



Hradec Králové Region - Research and innovation strategy for smart specialisation (RIS3)

Annex to RIS 3 of the Czech Republic

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1 Analytical Part

1.1 Position of the Region

The Hradec Králové Region can be characterised as an agro-industrial region with well-developed tourism. The industry is concerned mainly in urban areas, intensive agriculture is in the Elbe Region. The region contributed to the creation of the gross domestic product of the Czech Republic with 4.6 % in 2012. The average population was 553,290 in 2012, which is 5.3 % of the population of the Czech Republic. The share in the sales of industrial enterprises in the Czech Republic was 3.8 % in 2012.

In terms of GDP per capita, the region achieved 86.6 % of the national average in 2012, which corresponds to the 6th rank in the inter-regional comparison. Real convergence expressed in % of the EU 27 GDP in PPP was 69.3 % in 2012. The value of the available household income per capita was CZK 179,715 in 2012, which corresponds to the 7th rank in the inter-regional comparison. According to the Labour Force Survey, 253.2 thousand people were employed in the regional economy in 2012. The largest share was represented by the manufacturing industry (31.1 %), wholesale and retail trade (12.2 %), health and social care (7.9 %) and civil engineering (7.3 %).

The Hradec Králové Region has long been placed at the forefront of the respected national research project “Good Place to Live”, assessing the quality of life of the people in the Czech Republic using a set of 54 indicators. In the last three years, the worst rank of the region was always the 3rd.

According to the inter-regional comparison, the population is ageing (the second highest proportion of residents over 65 years of age (17.1 %) after Prague). The proportion of university-educated population is growing, but it is still below the CR average (on average the 7th rank between 2009 and 2011), from which it is becoming more distant.

The unemployment indicators in the Hradec Králové Region are below the CR average in the long term, which may paradoxically present a problem for some incoming investors, who would prefer to use the cheaper unemployed labour force directly in the region. The regional hourly labour productivity is also lower compared to the other regions.

In terms of sectoral distribution of the labour force, there is a positive high employment in progressive fields (the manufacture of motor vehicles, electrical equipment, machinery and textiles, health care and the sector of rubber and plastics). In contrast, the persistent low employment in knowledge-intensive sectors may have a negative impact on maintaining competitiveness. The structural problem of the region and the entire Czech Republic is the continuing discrepancy between the labour market demand and the supply of skilled labour. There is also little interest in the study of science and technology, which is reflected in a lack of skilled labour force in technical fields that dominate the regional economy. Unfortunately, the average wage is higher in less technically demanding fields and lower in more demanding professions compared to other regions, leading to an outflow of professionals from the region. However, there is great potential in the cooperation between secondary education institutions and companies in the fields of CBBE 23 Mechanical engineering and production, CBBE 26 Electrical engineering, telecommunications and IT, CBBE 18 Informatics, CBBE 29 Food-processing industry and food chemistry, and CBBE 31 Textile and clothing industry. There were over 12 thousand university students in the region in 2012.

A low value of gross fixed capital formation (the 12th rank on average) indicates a low investment activity of enterprises in the region that probably focus on operational optimisation rather than on capacity expansion.

The technology balance of payments of the region is negative (the 3rd highest balance in the inter-regional comparison). In this context, the region is dependent on imported technology services. In terms of revenues, the revenues from the export of property rights are dominant. The balance consists mainly of payments for import due to royalties and trademarks.

The volume of foreign direct investment in the region is growing slightly; however, in the relative inter-regional comparison, the region is losing its investment attractiveness (the 11th rank on average). The investment and reinvestment activity in the region is carried out mainly in the automotive industry, textile industry, ICT and energy.

1.2 Research and development in the region, innovative business

Key characteristics

The regional innovation and research system of the Hradec Králové Region is at the average level in its parameters in the context of the CR. Academia is focused primarily on medical research (medical fields, drug development), with an important sub-discipline in the form of military and agricultural research and ICT. To a lesser extent, through the branches of public research organisations, research is represented in the field of gnotobiotics, forestry, radiation protection and animal production. Research organisations in the region cooperate with several companies operating in the same fields in which they have found specific niches and in which they have a high research/innovation activity. The number of these companies in the region is sub-critical (in terms of the share in the regional business expenditure on research and development and in the regional export), which leads to the cooperation of the regional research organisations with companies mainly outside the Hradec Králové Region. Nevertheless, the volume of cooperation (expressed as a number of joint projects) in and outside the region is gradually increasing with placing more and more emphasis on the application potential of research results, the development of technology transfer services and the search for opportunities of interdisciplinary cooperation.

One of the identified problems is a low number of innovation companies. The share of innovation enterprises in the total number of enterprises in the Hradec Králové Region is very low (CZSO 2014). The region ranks the second worst in this respect (34.4 %) immediately after the Karlovy Vary Region. There is a slightly higher proportion of enterprises with technological innovation.

In the corporate sector, a significant part of research and development activities is carried out by medium-sized and large enterprises under foreign control in the fields of ICT, automotive and mechanical engineering. However, many enterprises under foreign control still focus on activities with a low added value at the lower levels of the chain. Some of them are trying to upgrade their activities (development or construction activities approved by the parent organisation for implementation in the Czech Republic) in the chain (e.g. the production of automobiles and their parts and the manufacture of rubber components). Large enterprises under domestic control with R&D expenditure are present in fields such as the textile industry, mechanical engineering except the automotive industry, ICT, packaging technology and electronics. Small and medium-sized enterprises implementing research and development are largely under domestic control, but their expenditures on research and development are lower. In general, businesses in the region seldom cooperate with regional research organisations, either because of different areas of specialisation, or because their strategy is not based on R&D but rather on the increase in productivity; these businesses therefore do not need to collaborate with research organisations.

There is a more active cooperation with secondary schools (because of the demand for employees with secondary education) than with universities in the region, since there are no university fields of technical focus.

Intermediate bodies are represented by two science and technology parks and the newly established centre for biomedical technology transfer; there are many active clusters in the region (packaging, stone, IT), whose members also conduct research activities. Some companies are involved in clusters located outside the region.

At the same time, the regional research system may be negatively affected by the threat of losing research and development workers; there is a risk of their outflow especially to the newly built research centres. Maintaining, developing and attracting high-quality human resources in the region appears to be the key issue for the future.

The internationalisation of regional research organisations expressed in terms of participation in international research programmes is still low because the internationalisation of regional research within the 7th Framework Programme takes place mainly in the private sector (the highest share in regional expenditure in inter-regional comparisons) and focuses mainly on new technologies, materials and agriculture (TC ASCR, 2012). The possibilities of FP7 are not fully utilised by entities in the region (low awareness, a challenging project management in English, European-wide competition), as only around 1 % contribute to the gross regional R&D expenditure.

The main RDI statistics

The share of total R&D expenditure in GDP (%) is below the average of the Czech Republic in the long term (the 11th position on average), while the expenditure of the private sector exceeds the expenditure of the public sector. This area may be affected by a slight distortion of the RDI statistics, as research organisations with the best research results and some powerful companies (automotive, hygiene products) are not based in the region but only have a branch there and thus belong in other regions. The share of R&D expenditures of the university and government sectors, financed by the domestic or foreign business sector in 2012, is low in the region (only 3.7 %). This indicates a low cooperation of the business and academic sectors, which is a systemic problem of the Czech Republic (5.6% share of the funding).

The expenditure of the state budget on R&D of entities in the region is directed particularly at targeted support. It is the 11th position from the total amount of funds. In the period between 2005 and 2011, the volume of targeted support was growing, but still the region ranked 11th in the share in the total national volume. The volume of institutional support obtained by entities in the region in the monitored period declined. On average, the region reached the 11th position in the share in the total volume of the Czech Republic.

The proportion of applicants from the region in the number of approved projects of the programmes of the OP EI, TIP MIT and ALFA TA CR is average. Specifically, in the inter-regional comparison - OP EI Innovation 5th position, ICT OP EI and Strategic Services 7th position, TIP MIT 7th position, ALFA TA CR 9th position and OP EI Potential 11th position. Most of the EU funds flowed into the mechanical engineering, biomedicine and the textile industry.

The number of R&D employees (HC) was increasing in the monitored period. However, the region's average share in the total number in the Czech Republic was 3.57 % (9th position). The number of R&D employees

per 1,000 economically active persons grew by 28 % in between 2005 and 2011, which is more than the average growth in the CR (+23 %). The dynamics of growth corresponds to the 5th position.

The low degree of commercialisation of the results of regional research organisations is reflected in the overall low number of patents granted to public universities (10th position) in the period between 1994 and 2012. The greatest patent success was achieved by business entities (6th position). Generally, applicants from the region participated in the number of patents valid in the Czech Republic as of 31 December 2012 at the rate of 4.68 % (7th position).

1.3 Public Administration and its Role in the Region's Innovation System

Below is a list of current analyses, surveys and strategy documents relevant to the field of research, development and innovation in the Hradec Králové Region:

Development Strategy of the Hradec Králové Region 2014-2020 (RDS)

This is a basic regional strategy document that defines the broader strategic areas and objectives of regional development. It is followed by a three-year Regional Development Programme that develops objectives into actions. The area of research, development and innovation is included in the strategy area Competitiveness and Innovation. The strategy is implemented by projects of a wide range of key regional players. There is regular annual monitoring and subsequent evaluation in 2-3-year cycles.

Regional Innovation Strategy of the Hradec Králové Region 2010-2015 (RIS)

RIS is a document with close ties to RIS3. In recent months, work began on updating this document for the period until 2020, using RIS3. It is necessary to align its structure with the defined regional horizontal themes and vertical specialisations, upgrade the system of monitoring and evaluation, and reflect more on the position of the research and innovation system of the Hradec Králové Region in the national and European context and also on the focus of the future national and international funds.

A comprehensive study of progressive sectors in the Hradec Králové Region in the fields of research, development and innovation

The aim of this document is to explore the multidisciplinary of research and innovative business in the region. The conclusions form one of the inputs into the implementation process of RIS3. The typical characteristics of the region is the diversified identified sectoral structure of excellence in research (life sciences / biomedicine, agricultural sciences, ICT) and innovative business (automotive, mechanical engineering, textiles, rubber, electronics, electrical engineering). The proposed cross-cutting measures, which serve as a pool for the action plan of the updated regional RIS, focus primarily on human resources in research, development and innovation (quality, mobility, entrepreneurship), technology transfer, internationalisation and services for enterprises and research organisations.

Business environment survey in Hradec Králové

This is the underlying survey for the purposes of updating the strategic plan of the city until 2030. It contains very valuable opinions of entrepreneurs based in the regional capital (e.g. the declining quality of graduates of secondary schools and universities, the structure of apprenticeships often not satisfying the requirements of potential employers, the passive approach of the city to entrepreneurs, the absence of an industrial zone in the city...), useful for the proposal part of the annex.

