



Regional Innovation Strategy for Pilsen Region

**Regional Development Agency
of Pilsen Region**

Regional Innovation Strategy for Pilsen Region

1st update

Approved by the Pilsen Region Council for Research, Development and Innovation on 16 February 2018

Author: **Regional Development Agency of Pilsen Region**

Team of authors: Ing. Pavel Beneš

Ing. Martin Holubec

Ing. Jan Naxera

Mgr. Martina Robotková

Ing. Filip Uhlík

Members of the Pilsen Region Council for Research, Development and Innovation and the innovation platforms “Human Resources for Research, Development and Innovation” and “Potential and Results of Research, Development and Innovation in Pilsen Region” contributed to compiling the report.

The document has been prepared as part of the Pilsen Region Smart Accelerator project, reg. no. CZ.02.2.69/0.0/0.0/15_004/0003807.



EVROPSKÁ UNIE
Evropské strukturální a investiční fondy
Operační program Výzkum, vývoj a vzdělávání

MSMT
MINISTERSTVO ŠKOLSTVÍ,
MLÁDEŽE A TĚLOVÝCHOVY

Contents

Introduction.....	4
A. Analysis section.....	6
1 Position of Pilsen Region	6
1.1 Economic performance in Pilsen Region	6
1.2 Job market in Pilsen Region	7
1.3 Human resources in Pilsen Region.....	8
1.3.1 Population of Pilsen Region and forecast trends.....	8
1.3.2 Education structure of Pilsen Region residents.....	9
1.4 Education in Pilsen Region	10
1.4.1 Secondary school graduates in Pilsen Region.....	10
1.4.2 University students living in Pilsen Region	11
1.4.3 Universities and faculties in Pilsen Region	13
2 Research, development and innovation in Pilsen Region	15
2.1 Employment in research and development.....	15
2.2 Research & development sites	15
2.3 Financing research & development	16
2.4 Support for research & development	17
2.5 Results of research & development.....	19
2.6 Innovation	19
2.7 Advanced technology	20
3 Main innovation system stakeholders	21
3.1 Research organisations	21
3.2 Enterprises carrying out R&D	22
3.3 Application sector	24
3.4 Innovation infrastructure	25
3.5 Public administration.....	27
4 Public administration and its role in the region's innovation system.....	29
4.1 Strategic documents with the support of research, development and innovation	29
4.2 Programmes supporting research, development and innovation	30
4.2.1 National programmes	30
4.2.2 RD&I support from European structural funds.....	30
4.2.3 International research and development support programmes	30
4.2.4 Regional programmes	31
4.3 Examples of good practice in the Czech Republic and abroad.....	32
4.3.1 Supporting the establishment of innovation enterprises and acceleration	32
4.3.2 Support of collaboration between research organisations and the practical sphere	36
4.3.3 Internationalisation for research, development and innovation	37
5 SWOT analysis	40

B. Strategy section	41
6 Foundations of strategy section	41
6.1 Methodology foundations.....	41
6.2 Objective foundations – summary of analytical findings	41
7 Strategic framework – Main and Strategic Goals	44
7.1 Main Goal	44
7.2 Strategic Areas and Strategic Goals.....	44
8 Strategic interventions –strategy development	46
8.1 Strategic Area 1: Human Resources for RD&I.....	46
8.2 Strategic Area 2: Environments for RD&I	48
8.3 Strategic Area 3: R&D Facilities	50
8.4 Strategic Area 4: Innovation	51
8.5 Strategic Area 5: RD&I marketing.....	53
9 Implementation of RIS3	55
9.1 Management of RIS3.....	55
9.2 Project preparation and implementation	56
9.3 Evaluation of RIS3 implementation.....	56
9.4 Update of RIS3	57
10 Financial support of RIS3.....	58
10.1 Management of RIS3.....	58
10.2 Development project preparation and implementation.....	58
Sources used	62

Introduction

As in all other regions of the Czech Republic, Pilsen Region's Regional Innovation Strategy for Smart Specialisation (RIS3) was created based on an initiative of the Government of the Czech Republic and the European Commission, and it is an annex to the Czech National Innovation Strategy. Its aim was to strengthen the importance of research, development and innovation (RD&I) for economic competitiveness at the regional level and secure the more efficient use of public resources. Although the initiative for preparing a strategy originated outside the region, the characteristics of development in Pilsen Region and scenarios of change in industry, employment and education brought on by digitisation and robotics clearly represent a strong argument in favour of changing the approach that has been taken towards supporting economic development in the region.

The preparation and implementation of RIS3 is the interest and task of institutions and companies that create Pilsen Region's innovation ecosystem. The Regional Authority plays an invaluable role in creating an environment for regional collaboration in RD&I, as this topic affects the broader context of economic development and the lives of citizens of Pilsen Region. And as the contracting authority of RIS3, when implementing the strategy Pilsen Region primarily acts as the main partner for other RD&I stakeholders whose activities have contributed to implementing RIS3.

Pilsen Regional Authority may directly carry out only a relatively small portion of proposed activities, e.g., in human capital or infrastructure. The remaining activities are implemented (based on agreements and in partnership with Pilsen Region) by other RD&I stakeholders, either as the guarantor of the activities or of the collaborating subjects. Ways in which Pilsen Region supports these activities include marketing, preparing the projects, or securing external resources.

The entire process of updating RIS3 is based on communication, a mutual understanding of needs, and finding consensus among major stakeholders. The conclusions and recommendations have been discussed with key players. A number of active corporate and institutional representatives in the Pilsen Regional Council for Research, Development and Innovation and the council's innovation platforms were involved in the RIS3 preparation process. RIS3 will also serve as a foundation for finding synergies between relevant ministries, government agencies and the Pilsen Regional Authority.

This first update of RIS3 focuses on adding the missing strategic areas of "Environments for RD&I" and "RD&I Marketing" and on fine-tuning the document into a standard strategy whose implementation can be coordinated and evaluated. The aim of these changes is to immediately create more favourable conditions for communication and collaboration between all major stakeholders in RD&I, to take advantage of the synergistic effects of the implemented activities, and to improve Pilsen Region's image in this field. Delaying these steps until the end of the Smart Accelerator project in 2019 would lead to a further waste of the potential that Pilsen Region has in RD&I.

Work on updating RIS3 will continue in the Pilsen Region Smart Accelerator project. The main tasks for the 2018–2019 period will include specifying Pilsen Region's long-term vision in R&D and defining the main areas of innovation and research in which the region aims to become a national or European leader. The results of these tasks will be used in the second RIS3 update as part of the Smart Accelerator project in 2019.

It must be emphasised that in the process of this first update, it has been possible to put in place the basic mechanisms of communication and verify major stakeholders' interest in

deeper collaboration, which is a condition for the successful update and implementation of RIS3.

A. Analysis section

1 Position of Pilsen Region

1.1 Economic performance in Pilsen Region

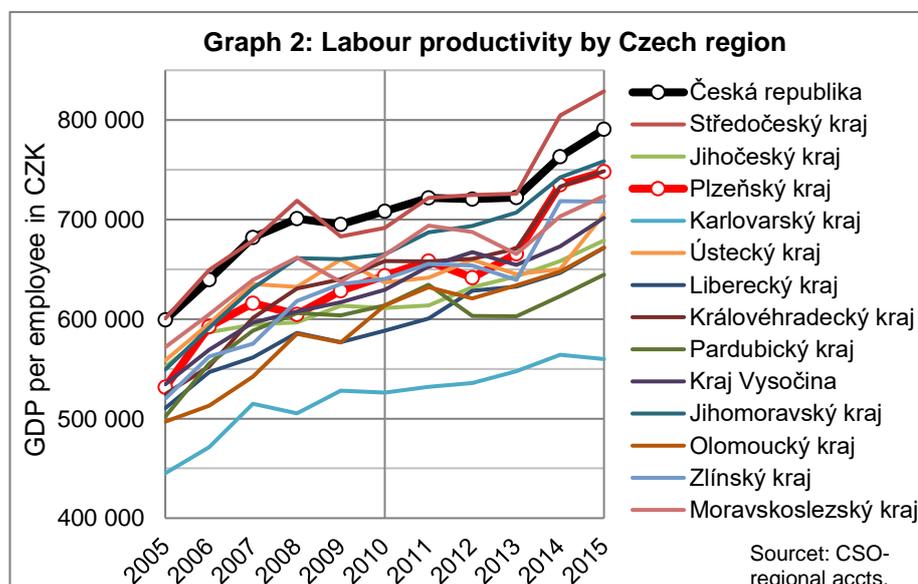
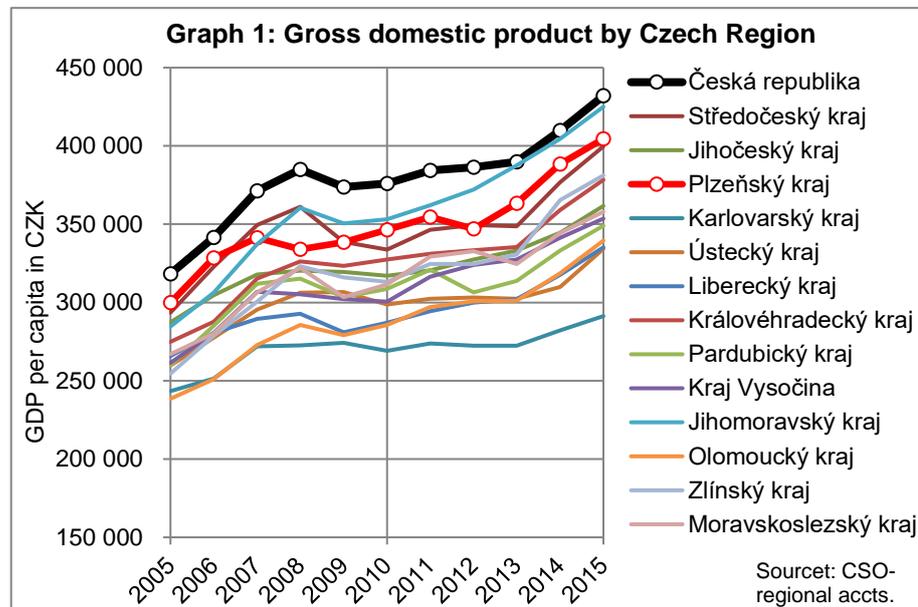
Economic performance in Pilsen Region, measured according to GDP per capita, has stably been one of the highest among the Czech regions, even though it remains below the Czech national average (see Graph 1). Only the economic performance of Prague is above the Czech national average (outside of Graph 1).

Graph 1 also shows that in 2008 and 2012 the region experienced a decline in economic performance. As a result, Pilsen Region temporarily lost its ranking (from 2nd-3rd place to 4th place) for this indicator. Above-average economic growth after 2012 returned Pilsen Region to 3rd place.

The economic prosperity of Pilsen Region is closely tied to the manufacturing industry, which is symbolised by large, historically important companies in the engineering and food industries (Škoda, Pilsner Urquell, etc.) and by successful foreign direct investments (such as Daikin and Panasonic).

Pilsen Region's position according to labour productivity (gross added value per employee) is slightly lower for the entire monitored period 2005–2015 (see Graph 2).

According to this indicator, until 2013 the region ranked between 5th and 10th place among Czech regions. Stronger economic growth after 2012 lifted the region up to the same level as Hradec Králové Region, with the two regions now alternating between 4th and 5th place.



Pilsen Region's worse position in labour productivity compared to GDP per capita stems from the higher employment rate, specifically the ratio of employed persons to the population.

Like in other regions, labour productivity in Pilsen Region differs according to sector. According to the CSO's regional accounts, information is available only for nine sectors, with several of these creating an aggregate of more than one sector in CZ-NACE (see Graph P1 in the appendix).

Most sectors in Pilsen Region reported a growing labour productivity trend after 2008. The greatest increase occurred in the manufacturing industry. There was a decline in the three most productive sectors (Real Estate Activities, Financial and Insurance Activities, Information and Communication). The aggregated sector Professional, Scientific and Technical and Administrative Activities, which includes employment agencies, stagnated, and for Pilsen Region its labour productivity fell to last place.

A sector-based comparison of labour productivity among regions (see Graphs P2 in the appendix) shows that Pilsen Region's position in the tertiary sector in aggregate improved (from 8th to 5th place), but in the Information and Communication sector the region fell from 6th place in 2010 to 11th in 2015. The region continues to hover around 10th place in the aggregated sector Professional, Scientific and Technical and Administrative Activities.

1.2 Job market in Pilsen Region

For the entire monitored period, unemployment as a main indicator of the situation on the job market is significantly below average in Pilsen Region compared to other regions (see Graph P3 in the appendix). Pilsen Region had its lowest unemployment rate ranking among the Czech regions during the economic crisis, from the spring of 2008 until late 2010 (5th place). Since the beginning of 2012, except short-term seasonal fluctuations, it never went below 2nd place, and since mid-2016 it has mostly held 1st place.

Unemployment in Pilsen Region has remained below 4% since May, and in mid-2017 it was only slightly above 2.5%. This development and level of unemployment, though favourable from a social perspective, also reflects the current significant shortage of workers on the regional labour market, which is in part a consequence of the strong interconnection with the German economy, particularly Bavaria.

Pilsen Region is also unique within the Czech Republic with regard to the structure of employment by CZ-ISCO major group, as demonstrated in Tables P4 in the appendix. Whereas Craft and Related Trades Workers (major group 7) have the highest share in employment nationwide and in most regions, Pilsen Region is dominated by Plant and Machine Operators and Assemblers (major group 8 – 19%). This indicates a greater share of less qualified labour in the region.

Professionals (main group 2) are the 5th largest contributor to employment in Pilsen Region, which is similar to most other regions. But Professionals account for just 11.6% of employment in the region, ranking it 9th of the country's 14 regions.

Wage trends are another significant indicator of the situation on the labour market. A comparison of the regions shows that overall and in select groups of employees, Pilsen Region ranked between 3rd and 4th place among Czech Regions in recent years; however, it was mostly below the national average (see Graphs P5 in the appendix). Salary growth rates

in the region experienced an upward trend, exceeding the national average in all monitored groups.

A comparison of salary trends among these employee groups in Pilsen Region also shows that the gross average monthly salary rose more rapidly than among Professionals. Of all the monitored groups, ICT specialists had the slowest salary growth. The labour shortage that the region is currently experiencing, particularly in less-qualified professions, is leading to more rapid wage growth in this group.

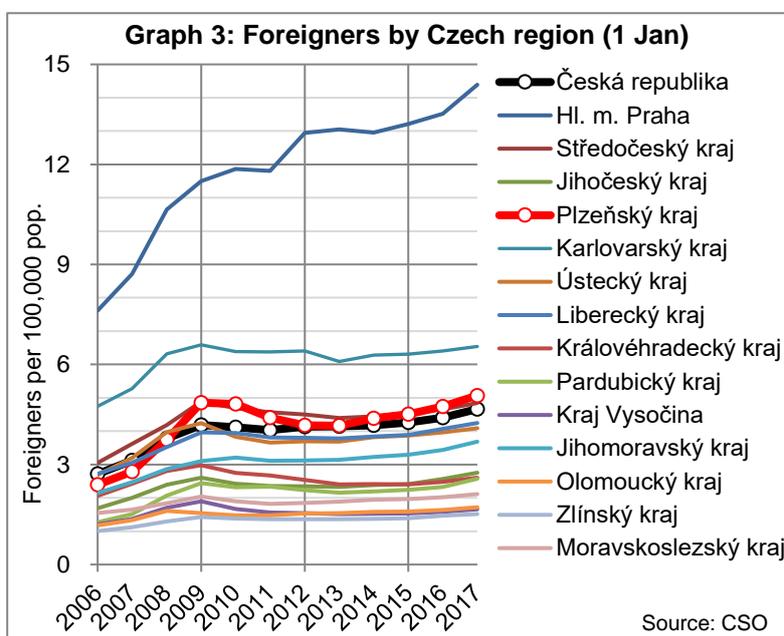
1.3 Human resources in Pilsen Region

1.3.1 Population of Pilsen Region and forecast trends

Since 2005 the population of Pilsen Region has continuously grown. From 2005 to 2017 the region's population increased from 550,000 to 579,000, i.e., by more than 5%. The most rapid population growth was between 2005 and 2009, when the population grew by nearly 20,000.

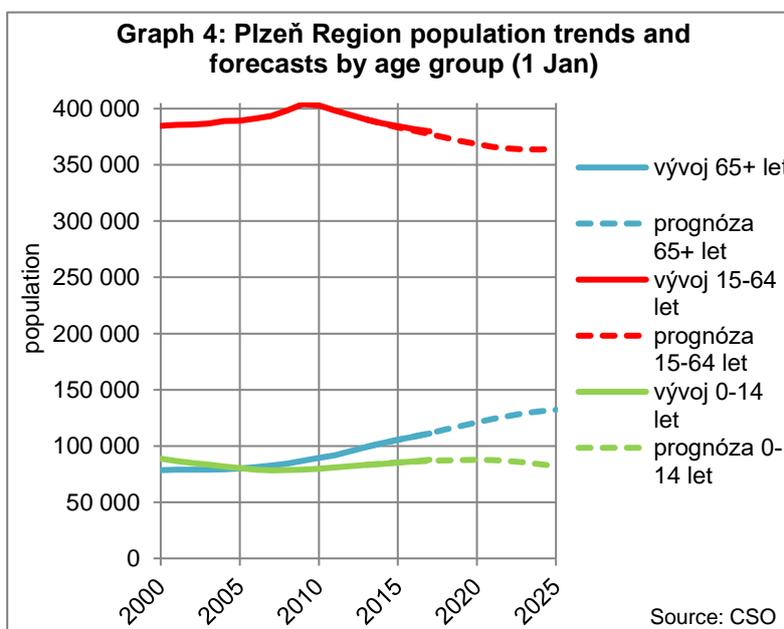
Foreign migration contributed very significantly to population growth in Pilsen Region. The share of foreign residents grew most rapidly until 2009, when it neared 5% (see Graph 3). After a decline associated with the economic crisis, the share of foreign residents began to grow again after 2013, and by early 2017 it had surpassed the 5% mark.

Citizens of Slovakia (26%), Ukraine (21%) and Vietnam (19%) contribute most to foreign resident numbers in Pilsen Region.



Since 2009 the number of residents of working age (15–64) in Pilsen Region has fallen, and according to the CSO's demographic forecasts (incl. migration), this decline will continue (see Graph 4). Between 2009 and 2017 the number of residents of working age in the region fell by 6%. By 2023, when the lowest level should be hit, the decline is expected to be 10% compared to 2009.

The reason for this decline is that people born during the strong post-war years are



retiring, and in contrast few people born during the very weak years around 2000 are reaching working age. For this reason, the greatest decline will occur in groups aged 20–35 between 2009 and 2023.

