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Regional Annex to the National RIS3 Strategy for the Hradec Králové Region



Update – October 2023

Smart Accelerator+ of the Hradec Králové region I

+inovace



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Introduction

The Regional Annex to the National RIS3 Strategy for the Hradec Králové Region (hereinafter referred to as RIS3) is a thematic conceptual document of the Hradec Králové Region (KHK) for the area of science, research, development and innovation (R&D&I). It reflects the development of strong sectors in the region, the so-called domains of specialization, and arises from the needs of the subjects, the actors of the regional innovation ecosystem. RIS3 defines opportunities to strengthen cooperation between research organisations, businesses and public administrations, focusing on removing barriers to the diffusion of innovation.

Regional RIS3 is a dynamic document that was created in 2014, when it was also approved by the Hradec Králové Regional Council. Since then, it has undergone two updates (2018, 2020). The year 2023 is the third time the strategy has been updated. The most important changes are the creation of a new domain of specialization - Cultural and Creative Industries; the proposal of realistic and measurable indicators linked to clear and achievable objectives of the Smart Accelerator+ of the Hradec Kralove Region I (SA+); the incorporation of elements of RIS3 missions, i.e. the priorities of the National RIS3. These missions are oriented towards addressing societal challenges contributing to the achievement of, among others, the Sustainable Development Goals (preparedness for the limited availability of natural resources, the negative impact of climate change, global warming, a growing and ageing population and related requirements for transport, health, education, security and other assets). In the case of the Regional RIS3, these are NRIS3 missions: *Making the economy more material, energy and emissions efficient, Strengthening society's resilience to security threats.*

In addition to the RIS3 itself, the so-called *Action Plan of the Regional Annex to the National RIS3 Strategy* is updated annually. This is a non-public document to which only members of the KHK Research, Development and Innovation Council; the SA+ team and the Ministry of Education, Youth and Sports (in its role as the SA+ project controlling body) have access. The plan is made up of individual project intentions (so-called strategic interventions, hereinafter referred to as SI) to be implemented by major R&D&I actors. Its main task is to map the proposed projects of important stakeholders in the Hradec Králové Region for the purpose of possible networking with new partners, justification of proposals for supporting instruments for R&D&I in the region (e.g. new regional funding titles), potential inflow of investment into the agglomeration through EU subsidies or proving the compliance of the project plan with the RIS3 strategy.



1. Key analytical findings

1.1. The position of the Region and its performance

The Hradec Králové Region is located in the north-eastern part of Bohemia. Together with the Pardubice and Liberec Regions, it forms the Northeast Cohesion Region and has a favourable transport location within the Czech Republic, which is, however, slightly limited by the absence of a comprehensive connection to the highway network and the lower transport capacity of railway lines. With an area of 4 759 km² it is classified as a smaller region. The median population of the county in 2021 was 542,892. This value has decreased by 2 p.p. since 2011 (2021). There is a year-on-year decline of 0.2 residents per 1,000 of the population of the region, which puts the region in the bottom third nationally (10th out of 14 regions). **The region is therefore one of the oldest in terms of age composition and the population continues to decline, especially in the economically active group.** This statistic also makes it the 5th least populated region, accounting for 5.2% of the total population of Czechia.

With its 90 573 inhabitants, the economic and knowledge centre of the region is the regional city of Hradec Králové, which in terms of economic activity is the centre of concentration of registered entities and in terms of the knowledge base is the seat of the University of Hradec Králové, Charles University (Faculty of Pharmacy and Medicine in Hradec Králové) and the University of Defence (Faculty of Military Health) with a total of 8 faculties. Other regional centres include the **Trutnov region**, where winter tourism is the most frequent in Czechia thanks to the Krkonoše ski resort network, the **Náchod region**, which is the centre of summer tourism in the Broumov region, but it is also an economically vulnerable area with the highest unemployment rate, the **Rychnov region** with its important industrial zone in the automotive sector with the lowest unemployment rate in the region, and the **Jičín region**, where the highest volume of foreign investment in the region flows.

The regional gross domestic product (GDP) in 2021 was 4.7% of the output of the whole Czechia, a value adequate to the 5.2% share of the KHK population in the total population of Czechia. Moreover, GDP in the region has increased year-on-year (2020-2021), which is also a very positive indicator in terms of the region's productivity. The most important sectors contributing to regional gross value added (GVA) in 2021 were **industry, mining and quarrying (40.7%), public administration and defence, education, human health and social work activities (18.1%) and trade, transport, accommodation and food services (15%)**. It is worth mentioning, among other things, the cumulative share of **industry and construction - 45.5% vs. 33.3%** of Czechia - (dominantly in favour of the manufacturing industry), or **agriculture, forestry and fishing - 2.8% vs. 2.0%** of the Czechia - in the regional GVA and the share of employees in these sectors, which is above the average for the whole Czechia. In particular, agriculture, forestry and fisheries, despite the declining trend of the last decade, have recorded a noticeable year-on-year increase in employment (2020-2021), which is to some extent a positive indicator for these sectors.

The general unemployment rate (ILO) fell by 12% year-on-year (2020-2021) in the region, which is also a generally positive indicator from a labour market perspective. However, the professions that are most frequently occupied in the region in terms of the number of workers include product and equipment assemblers; blacksmiths, toolmakers and related workers; mobile equipment operators; physical and industrial technicians (4.2%) and retail and wholesale store operators, salespersons (3.6%). **A worrying indicator in this market and in the field of innovation may be the fact that only one of the most frequently occupied occupations requires a university degree.** The average gross wage per person by activity in KHK in 2020 was **CZK 32,569 vs. CZK 34,609** in Czechia. The highest

average gross monthly wages in KHK are in the money and insurance sector (CZK 54,027), followed by production and distribution of electricity, gas, heat and air conditioning (CZK 53,369), and ICT (CZK 47,687). Combined with the share of manufacturing in regional GVA and employment, it is easy to infer from secondary quantitative data that the region as a whole has a low value added economy.

The above is a rough list of secondary and general statistics which, in terms of added value for the region, may or may not imply a negative scenario for future development or a certain degree of stagnation. Although the quantitative level is an important trigger for the context and uncovering potential risks, it also encourages a proactive shift of Smart Accelerator activities towards local firms with specialisation, the acquisition of relevant knowledge by collecting verified primary data directly in institutions, forming partnerships, or other supporting activities that deepen market relationships and break down multi-layered barriers. Given the hyper-competitive global market, which is increasingly interconnected and driven by innovation, it will be essential for the competitiveness of the region to consistently continue to align the regional innovation strategy with the actual market. As a unified ecosystem, the region is then able to face the challenges together, to address the changes and legislative barriers that international trade (exports), contribution to the added value of the final product (innovation of processes, products and services), or science and research bring. The 4Helix cooperation model remains an issue. What do these innovations deliver to the community (public and residents) of the region? Here we come to the specific issue of a regional innovation ecosystem targeting domains of specialization. Through this process, the RIS3 strategy not only emphasises the strengths of the region to be further developed, but also takes into account the residents, their needs and skills.