Below is an overview of the existing support schemes in the Hradec Králové Region:

Name of scheme, support or project	Funded and implemented by	The financial allocation in the last 2 years	A brief evaluation - for whom, results, benefits
Innovation vouchers	Regional Innovation Fund of the Hradec Králové Region implemented by the Centre of Investment, Development and Innovation	2 million	So far limited to companies and ROs in the region. 15 projects supported. Most of the projects build on existing cooperation. ROs and companies collaborate more with entities outside the region; it is necessary to enable such cooperation in the coming calls.
Coordinated international call under the FP7 ERANET CROSSTEXNET project www.crosstexnet.eu	Regional Innovation Fund of the Hradec Králové Region implemented by the Centre of Investment, Development and Innovation	1.5 million	A unique combination of 18 funding public institutions from across the EU. The region supported a textile research company as a member of an international research consortium focused on flame-retardant fabrics. An interesting tool for the internationalisation of regional ROs and companies.
Scholarships for students of secondary technical schools	Hradec Králové Region	CZK 10 million (5 million a year)	A regular tool. In the last three years, 1,300 students supported per year.
Scouting for investors	Hradec Králové Technology Centre (HKTC)	CZK 1 million	The HKTC seeks ICT companies that might invest. Mandate agreement with investors. A success fee in the event of successful entry. Entries in 2 start-ups mediated.
Coolworking www.coolworking.cz	Hradec Králové Technology Centre + ČSOB/ERA	Operating costs of roughly CZK 1 million per year.	A newly opened co-working facility in Hradec Králové. Support for entrepreneurship in students and the development of the regional start-up community.
MIC MINUTES - pitch presentations of innovation projects to investors	The Hradec Králové Technology Centre as a Microsoft innovation centre	-	So far limited to ICT. The development of non-technical skills and entrepreneurship. The possibility to use in other fields according to the regional specialisation.
Business Incubator	Hradec Králové Technology Centre	CZK 2-3 million per year	Mostly the headquarters of ICT companies. Over 100 jobs generated.
Centre for Transfer of	Hradec Králové University	-	A newly established TTC. It

Biomedical Technologies	Hospital		provides shared TT for 3 biomedical research organisations. Possible best practice of shared services within the region.
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Historically, the initiator of support schemes that go beyond the boundaries of one institution was the Hradec Králové Region together with the Regional Development Agency and the Hradec Králové Technology Centre with the support of the City of Hradec Králové. The regional research organisations gradually made use of the possibility of EU funding, and implement project-based activities related to the mobility of post-doctoral students, the use of the proof-of-concept or the establishment of a shared technology transfer centre.

1.4 Main Actors in Innovation System – Results of Stakeholder Analysis

1.4.1 Application sphere

The main export items are generated mainly in the automotive industry, mechanical engineering and the electrical components segment. The export profile is dominated by motor vehicle parts and cars, with over a one-quarter share. Over 3 % of the regional export constitute the SITC classes of rotating electrical machinery and parts, basic metal products, electrical apparatus for the connection and disconnection of circuits, pumps and conveyors for liquids, textiles and rubber products.

If we look at the CZ-NACE fields of economic activity that contribute most to the regional corporate expenditure on research and development, there is a dominance of activities in the field of information technology (especially software development) and architectural/engineering services (mainly the development and construction of components for automotive/mechanical engineering and the development/design/supply of process equipment for the sectors of chemistry, energy, coke and food-processing), which together have a share of more than 30 %. There is also the production of parts and accessories for motor vehicles and their engines (especially brake and washer systems), research and development in the field of natural and technical sciences (especially breeding, textile materials and biotechnology), the manufacture of other special-purpose machinery (e.g. printing machines, machines for mining and construction, units for the pharmaceutical and food-processing industry and energetics), the manufacture of rubber products, medical devices and more.

Activities related to mechanical engineering and automotive are on the top four positions in the regional business expenditure on research and development, which may indicate that not all companies in these export segments are located at the lower levels of the value chain; some of them even conduct R&D activities. The Sector Database of Suppliers managed by CzechInvest confirms this assumption, as it contains 18 first-order, 27 second-order and 34 third-order suppliers in the automotive sector in the Hradec Králové Region. The general statistical data at the national level show a higher innovation activity of large enterprises.

Further company segmentation was performed by selecting from the Czech Credit Bureau Database. The criteria for the selection of companies included the average annual turnover for the last 2 years reported of > CZK 5 million, at least 10 employees, the rating of the company's economic health of at least 2 and the registered principal or ancillary economic activity in the field of CZ NACE 72 (research and development). These criteria were met by 57 entities from the Hradec Králové Region. 79 % are small and medium-sized enterprises. An annual turnover of more than CZK 1 billion is reported by 7 entities in the manufacture of textiles, plastic and rubber products, electrical equipment, motor vehicles, machinery and equipment and wholesale except motor vehicles. The most represented sectors are the manufacture of machinery and equipment (9) and the manufacture of other non-metallic mineral products (8).

1.4.2 Clusters

The **Omnipack Cluster** brings together over 52 members of the field of development, production and testing of standardised industrial packaging and fixation elements (pallets, crates, boxes etc.) and packagings that are developed directly according to customer requirements. Its members are companies and research organisations. The cluster has a shared development and testing centre and a training centre. Emphasis is placed on the economic growth of the cluster members, the transfer of R&D knowledge into the environment of the cluster members and the systematic training of members. Geographically, it covers several regions of the Czech Republic.

The **Czech Stone Cluster** brings together 8 academic and 11 business members in the field of stone mining and processing, trading of stone products and related activities, secondary and tertiary education and research, with the participation of relevant regional administrative bodies. It is focused on the expansion of the Bělohrad sandstone, which is the only sandstone of its kind in Europe. The cluster operates accredited laboratories for the research of rocks, soils and building materials at the Innovation Centre in Ostrava and Hořice, which implement solutions in terms of new types of materials, advanced technology, waste treatment, impregnation of stone and the use of sandstone from the overlying strata of the North Bohemian brown coal basins. Geographically, it covers several regions of the Czech Republic.

The **Hradec IT Cluster** is a cluster of regional importance uniting 14 companies, 1 university and 1 secondary school. The main line of business of the cluster is the implementation of joint research and development projects in the field of ICT focused on the applicability of new technologies in the development of products of the cluster members and their deployment methodology; distributed backup, the automation of management of information system development, information systems security and server housing.

1.4.3 Research organisations

The **Faculty of Pharmacy of Charles University in Hradec Králové** (FP) focuses on research and development of new drugs, dosage forms, drug delivery systems, biomedicine (Study of Drugs and Other Biologically-Active Substances Perspective in Prevention and Treatment of Important Lifestyle Diseases, Centre for the Study of Toxic and Protective Effects of Drugs on Cardiovascular System, Centre of Drug-Dietary Supplements Interactions and Nutrigenetics), clinical pharmacology and pharmacoepidemiology. Contractual research and development is conducted for companies and research organisations (e.g. new medicaments and dosage forms). Together with companies, it conducts advanced collaborative research. In cooperation

with companies and research organisations, it has filed several patents. The FP has founded a spin-off company - AB PHARMA s.r.o. In cooperation with companies, diploma theses (220 per year, of which 35 abroad) and dissertations (30 per year, of which 15 in cooperation with foreign facilities and 8 in cooperation with companies) are completed. Experts from the practical sector (pharmaceutical companies, hospitals, etc.) are involved in the teaching of for example industrial pharmacy, social and clinical pharmacy, biomedical disciplines, etc. The FP offers study programmes/jobs for foreign students/staff in the doctoral studies and on post-doctoral positions. The FP has a wide network of international relations not only in the EU but also worldwide - internships for employees/students and international research collaboration. Many of the academicians are members of the world's leading expert organisations.

The **Faculty of Medicine of Charles University in Hradec Králové** conducts a wide range of research activities from basic research to practical research in three main areas: (1) the area of lifestyle diseases affecting the cardiovascular and gastrointestinal system, (2) the area of oncology and haematology-oncology and (3) the area of personalised medicine and the challenges of ageing. The research capacity includes several hundred scientists and more than 250 doctoral students, some of whom are involved in joint research with the application sphere; reciprocally, the faculty allows young scientists in the application sphere to study in its doctoral programmes. The faculty promotes the exchange internships of students and scientists in research organisations and in the application sphere at the national and international level. The faculty has developed and is developing a network of collaborating organisations in biomedical research at the regional, national and international levels and supports the involvement of scientific teams in these research projects, including the collaboration with the application sphere.

The **Hradec Králové University Hospital (HK UH)** focuses, in terms of research, on the following areas - (1) bio-indicators in clinical medicine, (2) oncological surgery and transplantation, (3) ageing and care of the elderly population, improving the quality of life in old age, (4) neurodegenerative diseases (targeted at the development of pharmacotherapy for Alzheimer's disease) and (5) advanced diagnostics - development of methods and their validation in clinical medicine. The HK UH is very active in the area of contractual research, in particular in the clinical evaluation of drugs and laboratory evaluation, for both domestic and foreign pharmaceutical companies (annually there are usually more than 230 clinical evaluations and laboratory studies). Other areas of contractual research include the synthesis of potential drugs to order, the optimisation of materials for applications in health care, instruments for medical use, etc. The HK UH owns 6 patents and 2 utility models and annually registers 2-3 promising research results for legal protection. The HK UH employs the total of 28.27 FTE for research; however, most of the employed doctors have research as part of their job descriptions. Several dozen Ph.D. students from all the Hradec Králové faculties work at the HK UH every year. In terms of research, the HK UH collaborates with many renowned foreign institutions and its employees are members of the world's leading expert organisations.

The University of Defence, the Faculty of Military Health Sciences in Hradec Králové derives its focus from the needs of the Army of the Czech Republic, and focuses primarily on the protection against the effects of biological and chemical weapons. Research projects in the biological field are focused on methods of detection of highly hazardous biological agents and the development of preventive and therapeutic vaccines. In the field of toxicology and protection against chemical weapons, the priorities include the development of antidotes, modern way of their application, analyses of the effect of chemical agents on living systems and the detection of toxic substances in the water. The third pillar of research is aimed at protecting against nuclear weapons, especially biodosimetry. The faculty collaborates with several national companies in the

field of CBRN research and many domestic and foreign academic and military institutions. Accredited doctoral study is offered in 8 fields primarily focused in accordance with the directions of research.

