Summary Report

of the

expert interviews / questionnaires

and the

specific research on the field of manufacturing companies

Introduction

This report should lay the background for the development of the further produced content (development of suitable and effecting Learning Materials that are tailored to our target-group´s learning preferences). To get all the information needed to fulfill this task, there have been two different tasks: questionnaires and a specific research.

The main purpose of the questionnaires and the main challenge was to find out, what the situation among the manufacturing companies is right now. The base for the questionnaires has been following questions:

- Do they (manufacturing companies) know about Industry 4.0?
- If yes – how much and how big is a gap between the hierarchy in the company – top management / middle management / senior staff
- What kind of information is relevant for companies?

To get a complete picture not only from the manufacturing companies, there has been also created and implemented a questionnaire targeted to the suppliers of Industry 4.0 technologies where similar questions have been asked.

In addition to the employees' own experiences, the (practical) results and evaluations of the customers and the general public on the technologies of Industry 4.0 were also surveyed within the questionnaires.

Second part of this intellectual output is the specific research which is focused on searching for companies which are in position of suppliers of the innovative solutions within the Industry 4. This report should give an overlook, which companies are operating in this field in the four countries involved in this project (Austria, Spain, Portugal and Czech Republic).

The following aims (of the questionnaires and research) have been declared for the whole task:

- to summarize and describe actual situation of knowledge about Industry 4.0 among the employees of the manufacturing companies,
- to find out and specify the knowledge gaps among the employees of the manufacturing companies on different positions,
- to describe and set up a standard of knowledge about the Industry 4.0,
- to identify what kind of information will have the biggest impact on the companies and the public at large,

- to define how should the content look like to be easy to read and understand by the general public,
- to determine, how deep the content shall/should be within the Industry 4.0,
- to find applicable conclusions and recommendations for further project phases and
- ADDED VALUE: future projects will be able to build up on the research that we will be conducted as the report will be available under open access on our project website.

Content

1. Questionnaires

The questionnaires are based on the information about Industry 4.0 gathered in the intellectual output 1 in this project.

The main focus lies on the technologies which were explained in the report of the intellectual outcome 1:

- Information and communication technology,
- cyber-physical systems,
- network communication,
- big data,
- cloud computing,
- modelling, virtualization and simulation and
- improved tools for human-computer interaction and cooperation.

The survey platform used was surveymonkey.com. On this website the data was first entered, then the answers were collected and then analyzed. The questionnaires for Spain and Portugal have been translated from English to Spanish and Portuguese as the partners thought, that the companies wouldn't fill out the English form as they are not as good in English. After the collection of all questionnaires, they have been combined again to form an overall result.

Questionnaire 1 was answered by 29 persons working mainly in the department of human resources in manufacturing companies. Questionnaire 2 was answered by 34 persons working in companies which offer Industry 4.0 technologies as suppliers.

1.1. Questionnaire: manufacturing companies (Human Resources)

The questionnaire has been sent out via email to the Human Resource Department of various manufacturing companies in the specific countries – Austria, Czech Republic, Portugal and Spain.

The questionnaire has been sent out through our own network. Furthermore, all companies have been contacted, which are working directly in the field of Industry 4.0 technologies.

1.1.1. The results

Completed questionnaires

Austria	Spain	Portugal	Czech Republic
7	7	8	7

Question 1: "Do you know what Industry 4.0 means and includes?"

75,86 % of the interviewees stated, that they know what Industry 4.0 means and includes.

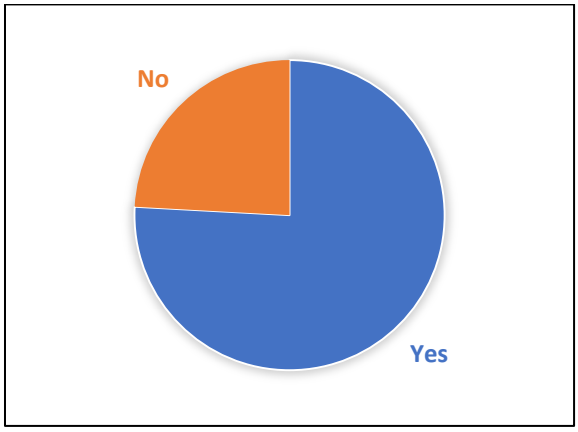


Figure 1: Knowledge about Industry 4.0

Four interviewees also wrote a commentary on this question.

1. I know what it means, but I am not sure what is included.
2. It is what is called a hypothetical fourth mega or stage of both technical and economic evolution
3. 4 (fourth) industrial revolution focusing on automation and data-processing technology where "smart" plants communicate with humans in real time enabling more reliable decision-making to increase efficiency and effectiveness in all types of operations. Eliminating waste that does not add value to the product / service.
4. Yes, but I do not have a deep knowledge

Conclusion 1: This result shows that the majority of the interviewees (75,86 %) have general knowledge of Industry 4.0.

Question 2: "What do you associate with Industry 4.0?"

The following answers were given to this question by the respondents:

1. Everything in connect together via IoT, Decentral autonomic systems
2. big data, clouding, 3D printing etc.
3. innovations, future, ICT, robotics
4. new technologies, services
5. Use of high-tech equipment; networking of processes within the company
6. 4th industry revolution
7. digitalization, robotics, 3D printing etc.
8. digitalization
9. Automation, digitization, clouds, smart production;
10. Digitization
11. robotics, automatization
12. Digital Business
13. Digitization and Robot Technology
14. digitalization, nanotechnology, robotics etc.
15. The digitalization of processes
16. artificial intelligence, robotics, virtual reality.
17. Technological innovation.
18. It is associated with Big Data, the use of algorithms to process them with the massive interconnection of systems and digital devices.
19. Technological evolution (robotics, for example)
20. Digitized and sustainable industry
21. A new form of organization and management of companies and their industrial assets.
22. Automation
23. digital connectivity, network of systems that communicate with all the data / actors of an industrial process
24. 4th Industrial Revolution
25. technologic evolution
26. developments
27. evolution
28. ICT, Artificial Intelligence, News Jobs, New ways of work
29. Program

Conclusion 2: The responses of the interviewees show that the majority associate digitization with Industry 4.0. At the same time some technologies of Industry 4.0 are already shown, such as Robotics/Robot Technology, Artificial Intelligence, ICT, Big Data, Automation. Furthermore, the changes are taken up by statements such as: "innovations", "technological revolution", "new jobs", "new ways of work" and "a new form of organization and Management of companies and their industrial assets".

Question 3: "How do you rate your knowledge of Industry 4.0?"

From all 29 Answers there has been made an average number of the results to show an adequate average value.

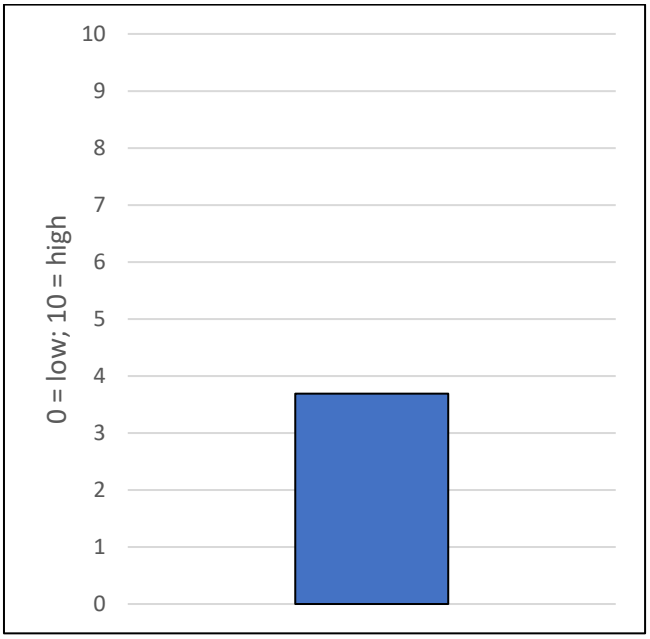


Figure 2: Individual knowledge on Industry 4.0 - average

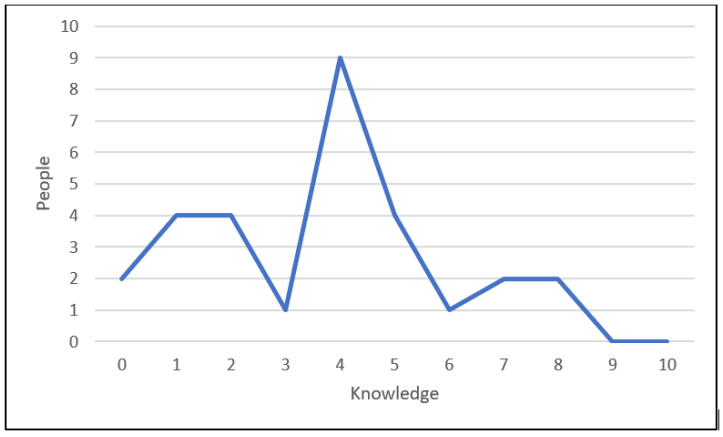


Figure 3: Individual knowledge on Industry 4.0 - individual

Conclusion 3: Despite the fact that the interviewees have knowledge of Industry 4.0, this graph shows that knowledge is rather low with an average value of 3,69.

In the second graph one can very well see that some individuals have a higher knowledge of Industry 4.0 - on average, however, they are outnumbered.

Question 4: "How much have Industry 4.0 developments affected you in the execution of your job?"

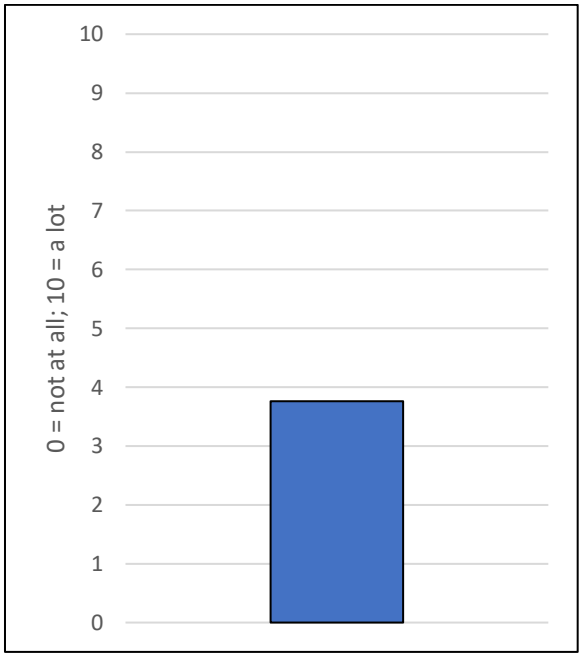


Figure 4: Influence Industry developments 4.0 on job execution – average

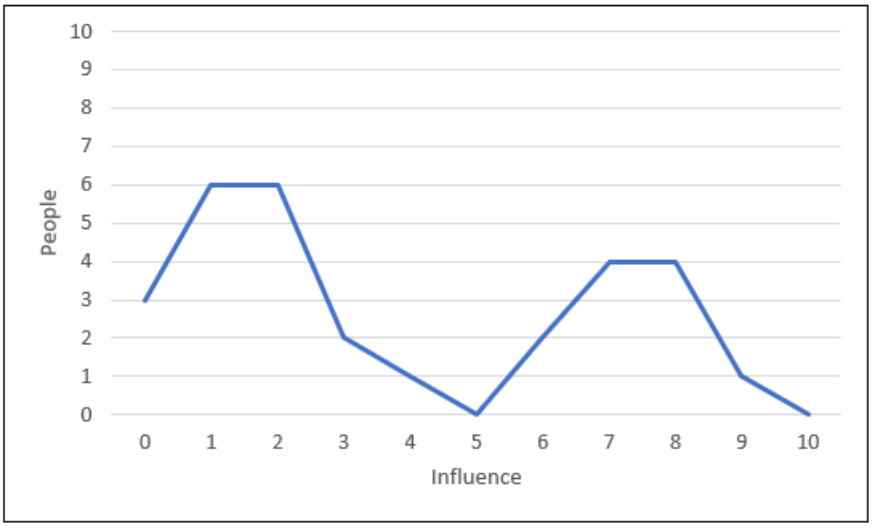


Figure 5: Influence Industry 4.0 on job execution – per individual

Conclusion 4: The average value of 3.76 shows that the interviewees tend not to be affected much in the execution of their job by Industry 4.0.

In the second graph you can see very clearly that some individuals do not see any significant influence of Industry 4.0 technologies in their companies. On the other hand, there are some individuals who are more affected by Industry 4.0 technologies.

Question 5: "Have you ever had or used further education activities (like the following) concerning Industry 4.0?"

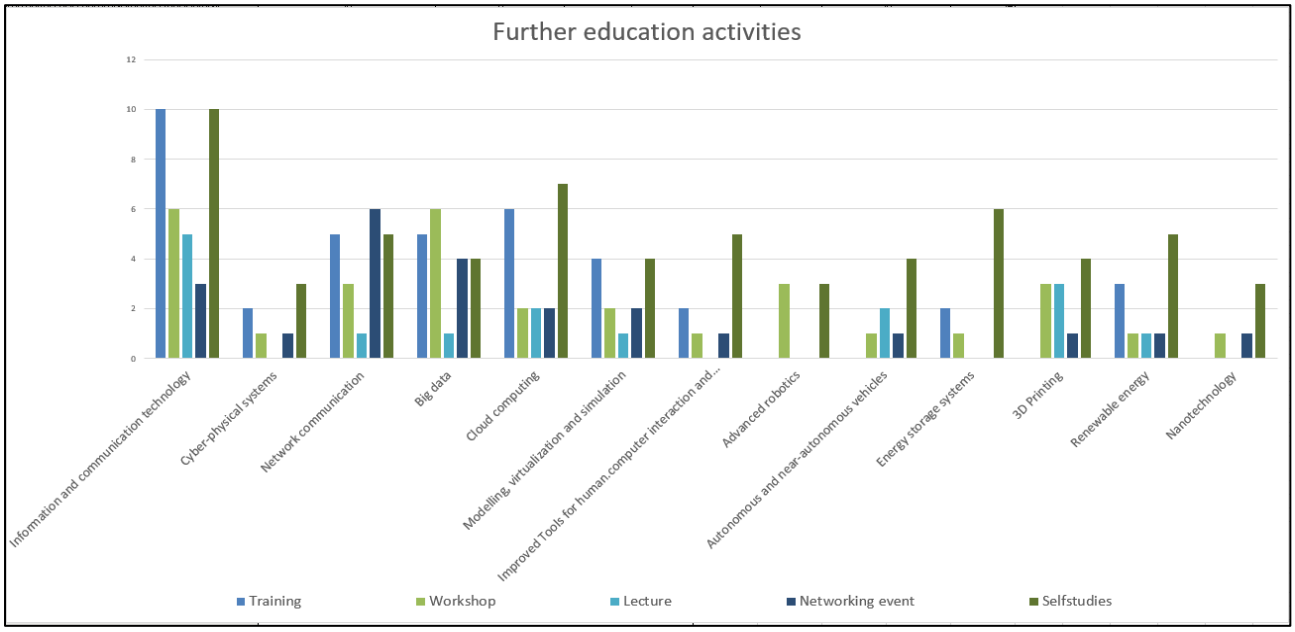


Figure 6: Further education of Industry 4.0 - field of technology

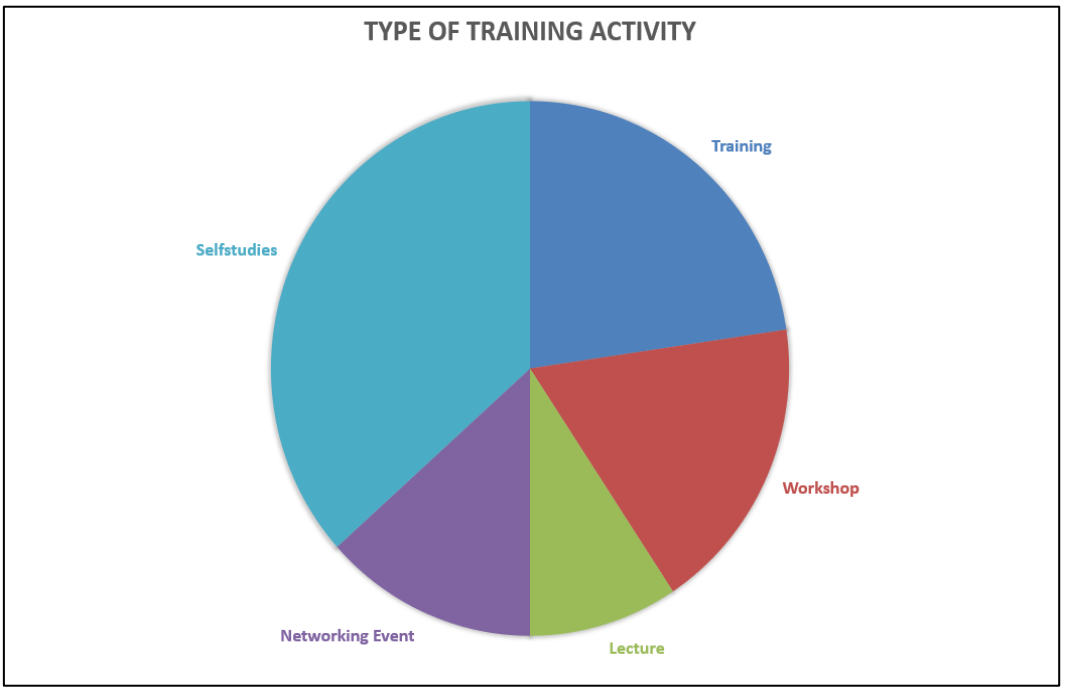


Figure 7: Further education of Industry 4.0 - activity

Within this question, the interviewed people have been asked to "How many hours in total for which activity?". 20 persons answered this additional open question. The answers to this question are listed in the table below.

1. Information and communication Technology: 3
   Cloud computing: 8
   Modelling, virtualization and Simulation: 40
   Autonomous and near-autonomous vehicles: 1
2. 1-2 days for each of all
3. All activities were 8 hours, so just 1 one day per act.
4. about 8 hours per activity
5. 1-2 hours
6. 1 day for each
7. none of them
8. point 1: 5 hours
   point 8: 0,5 hours
   point 10: working with it (ISO 50001)
9. 5h/activity
10. I am much interested in new technologies and in my studies i have learned a bit about it and which occupation will die with it. When i have time i read articles and use maybe 5 hours per month for it
11. usually 1 or 2 days

12. About 30 hours
13. 5
14. Information and communication technology - 350 hours
    Cyber-physical systems - 120 hours
    Big Data - 300 hours
15. 20 hours
16. About 8 hours
17. about 4 hours
18. ICT: More than 50h
    the others: Less than 2h
19. 2
20. 8h in total

Conclusion 5: As can be seen from figure 6, most of the interviewees had further training courses on information and communication technologies (20 %). This is followed by three areas: network communication (12 %), big data (12 %) and cloud computing (11 %). The three least technology fields in which the interviewees had used training activities are "Nanotechnology" (3 %), "Advanced Robotics" (3 %) and "Cyber-physical Systems" (4 %).

Figure 7 shows very well that most of the knowledge was acquired via self-studies, followed by trainings and workshops.

Question 6: "Which technologies had or have the most impact onto your business?"

The interviewees were able to determine the impact of this question on the business. The scaling was 0 = no Impact, 1 = small Impact, 2 = medium Impact, 3 = high Impact and 4 = very high Impact.

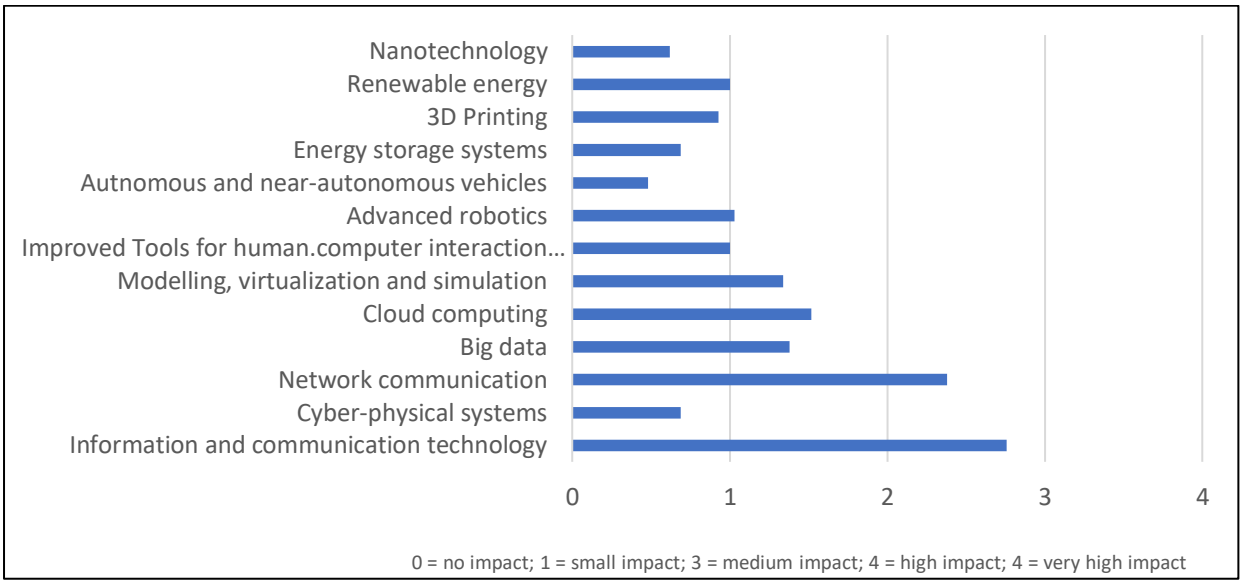


Figure 8: Impact on business - subdivided by technologies

Conclusion 6: According to the interviewees, "Information and communication Technologies" and "Network communication" have the greatest impact on their business with average values of 2.38 and 2.76 respectively.

Nanotechnology (0.62), energy storage systems (0.69), autonomous and near-autonomous vehicles (0.48) and cyber-physical systems (0.69) have no or only a minimal impact.

Within this question, the interviewed people have been asked to “Please describe how the Tools/Instruments (available to the Company) are used”. The answers to this question are listed in the table below.

Comments on the individual technologies	
Nanotechnology	- car polish, clothes
Renewable energy	- heat recovery - Photovoltaik
3D Printing	/
Energy storage systems	- solar - They are used in lifting / transport systems and in oscillation protection systems in the electrical network - 100% renewable electric supply certificate - The installation of photovoltaic panels allowed a direct reduction in the cost of energy - reduction of electrical costs

Autonomous and near-autonomous vehicles	/
Advanced robotics	- robots - Alexa
Improved Tools for human-computer interaction and co-operation	- Intuitive tools and versatile software make information faster and more
Modelling, virtualization and simulation	- CADENCE (Modelling, virtualization and simulation), MATLAB (Modelling, virtualization and simulation) - revit - View projects more easily
Cloud computing	- Amazon computing cloud (virtualization and simulation), One drive (web access) - iCloud - azure - use of marketing and sales platforms; extranet portal for clients - One drive
Big data	- smack - Marketing - Personalized communication with clients
Network communication	- Intranet - Audioconference, videoconference, talks (IRC-Internet Relay Chat) - training platforms - office 365 - Seek that the Information of the various areas be in online mode - only intranet - All in our computer system (Erp, production, etc.) operates in network monitoring and control of manufacturing processes - Networking, with up-to-the-minute documents and the ability to work from a distance - Possibility of linking all departments that are physically very remote
Cyber-physical systems	- Distributed control system, SAP - Monitoring and control of manufacturing processes
Information and communication technology	- kype (inter. meetings), remote access (home office via servers, ect.) - mails, info screens, daily protocols - Intranet, Smartphone - Email, Distribution lists, Asynchronous communication, Newsgroups - wiki, fullstep - Collaborative tool - the wireless systems allow great mobility in the equipment that needs internal and / or external communication - ERP, CRM, digital marketing management platform, product warehouse management system, machine control and production

	- Computer and social networks; ERP's Production Support, Human Resources, Accounting … - E-mail, workboards likeTrello - ERP for planning, production, cost and sector control. E-mails for communication of information.