INDICATOR: 2021	KHK: 2021	KHK vs. CZE: 2021	2020-2021
Area [km ²]	4 759	6,0 % of CZE	neutral
Population [persons]	542 583	5,2 % of CZE	-1,50 %
Number of foreigners [persons]	18 626	2,8 % of CZE	+0,90 %
Live births per 1 000 inhabitants [%]	10,2	10,6 ‰ in CZE	+0,2 p.p.
Number of municipalities	448	7,2 % of CZE	neutral
Percentage of urban population [%]	65,7	68,3 % in CZE	-0,40 %
Gross domestic product [CZK mil.]	288 036	4,7 % of CZE	+7,80 %
Gross domestic product per capita [CZK]	522 295	91 % úroveň ČR	+1,00 % vs. CZE
Employed [thousands of persons]	265,9	5,1 % of CZE	+0,10 %
Employed in agriculture, forestry, fishing (share of GVA) [%]	3,8 (2,8)	2,5 (2,0) in CZE	+19 %
Employed in industry and construction (share of GVA) [%]	39,1 (45,5)	36,8 (33,3) in CZE	neutral
Employed in market and non-market services (share of GVA) [%]	57,0 (51,8)	59,9 (64,7) in CZE	-1 %
Economic activity rate [%]	58,6	59,8 in CZE	+0,10 %
General unemployment rate (ILO) [%]	2,3	2,8 in CZE	-12,00 %
Jobseekers registered with the Labour Office [persons]	10 622	4,1 of CZE	-8,10 %
Average gross monthly wage per employee (2020) [CZK]	32 569	34 609 in CZE	+0,40 %
Registered companies	15 716	2,9 % of CZE	+1,70 %
Registered physical persons	113 449	5,2 % of CZE	+0,70 %
Sales of products and services [CZK million, current prices]	186 332	4,7 % of CZE	+10,80 %
Construction works completed [CZK million, current prices]	17 786	5,0 % of CZE	+12,60 %
Finished apartments	1 725	5,0 % of CZE	+13,70 %
Percentage of households with internet access [%]	81,4	83 % in CZE	+1,3 p.p.
Registered crimes per 1 000 inhabitants	9,7	14,6 in CZE	-0,9 p.p.
Government revenue after consolidation [CZK million]	34 514	1,6 % of CZE	+7,00 %
Public budget expenditure after consolidation [CZK million]	33 128	1,3 % of CZE	+2,10 %
Pupils in primary schools (272 primary schools in 2021/2022) [persons]	49 524	5,1 % of CZE	-0,70 %
Pupils in secondary schools (74 secondary schools in 2021/2022) [persons]	23 287	5,2 % of CZE	+3,30 %

1.2. Regional innovation ecosystem

BUSINESS SECTOR:

Asociace českého průmyslového designu
 Asociace obranného a bezpečnostního průmyslu ČR
 CEDEG, z.s.
 CLUTEX - klastr technické textilie, z. s.
 Czech Cloud Cluster
 CZECH IT CLUSTER, družstvo
 Czech Marine Cluster, z.s.
 Czech Smart City Cluster, z.s.
 CZECH STONE CLUSTER, družstvo
 CZECHIMPLANT, z. s.
 Česká peleta, z.s.p.o.
 Český optický klastr, z.s.
 Energeticko-technický inovační klastr, z.s.
 Klastr českých nábytkářů, družstvo
 Klastr obecného strojírenství
 Klastr výrobců obalů, družstvo (OMNIPACK)
 Moravskoslezský automobilový klastr, z.s.
 NANOPROGRESS, z. s.
 Ovocnářská unie České republiky, z.s.
 Technologický klastr, z.s.
 Zemědělský Klastr ORLICKO z.s.

PUBLIC ADMINISTRATION AND EDUCATIONAL INSTITUTIONS

Centrum anragogiky, s.r.o.
 Česká zemědělská univerzita - pobočka
 KHK institut pro vzdělávání a inovace (KKIVI)
 Královéhradecký kraj
 Municipalities with extended competence Statutory
 City of Hradec Králové
 Elementary, Secondary and Vocational schools



RESEARCH ORGANIZATIONS

Fakultní nemocnice Hradec Králové
 Farmaceutická fakulta v Hradci Králové Univerzity Karlovy
 Lékařská fakulta v Hradci Králové Univerzity Karlovy
 Mikrobiologický ústav AV ČR, v.v.i.
 Muzeum východních Čech v Hradci Králové
 Státní ústav radiční ochrany, v.v.i.
 Univerzita Hradec Králové
 Univerzita obrany, Fakulta vojenského zdravotnictví Hradec Králové
 VÚ lesního hospodářství a myslivosti, v.v.i.
 Výzkumný a šlechtitelský ústav ovocnářský Holovousy s.r.o.
 Výzkumný institut ochrany genofondů, v.v.i.
 Výzkumný ústav živočišné výroby, v.v.i.

SUPPORTING INSTITUTIONS

Agentura pro podnikání a inovace (API)
 Asociace inovačního podnikání ČR
 Centrum investic, rozvoje a inovací (CIRI)
 Centrum pokročilých technologií Hradec Králové
 Centrum pro přenos poznatků a technologií (CPPT)
 Centrum transferu biomedicinských technologií (CTBT)
 Centrum uměleckých aktivit (CUA)
 Charles University Innovations Prague a.s. (CUIP)
 CzechInvest KHK a Czech Trade
 Enterprise Europe Network (EEN)
 Eurocentrum Hradec Králové
 Galerie moderního umění v Hradci Králové
 Hvězdárna a planetarium Hradec Králové
 Krajská hospodářská komora Královéhradeckého kraje
 Svaz průmyslu a dopravy ČR
 TECHNOLOGICKÉ CENTRUM Hradec Králové z. ú. (TCHK)

1.2.1. The business sector through the lens of value chains

The majority of companies in the RIS3 domains of specialization are at the Tier 1 supplier level. Thus, they offer relatively sophisticated products and services that are a comprehensive input to the final product. At the same time, however, most domestic companies at this level operate only on the Czech/local market, while foreign companies (also by definition) are mostly internationally oriented and export most of their production abroad.

The region lacks companies of the global leader type, i.e. companies that export more than 95% of their production to at least three continents and at the same time are in the position of an integrator. In general, the relatively limited market position of most domestic firms in the KHK encourages activities to strengthen international and global competitiveness. As part of its activities, the region should focus on finding the reasons why the national market is the main one for most companies and they have no ambition, do not want or cannot go to foreign markets.

1.2.2. Public research and development environment

The public research environment in the region is covered by research capacities mainly from the public universities sector. The sector invested €787 million in R&D&I in 2021. CZK (29% of the total regional R&D&I expenditure) and accounted for ~3.2% of the national universities' R&D&I expenditure. In terms of public expenditure on R&D&I, the region is in the lower half of the national scale.

Public research is primarily focused on life science. In the field of advanced medicine, research focuses primarily on the emergence and development of age-related diseases, civilisation diseases, oncology, bioindicators in clinical medicine, new surgical procedures and technologies; in the field of

pharmaceuticals, pharmacology and toxicology; in addition, protection against weapons of mass destruction; and research on sensor systems for sensing human vital functions. The process of commercialisation of R&D results is supported by established technology transfer centres.

Furthermore, the public research sphere in the region consists of advanced agriculture, especially in the fruit growing sector (specifically cultivation technology, applied chemistry, phytopathology and gene resources including their diversity), and to a lesser extent, forest ecosystems, gnotobiology and the use of the potential of livestock production.

A cross-cutting area is ICT, which shows interdisciplinary links with impact on life science, automotive or humanities in the form of digital humanities.

From the point of view of cooperation between the research institutions and the application sphere, the results are most often intended for industrial enterprises and private companies providing services, as well as for research organisations abroad. The volume of collaboration in contract research varies considerably. Contract research in the field of advanced agriculture and forestry is at a good level (cooperation with entities in the field, but also outside the field - e.g. medical research, pharmacy, etc.). Biomedical research institutions cooperate mainly with entities operating in the same field - manufacturers and distributors of pharmaceuticals, manufacturers of chemical substances and compounds, companies producing food supplements, developers of medical devices, medical institutions. ICT research institutions are engaged in contract research mainly with manufacturers of electrical and electronic equipment, lighting manufacturers, solar systems, measurement, control, software development, etc.