The **Research and Breeding Institute of Pomology Holovousy** deals with the issue of research and development in most fruit species, with a focus on the creation of new varieties by detecting gene markers, core and stone fruit improvement by biotechnological methods, cultivation technology innovations focused on reducing the inputs of contaminants into the ecosystem and the environment, and the development of methods of integrated production and organic systems of cultivation of economically important fruit species. To its contractual partners, it provides research and development in the field of testing of new products, varieties, cultivation systems and curative methods focusing on non-viral primary sources. The Institute, under the “Czech National Programme on Conservation and Utilisation of Plant Genetic Resources and Agrobiodiversity”, stores and evaluates 2,300 varieties of most fruit species. In the long term, it cooperates with major research organisations in developed countries in terms of fruit growing. It is involved in international projects within FP7 - EU-Kontakt II-LH11134, COST FA1104, FP7-KBBE-2010-4, EUPHRESCO II. At the national level, it is involved in projects of the MA, MEYS, MC and TA CR. It provides training, educational, consulting and publishing activities and tasks for government institutions. Certified methods for the fruit growing practice are issued cyclically. On the basis of international agreements, the newly bred varieties are tested in different conditions of the EU countries and around the world. So far, the State Variety Book has registered 34 varieties of apples, 23 varieties of cherries, 7 varieties of pears, 3 varieties of plums and 2 varieties of apricots. Further 21 varieties are currently in the registration procedure. At the moment, there are 60.4 R&D FTEs in the institute. In cooperation with universities, 8 students (of which 6 are employees) pursue their Ph.D. studies at the institute. 1 employee is studying the Master’s degree and 1 employee has successfully completed the studies. 2 Bachelor’s theses and 10 diploma theses are supervised by the institute. As part of the OP RDI project implementation, selected researchers participate in international internships.

The **University of Hradec Králové (UHK)** in its research activities works primarily through the Faculty of Informatics and Management (e.g. ICT applications in industrial environments (smart energy networks), multi-agent systems) and the relatively young Faculty of Science (e.g. applied mathematical physics, sensors, sensing the behaviour of the human body (cooperation with LINET, IKEM), organic and analytical chemistry).

The Faculty of Science of the UHK is focused on the research of new drugs (currently, for example, the preparation of compounds affecting mitochondrial enzymes as potential drug candidates for Alzheimer’s disease; the research of modified cholinesterase reactivators for treatment of intoxications with organophosphorus pesticides), food supplements, research on toxicology (e.g. analysis of toxins in food) and the breeding area in cooperation with domestic and foreign partners, and the development of diagnostic medical devices (application of physics, testing sensors, signal processing, non-traditional mathematical methods of data processing and the like (currently, for example, non-invasive pulse wave velocity measurement in the aorta)). Several patents were filed in cooperation with companies and research facilities: doc. PharmDr. Kamil Musílek, Ph.D. et al. patent: Inhibitors of amyloid-binding alcohol dehydrogenase (ABAD), doc. RNDr. Štěpán Hubálovský, Ph.D. et al. patent: Food supplement and its manufacturing method, a hopeful traditional cooperation with Linet applied to other important results.

The Faculty of Informatics and Management of the UHK is focused on the processing of large data files, software solutions, the application of knowledge-based and mobile technologies in various fields, smart

sensors and their applications. There is the newly launched research and development in the field of interconnection of ICT and biomedicine - the direction of excellence and mission of the newly established Centre for Basic and Applied Research of the FIM. This is about cloud solutions in biomedicine, parallel computing, artificial neural networks, the development of medical devices, etc. A patent filed by Ing. Petr Šuba, Ing. Jan Matyska: Sensor connection using the existing electrical wiring. An extensive cooperation with the companies of the Hradec IT Cluster. If possible, research is carried out together with research institutes and companies in the region, but also in cooperation with other foreign entities on the basis of an extensive portfolio of international agreements.

Research at the UHK faculties is conducted on the basis of contractual cooperation and in the framework of selected research grants by various providers of the TA CR, MIT and MEYS (the COST CZ programme); cooperation between the Czech Republic and the USA (the MEYS KONTAKT II programme), etc. Naturally, there is the involvement of Master's and especially DSP students at the UHK in research and the participation of domestic and foreign experts in teaching, research and in the preparation of diploma theses/dissertations. 3/4 of the UHK employees are devoted to important activities. Currently, there are 166 DSP students at the UHK.

The **Institute of Microbiology of the ASCR, public research institution** has a **detached facility in Nový Hrádek in the Hradec Králové Region**. It is a unique laboratory of gnotobiology where the basic research focuses on the importance of intestinal microbiota in the development of lifestyle diseases such as inflammatory bowel disease, allergy, atherosclerosis, cancer and diabetes. Excellent results are achieved in the study of the development of sub-populations of T and B lymphocytes in the ontogeny of pigs. The gnotobiological laboratory is the only facility in Central Europe where germ-free and gnotobiotic animals (animals with known bacterial species) are kept and which collaborates with leading institutions in Europe and the USA. Bachelor's and diploma theses and dissertations are supervised at the facility. The laboratory addresses projects supported by the Grant Agency of the Czech Republic, the MEYS and the MRD. In the context of cross-border cooperation with Poland, the facility implements the project Probiotics: joint research, training and education and Pollen and food allergies know no boundaries. The research organisation also performs contractual research.

The **National Radiation Protection Institute, public research institution - Hradec Králové branch** specialises in radiation protection, the development of advanced detection methods of ionising radiation, applied research for the needs of the government and especially security research and research for supervisory and administrative activities of the State Office for Nuclear Safety of the Czech Republic. In terms of research in this field, it cooperates with institutes and companies of a similar focus, conducts training in radiation protection, organises courses in accordance with the Atomic Act required to undertake systematic monitoring of compliance with the requirements of RO, and organises internships for the International Atomic Energy Agency (IAEA).

The **Research Institute of Animal Production, public research institution - Kostelec nad Orlicí branch** is engaged in applied research using the potential use of pigs in terms of the intensity and efficiency of reproduction and production traits. The department is involved in the programme of protection of genetic resources as a specialised centre for cryopreservation of semen and other biological materials.

The **Forestry and Game Management Research Institute, public research institution - Research Station Opočno** (RS Opočno) is engaged in applied research, advisory and expert activities in the field of silviculture,

with nationwide coverage for all users, managers and forest owners. In collaboration with public and private owners and other forestry operators, research projects of national agencies (e.g. the National Agency for Agricultural Research, TA CR) are implemented. Another form of cooperation is contractual research and development, for example for the Military Forests and Estates and the Forests of the Czech Republic, state-owned companies. The main outputs of applied research conducted by RS Opočno include, in addition to classical scientific and professional publications (articles, books), proven technologies, certified methodologies and maps, results projected to legal standards, software and utility models. An important part of the activities of RS Opočno is the transfer of research findings into practice through expert and advisory activities, organising seminars, excursions and instructions including the provision of training materials on the website. The workers at the station are involved in the activities of international forestry organisations IUFRO and EFI and participate in the education of students and supervision of Ph.D. students of the Faculty of Forestry and Wood Sciences and the Faculty of Environmental Science of the CULS in Prague and of the Faculty of Forestry and Wood Technology of Mendel University in Brno. The current research findings are also presented when teaching at the Czech Forestry Academy Trutnov. Currently, there are 14 R&D employees including 1 Ph.D. student at RS Opočno.

Czech University of Life Sciences

The Regional Agrarian Chamber of the Hradec Králové Region, the District Agrarian Chamber in Hradec Králové, the District Agrarian Chamber in Jičín and the Czech Forestry Academy Trutnov provide, in consultation centres in Hradec Králové, Trutnov and Jičín, Bachelor's and Master's programmes in the fields of public administration, management, regional development, forestry and rural development on behalf of the Czech University of Life Sciences in Prague. The fields are guaranteed by the Faculty of Economics and Management and the Faculty of Agrobiological Sciences, Food and Natural Resources. The expected number of students in the academic year 2014-2015 is about 800.

1.4.4 Intermediate, support and umbrella institutions

The **Hradec Králové Technology Centre, civic consulting centre** is a non-profit company founded by the Statutory City of Hradec Králové. It provides the basic infrastructure of services focusing on the support of business and persons preparing for business. It acts as an incubator for start-up companies, providing discounted rent and support services (counselling, coaching, mentoring, investor search). A major activity is the support of new talent and businesses through building the regional start-up community and the operation of a co-working centre. At the same time, it has the status of a second Microsoft Innovation Centre in the Czech Republic, offering a range of related services. The aim of the activities is to help start-up companies enter their business, bridge the first years of existence, gain customers and become prosperous companies generating profits and jobs. In addition to the development of the business environment in the city and the region, it provides a link between tertiary education, the science and research base and the business environment.

The **Centre of Textile Technology and Education**, Dvůr Králové nad Labem is an accredited facility of the association of science and technology parks in the Czech Republic, focused on the field of textile finishing. It focuses primarily on the transfer of promising new technologies and the development of new environmental practices of finishing to maintain the competitiveness of the textile industry in the Czech Republic. The centre is strongly tied to educational institutions (the Technical University of Liberec, the University of

Pardubice, the Secondary School of Informatics and Services in Dvůr Králové n.L.) and umbrella organisations such as CLUTEX - a cluster of technical textiles and the Czech Technology Platform for Textiles. The centre is operated by INOTEX spol. s r.o., which exhibits a high degree of internationalisation in setting up and implementation of sectoral R&D policies of the EU; for example, it coordinates the European R&D programme for the cooperation of BioTEX for the introduction of emerging industrial biotechnology between the European Textile Technology Platform (ETP) and the EuropaBio Association. It is a member of the European association of textile research institutions (TEXTRANET) and is involved in the expert groups of ETP EURATEX (new materials, cleaner technology, ecology).

The **Centre for Transfer of Biomedical Technologies (CTBT)** is a joint facility of the Hradec Králové University Hospital, the University of Hradec Králové and the Faculty of Military Health Sciences of the University of Defence in Brno. It supports application-oriented research and development to accelerate and promote the transfer of research results into practical use by health care providers and companies from related fields that bring innovative solutions to the users and thus to the market. The CTBT provides services to researchers in the direction of research and in completing the research results in the form of early products interesting to the application companies, while providing similar services to companies that seek research services and research collaboration with academic institutions. The range of services includes legal advice and support, building industrial-legal protection, linking scientific teams with application companies, processing of the analyses of market and sales trends for specific technologies and subsequent projects and strategies of commercial and technical development of promising technologies.

The **Association of Innovative Entrepreneurship of the Czech Republic** has acted as a NGO for innovative business in the Czech Republic since 23 June 1993. Within the system of innovative entrepreneurship in the Czech Republic, it has offices in the Czech regions, and in addition to other activities and projects it operates the homepage of Technological Profile of the CR (www.techprofil.cz). It publishes CD ROM Technological Profile of the Czech Republic, currently version 14, which addresses the innovation potential of the country. The Technological Profile of the CR database currently contains information on 170 entities in the Hradec Králové Region.

The **Centre for Investment, Development and Innovation** is a regional development agency of the Hradec Králové Region. It is engaged in project management and strategic planning. It prepares regional strategy documents, including RIS, performs monitoring and evaluation, is the initiator of new RDI activities, co-manages the Regional Innovation Fund of the Hradec Králové Region, ensures the operation of the Research, Development and Innovation Council of the Hradec Králové Region, is the executive unit for the implementation of RIS3 and tries to encourage cooperation and awareness of key actors in the region, for example as the initiator of the project entitled Platform for investment, development and innovation of the Hradec Králové Region.