Question 7: "What do you think - how will the relevance of the following technologies change for your customers within the future? Please explain briefly for each answer why you think so."

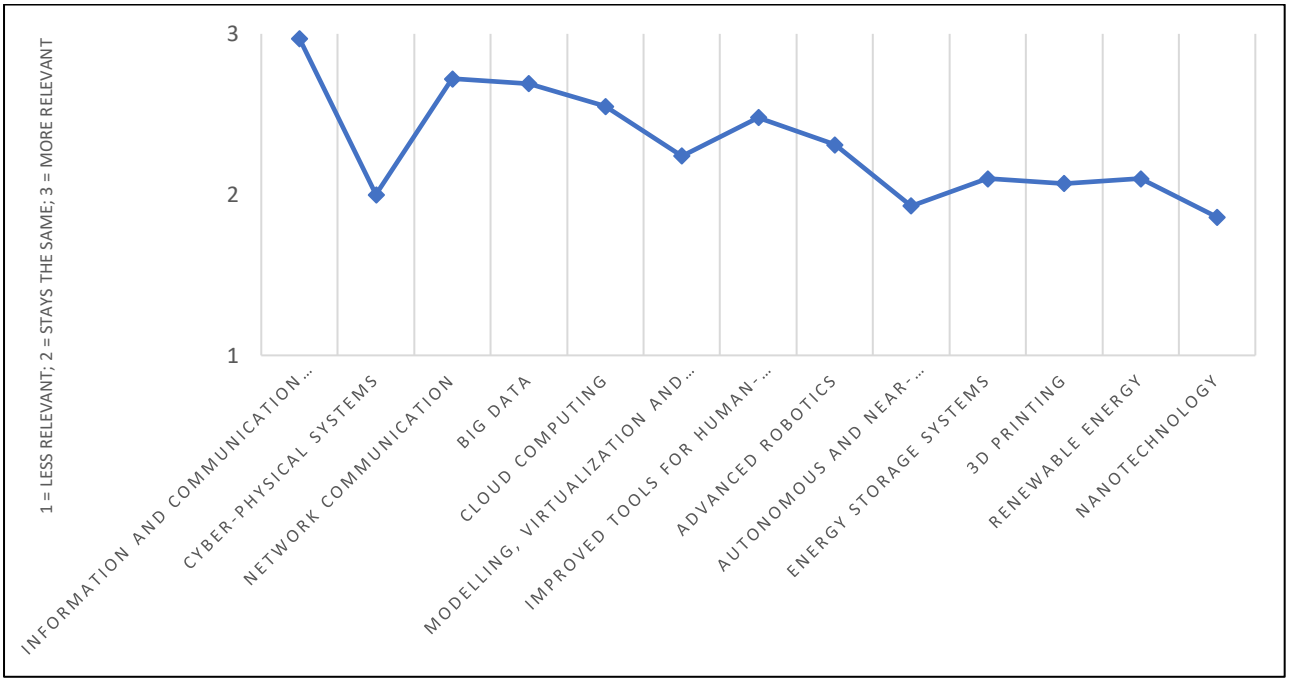


Figure 9: Future relevance for customers

Within this question, the interviewed people have been asked to "briefly explain for each answer why you think so". The answers to this question are listed in the table below.

Comments on the individual technologies	
Information and communication technology	- communication can be done very good via Networks - simply effectivity of work - save paper, fast way to communicate - knowledge based systems - All information will have to continue to be made available more and more rapidly

	- Development of active products that will work through communication between devices - Be more agile in handling information - Faster and more reliable decision making - Impacts on productivity and efficiency - Process automation - Basis of our development of other technologies
Cyber-physical systems	- Smart Grid systems are important in future - in the industrial branch that I am included I do not see possible application - Links between computational elements and physical elements. - Today I do not think it affects
Network communication	- more data more network communication - again, effectivity - High involvement in Globalization - More information but more and more shareable and easier and economically accessible - speed in equipment - Interconnection of people and machines - Currently the business is based on the net - Collaborative Work
Big data	- data is money - lean and effective production - safety - increased data security - is a concept / the use in our primary sector will not happen - Handling critical data for a good management and decision making - Exploitation of the information we have been storing for 10 years - Know the customer
Cloud computing	- the amount of data can only be calc. in that way - you can use information everywhere - is a concept / the use in our primary sector will not happen - Speed, low hardware and software costs, increased productivity and performance as well as more security - All our business is cloud - Flexibility
Modelling, virtualization and simulation	- human will interact with machines -> virtualization & modelling nec. - new services, new products - state of the art - intelligent use of resources - faster response in the case of product development. With virtual reality will not be necessary to do so many changes to the prototypes in test. Virtualization will enable a more assertive change and it will allow the visualization of the changes. - to reduce variations/differences - more and better process management - I do not think it affects - better service to the customer

Improved tools for human-computer interaction and co-operation	- since human interact more & more with very complex computers --> the interface/cooperation has to be changed - impact on effectivity, learning - state of the art - increased interaction between people and computers - Many of the industrial tasks will be increasingly replaced by equip-ment - more agility - Critical effective decision-making to improve productivity and ef-ficiency / effectiveness in operations - I do not think it affects - better service to the customer
Advanced robotics	- for simple tasks - cheaper/quicker production process - state of the art, easy working - Robots in every area - Increasingly intelligent and reliable equipment - is a concept / the use in our primary sector will not happen - Speed of process - I do not think it affects - improvement for the client
Autonomous and near-autono-mous vehicles	- industry goes for that - not relevant for us - easy way to work, less faults - avoid accidents - Reduce costs and accidents - saving of costs - I do not think it affects - we don’t use it
Energy storage systems	- lean production - to use energy carefully - This will reduce costs and make systems more autonomous - energy efficiency - Reduction of costs that are not foreseen - I do not think it affects - sustainability
3D Printing	- faster & better tech. dev. - not relevant for us - reproducing all things - greater speed in obtaining the desired product. Just in time - dras-tic reduction of stocks - to reduce work variations/loads - I do not think it affects - we don’t use it
Renewable energy	- may be fusion can change the energy prob. in future - lean production - save our world - Reducing energy costs and the ecological footprint - We will consider the installation of renewable energy production systems

	- energy efficiency - I do not think it affects - sustainability
Nanotechnology	- not relevant for us - use positive effects of nature - is a concept / the use in our primary sector will not happen - I do not think it affects - we don't use it

Conclusion 7: The table shows very clearly that none of the technology fields indicated is considered less relevant by the interviewees regarding the future significance of the customers.

It is quite clear that information and communication technology will have a high relevance for customers in the future (2.97). In this answer option 96.55 % of the respondents indicated "more relevant". It is closely followed by Network communication (2.72), Big Data (2.69), Cloud computing (2.55) and improved Tools for human-computer interaction and cooperation (2.48). All other responses tend to say that future relevance will remain the same.

Question 8: "How do you rate your individual/personal knowledge of those novel technological advancements?"

While in question 3 the overall knowledge regarding Industry 4.0 was queried, in this question the knowledge within the individual novel technological advancements was explicitly asked.

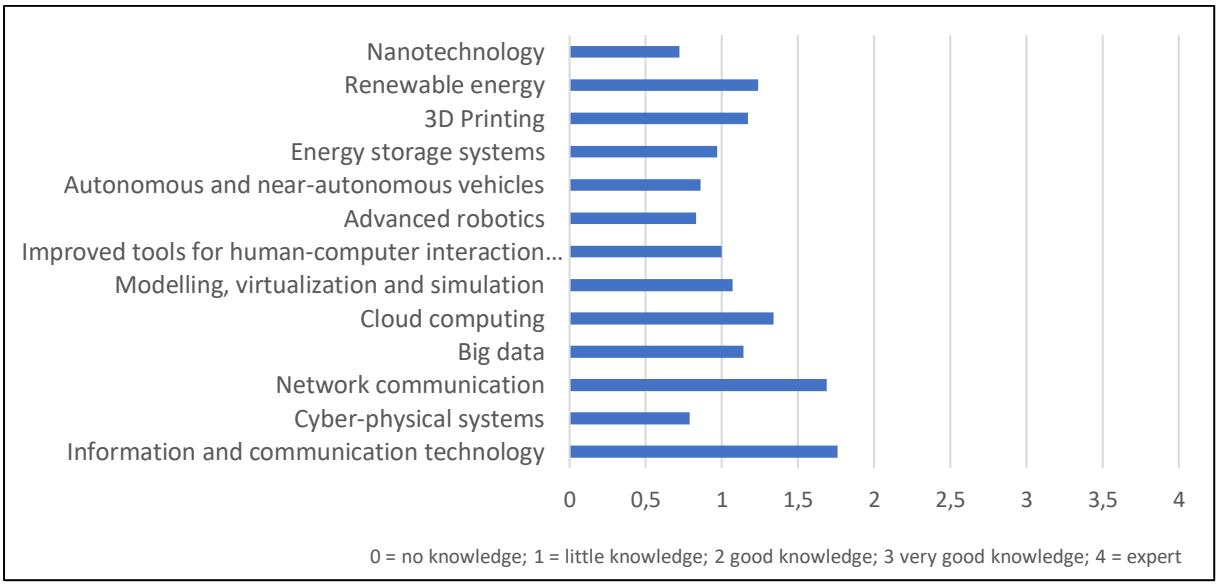


Figure 10: Individual knowledge of Industry 4.0 technologies

Conclusion 8: The interviewees have the good knowledge in the fields of "Information and communication Technology" (1.76) and "Network communication" (1.69) and the least knowledge in the areas Nanotechnology (0.72), Cyber-physical Systems (0.79), Advanced Robotics (0.83) and autonomous and near-autonomous vehicles (0.86).

Question 9: "On a scale from 0 (low) to 5 (high) - how would you rate the current knowledge on Industry 4.0 of the majority of the employees in your company (apart from your specialists)?"

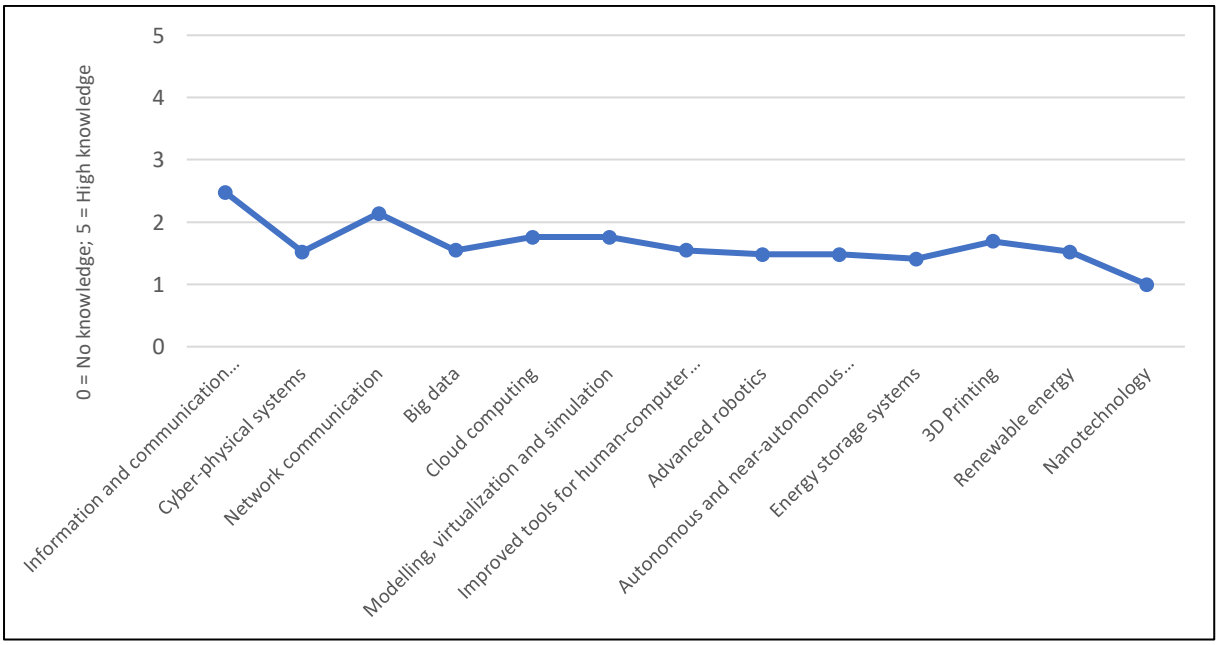


Figure 11: Knowledge of employees on Industry 4.0 technologies

Conclusion 9: According to the interviewees, the employees in their companies have average knowledge in the areas of "Information and communication Technology" (2.48) and "Network communication" (2.14). They have less knowledge in the other areas, where the average value is between 1 and 1.76.

Question 10: "On a scale from 0 (not important) to 5 (very important) - how important do you consider having a basic knowledge of the following skills for the majority of the employees in your company (apart from your specialists)?"

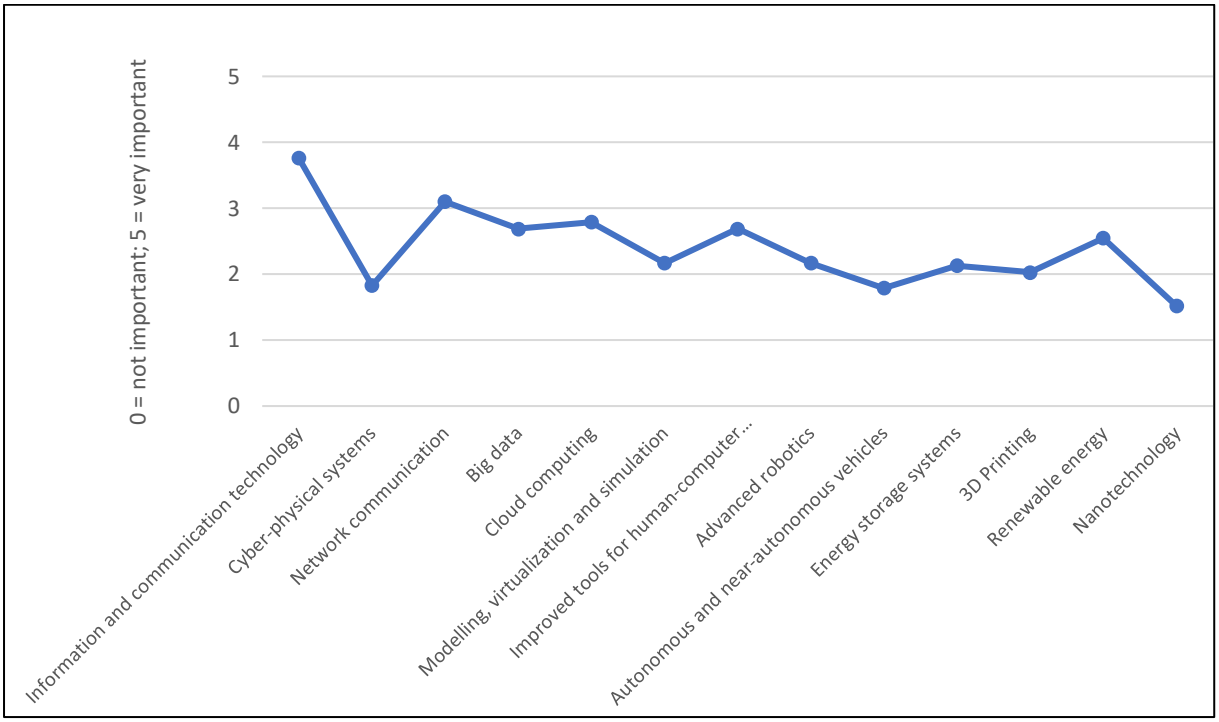


Figure 12: Importance of the basic knowledge of employees

Conclusion 10: According to the questionnaire, the basic knowledge of the employees regarding information and communications technologies has a great importance (3,76).

The basic skills of employees in cyber-physical systems (1.83), autonomous and near-autonomous vehicles (1.79) and nanotechnology (1.52) are of minor importance.

Of medium importance is the basic knowledge of the other technologies (between 2.03 and 3.10).

Question 11: "Are developments in connection to Industry 4.0 reflected in your organizations communicated vision or company´s mission?"

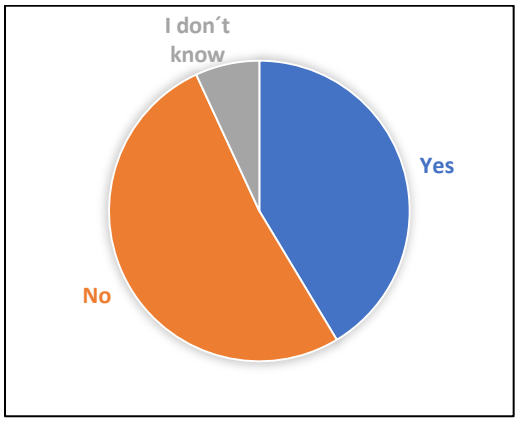


Figure 13: Connection Industry 4.0 with company´s mission/vision

Conclusion 11: More than half of the respondents (15) stated that Industry 4.0 developments did not appear in the company's vision or mission.

Twelve persons stated that there is a connection between Industry 4.0 and the mission/vision, and two persons stated, "I don't know".

Within this question, the interviewed people have been asked "if Yes – how?". The answers to this question are listed below:

1. Everything is connected - Meetings/ calls / Problem Reports/ Costumer Reports/ -
2. Investment in new technologies
3. workshops, trainings
4. 3D-Printing, Digital Communication
5. Reformulation of the mission
6. For the use of technology to improve our processes, expand services and achieve customer satisfaction.
7. In the development of new software for internal and external improvement.
8. In everything related to supply, customer knowledge and collaborative work.
9. Continuous improvement is and will continue to be an objective of our day-to-day operations, particularly with regard to information sharing (fast at the lowest cost) and process automation (although still little implemented)

Question 12: "Which measures have been taken within your company to anticipate the transformations due to the Industry 4.0?"

Within this question, more answers have been possible.

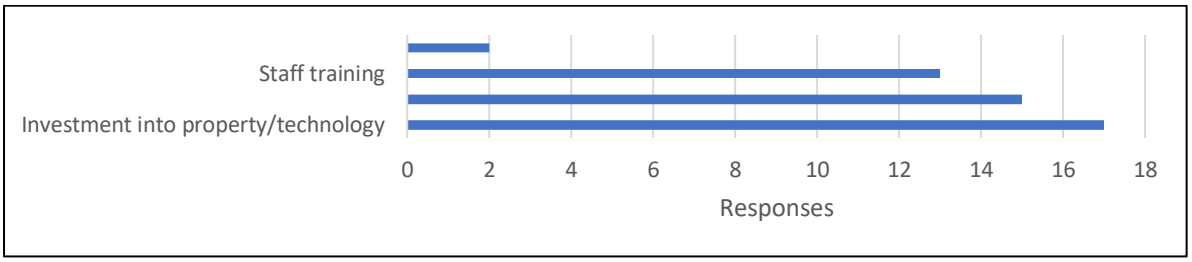


Figure 14: Measures taken by company

Conclusion 12: In more than half of the companies surveyed, both Investment into property/Technology (58.62 % - 17 positive responds) and Investment into Research and Development (51.72 % - 15 positive responds) were found. Staff training was carried out in 44.83 % (13 positive responds) of the companies and only 6.9 % (2 responds) of the companies did not take any measures to anticipate the changes brought about by Industry 4.0.

Question 13: Does your company have any digital transformation strategy plan for the future?"

Within this question, more answers have been possible.

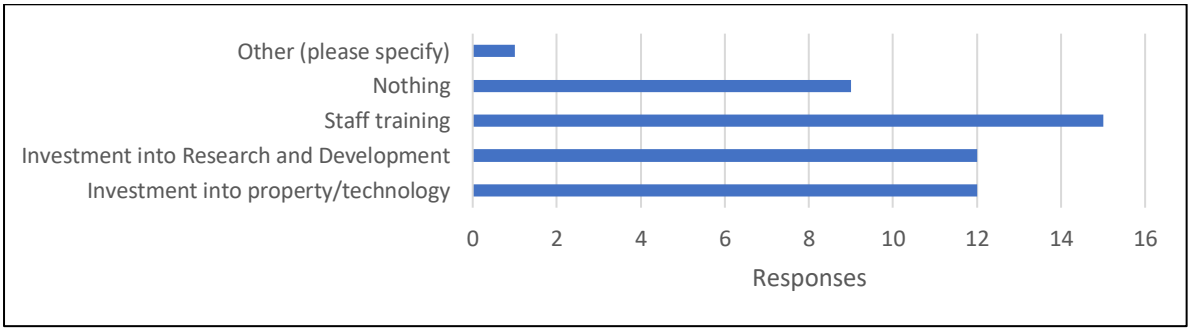


Figure 15: Future digital transformation strategy plan

Other: Systematic implementation to enable the connection of all equipment and areas in the network as well as information sharing system.

Conclusion 13: The strategy plan for the future of the companies is clearly moving in the direction of staff training: 51.72 % of the companies will practice this in the future regarding digital transformation.

Of the respondents, 41.38 percent stated that both an investment into property/technology and an investment into research and development in the companies is planned for the future. In 31.03 % of the companies there is no strategy plan in connection with digital transformation and one person stated that a systematic implementation will take place.

Question 14: Are there trainings in your company or on behalf of your company in which basic knowledge in relation to Industry 4.0 is taught?“

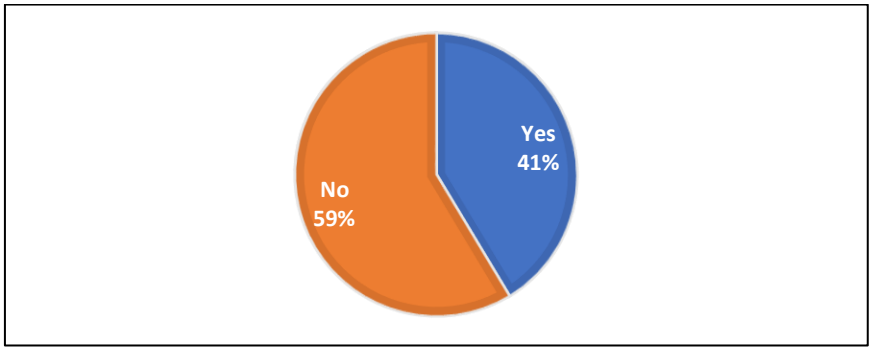


Figure 16: Training in company concerning basic knowledge of Industry 4.0

Within this question, the interviewed people have been asked “If NO: are there future plans for trainings?”. The answers to this question are listed below:

1. cyber security; big data
2. no
3. just a plan
4. not really
5. at the moment no
6. no
7. not sure
8. Yes
9. I don't know
10. It is not foreseen
11. no

Conclusion 14: Of the 29 respondents, 12 indicated that their companies had Industry 4.0 training sessions; 17 indicated that there were no training sessions. Of these 17 people, 11 answered the supplementary question of whether there were future plans for Training. There is a trend shown, that there is no intention of trainings in the future in companies in those, where there are no currently trainings.

Question 15: "Which topics of the novel technological innovation trends were required in such trainings in you company or on behalf of your company?"

Within this question, more answers have been possible. 24 persons answered this question and 5 persons skipped it.

