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

D.T1.2.1 Mapping Report the 9 elements of Industry 4.0 compared to SMEs need in each RIS3 region

FINAL VERSION
04/2020

Transnational Mapping Report

„A projekt és a jelen dokumentum az Interreg Central Europe Programban megvalósuló 4STEPS projektben, az Európai Unió és Magyarország társfinanszírozásával valósul meg."

"The current document has been prepared in the framework of the 4STEPS project which is co-financed by the European Regional Development Fund through Interreg Central Europe".

Project Number	CE1492
Project Name	Towards the application of Industry 4.0 in SMEs
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Activity	Activity 1.2-RIS3 SMEs and Industry 4.0
Deliverable	**Deliverable 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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This document must be referred to as	Mapping Report the 9 elements of Industry 4.0 compared to SMEs need in each RIS3 region-Transnational Mapping Report
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1.Introduction of the 4STEPS project

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 4STEPS 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 Transnational 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 transnational mapping 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.

Due to the tremendous effort of all partners, the **partnership reached 355 filled questionnaires by January 2020** in the following distribution: CNA+RELAB together: 77; ARRSA: 50, FHV, 47; DEXIC: 44; PBN:50; GZS: 39; VDC 48.

Following the finalisation of SME involvement, every partner (LP+PP2 are working together) was preparing separate mapping reports (D.T1.2.1) based on the results of their own SME involvement in their regions, following the common report structure approved by the partnership. Since the quantification target of the Mapping Report according to the project requirement (D.T1.2.1) is 8, partners were working in their own report document following the common structure, and the 8th document (current one) is a transnational summary/comparison, which is presenting a comprehensive picture about all SME results in the partnership.

The current transnational mapping report was prepared by PBN- as WPT1 Leader. PBN, prior to the preparation of this current report has compared the SME answers to the common questionnaire on transnational level, and before the analysis of the transnational result, the so-called 'outlier' data (fake data, missing data..) was discussed and clarified with the respective partners.

Following the "data double-checking" procedure, PBN-with support of external expert- has prepared demonstrative figures comparing the different results. These figures (graphs) shall be explained and detailed in this current report as well as they have been uploaded to the preliminary established CRM system, where the SME questionnaire results are also visible.

The log-in screen of the CRM is available here:

https://4stepscrm.com/index.php

The credentials of PBN as WP Leader (and main administrator of the system) is the following:

username: martin.dan@pbn.hu

Password: aA123456

The way to reach the transnational figures on CRM: Questionnaires→Questionnaire statistics→Graphs→Choose the question and the appropriate graph will appear

2. Transnational results of the general information of SMEs on partnership level

2.1. The comparison of number of employees and turnover of SMEs

The first three figures (Figure 1-3) are demonstrating the compared results of SMEs in connection with their number of employees and their turnover. Regarding the number of employees, the questionnaire differentiated four groups, and these groups are marked with four different colours in Figure 1. This figure points out the distribution of SMEs' employees in a percentage form. What can be highlighted from the Figure is the followings: - **In Italy, the small companies (between 10-49 employees) were overrepresented in the analysis** (approx. 70%)- **in Poland the micro companies (1-9 employees) have given the majority of the SMEs** (approx. 50%)- **in Hungary and Germany the share of the small companies (10-49) are almost the same** (approx. 45%), but in Germany the distribution of medium companies in the analysis is smaller than in Hungary- in **Austria and Czech Republic the 40% of the involved companies belong to the 10-49 employees category. In Slovenia, the medium and large companies have been overrepresented** in the survey.

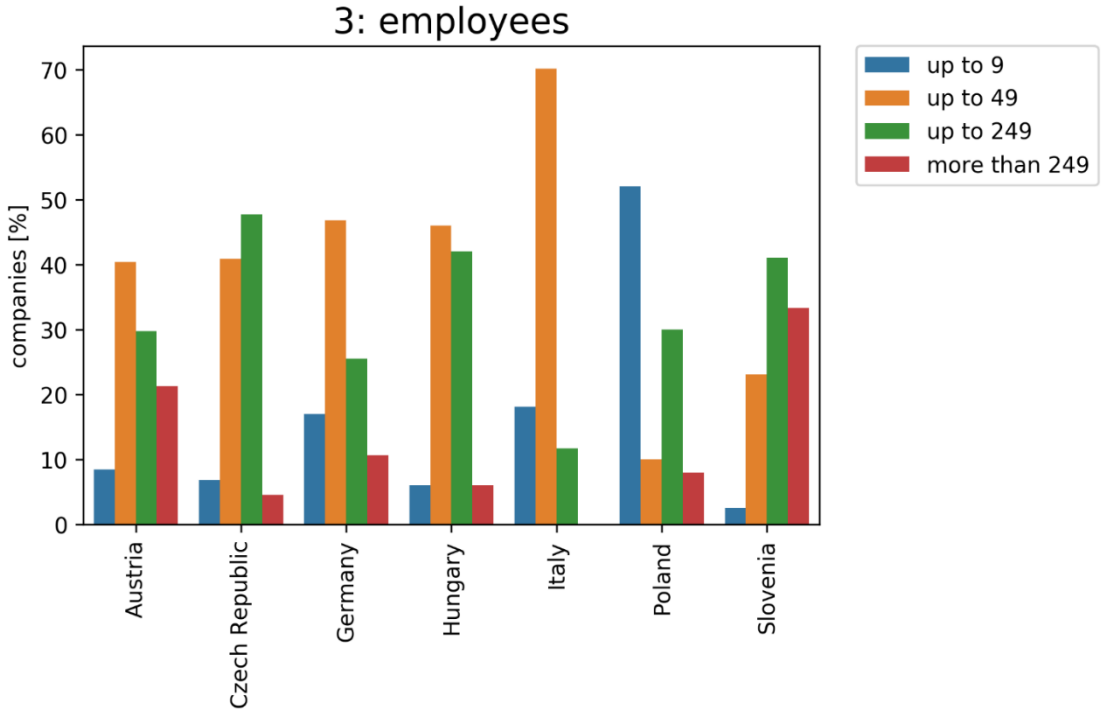

Figure 1: The distribution of number of employees of the involved SMEs

As far as the yearly turnover of the involved companies are concerned, Figure 2 shows that the vast majority of the **Italian (approx. 70%) and Polish companies (approx. 55%) have less than two million EUR yearly turnover**. An additional outstanding result can be noticed in **Hungary**, since in their case, **almost 70% of the involved firms have between 2 and 10 million EUR turnover** annually. In the other involved countries, the distribution of turnovers is almost equal, however the relatively **large extent of Slovenian companies (approx. 20%) with more than 50 million EUR yearly turnover can be considered remarkable**, but having large extent of big Slovenian companies in the survey, this relatively high portion of yearly turnover is not as outstanding as it may seem.

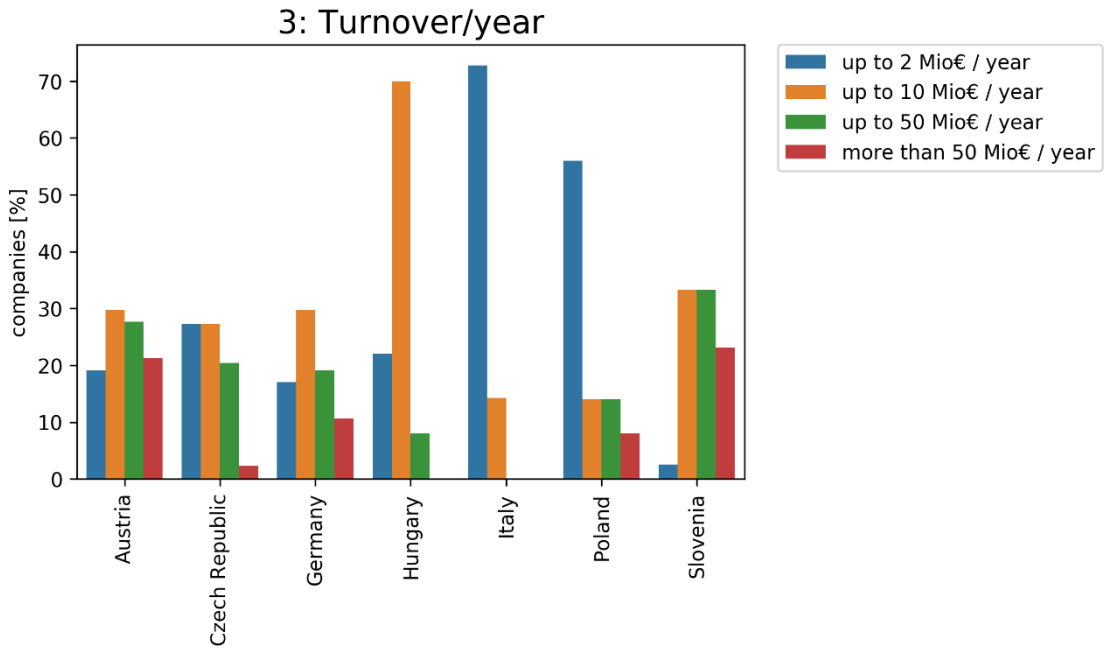

Figure 2: The distribution of the yearly turnover of companies

The previously shown results (number of employees as well as annual turnover) have been compared, and Figure 3 demonstrates its comparison results on a heat map. The heat map clearly depicts that linear relationship can be perceptible between the number of employees and the yearly turnover data, namely the more employees the certain company has the more annual turnover they will receive.

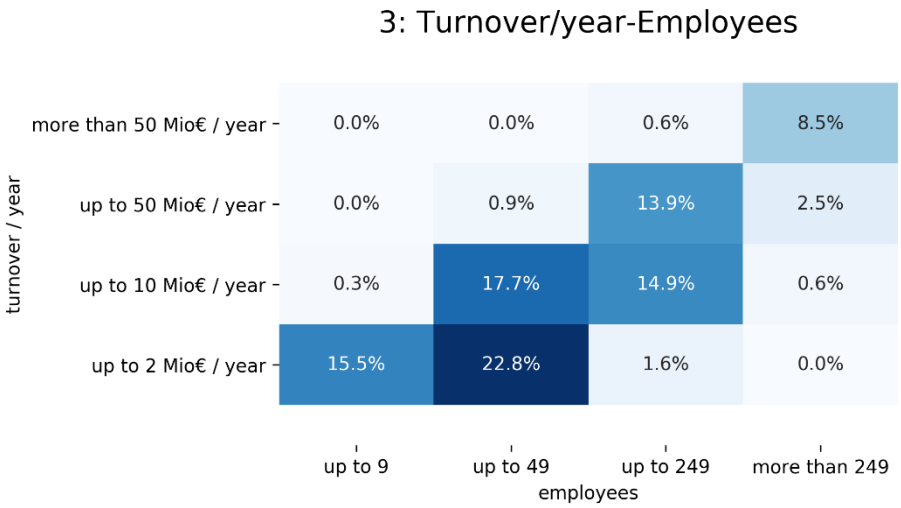

Figure 3: The correlation between yearly turnover and employees

2.2. Distribution of the industrial sectors of the companies

Within the general information of the companies, certainly the sector of the companies has been also scrutinised. **Figure 4-** in a heat map format- has highlighted the **five sectors where the majority of the participant companies are operating in.** The Figure shows that the vast majority of the companies on partnership level (**309 out of 355) have indicated themselves into these five categories**. The figure also demonstrates that all in all **130 companies** are operating in the **metal products area**, and it can be also noticed that in Hungary and Italy companies are operating in this field a large extent, but in the Czech Republic the majority of the involved companies also belong to this category. The Figure is also presenting that in **Austria and Germany the computer programming field is overrepresented** among the involved companies. **The automotive field** has a relatively high proportion among **Polish and Slovenian companies**, as well as **electrical equipment area** is also remarkable at **Slovenian firms**.

