

# D.T1.2.1: MAPPING REPORT THE 9 ELEMENTS OF INDUSTRY 4.0 COMPARED TO SMES NEED IN EACH RIS3 REGION

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D.T1.2.1 Mapping Report the 9 elements of Industry 4.0 compared to SMEs need in each RIS3 region **FINAL VERSION**  
**02/2020**

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Regional Development Agency in Bielsko-Biała - PP3 - Poland





Project Number	CE1492
Project Name	Towards the application of Industry 4.0 in SMEs
Project Acronym	4STEPS
Work package	WPT1-The SME towards the scenario and themes of Industry 4.0
Activity	Activity 1.2-RIS3 SMEs and Industry 4.0
Deliverable	<b>Deliverable D.T1.2.1</b> -Mapping Report the 9 elements of Industry 4.0 compared to SMEs need in each RIS3 region
WP responsible partner	Pannon Business Network
Dissemination Level	Public
Date of Preparation	<ol style="list-style-type: none"> <li>1. Template: 11.2019 prepared by PBN</li> <li>2. Finalised version: 02/2020 prepared by PP3</li> </ol>
This document must be referred to as	Mapping Report the 9 elements of Industry 4.0 compared to SMEs need in each RIS3 region- Regional Development Agency in Bielsko-Biała - PP3 - Poland
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# 1. Introduction of the 4STEPS project

## *Objectives & Activities:*

4STEPS project is addressing the main challenge of Industry 4.0 (I4.0) as tool towards a new, digital industrial revolution holding the promise of increased flexibility in manufacturing, mass customisation, increased speed, better quality and improved productivity and its development is supporting the RIS3 in the target regions in the different sectors. SMEs in the target regions are lagging behind in the adoption of innovative tools and solutions proposed by I4.0 revolution and need to increase transnational collaboration in facing this challenge.

The main project objective is to support the successful RIS3 implementation applying the I4.0 to all the industrial sectors identified by each region. The innovative elements of 4STEPS will be the methodology applied based on the involvement of all the actors of the quadruple helix, thanks to a bottom up approach. SMEs will be the main target and they will be involved via the CE network of the Digital Innovation Hubs (DIH)- including also the relevant stakeholders of the R&D sector, governance actors, society thanks to a holistic approach. 4STEPS will lead to an improved level of innovative productive methods and application of I4.0 thanks to a Catalogue development of main possible services offered, a Technology Maturity Level Index development, Transnational Action plan and the creation of the Digital Innovation Hubs, tested during the pilot actions. Within this approach of networking 4STEPS will include also a solution preparing the CE citizen towards the digital future during targeted workshop for digital skills improvement. The project approach developed within the 4STEP S project will consider the Industry 4.0 plans applied in CE countries which is are linked to the digitalised production system that will result in a wide range of changes to manufacturing processes, outcomes and business models.

The current Mapping Report (D.T1.2.1) is prepared in the framework of the first thematic work package (abbreviated as WPT1) of the project. WPT1, which is led by PP6 Pannon Business Network Association, includes identifying the different methodologies oriented to enable the approach of RIS3 small companies to the issues of Industry 4.0. These methodologies include mapping the contents of Industry 4.0,



focusing in particular on the priorities of the national and regional plans, as regards the needs of SMEs, i.e. a correlation among the **9 technologies of Industry 4.0 (Big Data, Augmented Reality, Simulation, Internet of Things, Cloud Computing, Cyber Security, System Integration, Additive Manufacturing, Autonomous Systems)** and their redefinition as regards needs, prospects and scenarios of RIS3 business sectors.

## 1.1 Objective of this report

This current report **shall map and compare the SMEs needs** focusing in particular the priorities of the national plans, i.e. a correlation **among the 9 Industry 4.0 technologies** and their redefinition as regards needs, prospects and scenarios of SMEs.

The Lead Partner, PP2 and PP6-as WPT1 leader- preliminary developed a common structure to the current report, and this proposal was distributed among the partnership. Following that the partners provided some valuable feedbacks how to modify the report, and these inputs were integrated to the proposal, and then the **common structure of the mapping report could be finalised.**

Every partner (LP+PP2 are working together) will prepare a separate mapping report based on the results of their own SME involvement in their regions.

Since the quantification target of the Mapping Report according to the project requirement (D.T1.2.1) is 8, partners will be working in their own report document following the common structure, and the 8th document will be a transnational summary/comparison, which will present a comprehensive picture about all results in the partnership. This transnational summary will be prepared by the WPT1 Lead Pannon Business Network based on the separate results provided by the partners.

## 2. Introduction to the regional context



## - 2.1. General context

Industry 4.0, i.e. basing industrial processes on advanced data processing systems, automation, the Internet of Things and smart technologies, is a concept that is increasingly often referred to in the context of specific business needs. It is also a response to personnel problems and trends in customization.

According to the survey conducted by PSI Poland, the term Industry 4.0 was met by more than half the companies (52%). Bigger knowledge of this concept was shown by large manufacturers (62%) than the average (41%). As many as 70% of companies knowing the concept of Industry 4.0 planned or already started to implement solutions being its element. Large companies were the leader here, because more than 3/4 of them (77%) took such actions. Among the average players this indicator was 59%, but both groups were equally eager to declare the implementation of these technologies in the future. Manufacturers of machines and equipment (87%) and cars and transport equipment (70%) were most enthusiastic about this process.