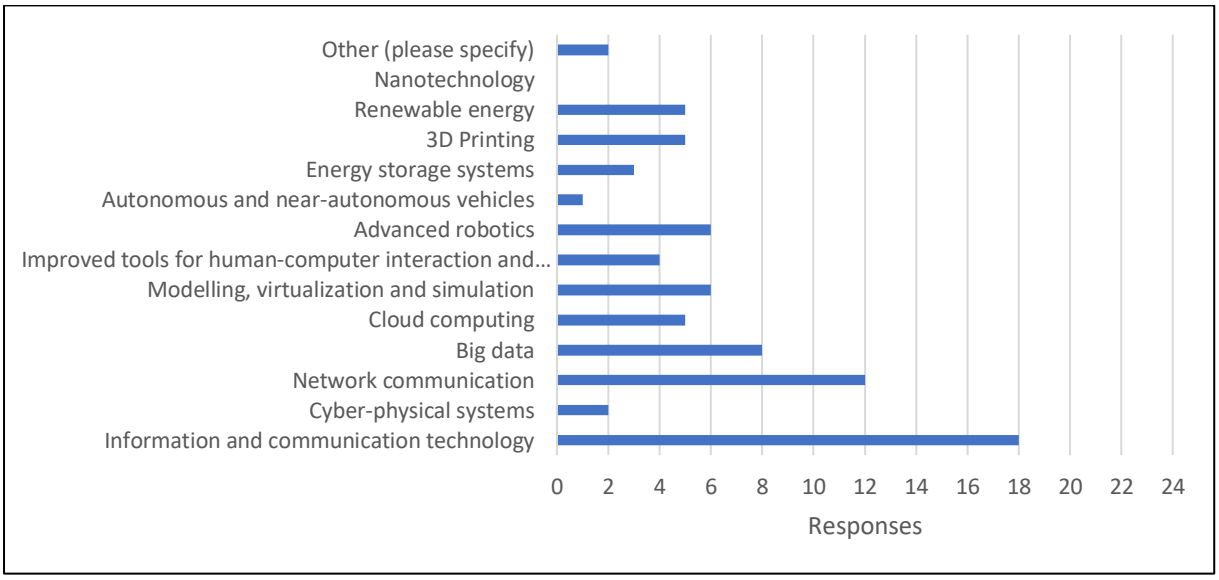


Figure 17: Topics covered in trainings

Conclusion 15: 75 % of the respondents stated that training courses in their company or on behalf of their company had the topic "Information and communication technology".

In half of the companies the topic "Network Communication" is covered. Less than 10 percent of the companies dealt with "Cyber-physical Systems" and "Autonomous and near-autonomous vehicles". The topic "Nanotechnology" did not appear in any training.

Question 16: "Which topics should be covered in general in trainings for the majority of the employees in your company concerning Industry 4.0 (innovative products, services, procedures)?"

20 persons answered this question and 9 persons skipped this open question.

1. data awareness
   cyber security
2. I do not know
3. just a basic information about Industry 4.0 with highlighted topics related with our core business
4. what is it all about, what is it good for, why we should know this, how it could help me/us at work
5. Depends on the people who participate in the trainings. General presentation of the topic, in which subareas the topic is divided and then focus on the respective area as required.
6. all above mentioned
7. Industry 4.0 generally
8. services
9. advanced robotics, ICT
10. what is Industry 4.0 all about - general information = for the majority of the employees
11. Basic knowledge about digital businesses (Best Practise etc.)
12. procedures
13. Industry 4.0 generally
14. kk
15. Information technology and communication. Bigdata Virtual reality.
16. Digitalization
    Tendency towards automation
17. Innovative products and services
18. The ones designated
19. Automation
20. Time reduction

Conclusion 16: Seven interviewees (28.57 %) would consider a general treatment of the topic Industry 4.0 as meaningful with a special connection to the company-relevant reference and with best practice examples.

Six respondents would like to have explicit topics covered (Data awareness, cyber security, advanced Robotics, ICT, Information Technology and communication, Bigdata virtual reality, digitalization, tendency towards Automation and time reduction).

Five people would like to deal with the topics proposed in the question (innovative products, services, procedures).

Two answers are not suitable (I do not know, kk).

Question 17: "Is there a special demand for trainings in the previously indicated technical-business fields?"

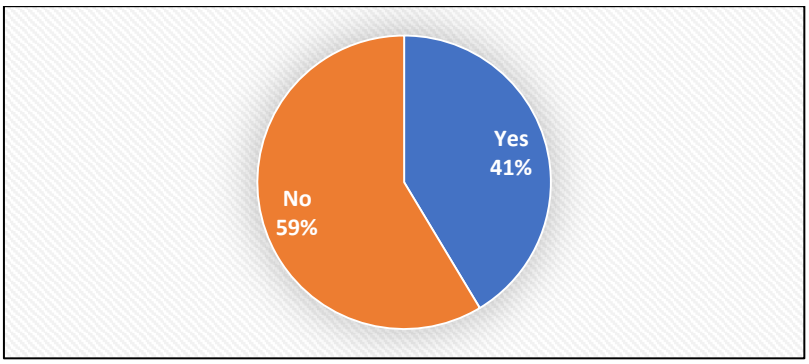


Figure 18: Demand for trainings

Within this question, the interviewed people have been asked "Why do you think so?". The answers to this question are listed below:

1. hard to say
2. not really
3. it will be the future!
4. Programming
5. technical fields change quick
6. kk
7. The interest of the people to expand their computer skills is appreciated.
8. Because every day we go towards digitalization and to make the information accessible to all.
9. Because it does not affect the daily work of the workers.

Conclusion 17: The majority of the interviewees (17) do not consider that there is a special need for training in the aforementioned technical and business areas. Twelve people are of opposing opinions and feel a need for training.

Of the 29 responses, nine people left an additional comment. It is mentioned that it is needed because these areas are the future and are constantly changing. On the other hand, it has no influence on the daily work of the workers. Two comments are not useful (hard to say, kk).

Question 18: "Which targets (of your company or business units) should be covered in those trainings to get the best outcome?"

27 persons answered this question and 2 persons skipped this open question.

1. Show what happens to your data via IoT
   data awareness
   cyber security
2. I do not know
3. general aims, mainly for all employees - at first stage
4. it is a general manager decision
5. N.A.
6. production workers
7. quality, IT, production
8. show what the future brings, invest money
9. Communication
10. I do not know
11. ?
12. to connect all into the corporate culture
13. to increase the level of employee knowledge
14. responsible of each area, all areas should be involved
15. R&D Department
16. Sales, production and logistics
17. Managers
18. Administrative
19. Sales
20. Start with the managers and then expand to the other levels
21. Managers
22. kk
23. Human Resources
24. The business unit
25. Technological development area
26. I do not know this information
27. With external entities, covering most of the departments of the company

Conclusion 18: According to the interviewees, the following objectives should be covered: general aims, data awareness, data processing within and by IoT, quality, IT, production, future prospects,

communication, connection of it into the corporate culture, increasing of the employee's knowledge level.

The target group was defined by the respondents as follows: production Workers, R&D Department, Sales, production and logistics, Managers, Administrative Staff, Sales, Human Resources, the business unit - in summary, it is important to the respondents that all staff are trained.

Question 19: Which conditions must be present for a training to be successful for the employees?

All 29 persons answered this open question.

1. Good trainer with good examples
2. I cannot answer it
3. they have to understand it; the content must be easy to understand with possibility to learn more If they want.
4. well-chosen topic
5. The interest of employees and the feasibility/applicability of the information in everyday life
6. more time
7. practical examples, not only theory
8. questions after training
9. simple and logical structure
10. I don't know
11. quality of the trainer, well-chosen employees +topic
12. Tools, Wearables, Systems, Prototypes etc.
13. To involve as much people as you can
14. practical issues, f.e. Industry 4.0. environments
15. Real examples and cases in order to demonstrate the impact on our processes and reality
16. Present real examples
17. Trainers with deep knowledge and experience in the field
18. demonstrate the utility in the professional context
19. daily implementation
20. People should be involved in the problem and feel that are part of the solution
21. real examples
22. invest in this technology
23. kk
24. Be continuous Be specific and specialized
25. Dynamic and useful
26. A good instructor, practical classes that go according to the lines of business
27. Training that is useful for the application in its functions
28. Dynamic, fluid, not excessively long and economical
29. That has a very practical orientation to the daily work of employees

Conclusion 19: According to the interviewed persons the following conditions are desired to have a successful training for the employees: good and qualified trainer with deep knowledge and experience, easy and understandable content, well-chosen topic, the interest of employees and the feasibility/applicability of the information in everyday life, time, good and real examples/practical issues, questions after training, simple and logical structure, the involvement of people (as much as possible), daily implementation, training structure: dynamic, fluid, not excessively long and economical and it has to have a very practical orientation to the daily work of employees.

Question 20: What do you consider as key success factors for staff training and development in general?

All 29 persons answered this open question.

1. Motivation
   Combine always theory with a small example
2. employee motivation and effectivity
3. Training with some goals and after a while results in the working process or let's say in the company strategy.
4. Well-structured information focus on a properly chosen target group
5. Interest and commitment on the part of the employees, the will to develop further
6. more time
7. sharing the best experience with other companies
8. questions after training
9. Practical and simple Structure
10. Engagement
11. quality of the trainer, well-chosen employees +topic
12. Not only to talk about it, but to show Tools, Wearables, Systems, Prototypes etc
13. to engender confidence
14. sharing the experience with other companies
15. Adequate training and use of specific terms of the sector which we intend to train
16. to be practical
17. adequate the training to the company, its processes and culture
18. demonstrate its utility in the business context
19. real interest of the stakeholders
20. commitment to evolve
21. Real connection to the daily work
22. Invest in technology
23. kk

24. Continuing education
25. Pre-detection
26. Practical classes that are consistent with the development of the business and are adapted to the company's needs
27. Practical and easily applicable training
28. Innovation, digital training, support and monitoring. Formations renewed in the short term.
29. Training appropriate to the collective, with practical and useful topics for each one's work.

Conclusion 20: The interviewees consider the following conditions as important, so that a training can be successful for employees: motivation, engagement, effectivity and confidence, combination of theory and practice, existing goals and midterm milestones, well-structured information, interest and commitment of the employees, time, sharing of best experience with other companies, questions after training, practical and simple structure, quality of the trainer, well-chosen employees and topic, showing/presenting of tools, wearables, systems, prototypes etc., connection to daily work and specifications to the business-related sector and the company's processes and culture, demonstration of utility, interest of stakeholders, continuing education, innovation, digital training, support and monitoring.

Question 21: Does your company use a Learning Management System?

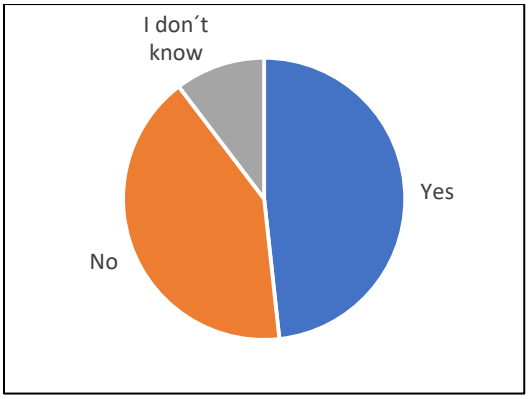


Figure 19: Learning Management System in Company

Within this question, the interviewed people have been asked "If YES: please specify which one?". The answers to this question are listed below:

1. internal one
2. sakai

3. sam* of the system secova
4. it is internal
5. ISO 9001:2015
6. Learning Management System
7. Moodle
8. I do not know
9. Soon
10. I do not know

Conclusion 21: Fourteen people (48 %) stated that learning management systems are used in their companies. Twelve people (41 %) stated that none are used in their companies. Three people (10 %) answered this question with "I do not know".

Question 22: Does your company use one of the following Learning Technologies? And how would you rate the future relevance of those technologies for your company?

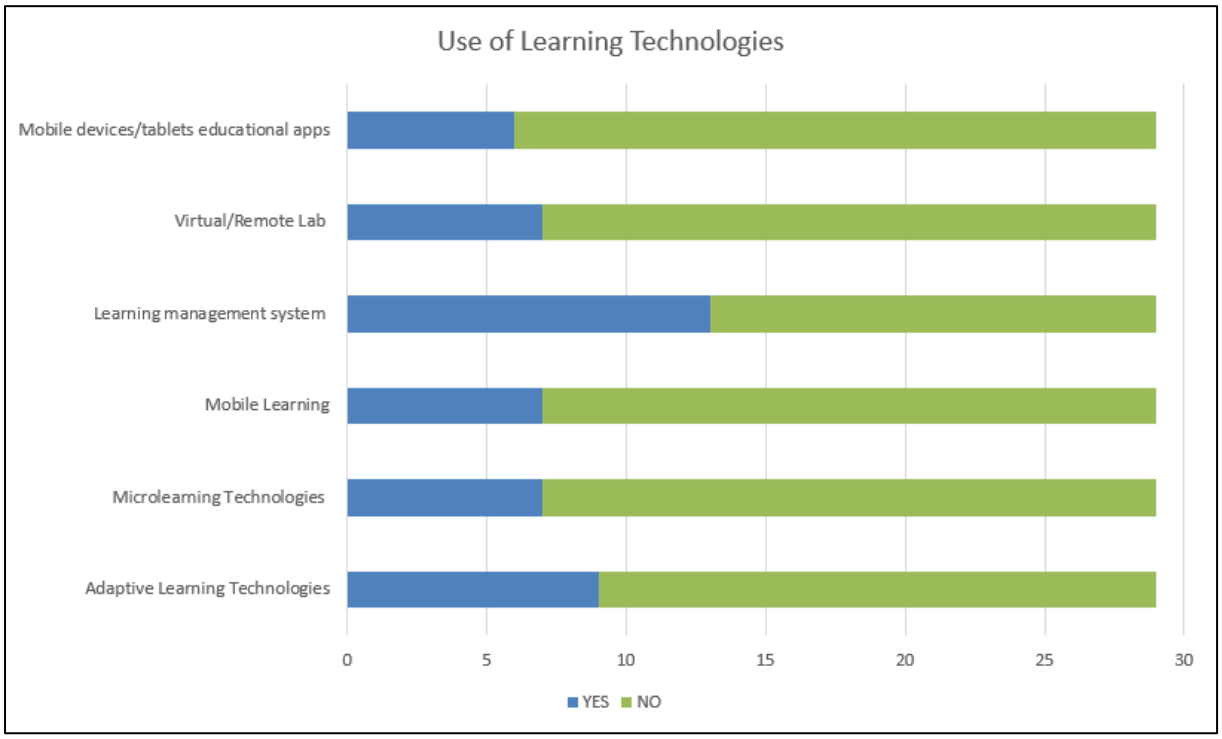


Figure 20: Use of Learning Technologies

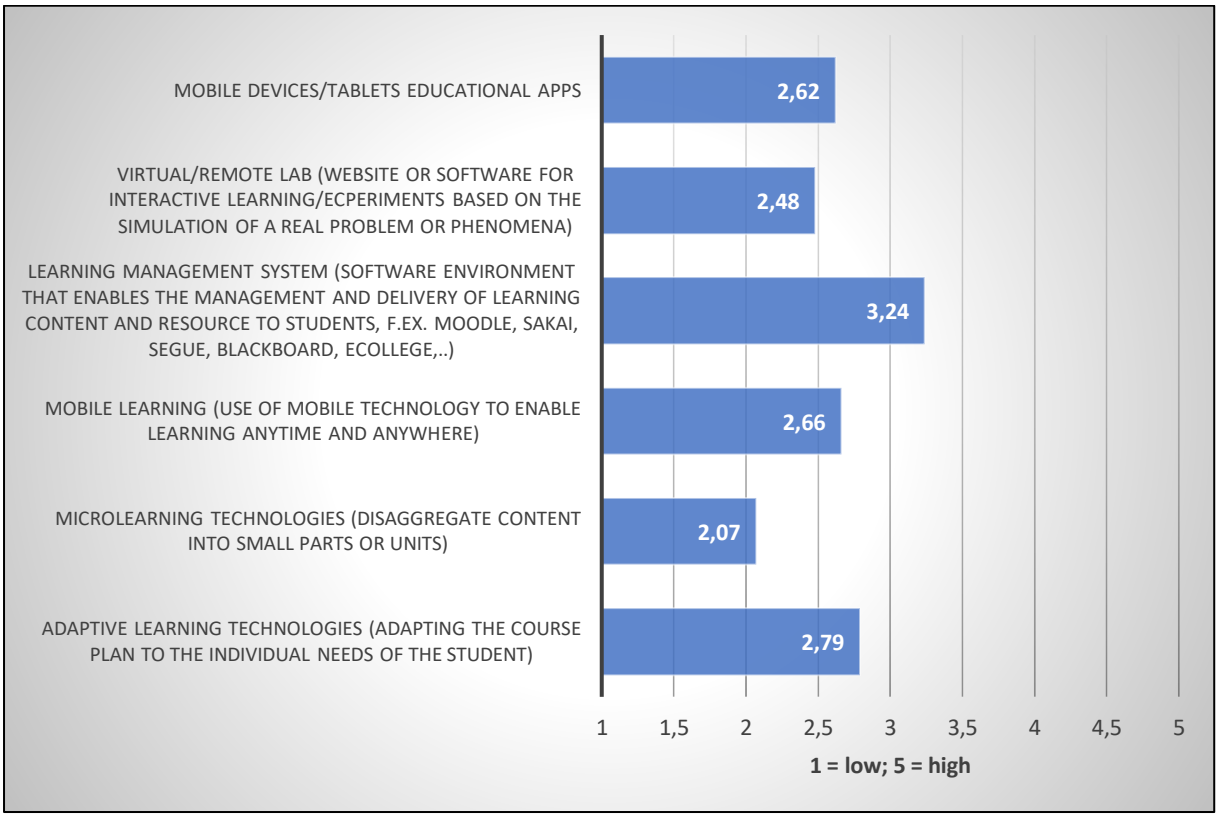


Figure 21: Future Relevance of Learning Technologies

Within this question, the interviewed people have been asked “Please explain and specify the Learning Technologies you are using in your company?”. 11 people answered this additionally open question. The answers to this question are listed below:

1. small tool with videos for business trainings
2. We use rather training by lecture, in person...
3. the program sam* of the company secova. it can be used wherever you have internet
4. use phones and tablets
5. no use
6. LMS.
7. Custom training itineraries
8. Learning Online and presential have been used
9. Tablets, e-learning trainings, LMS coming soon, etc.
10. In the framework of the ISO 9001: 2015 QMS, we identify opportunities for improvement. Records are made and actions are identified for improvement. These actions are monitored to see if these actions were effective.
    Continuing training in group or individual.
11. Learning Management System

Conclusion 22: The interviewees stated that in most companies rather few Learning Technologies are used.

Learning management systems are used in 45 % of the companies, in 31 % of the companies Adaptive Learning Technologies are used, 24 % of companies in each Microlearning Technologies, Mobile Learning and Virtual/Remote Lab and 21 % of companies use mobile devices/tablets educational apps.

The interviewees estimate the future relevance of Learning Technologies as low to medium important. Learning management systems have the highest future relevance (weighted average 3,24), followed by adaptive learning technologies (2,79), mobile learning (2,66), mobile devices/tablets educational apps (2,62) and virtual/remote lab (2,48). According to the interviewees, microlearning technologies have the lowest future relevance (2,07).

Question 23: If your company is using some of the previous presented Learning Technologies - what is your personal/individual experience with them? (f.ex. positive/negative; like/dislike; useful/not useful; time-consuming; etc.) Please provide a view words of your association about each Learning Technology.

17 persons answered this question and 12 persons skipped this open question.

Adaptive Learning Technologies	- positive, like, useful - useful - really good experience, easy to handle - useful - kk - Useful - Positive - Positive - POSITIVE - adapt contents - positive
Microlearning Technologies	- no time for that... - useful - positive - useful - kk - useful - Positive - No - LOSS OF TIME - short training sessions with big impact

	- positive
Mobile Learning	- like - positive - Good, I like it - positive, useful, easy to handle - like - kk - Not useful - Positive - POSITIVE - to learn everywhere - positive
Learning Management System	- useful - useful - Good, I like it - very useful for trainings - positive, useful, easy to handle - in our intranet, good overview - like - kk - very useful - coming soon - I've liked it, very useful and practical - LOSS OF TIME - manage the learning and contents - positive
Virtual/remote Lab	- like - like - Good, I like it - useful - We have not used it - No - kk - Like, very useful - loss of time - easy access repositorium - positive
Mobile devices/tablets/ educational apps	- positive - like - nice to have - like - kk - They are not necessary - Positive - LOSS OF TIME - mobility and learning - positive

Conclusion 23: From the responses one can conclude that all Learning Technologies are mainly perceived as positive.

Learning Management Systems are rated 10 times as positive, Adaptive Learning Technologies have 9 positive votes, Mobile Learning is rated 8 times as positive and microlearning technologies, Virtual/remote Lab and Mobile devices/tablets educational apps are rated 6 times as positive.

Question 24: What is the name of the company you are working at the moment?

Since this questionnaire is published anonymously, no collected data is displayed here.

Question 25: What is your current position in the company?

Current position	Number of responses
HR	12
Developer	1
Project Management	3
Quality Control	1
IT Technician	1
CEO	4
Employee	1
Teaching responsible	1
Manager	1
Systems responsible	1
Product Engineer	1
General Director	1
Financial Manager	1

Question 26: To which industry is your company assigned (major field of Business)?

Industry	Number of responses
Semiconductor	1
Automotive Industry	3
Engineering	2
Production/Manufacturing Industry	4
Air craft Industry	1
Textile Industry	4
Food Industry	2
Creativity Industry	2
Paper and packaging Industry	1
Metal	2
Industry	1
Health	1
ICT	1
Clothing	1
Services	1
Training	1
Telecommunication	1
Consultancy	1

Question 27: In which country is your company located?

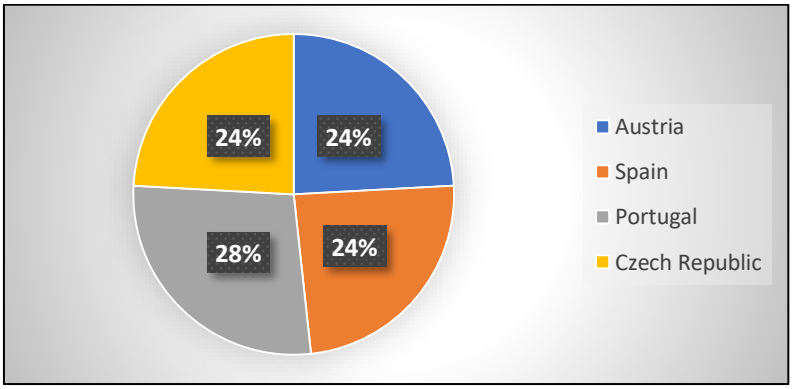


Figure 22: Location of the business by country

Question 28: In which department of the company are you working at?

Department	Number of responses
Human Resource	13
(Project) Management + Management Board	6
Quality Management/Department	2
Sales Department	1
Production + Systems	3
Finance Department	1
IT	1
Talent & Culture	1
Secure Car Access	1

Question 29: What is your profession?

Profession	Number of responses
HR manager/specialist/expert/director/ technician	13
Analog Designer	1
(Project) Manager	4
Quality Control	1
IT Technician	2
Entrepreneur	1
Employee	1
Marketing	1
Engineer	1
Factory Director	1
Financial Director	1
Pharmaceutical	1
System responsible	1

Question 30: What is your highest education and in which field?

Highest Education	Number of responses
University degree (Bachelor + Master)	26
Highschool	3

Question 31: How many employees are working in your company?

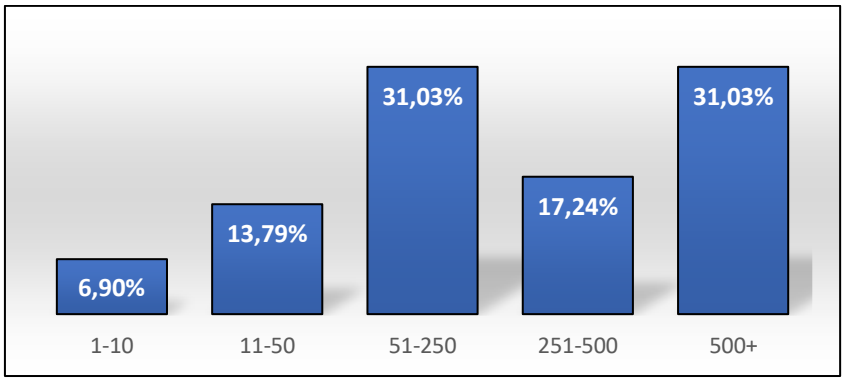


Figure 23: Number of employees / company size

Question 32: E-Mail

Within this open question respondents could leave their E-Mail address if they would like to get informed about the result of this questionnaire. Since this questionnaire is published anonymously, no collected data is displayed here.

1.1.2. Conclusions

It was important, to have at least 5 conclusions (out of the information's gathered during the questionnaire) for the further project progress, which is the development of suitable and effecting Learning Materials that are tailored to our target-group´s learning preferences.

1.1.3.1. Conclusions of the individual questions

Conclusion 1: This result shows that the majority of the interviewees (75,86 %) have general knowledge of Industry 4.0.