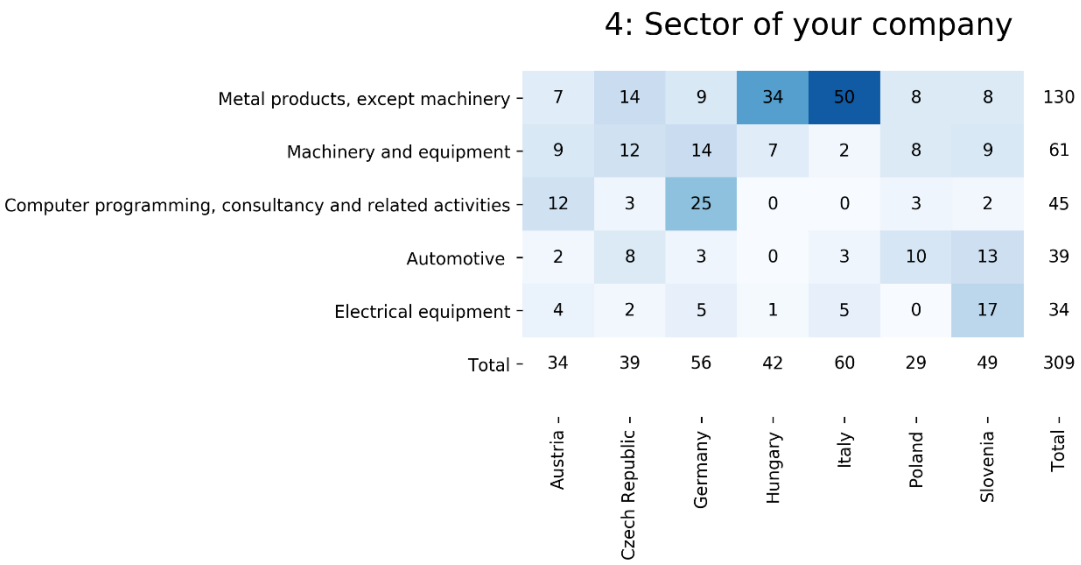

Figure 4: The distribution of the top five sectors of the companies

3. Transnational results of the specific information of SMEs on partnership level

3.1. The method of products and service development of SMEs

Following the general information of SMEs, the questionnaire continued with more specific topics, and in this subchapter the correlation between the number of employees and the different sources of new service/product development shall be explained. Within the question in relation with the way of service/product development, SMEs had the possibility to choose from the listed reply options and multiple answers were also allowed. Figure 5 points out that the **majority of the SMEs is developing new services/products with support of suppliers/customers irrespective of the number of employees they have**, as well as the support of the **technical and R&D office is also remarkable in case the company has more than 9 employees.** Further interesting result from Figure 5 is the relatively **high percentage of no development implementation at micro companies**. Nevertheless, at these micro companies the already existing technologies on market can be considered a significance factor when it comes to method of service development. The additional methods listed at this question do not play important roles in terms of service/product development.

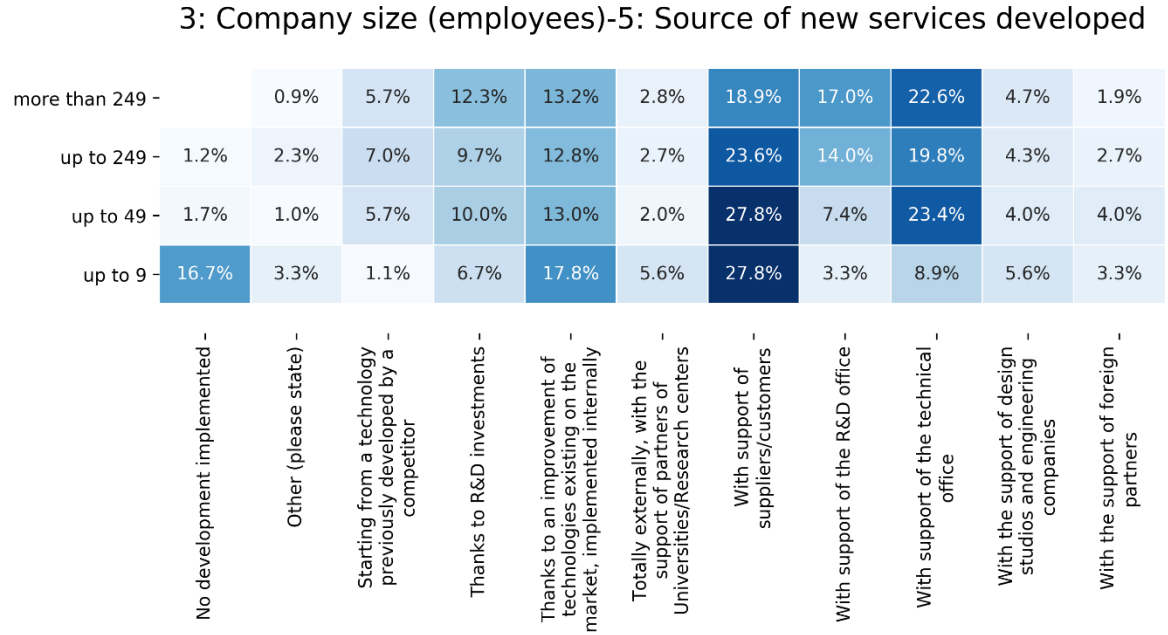

Figure 5: The correlation of company size and source of new services developed

3.2. R&D and technical office

The questionnaire analysis was dealing with the R**&D and technical office departments** in a separate question where the question was sub-divided into further elements differentiating the education level of the offices. Figure 6 demonstrates the size of these offices, (aggregation of the results) listing all sub-questions appeared in the questionnaire. According to the figure, **relatively high numbers were indicated by Austrian, German, and Slovenian companies**. The reason of these high numbers might be explained that companies have indicated their parent companies' numbers. PBN-following the realisation of these outstanding figures- contacted the German, Austrian and Slovenian project partners, but they confirmed these numbers which had been indicated by the companies. The figure also points out that the staff in R&D offices- when we analyse the aggregated responses- is remarkable in Czech Republic and Hungary as well, nevertheless, in **Italian and Polish companies the R&D offices are not significant.**

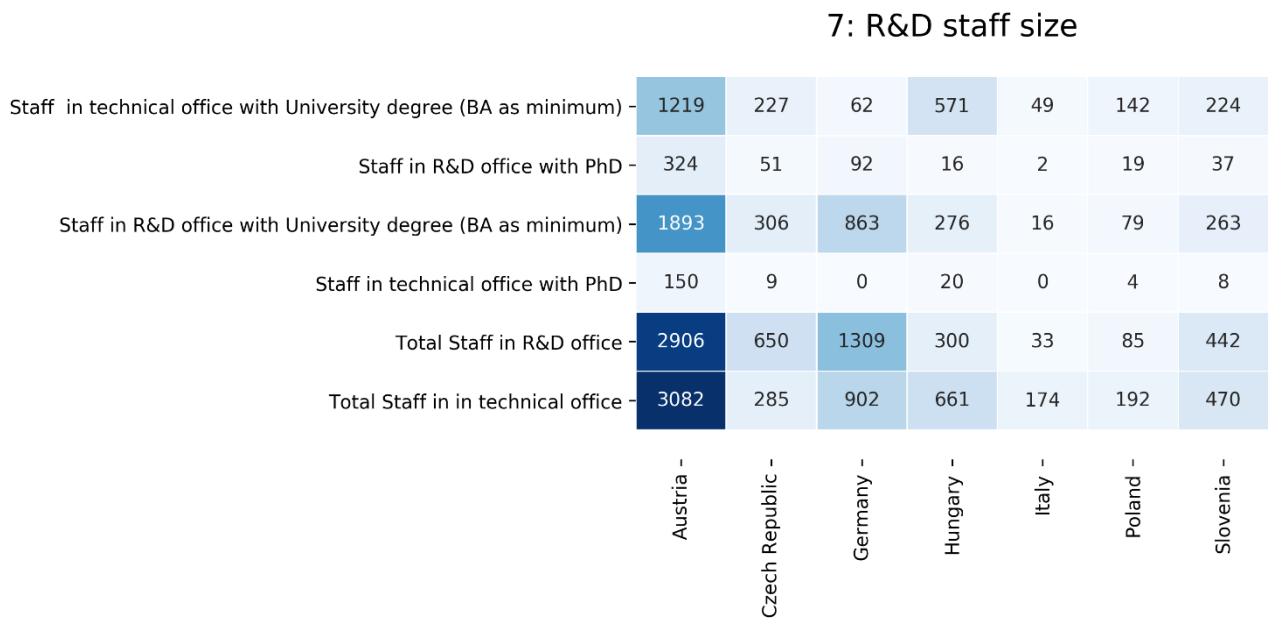

Figure 6: The number of staff in R&D and technical offices (aggregated number)

3.3. Participation in projects (Regional-Country-EU level)

Apart from the distribution of the R&D and technical staff, the SME questionnaire has asked whether the firms has participated in research and innovation project in the past. The responders could choose between projects on different levels (EU-Country-Regional) and multiple answers were also accepted at this question in case the firm has participated in projects on different levels. Figure 7 shows the distribution of every variable and based on this figure, it has turned out that the most of the **Italian and Polish companies**, involved in the survey are **not active in projects neither in country nor in EU level**. When we scrutinise all countries' SME results, it can be noticed that the majority of the involved companies are active in project in country level. Nevertheless, it is also visible in the figure that the **majority of the Hungarian companies have been active in projects on EU level**. Figure 8 reflects that the bigger the company the more active in projects both on EU and country level. Furthermore, the figure shows that **large companies and mid-caps are active on European scale** whereas

medium and small companies are present in regional/national funds and **micro companies are inactive on project level.**

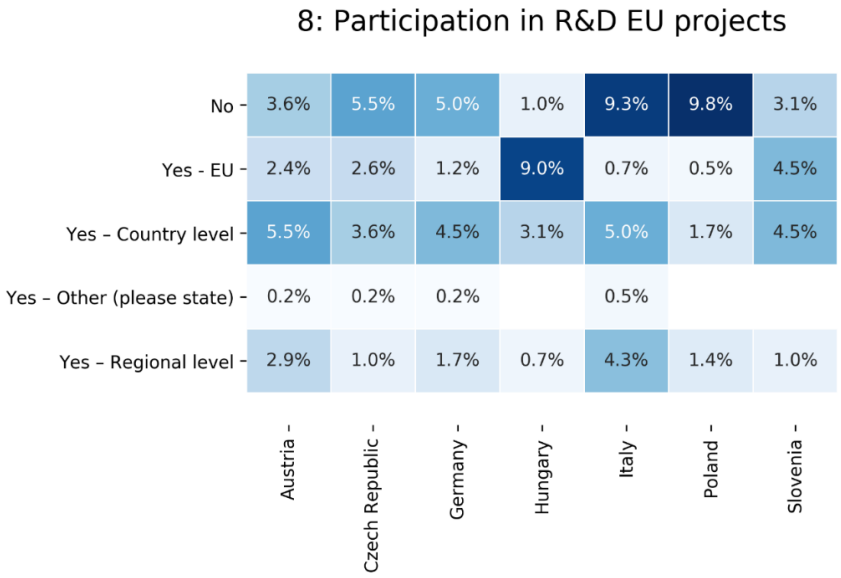

Figure 7: The distribution of companies' participation in projects (EU/national)

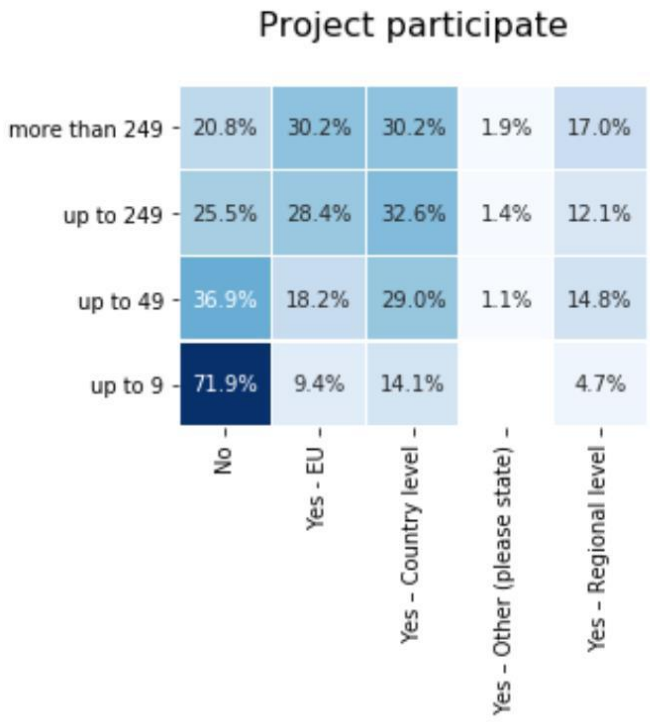

Figure 8: The correlation between companies' number of employees and project participation

3.4. Distribution of End User/Supplier companies of Industry 4.0

The questionnaire has differentiated between the end user and supplier companies of Industry 4.0 products and services. Based on the transnational results, (Figure 9) the **vast majority of the companies belong to the end user category (approx. 70%)** which is followed by supplier companies (approx. 20%) and approx. 10% of the sample companies have identified themselves in both categories. The second part of the questionnaire (mostly technology-oriented questions) was differentiated between end users and suppliers, and companies of the certain category have answered to the respective questions, namely end users were asked to reply between Question 13-17, whereas suppliers were asked to give answers Question 18 and 19 of the questionnaire. In case the company has identified themselves as both categories, they were asked to fill in every Question from 13 to 19.