When asked about the most strategic solutions from the area of Industry 4.0, the surveyed companies gave advanced IT systems in the first place - they were indicated by 57% of the surveyed entities in total, including as much as 70% of large companies.

industrial revolution), the companies indicated technologies enabling cooperation between people and robots. Their importance was appreciated by 52% of the surveyed, 22% of companies have already implemented them, and almost 1/4 planned to implement them within the next 2-3 years. These solutions were more promising for medium-sized companies (60% of indications).

At the same time, the low position of other areas of Industry 4.0 is interesting. 24% of respondents considered Artificial Intelligence to be a strategic solution, and Big Data technologies only 8%. The situation in the area of implementation of these technologies was even worse - their use was declared by 1% and 4% of companies respectively<sup>1</sup>.

In other report, prepared by IDG and ABB, the strategic level was more stressed out. The survey shows that only 14% of companies have developed a strategic transformation plan for activities within the Industry 4.0 and started to implement it. Almost half (48%) declare that activities related to the digitisation of manufacturing processes are not anchored at the level of the company's strategy, although smaller projects in this area are carried out. And what is most worrying - more than every fourth company (27%) does not intend to carry out any activities related to the broadly understood Industry 4.0<sup>2</sup>.

## - 2.2. National and regional priorities regarding I4.0

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<sup>1</sup> Based on the results of report „Readiness of manufacturing companies to implement Industry 4.0 solutions” prepared by PSI Poland

<sup>2</sup> Based on the results of the report „Towards the Economy 4.0” prepared by IDG and ABB



On the national level there is a dedicated foundation operating in terms of Industry 4.0 dissemination and programming. It was created last year under the name of The Future Industry Platform.

One of the key activities of the Platform is to build an appropriate environment around Industry 4.0, based on cooperation and trust. To this end, the foundation will cooperate, coordinate and standardize Digital Innovation Hubs (DIHs). The Hubs are to operate on the basis of an appropriate technological infrastructure (competence centres) and provide access to the latest knowledge and technology in order to support entrepreneurs in pilot activities, tests and experiments of a given technology. The aim is to increase productivity and change business models.

The platform is to propose technological solutions from the area of industry 4.0, as well as necessary change, knowledge and innovation management in their application. Its task is also to create mechanisms for cooperation, knowledge sharing and building trust in relations between entities involved in the process of digital transformation. It is also to provide non-financial support (training, consultancy, undertakings integrating entrepreneurs in the area of digital transformation). This support will be granted to entrepreneurs, entities managing innovative clusters, entities operating for innovative economy and social and economic partners operating for development.

### - 2.3. S3 Strategy in the next programming period (regional or national level according to the partner)

In the “Assumptions for the Partnership Agreement for 2021-2027” it is indicated that: The transition must take into account the need for the industrial sector to evolve towards what is referred to as “Industry 4.0” and take into account the global trend of increasingly relying on data that is becoming a value-creating production resource. This requires support for investments that increase digitisation, automation or robotisation rates of enterprises. It is therefore necessary to treat IT not as a separate industry, but as a cross-cutting issue, present throughout the economy. These measures will be complemented by the development of national institutions (public and private) which support the modern economy, i.e. create an ecosystem of innovation and entrepreneurship at the national, regional and local level.

## 3. Description of the sample

### -3.1 Criteria for the sample’s selection

The aim of the questionnaire was to map the needs of SMEs in the region in terms of their technology maturity level. As the scope of activities of Regional Development Agency in Bielsko-Biała (RDA) is the Southern Subregion of Silesia Voivodeship we decided to focus on this territory and smart specialisations indicated in the strategic documents related to it.

In order to ensure the appropriate degree of professionalism and feasibility of the questionnaire service, we decided to hire an external expert for this task. In the procurement procedure we have received there offers, from which we have chosen the one that was the most appropriate in terms of geographical scope, know the specificity of the local market and have proper experience in terms of conducting the surveys.



The questionnaire has been conducted by Regional Chamber of Commerce and Industry - the institution with a direct access to the entrepreneurs and relevant knowledge about their needs.

The impact area of RDA covers Southern Subregion of Silesia Voivodeship, so we have focused of smart specialisation priorities and the most relevant sector of this specific territory. We decided to choose automotive sector as one of the most developed, and related to various types of services - from software programming, through electronics and car repairing to car parts production and cars distribution.