The **Regional Office of the CzechInvest Investment and Business Development Agency** provides information on the services of CzechInvest, consultancy for the support area of business using the Structural Funds and investment incentives. In the area of investment incentives, 40 investment projects were implemented in the Hradec Králové Region between 1993 and 2014. Under these projects, investment of over CZK 36.2 billion was promised and more than 10 thousand jobs were created. Most often the investment was in the production of transport equipment (including components), the electronic and electrical industry, the chemical industry, pharmacy, mechanical engineering and the textile industry. Under the Operational Programme Enterprise and Innovation 2007 - 2013, over 100 projects were supported in the programme of

Innovation - Innovation Project (CZK 2,358 million) and 26 projects were supported in the Potential Programme (CZK 364 million) in the Hradec Králové Region. The CzechInvest Regional Office for the Hradec Králové Region is also actively involved in the project of Platform for investment, development and innovation of the Hradec Králové Region, primarily in the support area for the investment environment (e.g. attracting FDI, care of the existing investors, commercial properties and brownfields).

The **Regional Chamber of Commerce of the Hradec Králové Region** is generally dedicated to the support for business with region-wide coverage through its offices in all the former district towns and cities of the Hradec Králové Region. As part of its activities, it carries out consultancy and training activities, in particular for the membership, and it supports the export activity of companies of the Hradec Králové Region.

The Confederation of Industry, Regional Office for the Liberec, Hradec Králové and Pardubice Regions

The Confederation of Industry is a voluntary NGO associating employers and entrepreneurs in the Czech Republic. It focuses on the creation of optimal conditions for dynamic development of business in the Czech Republic, defending the interests of its members, but also on the development of the membership base (more than 100 companies based in the Hradec Králové Region).

1.4.5 Public administration

The **Hradec Králové Region** seeks to develop the regional research and innovation system. It is the implementer of the Regional Innovation Strategy, updates it and prepares related studies. The Research, Development and Innovation Council has been operating since 2007, under the Deputy Governor for Regional Development. The Council is a coordinating, advisory and initiative body of regional autonomy in the area of research, development and innovation, and acts as an expert team linking the views of the public administration, research organisations, major companies, intermediary and umbrella organisations, educational institutions and other partners. Through the Regional Innovation Fund, the region finances some of the schemes listed in Chapter 1.3 above. The region is also the implementer of the popularisation project of construction of the Digital Planetarium under the OP RDI and modernises selected secondary schools into vocational educational centres. The region is the authority of more than 50 secondary schools.

The **Statutory City of Hradec Králové** focuses on creating conditions for the development of business environment and employment with an offer of diversified jobs corresponding to the structure and quality of the labour force. The city is an active but not impartial mediator and makes great efforts to attract new investors. The city also cooperates with the owners of the so-called brownfields (land and property within urbanised areas that have lost their original function or are underutilised), and its role is supportive and lies mainly in active marketing and in providing free advisory and methodological services, including presentations to potential investors and other stakeholders. In the area of RDI, the city established and funds a science and technology park (the Technology Centre) that acts as a business incubator and technology transfer centre (see above). The contact point for business support is run by the Trade Office of the Municipality of Hradec Králové.

2 SWOT analysis

Strengths and weaknesses

Strengths	Weaknesses
<i>Position of the region</i>	
<p>A higher proportion of expenditure on R&D and export performance of some fields of business (e.g. parts and accessories for motor vehicles, electrical devices and electronics, textiles, ICT)</p> <p>Foreign investment of regional companies (textiles, the manufacture of rubber products)</p> <p>The unemployment rate below the national average in the long term</p> <p>The existence of several major foreign-owned companies conducting R&D (e.g. automotive, ICT, medical devices, the manufacture of rubber products)</p> <p>Transport accessibility of Hradec Králové on highway D11 (one of the possible factors of mobility of RDI employees)</p> <p>A high visit rate of the region - tourism</p>	<p>Varied field focus of research organisations and companies (= low cooperation)</p> <p>Rather average values of statistical RDI indicators compared to the other regions (R&D expenditures, payroll, employees, drawing on institutional support...)</p> <p>Weakening investment attractiveness of the region</p> <p>A high proportion of foreign-owned companies located at the lower levels of global value chains / production networks</p> <p>A lower ratio of local government expenditure to support research, development and innovation</p>
<i>Innovative business</i>	
<p>A stable high share of the business sector in regional expenditure on research and development (especially in technical fields)</p> <p>Active clusters based in the region (packaging, stone, ICT)</p> <p>A significant involvement of CLUTEX - a cluster of technical textiles in linking key players within NUTS 2 Northeast</p> <p>High participation of the business community in the drawing of FP7 (mainly the area of new materials)</p> <p>The potential for interdisciplinary collaboration in the region</p>	<p>Lack of supporting infrastructure for research and development: low capacity and efficiency of some science and technology parks, business incubators</p> <p>Low internationalisation of SMEs</p> <p>Low innovation activity of enterprises</p>
<i>R&D</i>	
<p>The existence of international excellence in research and development in research organisations and companies (e.g. several centres in the fields of biomedicine (especially military), medical devices, pharmaceuticals, breeding, gnotobiology, electronics, optics and optoelectronics, functional textiles and biotechnology)</p> <p>The potential of research organisations to focus more on applications, e.g. based on the application</p>	<p>A low degree of commercialisation of the results of research organisations (the starting activity of technology transfer centres and specialised services of IPP -> need for a gradual change in the perception of the importance of applied research and cooperation with the practical sphere)</p> <p>A low share of the government sector in regional expenditure on research and development</p> <p>A low share of government and university sector</p>

<p>of the approach of related diversity</p> <p>Companies conducting research and development can find cooperating research organisations also outside the region (maintaining competitiveness)</p>	<p>expenditures on research and development financed by the business sector</p> <p>Absence of technology and natural sciences at universities (the Faculty of Science of the University of Hradec Králové is gradually developing), and the absence of a critical mass and size of companies with a focus in line with regional research organisations</p> <p>A low level of non-technical skills in academia</p> <p>Underdeveloped services for start-up (especially technology) entrepreneurs</p>
<p><i>Human resources for innovation and R&D</i></p>	
<p>The existence of recognised scientists and R&D teams with elements of international excellence with a link to the application sector</p> <p>Interdisciplinary collaboration between research teams (e.g. ICT in biomedicine, cooperation of the areas of breeding/pomology with a research of functional food)</p> <p>Secondary education institutions collaborating with companies</p>	<p>Wages in knowledge-intensive sectors (CZ-ISCO 2,3) below the average of the Czech Republic</p> <p>Low levels of entrepreneurship in academia and students</p> <p>A less attractive region for foreign researchers</p> <p>Low interest in the study of technical fields in secondary education</p> <p>The continuing discrepancy between the profile of graduates of initial education and the needs of the regional labour market</p> <p>Low effectiveness of career counselling and assisting talented students</p>

Opportunities and threats

Opportunities	Threats
<p><i>Political/legislative influences</i></p>	
<p>Reducing barriers to business (administration, bureaucracy)</p> <p>A reform of the immigration law to facilitate the employability of foreigners in knowledge-intensive fields</p> <p>Indirect support for research and development (e.g. major tax advantages and increased tax benefits of the use of research services provided by research organisations)</p> <p>The use of the European Union funds for RIS3 implementation</p>	<p>Legislation of research and development (financing system - instability)</p> <p>Lack of uniformity in the interpretation and insufficient law enforcement</p>
<p><i>Economic/financial impacts</i></p>	
<p>National / regional RIS3 tools</p> <p>Infrastructure: support for R&D projects in academia</p>	<p>The outflow of foreign direct investment (the exhaustion of the low cost and incentive benefits,</p>

<p>and industry, TTC, STP, co-working, digital planetarium</p> <p>The potential for the influx of outside investment in knowledge-intensive sectors, ideally using the regional knowledge base</p>	<p>changes in the tax system)</p> <p>Rising prices of production inputs (energy)</p> <p>A decline in foreign demand for regional production</p>
<i>Social/demographic influences</i>	
<p>The potential of a broad portfolio of secondary schools for a closer cooperation with research organisations and businesses</p> <p>An increased cooperation of the education system with employers</p> <p>The development of science, research and innovation popularisation activities (e.g. the Digital Planetarium in Hradec Králové)</p> <p>The possibility of attracting skilled foreign workers to companies and ROs</p>	<p>The outflow of skilled human resources from the region</p> <p>Deepening the mismatch between educational institutions and the requirements of the regional labour market</p>
<i>Technological aspects</i>	
<p>The possibility of internationalisation of regional entities (H2020, COSME, participation in technology platforms)</p> <p>The potential of interdisciplinary approach (related variety) in RDI</p> <p>Successful cases of upgrading in global value chains (e.g. in automotive, rubber production, mechanical engineering)</p> <p>Greater focus of research organisations on applicable results with a good marketability or a public end user</p> <p>The development of sectoral cooperation among companies and with research organisations outside the region</p>	<p>Untapped potential and obsolescence of the regional research, development and innovation infrastructure</p> <p>The declining attractiveness of the region for investment in knowledge-intensive fields</p>

3 Methodology of Regional Annex Formation

For the creation of the regional annex, the methodological recommendations of the European Commission summarised in the Handbook for Research and Innovation Strategies of Smart Specialisation and the documents described in Chapter 1.3 were used. The main part was a comprehensive study of progressive sectors in the Hradec Králové Region in the field of research, development and innovation, which included sectoral analyses, technological foresight, the preparation of a regional competence map and the design of a pool of 30 measures for implementation that were prioritised by key players in the regional RDI system within a field survey. The analytical part was produced on the basis of RDI statistical data, from which the conclusions were drawn regarding the position of the Hradec Králové Region in inter-regional comparison.

The document was also based on the data provided by the MEYS, RDI IS data, the Commercial Register and annual reports of companies and research organisations, drawing statistics of the OP EI and FP7 and information from the Czech Credit Bureau Database. Using the above sources, an analysis of the stakeholders of the regional triple helix was carried out. The analyses were summarised using the SWOT method, which served as the input for the support problem analysis, whose conclusions were also reflected in the settings of the objective tree in the proposal section that contains the vision, the key change areas and relevant strategic and specific objectives. Indicators were determined for both levels of objectives. Type activities were proposed for the individual objectives that would later be translated into action plans, consisting of the individual project fiches. The annex was discussed and commented on at four meetings of the Research, Development and Innovation Council of the Hradec Králové Region. Further ideas for targeting the support were obtained at the meetings of the RDIC of the Hradec Králové Region, at meetings of innovation platforms and during structured interviews with representatives of research organisations and companies in the region that take place continuously and in parallel with the creation of this document.

This document and the supporting documents are available at www.riskhk.cz and www.cirihk.cz/ris3

4 Proposal of the region's specialisation - domains for RIS 3 ¹

Due to the different field structure and focus of research organisations and companies in the Hradec Králové Region, the proposal of the specialisation domains is based on three type of situations:

a) the presence of fields of innovative business with a substantial share of regional exports and a supercritical amount of non-capital R&D expenditure, which reflects the existence of its own R&D centre or the purchase of R&D results from companies and research organisations outside the region. These R&D inputs are subsequently used by companies in production, which is reflected in the economic indicators of the region

or

b) the presence of the fields of research specialisation which do collaborate more with the application sphere/the end public users outside the region (i.e. rather improve the statistics of innovation competitiveness in the other regions, as there is an insufficient number of suitable companies in the region); however, they may contribute to the competitiveness of the Hradec Králové Region through the production/attracting of high-quality R&D human resources, employment and revenues from the commercialisation of their R&D results

or

c) the field compliance of the focus of research organisations and economic specialisation in the region, which occurs only in a few niches.