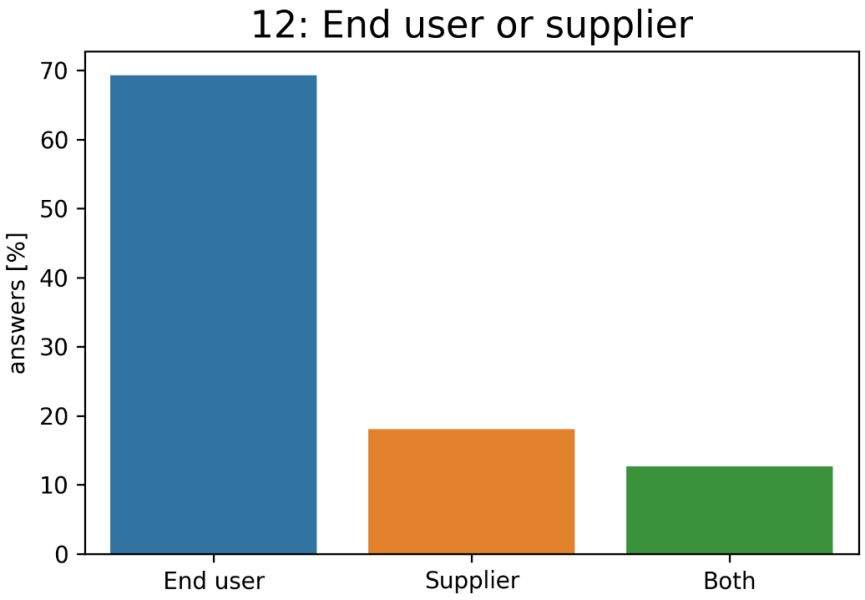

Figure 9: Distribution of the category of the involved companies (end user/supplier/both)

3.5. Currently used Industry 4.0 methods and technologies by end user companies

The first technology focused question of the analysis (Q13) was asked the respondent firms to what extent they are currently using Industry 4.0 methods and technologies, and this question was answered by either only end user companies or firms who has identified themselves as suppliers and end users at the same time. Within the question, the 9 pillars of I4.0 were listed and at each pillar four different extents were given from 'no usage at all' up to 'very intense use'. The following figures (10-16) demonstrate the results of the extent of each technological pillar usage in each country. Separate figure has been prepared for each country involved in the analysis, and it can be noticeable at first sight that **Austrian and German companies are leading the way**, since according to the statistics, **companies in these countries** are currently using the **Industry 4.0 technologies in a higher extent** than firms in the other involved regions.

In the **Austrian companies**, within the Industry 4.0 technologies, **cybersecurity, cloud technologies, as well as horizontal and vertical systems integration** can be considered as a **strength** since these pillars are used at least in a good extent by 22.6%, 38.7% and 29% of the Austrian companies.

When we further scrutinise the usage of the technological pillars, the figures point out that in **Czech companies, cybersecurity is used intensely by 22.2%** of the involved companies in the country, which can be considered an outstanding result.

When it comes to **German results**, it is noticeable at first glance of the figure, that the majority of the involved German companies **are currently using almost every I4.0 pillars at least in a good extent**. The ratio of **cybersecurity usage is also high in German** companies, since half of the involved companies are currently using this technology at least in a good extent (40% good extent, 10% very intense usage). Apart from cybersecurity, at least 20% of the involved companies in **Germany are using big data analytics (25%), cloud technologies (35%) horizontal and vertical system integration (35%), industrial internet of things (20%) and simulation (25%) at least in a good extent level**

Regarding Hungarian companies, the figure points out that the majority of the technological pillars are not used at all by **Hungarian companies**, but horizontal and vertical system

integration, industrial internet of things as well as simulation are used at few extent by at least 66% of the companies.

Having analysed the **Italian results**, the figure demonstrates that **the vast majority of the Italian end user companies are not using Industry 4.0 technologies at all.** However, **additive manufacturing belongs to an exception**, which is currently used by 14.5% in a few extent and 23.7% in a good extent by Italian companies.

As far as **the Polish results** are concerned, no outstanding results can be read from the figures, nevertheless it is visible that **10.4%** of the Polish companies are **using simulation** whereas **16.7% are using cybersecurity** in a good extent.

Based on the results of the involved **Slovenian companies**, two results might be underlined, which can be considered remarkable. On the one hand, **cybersecurity is used by 22.22% of the Slovenian companies at a good extent** whereas approximately every fifth involved Slovenian companies **(19.4%) are using autonomous robots** in an intense level.