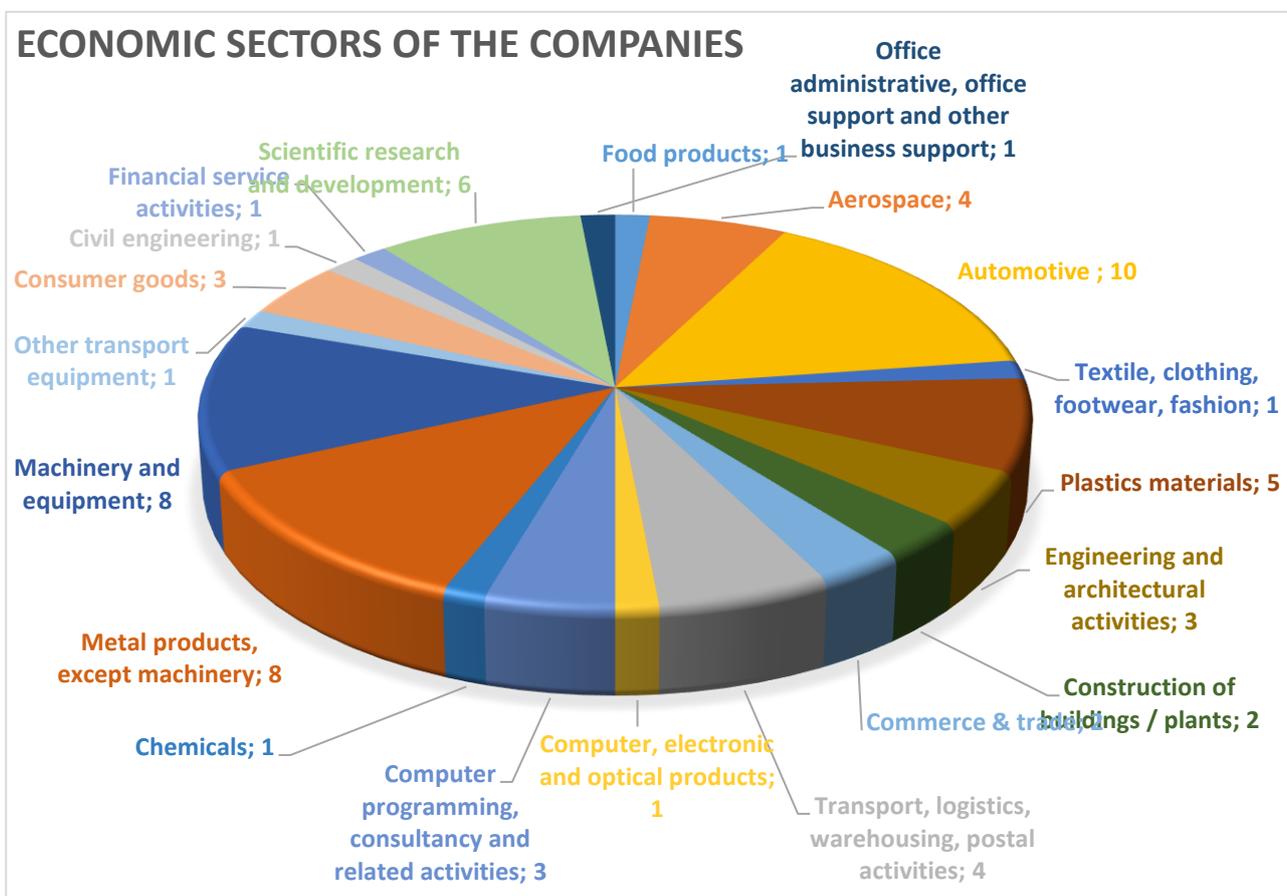
### - 3.2 Economic sectors represented

We have chosen automotive sector as one of the most developed in the region. As a wide range of companies work under the automotive, in the survey we can find 20 different sectors indicated in terms of the company operations (in line with NACE).

Nevertheless, most of the companies that took part in the survey have indicated automotive as the sector of their company, of their suppliers or customers.

The graphs below show how the answers were given by the surveyed' companies in terms of their own operations (graph 1), their suppliers (graph 2) and their customers (graph 3).

*Graph 1. Economic sector represented by the surveyed' companies.*



*Graph 2. Economic sector represented by the suppliers of surveyed' companies*

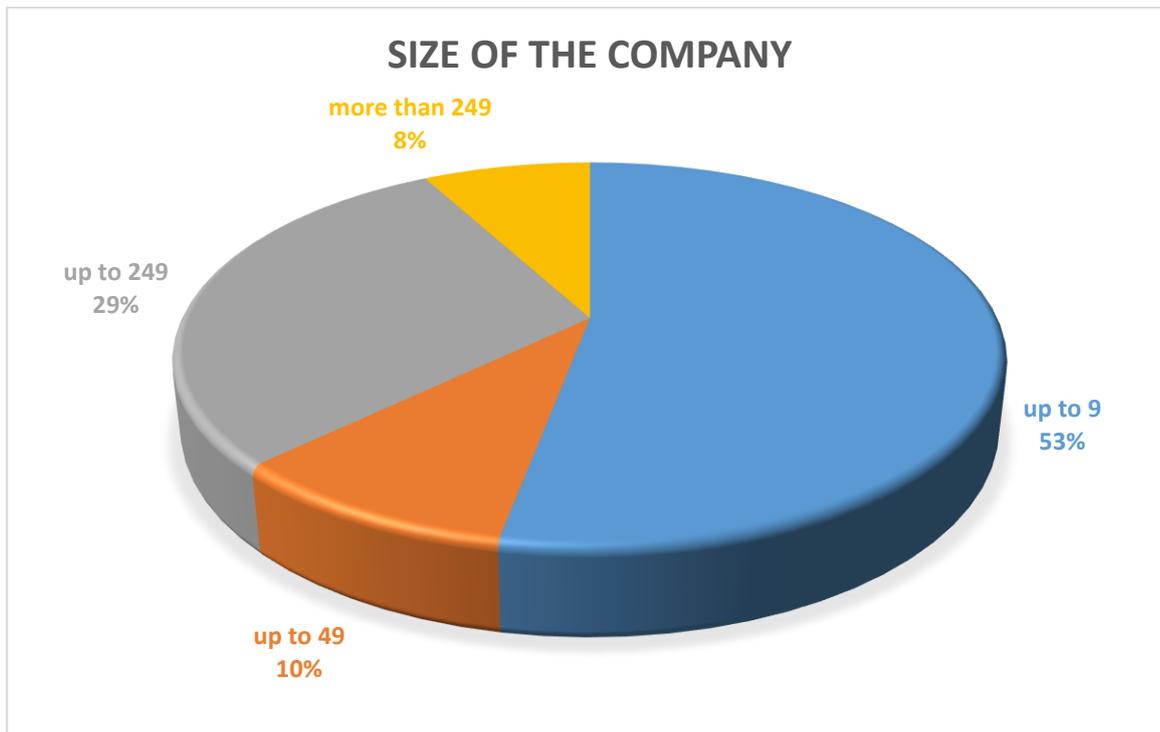




### - 3.3. Size

More than 90 % of the companies were from SME sector, the rest where big companies.