The main identified barriers to the commercial exploitation of research results include cost, risk, the length of the commercialisation process, certification, homologation, legislation and intellectual property protection. The problem of cooperation between research institutions and companies is also mutually insufficient experience of stable and long-term cooperation within the region, including problematic communication, different speed of processing of knowledge and demand. Companies need research results often, as soon as possible. A partial problem, especially in advanced medicine and pharmaceuticals, is also the low rate of absorption of know-how by firms compared to the higher rate of the research institutions' knowledge base.

1.3. RIS3 specialisation domains of the Hradec Králové Region

The domains of specialisation represent the main "vertical" priorities of RIS3 and are built on the strengths of the region, its specific capacities and resources, especially in the economic, innovation and research areas. The region is now characterised by seven domains of specialisation. Each of them shows certain elements of uniqueness and high growth potential.



The production of vehicles and their components is characterised by the production of passenger cars and an ecosystem of suppliers. What makes it unique, however, is the research in the aerospace industry (the propeller test facility of the Faculty of Mechanical Engineering of the Czech Technical University) and the production of ultralight aircraft exported to almost all continents.

Engineering and investment units have a long tradition in the region and a high representation from the corporate sector. Mechanical engineering has an interdisciplinary overlap into the medical field (e.g. through the design, production and installation of custom-made medical and technical gases) or into the domains of agriculture, automotive, textiles, IT or art-oriented CCIs.

New textile materials - this domain is characterised by a significant number of traditional enterprises of rather smaller size, employing a relatively low number of employees, achieving lower sales and, if they have a Czech ownership structure, they tend to focus more on the local/national market. Nevertheless, there are also large textile firms or narrowly profiled progressive firms engaged in research and development in the region. This domain also enables new multidisciplinary applications, especially in construction, biomedicine and agriculture.

Electronics, optoelectronics, optics, electrical engineering and IT account for a high share of regional employment and firm R&D expenditure. It is based on both companies and research organisations in

the region with a highly diversified product structure. KHK is among the top 3 regions in the country in the inter-regional comparison of the business environment according to R&D&I capacities in ICT. The region also has active interdisciplinary linkages between ICT and biomedicine with a high-level knowledge base.

Pharmaceuticals, medical devices and health protection - the region offers a broad knowledge base for continuing education in life science with an overlap into R&D&I and is one of the leading regions in Czechia in the development and synthesis of potential pharmaceuticals. The key capacities in terms of R&D&I in this domain are significantly concentrated in public institutions - Charles University, Hradec Králové University Hospital, University of Hradec Králové and University of Defence), between which there is active cooperation. In the business sector, there is a diverse spectrum of mostly small and medium-sized enterprises with a purely Czech ownership structure. However, there are also large multinational companies operating here, which are among the world's top producers or are on the verge of becoming leaders. The main field of activity of companies in this domain is the production of medical products, materials and pharmaceuticals.

Advanced agriculture, food and forestry is based on the activity of research organisations with application potential in both the private and public spheres. Fruit growing research and development takes a leading role. The transfer of breeding results has a major market or innovative impact at intercountry, national and, most importantly, global level.

The region sees the **cultural and creative industry (CCI)** as a potential effective tool for accelerating economic and social development. In terms of innovation policy, CCIs are particularly important in their role in the creation of public space, design, building regional brands, creative and traditional activities, and influencing consumer behaviour in the use of products. If CCIs are neglected, a number of negative effects may occur, e.g. brain-drain outside the region. There is a sufficiently diverse knowledge base in the region that allows accessible continuing education (primary to tertiary) to develop human resources in the arts and creative activities. The corporate sector of the CCI is primarily made up of a large group of small entrepreneurs, sole traders, architects, as well as creative agencies and industrial design firms. A fact contributing to the existence of the CCI domain in the region is the organisation of festivals with a long, international tradition.

The issue of gradual decarbonisation and the introduction of carbon footprint reduction elements permeates all these areas.

1.4. SWOT of the regional innovation ecosystem: selected strengths, weaknesses, opportunities and threats

STRENGTHS (BUSINESS ENVIRONMENT)	WEAKNESSES (BUSINESS ENVIRONMENT)
TOP3 CZE share of corporate R&D&I workers from ICT in interregional comparison	Low total company expenditure on R&D&I (in interregional comparison)
Higher frequency of companies with relatively sophisticated Tier 1 product	Absence of universities in technical fields
Existence of industry-related companies for the establishment of new clusters or other groupings	Lower internationalisation rate of SMEs
STRENGTHS (PUBLIC RESEARCH)	WEAKNESSES (PUBLIC RESEARCH)
Existence of international excellence of research institutions (e.g. in pharmaceuticals, advanced medicine or agriculture)	Low level of commercialisation of results
High share of educational capacities for continuing education of researchers in life science (high school, college, university)	Absence of top universities in the TOP 200
Developing interdisciplinary collaborations (ICT, life science, CCI; humanities)	Low level of effective international mobility of research institution's staff
STRENGTHS (HUMAN RESOURCES AND SKILLS)	WEAKNESSES (HUMAN RESOURCES AND SKILLS)
Increase in the share of the population with university education (increase in the educational structure of the population)	Persistent mismatch between the profile of graduates and the needs of the regional labour market
Evolving strategic marketing to attract new recruits to academic organisations	Low interest of pupils in polytechnic and vocational education
High employment in progressive industries	Outflow of intellectual property and dividends abroad



OPPORTUNITIES (ECONOMY/FINANCE)	THREATS (ECONOMY/FINANCE)
Supporting the digitisation of SMEs and public administration	Slowing global economic growth.
Competitive advantage and financial benefits for companies in addressing decarbonisation early	Outflow of foreign direct investment (exhaustion of low-cost and incentive advantage)
The transition of Czechia to an innovation-driven economy	Closed regional research environment, failure to capture global research trends
OPPORTUNITIES (POLICY/LEGISLATION)	THREATS (POLICY/LEGISLATION)
Promoting the principles of smart specialisation in public policies.	Faster developing research / innovation systems in other regions of Czechia
Reducing barriers for businesses (administration, bureaucracy) through the development of e-Government	R&D&I legislation (funding system, discontinuity, administrative complexity)
Reform of immigration law to facilitate the employability of foreigners in knowledge-intensive fields	Non-continuous ecosystem evolution under changes in political leadership
OPPORTUNITIES (TECHNOLOGY)	THREATS (TECHNOLOGY)
Development of triple-helix cooperation across regional borders, promotion of interdisciplinarity	Cyber security threats, lack of specialists or outdated technology
More accredited/certified workplaces for research institutions (for cooperation with the application sphere)	Declining attractiveness of the region for investments in knowledge-intensive industries
Use of new trends and technologies in ICT with emphasis on artificial intelligence	Loss of competitiveness of companies due to faster introduction of digitalization and new technological trends by competitors



2. Design part

2.1. RIS3 vision

Increasing the competitiveness of the Hradec Kralove Region, which through the 4Helix cooperation model and direct support for innovation, science and research, uses its unique ecosystem of specialization to create a progressive, prosperous and balanced environment where entrepreneurs (I.) realize their goals, research organizations (II.) fulfill their missions, and public administration and supporting institutions (III.) take into account the everyday needs of residents and the public (IV.).