Conclusion 2: The responses of the interviewees show that the majority associate digitization with Industry 4.0. At the same time some technologies of Industry 4.0 are already shown, such as Robotics/Robot Technology, Artificial Intelligence, ICT, Big Data, Automation. Furthermore, the changes are taken up by statements such as: "innovations", "technological revolution", "new jobs", "new ways of work" and "a new form of organization and Management of companies and their industrial assets".

Conclusion 3: Despite the fact that the interviewees have knowledge of Industry 4.0, that knowledge is rather low with an average value of 3,69. Some individuals have a higher knowledge of Industry 4.0 - on average, however, they are outnumbered.

Conclusion 4: The average value of 3.76 shows that the interviewees tend not to be affected much in the execution of their job by Industry 4.0.

Some individuals do not see any significant influence of Industry 4.0 technologies in their companies. On the other hand, there are some individuals who are more affected by Industry 4.0 technologies.

Conclusion 5: Most of the interviewees had further training courses on information and communication technologies (20 %). This is followed by three areas: network communication (12 %), big data (12 %) and cloud computing (11 %). The three least technology fields in which the interviewees had used training activities are "Nanotechnology" (3 %), "Advanced Robotics" (3 %) and "Cyber-physical Systems" (4 %).

Most of the knowledge was acquired via self-studies, followed by trainings and workshops.

Conclusion 6: According to the interviewees, "Information and communication Technologies" and "Network communication" have the greatest impact on their business with average values of 2.38 and 2.76 respectively.

Nanotechnology (0.62), energy storage systems (0.69), autonomous and near-autonomous vehicles (0.48) and cyber-physical systems (0.69) have no or only a minimal impact.

Conclusion 7: None of the technology fields indicated is considered less relevant by the interviewees regarding the future significance of the customers.

It is quite clear that information and communication technology will have a high relevance for customers in the future (2.97). In this answer option 96.55 % of the respondents indicated "more relevant". It is closely followed by network communication (2.72), big Data (2.69), cloud computing (2.55) and improved tools for human-computer interaction and cooperation (2.48). All other responses tend to say that future relevance will remain the same.

Conclusion 8: The interviewees have the good knowledge in the fields of "information and communication technology" (1.76) and "network communication" (1.69) and the least knowledge in the areas nanotechnology (0.72), cyber-physical systems (0.79), Advanced robotics (0.83) and autonomous and near-autonomous vehicles (0.86).

Conclusion 9: According to the interviewees, the employees in their companies have average knowledge in the areas of "information and communication technology" (2.48) and "network communication" (2.14). They have less knowledge in the other areas, where the average value is between 1 and 1.76.

Conclusion 10: According to the questionnaire, the basic knowledge of the employees regarding information and communications technologies has a great importance (3,76).

The basic skills of employees in cyber-physical systems (1.83), autonomous and near-autonomous vehicles (1.79) and nanotechnology (1.52) are of minor importance. Of medium importance is the basic knowledge of the other technologies (between 2.03 and 3.10).

Conclusion 11: More than half of the respondents (15) stated that Industry 4.0 developments did not appear in the company's vision or mission.

Twelve persons stated that there is a connection between Industry 4.0 and the mission/vision, and two persons stated, "I do not know".

Conclusion 12: In more than half of the companies surveyed, both Investment into property/Technology (58.62 % - 17 positive responds) and Investment into Research and Development (51.72 % - 15 positive responds) were found. Staff training was carried out in 44.83 %

(13 positive responds) of the companies and only 6.9 % (2 responds) of the companies did not take any measures to anticipate the changes brought about by Industry 4.0.

Conclusion 13: The strategy plan for the future of the companies is clearly moving in the direction of staff training: 51.72 % of the companies will practice this in the future regarding digital transformation.

Of the respondents, 41.38 percent stated that both an investment into property/technology and an investment into research and development in the companies is planned for the future. In 31.03 % of the companies there is no strategy plan in connection with digital transformation and one person stated that a systematic implementation will take place.

Conclusion 14: Of the 29 respondents, 12 indicated that their companies had Industry 4.0 training sessions; 17 indicated that there were no training sessions. Of these 17 people, 11 answered the supplementary question of whether there were future plans for Training. There is a trend shown, that there is no intention of trainings in the future in companies in those, where there are no currently trainings.

Conclusion 15: 75 % of the respondents stated that training courses in their company or on behalf of their company had the topic "Information and communication technology".

In half of the companies the topic "network communication" is covered. Less than 10 percent of the companies dealt with "cyber-physical systems" and "autonomous and near-autonomous vehicles". The topic "nanotechnology" did not appear in any training.

Conclusion 16: Seven interviewees (28.57 %) would consider a general treatment of the topic Industry 4.0 as meaningful with a special connection to the company-relevant reference and with best practice examples.

Six respondents would like to have explicit topics covered (Data awareness, cyber security, advanced robotics, information and communication technology, bigdata, virtual reality, digitalization, tendency towards automation, automation, time reduction).

Five people would like to deal with the topics proposed in the question (innovative products, services, procedures).

Conclusion 17: The majority of the interviewees (17) do not consider that there is a special need for training in the aforementioned technical and business areas. 12 people are of opposing opinions and feel a need for training.

Of the 29 responses, 9 additional persons left a comment. It is mentioned that it is needed because these areas are the future and are constantly changing. On the other hand, it has no influence on the daily work of the workers.

Two comments are not useful (hard to say, kk).

Conclusion 18: According to the interviewees, the following objectives should be covered: general aims, data awareness, data processing within and by IoT, quality, IT, production, future prospects, communication, connection of it into the corporate culture, increasing of the employee's knowledge level.

The target group was defined by the respondents as follows: production Workers, R&D Department, Sales, production and logistics, Managers, Administrative Staff, Sales, Human Resources, the business unit - in summary, it is important to the respondents that all staff are trained.

Conclusion 19: According to the interviewed persons the following conditions are desired to have a successful training for the employees: good and qualified trainer with deep knowledge and experience, easy and understandable content, well-chosen topic, the interest of employees and the feasibility/applicability of the information in everyday life, time, good and real examples/practical issues, questions after training, simple and logical structure, the involvement of people (as much as possible), daily implementation, training structure: dynamic, fluid, not excessively long and economical and it has to have a very practical orientation to the daily work of employees.

Conclusion 20: The interviewees consider the following conditions as important, so that a training can be successful for employees: motivation, engagement, effectivity and confidence, combination of theory and practice, existing goals and midterm milestones, well-structured information, interest and commitment of the employees, time, sharing of best experience with other companies, questions after training, practical and simple structure, quality of the trainer, well-chosen employees and topic, showing/presenting of tools, wearables, systems, prototypes etc., connection to daily work and specifications to the business-related sector and the company's processes and culture,

demonstration of utility, interest of stakeholders, continuing education, innovation, digital training, support and monitoring.

Conclusion 21: Fourteen people (48 %) stated that learning management systems are used in their companies. Twelve people (41 %) stated that none are used in their companies. Three people (10 %) answered this question with "I do not know".

Conclusion 22: The interviewees stated that in most companies rather few Learning Technologies are used.

Learning management systems are used in 45 % of the companies, in 31 % of the companies Adaptive Learning Technologies are used, 24 % of companies in each Microlearning Technologies, Mobile Learning and Virtual/Remote Lab and 21 % of companies use mobile devices/tablets educational apps.

The interviewees estimate the future relevance of Learning Technologies as low to medium important. Learning management systems have the highest future relevance (weighted average 3,24), followed by adaptive learning technologies (2,79), mobile learning (2,66), mobile devices/tablets educational apps (2,62) and virtual/remote lab (2,48). According to the interviewees, microlearning technologies have the lowest future relevance (2,07).

Conclusion 23: From the responses one can conclude that all Learning Technologies are mainly perceived as positive.

Learning Management Systems are rated 10 times as positive, Adaptive Learning Technologies have 9 positive votes, Mobile Learning is rated 8 times as positive and microlearning technologies, Virtual/remote Lab and Mobile devices/tablets educational apps are rated 6 times as positive.

1.1.3.2. Total conclusions

1. **Improvement of knowhow of the employees needs to be established**

   In the future, it will be important to improve the knowledge of employees in companies with regard to Industry 4.0. Although there is a rough basic knowledge of Industry 4.0 (as 75 % of

the interviewees stated), knowledge was ranked at an average of 3.69 with a score of 0 = no knowledge and 10 = expert knowledge *(Question 1 + 3).*

There is still potential, especially in the individual explicit forms of technology. On a scale of 0 (no knowledge) and 4 (expert knowledge), the individual technologies an average value from 0.7 to 1.76, which is equivalent to little up to good knowledge *(Question 8).*

A similar picture emerges for all employees in their companies: on a scale of 0 (no knowledge) and 5 (high knowledge), the average values range between 1 and 2.5 and thus have a low up to medium level of knowledge *(Question 9).*

2. **Methods must be changed and/or adapted to guarantee successful learning environments**

According to the survey, more money is currently invested in property/technology and research and development than in staff training (Question 12). The companies have already compensated for this and according to the respondents there are more investments in staff training (51 %) than in property/technology and R&D (41 %) *(Question 12 + 13).*

This insight is an important one and should be pursued further.

According to the survey, 41 % of companies have training courses related to Industry 4.0 relevant knowledge. In those companies that do not currently offer such training, there are no future plans to do so - here is still potential for an increase in this quota *(Question 14).*

The interviewees acquired the most knowledge via self-studies (37 %), followed by trainings (37 %), workshops (18 %), networking events (13 %) and concluding lecture (9 %) *(Question 5).*

The conclusion is that if adequate training activities are offered, the individuals could be relieved and not have to acquire the knowledge themselves.

3. **Bigger relevance on Industry 4.0 technologies**

All respondents indicated that the Industry 4.0 relevant technology areas indicated will at least remain the same or have a higher relevance in the future for the customers, such as information and communication technology, where 97 % of the respondents indicated that these technologies will have a higher relevance in the future *(Question 7).* It is therefore essential not only to disseminate the knowledge within companies, but also to pass it on to customers.

To develop a basic knowledge for these technologies becomes more and more important for employees. Especially in the areas of "information and communications technology", the basic knowledge was rated as important by the interviewees. According to the respondents, it is of medium importance in the areas of "network communication", "big data", "cloud computing",

"improved tools for human-computer interaction and cooperation", "advanced robotics", "Energy storage systems", "3D printing" and "renewable energy" *(Question 10).*

Of those surveyed, 59 % stated that there was no special demand for training in the special technological areas concerning Industry 4.0. Of the respondents, 42 % disagree and comment, for example: "It will be the future!" *(Question 17).*

Overall, more people in this survey are convinced that there is currently no demand - in the previously demonstrated figures, the demand from the training's contrasts with the need and demand for basic knowledge about these technologies and this can be achieved through training.

4. Need of creation of appropriate learning environments and materials

Following areas must be considered to establish an appropriate learning environment and materials: environmental and individual conditions, target group and teaching content.

According to the interviewed persons the following environmental and individual conditions are desired to have a successful training for the employees: good and qualified trainer with deep knowledge and experience, easy and understandable content, well-chosen topic, the interest of employees and the feasibility/applicability of the information in everyday life, time, good and real examples/practical issues, questions after training, simple and logical structure, the involvement of people (as much as possible), daily implementation, training structure: dynamic, fluid, not excessively long and economical, it has to have a very practical orientation to the daily work of employees *(Question 19),* motivation, engagement, effectivity and confidence, combination of theory and practice, existing goals and midterm milestones, well-structured information, interest and commitment of the employees, time, sharing of best experience with other companies, questions after training, practical and simple structure, quality of the trainer, well-chosen employees and topic, showing/presenting of tools, wearables, systems, prototypes etc., connection to daily work and specifications to the business-related sector and the company's processes and culture, demonstration of utility, interest of stakeholders, continuing education, innovation, digital training, support and monitoring *(Question 20).*

Regarding the teaching content, the following objectives and contents should be covered by the learning material: general aims, data awareness, data processing within and by IoT, quality, IT, production, future prospects, communication, connection of it into the corporate culture, increasing of the employee's knowledge level *(Question 18).*

The target group was defined by the respondents as follows: production Workers, R&D Department, Sales, production and logistics, Managers, Administrative Staff, Sales, Human Resources, the business unit - in summary, it is important to the respondents that all staff are trained *(Question 18).*

5. Changed connection between Industry 4.0 and labour market

The current influence of Industry 4.0 developments on the performance of the job was regarded by the interviewees as rather small with an average value of 3.76 (0 = no influence; 10 = very high influence) *(Question 4).*

On the other hand, there are the results of *Question 6,* in which the interviewees gave higher values for the influence of the individual technologies. “Information and communication technology” as well as “network communication” have a medium to high impact, “advanced robotics”, “improved tools for human computer interaction and cooperation”, “modelling, virtualization and simulation”, “cloud computing” and “big data” a small to medium impact.

The connection between developments related to Industry 4.0 and the vision or mission communicated by companies is not present in more than half of the respondents' companies (52 %). In 41 % of the companies, Industry related developments are included in the mission or vision and seven per cent of the respondents did not know *(Question 11).* Especially in today's rapidly changing times and the ever-increasing importance of Industry 4.0 technologies, it is important that these significant links also occur in the presentation of companies.

6. Establishment and the advantages of learning management systems and other learning technologies

Learning management systems are already in use in 14 companies (48 %) of the respondents. In 41 % of the company’s such systems are not used and 10 % of the interviewees did not know (Question 21).

On a scale of 1 = low future relevance and 5 = high future relevance, learning management systems have the highest future relevance (weighted average 3,24), followed by adaptive learning technologies (2,79), mobile learning (2,66), mobile devices/tablets educational apps (2,62) and virtual/remote lab (2,48). According to the interviewees, microlearning technologies have the lowest future relevance (2,07) *(Question 22).*

From the responses in *Question 23* it can be concluded that all Learning Technologies are predominantly perceived positively.

With the positive attitude towards learning management and other learning technologies and the potential to raise awareness and use of these technologies, they can be used to combine learning, labour market and new developments in the field of Industry 4.0 developments.

1.2. Questionnaire: suppliers of Industry 4.0 technologies

The questionnaire has been sent out via email to various suppliers of Industry 4.0 technologies in the specific countries – Austria, Czech Republic, Portugal and Spain.

The questionnaire has been sent out through our own network. Furthermore, all companies have been contacted, which are working directly in the field of Industry 4.0 technologies.

1.2.1. The results

Completed questionnaires:

Austria	Spain	Portugal	Czech Republic	Others
7	8	9	7	3 *(USA, Luxembourg, international company)*

Question 1: Which of the following technologies are you using in your company and how often?

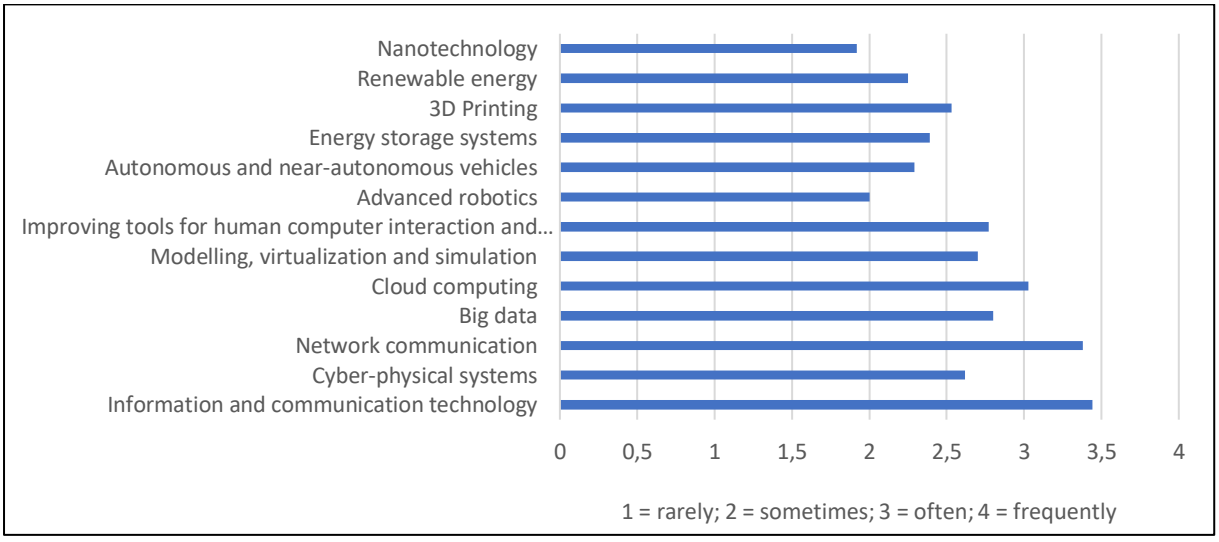


Figure 24: Average use of Industry 4.0 technologies

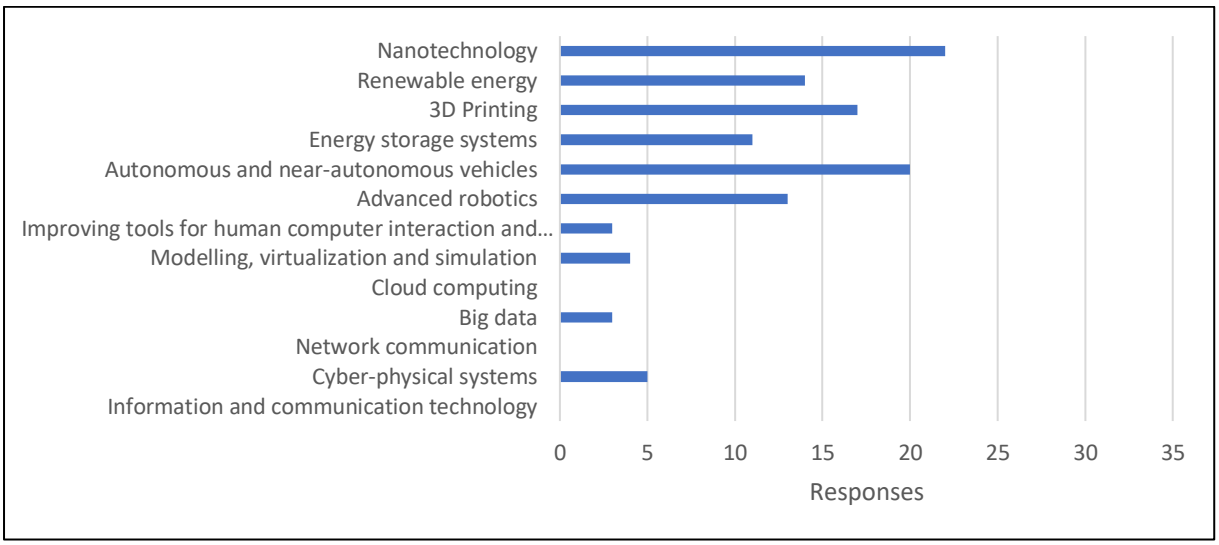


Figure 25: No use of listed technologies in the company

An open field has been offered for "Others (please specify)" and two respondents have written a comment:

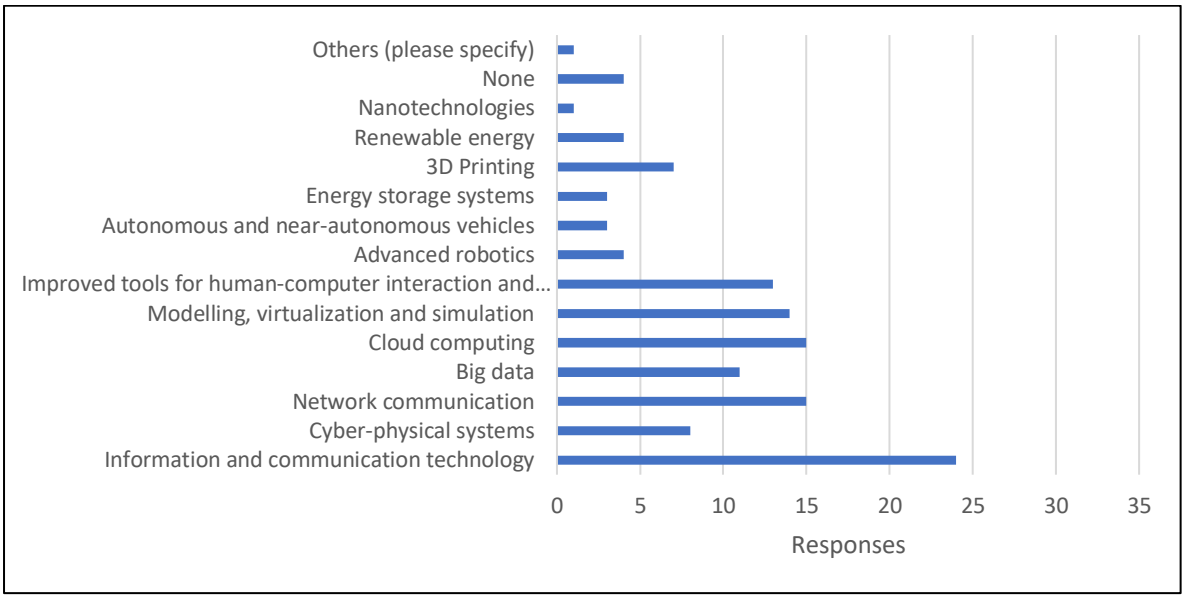
1. Virtual Reality (often)
2. Business Model Innovation Technologies

Conclusion 1: The interviewees who use the technologies in their own companies show that they use them at least sometimes - the majority, however, is often up to frequently used.

The survey also showed that some systems are not used at all in the companies of the respondents - above all "nanotechnology" (22 respondents) and "autonomous and near-autonomous vehicles" (20 respondents). Only "Information and communication technology", "network communication" and "cloud computing" are used in every company where respondents work.

Question 2: Which technologies are you offering to/for your customers?

Within this question, more answers have been possible.



An open field has been offered for "Others (please specify)" and two respondents have written a comment:

1. Business Model Innovation Methods

Conclusion 2: The responses indicate that mainly "information and communication technologies", "network communication technologies", "cloud computing technologies", "modelling, virtualization and simulation" and "improved tools for human-computer interaction and cooperation" are offered to customers.

Question 3: How do you rate your personal knowledge of Industry 4.0 technologies in general?

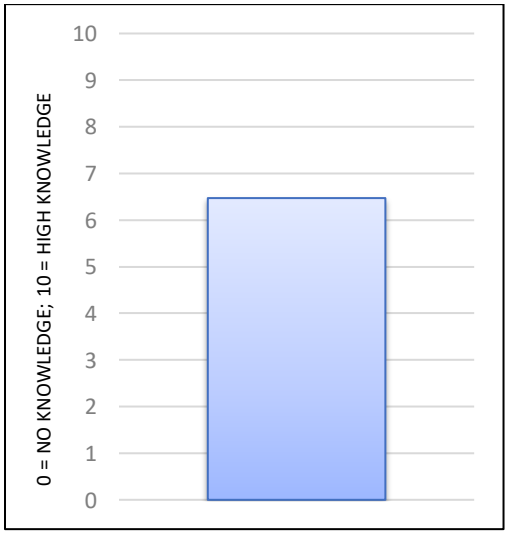


Figure 26: Personal knowledge of Industry 4.0 technologies (average)

Conclusion 3: The individual knowledge of Industry 4.0 technology suppliers can be considered medium high - the average value is 6.47 (0 = no knowledge; 10 = high knowledge).

No person has entered the value 0 - the lowest value entered was 2 and was selected three times.

Question 4: In your opinion, does the general public need more knowledge about the technologies of Industry 4.0?