*Graph 4. Division of the companies in terms of their number of employees.*



As it is shown in the graph above, micro enterprises constituted more than the half of the sample. 39 % were small and medium companies and 8% were big ones.

In terms of the annual turnover and year balance not all of the companies have given the answer. However, we can see the ratio between micro, small, medium and big remains the same.

By choosing this kind of companies we wanted to have an overview of the real situation on the market, as the highest number of companies are from the micro and SME sector.

### - 3.4 Geographic distribution

The survey was conducted in the Southern Subregion of Silesia Voivodeship. This is the area of impact of Regional Development Agency.

## 4. The SMEs and the 9 pillars

*Specific to each region*

Mapping of the

attitude of the interviewed SMEs towards the 9 enabling technologies



#### 4.1. In case of end users:

In terms of the level of adaptation 75 % in average declared that they haven't used Industry 4.0 technologies. Augmented reality (90%), autonomous robots (84 %) and IoT (76 %) were indicated the most times.

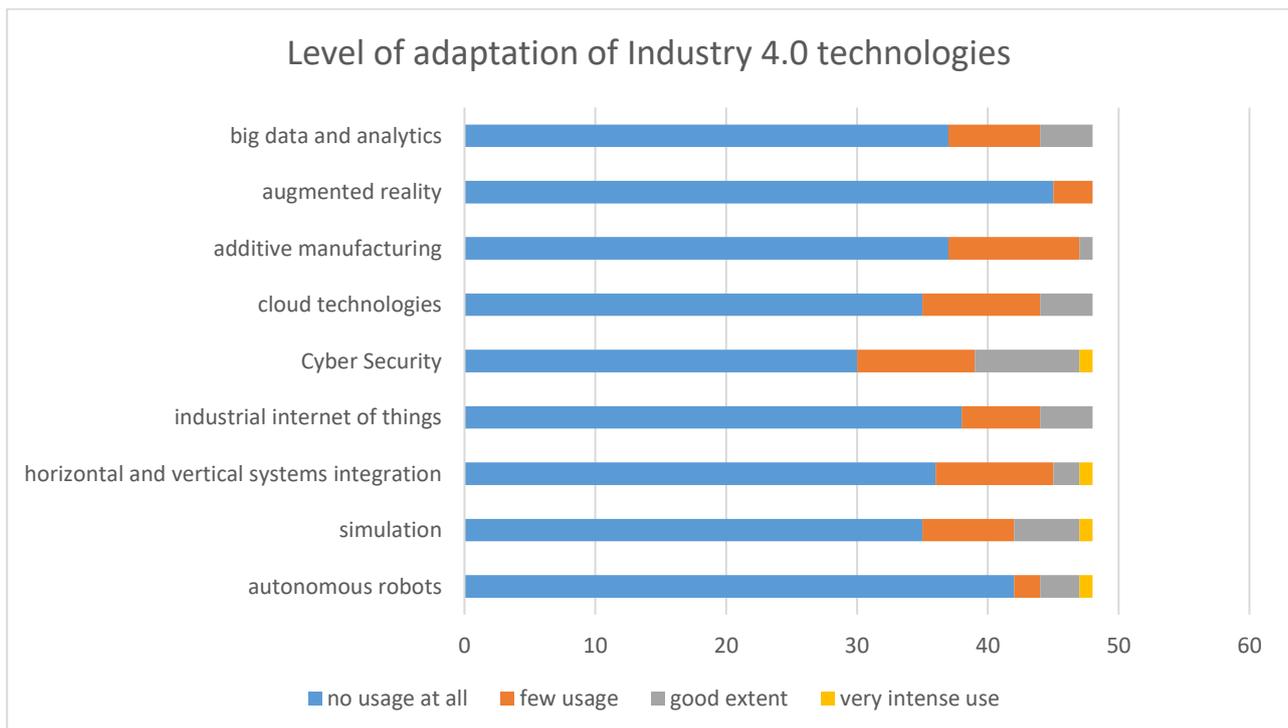
The companies that have indicated that they are using the Industry 4.0 technologies, have indicated mostly the: additive manufacturing, cloud technologies, cybersecurity, systems integration.

The answer "very intense usage" (of Industry 4.0 technology) was indicated 4 times in total.

Table 1. Usage of Industry 4.0 technologies.