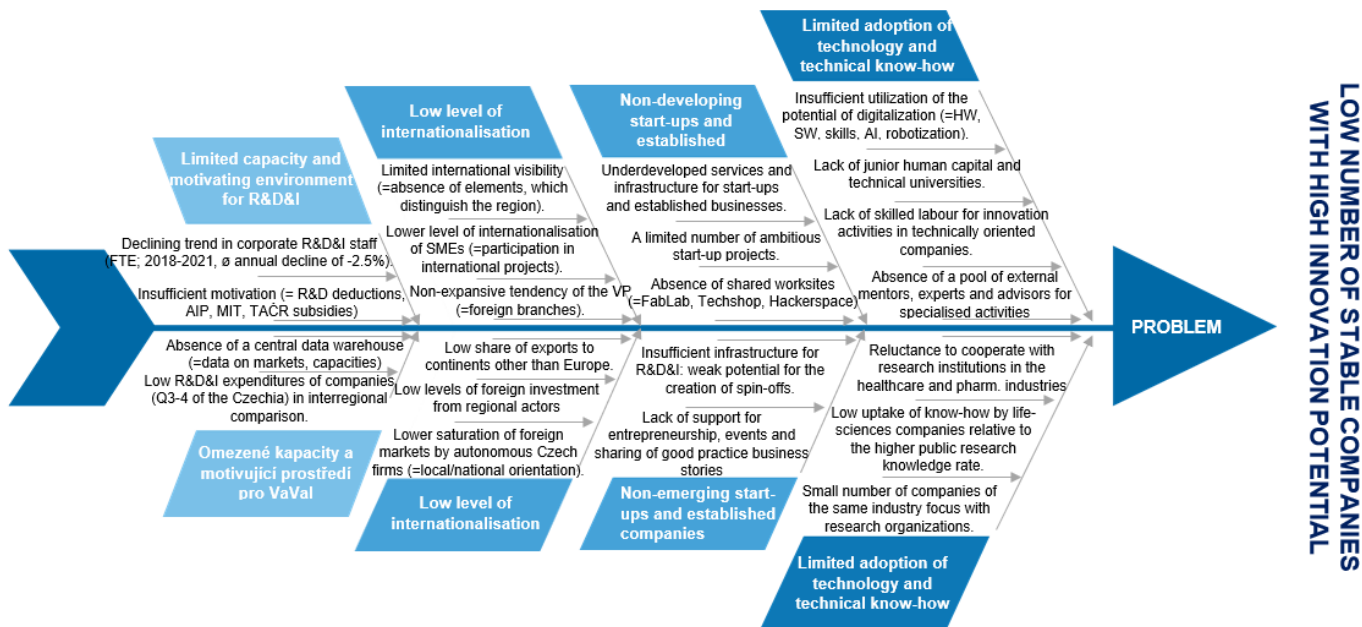


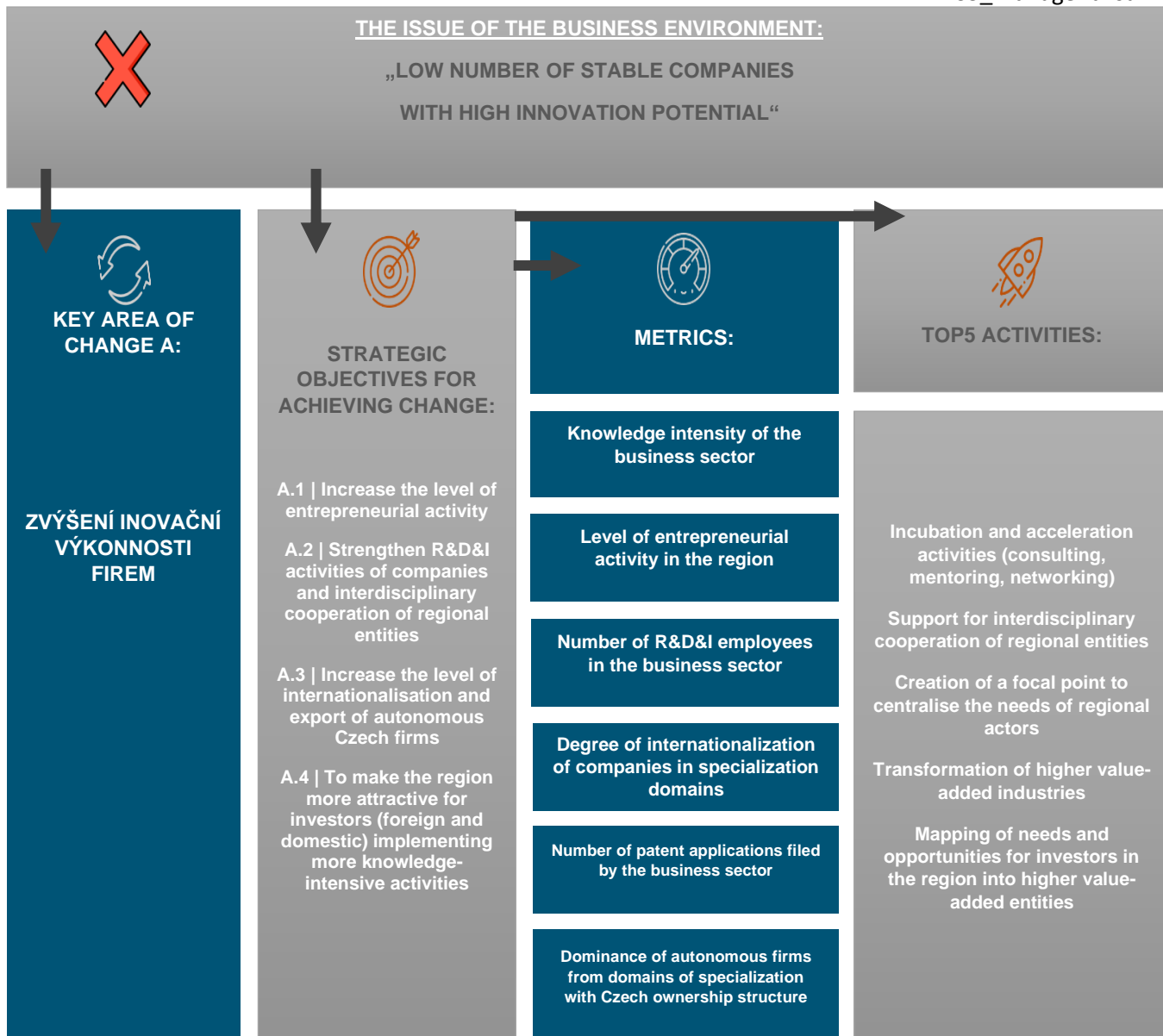
2.2. Challenging areas and identification of strategic objectives

To achieve the vision, RIS3 sets out four key areas of change, associated targets and proposed indicators. A cause and effect diagram, also known as an Ishikawa diagram or Fishbone diagram, was chosen to visualise the problem areas. The actual issue forms the head of the imaginary fishbone and the main bones leading from the spine denote the areas where the problem may be located. The secondary bones then signify specific potential causes.