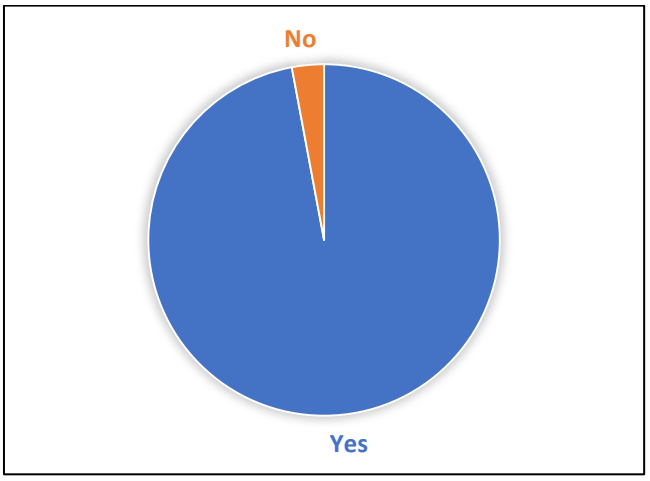


Figure 27: Need of improvement of knowledge for the general public

Within this question, the interviewed people have been asked “Why?”. The answers to this additional open question are listed below:

1. Simply - they do not know much...
2. It's a complicated topic. Everyone has to understand it.
3. For most of the people it is just a headline which is quite popular these days but very few People know, what is really behind.
4. if the technology is good, the user doesn't need to know much about it
5. Because they need to be aware of the technologic developments

6. For 2 reasons. The first reason is related with the importance of being informed about these technologies and the second reason is related with dissemination. Despite of some technologies have already been used, there is no knowledge of their classification as Industry 4.
7. Because all the possibilities and advantages are not known.
8. Facilitate technological knowledge and break the gap
9. So that you cannot develop opportunities.
10. So as not to become obsolete
11. Product emergency
12. Improve skills
13. Because it is the future

Conclusion 4: As you can see, the respondents see a need for the general public to know more about Industry 4.0 technologies - only one person out of 34 sees no need.

Question 5: In your opinion, do your customers need more knowledge about the technologies of Industry 4.0?

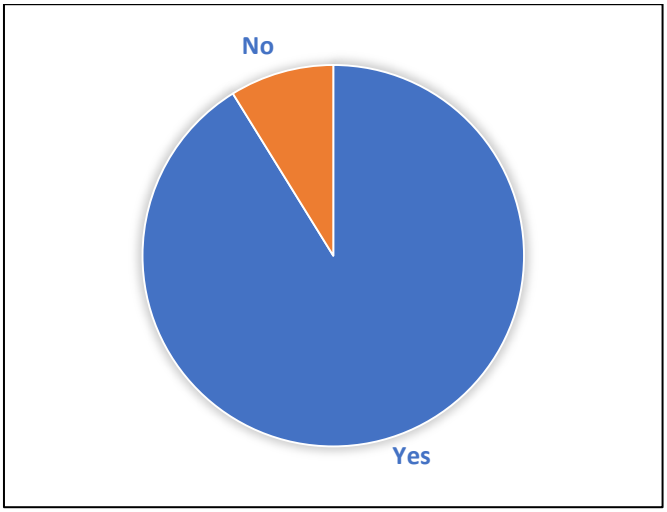


Figure 28: Need of Improvement of knowledge for customers

Within this question, the interviewed people have been asked “Why?” The answers to this additional open question are listed below:

1. In some parts, they know a lot, it depends..., but the general knowledge is missing, connections among all parts of IR 4.0 is not on the high level.
2. It's a complicated topic. Everyone has to understand it.
3. It depends but esp. in developing countries the availability of the corresponding technologies is both not very well known and also not really available.
4. if the technology is good, the user doesn't need to know much about it
5. Increase the productivity and the production
6. These technologies enhance the competitiveness of companies. In our specific case, our costumers belong to the manufacturing industry and these technologies are very important for their modernization, making them better prepared to overcome the challenges of the market (now and in the future).

Conclusion 5: As you can see, the respondents see a need for the customers to know more about Industry 4.0 technologies - only three persons out of 34 see no need.

Question 6: Is training for the specific products you offer your customers sufficient and enough or does it require a basic level of knowledge from your customers about Industry 4.0 technologies?

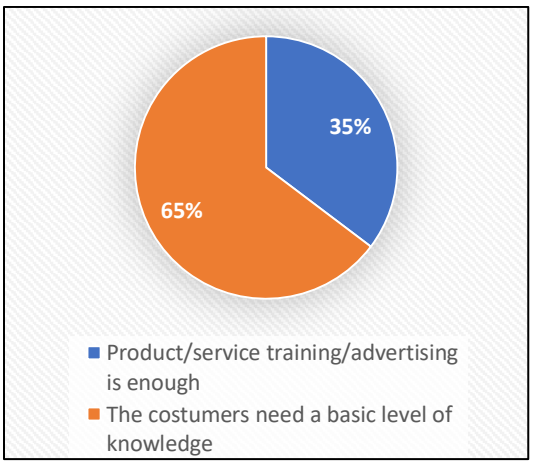


Figure 29: Training or basic knowledge – customer

Conclusion 6: 12 of the respondents stated that it is enough that the product descriptions/service trainings and advertising that they offer at the moment for the customers is enough.

The other 22 people see it differently and think that a basic knowledge of the customers is needed.

Question 7: Is training about the IT-procedures you offer to the staff enough or do they need a basic knowledge about Industry 4.0 technologies?

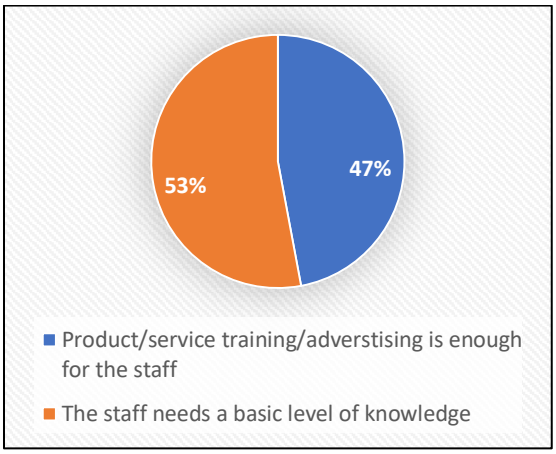


Figure 30: Training or basic knowledge - staff

An open field has been offered for comments and a respondent has written a comment:

- We don't offer ICT or Industry 4.0 products or services

Conclusion 7: A little more than half of the respondents (18 out of 37) stated that it is important for employees to have basic knowledge of Industry 4.0. The other 16 people stated that the training offered for the IT procedures for the employees is sufficient.

Question 8: Does your company offer trainings, workshops and/or specific advertising for the customers concerning technologies of Industry 4.0?

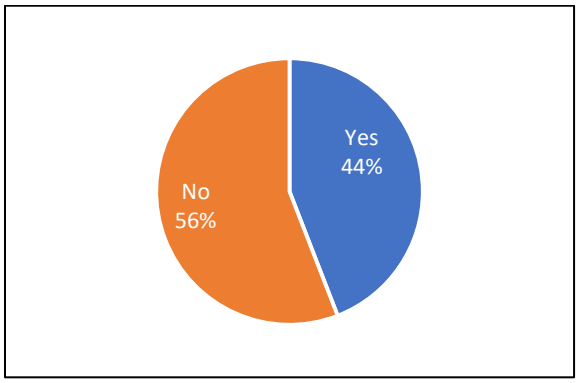


Figure 31: Information offer regarding Industry 4.0 technologies for customers

Within this question, the interviewed people have been asked "If Yes: how many hours approximately per month (on average)?" The answers to this additional open question are listed below:

1. 40
2. But we plan to do so
3. 20
4. 1 hour
5. 15
6. 5

Conclusion 8: In 15 companies of the interviewed persons there are trainings, workshops and/or specific advertising for the customers. In the other 19 companies such services are not offered.

Question 9: Which trainings and/or specific advertising methods for the customers are carried out by your company?

Within this question, more answers have been possible.

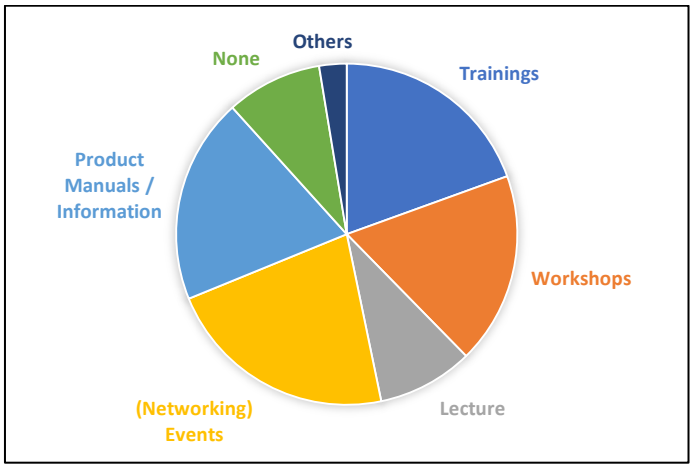


Figure 32: Trainings/methods for the customer 1

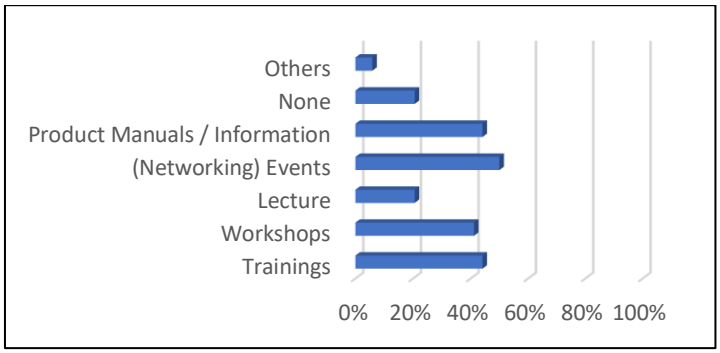


Figure 33: Trainings/methods for the customer 1

The response option "Others" also contained a field in which the respondents could make more detailed specifications. The two responses to "others" were:

1. Conferences
2. Video tutorials and information in call, chat or email about any doubts they may have.

Conclusion 9: The knowledge transfer for the customers takes place via different channels. All channels (training, workshops, lectures, (networking) events and product manuals/information) are used 21 - 50 % by the companies.
Seven companies do not offer training and/or specific advertising methods for their customers.

Question 10: Which technologies had or have the most impact onto your business?

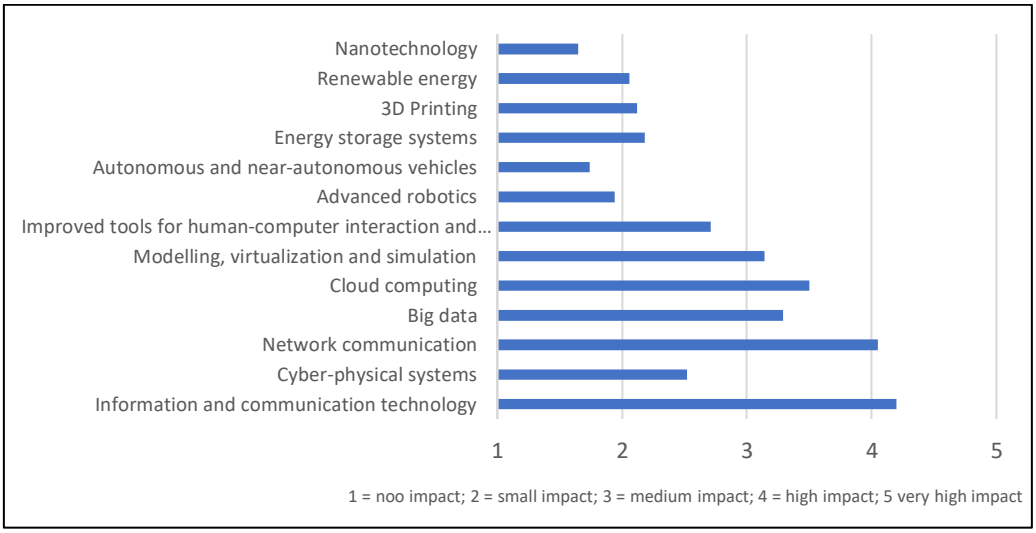


Figure 34: Impact technologies on business

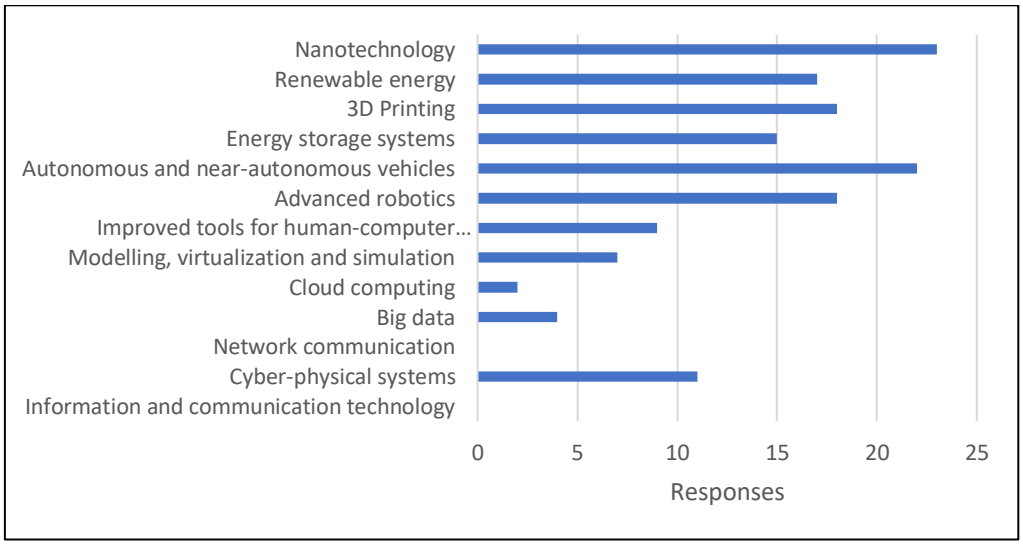


Figure 35: Technologies with no impact on business - additional figure

Within this question, the interviewed people have been asked “Please describe how the tools/instruments (available to the company) are being used?” The answers to this additional open question are listed below:

Comments on the individual technologies	
Nanotechnology	- i do not know - Equipment to test coating materials

Renewable energy	- We pay attention to energy consumption - solar energy to charge the batteries of equipment's - Test equipment for low voltage equipment
3D Printing	- we do not use it - Create specific Boards to support the created equipment - equipment for additive manufacturing
Energy storage systems	- fuel tank - E-Motor testbeds - batteries supported by solar panels
Autonomous and near-autonomous vehicles	- manufacturing machines, pre-cut machines - Development project
Advanced robotics	- no reply - equipment to handle parts
Improved Tools for human computer interaction and cooperation	- no reply - Do not know what is behind this term - Equipment to test materials and products - Telephone software with CRM support
Modelling, virtualization and simulation	- in product design and production - Engine simulation and development - which are the products with more potential - Numerical simulation and modeling software, computerized tomography equipment - Project Development
Cloud computing	- IT department in house is responsible - company internally to connect the affiliates to one harmonized global network - anticipate problems and increase production - High performance computing in numerical simulations - Document management (Drive, Box, Dropbox). - Hosting
Big data	- Administration of customers and products - Data storage of layouts, drawings etc. Data Exchange internally with affiliates and customers. - data storage - CRM / CRM
Network communication	- events for customers - E-Mail, Teleconferences, Data Exchange - to transfer data from remote locations - digitalization of processes and interconnections of them in the cloud - Project managers (Trello); internal communication tools (hangouts) - Web design and support
Cyber-physical systems	- in the tour planning in the driving park - I have never heard this term so far. - lab equipment's
Information and communication technology	- necessary in daily business - Esp. in tele conferences with customer these tools are frequently used.

	- Visualize the performance of the production department - digitalization of processes and communications - Internal communication (hangouts), project management (Trello), data analysis (Tableau), document management (Drive, Box, Dropbox). - Mocked

Conclusion 10: Figure 34 shows that for "information and communication technologies" and "network communication", the average impact on the work of the interviewees is high to very high. "modelling, virtualization and simulation", "cloud computing" and "big data" have a medium to high impact. "renewable energy", "3D printing", "energy storage systems", "improved tools for human-computer interaction and cooperation" and "cyber-physical systems" have a small to medium impact on average. "Nanotechnologies", "autonomous and near-autonomous vehicles" as well as "advanced robotics" have none up to a small impact onto the business of the respondents.

At the same time, it should be noted that many respondents stated that certain technology has no impact at all on their business. Figure 35 shows that in 15 - 23 companies according to the respondents "nanotechnologies", "renewable energy", "3D printing", "energy storage systems", "autonomous and near-autonomous vehicles" as well as "advanced robotics" have no impact on the company.

Question 11: What do you think - how will the relevance of the following technologies change for your customers within the future?

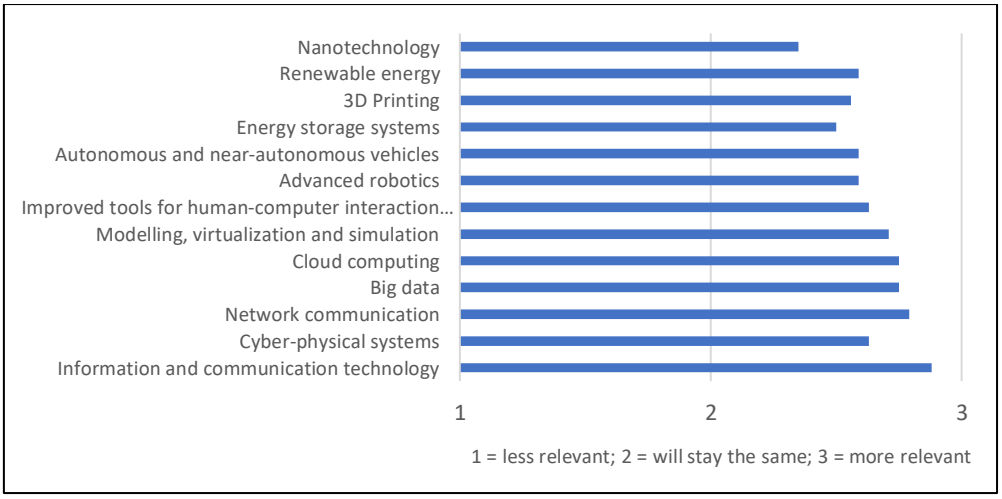


Figure 36: Future relevance of technologies for customers

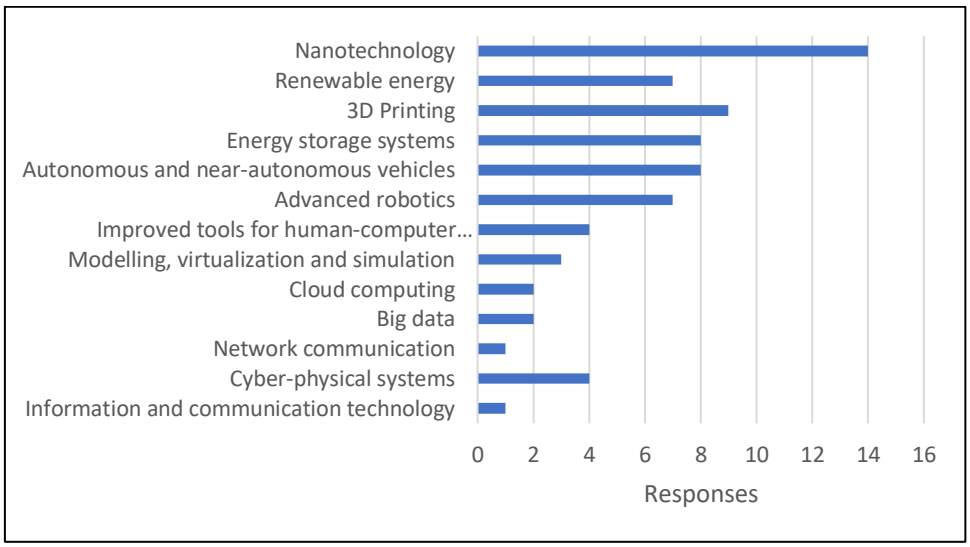


Figure 37: Relevance of technologies for customers - additional figure - not applicable to the company

Within this question, the interviewed people have been asked "Why do you think so?". The answers to this additional open question are listed below:

Comments on the individual technologies	
Nanotechnology	- it does not affect
Renewable energy	- very important topic - Sustainability - Solar energy is important to keep the functioning of systems
3D Printing	- Visual impact - to create models and specific equipment's
Energy storage systems	- new approaches - Development of hardware and control systems - Economic performance - remote locations without a stable energy source
Autonomous and near-autonomous vehicles	- very important for the future - The route will go into the direction of autonomous driving. - it does not affect
Advanced robotics	- is getting more intense - it does not affect
Improved Tools for human computer interaction and co-operation	- Process streamlining - Efficiency
Modelling, virtualization and simulation	- facilitate the work process - Increase of computing power - Prototyping - Visibility

Cloud computing	- the it department is responsible for - Hardware will develop but the concept will remain the same - Security and accessibility - Improvement of resources - increase production and productivity
Big data	- the digitization makes almost every company a collector of data - Increase of storage capacities - Optimization of activities - Low impact
Network communication	- depending on the customer - Higher speeds, new hardware technology - Process streamlining - Technical support
Cyber-physical systems	- more information will be needed - it does not affect
Information and communication technology	- Information and communication is always needed - ICT is continuously changing and developing. - Process streamlining - Improvement of relationships

Conclusion 11: The survey and the results of the respondents show that the importance and relevance of the technologies shown not only remain the same, but that they will have a greater impact on customers in the future.

At the same time, it should be noted that many respondents stated that these certain technology "does not apply to our company". Figure 37 shows that f.ex. in 7 - 14 companies of the interviewees "nanotechnologies", "renewable energy", "3D printing", "energy storage systems", "autonomous and near-autonomous vehicles" as well a "advanced robotics" are not applicable to the company.

Question 12: On a scale from 0 (low) till 5 (high) - how do you rate the current knowledge of your customers of those novel technologies?

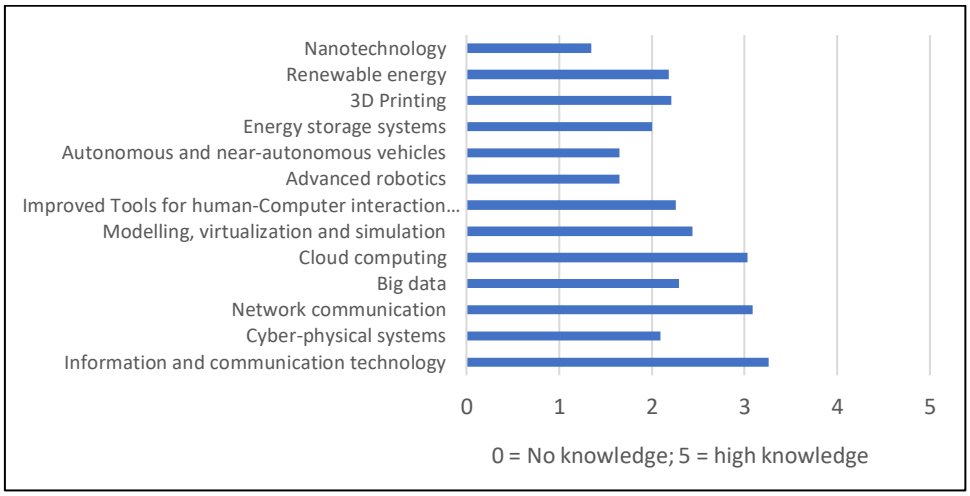


Figure 38: Customers knowledge on Industry 4.0 technologies

Conclusion 12: The knowledge of the customers about the individual technical areas is rated as moderate by the interviewees. Only in the three areas "nanotechnology", "autonomous and near-autonomous vehicles" and "advanced robotics" is this knowledge regarded as low or less than average.

Question 13: On a scale from 0 (not necessary) till 5 (totally necessary) - where would customers need to improve their knowledge regarding technologies of Industry 4.0?