Technology	Answers of the companies			
	no usage at all	few usage	good extent	very intense use
autonomous robots	42	2	3	1
simulation	35	7	5	1
horizontal and vertical systems integration	36	9	2	1
industrial internet of things	38	6	4	0
Cyber Security	30	9	8	1
cloud technologies	35	9	4	0
additive manufacturing	37	10	1	0
augmented reality	45	3	0	0
big data and analytics	37	7	4	0

Graph 5. Level of adaptation of Industry 4.0 technologies



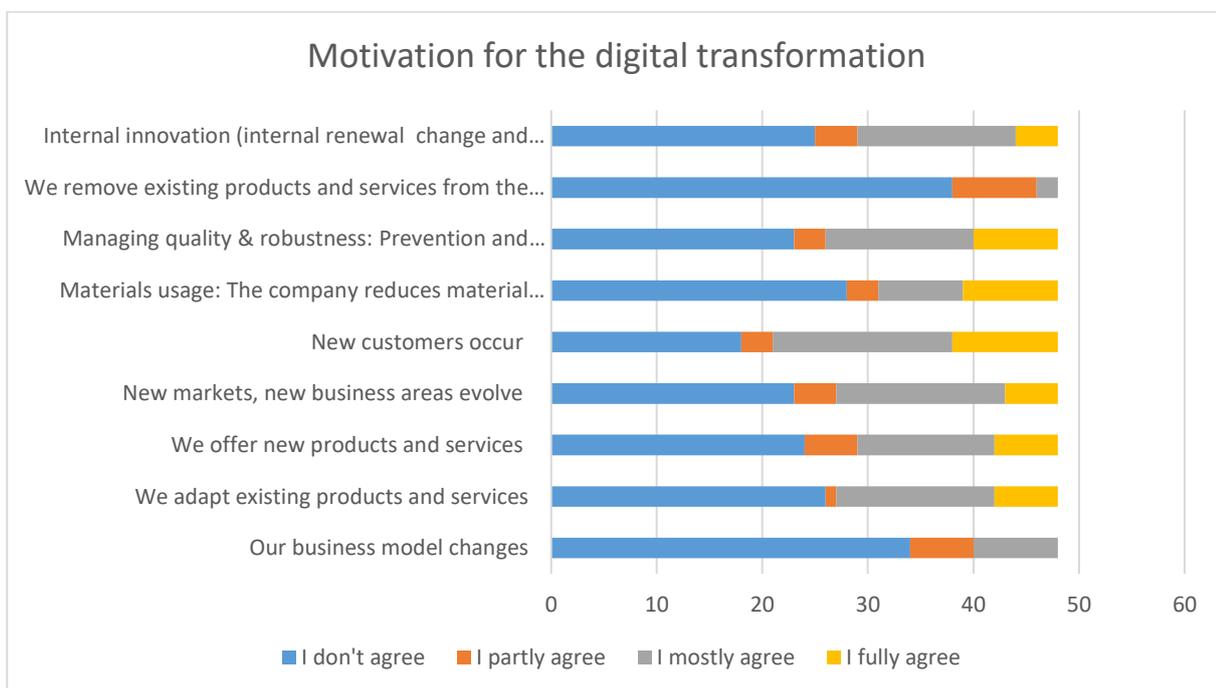


On the base of the answers given, we can assume that the most important in terms of motivation in terms of adaptation of Industry 4.0 are new costumers that can occur thanks to the new technological solutions provided. On the second place there was the evolution of new markets and new areas of operation and then adaption of existing products and internal innovation. The table below shows the exact numbers of the answers given.

*Table 2. Motivation in terms of adaptation of Industry 4.0 technologies.*

Motivation	Answers of companies			
	I don't agree	I partly agree	I mostly agree	I fully agree
Our business model changes	34	6	8	0
We adapt existing products and services	26	1	15	6
We offer new products and services	24	5	13	6
New markets, new business areas evolve	23	4	16	5
New customers occur	18	3	17	10
Materials usage: The company reduces material consumption through product and manufacturing optimisation.	28	3	8	9
Managing quality & robustness: Prevention and correction actions, product and service changes, transfer processes and manufacturing feasibility tests are all documented and feed into KPI's for new products, processes and services.	23	3	14	8
We remove existing products and services from the market.	38	8	2	0
Internal innovation (internal renewal change and adaption) is fostered	25	4	15	4