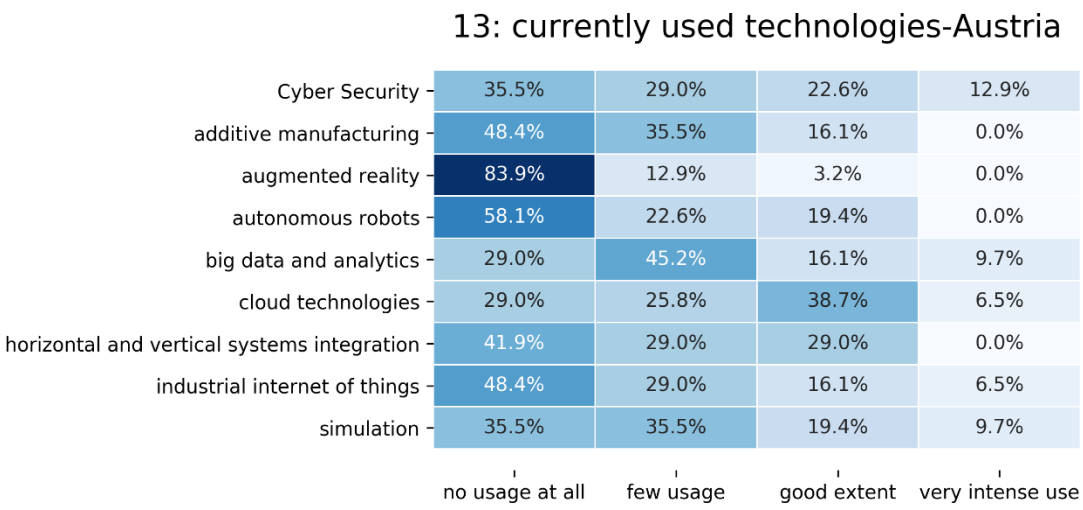

Figure 10: Currently used I4.0 technologies of Austrian end user companies

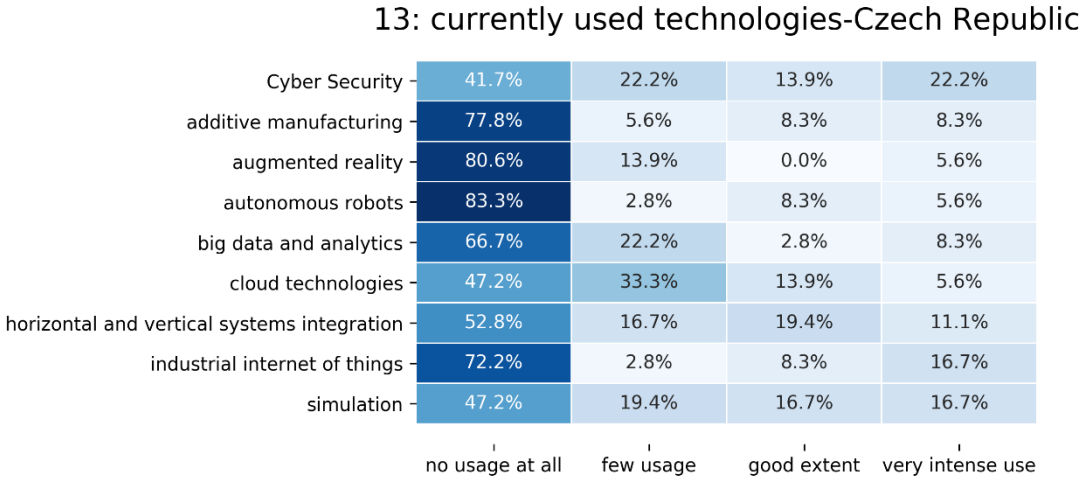

Figure 11: Currently used I4.0 technologies of Czech end user companies

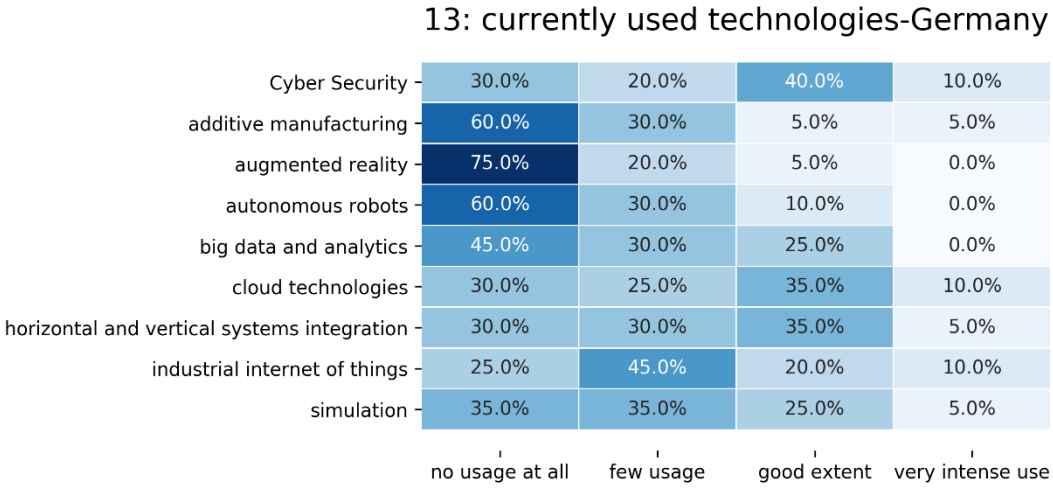

Figure 12: Currently used I4.0 technologies of German end user companies

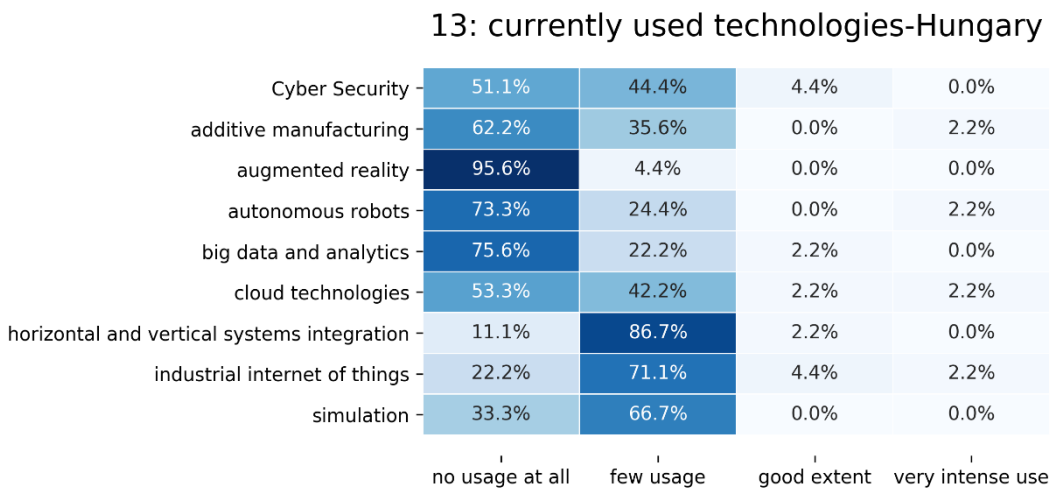

Figure 13: Currently used I4.0 technologies of Hungarian end user companies

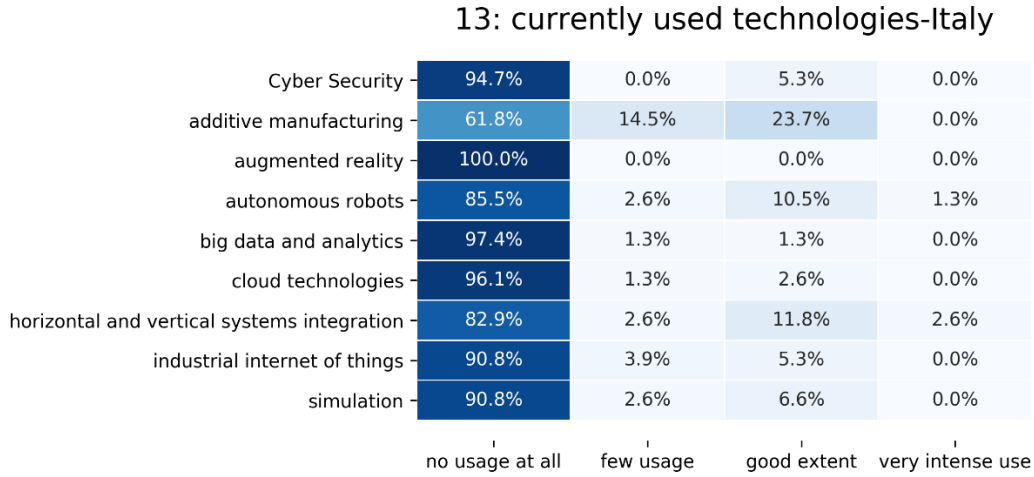

Figure 14: Currently used I4.0 technologies of Italian end user companies

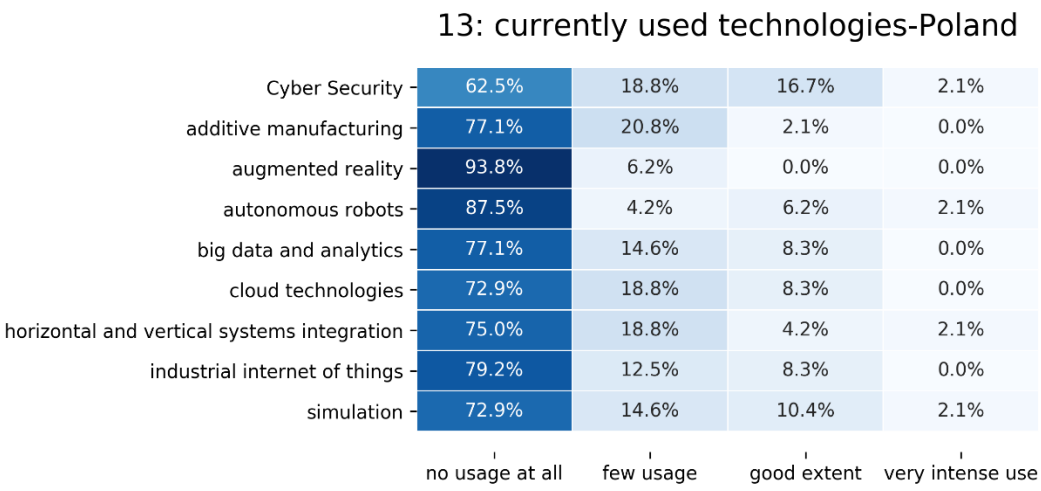

Figure 15: Currently used I4.0 technologies of Polish end user companies

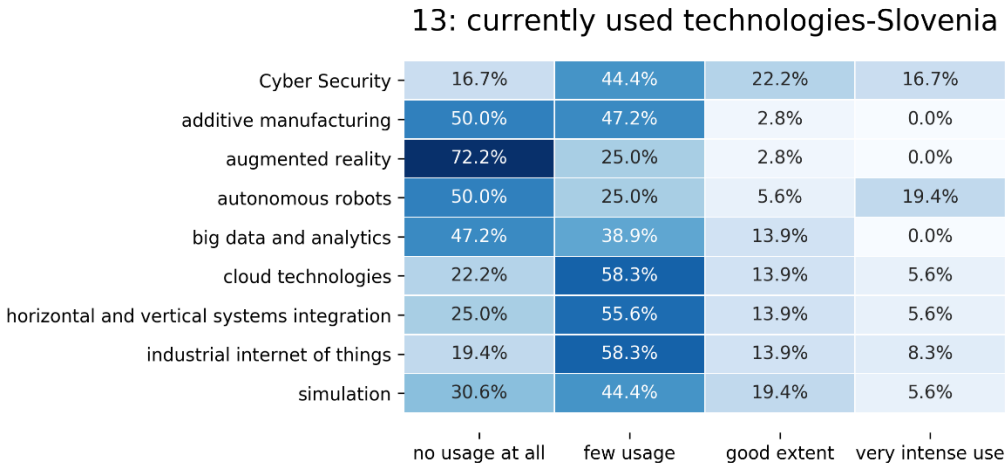

Figure 16: Currently used I4.0 technologies of Slovenian end user companies

3.6. The correlation between the currently used technologies and size of the company among end user companies

In the previous subchapter the extent of usage of I4.0 technologies were described separately by each country, whereas within this subchapter the correlation between the currently used technologies and the sizes of the companies shall be further exploited on transnational level.

Figure 17-25 is demonstrating the correlation between these results with the help of heat maps.

When we examine the correlation between company size and **additive manufacturing** usage, Figure 17 points out that this technological pillar is **mostly used by companies with 10-49 as well as 50-249 employees in a few extent**.

As the previous subchapter has already anticipated, **augmented reality** is rarely used by the involved companies. Therefore, the result of Figure 18 is not surprising, since this figure also confirms that this technological **pillar is rarely used by companies irrespective of the company size.**

The correlation between company size and the usage of **autonomous robots is** very similar to augmented reality usage distribution, since **these pillars are rarely used by companies** irrespective of the number of employees the company has.

Regarding **big data analytics** and number of employees correlation, Figure 19 demonstrates that **mainly companies between 50-249 employees are currently using this technology in a few extent.**

According to statistics, the **few extent usage of cybersecurity** is very similar at small (10-49 employees) and medium (50-249) size companies as well. Besides, it has to be also highlighted that relatively high proportion of the companies are using cybersecurity in a **higher level among companies with 50-249 employees.**

Horizontal and vertical system integration technology is also used by **mainly mid-size companies at a few extent**, but the proportion **of smaller companies using this technology** is also remarkable based on the transnational comparison of the results.

Regarding **industrial internet of things usage, Figure 24** points out that the ratio of **few extent usage of this technology is very close among midsized and smaller companies** and at this case the companies with higher number of employees also use this technology in a few extent.

Regarding **simulation** as I4.0 technology, it is widely used **mainly by midsized companies** according to the transnational analysis.

The usage of **cloud technologies** is similar to big data analytics, since the result is almost the same when the size of the company and the technology usage are compared. Figure 25 reflects that **mainly companies between 50 and 249 employees use cloud technologies in a few extent**, but **smaller companies** between 10-49 employees are also using this technology in a **few extent** as well.

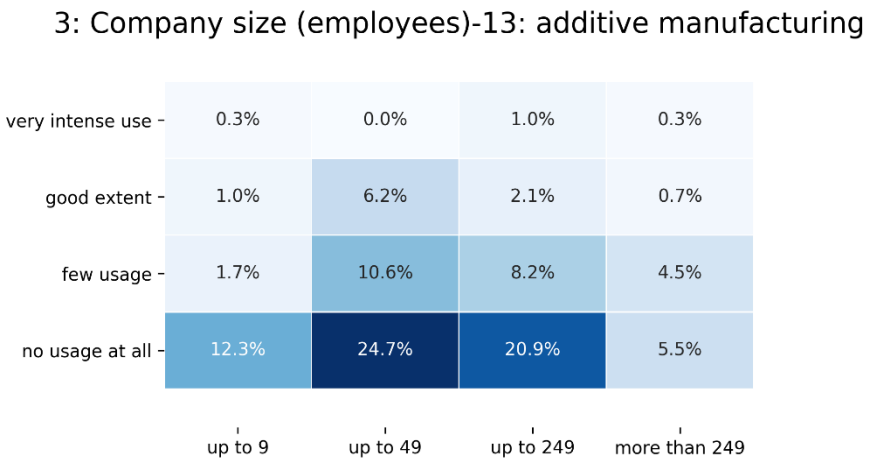

Figure 17: The correlation between company size and the usage of additive manufacturing technology

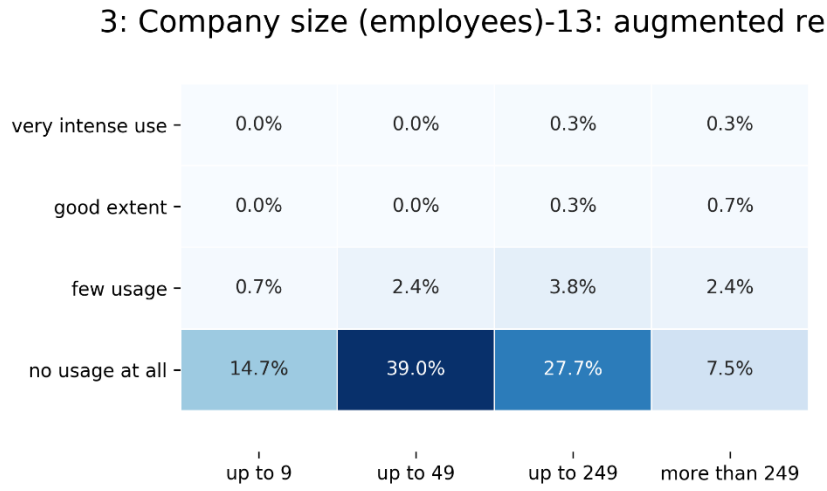

Figure 18: The correlation between company size and the usage of augmented reality technology

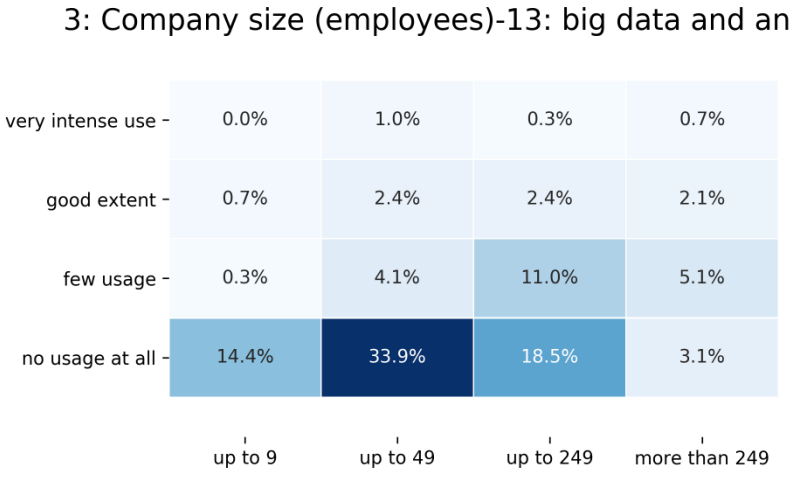

Figure 19: The correlation between company size and the usage of big data and analytics

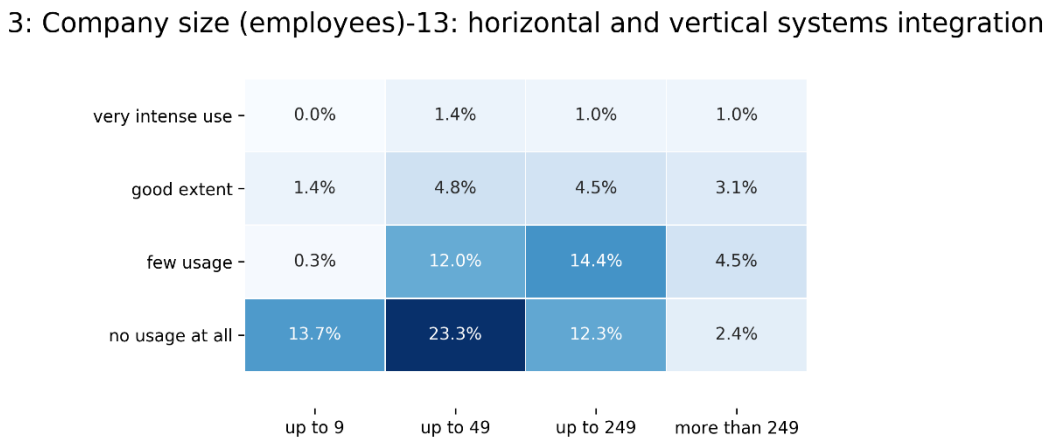

Figure 20: The correlation between company size and the usage of horizontal and vertical systems integration

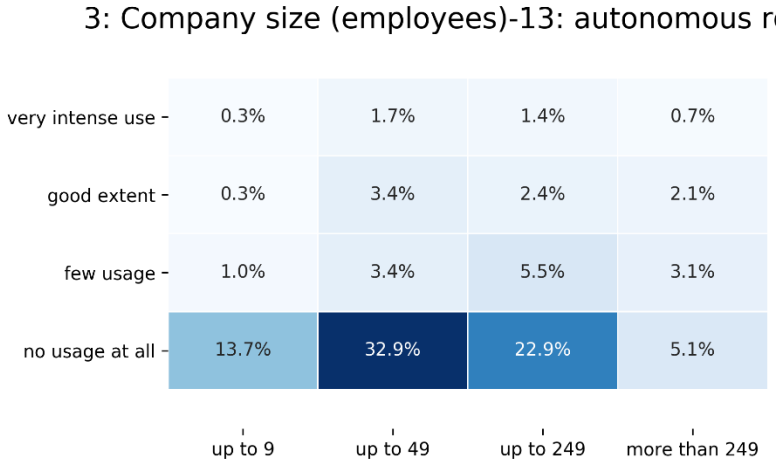

Figure 21: The correlation between company size and the usage of autonomous robots

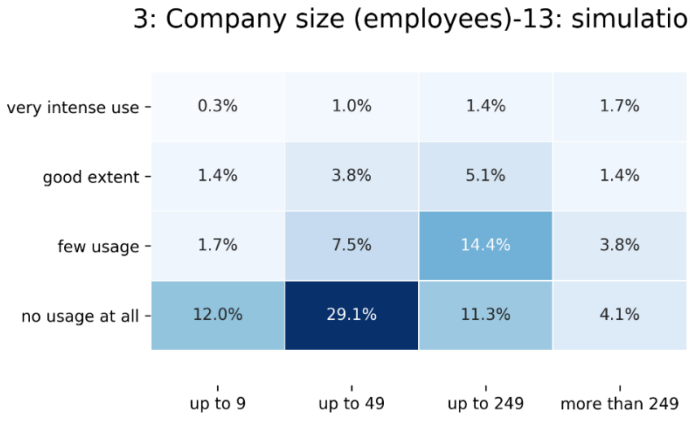

Figure 22: The correlation between company size and the usage of simulation technology