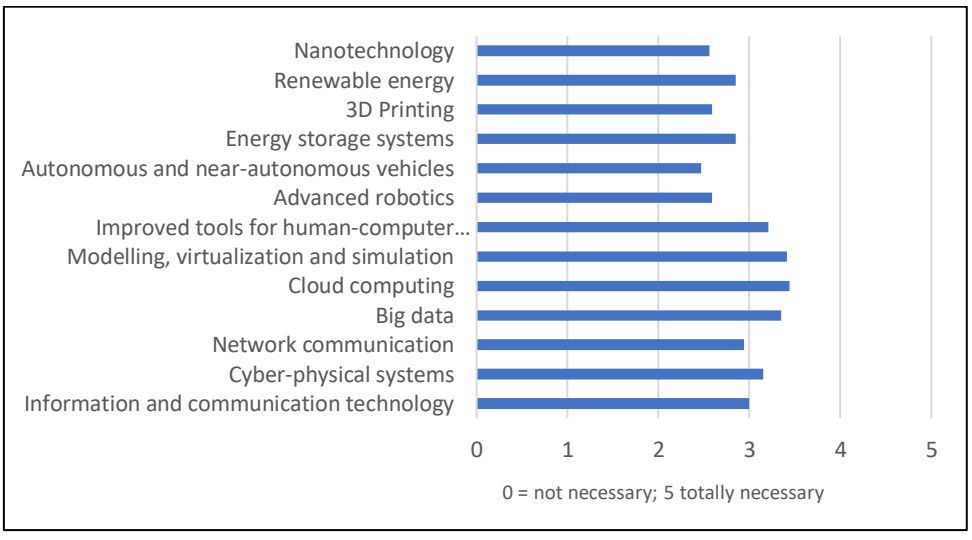


Figure 39: Customers need of improving their skills

Conclusion 13: As can be seen from the preceding graph (39), there are no clear and significant results with regard to the question "Is it not or totally necessary for customers to improve their knowledge of the individual Industry 4.0 technologies". On the scale from 0 to 5, the weighted average lies between 2.47 and 3.44. One can therefore make the statement that the improvement of basic knowledge for the individual technologies for customers is not unimportant, but also not a priority.

Question 14: On a scale from 0 (not important) to 5 (very important) - how important do you consider having a basic knowledge of the following skills for your customers?

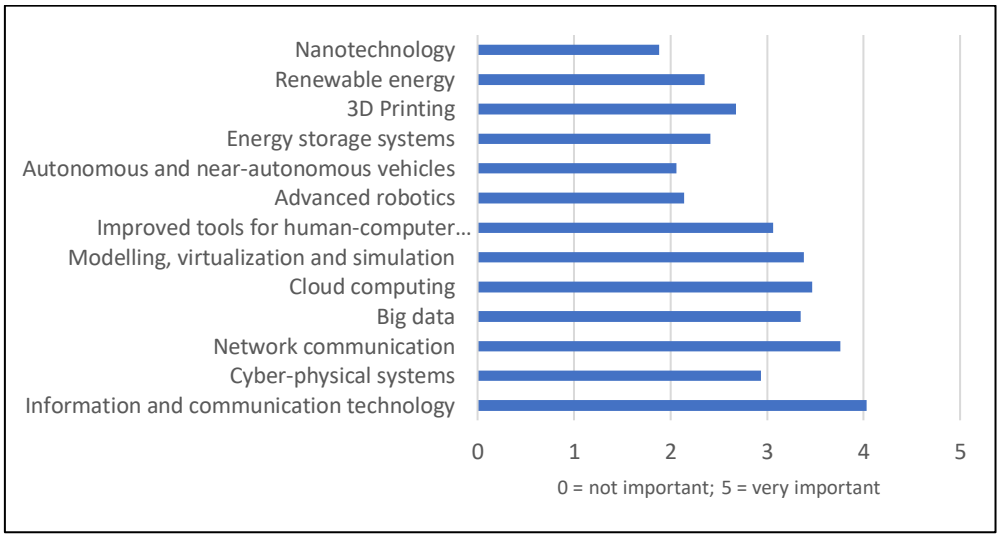


Figure 40: Importance of basic customer knowledge

Conclusion 14: In contrast to the previous question when asked about the future improvement of knowledge, in this question the respondents were able to state the importance of customer knowledge about the individual Industry 4.0 technologies.

The five most important technologies, that customers should have knowledge about are (according to the people questioned):

- Information and communication Technology (4.03)
- Network communication (3.76)
- Cloud Computing (3.47)
- Modelling, virtualization and Simulation (3,38) and
- Big data (3.35).

Less important for the interviewees is the customer's basic knowledge of following technologies: Nanotechnologies (1.88), autonomous and near-autonomous vehicles (2.06) and advanced robotics (2.14).

Question 15: Which measures have been taken from your HR to provide your employees with sufficient knowledge so that they can train your customers?

1. regular training
2. none
3. trainings, analysis of educational needs
4. training and workshops, need analysis
5. in-house training
6. trainings
7. unfortunately none
8. Only one Information Workshop for all employees.
9. -
10. plan the training for the specialists continuously and regularly
11. Recruiting of specialists for certain Topics, external 1 or 2 day's training of our staff
12. Information, Trainings
13. additional Courses for employees
14. online course development
15. None
16. Training courses
17. Improvement groups
18. We arrange meetings and training courses weekly
19. Courses
20. Training
21. Training and recycling courses
22. Courses are given
23. Training and tools
24. Take doubts and technical advisory
25. Training, workshops, webinars, self-study and training
26. workshops, training, eLearning
27. information, workshop
28. Internal documents about several subjects. Presentations made by the department responsible
29. None
30. workshops and training
31. The company has an annual training program per employee. This plan/program has in consideration the present and future needs in terms of competences
32. Training, workshops, webinars, self-study and training

33. Workshops, training, visit to fairs, participation in scientific congress
34. Manage the knowledge

Conclusion 15: Twenty-four companies of the interviewed persons offer online and offline workshops/trainings in which knowledge is conveyed that the employees can then pass on to the customers. These trainings/workshops have different durations (annual, weekly, continuously, ...).

In one company, additional webinars are offered, and employees acquire moreover knowledge through self-study. In four companies no measures are taken, one company is in the process of developing online courses. In one company the knowledge is managed. One person answered this question with "-".

In three companies, there are the following explicit measures:

- doubts and technical advisory,
- improvement groups and
- internal documents about several subjects and presentations made by the Department responsible.

Question 16: Is there a special demand for trainings for the customers in the previously indicated technical fields?

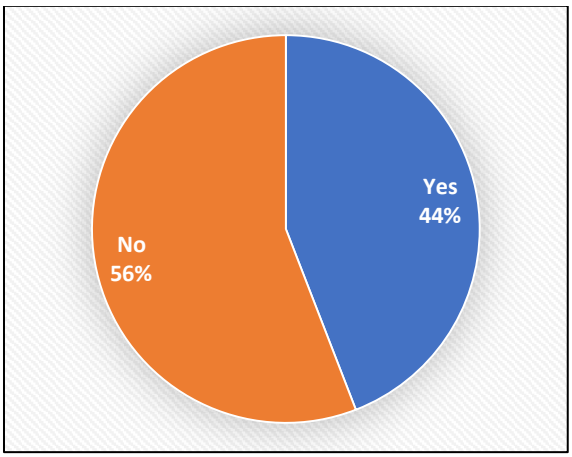


Figure 41: Demand for trainings for customers

Conclusion 16: Fifteen of the respondents (44 %) said that there is a demand for customer training on Industry 4.0 technologies.

The other 56 % (19 respondents) disagree and do not see any current demand.

Question 17: What is the name of the company you are working at the moment?

Since this questionnaire is published anonymously, no collected data is displayed here.

Question 18: What is your current position in the company?

Current position	Number of respondents
CEO/Director (of IT)	7
(Key Account/Quality/technical/Project) Manager/Coordinator/Supervisor/Team Leader	14
Technician (specialist) / System Administration Department / Senior Software Engineer / Planning, Quality and Innovation Technician	7
Business and Strategic Relations	1
Coordinator of the development team	1
Operator/Production	2
Head of research department	1
Head of logistics	1

Question 19: To which industry is your company assigned (major field of Business)?

33 persons filled this field with information and 1 persons answered with "-".

Industry	Number of respondents
Automotive/Aviation/Process Industry	8
Metal	1
ICT	7

Education	1
Engineering	1
Logistics	1
Social security, occupational health and safety	1
Management software/Software Development/Online Services/Digital Information	4
Nanotechnologies	1
Financial sector	1
Research	1
Consumer goods	1
Third sector	1
Editorial	1
Information and dissemination service	1
Stock market banking	1
Private security	1

Question 20: In which country is your company located?

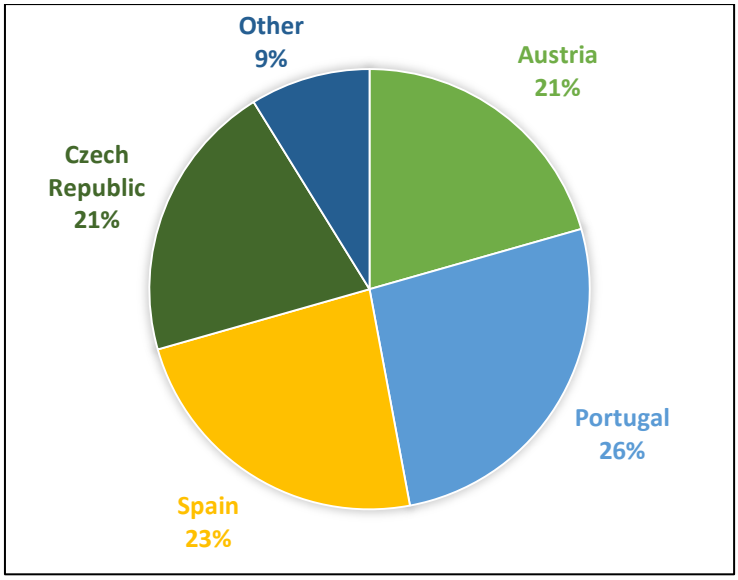


Figure 42: Location of the business by country

The response option "Other" also contained a field in which the respondents could make more detailed specifications. The three responses to "other" were:

1. USA
2. Luxemburg
3. At an international level

Question 21: In which department of the company are you working at?

Department	Number of responses
Production/Logistics/Operations/Industrial	7
Sales/Administration	3
(Software/training and project) development; R&D	6
Consulting	2
IT / technical department	4
Marketing	1
(Planning and) Quality	3
(Global Project) Management	2
Legal and teaching	1
Business	1
ICT	1
Drive information	1
Oil & Gas	1
Prevention	1

Question 22:

33 persons filled this field with information and 1 persons answered with "-".

Profession	Number of responses

(Quality/key account/logistic/operations/product/ creative/department/project) Manager/Management/Team leader	12
(Quality) Technician	3
(Computer) Engineer	6
Consultant	2
Economist	1
Editor	1
Freelance/autonomous worker	2
IT (expert) / Computer programmer / System Administrator	4
Operations	1
Leading customer projects	1

Question 23: What is your highest education and in which field?

Highest Education	Number of responses
University degree (Bachelor + Master)	28
Highschool	4
VET	1
Operations	1

Question 24: How many employees are working in your company?

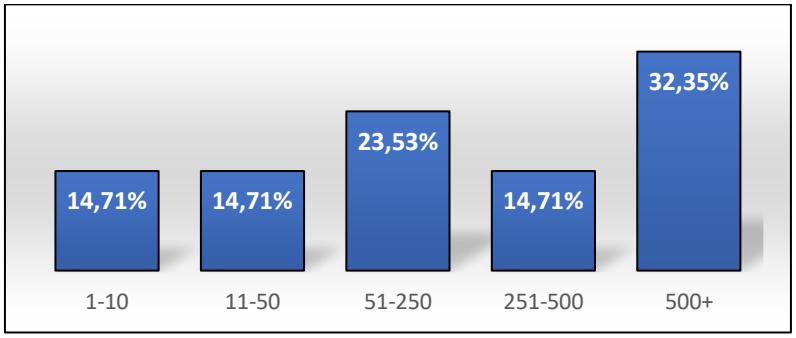


Figure 43. Number of employees / company size

Question 25: E-Mail

Within this open question respondents could leave their E-Mail address if they would like to get informed about the result of this questionnaire. Since this questionnaire is published anonymously, no collected data is displayed here.

1.2.2. Conclusions

It was important, to have at least 5 conclusions (out of the information's gathered during the questionnaire) for the further project progress, which is the development of suitable and effecting Learning Materials that are tailored to our target-group´s learning preferences.

1.2.2.1. Conclusions of the individual questions

Conclusion 1: The interviewees who use the technologies in their own companies show that they use them at least sometimes - the majority, however, is often up to frequently used.

The survey also showed that some systems are not used at all in the companies of the respondents - above all "nanotechnology" (22 respondents) and "autonomous and near-autonomous vehicles" (20 respondents). Only "Information and communication technology", "network communication" and "cloud computing" are used in every company where respondents work.

Conclusion 2: The responses indicate that mainly "information and communication technologies", "network communication technologies", "cloud computing technologies", "modelling, virtualization and simulation" and "improved tools for human-computer interaction and cooperation" are offered to customers.

Conclusion 3: The individual knowledge of Industry 4.0 technology suppliers can be considered medium high - the average value is 6.47 (0 = no knowledge; 10 = high knowledge).

No person has entered the value 0 - the lowest value entered was 2 and was selected three times.

Conclusion 4: As you can see, the respondents see a need that the general public need more knowledge about Industry 4.0 technologies - only one person out of 34 sees no need.

Conclusion 5: As you can see, the respondents see a need for the customers to know more about Industry 4.0 technologies - only three persons out of 34 see no need.

Conclusion 6: 12 of the respondents stated that it is enough that the product descriptions/service trainings and advertising that they offer at the moment for the customers is enough.

The other 22 people see it differently and think that a basic knowledge of the customers is needed.

Conclusion 7: A little more than half of the respondents (18 out of 37) stated that it is important for employees to have basic knowledge of Industry 4.0. The other 16 people stated that the training offered for the IT procedures for the employees is sufficient.

Conclusion 8: In 15 companies of the interviewed persons there are trainings, workshops and/or specific advertising for the customers. In the other 19 companies such services are not offered.

Conclusion 9: The knowledge transfer for the customers takes place via different channels. All channels (training, workshops, lectures, (networking) events and product manuals/information) are used 21 - 50 % by the companies.
7 companies do not offer training and/or specific advertising methods for their customers.

Conclusion 10: Figure 34 shows that for “information and communication technologies” and “network communication”, the average impact on the work of the interviewees is high to very high. “modelling, virtualization and simulation”, “cloud computing” and “big data” have a medium to high impact. “renewable energy”, “3D printing”, “energy storage systems”, “improved tools for human-computer interaction and cooperation” and “cyber-physical systems” have a small to medium impact on average. “Nanotechnologies”, “autonomous and near-autonomous vehicles” as well as “advanced robotics” have none up to a small impact onto the business of the respondents.

At the same time, it should be noted that many respondents stated that certain technology has no impact at all on their business. Figure 35 shows that in 15 - 23 companies according to the respondents “nanotechnologies”, “renewable energy”, “3D printing”,

"energy storage systems", "autonomous and near-autonomous vehicles" as well a "advanced robotics" have no impact on the company.

Conclusion 11: The survey and the results of the respondents show that the importance and relevance of the technologies shown not only remain the same, but that they will have a greater impact on customers in the future.

At the same time, it should be noted that many respondents stated that these certain technology "does not apply to our company". Figure 37 shows that f.ex. in 7 - 14 companies of the interviewees "nanotechnologies", "renewable energy", "3D printing", "energy storage systems", "autonomous and near-autonomous vehicles" as well a "advanced robotics" are not applicable to the company.

Conclusion 12: The knowledge of the customers about the individual technical areas is rated as moderate by the interviewees. Only in the three areas "nanotechnology", "autonomous and near-autonomous vehicles" and "advanced robotics" is this knowledge regarded as low or less than average.

Conclusion 13: As can be seen from the preceding graph (39), there are no clear and significant results with regard to the question "Is it not or totally necessary for customers to improve their knowledge of Industry 4.0 technologies". On the scale from 0 to 5, the weighted average lies between 2.47 and 3.44. One can therefore make the statement that the improvement of basic knowledge for customers is not unimportant, but also not a priority.

Conclusion 14: In contrast to the previous question when asked about the future improvement of knowledge, in this question the respondents were able to state the importance of customer knowledge about the individual Industry 4.0 technologies.

The five most important technologies, that customers should have knowledge about are (according to the people questioned):

- Information and communication Technology (4.03)
- Network communication (3.76)
- Cloud Computing (3.47)
- Modelling, virtualization and Simulation (3,38) and
- Big data (3.35).

Less important for the interviewees is the customer's basic knowledge of following technologies: Nanotechnologies (1.88), autonomous and near-autonomous vehicles (2.06) and advanced robotics (2.14).

Conclusion 15: Twenty-four companies of the interviewed persons offer online and offline workshops/trainings in which knowledge is conveyed that the employees can then pass on to the customers. These trainings/workshops have different durations (annual, weekly, continuously, ...).

In one company, additional webinars are offered, and employees acquire moreover knowledge through self-study. In four companies no measures are taken, one company is in the process of developing online courses.

In three companies, there are the following explicit measures:

- doubts and technical advisory,
- improvement groups and
- internal documents about several subjects and presentations made by the Department responsible.

In one company the knowledge is managed. One person answered this question with "-".

1.2.2.2. Total conclusions

1. **Knowledge about Industry 4.0 has an impact on employees**

   Industry 4.0 are used in the company of the respondents often up to frequently often and especially the technologies “Information and communication”, “network communication” and “cloud computing” are used in every company where the respondents work *(Question 1).*

   Especially these three technologies have also a medium to high impact on the work of the respondents but also the other technologies are used in the everyday life such as in telephone conferences, internal communication through tools, equipment to test materials and products, solar energy to charge the batteries of the equipment, high performance computing in numerical simulations and modeling software, data analysis and in many other areas *(Question 10).*

   Since the technological field is constantly changing and transforming, it is necessary for employees to know about these different tools and technologies used in the company.

2. **Knowledge transfer for employees can be improved**

According to the statements of the interviewees, their knowledge lies on a scale of 0 = no knowledge and 10 = high knowledge with an average of 6.47 and can therefore be regarded as medium high *(Question 3).*

For 53 % of the interviewees, it is important that employees have a basic knowledge of Industry 4.0 (technologies) *(Question 7).*

In order for employees to be able to pass on knowledge about industry technologies and their products and processes to customers, there are various types of knowledge transfer that are used in companies. Knowledge is mainly passed on in workshops and training sessions. However, there are also (additional) webinars, internal documents as well as advisory and improvement groups. Of the 34 people surveyed, 29 companies offer continuing education courses. However, access times vary - some of the interviewees reported weekly, others annually. In four of the companies surveyed, there were no further training opportunities *(Question 15).*

This list of persons surveyed shows that there are very different training opportunities with different time structures (regularly, weekly, just once). At the same time, some companies seem to be very committed to further training (consideration of the present and future needs in terms of competences; recruiting a specialist, needs analysis), while others still have some catching up to do and could further develop the potential (trainings: unfortunately none; only one information workshop for all employees).

3. Need to improve customers' knowledge of Industry 4.0 technologies

The respondents stated that in many technological areas it is very important for customers to have a basic knowledge about those technologies.

Especially in the areas "Information and communication technology", "Network communication", "Cloud computing", "Modelling, virtualization and simulation" and "Big data" skills are considered to be very relevant and important *(Question 14).*

91% of respondents said that customers need to gain more knowledge about Industry 4.0 technologies. It is important to “increase the productivity and the production” and “to enhance the competitiveness of companies – making them better prepared to overcome the challenges of the market” *(Question 5).*

The current knowledge of the customers is estimated by the respondents to be moderate *(Question 12)* and for the future it is important to increase this knowledge, as the importance

and relevance of Industry 4.0 Technologies will have a greater Impact on customers in the future *(Question 11).*

4. **Knowledge transfer for customers can be enhanced**

While 22 of the interviewed persons (65 %) feel that a basic knowledge of the customers is needed, 12 persons believe that product/service trainings and advertising that they offer at the moment for the customer is enough *(Question 6).*

In 15 of 34 companies in which the respondents work, own training courses, workshops and/or specific advertising concerning technologies of Industry 4.0 are offered for the customers *(Question 8).*

While in 21 - 50 % of the companies the knowledge transfer takes place via trainings, workshops, lectures, (networking) events and product manuals, in 21 % of the companies none of these trainings and/or specific advertising methods is applied *(Question 9).*

The need for customers to improve their knowledge is seen by the interviewees between not necessary and totally necessary in the midfield. One can conclude that it is important that customers have a basic knowledge, but the priority is not too high *(Question 13).*

5. **The general public must be involved**

When thinking about training and knowledge transfer, one should not only think about the specialists and the people who work directly with Industry 4.0 products, but one should also always draw the general population into consideration, as this topic appeals to each individual in a certain way.

The respondents also see it the same way – 97 % stated that the general public needs more knowledge about the technologies of Industry 4.0. When asked why it was necessary, respondents responded for example: “It is a complicated topic. Everyone has to understand it”, “For most of the people it is just a headline which is quite popular these days but very few people know, what is really behind” and to “facilitate technological knowledge and break the gap” *(Question 4).*

When thinking about developing and creating the best learning materials to use it is important to always pay attention to the general population and to their needs.

2. Research: main leaders of the field of developing and delivering innovative solutions

The research has been completed by all partners (Austria, Spain, Portugal and Czech Republic) and were realized by internet research. The aim was to create an overview of companies, which are suppliers of Industry 4.0 technologies in those countries.

