communication** drives towards the establishment of a The region's attractiveness is directly influenced by the quality of the conditions for the activities of both individuals and institutions. This is a natural consequence of its high **openness and welcoming nature for people and ideas** from outside. ▶ The essence of this strategic goal is to create an environment that will stimulate further **growth in the region's innovation performance and its interconnectedness inside and out, with a view to retaining its character and authenticity**. We strive in the long term for everyone within the ecosystem to be able to join up with everyone whenever they need, and to harness this to the collective benefit. ▶ We see the means to achieving this goal in **strengthening the identity** of the innovation ecosystem and in **awareness of the role of innovation and research** in its prosperity. We see it as useful for key stakeholders to feel a sense of belonging and pride toward the ecosystem thanks to its successes, and for them to be a conscious and effective part of it (we aim for an ecosystem with a vision of community-building as a cornerstone). ▶ The goal of unified communication is **for people to know of our region's attractiveness**. We are a region with a traditional heart, and a place that knows how to make one feel at home. We differentiate ourselves by creating a great place for living, infrastructure for creative people, and a space where success is in reach. ▶ The target group is all the ecosystem's stakeholders (and for communication, people abroad as well) – talented people, companies of all sizes, research organizations, the public sector, investors, non-profit organizations, and more. A **modern public administration** that is friendly towards both locals and foreigners plays a key role in meeting these goals. International comparisons show that modern public administration is one of the key elements that makes for a successful region with a high quality of life.
Metrics	▶ the number of qualified foreign workers in categories 1 and 2 per the CZ-ISCO classification

Spec. goal	6.1 | **Strengthen Trust and Open Communication among All Ecosystem Elements**
Summary	▶ The core of openness is the ability to communicate with the people in one's environment and react to their needs – perceptibly, predictably, and with the support of a respected strategy. For closer interconnection of the ecosystem, we consider it to be fundamental to strengthen trust, a sense of belonging, and pride in achieved successes. We rely during this on the active role of leaders across sectors who are willing to share contacts and able to offer experience and relevant global connections and bring in inspiration from outside the region.
Metrics	▶ the existence and outputs of a survey that tracks the subjectively perceived trust and sense of belonging of key RIS stakeholders
Typical activities	▶ tools for effective interconnection of the academic, business, and public spheres, tools for expanding contacts and building trust among individual groups of stakeholders (networking events etc.) ▶ strengthening the mutual relationship and transparency between research organizations and companies in the region ▶ the formation of platforms for regular discussion between companies and research organizations and policy/opinion makers ▶ an accent on strengthening interest in the development of the innovation ecosystem, social responsibility, and a "culture of giving back" ▶ organizing events to strengthen the community and raise awareness about successful local institutions; celebrating and publicizing successes ▶ meetings at which people can speak openly about problems and jointly seek solutions, with the city's and region's leadership being open to discussion in the course of this, taking an interest in problems and working on them within the bounds of its competencies ▶ functional multi-level RIS management, high-quality analytical foundations for the management of innovation policy, information on trends ▶ earmarking financial and human resources for supporting ecosystem products across ecosystem actors (openness towards entering partnerships and willingness to invest time and know-how)

Spec. goal	6.2 | **Strengthen the Region's Attractiveness as a Place for Innovation and Technologies**
Summary	▶ Attractiveness is shaped by the quality of conditions for the activities of both individuals and institutions. We are working on strengthening regional identity and on ensuring that corresponding awareness about the region exists abroad as well. Our tool for achieving this is unified marketing communication about the region and jointly coordinated campaigns. One part of this goal is organizing more events aiming to boost pride and active joint shaping of the ecosystem (the community aspect aims at all actor types).
Metrics	▶ number of entities in the innovation ecosystem that verifiably make use of elements for unified communication in their self-promotion
Typical activities	▶ development of brand management for the #brnoregion brand, a regularly updated communication plan, publicizing the platform inside of the region ▶ promotion of Brno and the region, PR activities, international marketing campaigns, presence at important events abroad, building a network of external ambassadors ▶ meetups for stakeholders across sectors; discussions on currently resonant topics and the state of the ecosystem; celebration of successes ▶ internationally distinctive events that bring both the Czech and international communities engaged in tech and innovation topics into Brno