Statistical data on the product structure of the regional export (the indicator of product application in international markets) were used to define the following fields of specialisation

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¹ The focus of the domains should be understood as a dynamic process where the regional implementation structures of RIS3 continuously monitor the real development of research and economic specialisations and can update this chapter as necessary.

- the following indicators broken down by fields of economic activity - CZ-NACE
 - corporate non-investment expenditure on research and development (reflects the critical mass of companies with a strategy based on R&D)
 - revenues from sales of products and services
 - average number of employees
 - average number of enterprises
- the success of the implementation of domestic and international RDI projects
- excellence in research fields according to the analyses of relative international citations (TC ASCR)
- number of impacted articles in WoS (the IDEA CERGE analysis - who conducts the best research in the Czech Republic)

The outputs of structured interviews with representatives of research organisations and innovation companies and the outputs of the meetings of innovation platforms and the RDIC of the Hradec Králové Region were also used.

The individual strategic/specific objectives defined in the individual horizontal key change areas A to D in the proposal part will focus on the development of the specialisation domains.

1 Production of vehicles and their components

Automotive sector and its supplier ecosystem in the Czech Republic are concentrated within the triangles of Prague - Liberec - Hradec Králové and Uherské Hradiště - Olomouc - Ostrava; the first triangle shows greater regional values of the localisation coefficients of employment.² This domain has the largest share of regional exports, industry sales and employment and the second highest share of non-capital expenditure of companies on R&D. It is based primarily on the regional companies, not research organisations. In terms of content, it is focused on the development/manufacture of passenger cars, research/development and the production of their components (e.g. transmissions, brake systems, body parts, locks, air bags, electronic components, adjustments of ambulances), the development and manufacture of rubber and plastic products and the development (including prototyping), construction and testing of components and sub-components using information technology.

2 Mechanical engineering and investment units

Mechanical engineering has a long tradition in the region in many fields, which can be grouped into the following categories despite a certain degree of heterogeneity. This domain has a high share of regional exports, industry sales, employment and non-capital expenditure of companies on R&D. It is based on companies (in collaboration with the external environment) rather than research organisations in the region. The first segment is the development and production of parts (e.g. hydraulics, gearboxes) and machinery, especially textile, printing, agriculture, forestry, metalworking and machinery for mining, quarrying, construction and welding. The second segment is the engineering, design, manufacturing and supply of investment equipment for construction, the pharmaceutical industry, the food-processing industry, the chemical and petrochemical industries, power plants (e.g. wind chargers, heat exchange systems, boilers),

² M. Damborský, G. Říhová, V. Rajtr - Regional Localisation of the Automotive Industry in the Czech Republic, Acta Oeconomica Pragensia 2/2012

ecological systems and the food-processing industry. A specific area consists of foundry, machining alloys and metal products.

3 New textile materials for new multidisciplinary applications (domain shared with the Liberec and Pardubice Region)

This domain has a high share of regional exports, industry sales, employment and non-capital expenditure of companies on R&D. It is based primarily on companies (collaboration with research organisations and companies mainly from the Liberec and Pardubice Region; interconnection of the textile triple helix across three regions, covering the whole chain of research-development-internationally marketable production, and accounts for 50 % of employment in the textile sector of the Czech Republic and 48 % of total sales); to a lesser extent, it is based on the research organisations in the region. The domain focuses on the research, development and production of textile materials using functioning (including nano and biotechnology techniques) and new eco-friendly dyeing and finishing processes. Another segment is the weaving of textiles, textile finishing and the field of technical textiles and non-wovens.

4 Electronics, optoelectronics, optics, electrical engineering and IT

This domain has a high share in regional exports, industry sales, employment and non-capital expenditure of companies on R&D (ICT has the highest share of the regional non-capital expenditure on R&D, the manufacture of electrical equipment has a very low share). It is based on both companies and research organisations in the region.

The first segment is the research/development and production especially of electrical (e.g. electric motors, rotary machines, generators, transformers, wires, cables, distribution and control equipment, switching equipment), electronic (condensers, microelectronics) and wiring devices and components.

The second segment is the industrial automation, including measuring, adjusting, testing and navigating instruments.

Another segment is an area devoted to the manufacture, research and development of special optical and optoelectronic components, modules and devices, including in particular fibre lasers, the research and development of passive elements for the diagnostics and therapy using optical wave guides, including optical sensors and communication in the visible region of the spectrum (replacement of microwave wireless communication with optical communication). There is an ongoing stable cooperation with the Academy of Sciences and other research organisations.

Within IT, this is primarily the development of software solutions (e.g. B2C, controlling, MIS, database systems), the processing of large amounts of data, the application of knowledge-based and mobile technology in various fields, smart sensors and their applications.

In the region, there is an interdisciplinary cooperation of ICT in biomedicine focused on cloud-based solutions in biomedicine, parallel computing, artificial neural networks and the development of medical devices.

5 Drugs, medical devices (equipment) and medical care (domain shared with the Pardubice Region)

This area concentrates the key educational capacity of the region. This domain has a higher proportion of business expenditure on R&D but a negligible export share. It is not based on a critical mass of companies in the region (some companies covering specific niches); it is rather based on the activities of research organisations with application potential.

The first segment is mainly the research and development of drugs, dosage forms, dietary supplements (including functional food) and toxicology (e.g. analysis of toxins in food). There is cooperation with the application sector, technology transfer and contractual research, including joint patents.

Another segment is the area of medical devices, equipment, and medical diagnostic tools and equipment. In this segment, there are several companies successfully covering the market niches, and at the same time there are research organisations conducting contractual research and technology transfer.

Another segment is military medical research, where the end users are the Czech Army and the health care system; there is also an ongoing cooperation with companies. This is mainly the field of antidotes (research and development of antidotes against chemical weapons), biodosimetry (research of new markers to quantify exposure), vaccination (research of new vaccination processes based on nanotechnology) and detectors (research, development and manufacture of devices for the detection of warfare agents).

The follow-up segment is the area of medical care - in particular research in the field of lifestyle diseases affecting the cardiovascular and the gastrointestinal system, oncology, oncosurgery, haemato-oncology and the area of personalised medicine and the challenges of ageing.

The user of the outputs is the health care system, and there is an ongoing cooperation with companies.

The segment of medical nanobiotechnology is shared with the Pardubice Region. The common segment of the specialisation is focused on regenerative medicine, tissue engineering and drug carriers. Regional activity in the area of medical applications, nano and biotechnologies is one of the strongest and most successful in the entire Czech Republic. Several pharmaceutical, nano and biotechnological companies with international importance were established or are based in the region. The institutions based in the Hradec Králové Region that are actively involved in research and applications of medical biotechnologies include the Faculty of Medicine of Charles University, the Faculty of Pharmacy of Charles University, the Faculty of Military Health Sciences of the University of Defence, the University of Hradec Králové and the University Hospital. The effect of public and private sectors is reflected in the fields of developing new pharmaceuticals, preclinical research, medical devices, biomedical informatics and, last but not least, we need to mention the vivarium including the possibility to test medical applications in laboratory animals (including large laboratory animals). The Pardubice Region traditionally has a strong bio-chemical industrial base in the area of medical applications, both in the field of synthetic chemistry, and in technologies for preparing bioactive materials. Furthermore, the University of Pardubice has traditionally hosted unique institutes and departments involved in spinning biologically active polysaccharides and bonding them with biologically active substances, globally renowned bio-analytical laboratories, the possibilities to carry out testing in bio-chemical laboratories etc. Nanobiomedical technologies require also the construction of new technological apparatus, such as apparatus for spinning and preparing fabrics from micro and nanofibres, apparatus for preparing wound dressings, scaffolds, diagnostics, data processing, etc. The region's active industrial and R&D base in the field of textiles, textile machinery, special manufacturing equipment, electrical engineering and ICT creates perfect conditions for the development of these applications and represents an opportunity for future development of new innovation companies in technological fields established on the basis of related variety. The area of bio and nanotechnologies and their applications in medicine is one of the world's fastest

growing markets. In the view of its socio-economic potential (ageing populations, treatment/prevention of lifestyle diseases, safety, etc.), it is one of the priorities of the Horizon 2020 programme which is currently in progress.

6 Advanced agriculture and forestry

This domain has a higher proportion of business expenditure on R&D but a negligible export share. It is not based on a critical mass of companies in the region; it is rather based on the activities of research organisations with application potential. In terms of content, it is focused on the research and development of pomology (breeding, biotechnological methods of healing, performing tests), biotechnology and applied research in silviculture, where the end user of the outputs is largely the public administration (the Ministry of Agriculture, the Forest Management Institute, the Forests of the Czech Republic, the Military Forests and Estates). The following arguments are for the inclusion of the domain:

- Applied research and development with a direct impact on the user community
- The need to develop the Pomology Research Institute
- Transfer of innovated technologies and new varieties in the CR and abroad
- Certified methods for the fruit growing practice are issued cyclically
- On the basis of international agreements, the newly bred varieties are tested in different conditions of the EU countries and around the world
- Possibilities of interdisciplinary collaboration in biomedicine (functional food) and the textile sector (cultivation of fruit trees).
-

5 Proposal Part

The proposal part is based on the analytical part summarised in the form of a SWOT analysis with regard to the conclusions of the problem analysis and the pool of type activities that were prioritised in the past by the key players in the regional RDI system in the context of the preparation of the comprehensive study of progressive sectors in the Hradec Králové Region in the fields of research, development and innovation. Further ideas for targeting the support were obtained at the meetings of the RDIC of the Hradec Králové Region, at meetings of innovation platforms and during structured interviews with representatives of research organisations and companies in the region.

In order to fulfil the vision, the proposal part has defined four key change areas with proposed strategic and specific objectives. Indicators were determined for both levels of objectives. Type projects, activities or programmes were determined in order to achieve specific objectives. The list of projects, activities or programmes is indicative only and may be expanded or further amended. The strategy will be implemented through action plans, which will include specific projects, activities or programmes leading to the fulfilment of objectives of the regional RIS3 strategy, including the implementers.

5.1 Vision

The Hradec Králové Region - a competitive region with developed innovative business, excellent research and qualified people.

This vision builds on the vision of the Development Strategy of the Hradec Králové Region 2014-2020 and the Regional Innovation Strategy of the Hradec Králové Region 2010-2015. The competitiveness of the Hradec Králové Region will be based primarily on the high proportion of local companies with a strategy built on research, development and internationally applicable production with a higher added value. Research organisations will effectively collaborate with the application sphere in the national and international context. Educational institutions in the Hradec Králové Region will ensure a qualified labour force and the maximum compliance with the requirements of the labour market for as many degrees of knowledge-intensive professions as possible. The Hradec Králové Region will have an effective network of intermediary institutions of research and development. The regional research and innovation system will be systematically developed and promoted on the basis of partnerships among the key stakeholders.