2.1. Austria

Nr	Company Name	one-liner about company	Field of business	Industry 4.0 Technologies	Main Products	Address	Website	E-Mail	Tel.	References – working with/ References – working for
1	A1 Telekom Austria AG	The A1 Telekom Austria Group is a leading provider of digital services and communication solutions in the CEE region.	Digital communication solutions, payment and entertainment services		Telecommunication	Lassallestrasse 9; 1020 Wien (AT)	https://www.a1.group/de/home	csr@a1.group	+43 506640	European Unit of América Móvil (one of the world's largest mobile network operators)
2	ABAX Informationstechnik GmbH	We plan complex IT system landscapes and supply all components. In addition, we install and configure passive and active network infrastructure	information technology	CymbIoT, Lancom Systems, Acam, essecca, Phoenic contact, LineMetrics	IT Systems	Thurngasse 10; 1090 Wien (AT)	https://www.abax.at/	service@abax.at	+43 508500	IBM; Cicso; Veeam; Sophos; Roxcel; 4Systems
3	AVL List GmbH	AVL is the world's largest independent company for development, simulation and testing technology of powertrains (hybrid, combustion engines, transmission, electric drive, batteries and software) for passenger cars, trucks and large engines.	development, simulation and testing technology of powertrains (hybrid, combustion engines, transmission, electric drive, batteries and software) for passenger cars, trucks and large engines	(CFD) Simulation, Vehicle Electronics & Connected Services, automation system with data acquisition system, E-Drive, IODP	Powertrain Systems, Simulation, Engine Instrumentation and Test Systems	Hans-List-Platz 1; 8020 Graz (AT)	https://www.avl.com/web/guest/home	hotline.austria@avl.com	+43 316787555	/

4	IBM Österreich	Our experts in business, technology and industry use advanced technology to help you reduce cost and risk, achieve compliance, accelerate speed to market, create new revenue streams and establish a security-rich and reliable infrastructure that's ready for AI and hybrid cloud.	Aerospace and defense, Automotive, Banking and financial markets, Chemicals, Construction, Education, Electronics, Energy and utilities, Healtcare, Insurance, Life sciences, Manufacturing, Metals and mining, Oil and gas, Retail and Consumer Products, Telecommunications, media and entertainment, Travel and transportation	IBM Cloud; IBM Watson (AI); Watson IoT Platform; IBM IGNITE Quality and Test; SAP; Sysco; Big Data Consulting Services; Blockchain Services	AI; Big Data Analytics; High Performance Computing; DevOps; Cloud; Security; IBM Storage	Obere Donaustraße 95; 1020 Wien (AT)	https://www.ibm.com/at-de/	gsc@at.ibm.com	+43 1211450	Box; Cisco; Citrix; Infor; Juniper; Microsoft; Oracle; Salesforce; SAP; Twitter; The Weather Company; Workday; itelligence Denmark; Agero; 1-800-Flowers; Celcom Aciata Berhad; Tektronix; The Works; ActivTrades; Red Eléctrice de Espana;
5	Infineon Technologies Austria AG	Infineon Technologies AG is a world leader in semiconductor solutions that make life easier, safer and greener.	Microelectronics / Semiconductor and system solutions		Semiconductor; system solutions	Siemensstraße 2; 9500 Villach (AT)	https://www.infineon.com/cms/austria/de/	Support@infineon.com	+43 800951951 951	Aaware; AbsInt; Accurate Technologies; Alogcraft; Altium; Ampotech; ArcCore; Argus; ARM; Atos; ASTC; AIT; AVL; Bluewind; BPM; Broadstar; Canova Tech; CPES; -cheng-Tech; Cichon Engineering; CMX Systems; CEI; Creoir; Cyntec;…
6	Kapsch BusinessCom AG	As a leading partner in digitalization, the company operates as a consultant, system supplier, and service provider.	Digitalization, software development, end-to-end technology	SAP; Tribefire; Azure, Connected Platforms & Applicatoins, converged infrastructure, digital facility solutions, intelligent network	Connected Platforms & Applications; Converged Infrastructure; Digital Facility Solutions; Intell f -*+igent Network; Security; Unified Workplace; professional planning, controlling and continuous monitoring of project progress	Am Europaplatz 2; 1120 Wien (AT)	https://www.kapsch.net/kbc	info@kapsch.net	+43 508110	Cisco; HewlettPackard Enterprise; Microsoft; Avaya; Barracuda; Check Point; Cherwell; ciena; Citrix; Hitachi; intel Security; Mitel; MobileIron; Oracle, paloalto; SAP; Symantec; Veeam; Veritas; vmware
7	Know-Center GmbH	The Graz-based Know-Center develops Austria's leading research center for data-driven business innovative information and communication technologies for the economy.	Research center for data-driven business and big data analytics.	Cognitive Computing System	Industrial Data Analytics; Strategic Intelligence; Data-driven Process and Decision Support; Digital Life Science	Inffeldgasse 13/6; 8010 Graz (AT)	http://www.know-center.at	info@know-center.at	+43 316873308 01	AVL List GmbH; KNAPP AG; Magna Steyr Fahrzeugtechnik AG & Co KG; Siemens AG – Division Rail Boogies; AT&S Austria Technologie & Systemtechnik AG; Baxter; AVL; bothinteract; Comet; Austin BFP; FFG; FBK; g-tec; Hyperwave;…
8	Magna Steyr Fahrzeugtechnik AG& Co KG	Magna is a company of entrepreneurs dedicated to delivering new mobility solutions. We are a technology company, one of the world's largest suppliers to the automotive industry. Our agility and expertise make us the ideal partner for autonomy, electrification and building complete vehicles.	automotive industry		automotive: innovation and manufactoring	Technologiestrasse 8; 1120 Wien (AT)	https://www.magna.com/home	/	+43 18125565	/

9	REXEL Austria GmbH	We are the trading company for technical products in the areas of electrical trade, commerce and industry and set standards for specialized and individual customer solutions.	Electrical installation material and electrical appliances	automation technology	Electrical installation material and electrical appliances	Murbangasse 1; 1100 Wien (AT)	https://www.rexel.at/	office@rexel.at	+43 1688038830	ABB; Agro; auer; Bachmann; Balluff; B.E.G.; Bernstein Berker Roxroth Bosch Group; Busch-Jaeger; Chauvin Arnoux; Coroplast; Dehn; Devi; Eaton; Dietzel Univolt; Eberle;…
10	Rosenbauer International AG	Rosenbauer is the world's leading manufacturer of fire-fighting technology in defensive fire and disaster control. For more than 150 years, the name has stood for significant innovations and pioneering techniques in the construction of fire engines and fire extinguishers in accordance with European and US standards.	Firemen outfitters	RFID; 3D Printing; ICT	Fire fighting vehicles, aerial ladders, aerial rescue platforms, airport vehicles, industrial vehicles, special vehicles, extinguishing systems, fire fighting equipment, stationary extinguishing systems and in the field of telematics solutions for vehicle management and operational management.	Paschinger Straße 90; 4060 Leonding (AT)	https://www.rosenbauer.com/en/at/rosenbauer-world	office@rosenbauer.com	+43 73267940	/
11	SBA Research	Within a network of more than 70 companies, 15 Austrian and international universities and research institutions, and many additional international research partners we jointly work on research challenges ranging from organizational to technical security to strengthen Europe's Cybersecurity capabilities.	research center for Information Security	ICT; Network communication; Big data; Cloud computing	Advanced Training; Data Protection Governance, Infrastructure Security; Security Governance; Software Engineering; Software Security	Favoritenstrasse 16; 1040 Wien (AT)	https://www.sba-research.org/	office@sba-research.org	+43 15053688	Airbus Group Innovations; Deloitte; EURECOM Sophia Antipolis; Fraunhofer SIT; TUHH; INRIA; KU Leuven; NII; NIST; SAP; SINTEF; TU Darmstadt; University of Mannheim; University of Texas at Arlington; Wilfried Laurier University
12	Schneider Electric	We are leaders in the digital reorientation of energy management and automation technology, ensuring that IoT-enabled solutions can be seamlessly networked, capture and analyze data in real-time, and respond to the situation.	Energy management and automation technology	Cloud computing; CAD;	Building automation; IT infrastructure; UPS; racks; Cooling and monitoring; Automation and control technology, low-voltage products and systems; Medium voltage products and energy automation; Installation and building system technology	Birostraße 11; 1230 Wien	https://www.schneider-electric.at	office.at@schneider-electric.com	+43 1610540	F. Schantl Elektro GmbH; GFI; Haberkorn; Regro; Schäcke; Sonepar; STARA; TEG WIEN; Walter Böhler Steuerungen GmbH
13	Siemens AG Österreich	For more than 135 years, Siemens has stood for technical performance, innovation, quality, reliability and internationality in Austria.	Technology: electrification, automation and digitization.	automation technology; advanced robotics; cyber-physical systems; ICT	Industrial automation; Building technology; Drive technology; Energy; health care; Mobility; financial solutions	Siemensstraße 90; 1210 Wien (AT)	https://www.siemens.com/at/de/home.html	kontakt.at@siemens.com	+43 517070	/

14	Tieto Austria GmbH	We envision a future in which data is the biggest driver of continuously increasing societal and economic value. As digitalization gains speed, personalized services become the new normal and a key success factor for our customers - rapidly increasing the demand for data-driven innovations and new revenue streams.	software and services	Digital experience and consulting; Industry solutions and software; Software R&D services, Cloud transformation; Data and AI; Managed services and integration	Digital experience and consulting; Industry solutions and software; Software R&D services, Cloud transformation; Data and AI; Managed services and integration	Handelskai 94-96; 1200 Wien (AT)	https://campaigns.tieto.com/de/node/302	suppliers.contact@tieto.com	+43 1331740	SAP; Microsoft; Nintex; Usecon; Genesys; Episerver
15	Zumtobel Group AG	The Zumtobel Group is an international lighting group and a leading supplier of innovative lighting solutions, lighting components and associated services.	Lighting	Indoor Navigation; People Tracking; Remote Monitoring; Sprace Management; Dynamic Lighting; Lighting Infrastructure	manufacture of hardware and software for lighting systems (LED light sources and LED drivers, sensors and lighting management)	Höchter Strasse 8: 6850 Dornbirn (AT)	https://www.zumtobel-group.com/en/	/	+43 55725090	/

2.2. Spain

Nr	Company Name	one-liner about company	Field of business	Industry 4.0 Technologies	Main Products	Address	Website	E-Mail	Tel.	References – working with/ References – working for
1	Sistec Tecnologia Y Sistemas Sociedad Limitada.	Sistec offers IT tools for the genral managament of the company: logistics, project management tools, data bases, SAP business ONE and financial solutions.	The realization of studies, works and computer applications	sap bussiness one	IT Consulting / could developing / comprehensive support / outsourcing and marketing	Calle Arbidea, 14, Bilbao, 48004 , Bizkaia	http://sistects.es/	marketingweb@sistects.es	+34 944598626	SISTEC is a direct partner of SAP. Installation, support and maintenance of SAP Business One // Sistec New Exact Partner EXACT SYNERGY SISTEC SAP BUSINESS ONE
2	Professional Software Sa	We are the first Spanish developer of computer solutions for the construction sector	Consultation of computer applications and provision of computer programs	Sigrid Construction Management / Sigrid Follow-up of Works / Sigrid Promoters / Sigrid RRHH / Sigrid CRM / Sigrid Portal Web / Other Modules / Memphis 8 / Memphis GO / Memphis BIM / Adaio Documentary Manager / Licita / Databases	construction sector, data base, Measurements and budgets, Sigrid ERP, Documentary Manager, The recruitment management of Administrations	Calle Maria Tubau, 4 - 3º, Madrid, 28050 , Madrid	https://prosoft.es/	info@prosoft.es	+34 913587580	Grupo San José, HAL 9000, Dragados, ohl industrial, siemens, sgs, movistar, adif and more.

3	Dynamic Soft Sl	Dynamic Soft is a company specialized in the development and implementation of ERP Management software	Consultation of computer applications and provision of computer programs	SEG and ERP	Dynamic ERP, Dynamic SEG, Dynamic PRES, Dynamic Financials, Consultancy, Sectoral Solutions	Calle Areal, 18 - 18, vigo, 36201 , Pontevedra	http://www.dynamicsoft.es/	info@dynamic-soft.es	+34 902875755	/
4	Altai Soft Sl	Programme of payroll programs and Software and management programs for companies, consultancies and offices	Consultation of computer applications and provision of computer programs	asesorDESK, ALTAI ClockIn, ALTAI bill Online, Custom software - Sector, applications, Backup online	Software and management programs for companies, consultancies, offices and training	Calle Pontevedra, 23, Pozuelo de Alarcon, 28223 , Madrid	http://www.altai.es/	info@altai.es	+34 91 201 07 50	/
5	Unit4 Business Software Iberica Sa	Unit4 is a multinational manufacturer of business management software focused on people	Provision of computer services: consulting and development of software projects. turnkey computer solutions. hardware and software maintenance services. information process services.	ekon ERP, ekon CRM, ekon Distribution, ekon Finance, ekon Employees , ekon Health, Production ekon, ekon Projects, ekon Shop, ekon Cabinets Unit4, Absence Manager, Unit4 Business World On!, Unit4 Financial Performance, Management (Unit4 Consolidation & Cash)	Unit4 Business World On! // ERP	Avenida del Conocimiento (edi d), S/N, Armilla, 18100 , Granada	http://www.unit4.es/	info.es@unit4.com	+34 902227000	Microsoft, CAPGEMINI, GCON4, HighValue, NCS, T&G de Colombia, T&G de Colombia
6	Cyr Creaciones Para Empresas Sl	Dedicated to making your best marketing and advertising ideas come true at the point of sale	We are dedicated to the design, development and production of paper, cardboard and plastic products for corporate development and corporate marketing.	Layout and design in 2d and 3d, Offset printing in all formats, including also UVI inks on special supports, digital printing, all formats and materials, 3D printing.	exhibitors, printing, packaging, block holders and folders, promotional products and plastic welds	Calle Ecija, 8 - BJ CT, Madrid, 28008 , Madrid	www.cyr-creaciones.es	comercial@cyr-creaciones.es	+34 915596277	/
7	Comunicaciones Para Empresas Berafone Sl.	the best solutions in digitalization and telecommunications for your company	optimize and improve the visibility of companies integrating their business in digital marketing	Web, SEO, Google adwords,	vodafone distributor, digital marketing solutions, consulting for companies,	Puerto de los leones 2, 1º planta Majadahonda. Madrid 28220	www.berafone.es		+34 676307309	Vodafone
8	Apoyo Contable Y Financiero Para Empresas Sl	The audit and control processes implemented by easyap allow certification of improvements and produce savings of 25% in periods less than 5 months, and it does not require for the client any investment in technology for its automation and improvement	automation of electronic invoice processes	SAP, peoeplesoft, navision, jdedwards, contaplus, easyapIP...	Electronic bill, Immediate Supply of VAT Information (SII), invoice workflow received, Control of Travel Expenses and Representation	Calle Espronceda, 39 - PTL B, Madrid, 28003 , Madrid	www.easyap.com	jose.elose-gui@easyap.com	+34 902327927	Ikea, tiger, dimension data, psa peugeot citroen, room mate hotels, tnt, goodyear, deutschebanck, triumph, alstom, sgel...

9	Gesor Gestion Y Organizacion Para Empresas Sl	Professional services business corporation specialized in management and organization consulting, information technologies, human resources, third sector support, international financing and strategic innovation.	management consultancy and organization, as well as financial and innovation advice. Comprehensive and organizational management consulting, as well as financial and innovation advice. Advice and coverage in the management of all areas related to the most important capital of a company: people.	MIG Management Information Methodology	Integral management and organization consulting, as well as financial advice	Calle Luchana, 4 - 1, Madrid, 28010 , Madrid	www.gesor.es	gesor@grupogesor.es	+34 914441700	Olympus Consulting, Sector 3, canal cv, Y.Innovación, ATM Natura
10	Redecom Soluciones Informaticas Para Empresas Sll	Professional services business corporation specialized in management and organization consulting, information technologies, human resources, third sector support, international financing and strategic innovation.	Develop activities and provide services in the area of telecommunications, information and communication, in particular, can develop activities related to internet	Programming Languages (Microsoft .NET), Databases (Microsoft SQL Server, MySQL), Content Management Server. Framework (2.0) (3.5)	IT maintenance, web design and application development	Calle Ocaña, 41 - 11 D, Madrid, 28047 , Madrid	www.redecom.es	jose-luis.lopez@redecom.es	+34 917172868	drainware, icox, fdi internet and mobile, arm consultores, treehouse...
11	Algi Open Source Solutions Sociedad Limitada.	Odoo is an incredibly powerful and flexible business management software. A great tool for both SMEs and large companies, provided that it is configured with an appropriate strategy.	Algios is a business management software consultancy, ERP, CRM and eCommerce with Odoo (formerly OpenERP)	odoo suite	Sales, CRM, Project Management, Warehouse Stock, Logistics, Manufacturing, Financial Management, Human Resources ...	CALLE ARTUNDUAGA, 2, Basauri, 48970, Vizcaya	https://algios.com/	hola@algios.com	+34 946941346	/
12	European Recycling Platform-erp Sas Sucursal En España	We make recycling and compliance easy for you.	dedicated to an integrated management system authorized for the 10 categories of electrical and electronic equipment and for all battery and accumulator technologies.	/	wee, batteries, packaging, data services, learning center	Calle Raimundo Fernandez Villaverde, 61, Madrid, 28003 , Madrid	www.erp-recycling.org	empresas@erp-recycling.org	+34 918063042	PyG, electrolux, canon
13	Sistemas Informaticos Iberia Sl.	We offer ICT solutions in sectors such as agri-food, graphic arts, construction, repair workshops for vehicles and dealers, textiles, metal finishes and coatings manufacturing, commerce, distribution and franchises and chain stores.	sectorial standard software, specialized erp, technological consultancy	qbs, tpv	Specialized ERP	Calle San Isidro, 55, Local C, 55, San Vicente del Raspeig/Sant Vicent del Raspeig, 03690, Alicante	www.es-system.net	info@es-system.net	+34 965671866	/
14	Pc Com Ingenieria Del Software S.c.v.	Software specialists for food and beverage distributors	Electronic exploitation by third parties	/	erp specific for food and beverage distributors	Calle Rafael Altamira, 2 - 1, Alicante/alacant, 03002 , Alicante	www.pccom.es	pccom@pccom.es	+34 965218314	/

2.3. Portugal

Nr	Company Name	one-line about company	Field of business	Industry 4,0, Technologies	Main products	Address	Website	E-mail	Tel.	References - working with/references - working for
1	Netgocio	Netgócio is a company dedicated to the development of business web solutions using the most innovative technologies. The main goal is the technological evolution of the customer, through the creation of customized tools, which meet your expectations	IT, software, services	Digital Communication	Online stores, internet pages, digital marketing, web applications	Rua Arqueólogo Mário Cardoso, Ed. Olímpicos nº 371 Loja A, B Fermentões 4835-076 Guimarães	netgocio.pt	geral@netgocio.pt	+35 1253519421	Continental, E.leclerc, Fitness Hut, AMI, Pc.clinic, Faccia
2	Bloom Idea	We've been making businesses bloom online since 2006. Ideas that turned into projects and that are now references in their industry.	Digital marketing	Digital Communication	Design, Content production, mobile and web programation, digital marketing, mobile apps, website	Rua Quinta de Cabanas n.˚ 110, 6˚ 4700-003 Braga	bloomidea.com	geral@bloomidea.com	+35 1253043732	BNP Paribas, ERICSSON, Vodafone, NOS, MEO, La Redute, Josefinas, governo de portugal
3	INL - International Iberian Nano-technology Laboratory	At INL – International Iberian Nanotechnology Laboratory scientists and engineers from all over the world work in a highly interdisciplinary environment and strive to make INL become a world-wide hub for the deployment of Nanotechnology addressing society's grand challenges.	Nanotechnology, Research (health, food and environment, renewable energy)	Nanotechnology	Products/services related to research development	Avenida Mestre José Veiga, Braga 4715-330, Portugal	inl.int	francisco.guimaraes@inl.int	+35 1253140112	/
4	PRIMAVERA BSS, Software de gestão, faturação, ERP e POS	Challenge the unknown. Explore possibilities. Overcome barriers. Innovate. Since 1993, these motivations have driven us forward in our search for innovative management solutions that will simplify the life of organisations.	IT, software, services	IT, Digital Communication	Managment solutions, business analytics, logistics, human resources, epayments, etransactions, etc	Edifício PRIMAVERA, Rua Dr. Egídio Guimarães, nº 74 Lamações 4719-006 Braga	pt.primaverabss.com	comercial@primaverabss.com (headquarters Braga)	+35 1253309900	Lanidor, Gran Cruz, Saudaçor, Quinta da Marinha
5	Creative Minds	We are not just a Communication Agency, we do not subcontract "external labor", like a kitchen robot. From the press office to the writing of content, through design and finishing in programming, we transform the raw material into final product, without leaving here.	Digital Communication and marketing	Digital Communication	Communication and marketing consulting, branding and advertising, digital marketing, strategic communication and monitoring, video solutions, books and publishing, health communication division, public relations and events	Rua de Pinto Bessa, 4300-428 Porto	creative-minds.pt/	geral@creative-minds.pt	+35 1225153030	Accenture, BNP Paribas, Whirlpool, Silver Box, Braun, Meliá
6	We are materia	Our approach is simple: proactive ideas, strong partnerships and bold projects. We are a creative agency focused on the success of our clients, we define ourselves as communicators capable of improving the strategies of companies and	Digital Communication and marketing	Digital Communication	Apps, portfolios, design, audiovisual, innovation, marketing solutions	Rua de Santo António, 99, 1º andar, 4800-162 Guimarães	studio.wearemateria.com	ask@wearemateria.com	+35 1253465109	INL on Air, Compal, Friendly Fire, Vitória de Guimarães

		brands through technology, creativity and innovation.								
7	inCentia - Tecnologia de Gestão	Our aim is to be recognized as one of the best Portuguese SME (Small & Medium Enterprises) working in the management technologies sector and therefore contribute to society. We want to add value to our clients' business, fulfilling the expectations of our employees, partners and shareholders as well as our social responsibility.	Information systems for management, marketing, inovation, apps, communication and systems and engineering and product development	IT, Digital Communication	Consultant solutions, business plans, finance restructuring, strategical diagnosis, cloud and mobile solutions, business intelligence, etc	Avenida Padre Júlio Fragata 68, 4710-413 Braga	www.incentea.com	info.pt@incentea.com	+35 1808222808	La Redoute, Science4you, Portway, Cimpor, Zagope
8	F3M - Information Systems	Our mission is to provide TIC solutions, specialized and quality assured, contributing to the improvement and competitiveness of client organizations.	Software, IT, telecomunications, services	IT, Digital Communication	IT infrastrucuture, Telecomunications, software, services, training centre	Edifício F3M Rua de Linhares 4715-435 Braga	www.f3m.pt/pt	contacto@f3m.pt	+35 1253250300	Toshiba, HP, PT Negócios, VMWare
9	Keep Solutions	Keep Solutions is a company that develops advanced solutions for managment and information preservation. We invest in the continuous development of innovative solutions. To support that, we remain active in the production of scientific knowledge while engaging in large-scale R&D projects in cooperation with national and international institutions.	IT, software, services	IT, Security, Digitalization	I&D, digital preservation, migration data, digitalization, ISO 16363 Consultancy	Rua Rosalvo de Almeida, n.º5, 4710-429 Braga	www.keep.pt	info@keep.pt	+35 1253066735	Yucoders, Vieira, a lot of portuguese counties and universities
10	Siemens	Siemens impresses with innovations that make real what matters. The application of a systematic innovation strategy helps us move forward.	Software, IT, services, Cybersecurity, digitalization, intelectual infraestructures	IT, Digital Communication, Security	Automatization, Buildings technology, energy, health and engines	Rua Irmãos Siemens, 2720-093 Amadora	www.siemens.com/pt	internetrequest.pt@siemens.com	+35 1214178000	
11	Bosch	Bosch is one of the most recognizable companies in Portugal. With a strong presence, Bosch exports more than 95% of its production to international markets tand has expanded its research and development activities in hardware and software for different business sector.	Software, hardware, IT, services, Mobility, Car solutions and services, security solutions	IT, Security	Mobility, House and Business and Industry solutions	Avenida Infante D. Henrique, Lote 2e-3e 1800-220 Lisboa	www.bosch.pt	www.bosch.pt/contacto	+35 1808100202	/
12	Silicolife	SilicoLife designs optimized microorganisms and novel pathways for industrial biotechnology applications, based on computational metabolic engineering and synthetic biology approaches.	System Biology, Bioinformatics, Artificial Intelligence, Biology, Text Mining and Metabolic engineering	IT, Artificial Intelligence	System Biology, Bioinformatics, Artificial Intelligence, Biology, Text Mining and Metabolic engineering	Rua do Canastreiro, 15 4715-387 Braga	www.silicolife.com	info@silicolife.com	+35 1253070273	Invista Textiles UK Limited, University College London Department of Bioch, University of Nottinham, European Forest Institute, Syngenta Crop Protection
13	Nokia Corporation	Developing disruptive research for the next phase of human existence	IT, software, services	IT, Intelligence solutions, IoT, Cloud	Managed services, professional services, systems integration, care services, network planning and optimization, network	Edifício Horizonte, Estrada casal do Canas, Alfragide 2720-092 Amadora	www.nokia.com	reception.horizonte@nokia.com	+35 1214242000	/

					implementation, services for public safety					

2.4. Czech Republic

Nr	Company Name	one-liner about company	Field of business	Industry 4.0 Technologies	Main Products	Address	Website	E-Mail	Tel.	References – working with/ References – working for
1	B&R	B&R as a part of the group ABB (ABBN: SIX Swiss Ex) is a pioneering technology leader in power grids, electrification products, industrial automation and robotics and motion, serving customers in utilities, industry and transport & infrastructure globally.	Innovation and new technologies in the industry	/	Automatization - a global center for machine and factory automation	Stránského 39 616 00 BRNO Česká republika	https://www.br-automation.com/cs/	office.cz@br-automation.com	+420 541420311	/
2	Intenmac	INTEMAC focuses on applied research, experimental development and training in engineering manufacturing technologies. We provide expert services and access to modern technologies, as well as actively support cooperation between companies and researchers.	applied research, experimental development and training in engineering manufacturing technologies.	Services and training for manufacturers, distributors and users of manufacturing technologies.	Trainings, consultancy, Production Cell 4.0, research	Blanenská 1288/27, 664 34 Kuřim, Česká republika	http://www.intemac.cz	lahodna@intemac.cz	+420 606097793	Sobriety; Vitkovice Heavy Machinery; SIEMAG TECBERG; Škoda Auto
3	Unicorn	Unicorn is a renowned European company providing the largest information systems and solutions in the area of information and communication technologies. Unicorn focused on a high added value and a competitive edge for our clients in the long term.	information systems and solutions in the area of information and communication technologies	SW solutions - Integration and Enrichment of Data	SW development	Executive Briefing Centre - Classic 7 Jankovcova 1037/49, 170 00 Praha 7 Czech Republic	https://unicorn.com/cz	info@unicorn.com	+420 221400111	T-Mobile CZ; BIOPHARM; ČEZ; Škoda Auto; ČEPS a.s.; Lagardere; NN Insurance and Pension Company; CCS; Pražská plynárenská a.s.; Sberbank; Bristol Group
4	Robix	COMAU is the world's leading manufacturer of automated systems and integrated devices, processes and services that increase efficiency with ever lower total costs.	automated systems and integrated devices, processes, and services that increase efficiency with ever lower total costs.	Advance robotics	The portfolio includes industrial robots, auto-controlled trucks, collaborative robots, and other tools to help your factory work efficiently.	Kbel 26, 294 71 Benátky nad Jizerou Česká republika	https://www.robix.cz/	valdemar.mokry@robix.cz	+420 732114561	/
5	ABB s.r.o.	ABB is the world's leading energy and automation company. It enables industry and distribution customers to improve their performance while reducing the impact of their activities on the environment.	Innovation and new technologies in the industry	/	A comprehensive portfolio of industrial technologies for customers in the energy, industrial, transport and infrastructure sectors.	BB Centrum budova Delta IIVyskočilova 1561/4a,140 00 Praha 4 Česká republika	https://new.abb.com/cz	kontakt@cz.abb.com	+420 800312222	/