2.2.1. Business environment

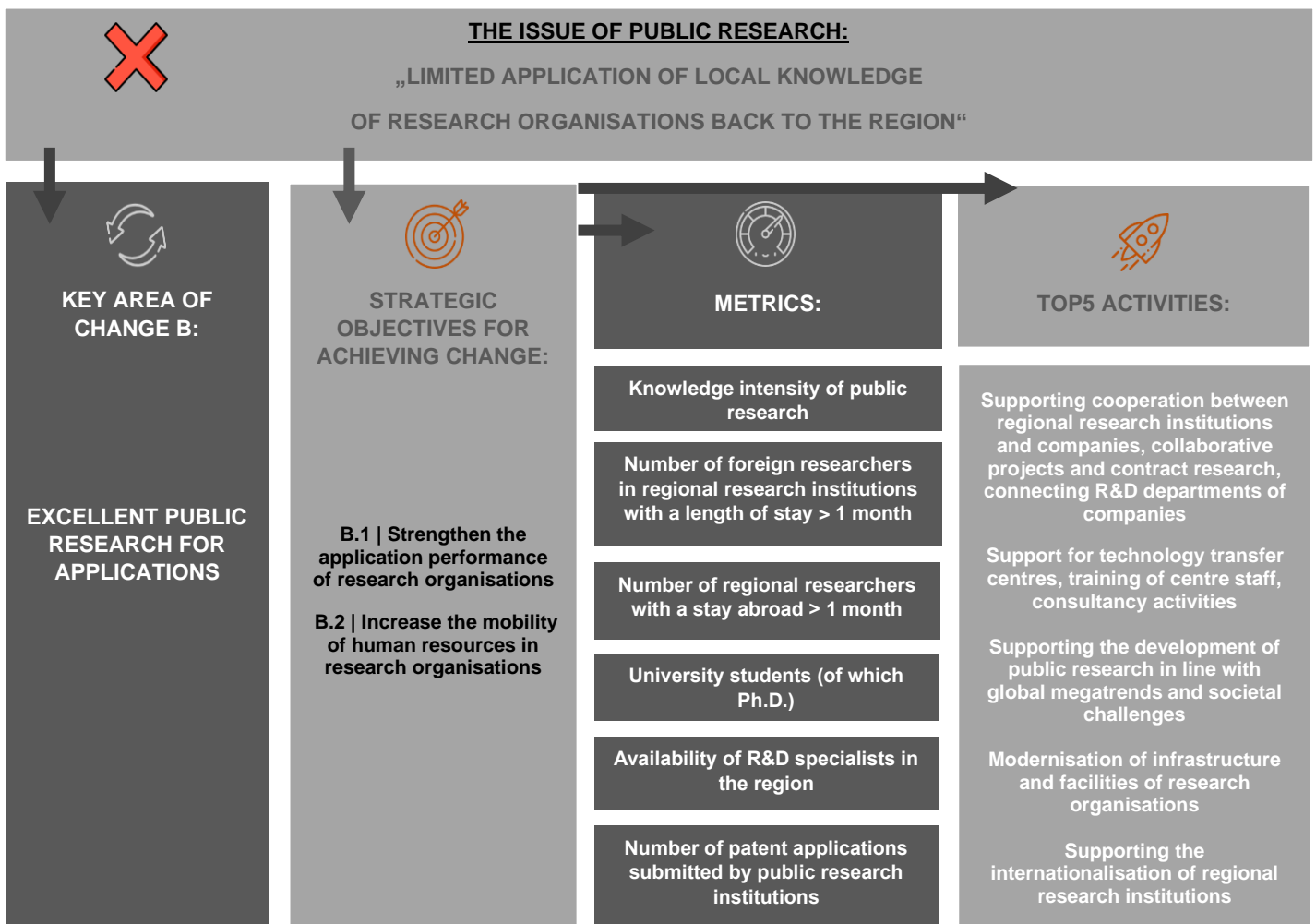
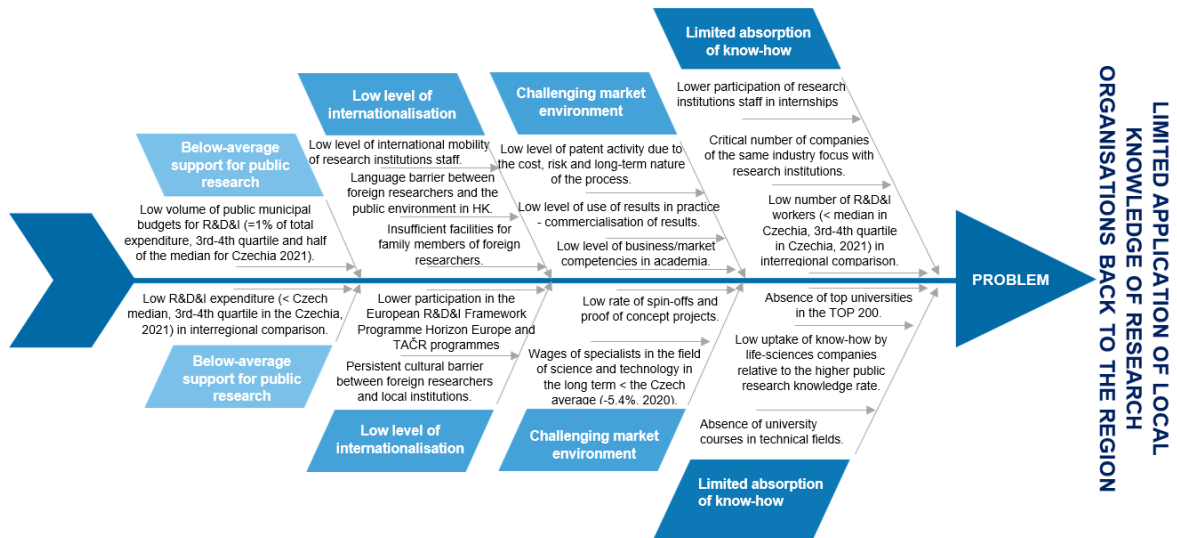
This area of change focuses on increasing the innovation performance of companies, starting with the start-up sector and motivating entrepreneurship, through self-acceleration and support for research, development and innovation activities, especially of small and medium-sized enterprises (SMEs), including sectoral and interdisciplinary clusters in the region, with an emphasis on international activities.