5.2 Key Change Areas

Key change area A: Increasing the innovation performance of companies

Key change area B: Excellent public research for applications

Key change area C: Development of human resources for research, development and innovation

Key change area D: Implementation and marketing of RIS3

Key change area A: Increasing the innovation performance of companies

The key change area is focused on increasing the innovation activities of enterprises, which are very low in the Hradec Králové Region compared to the other CR regions (CZSO 2012). First, it focuses on the beginning of the business cycle because the motivation of the population to pursue innovation business activities is constantly decreasing. The still undeveloped foundations for the development of interesting business plans, the so-called start-up scene, require greater involvement of all relevant stakeholders in order to generate more new successful companies whose growth will be long-term and based on innovation. Second, it focuses on the research, development and innovation activities of companies, professional and interdisciplinary groups in the region with an emphasis on international activities. Activities should be pursued that will motivate stable companies to adjust their strategic management in order to increase their RDI activities to successfully expand into new segments and markets. The structural problem is the low cooperation of companies and research organisations in general. The key change area is trying to interconnect these two worlds and get them to work on joint projects that might result in new internationally competitive products. There is no university/faculty of technical focus that would be professionally bound to the key sectors of the regional economy. After graduating from secondary school, students have to leave the region for further studies and their motivation to return after the completion of university studies is decreasing. The goal is to make it possible for companies to attract these needed skilled graduates and employees back to the region.

To increase the number of new innovation business plans, it is necessary to motivate citizens to pursue business activities, for example by means of popularising and counselling activities which will facilitate the business commencement, provide critical insight into the purposefulness of the business plan and help with its development, scalability and international market expansion. In the case of established companies with a strategy based on research and development, it is necessary to strengthen the activities leading to increased expenditures of companies (under domestic and foreign control) and outside investors on research and development. This is determined primarily by the development of human resources, material conditions (infrastructure, equipment) and the collaboration with other companies and research organisations in joint projects with international impact, if possible, and subsequent successful market application.

The target state is a situation where there has been created and maintained an environment for the establishment of new innovation companies in the region (entrepreneurship is generally promoted and encouraged). New ideas are provided with services that facilitate growth and international expansion. There are new businesses that survive the critical period of commencement and make it to the stage of first commercial success and profitability. The innovation activity of companies in the region is growing. There is an increasing number of foreign-owned companies conducting R&D activities. Companies

develop both human and material capacities for research and development and cooperate among themselves and with research organisations on projects with international market application.

Key change area A: Increasing the innovation performance of companies		
Strategic objectives in the key change area A: - Strategic Objective A.1. Increase the level of business activity - Strategic Objective A.2. Strengthen the research, development and innovation activities of companies, professional and interdisciplinary groups with an emphasis on international activities		Indicators of strategic objectives / key change areas: Non-investment R&D expenditure in the business sector The number of international patent applications submitted by companies
Strategic Objective A.1. Increase the level of business activity In the region, there has been created and maintained an environment for the establishment of new innovation companies such as start-ups and spin-offs (entrepreneurship is generally promoted and encouraged). New ideas are provided with services that facilitate growth and international expansion.		
Specific objectives	Specific objective indicators	Typical activities / projects / operations³
<i>Specific Objective A.1.1. Increase the number of new innovation companies with an emphasis on acceleration and incubation services</i>	<ul style="list-style-type: none"> • <i>Number of supported newly established companies existing for at least 3 years from the granting of aid</i> • <i>Share of the supported persons who have commenced business in the total number of persons supported</i> 	<ul style="list-style-type: none"> • <i>Incubation and acceleration activities (e.g. vouchers to use the services of co-working, mentoring, coaching)</i> • <i>Consultancy for starting entrepreneurs (e.g. vouchers to start business)</i> • <i>Training of staff/experts providing incubation and acceleration services</i> • <i>Popularisation events - the motivation for entrepreneurship; best practices of successful</i>

³ This is only an indicative list, which is not subject to approval by the Regional Council of the Hradec Králové Region. Specific activities will be contained in the related action plans to be fulfilled by project fiches.

		<p><i>entrepreneurs</i></p> <ul style="list-style-type: none"> • <i>Activities improving the access of starting entrepreneurs to alternative sources of funding</i> • <i>Support for the preparation of projects implementing a specific objective (e.g. through the smart accelerator)</i>
<p>Strategic Objective A.2. Strengthen the research, development and innovation activities of companies, professional and interdisciplinary groups with an emphasis on international activities</p> <p>The innovation activity of companies in the region is growing. Companies develop both human and material capacities for research and development and cooperate among themselves and with research organisations on projects with international market application.</p>		
<p><i>Specific Objective A.2.1. Increase the research, development and innovation activities of companies, professional and interdisciplinary groups with an emphasis on international activities</i></p>	<ul style="list-style-type: none"> • <i>The volume of drawn funds from international programmes (e.g. H2020, COSME,...)</i> • <i>The volume of expenditure incurred by the supported companies on contractual/collaborative research with research organisations</i> • <i>Number of companies with non-investment expenditure on R&D > CZK 10M per year</i> 	<ul style="list-style-type: none"> • <i>Activities for the establishment of cooperation between companies and knowledge providers (e.g. innovation vouchers)</i> • <i>Innovation and process audits - counselling (e.g. Interim Manager)</i> • <i>Consulting (grant, partner-search, strategic management)</i> • <i>Networking events and competitions (e.g. the Innovation Company of the Hradec Králové Region with the announcement of the most successful innovation products (products, processes, services) in the region (two-year periodicity))</i> • <i>Regional Proof of Concept Programme</i>

		<ul style="list-style-type: none"> • <i>Marketing activities (targeted at new foreign markets)</i> • <i>Support for the preparation of projects implementing a specific objective (e.g. through the smart accelerator)</i>
<p><i>Specific Objective A.2.2. Increase the number of skilled workers in companies</i></p>	<ul style="list-style-type: none"> • <i>Number of supported R&D employees in companies (HC)</i> • <i>Number of new jobs created by the supported entities (FTE)</i> 	<ul style="list-style-type: none"> • <i>Activities in the creation of new R&D jobs (e.g. Innovation Assistant)</i> • <i>Activities in the transfer of knowledge from ROs to companies (e.g. Knowledge Transfer Partnership - joint supervision of Ph.D. students by universities and companies)</i> • <i>Mobility of staff (e.g. among cluster members)</i> • <i>Assistance services for new R&D employees</i> • <i>Training activities for non-technical competences, management and IPR and innovation engineering</i> • <i>Support for the preparation of projects implementing a specific objective (e.g. through the smart accelerator)</i>

<p><i>Specific Objective A.2.3. Make the region more attractive for investors (foreign and domestic) implementing knowledge-intensive activities</i></p>	<ul style="list-style-type: none"> • <i>Number of foreign companies (entities under foreign control) implementing R&D activities in the Hradec Králové Region</i> 	<ul style="list-style-type: none"> • <i>Mapping the satisfaction/needs of investors in the region (a range of after-care services)</i> • <i>Updating the database of brownfields and greenfields</i> • <i>Activities to facilitate the commencement of business for investors (soft landing)</i> • <i>Promotional activities</i> • <i>Support for the preparation of projects implementing a specific objective (e.g. through the smart accelerator)</i>
<p><i>Specific Objective A.2.4 Expanding the capacities for the implementation of specific RDI activities in the region</i></p>	<ul style="list-style-type: none"> • <i>Investment in RDI capacities within grant programmes</i> 	<ul style="list-style-type: none"> • <i>Grant programmes to improve the existing facilities for specific intentions of innovation companies, clusters, technology platforms, public applicants (municipalities, regions, ...), research organisations and other R&D institutions</i> • <i>Support for the preparation of projects implementing a specific objective (e.g. through the smart accelerator)</i>
<p>Strategies and national documents that are used as a basis for strategic and specific objectives:</p> <p><i>Regional Innovation Strategy of the Hradec Králové Region 2010 - 2015: Priority 3 - Boosting the innovation performance of advanced sectors</i></p> <p><i>A comprehensive study of progressive sectors in the Hradec Králové Region in the fields of research, development and innovation</i></p>		
<p>Conditions for and barriers to the implementation of interventions in the key change area:</p> <p><i>Increasing the stability of the regulatory system (e.g. tax matters), and reducing the administrative burden</i></p> <p><i>Involvement of high-quality providers of consulting/incubation/acceleration services (trustworthy for companies)</i></p>		

Incentives for companies to develop towards an internationally competitive expansion based on research and development

The gradual overcoming of distrust of companies towards academia (e.g. gaining trust based on smaller “pilot” projects of cooperation)

Low motivation of young people to pursue their own business activities

Key change area B: Excellent public research for applications

The key change area is focused on strengthening the orientation of research organisations on topics of application and the extension of cooperation activities with end users either by providing R&D inputs into the process of placing new/innovated products by companies in the market or by providing internationally excellent outputs usable by the public sector, such as the army or the health care system. It is also focused on an effective system of cooperation with companies on joint R&D activities and on the implementation of more successful cases of commercialisation. All of the above areas should be reflected in a higher share of expenditure on the part of the government and the higher education sector financed by the business sector.

Cooperation with the application sphere is reflected in the area of human resources in the form of various student and staff mobilities, in order to strengthen and improve research teams. More R&D staff will be involved in collaborative projects with the application sphere in a variety of forms.

Thematic and targeted events and information technology will enhance the mutual awareness of the research infrastructure and application sector in terms of needs, demand and supply of the R&D capacities in joint activities. Using a variety of training activities, awareness of employees in academia will be raised with regard to business rules and the issue of IPP. Tools will be developed to verify the technical and commercial applicability of the results of research and development.

The target state is a situation where research organisations in the region will effectively collaborate with the application sphere on projects of contractual/collaborative research and together with companies develop human capacity for research and development. Research organisations in the region have an effectively set up internal system of commercialisation of research and development and generate results for the end user in the form of either a specific market-successful business case of commercialisation or a public user of the outcome such as the army, the health care system etc.