Spec. goal	6.3 | **Make the Region a Friendlier Place for Qualified Workers and Talented Students from Abroad**
Summary	▶ We will develop our attractiveness for talent from abroad and support in the area of accompanying services and infrastructure. The foundation here is to work from one unified policy for attracting and retaining qualified foreigners. On its basis, we will create a unified, high-quality, and visible palette of services for foreigners. One precondition is the public administration's ability to communicate in English.
Metrics	▶ the existence and outputs of a survey tracking subjectively perceived helpfulness towards qualified foreigners
Typical activities	▶ autonomous and independent institution coordinating the palette of services and communication aimed at people from abroad living in the region ▶ a unified contact point for foreigners that offers all essential services under one roof (arranging accommodation, support care for families, basic orientation, etc.) ▶ strengthening support services and soft infrastructure for foreign researchers and highly qualified workers; programs for accepting first-rate talent from abroad ▶ organizing events aimed at increasing the SMR's attractiveness for talent (e.g. from countries currently in economic decline) ▶ the introduction of multilingualism as the standard in profiled fields; the creation of English curricula; joint university marketing ▶ scholarships for foreign self-paying students in English-taught fields; supplementation of good support services for incoming foreign students and scientists ▶ linguistic readiness in the services area; English at public offices and in the public space

Strat. goal 7 | **#brnoregion as the Lab of the Future**

Summary

- One more puzzle piece for an advanced innovation ecosystem is **outward visibility for the specific innovations created and deployed locally**. #brnoregion (a shared marketing brand for the South Moravian Region and the City of Brno) will thus be an **exemplary place** that offers good infrastructure for innovators in ways that include enabling the testing and demonstration of their solutions in a real-world environment.
- The public administration's position as a major investor predestines it to contribute to adaptation to major society-wide changes through responsibly formulated demand and processes.
- We will systematically strive for all the elements of the innovation ecosystem, with the public administration at their fore, to "hunger" for all that is new and **have the ambition to be pioneers and test new solutions**. The city and region take on **the role of Customer Zero for companies responding to global challenges**; the public administration is capable of responsibly formulating innovation demand and being a partner for the development and testing of new solutions.
- We will be **a place that makes a targeted effort to be green, safe, and solidary**. Where all of the ecosystem's elements contribute toward this goal, where it is visible, and it can be felt in people's lives. We will demonstrate and test smart technologies for a sustainable future.
- The region is capable of detecting challenges and opportunities, while simultaneously mobilizing the power of companies and research to respond to these topics. The ecosystem gives rise to an array of strategic partnerships without barriers among sectors. Among stakeholders, there exists a strong awareness of responsibility for the region's direction and perception of their own activities as a contribution toward solving the problems of the outside world (expressed in part as SDGs).
- #brnoregion's communication with stakeholders **strengthens awareness of examples** of when and how the region's actors progressively respond to the challenges present and apply their solutions on global markets and to the benefit of local inhabitants' quality of life.

Metrics

- the number of relevant projects among the public administration and companies or research organizations that lead to the implementation of innovation solutions addressing global challenges and increasing service quality and the region's inhabitants' quality of life

Spec. goal 7.1 | **Create a "Living Lab" Environment for Testing New Solutions**

Summary

- The public administration (the city, the region, and the organizations they found) takes on the role of Customer Zero for solutions that are developed by local firms or research organizations and respond to global challenges. We thereby open up the possibility for the founding of new barrier-free strategic partnerships even across sectors. We create mechanisms for identification of priority needs and topics that it makes sense to react to in the context of global challenges, and we draw key stakeholders into the discussion of ways to address them. Communication by #brnoregion strengthens stakeholders' awareness of research and innovations as a practical part of the regional identity.

Metrics

- the number of relevant projects among the public administration and companies or research organizations that lead to the implementation of innovative solutions addressing global challenges and increasing the quality of public services

Typical activities

- activities by the public administration stimulating demand for innovative solutions (ongoing identification and publishing of innovation needs, open data, public administration in the role of a pilot customer); support for innovative public procurement
- the city and region as Customer Zero for companies or research organizations reacting to global challenges, the defining of innovation demands and formulating of needs for innovation-related public procurement
- a functioning think tank (advisory group) for priority trends (what trends it makes sense to respond to)
- strengthening of the mutual relationship of research organizations and companies in the region and the trust needed for entering into innovation partnerships
- an accent on the perception of the social relevance of research; strengthening of shared responsibility for the development of the innovation ecosystem
- activities for increasing the professional public's awareness of high-quality research performed in the region; strengthening of interactions and sharing of inspirations for the cooperation of scientists and companies; publicizing successes
- promotion of Brno and the region as a living lab for the development and implementation of innovative solutions; PR activities; showcase projects

IMPLEMENTATION

The implementation of the RIS strives for the coordination of the actors in the innovation ecosystem and rests upon four pillars: implementation structure; project culture; strengthening partnerships; and information, monitoring, and evaluation role. The goal of this chapter is to describe the management principles that enable effective implementation of the RIS and will ensure organizational and informational support for the process. These principles may be described in more detail in their corresponding process documents.