*Graph 6. Motivation for the digital transformation*





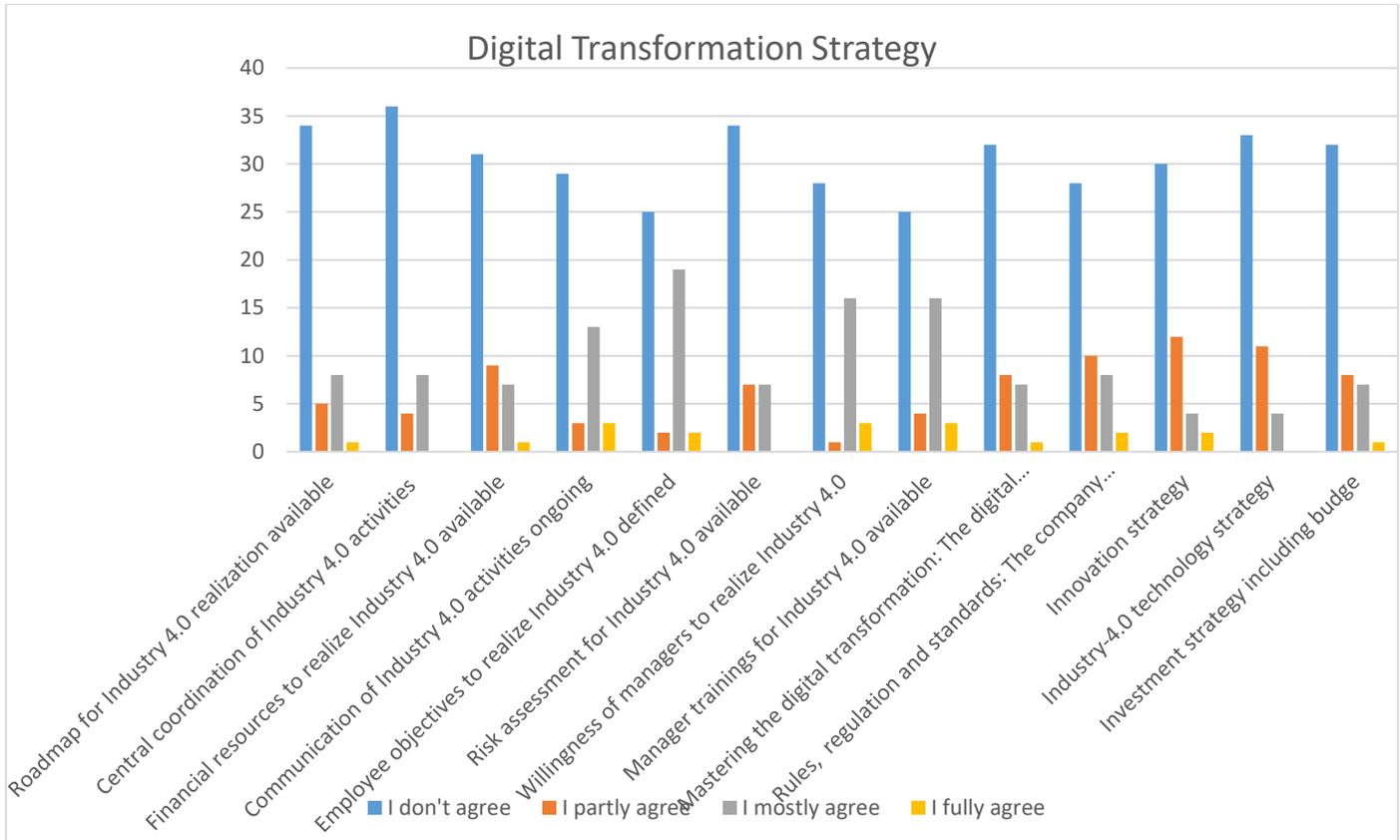
Regarding digitalisation strategy, average of 61 % has indicated that they don't have any kind of strategy or regulations related to the Industry 4.0 technologies. 21 companies have indicated (answers: "I mostly agree" and "I fully agree") that their employees have defined the objective of Industry 4.0. 19 companies have indicated (answers: "I mostly agree" and "I fully agree") the willingness of managers to train in terms of Industry 4.0 solutions.

*Table 3. Digital Transformation Strategy presence in the companies.*

Digital Transformation Strategy	Answers of the companies			
	I don't agree	I partly agree	I mostly agree	I fully agree
Roadmap for Industry 4.0 realization available	34	5	8	1
Central coordination of Industry 4.0 activities	36	4	8	0
Financial resources to realize Industry 4.0 available	31	9	7	1
Communication of Industry 4.0 activities ongoing	29	3	13	3
Employee objectives to realize Industry 4.0 defined	25	2	19	2
Risk assessment for Industry 4.0 available (Number of answers)	34	7	7	0
Willingness of managers to realize Industry 4.0	28	1	16	3
Manager trainings for Industry 4.0 available	25	4	16	3
Mastering the digital transformation: The digital transformation is managed and forms a part of the company's DNA.	32	8	7	1
Rules, regulation and standards: The company actively deals with both existing as well as new rules, regulations and standards.	28	10	8	2
Innovation strategy	30	12	4	2
Industry-4.0 technology strategy	33	11	4	0
Investment strategy including budget	32	8	7	1



**Graph 7. Digital Transformation Strategy**



In terms of the future plans of usage of Industry 4.0 technologies, the table below shows the density and time plan of the possible usage. Average of 78 % of the companies are not willing to use any of the Industry 4.0 technologies indicated in the survey. Industrial Internet of Things, cybersecurity, cloud technologies and additive manufacturing were indicated the most in terms of the density of usage.

Regarding the timeframe of planned usage of the Industry 4.0, total of 15 companies have answered this question in the survey. Average of 65 % of them are thinking of starting to use Industry 4.0 in more than 5 years. The answer “now” was indicated 14 times in total. The highest number of companies is planning to use: autonomous robots, simulation, cybersecurity and big data analytics in the shortest period of time.



Table 4&5. Intensity of using Industry 4.0 technologies and planned time of launching the usage

Desired intensity of use of the technology	Answers of the companies			
	no usage planned	few usage	good extent	very intense use
1. autonomous robots	39	6	2	1
2. simulation	31	11	5	1
3. horizontal and vertical systems integration	41	4	2	1
4. industrial internet of things	37	5	4	2
5. cybersecurity	34	6	6	2
6. cloud technologies	35	7	5	1
7. additive manufacturing	37	8	3	0
8. augmented reality	46	2	0	0
9. big data and analytics	39	3	4	2

Planned time of start of use of the technology	Answers of the companies			
	now	1-2 years	3-5 years	longer
1. autonomous robots	2	2	1	10
2. simulation	3	2	1	9
3. horizontal and vertical systems integration	1	2	1	7
4. industrial internet of things	1	3	2	8
5. cybersecurity	2	5	0	8
6. cloud technologies	1	4	0	8
7. additive manufacturing	1	3	1	10
8. augmented reality	0	0	1	9
9. big data and analytics	3	2	0	8



The companies that took part in the survey have also indicated the level of preparation which they think their employees have. Almost a half of the surveyed companies indicate that their employees are not prepared for digital transformation, neither in terms of competences, nor awareness and willingness.