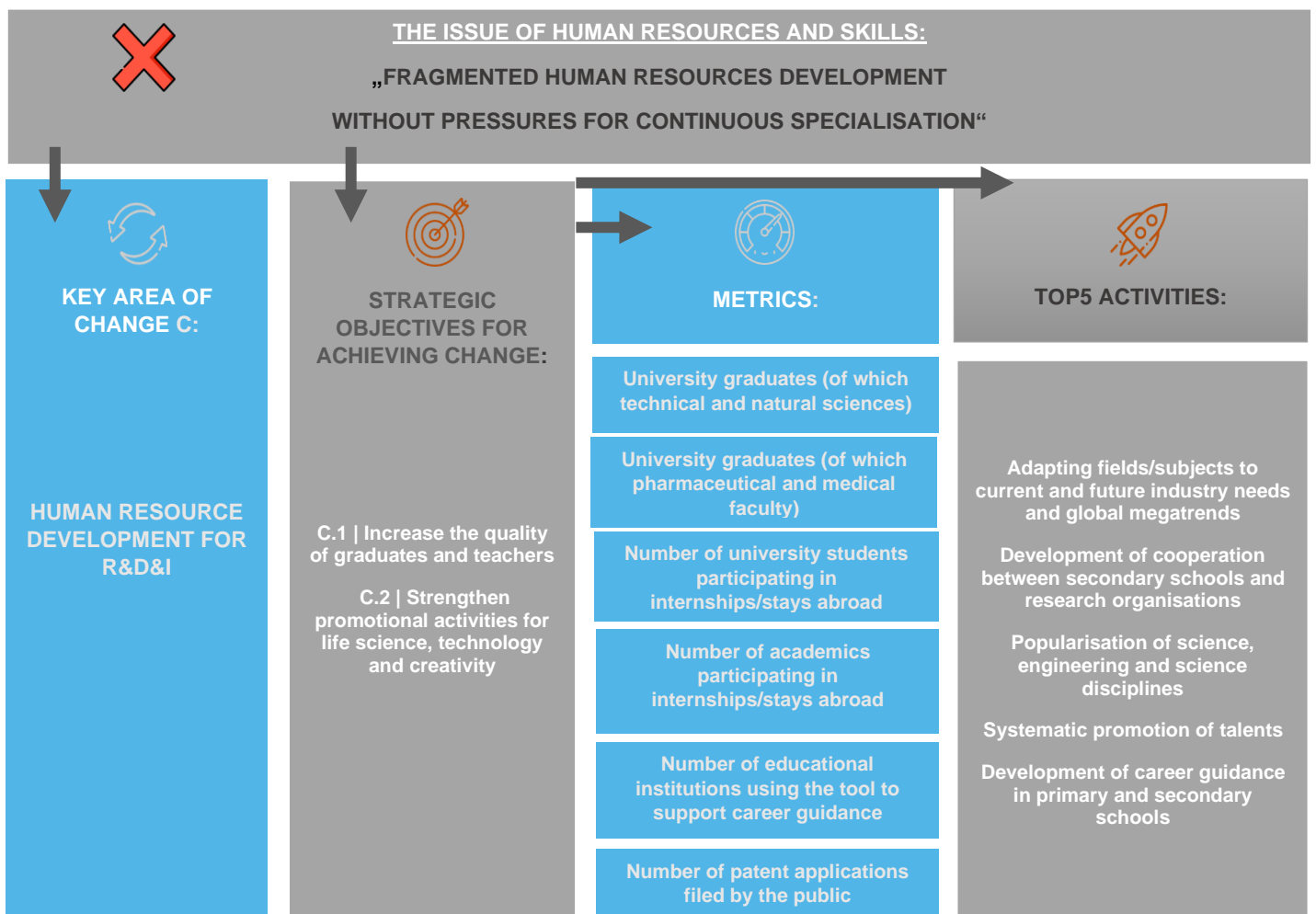
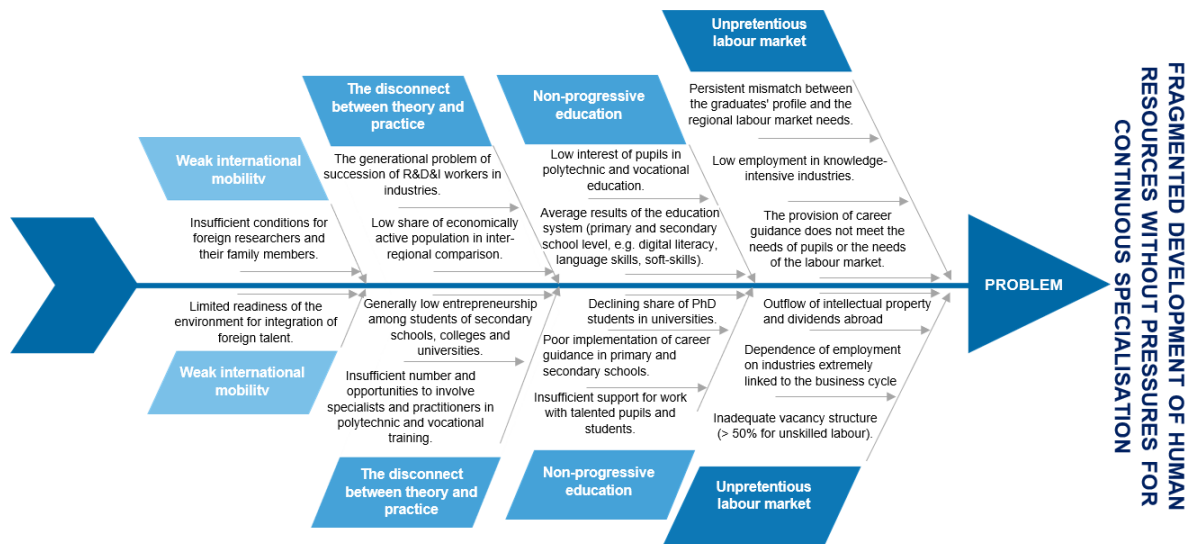
2.2.2. Public research

Excellent public research for applications as a key area of change focuses on strengthening the orientation of research institutions towards application topics and expanding cooperation activities with end users, either by providing R&D&I inputs into the process of placing new/innovated products by companies on the market or by providing internationally excellent outputs usable by the public sector. Meaningful support can be provided by activities helping to address the sectoral mismatch between the focus of research and the activities of companies in the Hradec Králové Region (interdisciplinary cooperation).



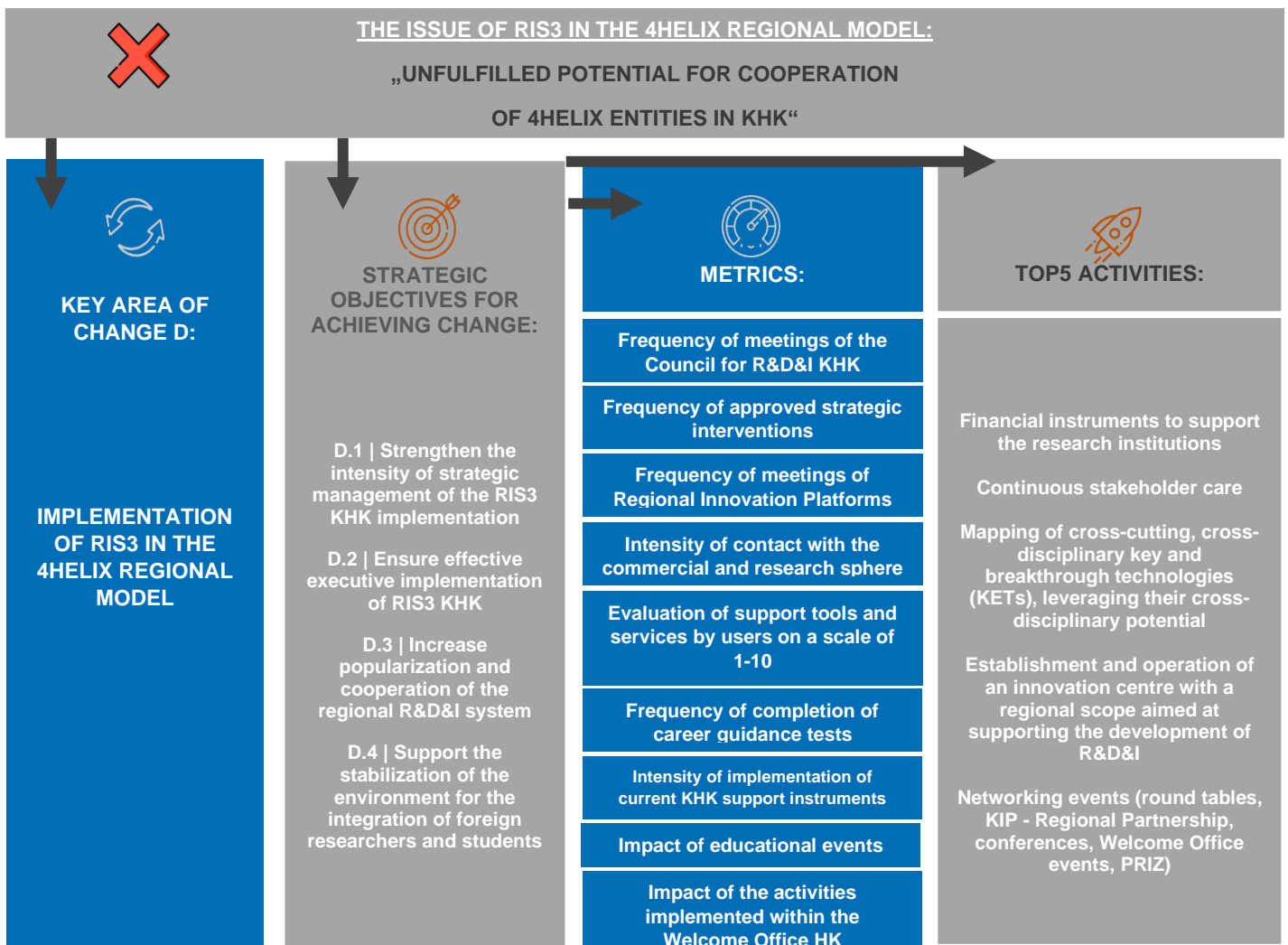
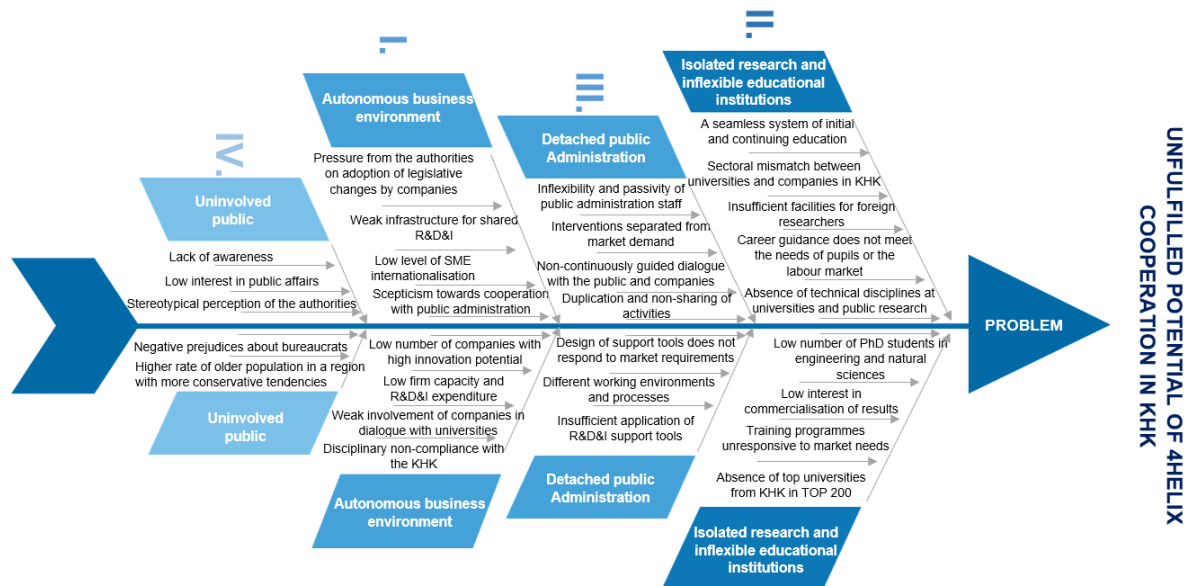
2.2.3. Human resources and skills