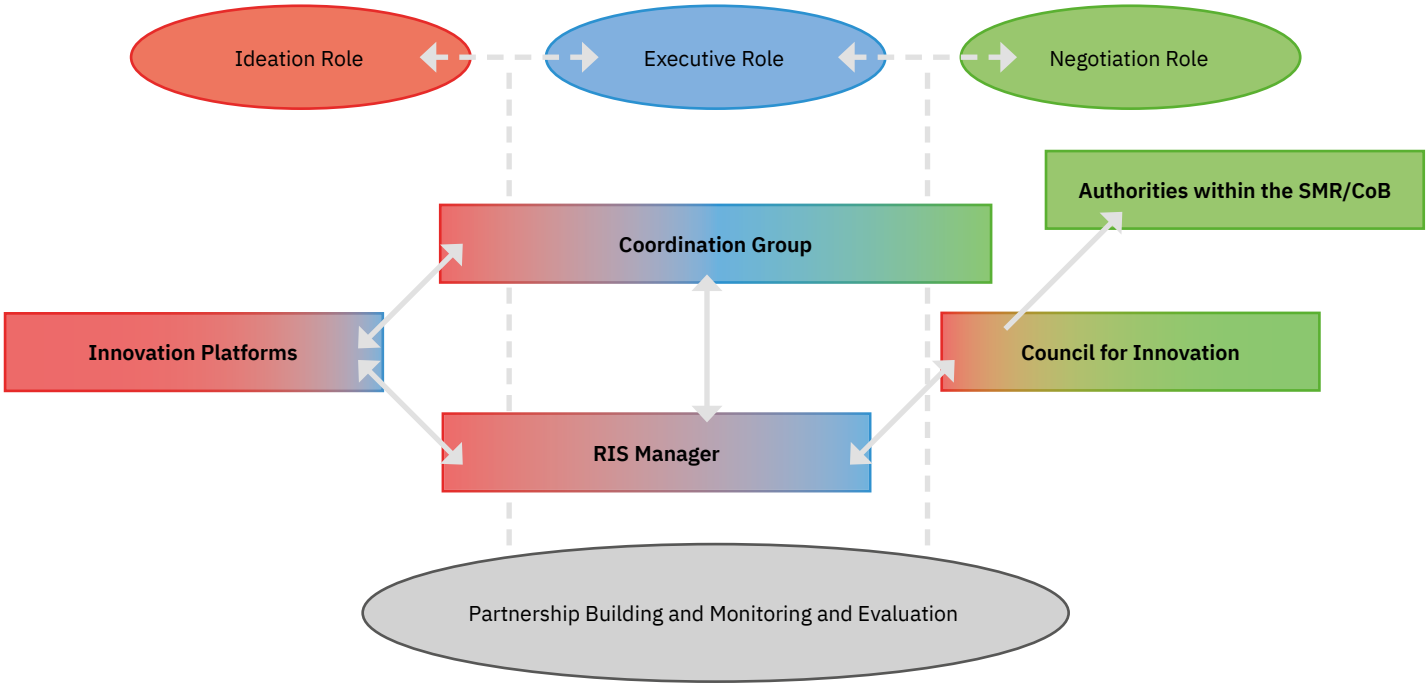
At the highest level, RIS implementation is under the self-governance responsibility of the SMR and the CoB; meanwhile, both institutions decide on how it is done and contribute to its financing. The coordination role in RIS implementation is delegated onto JIC, z. s. p. o.

The processes and structures for RIS implementation are designed in such a way as to enable them to respond effectively to important changes of external conditions and the region's innovation environment. The consequences of this for the strategy's fulfilment and any adjustments to it will be discussed at the Council for Innovation one or two times per year.

6.1 Implementation Structure

The following structures (including their hierarchical relationships and responsibilities) have been established for the purpose of managing RIS SMR implementation: Innovation platforms are created ad hoc for discussing and identifying problems' causes and suggesting possible solutions and measures in corresponding areas.