In terms of education it is important that the number of residents of pre-working age 0–14 in Pilsen Region has risen slightly since 2007, and according to forecasts, the next peak should be reached in 2020. Afterwards, this peak will shift to secondary school and university ages.

Although a Labour Force Sample Survey (LFSS) performed by the CSO showed that the number of residents of working age in Pilsen Region has fallen since 2009, the number of people employed in Pilsen Region continues to have a clear growing trend. Several sources of this growth in employment, i.e., the increase in the percentage of employed persons in the population, were identified:

- Reduction in unemployment
- Employment of economically inactive persons (i.e., persons previously in the home, working pensioners, working students, etc.)
- Increase in the number of foreigners

The current exhaustion of labour resources in Pilsen Region, which is indicated by the share of unemployed people, for example, is slowing the development of labour-intensive investments. Investments focused on increasing work productivity would be constructive.

1.3.2 Education structure of Pilsen Region residents

Although the share of Pilsen Region residents with a university education is increasing, this growth is slower than in other regions. According to the results of the Population and Housing Census (PHC), this resulted in a significant decline in Pilsen Region's position between 2001 and 2011 (see Table P6 in the appendix). In the ranking by share of university-educated residents, the region dropped from 4th place in 2001 (7.8%) to 8th place in 2011 (10.4%).

The results of the LFSS confirm this trend after 2011, but these results are less precise and fluctuate at the regional level. According to the Education Structure Prognosis (Mazouch, Fischer 2011), in 2050 Pilsen Region should be in 11th place in terms of the average number of years of education among residents aged 25 and higher. The falling number of students at the University of West Bohemia in Pilsen (see below) in particular is laying the groundwork for the realisation of this poor prognosis.

In 2011 Pilsen Region was also in 8th place according to the percentage of university-educated residents in the 30-34 age group (16.4%). However, the region had a lower proportion of residents with a post-secondary vocational degree (college – 2.7%, 11th place). According to the share of residents with a tertiary education (university & college) in this age group, the region ranks 10th (see Table P7 in the appendix).

Eurostat also pays particular attention to the 30–34 age group (see Table P8 in the appendix). In 2016 the Czech Republic was in 26th place out of 33 evaluated countries according to the share of people aged 30–34 with a tertiary education. Compared to 2007, however, it recorded the greatest increase in this share (from 13% to 33%, i.e., 2.5 times more).

The changing structure of the age groups based on the results of PHC 2011 are suggestive of long-term structural changes in fields of study among university graduates (see Graph 9 in

the appendix). The total numbers of university graduates living in Pilsen Region increase as one descends in age from the 40-44 age group (from year of birth between 1967 and 1971). In the 25-29 age group, graduate numbers were 60% higher, which is connected with the increasing number of students admitted to universities.

Among the larger groups of fields of study, numbers of graduates of Engineering and, in the past 25 years, Education show relative stability. However, the shares of each of these groups fell. In absolute and relative terms, gains were primarily seen in Social Sciences; among the less numerous groups, gains were seen in Business and Administration, Humanities and Social Services; and in the sciences there were increases in Computing, Mathematics and Life and Physical Sciences.

The rising number of female university students was a main contributor to the overall growth in the number of university-educated residents and in the number of university-educated residents who had studied a non-science subject. Starting with the generation of women born around 1980, the number of female graduates exceeded the number of male graduates (all in Graph P10 in the appendix).

1.4 Education in Pilsen Region

In the 2016/17 school year, 55 secondary schools operated in Pilsen Region. The authority for most of these schools is Pilsen Region; seven schools were private and two were religious schools. The region also hosts four post-secondary vocational schools (colleges) founded by the region and one private college. About half of these types of schools are concentrated in Pilsen (26 secondary schools and 3 colleges).

Pilsen is also home to the region's universities. Nine faculties of the University of West Bohemia in Pilsen, Charles University's Faculty of Medicine in Pilsen (LF UK), and the University Centre of the Metropolitan University Prague.

1.4.1 Secondary school graduates in Pilsen Region

The main output of secondary schools with respect to the development of RD&I in the region are graduates of secondary schools with a *maturita* (GCE). The number of students with a GCE has followed a declining trend since 2007. In 2016 there were 1,000 fewer graduates with a GCE (-42%) at regional secondary schools (not including fields with a higher proportion of practical preparation and extension studies) than in 2007. The main causes of this development were the demographic decline (approximately -30%) and the lower rate of graduation following the introduction of state GCEs (see Table P11 in the appendix).

In terms of groups of fields of study, the greatest numbers of secondary school graduates in Pilsen Region are produced by Gymnasium schools (despite a slight decline). With an average relative drop, graduates of Economics and Business remained in second place. Thanks to significant growth, graduates of ICT disciplines shifted up to third place (from 11th).

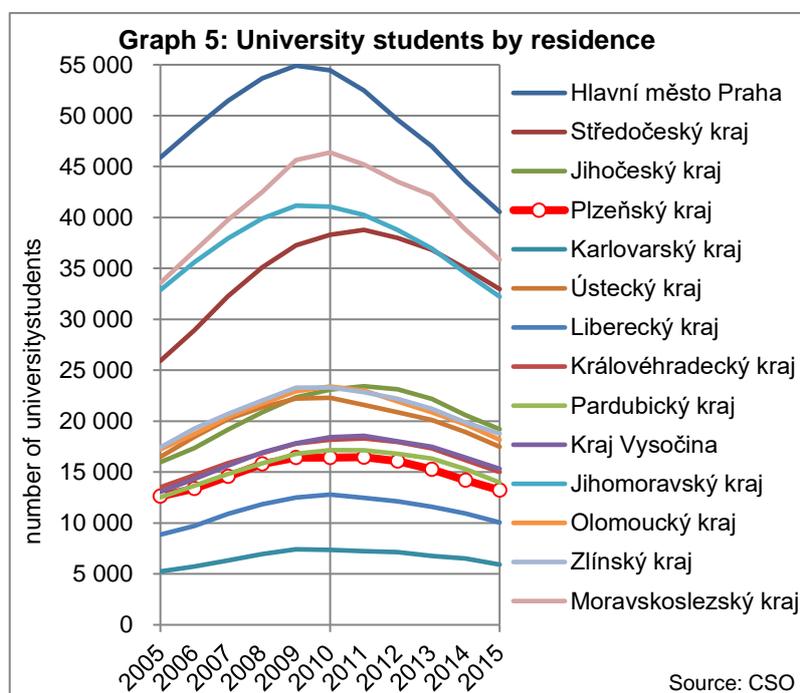
The greatest relative drop (by more than 60%) occurred in technical (Electrical Engineering, Construction, Mechanical Engineering) and scientific fields (Medicine, Agriculture, Environmental Protection). These fields also had the lowest numbers of graduates in 2016 (each group had between 50 and 80 graduates). One exception is the Textile and Leather Production, which in 2016 had zero graduates for the first time ever.

Since the 2011/12 academic year, the numbers in Pilsen Region are very close for all secondary school graduates with GCEs (including vocational fields) and numbers of people living in the region and enrolled in university entrance programmes in the Czech Republic. This suggests that a large part of secondary school graduates go on to study at universities, and some unsuccessful candidates reapply. It seems that only a small part of secondary school graduates with GCEs go directly to the workforce.

1.4.2 University students living in Pilsen Region

In recent years, the number of university students according to residence has declined in most regions (see Graph 5). Pilsen Region experienced a 20% decline between 2010 and 2015, which is higher than the nationwide average (17%). According to the number of permanently residing university students, Pilsen Region is in as low as 12th place. Several regions with lower populations (Hradec Králové, Pardubice, Vysočina) have a higher number of university students.

In all regions, the causes for the decline of university students by residence is both demographic (reduction in the number of residents of university student age) and proportional, i.e., decline in the percentage of university students in the population aged 20-24 years (see Graph P12 in the appendix). The proportional decline seems to be caused by the effort of the Ministry of Education (MEYS) to not further increase the proportion of university students and graduates in the Czech Republic, and this affects all regions.



According to the share of permanently residing university students in the population aged 20–24, Pilsen Region has long placed 11th, far below the national average. This increases the risk of the region's further deterioration in terms of the share of university-educated residents.

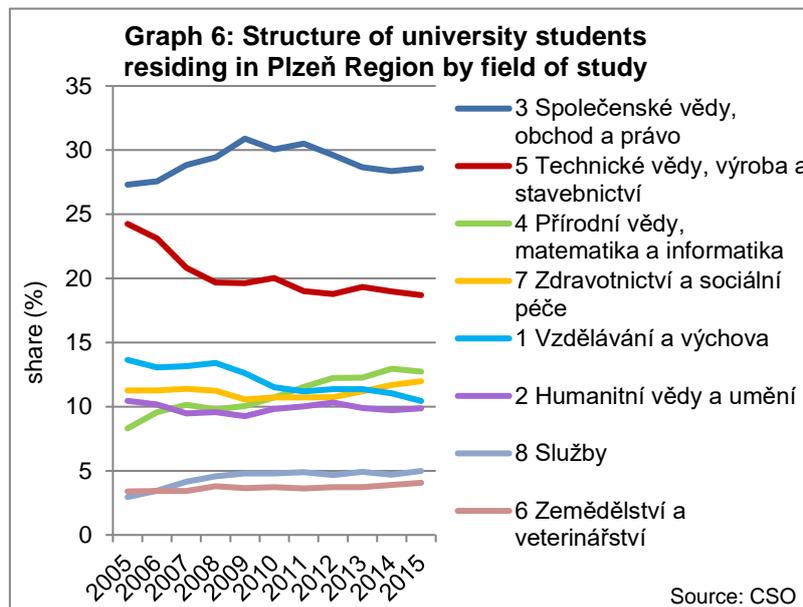
A regional comparison of the demographic causes for the decline in the number of university students by residence is presented in Graph P13 in the appendix. It is clear from the example of Pilsen Region, its neighbouring regions and Prague that in around 2010, the number of residents in the 20–24 age group started to decline, and this period will end in around 2020. In Pilsen Region, the number of residents in this age group is expected to fall by a third between 2009 and 2021.

In the period between 2005–2015, students of universities in the Czech Republic residing in Pilsen Region most frequently studied Social Sciences, Business and Law (see Graph 6).

The second highest share was for students of Engineering, Manufacturing and Construction. The share of this group of fields initially declined, but since 2008 it has stabilised slightly below 20%.

A significant decline in this period occurred in the Education field. In contrast, there was a distinct uptick in the share of students of Science, rising to 3rd place among students residing in Pilsen Region (all in Graph 6).

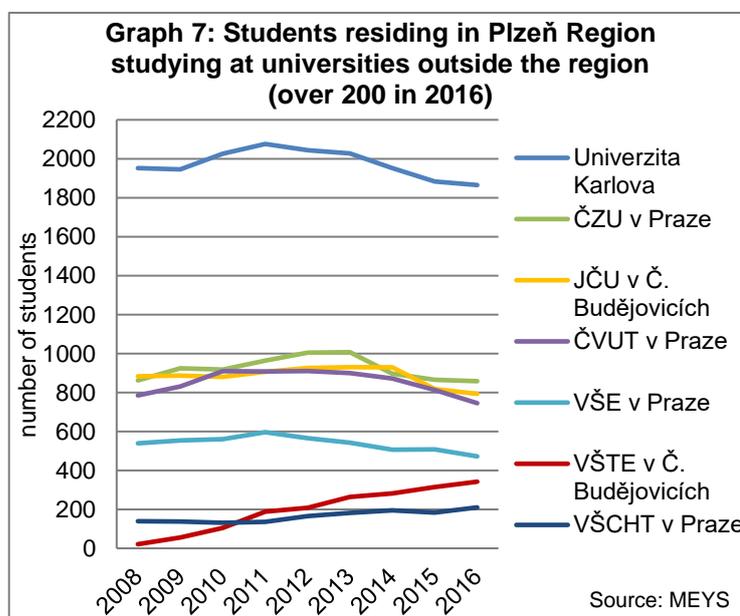
Compared to other regions, however, the share of Pilsen Region students studying Science at a university in the Czech Republic is low in relation to the number of residents aged 20-24 (see Graph P14 in the appendix). In the monitored period, the region ranked between 10th and 13th place, significantly below the Czech national average. As in most other regions, the greatest share of Science students in Pilsen Region studied Computing (see Graph P15 in the appendix).



With respect to students of students studying Engineering, Manufacturing and Construction at universities in the Czech Republic, Pilsen Region's position is better than in Science. The share of students of this subject in Pilsen Region ranged between 4th and 7th place (see Graph P16 in the appendix). The cause behind the persisting interest in engineering subjects is likely the region's history of industry and technical universities.

Students of universities in the Czech Republic permanently residing in Pilsen Region primarily attend the University of West Bohemia in Pilsen (ZČU). In the 2016/17 academic year, 5,508 university students (i.e., 44%) residing in the region attended the university. However, in 2009/10 this was 8,400 (52%). Over the course of seven years there has been a significant reduction not only in the number of students, but also the region's share of students at ZČU. Over the long term, Charles University's Faculty of Medicine in Pilsen has been attended by 4% of university students living in Pilsen Region.

A steadily increasing number of students from Pilsen Region have left the region, primarily going to Prague or the South Bohemian Region. Given the impact of dwindling university student numbers, this did not always lead to an increase in absolute numbers (see Graph 7).

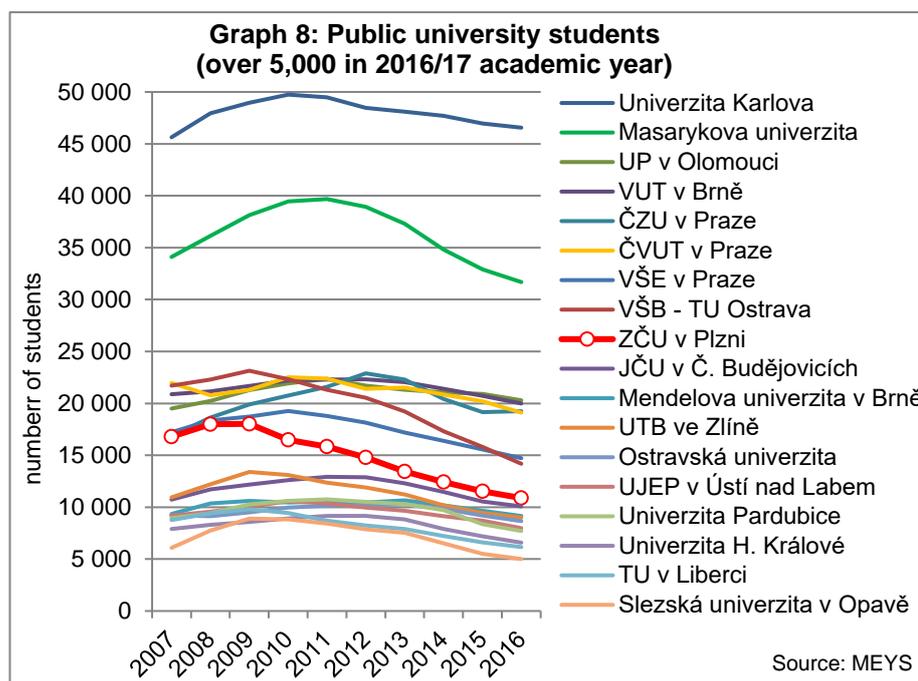


Over the long term the greatest number of students from Pilsen Region studying outside the region have attended Charles University, which increased its share from 12% to 15%. This is followed by the Czech University of Life Sciences, the University of South Bohemia in České Budějovice, and the Czech Technical University in Prague, with relatively stable numbers and increasing shares of students from the region. In terms of competing offers, the increase in the number of students from Pilsen Region attending the Institute of Technology and Business (VŠTE) in České Budějovice is significant.

In contrast, the number of students from Pilsen Region studying at private universities in the Czech Republic has declined to just under 8%. In the 2010/11 academic year this figure was more than 9%.

1.4.3 Universities and faculties in Pilsen Region

In the past ten years, the University of West Bohemia in Pilsen has registered a greater decline in student than in most public universities in the Czech Republic (see Graph 8). Between the 2009/10 and 2016/17 academic years the student body declined by 40% (from 18,000 to 10,900), which



was the second greatest decline among public universities in the Czech Republic. As a result, ZČU shifted from a large university to a mid-sized university.

Changes in student numbers at individual faculties of were quite uneven (see Graph P17 in the appendix). The greatest declines occurred in the Faculty of Law and Faculty of Electrical Engineering, which fell to less than half. This was followed by the Faculty of Education (-47%), Faculty of Arts (-43%) and Faculty of Economics (-40%). The Faculty of Applied Sciences (-34%) and Faculty of Mechanical Engineering (-27%) experienced relatively smaller declines. The greatest stability in student numbers were seen at new faculties: the Faculty of Medical Studies and the Ladislav Sutnar Faculty of Design and Art.

For the entire monitored period, Charles University's Faculty of Medicine in Pilsen maintained a very stable number of students (around 2,000), making it the largest faculty in Pilsen in terms of student body size since the 2015/16 academic year.

A comparison of numbers of students enrolled in public universities in the Czech Republic shows that there is still relatively high interest in ZČU. In the 2016/17 academic year, the university received the 5th highest number of student applications. Generally, however, the requirements for acceptance to ZČU are above the Czech national average, as suggested in

university acceptance rates (see Table P18 in the appendix). Due to a higher success rate in the application process, some technical universities accept more students than ZČU (Czech Technical University in Prague, Brno University of Technology, VSB–Technical University of Ostrava).

What is important for the future development of ZČU is how the university will be attractive not only for potential applicants from Pilsen Region, but also from neighbouring regions and from Prague (see Table P19 in the appendix).

After Pilsen Region, ZČU gains the second greatest share university students from those residing in Karlovy Vary Region (22% in the 2016/17 academic year). The share of students from the South Bohemian Region is declining, apparently due in part to the expansion of education options in the region (establishment of VŠTE in České Budějovice). The decline in the share of students from other monitored regions has halted over the past one to two years, which can be viewed as a positive trend.

A promising source of students for ZČU in Pilsen is also foreigners, who comprise a relatively low percentage of the student body (see Table P20 in the appendix). Overall, between 2007/08 and 2016/17 the percentage of foreigners in the ZČU student body rose from 1.8% to 4.2%. In comparison, the percentage of foreign students at Charles University's Faculty of Medicine in Pilsen increased over the same period from 25% to 30%. Overall, the share of foreigners at state and private universities in the Czech Republic went up from 7.9% to 14.0%.

At ZČU, only the Ladislav Sutnar Faculty of Design and Art has a higher percentage of foreign students (16.7%). A relatively high increase in the share of foreign students was seen at the Faculty of Arts (from 1.7% to 6.3%) and Faculty of Mechanical Engineering (from 1.4% to 4.8%).

The decline in the number of students at universities in the Czech Republic in recent years has also been reflected in the falling number of graduates. Between 2011 and 2016, the number of graduates at ZČU has fallen from 4,000 to 2,700 (-33.6%), which was the second most rapid decline among public universities.