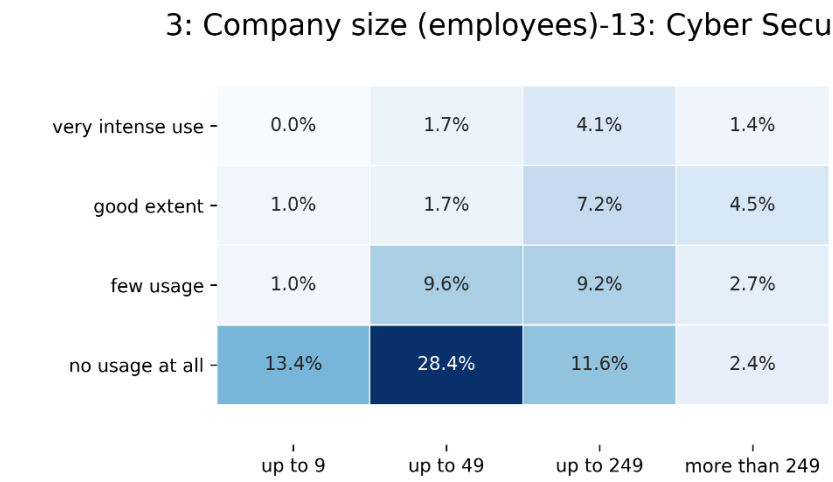

Figure 23: The correlation between company size and the usage of cybersecurity

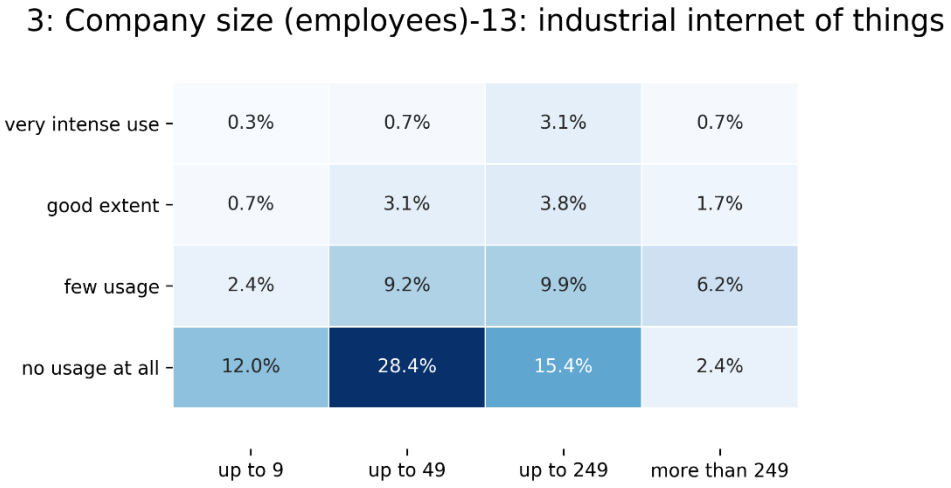

Figure 24: The correlation between company size and the usage of industrial internet of things

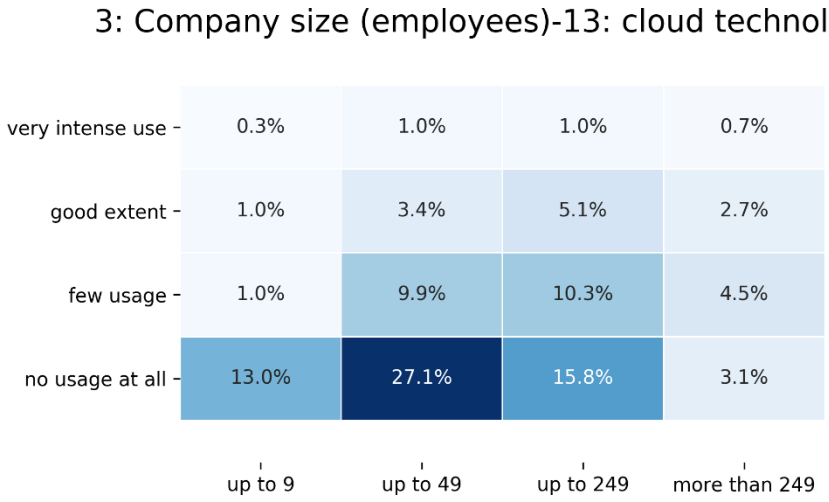

Figure 25: The correlation between company size and the usage of cloud technologies

3.7. Needs, and desired intensity of usage of industry 4.0 Technologies by end user companies

So far, in the previous subchapters of the report, **Industry 4.0 technologies** have been analysed and examined which are currently used by end user companies involved in the survey. In the framework of the questionnaire analysis not only the current state was measured but also the plans have been taken into consideration in relation with technology development, and within this sub-chapter these **plans shall be scrutinised on transnational level**. Similarly to the currently used session, the planned extent of use of technologies has been subdivided into four categories. Figure 26-34 will present separate results in connection with companies' plans at each technological pillar.

According to the results, there is a relatively **high interest in autonomous robots among Austrian and Slovenian companies**, since companies in these countries (Austria 32.3%; Slovenia 36.1%) have indicated that they are planning to use this technology at least in a good

extent level in the near future. At this point it should be also mentioned that **German and Hungarian companies are also contemplating to use autonomous robots at a few usage** in the following few years.

As far as the plans towards simulation technology are concerned, it is visible on the figure that there is a **high demand for simulation technology in Austria, Czech Republic and Germany and** besides the majority of **the Slovenian companies** are also wishing to use this I4.0 technology in the next periods.

Based on the transnational analysis, it can be also noticeable that **mainly Austrian, German, Czech and Italian companies are planning to use the technology of horizontal and vertical system integration** in the next years in a good extent, but apart from them the plans of **Hungarian companies** should be also discussed, because 86.7% of them would like to implement this kind of technology at a **few extent**.

The transnational analysis has also demonstrated that the **industrial internet of things technology is demanded by Austrian, (32.3%) German (40%) and Slovenian (52.8%) companies in a good extent.** Besides, it might be also underlined that **84.4% of the Hungarian companies are also planning to introduce IioT in a few exte**nt. On the other hand, it is also a significant result that **the vast majority of the Italian companies** (90.8%) are **not interested in the implementation IioT technologies.**

When it comes to the plans in connection with **cloud technologies**, the transnational figure is reflecting that this technology is **planned by Austrian (32.3%) and Slovenian (30.6%) companies mainly at a good extent**, but **Hungarian companies'** plans should be also taken into account **since 60% of the Hungarian firms** have chosen that they would like to use **cloud technologies in the next years.** At this point the **non-interest of Italian companies** are also visible at this technology since **94.7%** of the involved companies from Italy are not planning to introduce cloud technologies at all.

Cybersecurity was the next I4.0 pillar in the analysis, and according to the results, **Austrian and Slovenian companies are interested in the implementation of this technology**, more precisely 67% of the Austrian, and 58% of the Slovenian companies are planning to use cybersecurity at least a good extent-or even very intense use- in the near future. In addition, the results have shown that the involved **Italian companies (92.1%) are not interested in** implementing this technology at all.

Regarding additive manufacturing, **Italian (27.6%) Czech (25%) and Austrian (22.6%) companies desire to use this I4.0 technology** in a good extent, but **57.8% of the Hungarian** companies are also wishing to implement additive manufacturing solutions in a **few extent.**

As far as the plans are concerned towards **augmented reality** (AR) implementation, the statistics and the figure describe that this technology is planned mainly by **German (20%) and Slovenian (19.4%) companies in a good extent.** Nevertheless, the vast majority of the companies from the **other countries are rarely interested** in the introduction of this I4.0 technology. Namely, 91.1% of the Hungarian, 96.1% of the Italian, as well as 95.8% of the Polish companies, the implementation of AR does not belong to the short-term goals.

Last not but least, companies' plans in relation with **big data and analytics** have been also checked. According to the results, it can be confirmed that especially **Austrian companies (51.7%) and Slovenian companies (41.7%) are wishing to deal with this area** in the near future at least in a good extent. On the other side, it has to be also underlined that the majority of the **Italian (96.1%) as well as Polish (81.2%) companies are not planning to use** and apply big data solutions in the near future.

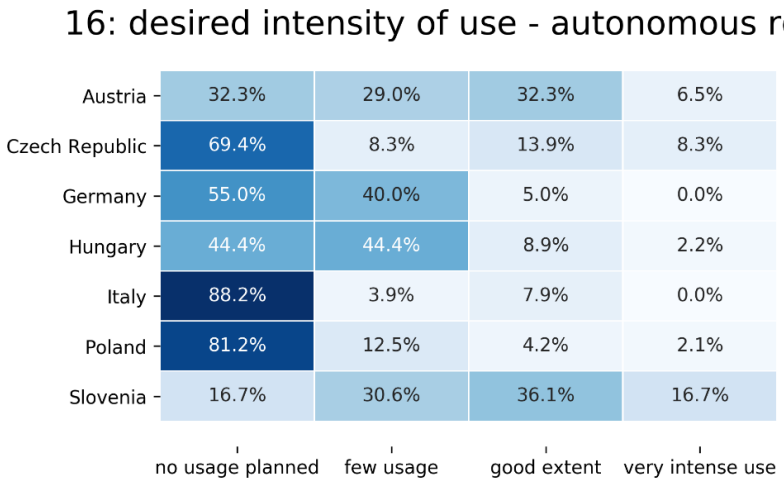

Figure 26: End user companies' desired intensity of use of I4.0 technologies- autonomous robots

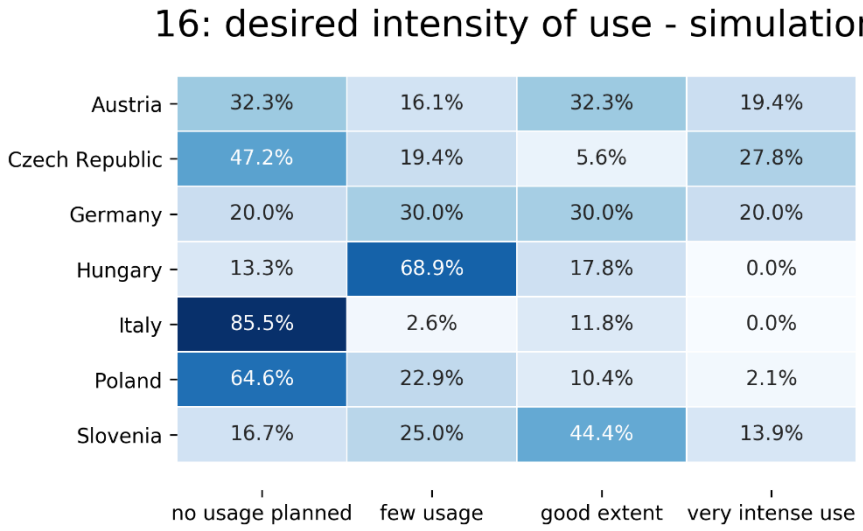

Figure 27: End user companies' desired intensity of use of I4.0 technologies- simulation

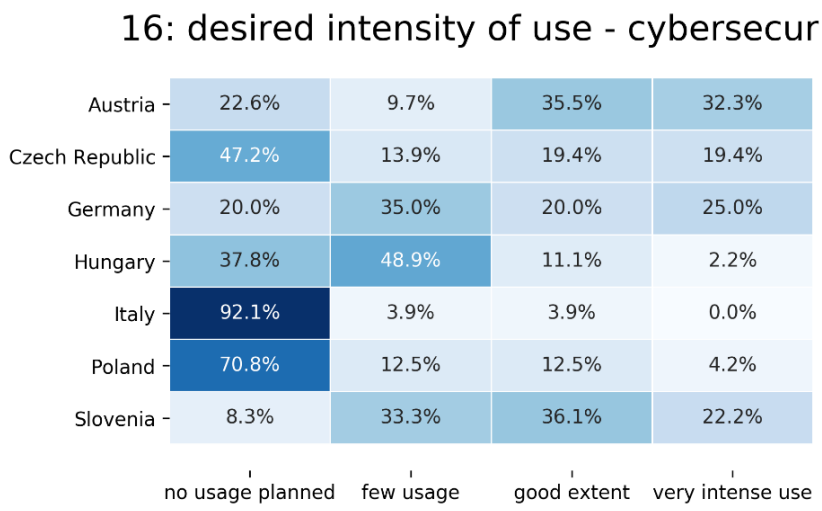

Figure 28: End user companies‘ desired intensity of use of I4.0 technologies-cybersecurity

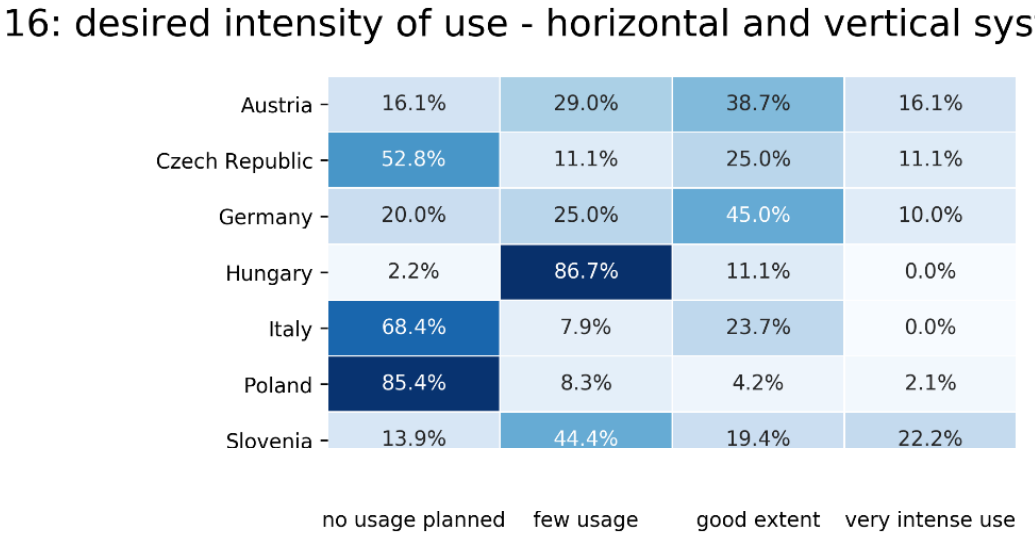

Figure 29: End user companies‘ desired intensity of use of I4.0 technologies-horizontal and vertical systems integration