Figure 4: Implementation Structure



Council for Innovation (CFI)

Within the Council for Innovation, the heads of all key institutions in the innovation ecosystem are represented – by type and in balance with regard to sectors, and, in the case of company representatives, to economic areas as well (numbers of members in parentheses). Upon agreement, the responsible councilors of the SMR/CoB approach institutions based on agreed principles and call them to participate.

- SMR – responsible councilor (chair), head of the appropriate department as permanent guest
- CoB – responsible councilor (vice-chair), head of the appropriate department as permanent guest
- companies from key economic areas – top executives (10)
- public and state universities – chancellors or vice-chancellors (6)
- Czech Academy of Sciences (1)
- non-governmental non-profit organizations from the areas of education and development of civil society (2)
- support agencies, SMR Chamber of Commerce – directors (4)

The Council for Innovation provides recommendations to the authorities of SMR/CoB regarding decisions in matters of innovation policy. It approves matters connected with the management of the RIS SMR – the strategy framework, ongoing evaluations, and Action Plan. It proposes what to focus on. During any major change in framework conditions, it calls forth discussion on updating the strategy. It speaks through consensus or as needed through a vote. It entrusts the RIS manager, who is the secretary of the Council for Innovation, with executive tasks in cooperation with the Coordination Group. It meets two to three times a year.

RIS Coordination Group (CG)

The Coordination Group contains representatives of the regional administration and the institutions directly responsible for the coordination of RIS SMR.

- responsible councilors of the SMR and CoB, heads of departments with relevant jurisdiction
- RIS manager and guarantors of change areas

The coordination group coordinates implementation of the strategy and carries out the recommendations of the Council for Innovation. It entrusts the RIS manager and representatives of the implementing institutions with the preparation of the proposals for solutions and interventions. It founds time- and topic-limited innovation platforms. Guests are invited to meetings based on the agenda. It meets roughly twelve times a year.

RIS Innovation Platforms

Within each innovation platform, representatives of the relevant stakeholders for the topics for which a given innovation platform was established by the Coordination Group are included. Each innovation platform prepares, within a determined amount of time, a solution proposal for the indicated area, or as appropriate contributes to the implementation of the proposed measures. Its commissioned leader reports results to the Coordination Group; the contents and course of its work are the responsibility of the given innovation platform's leader. Frequency and form of working meetings per needs.

RIS Manager

The role of RIS manager has been taken on by the agency JIC, z. s. p. o., which has been entrusted with coordinating the implementation of RIS SMR. Coordination of RIS SMR is financed from the budgets of the SMR and CoB, or where appropriate from the funds of the Smart Accelerator program. The RIS manager is the secretary of the CFI and is a member of the CG and holds an executive role in the management of RIS SMR. S/he represents RIS SMR in relations with partners. S/he answers for the organizing of follow-on activities, the collecting of projects of the Action Plan, monitoring, and evaluation.

6.2 Project Culture

The project management sets the mechanism for the creation and discussion of project proposals fulfilling RIS SMR. It is interlinked with the implementation structure – through its ideation, executive, and discussion role. The RIS manager arranges its record-keeping and procedural matters. Two project categories are differentiated in relation to RIS SMR:

- Individual projects that do not create any obligations for financing from the SMR/CoB, nor for activities by other actors in the ecosystem. This normally means projects whose main impact is on the implementers themselves. In light of their nature, these projects are not included in the Action Plan. The Coordination Group takes note of them and in case of alignment with RIS goals may, on request, issue a statement on this. The set of individual projects has an informational role and may be the subject of RIS SMR monitoring.
- Ecosystem projects that have a strategic nature and/or require financial obligations from the SMR/CoB and/or involvement of other actors in the ecosystem. This usually means projects with a significant impact on the innovation ecosystem as a whole or a part of it with a significant effect on the fulfilment of RIS goals. The inclusion of projects into the Action Plan is discussed by the Coordination Group; the updating of the Action Plan is approved by the Council for Innovation. The set of ecosystem projects is subject to RIS SMR monitoring and evaluation, with cooperation being expected by these projects' implementers.

The **RIS Action Plan** is to be understood as the portfolio of ecosystem project proposals that fulfil specific RIS SMR goals in the medium term. The action plan is updated on an ongoing basis by decision of the Council for Innovation (generally once per year). This is preceded by the collecting of project proposals (the responsibility of the RIS manager) and the discussing of them in the Coordination Group. A well-drafted project fiche is a prerequisite for discussion of the project. The RIS manager is in charge of encouraging good project culture.