Human resource development for R&D&I is aimed at addressing some of the causes of the shortage of skilled labour. This is largely caused by the mismatch between the focus of companies and the supply of study fields of study of educational institutions in the Hradec Králové Region. A prerequisite for quality education at all levels of the education system is its consistent connection with practice and real life, adequate material facilities in educational institutions and motivated and professionally skilled teachers and other employees.



2.2.4. RIS3 in the 4helix regional model

The key area focuses on strengthening the RIS3 implementation activities. The strategic role is fulfilled by the Council for R&D&I of the Hradec Králové Region, as well as the Smart Accelerator of the Hradec Králové Region (KHK + CIRI). In terms of strengthening coordination and cooperation of key players in the whole innovation ecosystem, coordination and cooperation of the whole 4helix is essential.



2.3. Proposal of measures and activities responding to the problem areas

2.3.1. Business sector

The priority in the area of the corporate sector is to increase entrepreneurial activity, which can be achieved provided that citizens are motivated to start their own business, both in the form of promotional and advisory activities. The basis is the provision of educational events such as incubation and acceleration services at the beginning of the business, as well as the continuous possibility to use consulting services, mentoring services and networking events. On the other hand, the challenge for municipalities is to raise awareness of innovative local companies and their activities, not only towards the region, but also at the national level, and even internationally.

For the functioning of the entire entrepreneurial ecosystem, it is desirable to create a central data warehouse for the collection of needs from individual subjects of all actors of the regional 4helix, ideally in digitized form, which would also fulfill one of the missions of the national and regional level. The long-term task of the business sector is to support firms with higher added value or to transform existing firms into such firms. It is important not only for the business sector to make the region attractive to foreign but also domestic investors, to qualified graduates and employees, to scientists, innovators and researchers.

The specific measures are based on four strategic objectives, i.e.:

- A.1 | Increase the level of entrepreneurial activity
- A.2 | Strengthen R&D&I activities of companies and interdisciplinary cooperation of regional entities
- A.3 | Increase the level of internationalisation and export of autonomous Czech firms
- A.4 | To make the region more attractive for investors (foreign and domestic) implementing more knowledge-intensive activities

And these are:

- Support for increased cooperation between entrepreneurs and towns and municipalities (cooperation with the Regional Permanent Conference of the Hradec Kralove Region, EDIH NEB - activities of professional conferences and platforms, networking and matchmaking events)
- Expanding the competences of the staff of the region's support institutions (training activities + networking within the EDIH NEB and SA+ projects, also through stakeholder activities in the region)
- Activities improving access of entrepreneurs to funding opportunities, preparation of regional funding programmes (SA+ development activities, in particular audit of subsidy opportunities for SMEs, support for creation of new SIs; administration of the Regional Research and Innovation Fund - RVIF and proposal of relevant financial instruments for SMEs; EDIH NEB -funding monitoring)
- Internationalisation of regional entities' activities (participation in formal and informal platforms of international scope, support of cross-border activities of the business sector through export service agencies - services of EEN, CzechTrade, EDIH NEB activities with international overlap)
- eGovernment support (EDIH NEB - digitalisation of administrative processes in relation to the corporate sector; round tables for representatives of the public sector)
- Activities for networking between companies and research institutions, project collaboration and commercialisation

(stakeholder cooperation within the regional innovation ecosystem, networking through thematic platforms, roundtables, etc.; financial instruments such as Innovation Vouchers, internships and networking within the EDIH NEB)

- Creation of a focal point to centralise the needs of regional actors
(SI Regional Innovation Centre; cooperation with other umbrella organisations operating in the region)
- Support for the use of new technologies for the development of R&D&I activities
(EDIH NEB -Test Before Invest for the introduction of new technologies, support for the creation of new SI, relevant funding titles such as Innovation Vouchers)
- Interdisciplinary cooperation of regional actors
(identifying the intersections of cooperation between actors across RIS3 domains - development SA+)
- Motivating stakeholders to make sustainable and conscious decisions
(SA+ activities focused on circular economy and carbon footprint reduction - vouchers, education, PR)
- Transforming higher value-added industries
(New SI, EDIH NEB: training and services in the field of digitalisation and artificial intelligence, financial instrument Innovation Vouchers)
- Activities to create new R&D&I jobs
(possible activity of the Employment Pact of the Hradec Králové Region or signatories of sectoral agreements)
- Activities supporting knowledge transfer from research institutions to companies
(in the competence of regional centres for knowledge and technology transfer; Knowledge transfer partnership activities - joint mentoring of PhD students by the company and the school)
- Supporting staff mobility
(short-term internships in the corporate sector, e.g. through EDIH NEB - activity WP1: internships in companies)
- Sharing good practice from abroad
(in the framework of establishing cooperation with foreign partners, cooperation EDIH NEB - internationalization, involvement in platforms with other EU EDIHs)
- Mapping needs and opportunities for investors in higher value-added entities in the region
(within the competence of the CzechInvest agency and other relevant stakeholders, within the framework of EDIH NEB - activity WP5: investors club)
- Better access for companies to invest in digitalisation
(EDIH NEB - Activity WP5: Investors' Club)

2.3.2. Public research

The primary task for the public sector is to support regional research organisations and companies in collaborative and contract research. The results of these collaborations then serve as key inputs for the innovation activities of regional entities. One of the activities to accomplish this task is to support activities in the technology transfer centres and to enable the emergence of new projects, as well as to expand the knowledge base of the local staff by deepening their competences in consulting activities. Furthermore, to promote effective mobility of R&D&I staff (both domestic and foreign) in order to share good practice, networking and establishing new collaborations.