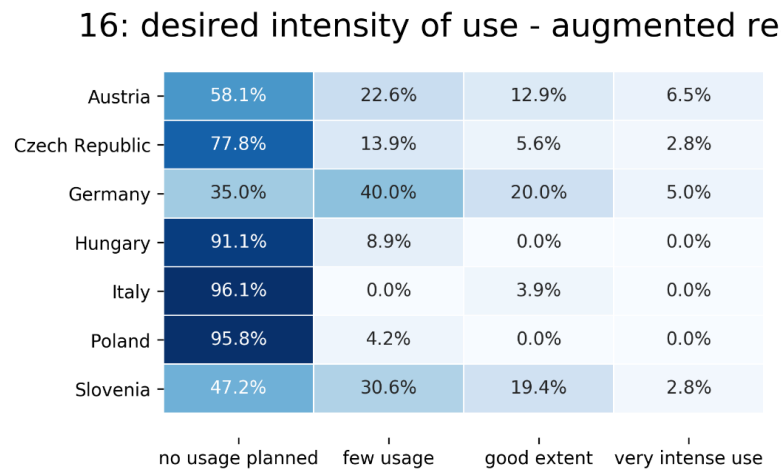

Figure 30: Companies‘ desired intensity of use of I4.0 technologies-augmented reality

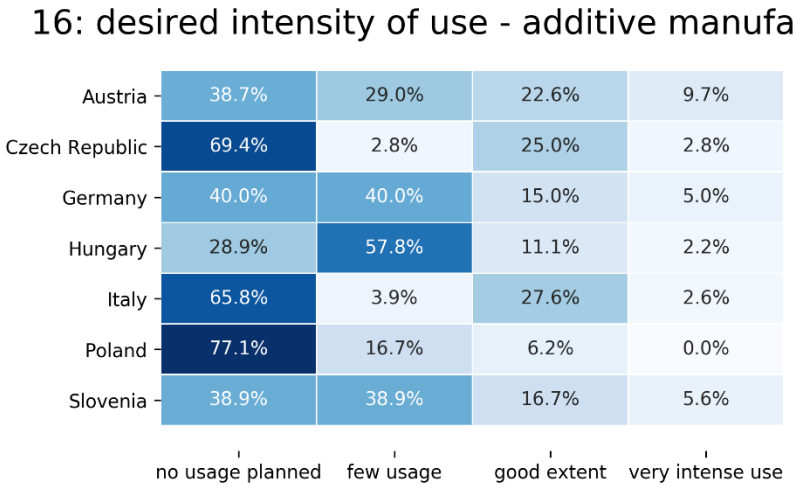

Figure 31: Companies‘ desired intensity of use of I4.0 technologies-additive manufacturing

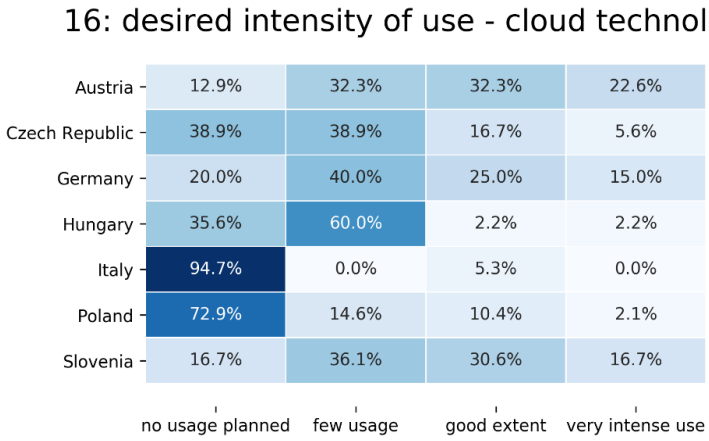

Figure 32: Companies‘ desired intensity of use of I4.0 technologies-cloud technologies

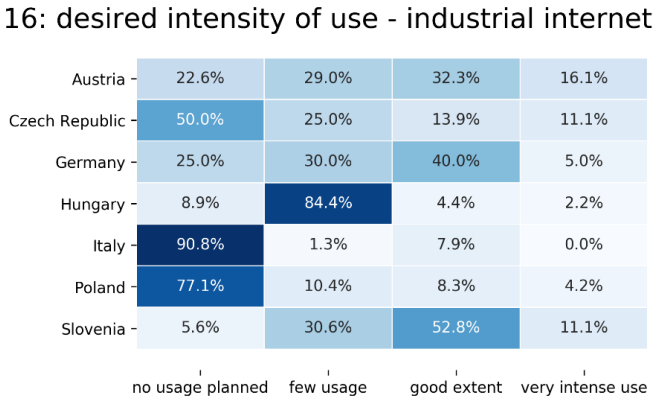

Figure 33: Companies‘ desired intensity of use of I4.0 technologies-industrial internet of things

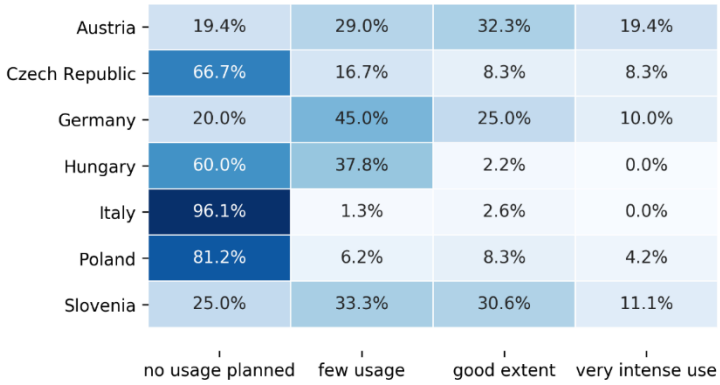

Figure 34: Companies‘ desired intensity of use of I4.0 technologies-big data and analytics

3.8 End user companies' motivation for digital transformation

Apart from the questions in connection with the currently and planned usage of I4.0 technological pillars of **end users**, these companies were also asked to reply questions in relation with their **motivation for digital transformation**. The main question of motivation has been subdivided into further elements, more precisely nine different statements were given and respondents could choose between four categories (' I don't agree', 'I partly agree', 'I mostly agree' 'I fully agree') In the framework of this subchapter, the most significant result shall be explained in relation with companies' motivation for digital transformation.

Figure 35-39 been integrated to this current report in order to demonstrate the companies' motivation for digital transformation. According to the analysis**, the majority of the German (65%) and Hungarian (53.3%) companies mostly agree that internal innovation**-including internal renewal as well as change and adaptation- **is fostered within their firms**. Besides, more than **30% of the involved end user companies fully agree in Austria, Czech Republic, Italy and Slovenia that they foster internal innovation as a part of motivation for digital transformation**. However, approximately **half of the Polish companies do not agree with** this statement at all, and within these companies internal innovation is not fostered.

Regarding the correlation between the appearance of new customers and digital transformation**, 64.5% Italian companies fully agree with this relation**. Interestingly enough **that 32.9% of the Italian companies**, however, **do not agree with this statement**. Besides, more than half of the **Austrian, (54.8%) German (60%) and Hungarian (62.2%) companies'** representatives **mostly agree with the statement that due to digital transformation new customers will appear.**

Within the motivation related question, not only the appearance of new customers were asked but also the appearance of new markets as well thanks to digital transformation. According to the survey, **the Italian companies are almost equally do not agree (46.1%) and fully agree (42.1%) with this statement**. The statistics have also shown that more than **half of the Hungarian companies mostly agree with the fact that new markets will evolve due to digital transformation**. Regarding the other countries no outstanding result can be presented.

The questionnaire survey was also asked in what extent the companies agree with the statement that in parallel **with digital transformation, their business model will also change. Based on the transnational results, 94.7% of the Italian, 70.8% of the Polish and 61.1% of the Czech companies do not agree with this statement at all**, whereas 40% of the German companies mostly agree with the statement that digital transformation will result change in business model as well.

The motivation related question was dealing with also the new product and service offers influenced by digital transformation. According to the results, **61.8% of the Italian and exactly half of the Polish companies do not agree with this correlation at all.** Nevertheless, **36.1% of the companies from the Czech Republic** as well as **30% of the German companies fully agree with this relation.**

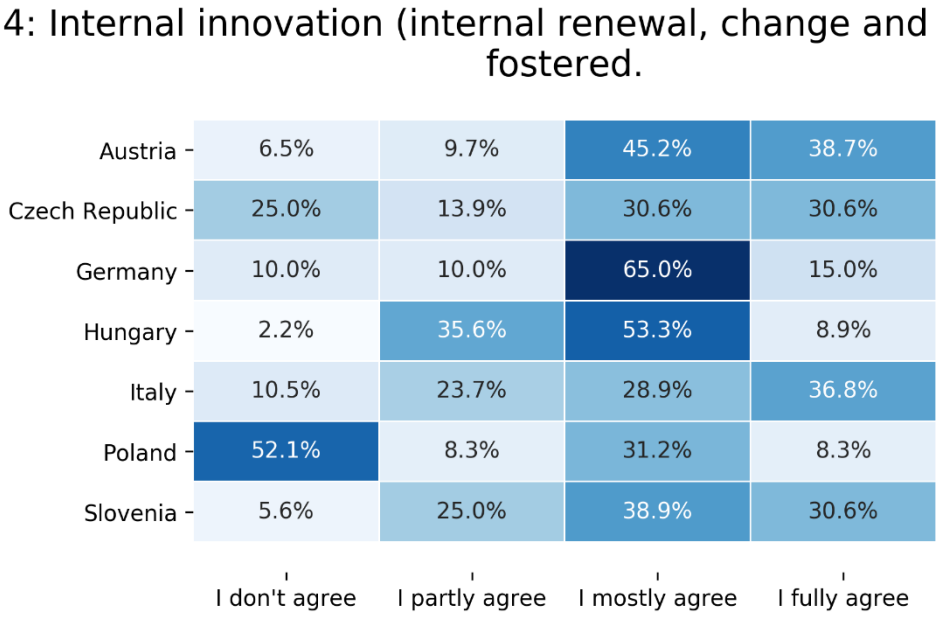

Figure 35: End user companies' motivation for digital transformation- internal innovation

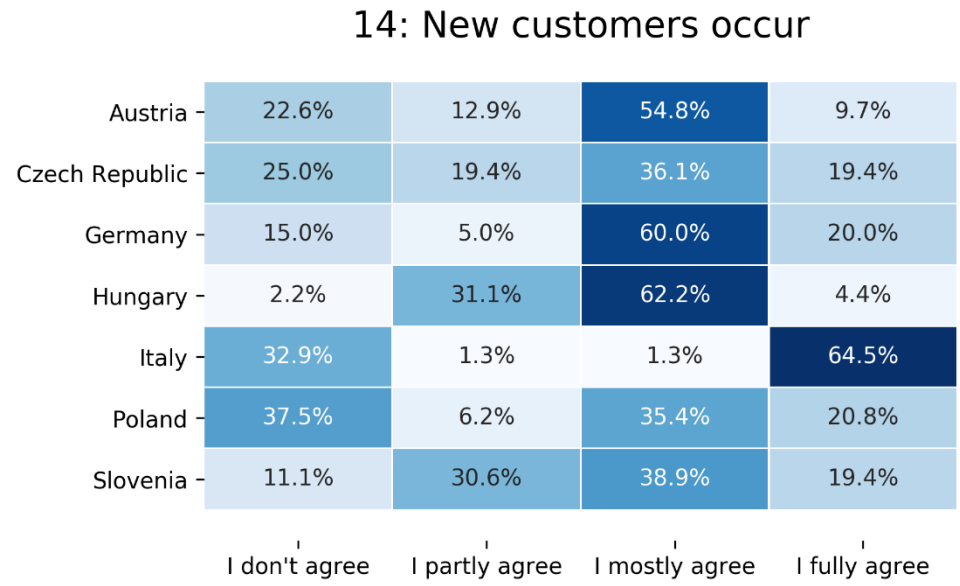

Figure 36: End user companies‘ motivation for digital transformation- new customers occur