The action plan distinguishes among projects in terms of their stage of preparation/execution and is a foundation for monitoring the course of interventions and their evaluation. It is updated roughly once per year.

6.3 Strengthening Partnerships and the Information Role

The strengthening of partnerships and the information role is covered by the basic principles for stakeholder-facing RIS SMR communication. Ensuring the mutual flow of information, partnerships, stakeholder involvement, and mutual trust – all this is the foundation for effective implementation of the strategy. The main responsibility within the strategy's execution rests upon the RIS manager.

Primarily the following channels beyond direct involvement in RIS SMR implementation are used for strengthening partnerships and fulfilling the information role:

- annual conferences of the innovation ecosystem,
- networking events,
- online communication (web www.risjmk.cz, newsletter etc.),
- activities by the RIS manager, and other elements of the implementation structure and stakeholders themselves.

6.4 Monitoring and Evaluation

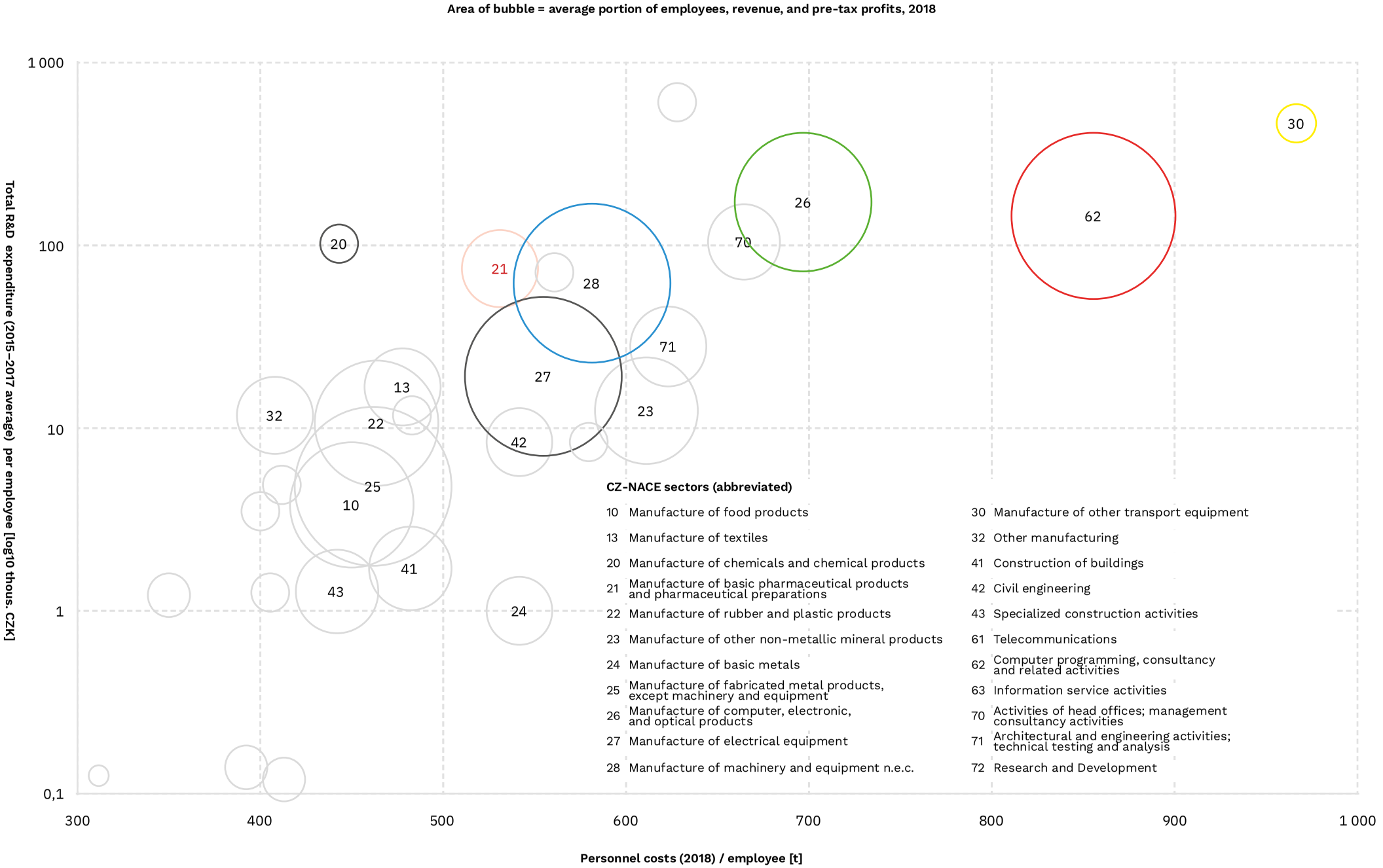
The implementation will be monitored at two levels: i) the project level; ii) the strategic level. The RIS manager bears responsibility for monitoring.