Exact numbers shown in the table below:

*Table 6. Preparation of the employees in terms of digital transformation.*

Preparation of the employees in terms of digital transformation	Answers of the companies			
	I don't agree	I partly agree	I mostly agree	I fully agree
Openness to new technologies	21	6	19	2
Competence with modern ICT	22	10	15	0
Awareness of non-IT-employees for meaning and value of digital data	21	3	21	1
Awareness of non-IT-employees for cyber security	22	4	20	1
Willingness to flexibilize work arrangements	20	9	18	0
Autonomy of shop floor workers	22	3	20	2
Willingness for interdisciplinary work	21	6	18	2
Willingness for continuous training	22	4	19	2
We know our employees digital competences	24	7	16	0

## 4.2 In case of suppliers:

Regarding the current offering of Industry 4.0 solutions, the number of suppliers based on the results of the survey is very low. Only 4 companies ticked the answers in this section, out of which none has the wide range of offers and two are offering Industry 4.0 in good extent (one in terms of simulation and one in IoT). The answer “few offers” was ticked 8 times, from which 3 was for IoT and 2 for autonomous robots.

In terms of the plans for the future - out of the four answers - few offers are planned in terms of industrial internet of things, autonomous robots and additive manufacturing. The TRL level of those solutions is 1 or 2, and the planned time of launch is up to 2 years.

## 5. Other enabling factors

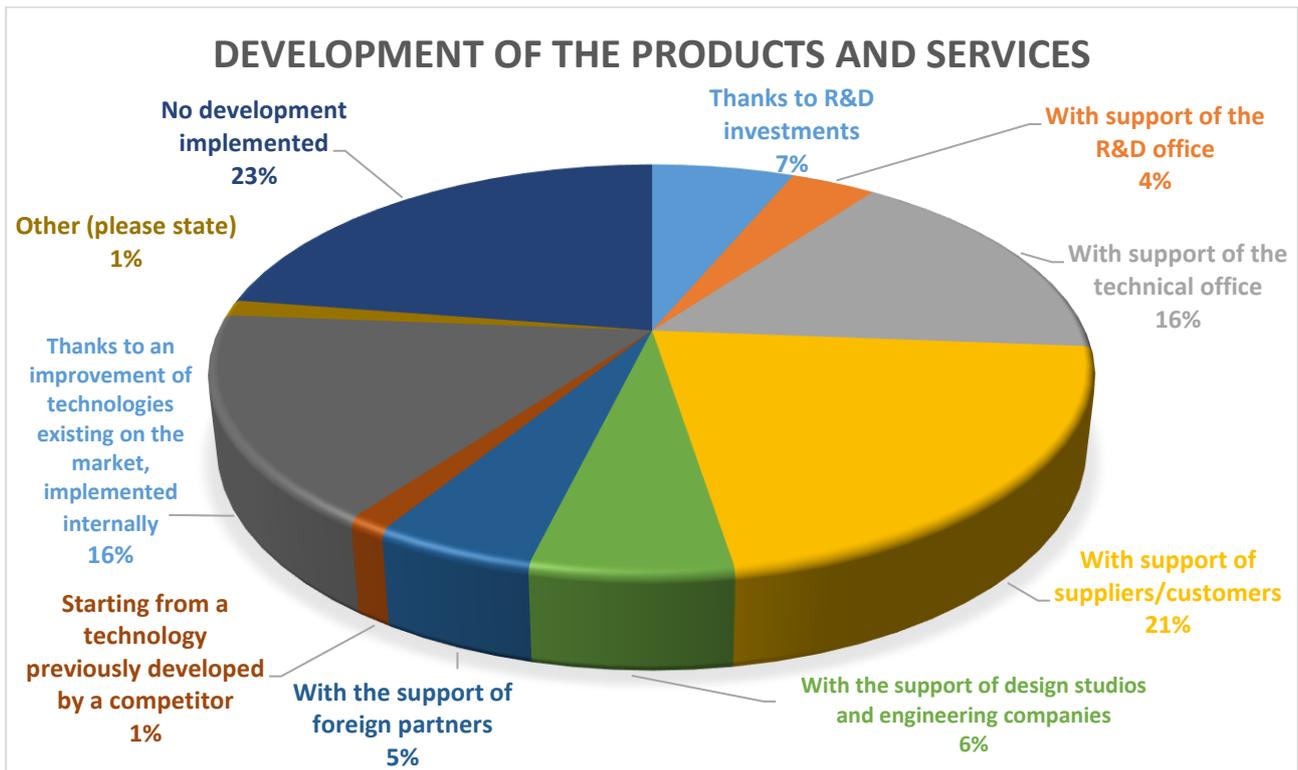
Description of the SMEs position with regards to other factors considered enabling for innovation (Related variety; Human resources; Fundraising capacity; Development, others...)

Regarding the factors that potentially enabling for innovation, the companies that took part with the survey seems to be on the relatively low level. As it is indicated on the graph below,



the development of new products and services with the R&D investment constitutes only 7 % of total number of answers and the support R&D office states following 4 %. At the same time 23 % of the companies indicated that they are not implementing any developments and other 16 % are using already existing technologies and adjusting them to their needs.