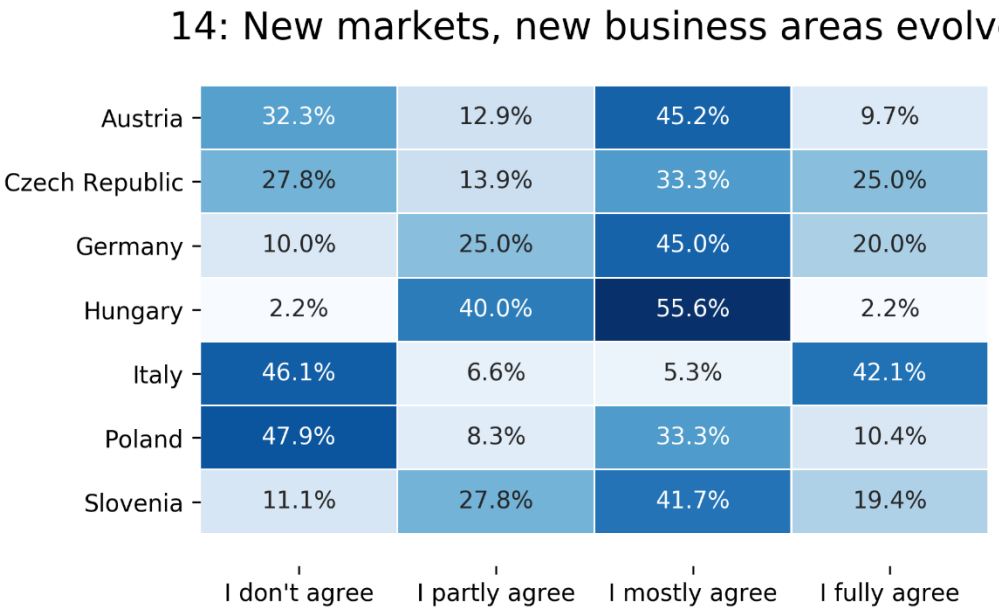

Figure 37: End user companies‘ motivation for digital transformation- new markets, new businesses evolve

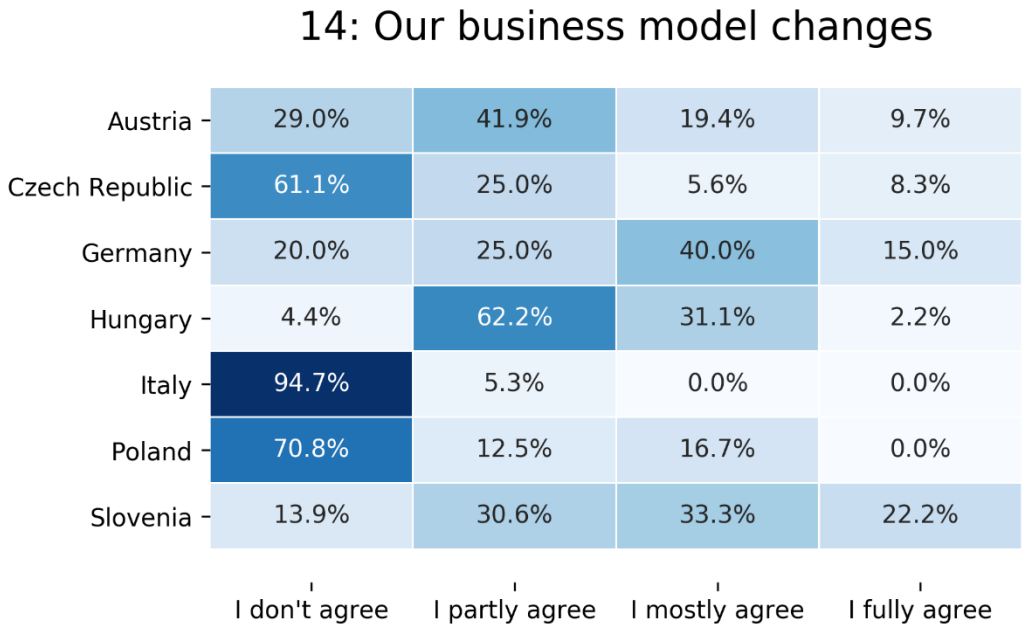

Figure 38: End user companies‘ motivation for digital transformation- business model change

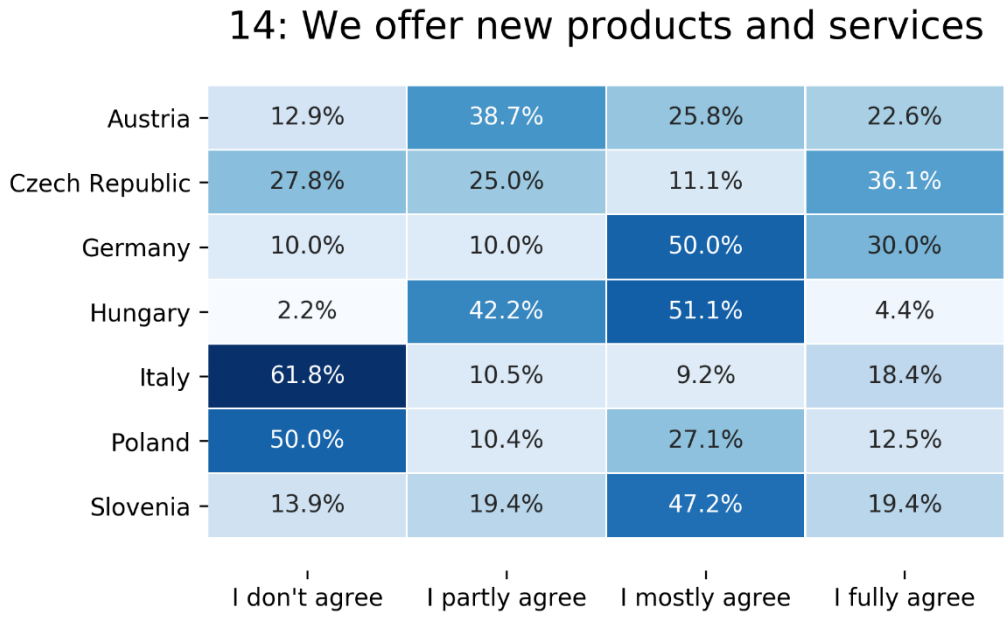

Figure 39: End user companies‘ motivation for digital transformation- offering of new products and services

3.9. End user companies' strategies for digital transformation

Apart from the motivation of end user companies towards digital transformation the analysis scrutinised the available strategies of end user companies in connection with digitization.

This subchapter shall demonstrate the most significant results in relation with **digitization strategies as well as internal motivation towards digitization will be also concerned**, presenting the results on transnational level.

Within the motivation related questions, firstly the employees' objectives to I4.0 were asked by companies' representatives. Figure 40 presents that the **majority of the Czech companies (80.6%**) has indicated that in their firms, employee objective to **realise Industry 4.0 has not been defined at all**. Apart from the Czech companies, **the majority of the Austrian companies (58.1%) have not defined employees' I4.0 objectives either**. However, **57.8% of the Hungarian companies mostly agree** with the statement that they have defined employees' objectives in connection with Industry 4.0.

Regarding the **exact availability of the Industry4.0 strategy,** Figure 41 reflects that Polish and Italian companies are on the two sides of the scale. The majority of the **Polish companies (68.8%) do not agree at all that they have such strategy available**, whereas almost one-third (**30.3%) of the companies from Italy fully agree that they have such I4.0 technology strategy**.

When it comes to the **roadmap of Industry 4.0 realisation**, (Figure 42) the transnational analysis has pointed out that **80.6% of the Czech companies, 97.4% of the Italian companies, as well as 70.8% of the involved companies from Poland do not agree** at all that they have already prepared such roadmap. Nevertheless, almost half of the **Hungarian companies (46.7%) mostly agree that they have such roadmap within their institutions.**

As far as the availability of the **financial resources for realisation of Industry 4.0** are concerned, (Figure 43) the most outstanding data is that the vast majority of the **Italian companies (97.4%) do not agree at all** with the fact that such resources would be available. On the other hand, approximately **two-third of the Hungarian companies (64.4%) mostly agree** that these **resources have been already realised.**

In the framework of the available strategies group, companies were asked in what extent **their managers are willing to realise Industry 4.0**. The result (Figure 44) has shown that **58.3% of the Polish companies do not agree with this statement, whereas 35.5% of the Italian and 30.6% of the Slovenian companies fully agree with the statement** that their managers are willing to realise Industry 4.0 technologies.

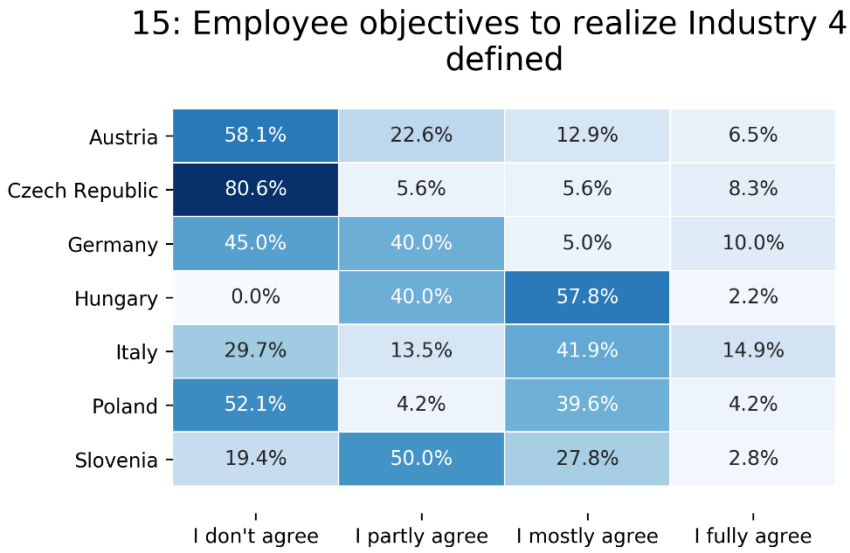

Figure 40: End user companies' strategies for digital transformation- employee objectives to realise I4.0

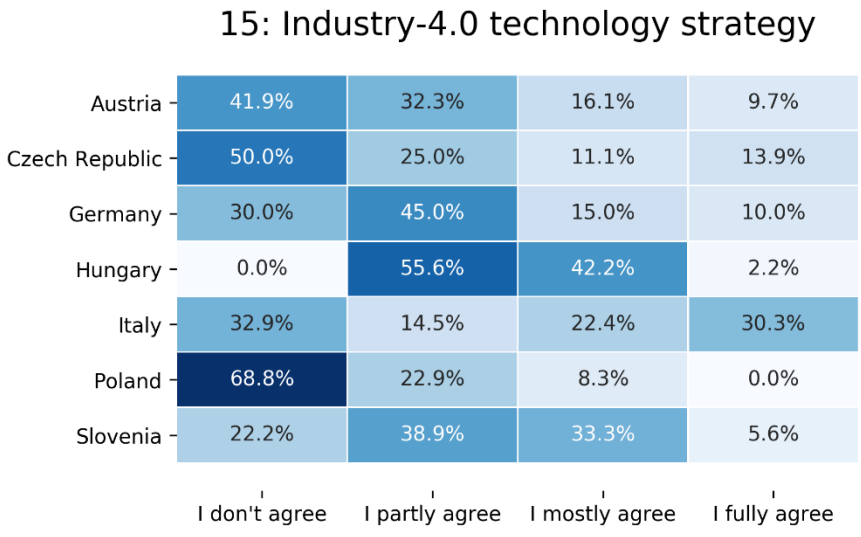

Figure 41: End user companies' strategies for digital transformation- I4.0 technology strategy

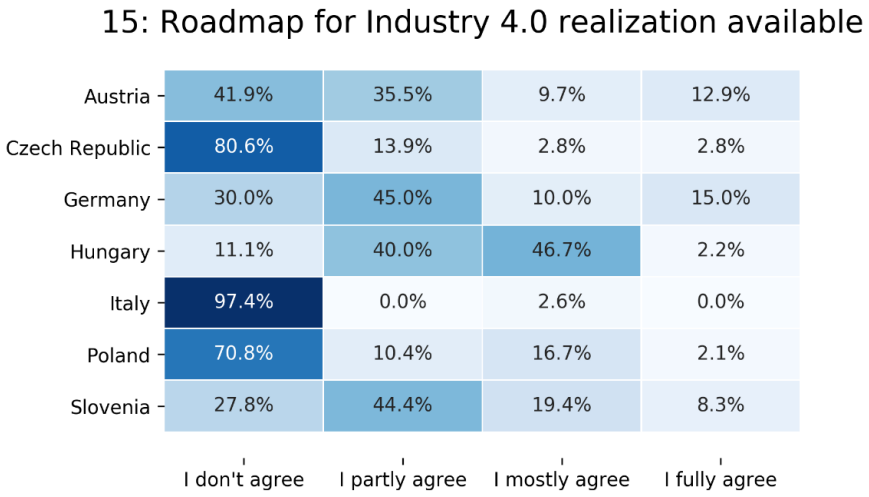

Figure 42: End user companies' strategies for digital transformation- roadmap for Industry 4.0