The fall in the number of students at the Faculty of Law (-57%) was the most severe. The decline was somewhat less at the Faculty of Education (-46%), Faculty of Electrical Engineering (-45%) and Faculty of Economics (-40%). Charles University's Faculty of Medicine in Pilsen has a very stable number of graduates at around 275 graduates per year.

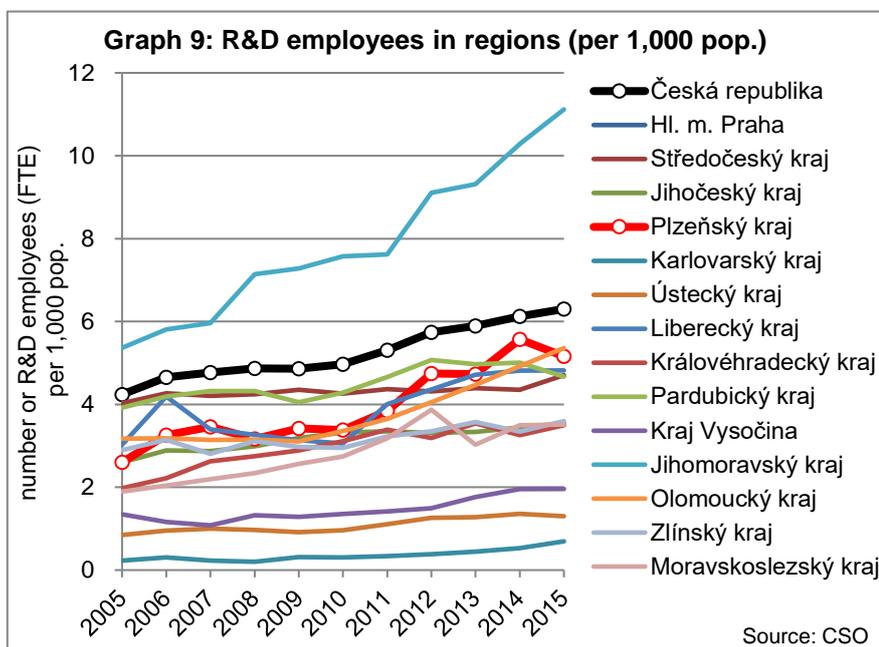
The number of PhD graduates at ZČU likewise follows a downward trend (from 88 in 2009 to 63 in 2016). Graduates of the three technical faculties account for well over half of all graduates.

2 Research, development and innovation in Pilsen Region

2.1 Employment in research and development

Like in other regions, the number of research and development (R&D) employees is increasing in Pilsen Region (see Graph 9). The rate of growth in the region accelerated significantly after 2010.

Between 2010 and 2015 the number of employees in R&D converted to full-time equivalent (FTE) units increased by more than half to nearly 3,000 FTE units, which was the 4th highest relative increase. As a result, the region moved up from 5th to



between 3rd and 4th place in the Czech Republic in terms of number of R&D employees per 1,000 residents.

One impetus for the development of R&D in the region is the newly opened university research centres. Initially part-time university staff were apparently involved in the centres' activities to a greater extent, as can be seen in the increasing share of part-time jobs and declining share of FTE units per individual employed in R&D (see Graph P21 in the appendix).

However, the business sector also had an impact on the increase in the number of R&D employees in the Pilsen Region. Its share in the number of R&D employees increased from approximately 40% in 2006–2008 to values around 60% in 2010–2015. As a result, the R&D workforce in the business sector outpaced the university sector (33% in 2015).

In 2015, the most R&D employees in Pilsen Region worked in engineering (66%), followed by natural science (17%), humanities (7%) and medicine (6%).

2.2 Research & development sites

In 2015 the CSO registered 120 R&D sites in Pilsen Region, tying for 9th with Liberec Region out of 14 regions. Most sites operated in the business sector (94). However, between 2012 and 2013 this sector saw a decline in the number of sites from 98 to 85, which was also reflected in the otherwise upward trend in the total number of R&D sites in Pilsen Region.

Seventeen R&D sites in the region operated in the university sector. R&D in the government sector is narrowly focused (6 sites), and the private non-profit R&D sector is undeveloped (3 sites). There is still a very small number of economic entities in Pilsen Region that have R&D as their main economic activity (less than 10).

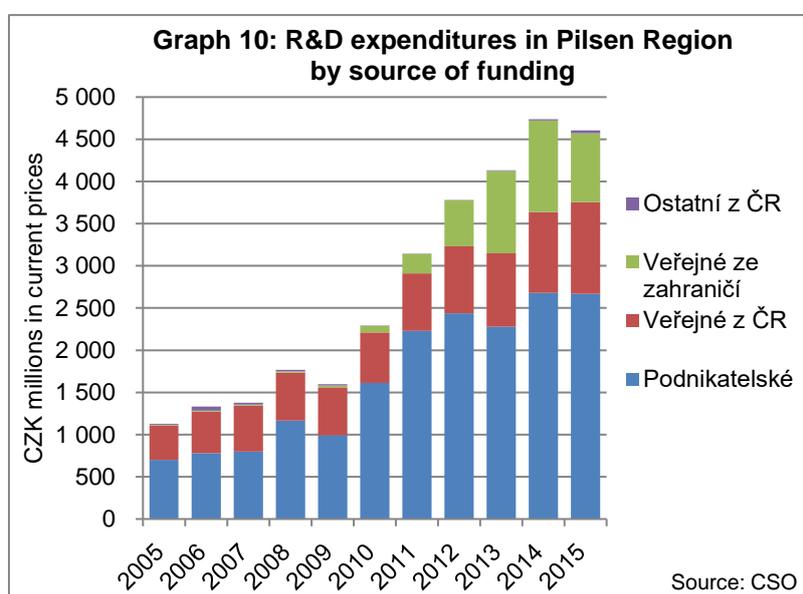
The average number of R&D employees per R&D site in Pilsen Region was 25, which was the third highest figure among Czech regions. Among all the regions, Pilsen Region had the lowest share of sites with fewer than 5 staff members (40%) and the highest share of R&D sites with between 50 and 99.9 staff members. This means that larger R&D sites are being formed in Pilsen Region (see Graph P22 in the appendix).

In terms of scientific areas, in 2015 there was a predominance of sites in the region focused on engineering (78 sites), followed by natural science (19), humanities (8) and medicine (6).

2.3 Financing research & development

There was a significant increase in R&D expenditures in Pilsen Region after 2009. The intensity of overall R&D expenditures as a share of GDP rose the fastest in Pilsen Region of all Czech regions between 2005 and 2015, moving the region up from 9th to 3rd place (see Graph P23 in the appendix). Overall R&D expenditures first reached the 2% mark in Pilsen Region in 2013.

R&D expenditure trends by source in Pilsen Region (see Graph 10) shows that as early as after 2009, the business sector, which over the long term has had the greatest share in funds, significantly increased its R&D expenditures. Public funds from abroad were added after 2010 and supported the increase in public funds from the Czech Republic. A decline in public funds from abroad can apparently be anticipated in Pilsen Region.



A regional comparison of R&D expenditure trends by source (see Graphs P24 in the appendix) suggests that Pilsen Region was one of the first regions to see an increase in businesses' R&D expenditures, and in 2011 and 2012 R&D expenditures compared to GDP was one of the highest among the Czech regions. In 2015 the region was in 4th place. The region was also in 4th based on public funding from the Czech Republic in relation to GDP. In 2013–2015, Pilsen Region hovered between 2nd and 3rd place in public funding from abroad.

In the monitored period of 2005–2015, the structure of R&D expenditures also changed according to type (see Graph P25 in the appendix). The 2005–2010 period was dominated by non-capital expenditures, i.e., salary and other regular expenditures were approximately the same. Capital expenditures started to increase after 2010, particularly in connection with the use of EU funds.

For the entire period from 2005 to 2015, the greatest part of R&D expenditures in Pilsen Region were made in the business sector; until 2012 this regularly exceeded 70%. After the

capacity of the university sector increased through the construction of R&D centres, this share has fallen by approximately 10% since 2013

The level of R&D collaboration between the business and university sector remains very low in Pilsen Region (see tables P26 in the appendix). In 2015 only 2.1% of business funds were directed towards the university sector for performing R&D, where these funds accounted for 3.5% of funds. A dominant source for university sector R&D was public funds from the Czech Republic and from abroad (94.3%). The business sector performing R&D used public funds to a relatively low extent (11.2%)

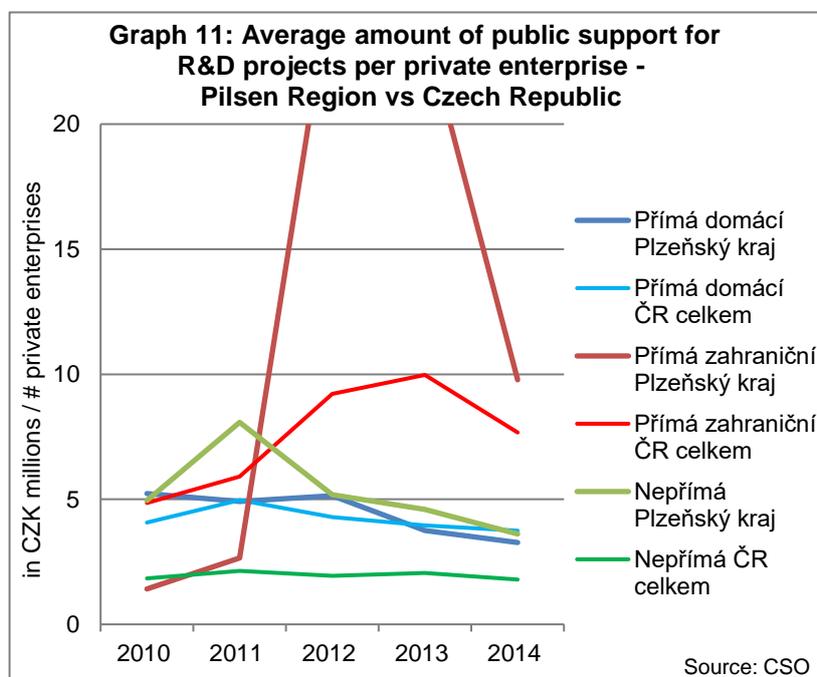
In terms of scientific areas, the greatest part of R&D expenditures in Pilsen Region are aimed towards engineering (78%), followed by natural science (12%) and medicine (4%).

2.4 Support for research & development

Public support for R&D in private companies in the Czech Republic is provided either as direct support from public funding, or as indirect support as a tax deduction for deductible expenses towards R&D. In 2014 Pilsen Region ranked 9th in the Czech Republic in the number of companies that used public support (see Graph P27 in the appendix). In terms of the amount of support used, it ranked 6th (see Graph P28 in the appendix). There is higher support per company than the Czech national average, particularly in direct foreign support and indirect support (see Graph 11).

In absolute terms, indirect support accounted for the greatest part of support in Pilsen Region in 2014 (CZK 170 million, 40%, 47 companies); indirect domestic support totalled CZK 134 million (32%, 41 companies); direct foreign support totalled CZK 117 million (28%, 12 companies).

Both 2012 and 2013 were exceptional for Pilsen Region and for the Czech Republic in terms of the amount of direct foreign support for private enterprises that was used. The amount of support per supported enterprise in Pilsen Region was significantly above average (see Graph 11). In 2011-2014 the number of companies in the region using all three types of support increased, but the amount of direct domestic and indirect support fell. For



this reason, the average amount of this support per supported enterprise in the region decreased (see Graph 11).

Traditional forms of public support for RD&I are grants from national and European sources. These funds are most frequently provided based on public tenders, and research

organisations and companies apply for them. RD&I support in Pilsen Region from these sources has been significant and has significantly impacted the growth of RD&I facilities (see previous subchapter).

For example, a statistical evaluation by Czech region of funds distributed from the Alfa programme in grant proceedings in 2010–2013 suggests that applicants' overall success rate was 27.4%, with applicants from Pilsen Region among the most successful. Their overall success rate was 32.3%, and in the first round of the programme the success reached as high as 50%. Pilsen Region ranked 5th in the total number of supported projects (total of 117 projects). A significant part of these projects was obtained by ZČU (54 projects with a success rate of 35.8%, overall in 6th place out of all recipients in terms of number of supported projects).

European funds were used for RD&I in the Czech Republic in 2007-2013 primarily via the Operational Programme Enterprise and Innovation (OPEI) and Research and Development for Innovation (OP R&DI).

In OP R&DI (total of 217 projects in the Czech Republic as of June 2016), 17 projects worth approximately CZK 3.5 billion were implemented in Pilsen Region, with 11 of these projects prepared by ZČU. Due in part to this programme, regional research centres and centres of excellence were built and university research infrastructure was significantly improved.

Projects were also prepared by COMTES FHT, LF UK – Biomedical Centre (reported in statistics under Prague) and Techmania SC (popularisation of science). In terms of volume of funds received per capita, Pilsen Region was the third most successful region in the Czech Republic; Prague and the South Moravian Region have significantly higher numbers of projects and volumes of received funding compared to other regions.

Of the European funds, OPEI provided support for innovation in 2007 – 2013, particularly to companies. In this programme, a total of 380 projects with a total financial volume of approximately CZK 3 billion were implemented in Pilsen Region, which is comparable in volume to OP R&DI, but far fewer number of activities (see Table P29 in the appendix). Pilsen Region's position compared to other regions was influenced by the lowest limits for public support and limited opportunity to draw funding from certain programmes (e.g., Development).

A major financial tool of grant support for research focused on pan-European priorities was the 7th Framework Programme for research and technological development. Support for applications from Pilsen Region subjects was provided in part by the Regional Contact Organisation (RCO) at ZČU.

The above analyses suggest that funds are concentrated in the City of Prague and the Southern Moravian Region. The City of Prague's position reflects the city's strong concentration of capacity, but it is likely also the administrative jurisdiction of institutions reported according to registered address.

Differences in the structure of the regions' economies, the focus of the calls (e.g., a preference for economically weak regions), and to a certain extent the conditions associated with public support all had an impact on regional differences in the absorption of grant funds (particularly those earmarked for business innovation). The maximum level of public support in Pilsen Region (or in the NUTS 2 Southwest region) was lower given its economic performance compared to other regions. For the new period 2014–2020, the level of support

for all regions (except the City of Prague) is identical, and the maximum level of support may reach up to 50% for innovation at companies, up to 70% for industrial research, and up to 100% of costs for basic research.

2.5 Results of research & development

Patent activity among applicants (i.e., number of patent applications per 1,000 employees) in Pilsen Region has been below the Czech national average in recent years; since 2009 this figure has been declining. According to this indicator, in 2011–2015 the region ranged between 11th and 12th place out of 14 regions.

This is also reflected in the relatively low number of patents granted to applicants from Pilsen Region. Although the number of patents granted per 1,000 R&D employees in the region rose from 3.6 in 2009 to 8.6 in 2015, the region ranged between 10th and 14th place in the Czech Republic for this indicator.

The differing development in the number of patent applications submitted (downward trend) and patents granted (upward trend) suggests an increasing success rate for patent applications from Pilsen Region.

According to the number of patents valid in the Czech Republic as of 31 December 2015, Pilsen Region is in 9th place (119 patents). The greatest contributors to this figure are enterprises (68%), followed by public universities (16%) and individuals (15%).

In recent years there has also been an unfavourable trend in the number of utility models registered by applicants from Pilsen Region. Whereas the relative number of utility models per 1,000 R&D employees hovered over 25 in 2011–2013 (placing the region in 8th–9th place), by 2015 this figure had fallen to 11 (14th place).

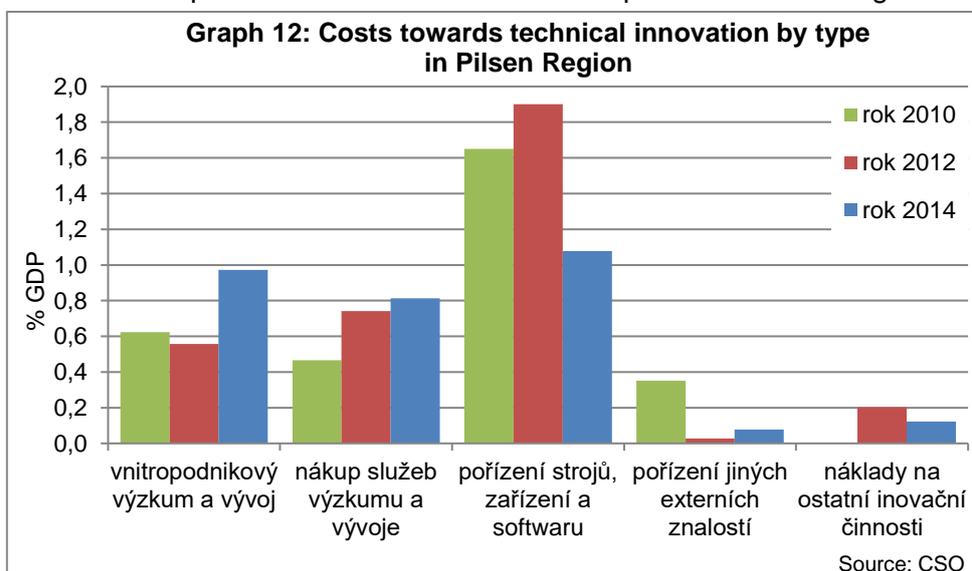
As of 31 December 2015, applicants from Pilsen Region had 314 valid utility models (8th place). Companies (40%) and universities (38%) accounted for the greatest share of this, followed by individuals (21%).

2.6 Innovation

According to relative costs of technological innovation at enterprises (related to GDP for comparability), Pilsen Region had a very good position within the Czech Republic in 2010–2014. It ranked between 2nd and 4th place with a stable share of costs towards technological innovation at companies ranging between 3.1% and 3.4% of GDP.

The growing significance of companies' own research and development in Pilsen Region can

be seen in the increase in costs for internal company research and development, which in 2014 moved up to second place, ahead of the purchase of



research and development services and nearing costs for the purchase of machinery, equipment and software (see Graph 12).

In terms of revenues for products that are new on the market or new for the company (in relation to GDP), Pilsen Region is above average. The situation is the same for intensity of technological innovation, i.e., the share of costs towards technological innovation in the total revenues of companies with technological innovations.

A regional comparison of the shares of innovation enterprises according to type of innovation activity sheds an entirely different light on the extent of innovation at companies in the Pilsen Region (see Table P30 in the appendix). Overall and in most types of innovations, Pilsen Region has a very low share of innovation companies compared to other regions (10th–14th place). This may mean that innovation is focused in a smaller number of companies which innovate more intensively.

2.7 Advanced technology

The extent of exports of technological services also testify to the level of products in the given region. In relation to GDP and per capita, Pilsen Region has a decent level of technological service exports. In 2011–2015 the region ranked between 3rd and 5th among the Czech regions for exports of these services overall per capita, and the rate of growth corresponded to the national average (see Graph P31 in the appendix).