The specific measures are based on strategic objectives, i.e.:

- B.1 | Strengthen the application performance of research organisations
- B.2 | Increase the mobility of human resources in research organisations

And these are:

- Promotion of cooperation between regional research institutions and companies, collaborative projects and contract research, linking R&D departments of companies (SA+ development, i.e., individual continuous cooperation; industry meetings; effective PR of shared marketing; rewarding cooperation between research and business - e.g., the Be Inspired competition)
- Modernisation of infrastructure and facilities of research organisations (Drawing of subsidies by own VOs; Assistance vouchers as a means to prepare project applications; support for the introduction of digital technologies in the framework of EDIH NEB -Test Before Invest)
- Promoting digitalisation education (EDIH NEB - conferences and internships)
- Sharing research good practice from abroad (mobility of researchers)
- Support for R&D&I staff mobility (services of the individual Welcome offices operating in the region)
- Promotion and support of doctoral studies for employment in research institutions (PR of given research institutions, role of shared marketing SA+)
- Supporting the internationalisation of regional research organizations (motivation to participate in international projects; involvement of KHK in international platforms)
- Support for knowledge and technology transfer centre services (SA+ training to increase stakeholder competences; establishing new forms of cooperation; creating new SIs)

2.3.3. Human resources

Currently, the supply of graduates from secondary and higher education institutions does not meet the demand from employers. It is essential to involve employers in cooperation with schools already at the level of primary education, and subsequently at secondary and higher education, i.e. to motivate pupils to study the fields required by the labour market. Career and education advisers should assist in the selection of training whose graduates will immediately find employment. It is desirable that every school should have such a specialist/professionals and have a set system of their continuous education that would respond to current sectoral needs and global megatrends. In this respect, there is also a need to increase the level and effectiveness of career guidance so that individuals with the appropriate skills, aptitudes and interests always study a particular field. Equally important is the systematic work with gifted and exceptionally gifted children and pupils to maximise their potential. Cooperation between secondary schools and research organisations serves to popularise science, engineering and the natural sciences, and this must be further deepened and systematically pursued.

The specific measures are based on strategic objectives, i.e.:

- C.1 | Increase the quality of graduates and teachers
- C.2 | Strengthen promotional activities for life science, technology and creativity

And these are:

- Promotion of science, engineering and natural sciences
(Shared marketing of SA+; PR in own research institutions; organisation of ideathons and hackathons; new SA+ tools for career counsellors, e.g. My Life After School, profit testing of primary and secondary school students)
- - Introducing elements of polytechnic education in kindergartens, primary schools, secondary schools
(Role of the Hradec Králové Regional Institute for Education and Innovation - KKIVI, TC HK, Cooperation of the members of the Territorial Employment Pact KHK)
- Development of not only interdisciplinary cooperation of secondary schools with each other and development of their cooperation with universities and research institutions in the region (competitions, excursions, Open Days)
- Supporting the introduction of innovative methods in teaching
(Increasing the competences of teaching staff - SA+ activities; promoting creative learning through relevant stakeholders)
- Development of leisure activities for children, pupils and students aimed at the development of technical and scientific skills
(interest groups, involvement of high school and university students in children's education / leisure activities)
- Scholarships or other forms of motivation for pupils, students
(SA+ as SI financial support for PhD students; activities promoting creative learning critical thinking)
- Developing activities to foster entrepreneurship
(activities supporting entrepreneurship such as Byznystarter, JA Achievement, etc.)
- Simplifying the orientation when choosing a secondary or higher education institution
(application of effective tools for career counsellors, e.g. My Life After School or profitesting)
- Systematic work with talents
(in the competence of own educational institutions + supporting organisations such as KKIVI)
- Monitoring the employability of graduates in the region
(SA+ analysis; data mining from paid databases, use of labour market insights; demand monitoring from stakeholders and the corporate sector)
- Internships/professional practice of pupils/students in companies, final/year theses

(through knowledge of the corporate environment - SA+ development; use of funding opportunities for this purpose)

- Internships for target groups in companies, research organisations, etc.
(EDIH NEB short-term traineeships)
- Meeting pupils and students with successful people from business (online/offline)
(excursions to companies, summer schools)
- Generational transfer of highly specialised competences and know-how
(two-way mentoring, working with inspiring personalities, employing people 50+)

2.3.4. Implementation of RIS3 in the 4helix regional model

A key task for this area of change is the systematic strengthening of RIS3 implementation activities in the region by the individual players of the whole 4helix. The strategic function in this system is performed by the Council for R&D&I of the Hradec Kralove Region, while the executive function is performed by the Centre for Investment, Development and Innovation.

The actual implementation of RIS3 is ensured by the activities of the Smart Accelerator+ project of the Hradec Králové Region I as the main tool for the development of the innovation environment in the region. It is a smooth continuation of the two previous projects Smart accelerator KHK I and II, which ensures continuity and development of all key activities. Furthermore, selected strategic interventions and specific activities of all key players of the regional innovation ecosystem. Networking occurs through meetings at organised events, such as the Regional Innovation Platforms (RIPs). The main role of these regular meetings is to strengthen and coordinate cooperation between key players in individual domains as well as between domains. Another regular format is the Regional Innovation Brand Platform (PRIZ): it is desirable to strengthen not only joint research and innovation activities, but also marketing activities. The members are dedicated to shared marketing and the scope of a common marketing brand + innovation. Its purpose is to promote the scientific research potential of the region as a whole, both inwards to the region and outwards to the national and international level. The individual supporting activities are defined by the Marketing Strategy and Communication Plan of the KHK Regional Innovation Brand.

The specific measures are based on strategic objectives, i.e.:

- D.1 | Strengthen the intensity of strategic management of the RIS3 KHK implementation
- D.2 | Ensure effective executive implementation of RIS3 KHK
- D.3 | Increase popularization and cooperation of the regional R&D&I system
- D.4 | Support the stabilization of the environment for the integration of foreign researchers and students

And these are:

- Organisation of events providing strategic management of RIS3 implementation (RVVI KHK, RIP, PRIZ)
- Development of SI Regional Innovation Centre (regional competence, support for R&D&I development)
- Effective and continuous development of the SA+ team
- (connecting all players in 4helix, preparing and facilitating new SIs; ensuring knowledge of the environment)
- Expanding the competencies of SA+ team members
- Analytical and evaluation activities (mapping trends, production networks and chains in RIS3 KHK domains; mapping cross-cutting, interdisciplinary key and breakthrough technologies - KETs and exploiting their interdisciplinary potential)
- Update of the Marketing Strategy for Shared Marketing of R&D&I, implementation of media campaigns (shared brand + innovation, online + offline proven and used tools)
- Supporting the integration of international students and researchers (through theWelcome Office KHK)

Summary

This document serves as a management summary of the just updated (2023) Regional Annex to the National RIS3 Strategy. The main data sources for the conclusions and analyses were secondary data from open sources of the Czech Statistical Office, Eurostat, the National RIS3 Strategy Portal, the Ministry of Industry and Trade, the Ministry of Culture, the Czech Technology Agency, CzechInvest, and KHK data, Open Data Portal, Czech Social Science Data Archive of the Academy of Sciences of the Czech Republic, Labour Market Forecast (Kompas), Envidata, IS VaVal, Ministry of Education, Department of Education and Department of Culture, Heritage Protection and Tourism of the KHK, annual reports of companies, universities and supporting organisations. Furthermore, paid MagnusWeb resources, Merk and primary data collection, including the processing of own analyses within the framework of mapping activities in the Smart Accelerator II and Smart Accelerator+ KHK I projects.

The entire team of the Smart Accelerator+ project of the Hradec Kralove Region I participated in the implementation of the Regional Annex to the National RIS3 Strategy (update 2023), as well as leading stakeholders of the regional innovation ecosystem, both from the business, research and education environment, as well as representatives of the state administration. The next update of RIS3 is planned for 2026.