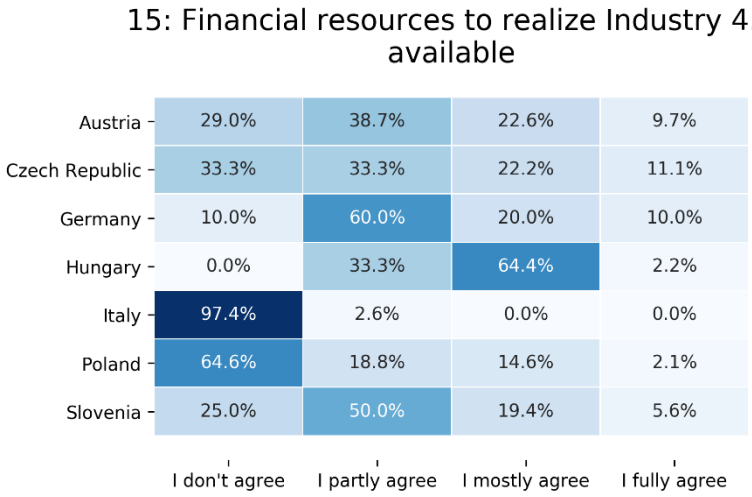

Figure 43: End user companies' strategies for digital transformation- financial resources to realise Industry 4.0

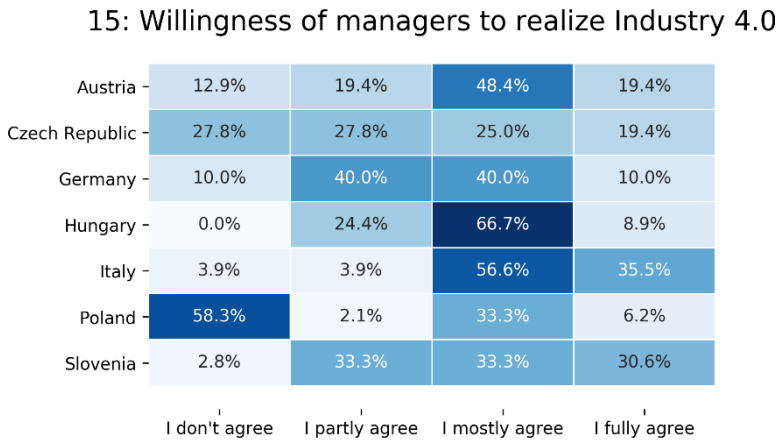

Figure 44: End user companies' strategies for digital transformation- willingness of managers to realise Indutsry 4.0

3.10. The correlation between the currently used vs. planned Industry 4.0 technologies among supplier companies

In the previous chapters the report was focusing on the replies of end user companies, whereas this **sub-chapter shall be concentrating on the result of companies suppliers of Industry 4.0,** highlighting their currently used I4.0 technologies as well as their planned ones.

Figures from 45-53 shall indicate these results, separately to every I4.0 pillar. What these figures undoubtedly reflect that the **majority of the involved supplier companies on transnational level do not use Industry 4.0 technologies** and they are not planning to implement them either.

However, if the figures are further scrutinised, it can be claimed that supplier companies with few range of offers of augmented reality would like to continue their offers in a few extent in the future as well.

The transnational analysis has also reflected that supplier companies who are offering **big data and analytics in a good extent, would like to keep this level in the following years** as well. Similarly to big data analytics, the same is true **for horizontal and vertical system integration**, that companies who offer this in a god extent would like to continue offering this technology in the same level as well. As far as **Industrial internet of things and simulation technologies**

are concerned, similar tendency might be observable, in case companies are offering these technologies in a certain extent (few, or good) they would like to **keep this level of offer** in the next periods as well.

Taking into consideration all results and figures, it can be stated that it is **very rare that companies would like to improve their level of offers in a certain technology, they would rather keep on the same level as they are currently offering**, or the majority of the companies are not using I4.0 technologies and they are not planning to use them either in the following years.

Nevertheless, the analysis has shown that **relatively high number of supplier companies would like to enhance their level of big data and analytics from few usage up to good extent**. Another remarkable result may concern **industrial internet of things area**, since examining the entire supplier companies sample, 6.4% (approx. 7) supplier companies are **interested in enhance their no offer level to few extent.**

18: currently used technology- 19: Planned technology (additive manufacturing)

Figure 45: The correlation between suppliers' currently used and planned I4.0 technology-additive manufacturing

18: currently used technology- 19: Planned technology (augmented reality)

Figure 46: The correlation between suppliers' currently used and planned I4.0 technology-augmented reality

18: currently used technology- 19: Planned technology (autonomous robots)

Figure 47: The correlation between suppliers' currently used and planned I4.0 technology-autonomous robots

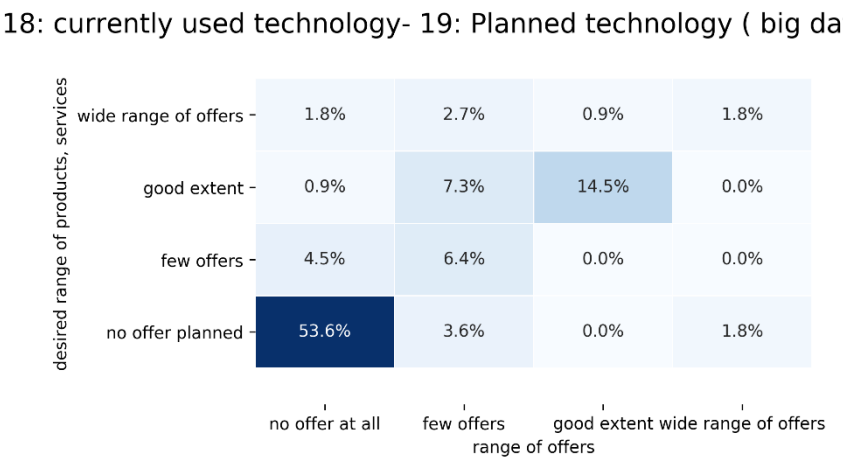

Figure 48: The correlation between suppliers' currently used and planned I4.0 technology-big data and analytics

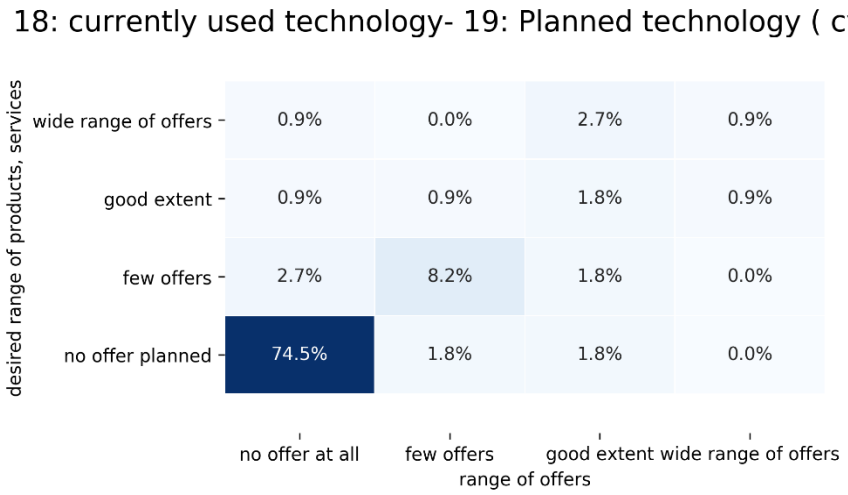

Figure 49: The correlation between suppliers' currently used and planned I4.0 technology-cybersecurity

18: currently used technology- 19: Planned technology (industrial internet of things)

Figure 50: The correlation between suppliers' currently used and planned I4.0 technology-industrial internet of things

18: currently used technology- 19: Planned technology (cloud technologies)

Figure 51: The correlation between suppliers' currently used and planned I4.0 technology-cloud technologies

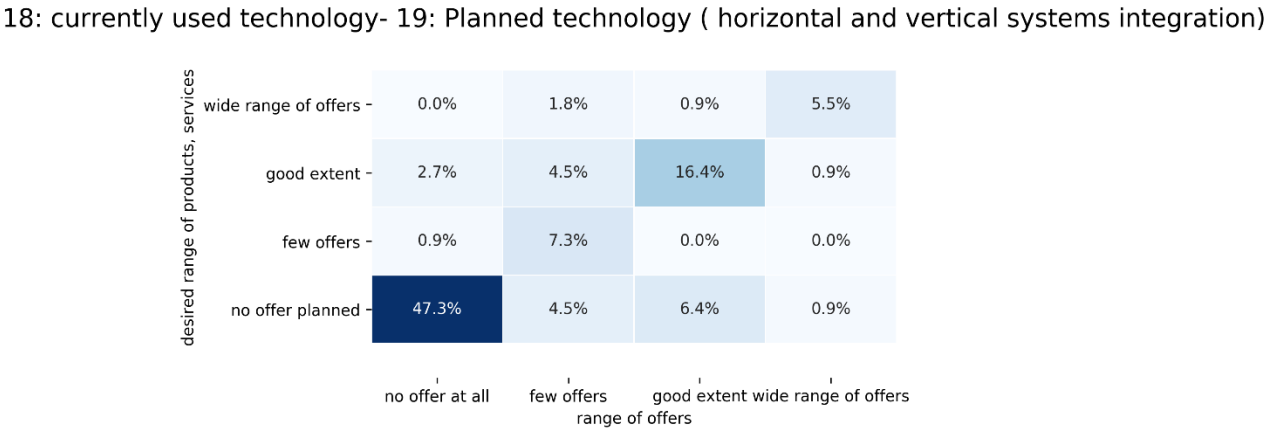

Figure 52: The correlation between suppliers' currently used and planned I4.0 technology-horizontal and vertical systems integration

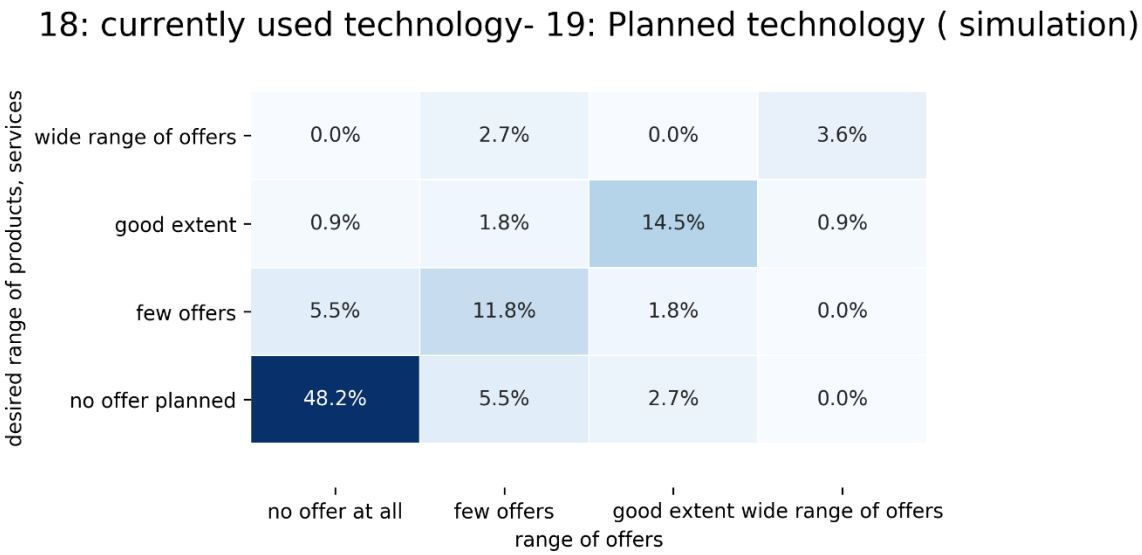

Figure 53: The correlation between suppliers' currently used and planned I4.0 technology-simulation

4. Conclusion:

The current transnational report has been discussing several data and it has also shed light on some results in connection with SMEs Industry 4.0 technology readiness within the seven CE countries where the analysis has been conducted.

Taking into consideration of all results, based on the current SME mapping report on transnational level, the following key findings can be determined:

- Countries data sample are different, due to various customer base (e.g.: Polish micro companies, small Italian businesses, relatively large Slovenian ones; Hungarian and Italian business dominantly from metal industry, while German companies from ICT, others are more balanced)
- *TOP3 key sources of digital transformation:*
    - ❖ Supplier/Customer push
    - ❖ R&D office
    - ❖ Technical office
- *Company size determines the source of transformation:*
    - ❖ For smaller companies customer/supplier support is essential
    - ❖ Larger companies can count on R&D and Technical office
- *Research in house capacity*
    - ❖ German and Austrian companies are far more equipped than others
    - ❖ Italy and Poland far behind
- *European Union Fund absorption*
    - ❖ Large companies and mid-caps are active on European scale
    - ❖ Medium and small companies are present in regional/national funds
    - ❖ Micro companies are inactive
- *Adaption of digital technologies by country*
    - ❖ German and Austrian companies are dominantly to a good extent

- Czech and Slovenian businesses are medium users
- Italian, Polish, Hungarian companies lag behind

- *Adaptation of technologies by digital technologies:*
  - Mobile robots and Augmented reality are not used
  - For medium sized companies: simulation, system integration, data analytics, cybersecurity and IIoT are overrepresented
- *Way to raise interest for digital transformation*
  - New customers
  - New markets
  - Flexible production
- *Demand for specific digital technologies yet country specifics are important*
  - 1.Industrial IoT
  - 2.Horizontal and Vertical integration
  - 3.Simulation
  - 4.Big Data and Analytics
- *Current usage is planned to be improved slightly*
  - Autonomous robot
  - Industrial Internet of things
  - Additive manufacturing