- This project level is based on monitoring the execution of ecosystem projects arising from the Action Plan. An indicative structure of monitoring assumes there will be an overview of interventions made and their status. The monitoring will be performed once per year in cooperation with implementers and will be presented to the Council for Innovation.
- The strategic level consists of meeting strategic and specific goals via defined sets of metrics (see the proposal section). The indicative structure of the monitoring assumes an overview of indicator fulfilment, an overview of spending of funds for RIS activities, a summary of the functioning of the implementation structure, project culture, and strengthening of partnerships, and a summary of the development of the region's innovation environment. The monitoring will be performed once per year and will be presented to the Council for Innovation. More detailed definitions of the RIS metrics for strategic goals and ambitions in terms of target values are listed in Appendix 4, while metrics for specific goals are explained in a separate document. The RIS metrics can be adjusted in connection with practical operation and availability of data.

Evaluation of the outputs from RIS SMR implementation will be performed at logical milestones (a combination of interim and ex-post evaluations) with a focus on recommendations for reviewing existing tools, directing strategies overall, and achieving impacts of activities in terms of effectiveness and efficiency. The evaluation process will include input from independent experts and will be initiated in cooperation between the Coordination Group and the RIS manager. It will run in multi-year cycles, and the evaluation will be presented to the Council for Innovation.

APPENDICES

Appendix 1: Key Economic Sectors – Data Analysis for Identification



Appendix 2: Key Economic Sectors – Illustrative Overview of Companies

Appendix 3: Chart of Strategic and Specific Goals

1. A Home for Globally Successful Entrepreneurs	2. Embedded Foreign Corporations with Strong Autonomy	3. Youth Prepared toChange the World	4. Sufficiency of Experts for the Knowledge Economy	5. Research with an Impact on Business and Society	6. An Open and Attractive Innovation Ecosystem	7. #brnoregion as the Lab of the Future
1.1 Heighten the Number of People with Entrepreneurial Drive Who Found Their Own Company	2.1 Strengthen Cooperation by the Managers of Foreign Innovative Corporations and Their Involvement in the Ecosystem's Development	3.1 Build up the System for Comprehensive Coverage of Awareness and Development of Entrepreneurship	4.1 Ensure a High-quality Education System for Youth in STEAM Subjects at PS and SS	5.1 Strengthen the International Attractiveness of Research and Education in Profiled Fields and Address the Challenges of Today's World	6.1 Strengthen Trust and Open Communication among All Ecosystem Elements	7.1 Create a "Living Lab" Environment for Testing New Solutions
1.2 Increase the Number of Dynamically Growing Startup Companies	2.2 Stimulate the Formation of Valuable Strategic Partnerships	3.2 Adapt the System for Educating Youth to Empower Them to Meet the Demands of Today's World	4.2 Introduce a Global System of Support for Popularizing Science and Technology and Developing Digital Literacy	5.2 Mobilize Partnerships between the Best Research Teamsand Companies	6.2 Strengthen the Region'sAttractiveness as a Place for Innovation and Technologies	
1.3 Increase the Number of Companies That Can Go International with Their Own Product	2.3 Strive for the Diversification of Global Companies' Activities in the Region to Harness the Available Knowledge Potential		4.3 Stimulate the Use of Skills through Cooperation with the Practical Sphere	5.3 Produce Favourable Conditions to Increase the Founding of Spin-Offs from Research Organizations	6.3 Make the Regiona Friendlier Place for Qualified Workers and Talented Students from Abroad	
1.4 Expand the Community and Deepen Cooperation among Local Entrepreneurial Leaders			4.4 Identify and Work Systematically with Exceptionally Talented and Motivated People			
1.5 Raise Awareness among Local Investors and Investor Clubs						
1.6 Develop the Infrastructure for the Creation of Business Hubs						