Computer services (CZK 2,500 per capita) and design, engineering and other technological services (CZK 2,200 per capita) accounted for the greatest share in exports of technological services in 2015. The share of research and development exports was lower (CZK 800 per capita). Licensing fees had a negligible share (all in Table P32 in the appendix).

A detailed look at the export trends and structure for computer service exports confirms Pilsen Region's very good position in the Czech Republic. In 2011–2015 the region ranged between 4th and 5th place in terms of computer service volume per capita and showed an upward trend. Computer software dominated computer service exports (2,000 per capita).

3 Main innovation system stakeholders

The main innovation system stakeholders are:

- Research organisations
- Enterprises carrying out R&D
- Application sector – companies with potential for applying the results of research, development and innovation
- Innovation infrastructure – organisations and equipment
- Public administration.

3.1 Research organisations

The University of West Bohemia and Charles University's Faculty of Medicine in Pilsen are the two largest public research and development (R&D) organisations in Pilsen Region. Their research is primarily focused on the fields of study represented at the universities, i.e., disciplines taught at individual faculties and departments. The list of scientific research centre facilities also includes research centres, which represent the main facilities for university and faculty research.

Main research organisations in Pilsen Region also include COMTES FHT a.s., Research and Testing Institute Pilsen, and Řež Research Centre.

The **University of West Bohemia in Pilsen** comprises more than 70 scientific, research and development teams, and currently provides facilities for approximately 12,000 students pursuing bachelor's, master's and PhD degrees. These are specialists in the fields of mechanical and electrical engineering, applied sciences, economics, education, law, medicine, the humanities and art.

ZČU's key research facilities are the following:

- **New technologies** – ZČU Research Centre – develop research into special thin-film technologies, into select production processes for the energy sector, and into polymer structures. It is also a major European entity in the field of laser technology for industrial applications.
- **CENTEM** – Centre of New Technology and Materials – a project comprised of five research programmes focused on research and modification of material morphology and surface texture, polymer material-based advanced technologies, laser technology for processing and analysing materials, research and development of polymer composites and materials for photovoltaics, and photonics and microsystem technology.
- **NTIS** – New Technology for an Innovative Society – the mission of this centre of excellence is research, development and innovation in two priority directions – Information Society and Material Research.
- **RICE** – Regional Innovation Centre for Electrical Engineering – concentrates all scientific potential into a single research programme titled Smart Industrial Systems, focusing on new propulsion and advanced technology designs for transport technology, material research, energy and industrial systems, diagnostics and testing.
- **RTI** – Regional Technology Institute –mechanical engineering and technology research centre of the Faculty of Mechanical Engineering. Research and development are primarily

focused on modern vehicle design, including drive systems, production machinery (including modernisation), shaping and metalworking technology.

A research facility for more than 300 specialists is located at **Charles University's Faculty of Medicine in Pilsen**. The faculty is one of 17 faculties of Charles University in Prague. and is strongly tied to University Hospital Pilsen. It focuses on research in the field of medical applications that represent a significant shift in patient care. To support research at LF UK, a regional research **Biomedical Centre** was constructed that is primarily focused on organ replacement and regeneration. LF UK's research activities have an immediate impact on the quality of education for medical professionals and on patient care. Excellence extending beyond the region's borders relate to selected disciplines, such as genetics and assisted reproduction.

COMTES FHT operates the West Bohemian Material Metallurgy Centre – a regional research centre focused on research into promising metal materials and technologies for manufacturing these metals in industry.

The primary mission of **Řež Research Centre** is research, development and innovation in the energy industry, particularly nuclear energy. As part of the SUSEN (SUStainableENergy) project, since 2012 the centre has conducted research into materials for nuclear and traditional energy and into new, unconventional methods for obtaining energy.

VZÚ Pilsen is focused on research, development and accredited testing. Among the company's most important activities are research and tests focused on increasing the operational reliability and lifetimes of energy equipment and road and rail vehicles, and research and development into thermal spraying.

The above indicates that between 2014 and 2016, research institutions in Pilsen Region were significantly reinforced by new research centre facilities at ZČU (CENTEM, NTIS, RICE, RTI) and LF UK in Pilsen (Biomedical Centre) and at COMTES FHT a.s. (West Bohemian Material Metallurgy Centre) supported from OP R&DI.

3.2 Enterprises carrying out R&D

All companies that develop new products or introduce product and process innovations can be considered, in the broader sense of the term, active corporate participants in the innovation system in Pilsen Region. For the needs for the RIS3 analysis of Pilsen Region, innovation system stakeholders from the corporate sphere are viewed as those who meet at least one of the following conditions:

- Build or expand research and development facilities using support from public sources (i.e., they obtained support from the Potential – OPEI and OPEIC programmes);
- Bring innovated products to market using support from public sources (i.e., they obtained support from the Potential – OPEI and OPEIC programmes);
- Use the services of research organisations for their innovation activities (they obtained support from the Innovation Vouchers, Knowledge Transfer Partnership OPEIC, Pilsen Region and City of Pilsen Business Vouchers programmes);
- Use tax deductions for R&D;
- Manage RD&I projects supported from public sources (i.e., they obtained support primarily from the TIP, ALFA, TRIO, Epsilon, Application, Eureka and Eurostars programmes and EU framework programmes);

- Are members of competence centres, technological platforms or clusters.

Pilsen Region has more than 50 businesses with significant research innovation capacity (RIC) in the form of newly built or expanded corporate development centres via support from the Potential – OPEI and OPEIC programmes. In terms of companies' specialisations, **CZ-NACE 28** – Manufacture of machinery and equipment is the leader. The most important corporate R&D centres built in 2009–2014 include MBtech Bohemia s.r.o.'s Technology Centre, Daikin Industries Czech Republic s.r.o.'s development centre, the Research Centre of Forming Technology at COMTES FHT a.s., ZF Engineering Pilsen s.r.o., GÜHRING s.r.o., and Doosan Škoda Power s.r.o.

Among small and mid-sized companies, significant investments into RIC have been made at Naretec s.r.o., Pilsen Tools s.r.o., Hofmeister s.r.o., and GTW Bearings s.r.o. In the period since 2015, RIC have been expanded or newly built at several sites, including Škoda Transportation a.s. (development of a testing and prototype centre), Exova s.r.o. (expansion of facilities for material creep testing), Witte Nejdek, spol. s r.o. (expansion of its development centre in Pilsen), Škoda Electric a.s. (new research facility for traction engines), KDK Automotive Czech s.r.o., and ETD Transformátory a.s.

Process and product innovation projects using public support in 2009–2014 were implemented at 45 companies, nine of which also received support for developing their research innovation facilities. Most CZ-NACE codes for these projects are **CZ-NACE 28** – Manufacture of machinery and equipment and **CZ-NACE 27** – Manufacture of electrical equipment. The most significant investments into implementing product and process innovations include the innovation of production at SWA, s.r.o., Brush SEM s.r.o., Kabelovna Kabex a. s., Škoda Electric a.s., Pebal s.r.o., Stölzle-Union s.r.o., Škoda JS a.s., International Automotive Components Group s.r.o., TS Pilsen a.s., Wikov Gear s.r.o., Schäfer-Menk s.r.o., and Solodoor a.s.

Major innovators (using support from public funds) among small to mid-sized enterprises include Atmos Chrást s. r. o., UniCut s.r.o., GTW Bearings s.r.o., Strojírna Tyc s.r.o., Astro Kovo Pilsen s.r.o., Hauser CZ s.r.o., and Replast Produkt, spol. s r.o. Currently (since 2015) product and process innovation projects are being implemented at 20 companies (13 of which repeatedly) –for example, at Škoda TVC s.r.o. (innovation of roof-mounted pantographs for trams), Baumruk & Baumruk s.r.o. (launch of production of sheet glass handling equipment), Lukr CZ a.s. (launch of production of a double-walled cooling tank), Škoda JS a.s. (innovation of radioactive fuel storage containers), Invel Plus spol. s r. o. (innovation of spring production), Greiner aerospace CZ spol. s r.o. (innovated aircraft seats).

Companies that have implemented or are implementing projects for establishing or expanding RIC, or projects introducing product and process innovations, include investigators of R&D projects from national and international sources. Since 2010 approximately 50 subjects have implemented research and development using public support. An example of a successful project for researching & developing a new product is the project for developing new turbo transmissions using a new type of segmented bearings (investigators: Wikov Gear s.r.o., GTW Bearings s.r.o.), which received the Useful Design Award from the Technology Agency of the Czech Republic (TACR) in 2013.

Companies from Pilsen Region are also active at competency centres, the establishment of which was initiated by TACR. Out of a total of 33 centres, whose specialisations are focused on areas with high application and innovation potential and promise for being a significant

contribution to increasing the competitiveness of the Czech Republic, Pilsen Region companies are active in 16. These are centres whose specialisations correspond to the region's industrial focus, e.g., the Production Engineering Technology centre of competence, the Centre for Advanced Nuclear Technology, the Centre for Research and Experimental Development into Reliable Energy, the Rail Vehicle Centre of Competence, the Centre for Smart Propulsions, and the Research Centre for Special Rotating Machines.

Approximately 50 companies use tax deductions for R&D. Since 2014, innovation activities using public support to purchase services from research organisations (regional vouchers, programmes supporting collaboration among research organisations (RO) and companies from OPEIC) have been carried out by another approximately 150 companies.

The above suggests that the corporate research and development facilities in Pilsen Region are the domain of large and mid-sized companies, primarily those that build on fields that have been historically strong in Pilsen Region – mechanical engineering, electrical engineering and energy, and vehicles. Often these are manufacturers that directly descend from Škoda Pilsen (such as Škoda Transportation, Brush SEM, Škoda Electric and Doosan Škoda Power). Over the past ten years, new investments have been made in Pilsen Region that are focused on research and development in companies with foreign capital (such as ZF Engineering Pilsen s.r.o., MBtech Bohemia s.r.o. Technology Centre, Daikin Industries Czech Republic s.r.o.'s development centre).

The Research Centre of Forming Technology at COMTES FHT a.s., which is a Czech and regional entity, can be viewed as an exceptional case. Entities building their own research and development facilities include companies in the automotive industry, which are traditionally viewed as primarily manufacturing factories – e.g., International Automotive Components Group s.r.o.

3.3 Application sector

Fields with a strong history in Pilsen Region are mechanical engineering, electrical engineering and energy, but it would be amiss not to mention the food industry (beverages) and the ceramics industry (kaolin mining and production of ceramic building material). Currently some of the largest companies in the region include factories that manufacture components for the automotive industry, which has developed significantly given the proximity of Germany and manufacturing facilities in the Czech Republic. The investment by Panasonic, which for nearly 20 years has produced consumer electronics at Borská Pole industrial zone in Pilsen, must also be mentioned.

Successful fields in Pilsen Region with potential for the application of research findings are perceived to be mechanical engineering, mechatronics, and electrical engineering and energy. Another sector with potential for growth and opportunities for use is information and communications technology. In terms of NACE codes, this primarily includes the groups and major businesses listed below (we are citing only the most important examples of companies and their products).

CZ-NACE 27 Manufacture of electrical equipment (MD Elektronik, RSF Elektronik – cable bundles for the automotive industry; Brush SEM – electric generators; Škoda Electric – electric motors and propulsions; ETD Transformátory – manufacture of transformers). The manufacture of equipment for the energy industry has historically been a knowledge-intensive field in Pilsen and in Pilsen Region; production of cable bundles is a field that is

strongly associated with supplies for the automotive industry and it is dominated by large companies with foreign ownership.

CZ-NACE 28 Manufacture of machinery and equipment (Dakin Industries Czech Republic – air conditioning; Škoda Machine Tool – machine tools; Doosan Škoda Power – development and production of steam turbines). Besides the above companies, approximately 50 more foreign and domestic companies are oriented towards R&D. The field is directly tied to traditionally strong areas of higher education (technical faculties at ZČU).

CZ-NACE 29 Manufacture of motor vehicles (except motorcycles), trailers and semi-trailers (International Automotive Components Group, Borgers, Ideal Automotive Bor, Grammer CZ – manufacture of components for the automotive industry). This is a field that has experienced significant growth in production and employment over the past 20 years. Moreover, it is a field that holds promise for expected significant impacts as part of Industry 4.0. The field has a strong impact on employment in the region, with a dominant contribution from foreign-owned companies. Innovation activities are often initiated by demands for optimising production and reducing production costs. Companies in this field have long reported a manufacturing labour shortage.

CZ-NACE 30 Manufacture of other transport equipment (Škoda Transportation, Faiveley Transport Czech – transport equipment; Zodiac Galleys Europe – aircraft interiors). The development and production of rail vehicles and trolleybuses has a long tradition in the region and is tied to traditionally strong areas of higher education (ZČU in Pilsen).

CZ-NACE 61, 62, 63 Information and communications technology is represented in Pilsen Region by a small number of large companies with over 100 employees (Socialbakers, Eurosoftware) and by a large number of micro-enterprises and small companies. The development of ICT firms is significantly influenced by the region's educated workforce capacity.

In Pilsen Region, mechanical engineering and electrical engineering, including the manufacture of transport equipment, continue to be viewed as the primary fields for applying knowledge gained from research, development and innovation. Companies producing components for the automotive industry (which are primarily foreign-owned companies) represent an opportunity for applying knowledge gained from research development, although in the global environment these processes are usually shared within parent companies for the entire group and obtaining excellence in a specific area presents a major challenge.

ICT fields are generally on the rise and represent promise for new knowledge and technologies, particularly in connection with the expected development of automation, robotisation, and smart technologies with application in both the private and public sectors. However, further development stumbles in part against insufficient quality facilities for larger companies in Pilsen.

3.4 Innovation infrastructure

The most important subjects offering support services for the development of RD&I in Pilsen Region are BIC Pilsen, Regional Development Agency of Pilsen Region and Pilsen Science and Technology Park. With respect to the promotion and popularisation of R&D in Pilsen Region, Techmania Science Center is the absolute leader. The recently established

DEPO2015 supports the creative industry. The ICT Administration Office of the City of Pilsen also recently founded the Dronet technology centre and Robotics Centre.

The Regional Chamber of Commerce of Pilsen Region, Pilsen Chamber of Commerce and Trade, the Mechatronics Cluster and Smart Pilsen Region can also be included among Pilsen Region's innovation infrastructure.

Pilsen Science and Technology Park (STP) is a company established by the City of Pilsen to support the commercialisation of research and development and to increase the competitiveness of small and mid-sized companies through the introduction of innovation; the project offers jobs and opportunity for creative development, particularly to young university graduates. Pilsen STP operates space for RD&I companies to locate. Implemented with BIC Pilsen and the City of Pilsen, "Pilsen Science and Technology Park" significantly increased the supply of space for innovation companies. Currently the total area for innovation companies is in excess of 15,000 m².

COMTES FHT a.s. also started to construct a technology-focused science and technology park. Slated for completion in the autumn of 2019, it will offer companies laboratories, workshops, a multifunctional hall and additional infrastructure. The science and technology park is built in Dobřany and has support from both the city and Pilsen Region, and it is expected that neighbouring Karlovy Vary Region will also get involved.

Since 2017, **Czech Technology Platform Engineering (CTPE)** has implemented a project co-financed by the European Union as part of the Operational Programme Enterprise and Innovation for Competitiveness. Titled "Development of CTPE activities", the project supports involvement in Industry 4.0 in the European context.

BIC Pilsen supports the establishment and development of innovation companies in the Pilsen Region. The company was established in 1992 and is a partner in the Enterprise Europe Network. Although the owner of the company is the Chartered City of Pilsen, its activities extend beyond the borders of the region. The company provides consulting services for companies and operates a business incubator space – BIC Pilsen is a member of the Czech Association of Science and Technology Parks.

Regional Contact Organisation (RKO) at ZČU in Pilsen aims to support participation by entities in the Pilsen region in European research programmes. This is a major financial tool of grant support for research focused on pan-European priorities (7th Framework Programme and Horizon 2020).

Regional Development Agency (RDA) of Pilsen Region provides specialised consulting to regional government in Pilsen Region and supports the economic and social development of the region. It is a co-implementor of the Pilsen Region Smart Accelerator project, which addresses regional support of research and development.

Techmania Science Center is active in the field of informal education and aims to outline developments in certain fields of human knowledge and demonstrate how that knowledge is applied in technology. Activities range from holding educational competitions and seminars to creating educational materials, organising theme-based exhibitions dedicated to the potential of science and technology centres and coordinating major events. Škoda Investment a.s. and the University of West Bohemia in Pilsen were behind the start of the project in 2005.

DEPO2015 is a project by the City of Pilsen that supports the creative industries, provides infrastructure for coworking activities, operates a creative incubator, and holds a number of

events and exhibitions in the field of interconnecting art, new technology and current topics. The “depot” is also home to **Dronet** technology centre, which is focused on the unmanned aircraft industry. The centre is operated by the ICT Administration Office of the City of Pilsen (ICTCP), an organisation established by the City of Pilsen. ICTCP’s activities also include the “**Robotics Centre**” (Digital Skills House), which is focused on education featuring cutting-edge technology for people of all ages.

Regional Chamber of Commerce of Pilsen Region and Pilsen Chamber of Commerce work towards developing the business environment. Besides advisory and consulting activities, they provide a wide range of services for businesses, non-business legal entities, and for the general public.

Clusters provide a bridge between the education and business sectors in the region. The **Mechatronics Cluster** is focused on a discipline that encompasses precision mechanics, electrical engineering and intelligent computer-controlled electronics.

Smart Pilsen Region Cluster works to develop the concept of a “smart” region in Pilsen Region with the aim of increasing the quality of life by connecting public services with new information technology and creating conditions for implementing this technology. In this cluster, OMEXOM GA Energo s.r.o. operates a smart polygon for demonstrating and testing the possibilities offered by smart technology.

The capacity of support services in Pilsen Region is primarily concentrated in the activities of BIC Pilsen – which, although established by the City of Pilsen, also provides services at a regional level with an impact extending beyond the region’s borders. The technical infrastructure for innovation companies is at a high level thanks to the Pilsen STP project. Nevertheless, currently there is no available capacity for larger corporate R&D projects – e.g., in the field of shared services – either in terms of quality space for lease or in terms of land where public or commercial entities could construct suitable buildings.

3.5 Public administration

There are two main public administration entities in Pilsen Region – Pilsen Region and the Chartered City of Pilsen. Both the Chartered City of Pilsen and Pilsen Region influence the regional innovation system via organisations that they have established for this purpose (such as BIC Pilsen, RDA Pilsen Region, Pilsen STP).

With respect to support of RD&I activities, the most active departments in **Pilsen Region** are the Department of EU Funds and Programmes and the Department for Regional Development. The Pilsen Regional Authority is responsible for making and updating the Regional Innovation Strategy and is the implementer of the Smart Accelerator project. Pilsen Region provides specific RD&I support via a “business voucher” programme to support collaboration between research organisations and the practical sphere.