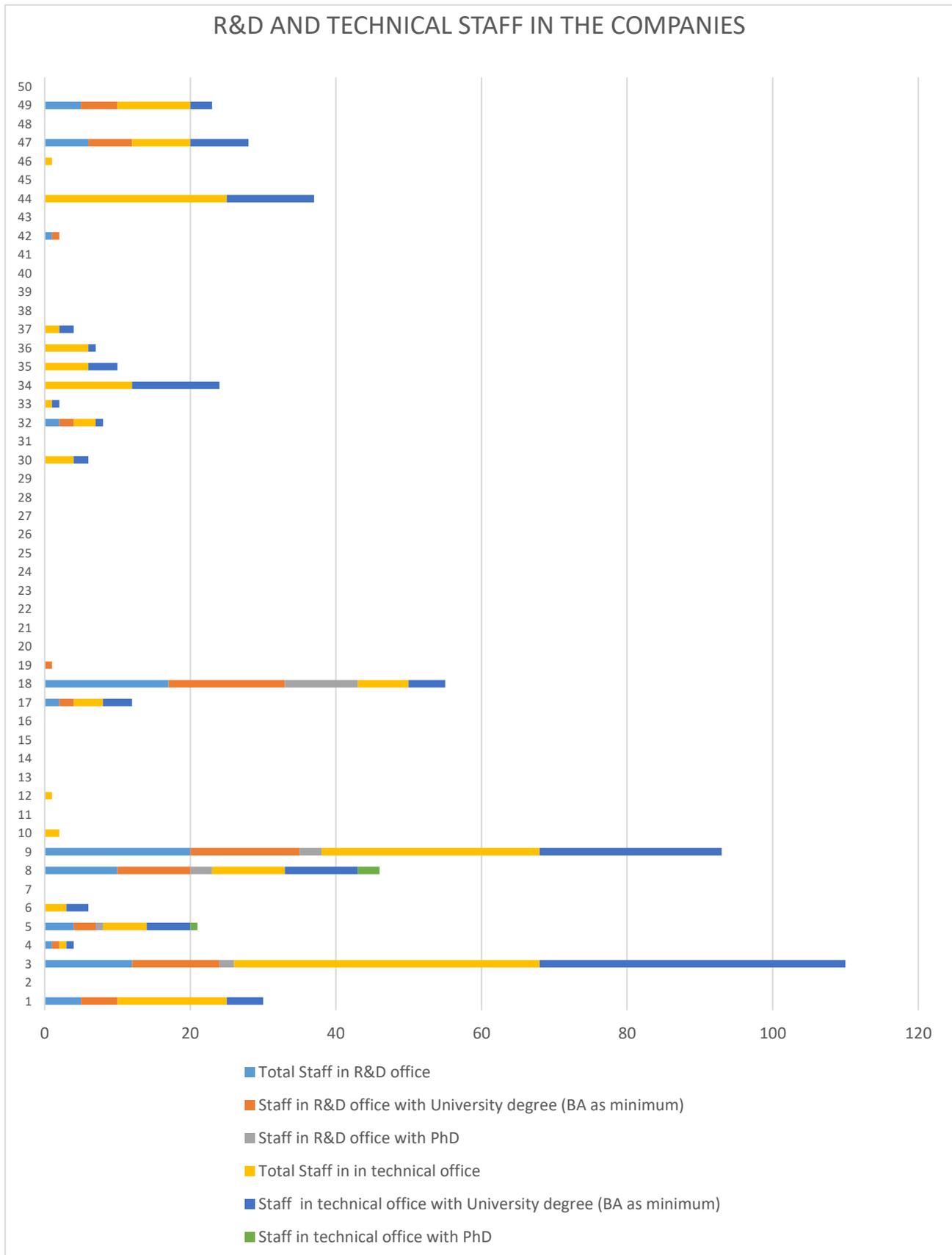
*Graph 8. Methods of development most relevant products/services of the companies*



In terms of the number of R&D and technical staff in the surveyed companies, many of them hasn't indicated any staff related to technical or R&D office. In our opinion an on the base of the comments from the external expert who was conducting the survey, this question was often considered as irrelevant for micro and small enterprises. Medium and big ones that took part in the survey have indicated the number which shows that the numbers are very varied depending on the company and that in many cases the number of technical or R&D in total is equal with the number of staff with university degree. On the other hand, there is a relatively very low level of employees with PhD, especially between the staff in technical office (only two companies have indicated it).



Graph 9. Number of R&D and technical staff in companies.





In terms of the fundraising capacities of the companies in relation to participation in EU or national funded projects over 71 % of companies haven't didn't apply for any projects that will support them with external capital. Moreover, more than 80 % haven't been involved in public funded projects in the last few years.

Additionally, in terms of cooperation with the world of academia and access to high level knowledge, which is considered as an enabler of innovation, more than 90 % of the companies don't have any ongoing cooperation with universities, research labs or clusters.

To sum up - the level of awareness in terms of digital transformation of the companies that took part in the survey is on a relatively low level. It was pointed by the external expert that conducted the survey, the companies in the Southern Subregion of Silesia Voivodeship aren't ready for the questionnaires on this level of maturity. The reason indicated was lack of competences and knowledge in terms of cutting-edge technologies and lack of human resources and funding to be dedicated in this kind of activities. Even if the company is aware of the importance of digitalisation, often features mentioned above limit its actions.