Key change area B: Excellent public research for applications		
Strategic objectives in the key change area B:		Indicators of strategic objectives / key change areas:
- Strategic Objective B.1. Enhancing the application performance of research organisations		The share of government and university sector expenditures on research and development financed by the business sector Number of projects of cooperation between research organisations and the application sphere
Strategic Objective B.1. Enhancing the application performance of research organisations Research organisations in the region effectively collaborate with the application sphere on projects of contractual/collaborative research and together with companies develop human capacity for research and development. Research organisations in the region have an effectively set up internal system of commercialisation of research and development and generate results for the end user in the form of either a specific market-successful business case of commercialisation or a public user of the outcome such as the army, the health care system etc.		
<i>Specific objectives</i>	<i>Specific objective indicators</i>	<i>Typical activities / projects / operations⁴</i>
<i>Specific Objective B.1.1. Enhance the relevance of research and development activities of research organisations in relation to applications</i>	<ul style="list-style-type: none"> • <i>The volume of the conducted contractual/collaborative research (domestic and international) in CZK</i> • <i>Employees of research organisations (FTE) involved in projects of contractual/collaborative research (domestic and</i> 	<ul style="list-style-type: none"> • <i>Networking and matchmaking meetings</i> • <i>Programme to support collaborative R&D projects</i> • <i>Upgrade of the infrastructure and equipment of research organisations</i> • <i>Sharing of best practice with foreign research organisations</i> • <i>Consulting (grant, partner-search)</i> • <i>Platform for investment, development and innovation of the Hradec Králové Region</i>

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	<p><i>international)</i></p> <ul style="list-style-type: none"> • <i>The volume of drawn funds from international programmes (e.g. H2020)</i> 	<ul style="list-style-type: none"> • <i>Evaluation of RDI activities in terms of commercial/application potential and TRL (maturity level of innovations for practical use).</i> • <i>Support for the preparation of projects implementing a specific objective (e.g. through the smart accelerator)</i>
<p><i>Specific Objective B.1.2. Increase the (international) mobility of human resources in research organisations</i></p>	<ul style="list-style-type: none"> • <i>Number of (foreign) R&D employees and Ph.D. students in research organisations with a duration of their stay > 3 months</i> • <i>Number of Ph.D. students collaborating with companies</i> 	<ul style="list-style-type: none"> • <i>Activities in the transfer of knowledge from ROs to companies (e.g. Knowledge Transfer Partnership - joint supervision of Ph.D. students by universities and companies)</i> • <i>Mobility of students and staff</i> • <i>Assistance services for incoming foreign students and R&D employees</i> • <i>Support for the preparation of projects implementing a specific objective (e.g. through the smart accelerator)</i>
<p><i>Specific Objective B.1.3. Increase the degree of commercialisation of results of research organisations</i></p>	<ul style="list-style-type: none"> • <i>Number of cases of patent sales and licensing of research results provided by research organisations to companies</i> • <i>Increase in revenues of research organisations from</i> 	<ul style="list-style-type: none"> • <i>The regional Proof of Concept programme (to ensure the protection of industrial knowledge, prototyping, pre-production testing and development, analysis and direction of the commercial potential)</i> • <i>Technology transfer centre services</i> • <i>Training for non-technical competences</i> • <i>Training on the basics of entrepreneurship, IPR (IPP,</i>

	<p><i>commercialisation</i></p>	<p><i>commercial assessment of research objectives)</i></p> <ul style="list-style-type: none"> • <i>Networking of academicians and R&D companies (excursions and internships in companies, training in the form of virtual companies - also an optional subject in the course of education)</i> • <i>Support for the preparation of projects implementing a specific objective (e.g. through the smart accelerator)</i>
<p>Strategies and national documents that are used as a basis for strategic and specific objectives:</p> <p><i>Regional Innovation Strategy of the Hradec Králové Region 2010 - 2015: Priority 2 - Creating the conditions for cooperation in the field of innovation</i></p> <p><i>A comprehensive study of progressive sectors in the Hradec Králové Region in the fields of research, development and innovation</i></p>		
<p>Conditions for and barriers to the implementation of interventions in the key change area:</p> <p><i>The willingness and motivation of research organisations to cooperate more with the application sphere</i></p> <p><i>The established system of commercialisation of research organisations (guidelines, roles, processes, bodies)</i></p> <p><i>A system of effective information exchange on the basis of regional partnership (Platform of investment, development and innovation of the Hradec Králové Region)</i></p>		

Key change area C: Development of human resources for research, development and innovation

The key change area is primarily aimed at addressing some of the causes of graduate unemployment in the Hradec Králové Region. The prerequisites for high-quality education at all levels of the education system include a strict connection with practice and real life, adequate material facilities in educational institutions and motivated and proficient teachers and other employees. In the region, there is a persistent discrepancy between the field structure of secondary schools and universities and the requirements of the labour market, not a very effective support for technical, electrical and construction fields by the founders of secondary schools at the expense of other unnecessary fields (e.g. economic), and a disparity between the number of places at secondary schools and the number of secondary school applicants, caused by an overall increase in the number of students interested in fields with school-leaving exams at the expense of applicants for fields offering vocational certificates. Another challenge is to ensure a practical approach to teaching specific fields so that the graduates are immediately employable after graduation. Currently, it is essential to involve employers in collaboration already at the level of elementary schools and subsequently at the level of secondary schools and universities. Students' motivation to study subjects required by the labour market should come from employers and, of course, from skilled career counsellors. School education programmes should also undergo changes that reflect innovation in teaching vocational subjects and in practical training at individual facilities. The aim is to promote the fields of education whose graduates are missing in the labour market, to focus on immediate employability of the graduates and to develop cooperation between schools and employers (e.g. partial transfer of teaching into the premises of businesses and companies, excursions and internships for teachers and students) for the purpose of showing the students what vocational education is like in real practice. To the greatest possible extent, it is necessary to introduce a system of talent identification and promotion in elementary and secondary education. In this regard, it is necessary to increase the level and effectiveness of career counselling, so that each field is always studied by individuals with the appropriate skills, prerequisites and interests.

The target state is a situation where the public administration continuously maps the needs of companies in the region and the overall situation in the labour market and obtains feedback on the quality of graduates. The education system cooperates with employers and to the maximum extent possible adjusts the graduate profile to the labour market requirements. Especially in elementary and secondary education, there is a system in place to identify and work with talent, including the development of persons engaged in career counselling. There is a system of further education for employees in education with an emphasis on cooperation with companies. For an effective implementation of RIS3 in the Hradec Králové Region, there is the Research, Development and Innovation Council of the Hradec Králové Region, the RIS3 executive unit and its RIS3 team and business innovation platforms.

Key change area C: Development of human resources for research, development and innovation		
Strategic objectives in the key change area C: - Strategic Objective C.1. Improving the quality of graduates and teachers		Indicators of strategic objectives / key change areas: Employers' satisfaction with the quality of graduates in the region (based on a regular representative field survey) Number of pupils/students participating in programmes to develop talented students
Strategic Objective C.1. Improving the quality of graduates and teachers The public administration continuously maps the needs of companies in the region and the overall situation in the labour market and obtains feedback on the quality of graduates with an emphasis on technical and science fields. The education system cooperates with employers and to the maximum extent possible adjusts the graduate profile to the labour market requirements. Especially in elementary and secondary education, there is a system in place to identify and work with talent, including the development of persons engaged in career counselling. There is a system of further education for employees in education with an emphasis on cooperation with companies.		
<i>Specific objectives</i>	<i>Specific objective indicators</i>	<i>Typical activities / projects / operations⁵</i>
<i>Specific Objective C.1.1. Enhance the quality of graduates of initial education with an emphasis on technical/natural sciences and popularisation activities</i>	<ul style="list-style-type: none"> • <i>Number of entities/persons involved in these activities</i> • <i>The ratio of pupils/students enrolling in technical and natural science disciplines at secondary schools/universities</i> 	<ul style="list-style-type: none"> • <i>Activities of popularisation of science and technology</i> • <i>Positive promotion of science and technology and RDI among the general public</i> • <i>Promoting the cooperation of elementary and secondary schools in teaching technical skills</i> • <i>Promotion of leisure activities for children, pupils and students towards the development of technical and</i>

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	<ul style="list-style-type: none"> • <i>The share of foreign students at universities</i> 	<p><i>scientific skills (extracurricular and non-formal education, competitions, educational interpretation of various topics in the form of entertainment, elementary school clubs, etc.)</i></p> <ul style="list-style-type: none"> • <i>Development of activities to promote entrepreneurship (financial literacy, non-technical skills, business basics, business competitions - business plans, virtual companies...)</i> • <i>Upgrade of the educational infrastructure and facilities</i> • <i>Support for the preparation of projects implementing a specific objective (e.g. through the smart accelerator)</i>
<p><i>Specific Objective C.1.2. Improve the cooperation between educational institutions and the business sector</i></p>	<ul style="list-style-type: none"> • <i>Employers' satisfaction with the level of specialised schools and graduate profiles (based on a regular representative field survey)</i> • <i>Number of diploma theses completed in collaboration with companies</i> • <i>Number of entities/persons involved in these activities</i> 	<ul style="list-style-type: none"> • <i>System of periodic analysis of the needs of companies in the region in relation to graduates of secondary schools and universities</i> • <i>Cooperation between schools and businesses to adjust the curricula and the competence models of secondary school and university graduates</i> • <i>Internships/work experience of pupils/students in companies</i> • <i>Meetings with successful entrepreneurs - good examples, motivation to pursue business activities</i>

		<ul style="list-style-type: none"> • <i>Support of seminar papers and diploma theses - topics assigned by companies</i> • <i>Summer schools organised in cooperation with research organisations and the application sphere</i> • <i>A platform of cooperation among schools, employers and the labour market institutions</i> • <i>Support for the preparation of projects implementing a specific objective (e.g. through the smart accelerator)</i>
<i>Specific Objective C.1.3. Introduce a system of talent promotion in initial education</i>	<ul style="list-style-type: none"> • The proportion of preschool and initial education institutions in the region with an established system of talent promotion • Number of persons involved (talented individuals) 	<ul style="list-style-type: none"> • <i>The introduction of a system of identification of and working with talents in kindergartens, elementary schools, secondary schools, tertiary vocational schools and universities (system and methodology preparation, training and internships for career counsellors, career counselling activities)</i> • <i>Preparation and implementation of specific tools for identified talent</i> • <i>Support for the preparation of projects implementing a specific objective (e.g. through the smart accelerator)</i>
<i>Specific Objective C.1.4. Enhance the quality of teachers</i>	<ul style="list-style-type: none"> • Number of FTEs in companies involved in teaching in initial education institutions 	<ul style="list-style-type: none"> • <i>Teaching internships in companies</i> • <i>Participation of people from the practical sphere in teaching at secondary schools and universities</i>

	<ul style="list-style-type: none"> • Number of persons engaged in activities 	<ul style="list-style-type: none"> • Promoting further training of teachers • Incentives for the participation of teachers in providing further education services • Support for the preparation of projects implementing a specific objective (e.g. through the smart accelerator)
<p>Strategies and national documents that are used as a basis for strategic and specific objectives:</p> <p><i>Regional Innovation Strategy of the Hradec Králové Region 2010 - 2015: Priority 1 - Effective utilisation of capacities and potential of institutions of secondary and tertiary education and research organisations</i></p> <p><i>Human Resources Development Strategy of the Hradec Králové Region - Priority Axis 1 and 2</i></p> <p><i>A comprehensive study of progressive sectors in the Hradec Králové Region in the fields of research, development and innovation</i></p>		
<p>Conditions for and barriers to the implementation of interventions in the key change area:</p> <p><i>The willingness of educational institutions, companies and organisations in the labour market to participate in purposeful activities to meet the needs of companies</i></p> <p><i>The interest of pupils and students in technical and scientific fields</i></p> <p><i>The existence of good practice in companies and research organisations that can be popularised</i></p> <p><i>The interest of companies to participate in teaching in secondary and tertiary education</i></p> <p><i>Improving the quality of teaching</i></p>		

Key change area D: Implementation and marketing of RIS3

The key change area is primarily aimed at strengthening the activities of the components of RIS3 implementation in the Hradec Králové Region. The Research, Development and Innovation Council of the Hradec Králové Region performs a strategic function at its regular meetings. The Centre of Investment, Development and Innovation performs the role of a RIS3 executive unit. Innovation platforms meet for specific purposes in the region. The implementation of the RIS3 of the Hradec Králové Region is carried out through action and communication plans consisting of specific projects/activities with specific implementers. The key change area is further aimed at strengthening the coordination and cooperation among key players of the triple/quadruple helix (i.e. the business sector, universities, the R&D sector and the public and user spheres). The goal is a better coordination of activities of the individual players and partnerships operating in the region and their involvement in the development of action plans; the subsequent elimination of duplicate activities or efforts for their sharing or complementarity. In addition to joint RDI activities, which are the most valuable result of mutual cooperation, there is the need to strengthen joint marketing activities and the need for a public presentation of the RDI profile of the region. This may include jointly organised events, the created promotional materials, a shared calendar of regional events and the promotion of achievements.