The **Chartered City of Pilsen** is the founder of organisations active in supporting RD&I: BIC Pilsen and DEPO2015. With respect to support of RD&I, the most active departments in the City of Pilsen are the Urban Planning and Development Institute of the City of Pilsen and Department for the Coordination of European Projects of the City of Pilsen. The City of Pilsen is also active in supporting collaboration between research organisations and the practical sphere via business vouchers. Innovation projects also concern current activities in supporting smart applications for the city.

The structure of public activities in Pilsen Region involved in the economic development and RD&I support process is clearly laid out. However, it is clear that especially at the regional level, economic development and the support of innovation is the focus of only a limited number of staff in departments that have a far broader agenda.

The City of Pilsen has capacity for economic development specialists. As a result, there is space for closer cooperation between the city and the region in supporting promising fields, research, development and innovation. A specific demonstration of this may be coordinating sub-activities, such as providing support via “business vouchers”, which are currently granted separately by both the city and the region.

4 Public administration and its role in the region's innovation system

The support of research, development and innovation is a European, national and regional theme. It involves the development of activities which should lead to an increase economic performance in the EU as a whole and at individual country and regional levels. Support is aimed at strategic preparation as well as at developing research and development infrastructure, implementing research activities, and giving rise to and developing innovation enterprises.

4.1 Strategic documents with the support of research, development and innovation

Regional Innovation Strategy (BIC Pilsen, RDA Pilsen Region, 2004)

This document is aimed at analysing the state of research, development and innovation in Pilsen Region and at creating a platform for developing innovation in the region. At the time this strategy was created, it was not possible to allocate or claim regional sources for the proposed measures. This strategy was primarily fulfilled in building technical infrastructure for innovation by developing the Pilsen Science and Technology Park.

City of Pilsen Development Programme (CPDP, Urban Planning Institute of the City of Pilsen, 2004, 2013)

In its Programme, the City of Pilsen primarily aims to develop its own scientific research potential, supporting the placement of innovation companies in the city, promoting Pilsen as a city with strong innovation potential, creating conditions for attracting foreign scientific staff, and strengthening collaboration between R&D organisations and the commercial sector. This topic was primarily addressed in priority area 3 Economic Development – Goal 3.1. Concrete results of implementation of this part of the CPDP included the preparation and co-financing of the Pilsen Science and Technology Park and support of selected projects at ZČU from the City of Pilsen budget. In the prepared Strategic Plan of the City of Pilsen, the support of research, development and innovation will be included in Strategic Goal 2, “Develop a Promising Job Market and Connect the Educational System with the Practical Sphere”.

RIS3 – Regional annex for Pilsen Region

This document was implemented according to a joint methodology in cooperation with the Ministry of Education in the first wave of compiling Czech regional strategies, and it was approved by the Pilsen Regional Council in 2015. Except for the innovation voucher programmes, no funds have been allocated for the proposed measures in the Regional Annex thus far.

Selected programmes supporting research, development and innovation

Most support of research, development and innovation in the Czech Republic is provided from the national budget and from EU structural funds. Crucial for the support of innovation businesses are national funds from the Technology Agency of the Czech Republic, sector-based funds of the Ministry of Industry and Trade (MIT), and funds from the government agency CzechInvest.

4.2 Programmes supporting research, development and innovation

4.2.1 National programmes

Through its programmes, **TACR** provides long-term and systematic support to applied research and collaboration between companies and research organisations. These are the Epsilon, Omega and Gama programmes. To collaborate with foreign technology agencies, the Delta programme was created (collaboration with Taiwan, Vietnam, China and Korea). The Gama-Seal of Excellence programme (sub-programme II) is offered for small and mid-sized enterprises (SME) and facilitates support for applied research, experimental development and innovation for SMEs that received the EC Seal of Excellence in SME Instrument – Phase 1.

The Czech Ministry of Industry and Trade has implemented several calls from the Trio programme, which is focused on industrial research and development. The programme is focused on developing the potential of the Czech Republic in the field of key technologies (KETs) like photonics, microelectronics and nanoelectronics, nanotechnology, industrial biotechnology, advanced materials and advanced production technologies. For the conditions of use in Pilsen Region, projects in the field of advanced production technologies are particularly relevant.

In 2017 **CzechInvest** launched programmes for supporting innovation start-ups. These are the CzechStarter, CzechAccelerator, CzechDemo and CzechMatch programmes, where entities can apply financing to develop innovation enterprises. These programmes support consulting services, training, marketing and other operational costs of developing companies for a limited time period needed to launch the companies' dynamic growth. These are select programmes that support only the most promising projects.

Interest in national R&D programmes exceed the possibilities offered by these programmes, but not all projects submitted in regional entities may be supported, even if they have been properly prepared and formally approved with respect to the programmes' conditions. Financing is the subject of competition within individual calls.

4.2.2 RD&I support from European structural funds

The main source for financing RD&I activities are EU structural funds, specifically the Operational Programme Enterprise and Innovation for Competitiveness (OPEIC) and Operational Programme Research, Development and Education (OPRDE).

OPEIC is aimed at a broad spectrum of activities for supporting innovation enterprises, including support for small companies and acceleration. The main programmes relevant for RD&I support are primarily: Potential, Innovation, Application, Knowledge Transfer Partnership, Innovation Vouchers and Patent.

OPRDE deals with financing, primarily for public research organisations. Its main themes are improving educational processes and supporting collaboration between research organisations and the practical sphere. The support of long-term interdisciplinary collaboration is a very promising area.

4.2.3 International research and development support programmes

Business entities may also obtain support implementing research and innovation activities from international programmes. Given corporate R&D almost exclusively concerns industrial

and applied R&D, the programmes that can be considered mainly include Horizon 2020, Eureka and Eurostars.

Horizon 2020 (H2020) is the largest and most important programme designated for financing science, research and innovation at the European level in 2014-2020. Horizon 2020 builds on the 7th Framework Programme for research, technological development and demonstration (2007–2013), and differs in its greater emphasis on supporting innovation. The programme is designated for scientific staff at universities, research institutes and industrial companies, but also for companies that may find in Horizon 2020 a tool for financing cutting-edge research activities and technology.

The programme has four priority areas, and the opportunity for business entities to receive support for R&D activities primarily lies in priority 2 – Leading Position of Industry. This is focused on supporting activities aimed at improving the competitiveness of European industry, particularly via ground-breaking technologies, and at supporting financing for research in industry and at SMEs. The “Leading Position of Industry” priority is further divided into three areas:

1. Ground-breaking and industrial technology.
2. Access to risk financing.
3. Innovation in SMEs.

The **Eureka programme** has been in place since 1985 and supports transnational collaboration between industrial companies, research institutes and universities, thus creating conditions for increasing the performance and competitiveness of European industry and developing Europe’s common infrastructure. There are no pre-set specified themes for Eureka projects, but the projects do stem from the priority directions of developing areas of industry. In general terms, Eureka projects are focused on the following areas:

- Information technology
- New materials
- Environment
- Biotechnology and medical technology
- Robotics and automation
- Communications technology
- Energy
- Transportation
- Lasers

The **Eurostars programme** is focused on supporting SMEs that, in addition to their manufacturing or service operations, also conduct their own research and development.

4.2.4 Regional programmes

The core of support for regional programmes is focused on two areas: support for the placement of starting and growing innovation companies, and support for collaboration between universities and the practical sphere.

A tool for supporting the placement of starting companies is the **Pilsen Science and Technology Park**. Thanks to the City of Pilsen’s participation in the “Prosperity” programme, discounted rent is provided as part of the transfer of the grant to the final recipients of the

support. As a result, support is provided in the amount of approximately CZK 10 million per year. Beyond this, advisory services are provided, such as: finding new technology that suits the needs of companies; identifying new knowledge that can be transferred; consulting on intellectual property protection; interconnecting the research and application sectors; providing assistance in developing collaborative relationships; informing about opportunities to obtain support for applied research and development; identifying suitable support programmes; preparing applied research and development projects; assisting in the development of international collaborative relationships in the technology sector, etc., in the total value of CZK 2 to 3 million per year.

Support for collaboration between universities and the practical sphere in Pilsen Region is implemented via **Business Vouchers**, which are a subsidy for services provided by a research organisation for the benefit of the company. The programme is focused regionally – the main provider of specialised services is the University of West Bohemia in Pilsen. This is funded by Pilsen Region and the City of Pilsen. Since 2013 more than 130 projects have been supported with a total grant exceeding CZK 11 million.

4.3 Examples of good practice in the Czech Republic and abroad

Opportunities for the development of an innovation system are very broad and take place on several different levels. For this reason, the collection of good practical experiences was primarily focused on looking for opportunities to improve the innovation system at the regional level – this relates to the following themes:

- Supporting the establishment of innovation enterprises and acceleration
- Supporting collaboration between research organisations and entities from the practical sphere
- Internationalisation for research, development and innovation

Activities and projects implemented at the regional level were primarily specified. As a priority, subjects in the Czech Republic and near cross-border region were verified with respect to intensive economic collaboration between the Czech Republic and Germany.

4.3.1 Supporting the establishment of innovation enterprises and acceleration

Supporting the establishment of innovation enterprises usually occurs through long-term programme support. Several such examples are evaluated in this subchapter.

JIC ENTER

Guarantor: South Moravian Innovation Centre

Place of implementation: Brno; participants may be from anywhere in the Czech Republic

Aim of support: Motivation for business, mentoring, coaching, pre-incubation

Form of support: Grants for consulting and mentoring services, educational workshops, coworking place (participants pay a flat fee of CZK 1,500/month).

Brief description: Programme for people interested in enterprise and starting entrepreneurs with innovative ideas. Participants receive methodology support from consultants to draft a business plan. Consultations are carried out in regular intervals for a period of up to six months. Advice from experienced experts on soft skills, marketing, sales and more can also be used. Clients may attend specialised workshops and use the equipment at the coworking

centre. The programme also includes any potential presentation of the business plan to investors and grant consulting.

Results to date: Approximately 40 supported clients/starting companies since 2014

Potential for implementation in PR: Usable concept; similar services are provided by BIC Pilsen in its incubation activities.

JIC Star Cube

Guarantor: South Moravian Innovation Centre

Place of implementation: Brno, teams and start-ups from around the world may participate in the programme

Aim of support: Incubation, acceleration

Form of support: Professional international consulting and mentoring services for drafting a detailed business plan, defining a business model, etc. Companies do not pay directly for services, but JIC obtains a 2% share in the company. Companies may also obtain up to CZK 100,000 for another 3% share. In part this is a programme for capital investments in companies. For foreign students, JIC prepares the documents needed to get a visa free of charge. Companies also get offices in the incubator free of charge. Participants also receive Microsoft BizSpark+ services free of charge.

Brief description: JIC Star Cube provides services to start-ups (at least 2 people) focused on hardware, the Internet of Things (IoT), computer security, or other areas of technology. The participation period is approximately nine months. The programme is implemented as part of the F6S network.

In the programme, participants get professional assistance from international mentors. With their help, the business plan and marketing strategy are drafted, the company established, corporate processes put in place, and cash flow and market launch are planned. Participants may also be connected with investors and suitable business partners and may get media publicity.

Results to date: Programme is in place since 2010, completed by over 70 projects (kiwi.com, Reservio, etc.). In recent years, 30 teams have been accepted to the programme per year.

Potential for implementation in PR: Given that JIC originally stipulated that the programme would only be for participants from the Czech Republic, and due to the shortage of quality plans it expanded to the entire world, the potential for collaboration in marketing and looking for suitable projects can be considered.

JIC Master

Guarantor: South Moravian Innovation Centre

Place of implementation: Brno

Aim of support: Incubation, acceleration

Form of support: Individualised consulting services from JIC experts, entrepreneurs and a business consultant with many years of experience in strategic consulting (“entrepreneur in residence”). The price is CZK 3,000 per month.

Brief description: JIC Master is a six-month individual programme for innovative technology companies with turnovers under CZK 10 million, which have already developed a new product, got their first customers, and are now preparing for further growth. This is regular

consultation (2 hours once every 14 days, up to 20 hours of external consultation free of charge), access to coworking space, provision of a meeting room free of charge.

Results to date: JIC Master builds on the JIC Innovation Park programme, which has been used by approximately 100 companies.

Potential for implementation in PR: BIC Pilsen is considering similar services in connection with its interest in building coworking space.

Techstars Startup Weekend

Guarantor: Techstars Central LLC

Place of implementation: Worldwide

Aim of support: Motivation for business, mentoring, coaching, pre-incubation

Form of support: Professional consulting and mentoring services in defining business plans

Brief description: Techstars Startup Weekend is a type of franchise that can be obtained by anyone who is interested in supporting start-ups and innovative business and can ensure that the set format can be provided: three days over a weekend (54 hours), public access, participation by international speakers and mentors registered in the Techstars weekend database, etc. Parties interested in business (individuals or teams) get the support of consultants and experienced international mentors to draft a business plan. This plan is also presented and assessed by an international committee composed of investors, businesspeople and experts. One of the goals of the event is also presenting plans to potential investors.

Results to date: The event has been held in 150 countries (total of approx. 2,900 startup weekends). About 29,000 participants have attended.

Potential for implementation in PR: BIC Pilsen held Techstars Startup Weekend as part of a joint project with IHK Regensburg. In October 2017 the event was held in Pilsen; the event was organised by the Nvias association in conjunction with ČU and BIC.

Demola

Guarantor: Demola

Place of implementation: Worldwide

Aim of support: Motivation for business, mentoring, coaching, pre-incubation

Form of support: professional consulting and mentoring services in defining business plans

Brief description: An international organisation (operating in about 20 countries) apparently from Finland, Demola arranges and organises collaboration between students, universities and companies in managing innovation plans. Worldwide it is a relatively widespread part of the innovation ecosystem.

Courses held by Demola appear to be included in university study programmes. Programmes use “open innovation”, where student teams work on specific corporate problems at partnered companies. Demola uses its own methodology for defining a problem/plan, structure, planning and facilitation. The course lasts four months. After this period, multidisciplinary teams of students and company representatives prepare a plan that is subsequently used either directly by the company, or it leads to the establishment of a start-up. Any IPR created are owned by the students. If it is used by the company, the company incurs costs (the company purchases or licenses the result).

Results to date: Hundreds of projects are worked on each year based on the needs of companies, but also the public sector (in Finland, for example, the Ministry of Education also defines its needs for investigation and resolution).

Potential for implementation in PR: Useable in CZ, unique scheme for support of companies

Flügge

Guarantor: Bavarian State Ministry of Sciences, Research and the Arts

Place of implementation: Federal Republic of Germany – Bavaria

Aim of support: Motivation for business, mentoring, coaching, pre-incubation

Form of support: Grants (especially for personnel costs for a period of up to 18 months) for carrying out pre-seed activities, including completing the development of a prototype of a marketable product. The aim is supporting the establishment of start-ups by university graduates and staff. Thanks to this grant, the risk associated with establishing a company is reduced.

Results to date: Data are not available.

Potential for implementation in PR: In OP R&DI, ZČU and Comtes FHT implemented projects focused on “pre-seed” activities with the aim of commercialising the R&D results these research organisations achieved. It can be expected that a similar programme will continue in OPRDE.

Start? Zuschuss!

Guarantor: Bavarian State Ministry of Sciences, Research and the Arts

Place of implementation: Federal Republic of Germany – Bavaria

Aim of support: Incubation, acceleration

Form of support: Grant of up to 50% (max. EUR 36,000 per year) for eligible costs – personnel costs, completion of product development, external services

Brief description: Support of technologically-oriented start-ups and enterprises with no more than two years of history, which are launching products in the field of digitisation with an innovative business model.

Results to date: A new programme, the first supported projects started to be implemented in October 2017.

Potential for implementation in PR: The programme could be relevant in PR with respect to the region's and city's activities in the field of smart and intelligent infrastructure.

BayTOU – Bavarian Programme for Technology-oriented Business Start-ups

Guarantor: ITZB –Innovations- und Technologiezentrum Bayern

Place of implementation: Federal Republic of Germany – Bavaria

Aim of support: incubation, acceleration

Form of support: Grants for (self-employed) individuals and SMEs to cover part of costs up to six years of existence. The level of the grant is 25% (45% for small businesses), max. EUR 26,000. For support for concepts, this figure is 25% and no more than EUR 52,000.

Brief description: Support of development projects to establish technologically-oriented companies. Grants for drafting technology concepts for new products for the purpose of further evaluation.

Results to date: Not available.

Potential for implementation in PR: There is relatively high interest in programmes that support RD&I for new products and processes (Trio, Epsilon, Application) in the region. It can be used as a resource for regional projects that did not receive grants due to extremely high interest in funding from Czech and EU sources.

In the Czech Republic, primarily the South Moravian Innovation Centre focuses in supporting the establishment of innovation companies at the regional level, using its own system of programme support to do so. In other regions, including Pilsen Region, this system of support is not in place, and intermediate programme support for certain segments is also lacking at the regional level. Implementation of these supportive schemes also runs up against the low absorption capacity of individual regions.

In advanced EU countries, a number of support programmes for companies in the early stages of development can be identified (verification of business plans, support in verifying prototypes or drafting technological plans), which can be seen in Bavaria, a region that has strong economic ties with Pilsen Region and with the Czech Republic. Another example of verification of new approaches to supporting starting projects are global programmes and initiatives; however, due to promotion and coordination (Techstars, Demola, etc.), their use requires significant effort towards preparations from local innovation system stakeholders.

4.3.2 Support of collaboration between research organisations and the practical sphere

Support of collaboration between research organisations and the practical sphere is an area that receives significant interest at the European and national levels. At the regional level in the Czech Republic, this topic is addressed in many regions via “business voucher” programmes. However, given the very limited financial framework, they primarily represent initiative and motivational support for companies to collaborate with universities and research organisations.

At the regional level, other options can also be found that are especially aimed at initiating collaboration between research organisations and companies. In the analysis, the below scheme was identified as a good example that in the regional context could expand innovation system stakeholders’ chances of getting the support of collaboration between research organisations and the practical sphere.

BayTP – Bavarian Technology Support Programme

Guarantor: ITZB –Innovations- und Technologiezentrum Bayern

Place of implementation: Federal Republic of Germany – Bavaria

Main goal: Support of collaboration between research organisations and the practical sphere

Form of support: Grants according to Framework (i.e., large company 25% of eligible costs; SMEs 35%; possible increase by 10% for effective collaboration). Possibility of a loan for up to 100% of eligible costs.

Brief description: Support for development of new technological products and applications of new technologies in products and processes. Products must be new in the EU. Phase I – support of RD&I from the idea to the creation of a functioning specimen. Phase II – from functioning specimen to prototype.

Results to date: Not available.

Potential for implementation in PR: High pressure in national and EU RD&I support programmes have resulted in quality projects by companies operating in PR not being implemented due to a lack of funds from these programmes. The programme could be relevant provided the absorption capacity is assessed.

4.3.3 Internationalisation for research, development and innovation

For internationalisation, good practice can essentially be found in two areas:

- PR activities of organisations interested in employing quality foreign staff
- Activities aimed at foreigners who already live in or plan to move to the region. The aim of these activities is to help foreigners create a “new home” here.

Organisations’ PR activities

In the conditions of the Czech Republic, nearly all research entities try to undertake certain PR activities, most frequently via their own websites or specialised sites. Examples include the English-language presentation on the websites of ZČU in Pilsen and Charles University’s Faculty of Medicine in Pilsen. Both websites can be considered sufficient sources of information, but less as tools of motivation or PR.

The international presentation of the Czech Republic’s RD&I sector as a whole is unsatisfactory. Tools for providing information about professional opportunities across Europe are little used (see e.g., Academic Positions or Euraxess).

Activities aimed at foreigners in CZ

In the field of activities aimed at foreigners in the Czech Republic, good practice can primarily be seen in the one-way transmission of the main information about conditions for relocating or working in the Czech Republic, intensive assistance to individual foreigners, and implementing targeted “integration activities”, including the creation of local communities. This can refer to local or also international activities. As examples we are listing the following three initiatives that represent these approaches.

Expats.cz - www.expats.cz

Guarantor: Howlings s.r.o.

Place of implementation: Website primarily focused on Prague and immediate surroundings.

Aim of support: The aim of the website is to allow foreigners to share experiences with each other about living in the Czech Republic (primarily in Prague). The site contains both general information (visas, etc.) and specific offers (jobs, services, etc.).

Form of support: The website acquaints foreigners with Czech culture. However, it primarily focuses on helping them find their way when it comes to everyday tasks. For example, it contains links to banks where they can open accounts, to various services, and to flat rentals. It tries to make it easier for people who do not speak Czech to find what they need in the Czech environment. One of the most frequently used links is to help wanted ads open to foreigners who do not speak Czech. According to the website operator, this link is visited by a thousand people per day.

Results to date: In the future the server aims to expand the service to other larger cities, such as Brno, Ostrava and Pilsen.

Potential for implementation in PR: For now, the site offers no information about Pilsen Region; therefore, it would be suitable to initiate adding information or assisting with updates

InterNations – Connecting global minds - www.internations.org

Guarantor: Founder & Co – CEO (Federal Republic of Germany, Munich)

Place of implementation: Coverage in all continents, website operated for 36 nationalities in 34 languages

Aim of support: The primary goal is to create a virtual communication platform for people of various ethnicities living outside their home countries. Ten platforms have been created for the Czech Republic: for Americans, Brits, Slovaks, Russians, Italians, French, Ukrainians, Germans, Russians and Indians.

Form of support: The core of the website is to facilitate communication among expats after they register with the site and allow them to share experiences (somewhat similar to Facebook). Communities are also organised locally; there are currently functioning platforms for Prague and Brno, and a platform for Ostrava is being created. As a result, social events can also be organised. Furthermore, the site contains current information about visas, work permits and taxes.

Results to date: Social events held in Prague regularly have over 200 attendees.

Potential for implementation in PR: Right now, there is no information about Pilsen Region; it would be good to use the site to present Pilsen Region.

Brno Expat Centre (BEC) – Free public service supported by the City of Brno

<https://www.brnoexpatcentre.eu/>

Guarantor: City of Brno and Brnopolis non-profit organisation

Place of implementation/implementer: Impact on city of Brno and vicinity

Aim of support: The aim is to help foreigners in Brno with integration and better orientation in Czech culture. The service is aimed at foreign specialists who live and/or work in Brno or are planning on moving there. It also supports the families of these workers.

Form of support: BEC primarily provides consultation and assistance free of charge. Staff are knowledgeable about Czech laws relating to foreigners working and residing in the Czech Republic. Thanks to personal contacts, they operate well primarily from a practical perspective.

BEC also organises seminars, information and social events. It operates an information site (information about accommodations, social events, etc.) and publishes a newsletter.

Results to date: Newsletters have been published since 2012.

Potential for implementation in PR: Possible inspiration for implementing similar activities in PR.

All these examples of good practice have their benefits, but also certain limitations. Assessing these is important when considering the possible use of similar solutions in Pilsen Region.

The main benefit of Expats.cz is that it is up-to-date and practical for everyday life in the Czech Republic for those who do not speak Czech. The weakness primarily lies in its strict geographical limitation, i.e., its orientation on Prague, which is primarily problematic in the job and flat rental tools.

The main benefit of the InterNations site is its support for people to meet and create local communities. For foreigners living in the Czech Republic, the ability to share their feelings (online or in person) is very important and other sites often forget this fact. The site's

operation throughout the world is another advantage, increasing its use among professionals who regularly figure on the international job market.

The main benefit of Brno Expat Centre is its operation of a physical contact point where foreigners can come at any time. Its weakness is the few motivational elements on the site (it does not emphasise visiting the contact point) and the site's weak density of information.

5 SWOT analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> - Growing number of IT graduates at region's sec. schools and uptick in share of region's uni students studying science, incl. computing. - Region's improving position in terms of number of R&D employees, especially in tech and science. - Region's high economic performance within CZ - Significant reinforcement of companies' research facilities, esp. in historically strong areas of mechanical and electrical engineering. - New research centres at ZČU. - Development of research at Charles University's Faculty of Medicine in Pilsen + connected to University Hospital Pilsen. - Involvement of regional entities in RD&I centres in progressive fields (Centres of Competence and Excellence). - Established (BIC, STP, TSC) and new activities for support of RD&I in Pilsen (SmartEduHouse – Robotics Centre, Dronet; DEPO 2015 – creative incubator). 	<ul style="list-style-type: none"> - Significant drop in ZČU student body numbers. - ZČU's technical faculties are below capacity due to low interest. - Little collaboration among RD&I stakeholders in region - Business sector uses region's R&D facilities at universities only minimally - Limited scope of R&D facilities in region in key technologies (KETs). - Low share of companies undertaking innovation, especially product innovation. - Low patent activity in region to date. - Lack of prepared infrastructure for major investors in services to enter market (shared services, R&D, etc.). - Absence of vision and marketing in RD&I in the region.
Opportunities	Threats
<ul style="list-style-type: none"> - Development of progressive multidisciplinary study programmes at ZČU. - Effective appeal to potential ZČU applicants abroad (e.g., in-country admissions process). - Attracting quality foreign specialists via good marketing and support. - Higher efficacy of marketing results of new research centres. - Increasing share of companies producing final products at a top level, incl. start-ups. - Getting involved in global initiatives that support creation of innovation and start-ups. - Coordination of activities of Pilsen Region and City of Pilsen that support economic development. - Intensive development of research collaboration among institutions and coordination of RD&I support with Bavaria and Upper Austria. - Connecting formal and informal education to increase interest in technical and scientific fields. 	<ul style="list-style-type: none"> - Deterioration of region's position in % of residents with uni education. - Growing share of less-qualified professions in region. - Departure of top specialists from the region. - Region falling behind in implementing high tech. - Complex manufacturing and technology relocating abroad / Society 4.0, shortage of labour and suitable space. - Response of research facilities towards progressive trends is not flexible enough. - Region's dependency on historically strong fields in manufacturing industry and R&D. - Low motivation to establish start-ups (during period of high employment). - Deteriorating competences of school graduates

B. Strategy section

6 Foundations of strategy section

6.1 Methodology foundations

Adopted in 2014, the RIS3 strategy that has been applicable in Pilsen Region thus far has focused on recognising the main characteristics of RD&I in Pilsen Region. The primary focus of this work was the identification of areas of necessary change in connection to the national RIS and the general specifications of realms of regional specialisation. In this document, areas of change were developed only in the form of goals, but specific activities were missing. For this reason, an RIS3 implementation document (Action Plan) could not be created that would have specified the activities selected from RIS3 with respect to requirements. An at least basic view of opportunities for financially securing the strategy or describing the essential organisational means for implementing the strategy was also lacking.

Over the past years, a number of activities have been executed in Pilsen Region in accordance with the goals of RIS3 from 2014. Nevertheless, these cannot be described as targeted and coordinated activities that would have brought the expected effects expressed, for example, at the strategic goal level. In terms of content, the strategy did not contain the subjects of marketing or the R&D environment, which are essential for communication, collaboration, and the presentation of RD&I successes in Pilsen Region.

All this, coupled with low interest by the leadership of Pilsen Region and minimal facilities for performing the role of regional administrator in RD&I, led a very low level of fulfilling most strategic goals. Based on these experiences, the decision was taken to undertake a two-stage update in the Smart Accelerator project. First, RIS3 will be developed into the form of a standard strategy. In the second update, the aim is to achieve a consensus on long-term, comprehensive RD&I strategies, with each stakeholder motivated to perform their role in the innovation ecosystem.

The presented update has examples of suitable activities listed for each goal, detailing the guarantor of that activity. The chapters on Strategy Implementation and Financial Support for the strategy were added to, and an Action Plan for RIS3 started to be prepared. The Action Plan will contain selected activities which experts believe can contribute most to fulfilling the goals of the strategy. It also addresses technical, financial, timeline, HR and organisational requirements for individual activities and how they are interlinked.

6.2 Objective foundations – summary of analytical findings

The strategy section of Pilsen Region's RIS3 is formulated in a period of significant demographical changes, intensive economic growth, a general labour shortage and starting changes caused by the more intensive application of digitisation and robotics, which from the perspective of Pilsen Region are the most important trends. The strategy section respects Pilsen Region's industry-based success thus far, and it appears that also into the near future the development of industrial technologies will be of determinative significance for the Pilsen Region.

The main problem in developing human capital for RD&I in Pilsen Region has been the sharp decline in student body numbers at ZČU, which was one of the largest public universities in the Czech Republic. This decline was deeper than the demographic decline and the reduction in the number of secondary school graduates with GCEs, as there was an increase

in the share of regional residents studying at universities outside the region. At the same time, over the mid-term Pilsen Region's position for residents with a university education is worsening.

The completed analysis indicates that the growing importance of research and innovation has manifested itself in Pilsen Region through extensive investments into research infrastructure with involvement by both the private and public sectors. National and European funds participated significantly in these investments. Both universities in the region have implemented projects to build regional research centres. Major employers have also significantly increased their expenditures towards research and development, leading to a significant increase in the number of R&D employees. Despite this, the level to which the results of research are applied in practice has been relatively low. The reasons for this can be found in regional companies' low demand for external services, in non-functioning tools for winning research orders, in the limited capacity of the local market, in the relatively low ability to succeed at an international level, and in the low supply of supportive measures (vouchers, infrastructure, etc.).

Pilsen Region's economy is characterised by the predominance of somewhat larger employers and the significant presence of industry. The largest industrial companies are majority owned by foreign owners, and ties to development projects in the local environment are less intense. These appear to be the reasons why Pilsen Region is assessed as a region with a low number of innovative companies. If the presupposition is true that small and mid-sized enterprises are flexible and effective at furthering innovation, it would be in Pilsen Region's interest to create the best possible conditions for the establishment and growth of innovative SMEs that are able to gain a foothold on the global markets.

The implementation of innovation projects in Pilsen Region is currently limited by the shortage of labour as well as of available infrastructure for supporting the establishment and placement of innovation projects. The most promising location in this regard is the City of Pilsen (see projects that have been successful thus far – STP, BIC, plans for the Robotics Centre currently under consideration, etc.). Investment projects intermediated by CzechInvest express demand for space for strategic services. However, Pilsen STP is used to full capacity, and there is a lack of additional buildings for placing highly innovative business projects or shared infrastructure for several start-ups in Pilsen and elsewhere in the region. Business infrastructure like this is not economically attractive enough for private investors for now, and it would be good to consider the efficiency of adequate public support.

In connection with preparing the RIS3 analysis, statistical data as well as interviews with representatives of companies and institutions were used. A significant part of these impulses directly contributed to the content of the strategy. The interviews indicated that there was growing interest and willingness to communicate, collaborate and contribute to formulating a regional RD&I strategy as a part of the economic strategy. To coordinate activities in this area, Pilsen Region currently uses the Smart Accelerator project, but for now it does not have its own permanent capacity. The creation of the region's organisational and personnel foundations for RD&I issues in cooperation with the City of Pilsen could significantly support the development of new RD&I activities and increase Pilsen Region's involvement in regional and international collaboration in this field.

A fundamental prerequisite for the successful implementation of RD&I strategies is that they are effectively communicated within and outside the region. However, Pilsen Region's original RIS3 did not address the topic of communications and marketing, nor were any mechanisms for coordinating marketing activities on RD&I topics created in the past years.

As a result, partial activities by several institutions in this area are not concentrated on a common interest and are missing opportunities for mutual support.

7 Strategic framework – Main and Strategic Goals

7.1 Main Goal

The strategic framework is based on a summary of analytical findings. These findings suggest that one of the main barriers to implementing RIS3 in Pilsen Region in a broader scope has been the low level of communication and coordination of major stakeholders' activities.

The Main Goal of the strategy responds to this finding for the next three years (until 2020), which focus on cultivating the environment and creating the groundwork for advocating RD&I themes as key tools in Pilsen Region's economic development. Achieving clarity and an understanding of the work of all stakeholders in the regional innovation ecosystem, maintaining their consensus on common priorities, arranging for functioning communication, collaboration and capacities for coordination represent the main change.

Key stakeholders in the private and public sector work in the fields of education, research, innovation, marketing and communication. The result of their involvement will be an attractive and inspiring environment for those interested in a promising education, scientific activity used in practice, and innovation-based business. The communication of RD&I successes will strengthen the identity and perception of Pilsen Region as a region with excellent economic perspective based on RD&I.

Main Goal of the Regional Innovation Strategy for Pilsen Region up to 2020:

- **Form a creative and functioning environment for the development of RD&I in Pilsen Region**

7.2 Strategic Areas and Strategic Goals

Building on the Main Goal of RIS3 are Strategic Goals formulated for five main Strategic Areas for change. The update of the document expands the original three key areas of change (human resources, research facilities, and innovation at companies) to include two more, which are: environment for RD&I (see Main Goal) and RD&I marketing. It appears that the absence of these areas limited the implementation of the original RIS3, because there was not enough communication and coordination of the key stakeholders' activities.

If the competitiveness of Pilsen Region is to soon be based on the application of the results of research, development and innovation, a high level of **human resources for RD&I** in the region is a must. It is essential that there are universities with an attractive range of educational options, making it possible to foster the necessary quantity and quality of specialists with respect to the economy's current and future needs. In this respect, it would be desirable to reverse the tide of dwindling student numbers at the University of West Bohemia. These changes should be based on the advantages of a broad spectrum of offered majors, their connections and current opportunities provided by digitisation and robotics.

Environment for RD&I is a new area in RIS3. Its inclusion highlights the need to improve the conditions for developing activities in RD&I. This requires not only the region's greater involvement in this area, but particularly the strengthening of collaboration among RD&I stakeholders. For example, thus far there has not been room for companies to get involved in the entrepreneurial discovery process (EDP). The development of essential infrastructure and services is an integral part of this. The area is fundamentally important to create a functioning innovative ecosystem in the region.

The Strategic Goal in the field of **R&D Facilities** responds to the current low level of diversification of use of R&D facilities built in recent years. A network of relationships has not been built that would pave the way to the optimal use of R&D sites with respect to the needs of the private and public sectors both inside and outside the region. The diversification of the use of R&D facilities will increase the stability of R&D sites, support R&D collaboration even beyond the region's borders, and particularly may contribute to introducing innovations based on R&D findings in Pilsen Region.

Business activity and the share of innovation companies are still relatively low in Pilsen Region. The Strategic Goal in the field of **Innovation** thus zeros in on the need to change the business structure towards increasing the share of innovation companies in the economic base. The establishment of new companies, more existing innovation companies, and arrival of significant innovation investments may all contribute to increasing the share of innovation companies.

As **RD&I Marketing** can significantly support the implementation of RD&I strategies, this area was newly included in RIS3. To the same extent that the region be presented to the outside world, it is important that an inner identity for Pilsen Region in RD&I is created. The public administration of Pilsen Region plays a fundamental role in communicating and forwarding the main themes of RD&I.

Overview of Strategic Areas and Strategic Goals:

	Strategic Area	Strategic Goal
1	<u>Human resources for RD&I</u>	Increase attractiveness and stabilise number of university students in Pilsen Region
2	<u>Environments for RD&I</u>	Improve infrastructure for collaboration among RD&I stakeholders in Pilsen Region
3	<u>R&D facilities</u>	Increase diversity of use of research facilities in Pilsen Region
4	<u>Innovation</u>	Expand number of companies with high innovation potential in Pilsen Region
5	<u>RD&I marketing</u>	Strengthen Pilsen Region's reputation in the world of RD&I

8 Strategic interventions –strategy development

Strategic interventions are proposed based on the strategic framework developed into the form of specific goals.

8.1 Strategic Area 1: Human Resources for RD&I

The Strategic Area Human Resources for RD&I is focused on setting the foundation for the successful development of RD&I in Pilsen Region, i.e., on the quality preparation of human capital for this area. Given the rapidly declining number of university students at ZČU in Pilsen in recent years and the falling share of university students resident in the region per resident in the corresponding age group, the entire area is focused on stabilising the number of students by increasing the attractiveness of universities in Pilsen Region. Several steps and changes must be taken to do this, which will be reflected in individual specific goals in this Strategic Area.

The first specific goal is focused on even **greater involvement by regional universities in international networks** than thus far. This step will contribute to increasing the attractiveness of studying in the region. Part of the proposed activities are focused on expanding study options for foreign students (expanding classes taught in foreign languages, foreign recruitment of university students). Additional proposed activities are based on teacher, student and graduate exchanges, which on the one hand expand their language and other skills and experience, but importantly people engaged in this way help to expand awareness about regional universities in the international context. Special attention is focused on opportunities for acquiring important foreign specialists, which can also occur in cooperation with employers.

The second specific goal is targeted at **expanding the range of modern, multidisciplinary study programmes at universities and secondary schools** in the region. Besides increasing the attractiveness of attending university in Pilsen Region, this goal responds to the anticipated need for broader knowledge among university graduates in connection with the penetration of digitisation into all sectors of the economy and people's daily lives. This process will significantly alter relationships both within and outside the economy. In addition to specialised education, it is therefore necessary to provide university and secondary school students with broader theoretical knowledge in other areas as well. This can be assisted by greater involvement in instruction by specialists from the practical sphere or by strengthening students' ability to gain practical experience in the public or private application sector.

The third specific goal in the field of human resources for RD&I is addressed by **systematic work with talent, including education**. If various institutions' currently somewhat fragmented efforts to support talented students can be interconnected and coordinated, a very attractive and inspiring environment will be created in Pilsen Region for developing talent. It is useful to work with talent as early as possible, which requires collaboration among all stages of education and the involvement of other educational and research institutions. This will also strengthen the relationship talents have to the region.