Key change area D: Implementation and marketing of RIS3	
Strategic Objectives in the key change area D: - Strategic Objective D.1. Strengthen the implementation capacity of RIS3 and intensify the promotion of regional RDI system	Indicators of strategic objectives / key change areas: Number of entities and functional partnerships of RIS3 involved in the development and implementation of action and communication plans of the RIS3 of the Hradec Králové Region
Strategic Objective D.1. Strengthen the implementation capacity of RIS3 and intensify the promotion of regional RDI system RIS3 implementation in the region is carried out, in terms of strategy, by the Research, Development and Innovation Council of the Hradec Králové Region at its regular meetings. The CIDI as the executive unit of RIS3 implementation has a RIS3 team of employees who provide for the operation of the RDIC of the Hradec Králové Region in terms of organisation, coordinate the preparation of action and communication plans, conduct the meetings of innovation platforms, and prepare and implement selected schemes/projects of the action plans. RIS3 activities are pursued by a critical mass of mutually cooperating entities of the triple/quadruple helix that also promote the region based on mutual agreement.	

Specific objectives	Specific objective indicators	Typical activities / projects / operations⁶
<i>Specific Objective D.1.1. Ensuring the strategic management of the implementation of RIS3 of the Hradec Králové Region</i>	<ul style="list-style-type: none"> • Number of meetings of the Research, Development and Innovation Council of the Hradec Králové Region 	<ul style="list-style-type: none"> • Meetings of the Research, Development and Innovation Council of the Hradec Králové Region • Update of the Regional Innovation Strategy of the Hradec Králové Region • Support for the preparation of projects implementing a specific objective (e.g. through the smart accelerator)
<i>Specific Objective D.1.2. Ensuring an effective implementation of the RIS3 of the Hradec Králové Region</i>	<ul style="list-style-type: none"> • Number of prepared, implemented and evaluated two-year action plans of the RIS3 of the Hradec Králové Region • Number of functional innovation platforms 	<ul style="list-style-type: none"> • A high-quality team for the implementation of the RIS3 of the Hradec Králové Region (team management, training, internships, external services,...) • Meetings of innovation platforms • Mapping trends, GVC and GPN in the domains of the RIS3 of the Hradec Králové Region • Support for the preparation of projects implementing RIS3 (e.g. through the smart accelerator)
<i>Specific Objective D.1.3. Strengthening the shared marketing, promotion and cooperation of the regional RDI system</i>	<ul style="list-style-type: none"> • Number of processed, evaluated and implemented communication plans of the RIS3 of the Hradec Králové 	<ul style="list-style-type: none"> • Media campaigns including promotional materials • Competitions and conferences • Shared web portals • Promotion of the RDI results/achievements of

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	Region	<p><i>stakeholders</i></p> <ul style="list-style-type: none"> • <i>Platform for investment, development and innovation of the Hradec Králové Region</i> • <i>Support for the preparation of projects implementing a specific objective (e.g. through the smart accelerator)</i>
<p>Strategies and national documents that are used as a basis for strategic and specific objectives:</p> <p><i>Regional Innovation Strategy of the Hradec Králové Region 2010 - 2015: Priority 4 - Development of the innovation environment - consulting services, publicity</i></p> <p><i>A comprehensive study of progressive sectors in the Hradec Králové Region in the fields of research, development and innovation</i></p>		
<p>Conditions for and barriers to the implementation of interventions in the key change area:</p> <p><i>Agreement of the key players on the elimination of duplicate activities and the idea of a greater coordination of the regional RDI system including shared marketing.</i></p> <p><i>Coordinating the scope of powers and competences of some overlapping organisations, advisory bodies, umbrella organisations and organisations of coordination and implementation of the EU 2014+ Structural Funds</i></p>		

6 Implementation structure of RIS3 in the Hradec Králové Region

This strategic role is played by the Research, Development and Innovation Council of the Hradec Králové Region (HKR RDIC)	<p><i>Number of members from the business community: 4 (it is planned to expand the number to 6-8 in 2014)</i></p> <p><i>Number of members from research organisations: 6</i></p> <p><i>Number of members from public administration bodies: 8</i></p>
Date of establishment of the Regional Innovation Council	25 July 2007
Dates of the meetings of the RDIC of the Hradec Králové Region held so far:	<i>In 2014: 7 April 2014, 30 April 2014, 12 May 2014, 28 May 2014</i>
Dates of preparatory meetings prior to the establishment of the Regional Innovation Council:	-
Composition of the RDIC of the Hradec Králové Region:	
Hradec Králové Region	First Deputy President for Regional Development, European Grants, Subsidies, Tourism and Culture
Regional Authority of the Hradec Králové Region	Head of the Department of Regional Development, Grants and Subsidies
Centre for Investment, Development and Innovation	Director
City of Hradec Králové	Deputy Mayor for Urban Development
Faculty of Military Health Sciences of the University of Defence	Vice Dean for Science
Faculty of Pharmacy of Charles University	Vice Dean for Research, Doctoral Studies and Academic Qualification
Faculty of Medicine of Charles University in Hradec Králové	Vice Dean for Science and Doctoral Programmes
University of Hradec Králové	Vice Rector for Research and External Relations
Hradec Králové University Hospital	Deputy for Strategic Management and Development
Research and Breeding Institute of Pomology Holovousy	Director
CzechInvest	Director of the Regional Office for the Hradec Králové Region
Hradec Králové Technology Centre, civic consulting	Director

centre	
Regional Chamber of Commerce of the Hradec Králové Region	Member of the Board
Association of Innovative Entrepreneurship of the Czech Republic	Secretary General
Representatives of clusters and companies	
Secretary:	S3 Manager
Innovation platform for innovative business - an informal cross-cutting focus on the identified companies with strategies based on research and development; convened as necessary.	
Number of members of the innovation platform	15
Dates of meetings of innovation platforms held so far, including preparatory meetings:	The establishment meeting on 3 April 2014
Innovation platform for human resources	
Number of members of the innovation platform	
Dates of meetings of innovation platforms held so far, including preparatory meetings:	<i>Establishment planned in 2014</i>
Expected executive unit for the coordination and implementation of the regional RIS3:	<i>Centre for Investment, Development and Innovation (allowance organisation of the Hradec Králové Region, the Regional Development Agency of the Hradec Králové Region)</i>
Owners/authorities of the executive unit and their shares in %:	<i>Hradec Králové Region (100 %)</i>
Regional S3 Manager	<i>Daniel Všetěčka, MSc.</i>
Organisation	<i>Employee of the Centre for Investment, Development and Innovation</i>

Note: The number of established innovation platforms may change over time. The implementation system may undergo changes during the final negotiations on the form of the operational programmes.

7 Implementation schedule and updates

The implementation of the RIS3 of the Hradec Králové Region will be ensured through action plans that will elaborate type activities contributing to the achievement of objectives into specific projects. The action plans will consist of interventions, tools and projects in the form of project fiches, indicating specific implementers. The action plans will be developed in cooperation with the implementers and partners of the individual interventions/tools/projects that will be discussed/commented on/(not) recommended for inclusion in the action plan by the regional partnership structures, i.e. the Research, Development and Innovation Council and innovation platforms. The following time schedule is indicative only. The implementation process may undergo changes during the negotiations on the final form of the operational programmes.

5 – 10 / 2014:	Development of project proposals and the first action plan
2/2 2014 – ½ 2015	Discussion of the action plan by the regional authorities Preparation of projects for the calls of the new operational programmes
2/2 2015 - 2016	Implementation of the activities under the first action plan
2017	Continuous evaluation of the implementation of RIS3; Update
2017-2018	Implementation of the activities under the second action plan
2019-2020	Implementation of the activities under the third action plan

8 List of abbreviations and acronyms

B2C	Business to customer - solutions on the basis of business → customer
BRICS	The identification of a common economic grouping of Brazil, Russia, India, China and South Africa
CIDI	Centre of Investment, Development and Innovation (the Regional Development Agency of the Hradec Králové Region)
TTC	Technology Transfer Centre
CR	Czech Republic
CZSO	Czech Statistical Office
ETP	European Technology Platform
FP7	The seventh framework programme for research, technology development and demonstration
FTE	Full Time Equivalent
GPN	Global production networks
GVC	Global value chains
H2020	Horizon 2020 - a framework programme of the European Commission for research and innovation (2014 - 2020)
HC	Head count - number of employees (physical entities)
GDP	Gross domestic product
ICT	Information and communication technology
RDI IS	Information system for research, experimental development and innovation
IPR	Intellectual property rights

HKR Hradec Králové Region

CBBE Classification of Basic Branches of Education

CZ-ISCO Classification of Occupations

M Million

MIS Management Information System

MIT Ministry of Industry and Trade of the Czech Republic

Preschool Kindergarten

MEYS Ministry of Education, Youth and Sports of the Czech Republic

MA Ministry of Agriculture of the Czech Republic

NACE International Classification of Economic Activities

OP EI Operational Programme Enterprise and Innovation

OP RDI Operational Programme Research and Development for Innovations

PPP Purchasing power parity

RIF Regional Innovation Fund

RIS Regional Innovation Strategy

RIS3 Smart Specialisation Strategy

RDIC Research, Development and Innovation Council of the Hradec Králové Region

SITC Standard International Trade Classification

RDS Regional Development Strategy

Secondary school Secondary school

SWOT Analysis of strengths, weaknesses, opportunities and threats

TA CR Technology Agency of the Czech Republic

TC AS Technology Centre of the Academy of Sciences of the Czech Republic

Triple helix Designation for the three components of the regional innovation system (academic sector, application sector, public administration)

TRL Technology readiness level

R&D Research and development

RDI Research, Development and Innovation

RO Research organisation

Tertiary vocational school Tertiary vocational school

UNI University

STP Science and Technology Park

WoS Web of Science