Proposed activities are focused primarily on expanding opportunities for developing talent and on broader use of existing facilities at various institutions (specialists, equipment, etc.) both in and outside the classroom. ZČU's popularisation of science is mentioned separately and is of fundamental importance for increasing interest in ZČU and science. Following large and established events there should be additional systematic events (either at schools or at ZČU) that further develop aroused interest.

The fourth specific goal responds to declining interest in studying education and the expected retirement of large numbers of teachers, which could considerably affect the functioning of the region's education system. Activities aimed at **greater teacher motivation and improvements to teacher training** are targeted at modernising early and further teacher training, connecting them closer to the practical sphere, and R&D support in educational sciences.

Strategic Goal 1: Increase attractiveness and stabilise number of university students in Pilsen Region

Specific goal 1.1: Increase involvement of universities in the region in international networks

Examples of activities:

- Expand instruction in foreign languages at ZČU
- Recruit university students abroad (connected to the "welcome centres" activity in culturally close regions) [ZČU (Fac Sci, Fac EE, ...), LF UK]
- Acquire foreign specialists (in collaboration with employers) [ZČU, LF UK]
- International internships for instructors [ZČU, LF UK]
- Increase mobility for PhD and post-doc students (create jobs at universities and research organisations) [ZČU, LF UK, research organisations]
- Promote ERASMUS and support administration for ERASMUS participants [ZČU, LF UK].

Specific goal 1.2: Expand the range of modern multidisciplinary study programmes at universities and secondary schools

Examples of activities:

- Identify potential multidisciplinary study programmes [ZČU, LF UK]
- Prepare and accredit multidisciplinary study programmes (e.g., Economics 4.0) [ZČU, LF UK]
- Get specialists from the practical sphere involved in instruction [ZČU, LF UK]
- Strengthen students' ability to gain practical experience in the application sector [ZČU, LF UK].

Specific goal 1.3: Strengthen the network of collaboration among educational institutions of all stages and research organisations in seeking talent and fostering RD&I specialists

Examples of activities:

- Develop systems for competitions and camps for all stages of education [region (Ed Dept), ZČU, Pilsen]
- Broader student involvement in national and international competitions [region (Ed Dept), ZČU, LF UK, Pilsen]
- Use schools' specialised facilities and space to teach extracurricular activities at lower education stages [region (Ed Dept), ZČU, LF UK, Pilsen]
- Get research organisation specialists involved in instruction of extracurricular activities [region (Ed Dept), ZČU, LF UK, Pilsen]
- Involve institutions of informal education in seeking and developing talent [TSC, LC]
- Popularization of science by ZČU (e.g., science days at schools – see earlier projects) [region (Ed Dept), ZČU, Pilsen].

Specific goal 1.4: Increase teacher motivation and improve teacher training

Examples of activities:

- Broader connection between teachers and practical sphere (show & tell days, get specialists from practical sphere involved in preparing school educational programmes, teacher internships at companies, etc.) [ZČU (Fac Ed, possibly Fac Arts, Fac Sci)],
- Modernisation of early teacher education (e.g., digitisation of education, teaching methods for motivation and creativity, interdisciplinary overlaps) [ZČU (Fac Ed)],
- Continuing education and methodology support for teachers (see above) [ZČU (Fac Ed), RECLS]
- Motivational support for students of teaching in select qualifications (such as scholarships) [region]
- Support for research and development in the educational sciences (such as a grant scheme) [region]

8.2 Strategic Area 2: Environments for RD&I

The main goal of this Strategic Area is to improve collaboration between key stakeholders and infrastructure in RD&I in Pilsen Region and thus contribute to forming a creative, functioning environment in this area. Support for RD&I, which is largely executed at the national level, will be supplemented in this area to include essential activities at the regional scale.

The first specific goal addresses activities **for identifying and promoting cutting-edge fields** (realms of specialisation). Given the need for current knowledge of the environment, ongoing monitoring of the situation in RD&I will be initiated. Knowledge will also be applied in building an EDP system in the region. It will also include the identification of subjects that will actively contribute to or become leaders in the process. As part of the structures initiated in drafting RIS3, it is expected that sector priorities in the region will be discussed and a consensus will be reached.

The second specific goal is the **introduction of a system of collaboration in the field of research, development and innovation**. Reaching this goal includes a number of activities that require closer collaboration among key research organisation stakeholders with companies, the public sector, organisations that support economic development and chambers of commerce. Cooperation between the main stakeholders will lay the groundwork for sharing information and training activities and preparing joint projects. Partners from cross-border regions will also be included in this cooperation, and contacts between research organisations and managements of companies with foreign investment will be strengthened. Lastly but importantly, there are plans to establish clusters and platforms (including interdisciplinary ones) that interconnect a broad spectrum of research facilities both from and outside the region.

The third specific goal includes activities necessary for **increasing RD&I support**. These are methodology support activities regarding the use of the results of collaborative research or activities that support the involvement of regional RD&I in EU support programmes. Areas where institutions in the region already have experience implementing specific activities are services for supporting RD&I provided by specialist organisations. There appear to be opportunities in the broader use of the public administration's open data and big data in RD&I.

The final specific goal comprises measures for **strengthening technical infrastructure for research, technical development and innovation**, e.g., by introducing fast internet access

in the region and networks for IoT in cities and towns. Also under consideration is the preparation of space or buildings with the aim of placing new investors in promising fields that suitably round out the range of jobs in the region. Current trends and studies also confirm the need to build specialised shared infrastructure for testing and demonstrations (hubs) as part of new economic phenomena (Industry 4.0).

Strategic Goal 2: Improve infrastructure for collaboration among RD&I stakeholders in Pilsen Region

Specific goal 2.1: Identify and promote cutting-edge sectors (realms)

Examples of activities:

- Introduce a system for ongoing monitoring of RD&I in the region (region – Smart; RDA)
- Build an EDP system in the region (region – Smart; BIC)
- Discuss and reach a consensus on sector priorities for RD&I in the region (region – Smart; RDA)
- Regularly update the strategic documents of the region and other entities - respecting specialisations in the priorities (region).

Specific goal 2.2: Introduce system of collaboration in RD&I

Examples of activities:

- Strengthen the region's interest and facilities in RD&I – human resources, activities of RC RD&I, organisation of platforms, coordination of marketing, etc. (region)
- Create regional centre for supporting RD&I collaboration – theme-based workshops, information sharing, institutional networking, support for preparing projects (region – Smart)
- Strengthen region's collaboration especially with Bavaria and Upper Austria – public administration, research organisations, application sector (region, Pilsen, IHK, ZČU, LF UK)
- Establish regional sector platforms and clusters (RCC, IHK)
- Organise interdisciplinary platforms for identifying RD&I opportunities – linking technical, medical, social, economic and other sciences (region – Smart), ZČU, LF UK
- Strengthening contacts between research organisations and managements of companies with foreign investment (IHK, research organisations).

Specific goal 2.3: Increase support for RD&I

Examples of activities:

- Methodology support for financing and using results of collaborative research (ZČU, research organisations)
- Support for involving regional RD&I facilities in the EU, e.g., Horizon 2020 – motivation for participation, consulting support, contribution towards preparations (ZČU – RCO, project centre; BIC)
- Development of services of BIC and Pilsen STP
- Support of use of big data (Pilsen, region)
- Development of public administration's open data (Pilsen, region).

Specific goal 2.4: Strengthen infrastructure for RD&I

Examples of activities:

- High-speed internet throughout the region (region, Pilsen – ICPCP)

- Development of independent network for IoT (Pilsen – ICPCP)
- Preparation of space and buildings for developing STP-type projects in attractive locations (Pilsen, other cities/towns)
- Construction of shared infrastructure for prototyping, testing and demonstrations – hubs (STP, BIC, ZČU, RO)

8.3 Strategic Area 3: R&D Facilities

The main goal of the Strategic Area R&D Facilities is to increase the diversity of use of the region's existing research facilities. Recommended activities are primarily aimed at the broader use of significantly strengthened research and development facilities for cooperation with companies. Proposed examples of activities and measures relate to improving the environment for research facilities to cooperate with the commercial sector, particularly activities that do not require high investment costs.

The first specific goal highlights the **involvement of research organisations in international teams**. Cooperation at the European level is the best proof of the excellence of R&D organisations' activities (such as projects in Horizon 2020). Activities are focused on greater involvement of regional R&D facilities in EU programmes, European technology platforms, and/or project teams. Further activities are aimed at foreign specialists' deeper involvement in the region and improving the experience of local specialists abroad, including building a system for their return and maintenance for the region.

The second specific goal emphasises **collaboration between research organisations and the application sector**. Broader involvement of R&D facilities for the needs of the corporate sector (not only in the regional context) can be assisted at the regional level via motivational financial tools that have already been used in the past (business vouchers). Further activities also relate to the cooperation of R&D facilities for the public administration, which generates broad demand for addressing social challenges. For closer collaboration of R&D facilities with companies, organisational measures are proposed that strengthen cooperation among research teams and support the transfer of technology. These activities also add to activities for sharing information on research and development projects and clarify key competences of R&D in the region.

The third specific goal is to **improve commercialising the results of research organisations**. From a regional perspective, this is a very difficult goal to reach. This is caused by the limited capacity and concentration of research facilities in the region and by R&D facilities' primary focus on historically strong industrial sectors. One way of reaching the goal is to support the establishment of spin-off projects or sale of patents and provision of licences for the use of know-how. Involving non-public funds to develop research activities has been identified as an opportunity.

Strategic Goal 3: Increase diversity of use of research facilities in Pilsen Region

Specific goal 3.1: Increase efficiency of involvement of research organisations in international teams

Examples of activities:

- Participation of regional RD&I institutions in EU programmes (e.g., Horizon 2020) – full support of preparations and project implementation, etc. (ZČU – RCO; LF UK, BIC)
- Participation in European technology platforms (ZČU, LF UK, RO)
- Involvement of research organisation teams in international teams – mediating contacts (ZČU – RCO, LF UK, BIC, RO)

- Internships by foreign specialists at research organisations in the region (ZČU, LF UK, RO)
- Sending research workers on internships abroad (ZČU, LF UK, RO)
- Support of the return of leading specialists to the region – building a team and base, supporting activities (ZČU, LF UK, RO, region).

Specific goal 3.2: Increase collaboration between research organisations and application sector

Examples of activities:

- Financial support for collaboration between research organisations and application sector – vouchers, tax consulting on indirect support, etc. (region, Pilsen)
- Short-term internships between research organisations and public sector (region)
- Strengthening the position of technology transfer centres at ZČU to offer comprehensive solutions and services – capacity, personnel (ZČU – project centre)
- Deepen collaboration between the project centre and research teams at ZČU (ZČU)
- Catalogue of key competences in R&D in the region (region)
- Support for regularly sharing information on current projects and results of research organisations – informational website, bulletin (ZČU, LF UK, region – Smart)

Specific goal 3.3: Intensify commercialisation of results of research organisations

Examples of activities:

- Support of establishment of spin-offs (ZČU, LF UK, BIC)
- Sale of patents and provision of licences (ZČU – project centre, LF UK)
- Development of research services by involving non-public resources in research (ZČU, LF UK, RO)

8.4 Strategic Area 4: Innovation

The aim of the Strategic Area Innovation is to expand the number of companies with high innovation potential in Pilsen Region. Studies in the analysis phase suggested that Pilsen Region is not a significantly innovative region. Emphasis is therefore placed on activities supporting the establishment of new and particularly innovative companies and on reinforcing innovation activities at existing companies. Lastly but importantly, the opportunity for obtaining new investments with high innovation potential into the region is pursued. Examples of activities and projects are aimed at infrastructure for doing business and at support services, projects and communication in strategic collaboration at the regional and/or national level.

The first specific goal relates to increasing the numbers of **new domestic innovation companies** and corresponds with the fact that Pilsen Region is presented as a region with lower business activity. The current high supply of jobs further decreases the otherwise low interest in entrepreneurship. However, the greatest benefit for the region is always companies with an owner based in the region. To motivate people, especially younger people, activities that reach all the way to the school level (business schools, camps) as well as informal projects (“business hotseat” events) are proposed. Consulting and educational services, coaching, and professional assistance in overcoming early problems and risks during the starting phase of business (financing, legal matters, protection of intellectual property, etc.) build on these activities.

The key point for supporting the establishment of innovation companies is securing financing for the startup period, whether by providing grants, loans, or via venture capital. An area in which Czech and regional companies have significant room for improvement is business models and relationships. In this area it is fundamental to provide access to information on target markets and support presentations of innovative companies and their potential clients. An essential part of this set of activities for supporting the early phase of business also includes the option to use shared infrastructure (incubators or less-formal coworking centres) for startup firms.

The second specific goal is focused on activities for **strengthening the use of innovation in existing companies**. Although expenditures towards research and development in Pilsen Region is continuously increasing the corporate sector reports more than 75% of these expenses, companies in Pilsen Region still have unexploited opportunities for increasing their innovation performance. It has been shown that significant opportunity is offered by the broader involvement of new research infrastructure and experts in companies' activities. e.g., by providing information on the latest available technology or getting involved in the knowledge transfer process. An essential prerequisite is securing funding to support innovation. Obtaining European and national funding is useful for supporting the supply of specialised services.

The third specific goal is targeted at **obtaining new investments with high innovation potential**. The findings show that placing these investments require a special approach that is significantly different from the experiences obtained from supporting the placement of investors in industrial zones or logistics centres. A suitable presentation of the region or access to these investors from regional or local governments is a key ingredient which, in synergy with government agencies for the support of investment, could positively enrich the region's economic environment. It is also essential to support communication among investors and the public administration in meeting the region's priorities with respect to employment structure, connections to public infrastructure, and the necessary structure of qualifications. Support from the region and from cities and towns should also be directed towards preparing suitable space or locations and placing strategic plans.

Strategic Goal 4: Expand number of companies with high innovation potential in Pilsen Region

Specific goal 4.1: Increase number of new domestic innovation-based companies

Examples of activities:

- Motivation programmes – such as “business hotseats”, business schools, sector-focused camps, business models in schools, etc. (region, Pilsen ICPCP, DEPO; ZČU, LF UK, BIC)
- Consulting and educational support – consulting assistance, coaching, vouchers for expert assistance, etc. (BIC, CI)
- Discounted access to business services – finance, law, IPR etc. (BIC)
- Access to sources of funding – mediation of grants, microloans, venture capital, capitalisation of public support, etc. (BIC, CI)
- Support for the development of business relationships –presentation of plans to larger companies, at trade fairs, etc. (RCC, PCC, IHK, CI)
- Discounted access to infrastructure for start-ups –coworking, incubator, etc. (BIC, STP, Pilsen – ICTCP, DEPO; COMTES FHT).

Specific goal 4.2: Strengthen the use of innovation in existing companies

Examples of activities:

- Providing information about the latest technologies available (BIC, ZČU, LF UK)
- Getting companies involved in EU projects for developing highly innovative plans, e.g., SME Instrument (BIC)
- Securing financial support to develop RD&I facilities –business RD&I, access to ESIF/ITI funds, etc. (BIC)
- Supporting the transfer of knowledge – purchasing licences, getting external specialists involved in innovation projects at companies (ZČU, LF UK, BIC)

Specific goal 4.3: Obtain major investments with high innovation potential

Examples of activities:

- Strategic cooperation with government agencies focused on supporting investments with high innovation potential (region, Pilsen)
- Definition of suitable space for implementing investments with a significant share of RD&I (Pilsen, other cities/towns)
- Support of strategic business plans from the region and local governments (region, Pilsen, other cities/towns)

8.5 Strategic Area 5: RD&I marketing

The Strategic Goal of RD&I marketing is to strengthen Pilsen Region's reputation in the world of RD&I. The introductory preparatory phase encompasses the creation of a regional innovation marketing strategy and introducing organisational measures to ensure it functions. The main focus is then to implement marketing strategy activities with the aim of building the region's identity as a region that supports innovation business.

The first specific goal is directed at **creating and regularly evaluating the regional innovation marketing strategy**. This is a dovetailed set of studies and analyses, defining goals and target groups leading to the creation of its own strategy. This also involves updating the regional innovation marketing strategy.

The second specific goal is to **introduce a functioning system for organising regional innovation marketing**. In the baseline situation, at the regional level there is no technology, organisation or staff available to implement a regional innovation marketing strategy. Activities are therefore focused on creating organisational structures and introducing a system of cooperation, incl. distributing competencies in this area. Structures and mechanisms created in connection with drafting Pilsen Region's RIS3 will be used for this to the maximum extent.

The third specific goal is focused on **implementing the marketing strategy and building the region's identity**. This concerns a broad range of activities in building the region's brand as an innovative region. The strategy's activities include communicating with target groups, sharing stories of successful innovation projects, communicating current and promising topics, etc. To achieve a specific goal, it is foreseen that a regional medium will be formed that will promote results, successes and trends in the field of research, innovation, education and employment in Pilsen Region.

Strategic Goal 5: Strengthen Pilsen Region's reputation in the world of RD&I

Specific goal 5.1: Create and regularly evaluate the regional innovation marketing strategy

Examples of activities:

- Studies and analyses verifying conditions and goals
- Definition of new goals, revision of target groups
- Drafting and approving the strategy and updates

Specific goal 5.2: Introduce a functioning system for organising regional innovation marketing (RIM)

Examples of activities:

- Organising the running of RIM (coordinator, interested partners, management processes)
- Organising the implementation of the marketing strategy (RASCI matrix, sharing budgets, etc.)
- Designating the rules of cooperation between the RIS3 coordinator and RIM coordinator.

Specific goal 5.3: Implement the marketing strategy and build the region's identity

Examples of activities:

- Building the region's strong brand as an innovative region (internally, externally)
- Actively communicating with the target groups in Strategic Areas (tools determined by RIM strategy)
- Communicating successful innovations in the corporate sphere, stories, practical impacts on people's lives
- Communicating primary current and promising research themes, results, people and stories in RD&I
- Communicating an innovated educational system and job perspectives
- Establishing a regional medium to promote results, successes and trends in the field of research, innovation, education and employment (digital, print).

9 Implementation of RIS3

Pilsen Region's RIS3 is a fundamental development document that supports research, development and innovation activities in Pilsen Region. The implementation of the strategy is reflected in the management and financing of entities active in RD&I and in preparations for projects in this field. The existence of a regional strategy is a general condition for drawing on ESIF funds.

To implement the Strategy, it is fundamental that an organisational chart be established, including an overview of essential activities and a description of the organisation, organisational structure and activities of individual divisions involved in the Strategy.

The fulfilment of Pilsen Region's RIS3 requires the following activities:

1. Strategy implementation management
2. Project preparation and implementation
3. Monitoring of strategy implementation
4. Updates to the strategy

To manage RIS3, existing mechanisms and structures used to implement the Pilsen Region Smart Accelerator project, the mission of which is to draft and update the strategy and contribute to its implementation, will be utilised to the maximum extent.

9.1 Management of RIS3

In terms of the hierarchy of management, implementation of the strategy can be divided into:

- Strategic management
- Operative management

The **Strategic management** of RIS3 is in the full competence of the Strategy's contracting authority, i.e., Pilsen Region and specifically the region's leadership. The strategic management of RIS3 for the region encompasses:

- Making the RIS3 strategy
- Updating RIS3 (see below)
- Evaluating the implementation of RIS3 (see below)

The **Pilsen Region Council for Research, Development and Innovation** (RC RD&I) will provide the region's leadership with significant support in the strategic management of RIS3. RC RD&I is an advisory body to the Pilsen Regional Council on the field of research, development and innovation. Its main mission is to coordinate the creation and implementation of RIS3 in Pilsen Region. RC RD&I performs the role of a steering group (of the RIS3 platform) in accordance with the European Commission's S3 Guide.

It is useful to get a broader circle of persons from all areas relevant for RD&I involved in the strategic management of RIS3. For this purpose, the specialist platforms created as part of the implementation of the Smart Accelerator project, are included in strategic management:

- Human resources for research, development and innovation in Pilsen Region
- Facilities and results of research, development and innovation in Pilsen Region
- Working group – marketing

The number and structure of platforms and/or working groups may change in the future. It is expected that meetings between the Regional Council, platforms and working groups will be held at least twice per year. This is important to maintain stakeholders' interest in the

Strategy, to actively involve various organisations and persons in implementation, and to transfer findings and experience to the RIS3 strategic management level.

The **operative management** of implementation of the Strategy is provided by the Pilsen Region Smart Accelerator project team until 2019. The team comprises staff from the Pilsen Regional Authority and staff from RDA Pilsen Region.

The operative management of RIS3 primarily encompasses:

- Supporting preparations and implementation of activities
- Meeting partners – activity guarantors
- Monitoring project preparation and implementation
- Communicating with other subjects (e.g., at the national level, companies, etc.)
- Educating and informing
- Coordinating activities
- Ensuring the organisational structure is functioning

Besides project preparations, implementation and monitoring (see next chapter), operational management will also include ongoing communication with public and private subjects, including obtaining feedback about the current state of RIS3 towards the drafters of the National Innovation Strategy (NIS3 ČR) and other entities at the national and regional level. At the same time, educational and information events will be carried out in the field of RD&I support at the regional level (conferences, workshops, popularisation and marketing events, etc.). An essential part of operative management is the coordination of all activities, incl. ensuring that the organisational structure is functioning.

For presentations and current information, the websites of Pilsen Region, key partners and the Smart Accelerator project www.inovujtevpk.cz will be used.

9.2 Project preparation and implementation

Project preparation and implementation is primarily connected with the performance of activities in individual strategic areas, drafting Project Fiches, identifying external sources of funding, and communicating with the guarantors of individual activities. Organising project preparations is the job of the Smart Accelerator team working in close conjunction with the guarantors of the activities in the Action Plan.

One of the outputs of operative management of Strategy implementation is monitoring the status of preparations and implementation of the projects and, if applicable, other activities. This is also the basis for strategic management, especially for evaluating the implementation of the Strategy (see below).

9.3 Evaluation of RIS3 implementation

As part of the regular evaluation of RIS3, the fulfilment of the Action Plan in connection to RIS3 will be assessed once per year. The results will be processed in the form of a report.

The report will contain the following sections:

- a) Overview of projects under preparation, underway and completed
- b) Comparison of the projects with the Action Plan and RIS3
- c) Assessment of fulfilment of the goals of RIS3 based on indicators
- d) Evaluation of developments in the region's RD&I based on context indicators (see proposed activity of RIS3)

- e) Proposal to update of priority activities in the Action Plan for the next period
- f) Proposal to update RIS3, if applicable (see below)

The Pilsen Region Department of EU Funds and Projects (DFP) ensures that the report is prepared with support from the Smart Accelerator team, and it submits the report to RD RD&I for discussion. DFP submits the result of the meeting with RC RD&I, including recommendations, to the leadership of Pilsen Region for further discussion.

The report, including comments by RC RD&I and Pilsen Region authorities, will subsequently serve as the specifications for updating the Action Plan or for updating RIS3 itself.

9.4 Update of RIS3

Given the need to define the vertical priorities – realms of specialisation – of Pilsen Region (per the commitment in the Smart Accelerator project), the strategy sections of RIS3 must be updated by the end of 2019. It would be practical to make additional updates based on the assessment of the implementation of RIS3 (see previous subchapter).

The basis for the update is always the last report evaluating the implementation of RIS3, which details the results and, if applicable, impacts of completed projects as well as changes in the external conditions.

The subject of the update may be one of the RIS3 segments:

- The Main Goal and Strategic Goals form the stable framework of the Strategy; updating them is subject to finding significant changes in the region's development.
- Specific goals may be updated, i.e., cancelled or supplemented, based on an assessment of whether they are still current and relevant given the region's development.
- Examples of activities are updated in connection with a review of the measures or based on new needs that are identified, for example, when discussing the annual evaluation of RIS3 implementation.

10 Financial support of RIS3

The purpose of the chapter is to submit the financial planning structure for fulfilling RIS3 and to establish the main sources for implementation. A definition of the sources and evaluation of their accessibility should also be included in decision on priority activities, which will result from the Action Plan preparation process. Establishing the precise amount of funding needed to implement the strategy in its full scope by 2020 is the subject of the Action Plan (i.e., a set of select projects with estimates of time, technical and financial requirements).

Funding needed to implement RIS3 up to 2020 can be identified in two main areas: management of RIS3 and project preparations and implementation.

10.1 Management of RIS3

RIS implementation requires that facilities for managing implementation be secured, particularly: monitoring and evaluating developments in the main indicators of the sphere of action of RIS, systematically coordinating regional partnership in RD&I, and forming a joint consensus about key priorities. An essential part of RIS management is also monitoring and providing organisational support for complementarity between the roles and processes of the stakeholders in the regional innovation ecosystem. Important associated activities can also be included in this category, particularly those concerned with providing a regional RD&I contact point, which acts as an umbrella for the connections and processes associated with implementing RIS3.

To a certain extent, management of RIS3 is one of the key elements for a functioning innovation ecosystem. The public administration, and particularly Pilsen Region, which is considered the lead manager of RIS, has a key role in securing funding for this area.

Beyond its own funds, it currently secures the funding needs for OP RDE via the Smart Accelerator project, which Pilsen Region is implementing in partnership with RDA Pilsen Region and other subjects. This project largely secures the funds for managing RIS3 up to 2019. In cooperation with representatives of the region and central institutions (Government of the Czech Republic and MEYS), discussions are underway on possible support for implementing RIS management as part of a continuation of the Smart Accelerator project even after 2019.

Besides this systemic tool for securing funding for RIS3 management, it would be good to seek additional sources, e.g., by involving regional partners in suitably focused grant projects of European cooperation.

10.2 Development project preparation and implementation

The performance of most development activities in RIS3 fall under the responsibility of individual stakeholders in the regional innovation ecosystem (see identification of subjects responsible for proposed activities in the strategy). Priority activities should become part of these subjects' strategic and financial plans.

Given the anticipated financial needs of implementation, it can be foreseen that besides the stakeholders' own sources and with respect to current capabilities, it is necessary to use external sources. It is therefore desirable to come to an agreement at the RIS financial plan level regarding individual stakeholders' responsibility to take care about obtaining these available resources. In this regard it is also essential that the agreement created regarding the content and objectives of RIS be used in the preparation and regional focus of existing or prepared development programmes and measures (e.g., preparation of ESIF 2021+, ITI,

focus of TACR national programmes, etc.). Internal public sources (such as regional and local budgetary funds) should be used especially in cases where the responsible entity is unable to secure the fundamental priority of RIS from its own funds, or if this priority cannot be secured from external financing.

To create a framework summary of considered external sources for funding RIS3 in connection with its goals, the following table has been created:

Specific goal of RIS	Programme	Examples of supported activities
SG 1.1: Increase involvement of universities in the region in international networks	OP RDE, PO2 (SG5)	International mobility of research workers
	ERASMUS+	International internships for instructors
	Horizon 2020, PO1, "Excellent Science"	Marie Skłodowska-Curie, Exchanges (Research and Innovation Staff Exchange, RISE), Individual scientific research residences for experienced research staff
SG 1.2: Expand the range of modern multidisciplinary study programmes at universities and secondary schools	OP RDE, PO2 (SG5)	Development of research-oriented study programmes Preparation of new study programmes
SG 1.3: Strengthen the network of collaboration among educational institutions of all stages and research organisations in seeking talent and fostering specialists		
SG 1.4: Teacher motivation and improvements in training	OP RDE, PO3	Implementation of KAP (Regional Action Plan)
SG 2.1: Identify and promote cutting-edge sectors (realms)	OP RDE, PO2 (SG5)	Smart Accelerator
SG 2.2: Introduce system of collaboration in RD&I	OP RDE, PO2 (SG5)	Smart Accelerator
SG 2.3: Increase support for RD&I	OP RDE, PO2 (SG5)	Smart Accelerator
	EUPRO II (MEYS)	Assistance in preparation and administration of international research projects, e.g., activity of RCO at ZČU
	OPEIC, PO1	Development of services (consulting).
SG 2.4: Strengthen infrastructure for RD&I	OPEIC, PO4, (SG 4.1)	Building high-speed internet network
	OPEIC, PO1 SG 1.2	Infrastructure services (development of science and technology parks, incubators)
SG 3.1: Increase efficiency of involvement of research organisations in international teams	OP RDE, PO2 (SG5)	International mobility of research workers
	OP RDE, PO1, SG 1	Research teams of excellence, Teaming, Phased projects, Excellent research, Research infrastructure, Teaming II 2017, Excellent research 2018
	OP RDE, PO1, SG 2	Pre-application research 2017, Long-term cooperation 2017, Pre-application research 2018
	Horizon 2020, PO1, "Excellent Science"	Marie Skłodowska-Curie, Exchanges (Research and Innovation Staff Exchange, RISE), Individual scientific research residences for experienced research staff (incl. return of research workers)

	EUPRO II (MEYS)	Assistance in preparation and administration of international research projects, e.g., activity of RCO at ZČU
SG 3.2: Increase collaboration between research organisations and application sector	OP RDE, PO1, SG 2	Long-term cooperation between companies and research organisations
	OP RDE, PO2 (SG5)	Building expert facilities – transfer of technology (CTT)
	OPEIC PO 1 (SG 1.1)	Support for developing RD&I facilities in companies (Potential, Innovation, Application)
	OPEIC, PO1, (SG1.1)	Innovation vouchers, proof of concept, knowledge transfer partnerships (purchase of consulting, expertise and support services in innovation from organisations for research and disseminating knowledge and from accredited laboratories)
	Horizon 2020, Eureka, Eurostars	Support of international applied research and experimental development projects (collaborative research, collaboration between research organisations and practical sphere)
	TACR programmes such as Epsilon, etc. and individual resorts, e.g., Trio – MIT	Support for applied research and experimental development projects, particularly at the national level Achieving patents, prototypes, functional samples, industrial designs and utility models, semi-industrial verification of technology, software.
SG 3.3: Intensify commercialisation of results of research organisations	OPEIC, PO1, SG1.1, Innovation Programme	Projects for protecting intellectual property rights
	TACR, Gama programme	Support for commercialising the results of RD&I achieved at research organisations
	OPEIC, PO1, (SG1.1) Proof of concept Programme	Verification of the commercialisation of RD&I results (designated for SMEs)
	Horizon 2020, SME Instrument, TACR, Gama programme	Verification of the commercialisation of RD&I results with international potential (designated for SMEs)
	CzechInvest programmes, esp. Czech-Starter, Demo, Eco System	Support of establishment of start-ups (including spin-offs) with international potential (activities such as coaching, mentoring, participation in prestigious international conferences and trade fairs, residence at prestigious business centres, etc.)
SG 4.1: Increase number of new domestic innovation-based companies	OPEIC PO2, (SG2.1)	Support for enterprises using innovation infrastructure, consulting support, provision of capital, support during expansion
	OPEIC, PO1 SG 1.2	Infrastructure services (development of science and technology parks, incubators)
	OPEIC PO2, (SG2.2)	Marketing support for operating on international markets.

	CzechInvest programmes, esp. Czech-Starter, Demo, Eco System	Support of establishment of start-ups (including spin-offs) with international potential (activities such as coaching, mentoring, participation in prestigious international conferences and trade fairs, residence at prestigious business centres, etc.)
	CMZR Bank	Discount loans, loan guarantees
SG 4.2: Strengthen the use of innovation in existing companies	OPEIC PO 1 (SG 1.1)	Support for developing RD&I facilities in companies (Potential, Innovation, Application), incl. purchasing equipment, technology and intellectual property rights
	Further programmes listed for SG 3.3. focused on companies	Support of RD&I projects
SG 4.3: Obtain major investments with high innovation potential	CzechInvest, MIT	Programmes supporting preparation of infrastructure, investment incentives.
SG 5.1: Create and regularly evaluate the Strategy for regional innovation marketing	OP RDE, PO2 (SG5)	Smart Accelerator
SG 5.2: Introduce a functioning system for organising regional innovation marketing		
SG 5.3: Implement the marketing strategy and build the region's identity		

Sources used

- *SLDB 2011 – Vzdělanostní struktura obyvatelstva [PHC – Educational structure of population]*. CSO. 2016. [on-line]. Available from: <https://www.czso.cz/csu/czso/uroven-vzdelani-obyvatelstva-podle-vysledku-scitani-lidu-2011-xllg5xjb8g>
- *Statistická ročenka Plzeňského kraje 2016 [Yearbook of Pilsen Region Statistics 2016]*. CSO. 2017. [on-line]. Available from: <https://www.czso.cz/csu/czso/statisticka-rocenka-plzenskeho-kraje-2016>
- *Terciární vzdělávání – databáze [Tertiary education – database]*. Ministry of Education, Youth and Sport. 2017. [on-line]. Available from: <http://www.msmt.cz/vzdelavani/skolstvi-v-cr/statistika-skolstvi/terciarni-vzdelavani>
- *Finanční a lidské zdroje [Financial and human resources]*. CSO. 2017. [on-line]. Available from: https://www.czso.cz/csu/czso/financni_a_lidske_zdroje
- *Věda, výzkum a inovace [Science, research and innovation]*. CSO. 2017. [on-line]. Available from: https://www.czso.cz/csu/czso/veda_a_vyzkum_veda
- *Výsledky výzkumu a vývoje [Results of research & development]*. CSO. 2017. [on-line]. Available from: https://www.czso.cz/csu/czso/vysledky_vyzkumu_a_vyvoje
- *Vyspělé technologie [Advanced technology]*. CSO. 2017. [on-line]. Available from: https://www.czso.cz/csu/czso/vyspele_technologie
- *Regionální účty 2015 [Regional accounts 2015]*. CSO. 2016. [on-line]. Available from: http://apl.czso.cz/pll/rocenka/rocenka.indexnu_reg
- *Roční národní účty [Annual National Accounts]*. CSO. 2016. [on-line]. Available from: <http://apl.czso.cz/pll/rocenka/rocenka.indexnu>
- *Patentová statistika [Patent Statistics]*. CSO. 2017. [on-line]. Available from: https://www.czso.cz/csu/czso/patentova_statistika
- *Licence [Licences]*. CSO. 2017. [on-line]. Available from: <https://www.czso.cz/csu/czso/licence>
- *Statistiky nezaměstnanosti [Unemployment Statistics]*. Ministry of Labour and Social Affairs. 2017. [on-line]. Available from: <http://portal.mpsv.cz/sz/stat/nz>
- *Inovační aktivity podniků v České republice 2010-2012 [Innovation Activities of Companies in the Czech Republic, 2010–2012]*. CSO. 2014. [on-line]. Available from: <https://www.czso.cz/csu/czso/inovacni-aktivity-podniku-v-cr-2010-az-2012-up1r9kkmj3>
- *Inovační aktivity podniků v České republice 2012-2014 [Innovation Activities of Companies in the Czech Republic, 2012–2014]*. CSO. 2016. [on-line]. Available from: <https://www.czso.cz/csu/czso/inovacni-aktivity-podniku-v-cr-2012-az-2014>
- Mazouch, P., Fischer, J., (2011): *Lidský kapitál – měření, souvislosti, prognózy [Human Capital – Measurements, Connections, Prognoses]*. First edition. Prague: C. H. Beck.
- Blažka, M., Šperlink, K., (2016): *Průvodce systémem veřejné podpory výzkumu, vývoje a inovací v České republice 2016 [A Guide to the System of Public Support for Research, Development and Innovation in the Czech Republic 2016]*. Pilsen: COMTES FHT a.s., 176 pp.
- *Firmy v Plzeňském kraji podle počtu zaměstnanců, odvětví ekonomické činnosti a právní subjektivity [Companies in Pilsen Region by Headcount, Sector and Legal Personality]*. CSO. 2016. [Database].
- *CzechInvest – programy podpory [CzechInvest – Support Programmes]*. CzechInvest. 2017. [on-line]. Available from: <http://www.czechinvest.org/programy-podpory>

- *Program TRIO [Trio Programme]*. Ministry of Industry and Trade. 2017. [on-line]. Available from: <https://www.mpo.cz/cz/podnikani/podpora-vyzkumu-a-vyvoje/informace-a-dokumenty-k-realizaci-programu-trio-1--verejna-soutez--223414/>
- *Programy TAČR [TACR Programmes]*. Technology Agency of the Czech Republic. 2017. [on-line]. Available from: <https://www.tacr.cz/index.php/cz/o-ta-cr.html>
- *Operační program Podnikání a inovace pro konkurenceschopnost [Operational Programme Enterprise and Innovation for Competitiveness]*. Agency for Enterprise and Innovation. 2017. [on-line]. Available from: <https://agentura-api.org/>
- *Operační program Výzkum, vývoje a inovace [Operational Programme Research, Development and Innovation]*. Ministry of Education, Youth and Sport. 2017. [on-line]. Available from: <http://www.msmt.cz/strukturalni-fondy-1/op-vvv>
- *Program Horizont 2020 [Horizon 2020 Programme]*. Technology Centre of the Academy of Sciences of the Czech Republic. 2017. [on-line]. Available from: <https://www.h2020.cz/cs>
- *Websites of main stakeholders in Pilsen Region innovation environment* – without specification
- *Seznam příjemců podpory EU pro programové období 2007-2013 (stav k 6/2016) [List of recipients of EU support for the 2007–2013 programme period (as of June 2016)]*. European Structural and Investment Funds. 2017. [on-line]. Available from: <http://dotaceeu.cz/cs/Fondy-EU/Programove-obdobi-2007-2013/Cerpani-v-obdobi-2007-2013>