6	ANASOFT, s.r.o.	ANASOFT is a software company with over 25 years of tradition, who bring innovations, know-how, creativity and news from our IT solutions. Also, they keep track of current trends and we create ourselves.	software solutions	SW EMANS	Smart Industry EMANS, built on the Industry 4.0 principles, is the concept of an "operating system" for the production of modern businesses. Its extensive functionality and features make it possible to efficiently plan, manage, monitor and evaluate individual operations and processes in production, logistics, maintenance and quality control. EMANS secures an increase in production potential, its quality and expanding production flexibility.	Hrnčířská 2985, 470 01 Česká Lípa, Česká republika	https://www.anasoft.com/emans/cz/	sales@anasoft.com	+421 232234372	BNP Paribas Personal Finance; Deutsche Post; Agrana; OmnicomMediaGroup;HBPO; Schmitz Cargobull; Business lease; GreenWay; GAD
7	Siemens	Siemens is one of the largest technology companies in the Czech Republic and for more than 125 years it is an integral part of the Czech industry and a guarantee of innovative technologies. Siemens portfolio covers solutions for industry, energy, transport and public infrastructure, building technology and healthcare. Czech Siemens is a pioneer in Industry 4.0 and Smart Cities, which brings customers comprehensive digital products and services.	Innovation and new technologies in the industry	automation technology; advanced robotics; cyber-physical systems; ICT	Industrial automation; Building technology; Drive technology; Energy; health care; Mobility; financial solutions	Siemens, s.r.o., Siemensova 1, 155 00 Praha 13, Česká republika	https://www.siemens.com/cz/cz/home.html	siemens.cz@siemens.com	+420 800909090	/
8	FOXON s.r.o.	Czech company which has been delivering solutions in the field of industrial automation since 2006. They specialise in spare part sales and repairs and industrial network diagnostics. In addition, the company provides specialised training and Industry 4.0 solutions.	industrial automation	Smart projects for iot and industry 4.0, e.g. FIOT projects deal with the whole maintenance ecosystem including data collection, condition monitoring (CM), smart maintenance, predictive maintenance and augmented reality.	A Comprehensive Portfolio of Services in the Field of Industrial Automation; industrial automation of spare parts sales and repairs	Česká 615/25; 463 12 Liberec 25 , Česká republika	https://www.foxon.cz/index.php	/	+420 488588746	PTC; HMS; Procentec; Delta Logis; Unis; Kyland; Monnit; Mitshubishi; Softlink; Tsubis; Schildknecht, ICO; Acksys; Euroconnection; Kollewin; GDM; Nautilus Infotech
9	COMPAS automatizace, spol. s.r.o.	COMPAS automatizace, spol. s r.o was founded in 1990 and gradually became a leading Czech engineering and manufacturing company for automation of production technologies (technological processes, machines, lines and equipment) and manufacturing information systems of enterprises (MES).	Innovation and new technologies in the industry	E.g. The principle of deep system integration of production functions, contained in current MES, ERP and sophisticated control systems.	Customized solutions for the digitization of manufacturing processes, based on the integration of enterprise systems ERP - MES - technology automation with goals similar to Industry 4.0, or partial solutions in our specialties	Nádražní 610/26, 59101 Žďár nad Sázavou, Česká republika	https://www.compas.cz/	info@compas.cz	+420 567567111	Continental; Federal Mogul; TRCZ; Biotika; Iveco; HBM Pharma; Vaillant; Nestle; Pepsico, Synthesia, Federal Mogul; Zentiva, Teva

10	Bosch Rexroth, spol. s r.o.	As a global partner, Bosch Rexroth promotes industry-leading technology services and unique expertise throughout the world. Above all, they facilitate the control of automation systems using different technologies through predefined functions and complex engineering solutions.	Innovation and new technologies in the industry	Smart Factory Demonstrator, consisting of several modules that show the benefits and potential of Industry 4.0: for example unlimited data exchange between individual production modules and many others.	Bosch Rexroth works closely with the German Research Center for Artificial Intelligence (DFKI) in Kaiserslautern; wide area of products mainly connected with automation systems using different technologies.	Těžební 1238/2, 627 00 Brno, Česká republika	https://www.boschrexroth.com/cs/cz/home/index	info@boschrexroth.cz	+420 548126111	/
11	KFB Control s.r.o.	Since 1999 we have been working on projects in the field of automation of technological processes, deployment of information technology resources and design and installation of attendance and access systems.	software solutions	/	MatrikonOPC offers software solutions for communication between different devices based on OPC specifications DA, HDA and A & E. OPC communication is generally accepted standard and is independent of the equipment or its suppliers.	Stará Vajnorská 37, 831 04 Bratislava, Slovensko	http://matrikonopc.cz/	office@kfb.sk	+421 232161700	/

3. Summary

The aim of the questionnaires was to find applicable conclusions and recommendations for further project phases from the collected data and information

The aim of the research was to create an overview of companies, which are suppliers of Industry 4.0 technologies in those countries.

At the beginning of this report, the following questions were identified, which were to be answered using the questionnaire.

- Do they (manufacturing companies) know about Industry 4.0?
- If yes – how much and how big is a gap between the hierarchy in the company – top management / middle management / senior staff
- What kind of information is relevant for companies?

As stated under the points 1.1.1., 1.1.2., 1.2.1. and 1.2.2. one can see, that knowledge about Industry 4.0 technologies is available, but that further knowledge can be built up. This is necessary because the thematic area is becoming more and more relevant in the future. Above all, research reveals the potential of the market and the different technologies offered by companies in different countries.

With regard to the second question (gap between hierarchy in the Company), no information could be collected within the questionnaire. In the questionnaire mainly persons answered with university degree (p. 38; p. 68) and therefore no comparison can be made between the different hierarchies within companies. This indicates that an interest in this topic goes hand in hand with a higher qualification. In order to ensure a complete comparability of the results, we interviewed several different persons in different companies.

We prepared the third question in such a way that both the thematic areas were defined by the division into the different technological areas of Industry 4.0 and on the other hand the connection to the learning material was established so that we can incorporate the needs and experiences of the respondents for the further development of the project.

The main results of the questionnaires are (total conclusions):

1. Improvement of knowhow of the employees needs to be established
2. Methods must be changed and/or adapted to guarantee successful learning environments
3. Bigger relevance on Industry 4.0 Technologies

4. Need of creation of appropriate learning environments and materials
5. Changed connection between Industry 4.0 and the labour market
6. Establishment and the advantages of learning management systems and other learning technologies
7. Knowledge about Industry 4.0 has an impact on employees
8. Knowledge transfer for employees can be improved
9. Need to improve customers knowledge of Industry 4.0 Technologies
10. Knowledge transfer for customers can be enhanced
11. The general public must be involved

Regarding the research (Chapter 2), companies offer Industry 4.0 technologies in all technological areas specified in IO1 and also in the questionnaire. It is therefore important that the public, employees and customers are aware of this. That is why it is so important to have an overview of the service structure of existing companies so that we can derive requirements for the teaching materials developed later in the project.

"Education is certainly one of the central subjects in the context of Industry 4. 0 and digitalization and plays a key role in successful digital transformation."[1]

The team from the Erasmus+ project "Intro 4.0" will use these findings to design the learning material that will be created in the future so that customers, employees and the general public can and want to use these documents.

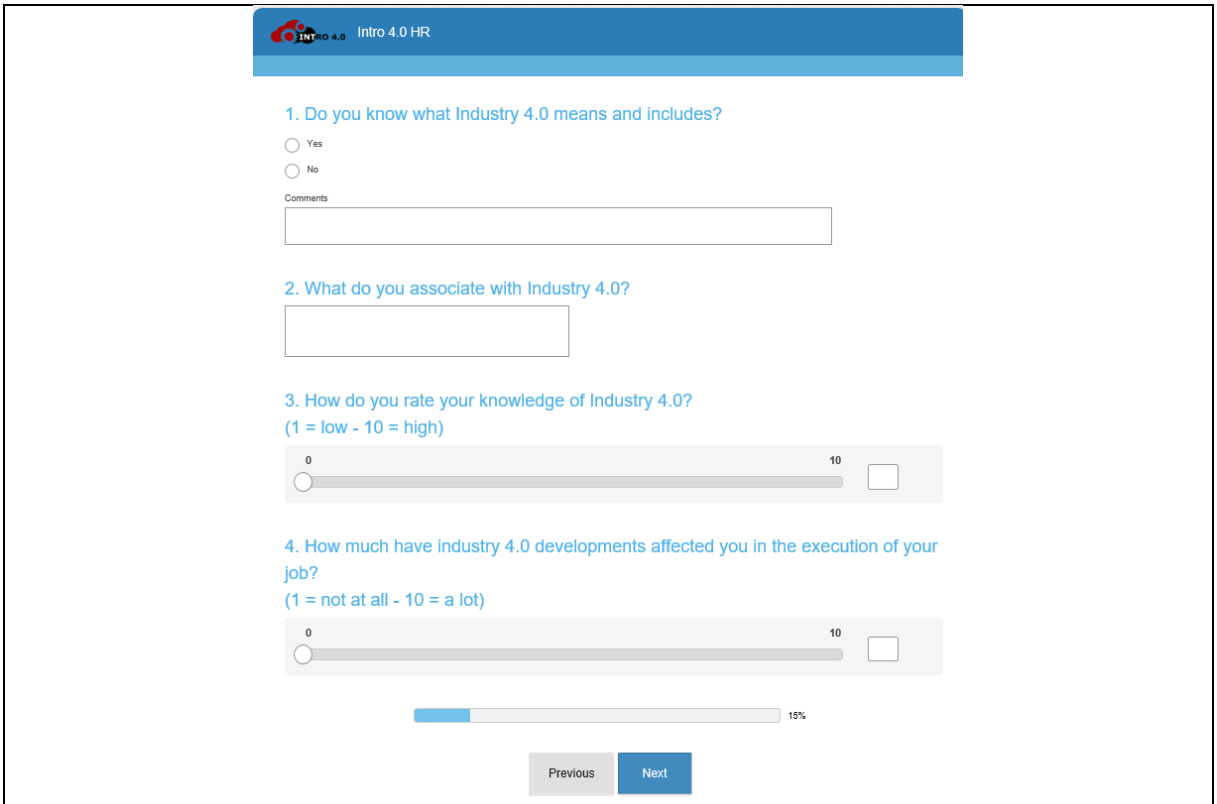
4. List of figures

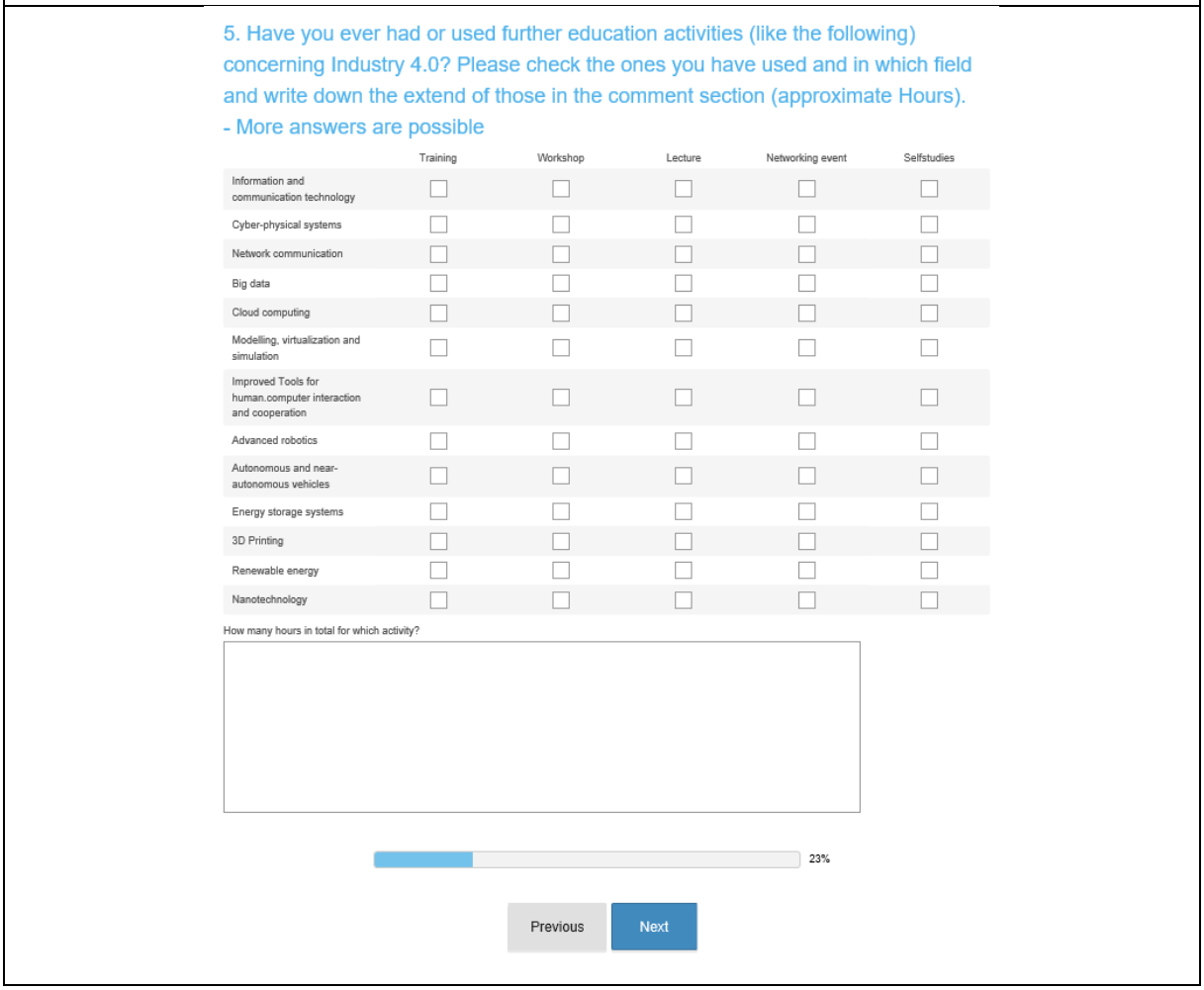
[1] Verein Industry 4.0 Österreich (2017): Ergebnispapier „Qualifikation und Kompetenzen in der Industrie 4.0". S. 9

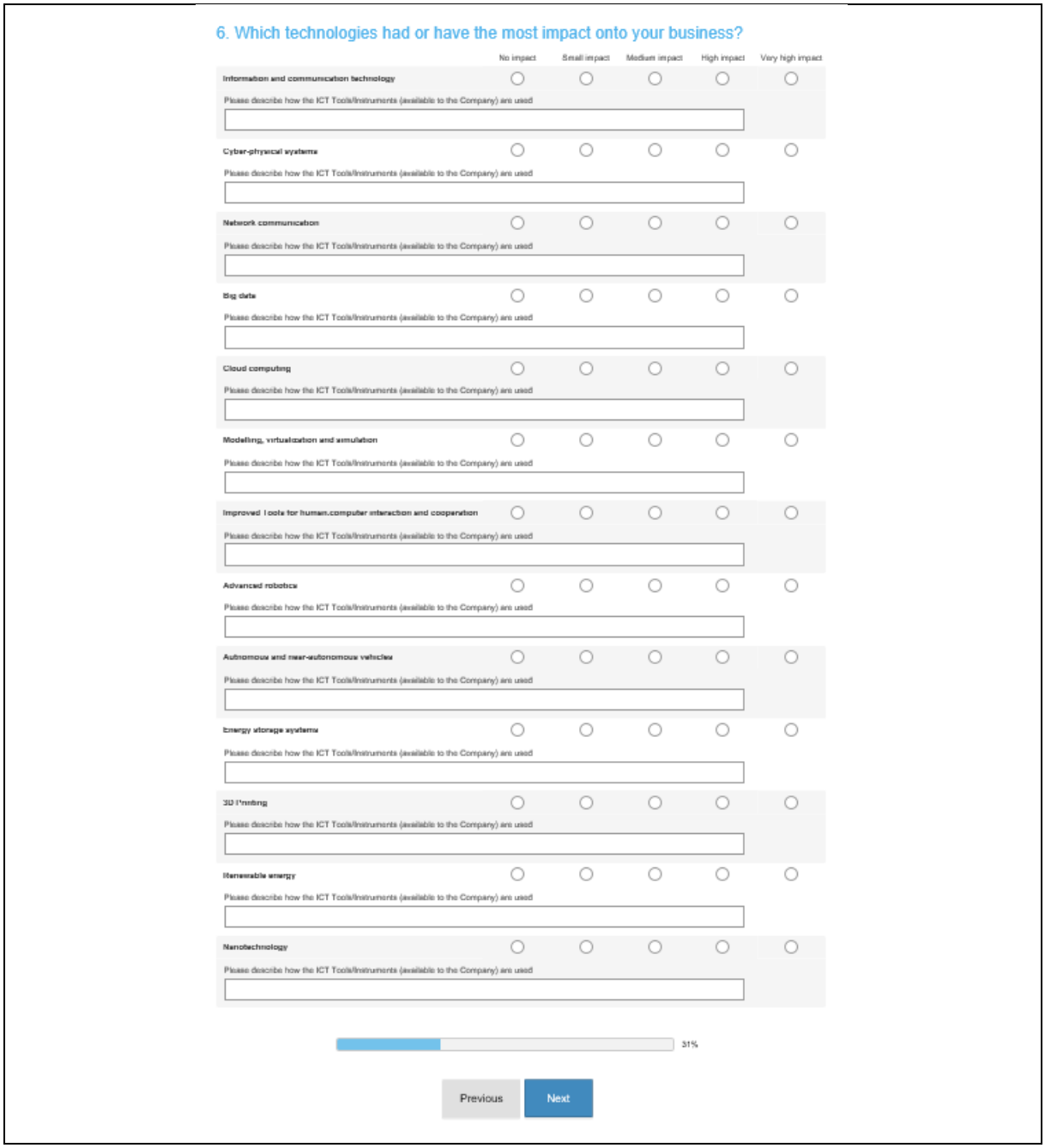
5. Annex

In this section you will find the questionnaires which have been developed for this use only. After we made the framework, we created an online survey through surveymonkey.com. Following there are the question stated which we asked on the one hand the manufacturing companies and on the other hand the suppliers of Industry 4.0 technologies.

4.1. Questionnaire manufacturing companies (HR)


Intro 4.0 HR
1. Do you know what Industry 4.0 means and includes?
Yes
No
Comments
2. What do you associate with Industry 4.0?
3. How do you rate your knowledge of Industry 4.0?
(1 = low - 10 = high)
0
10
4. How much have industry 4.0 developments affected you in the execution of your job?
(1 = not at all - 10 = a lot)
0
10
15%
Previous
Next


5. Have you ever had or used further education activities (like the following) concerning Industry 4.0? Please check the ones you have used and in which field and write down the extend of those in the comment section (approximate Hours).
- More answers are possible
Training
Workshop
Lecture
Networking event
Selfstudies
Information and communication technology
Cyber-physical systems
Network communication
Big data
Cloud computing
Modelling, virtualization and simulation
Improved Tools for human.computer interaction and cooperation
Advanced robotics
Autonomous and near-autonomous vehicles
Energy storage systems
3D Printing
Renewable energy
Nanotechnology
How many hours in total for which activity?
23%
Previous
Next

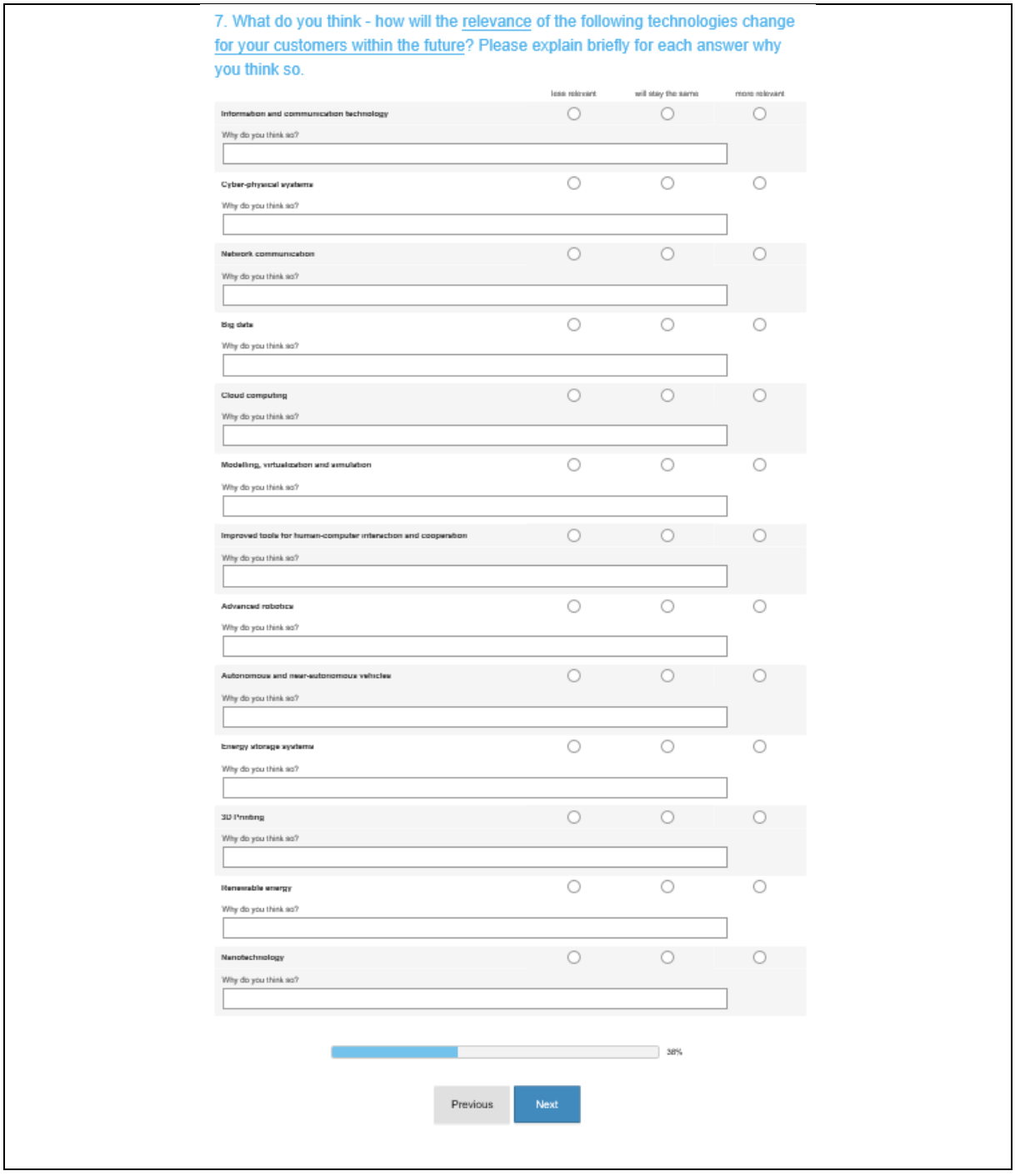


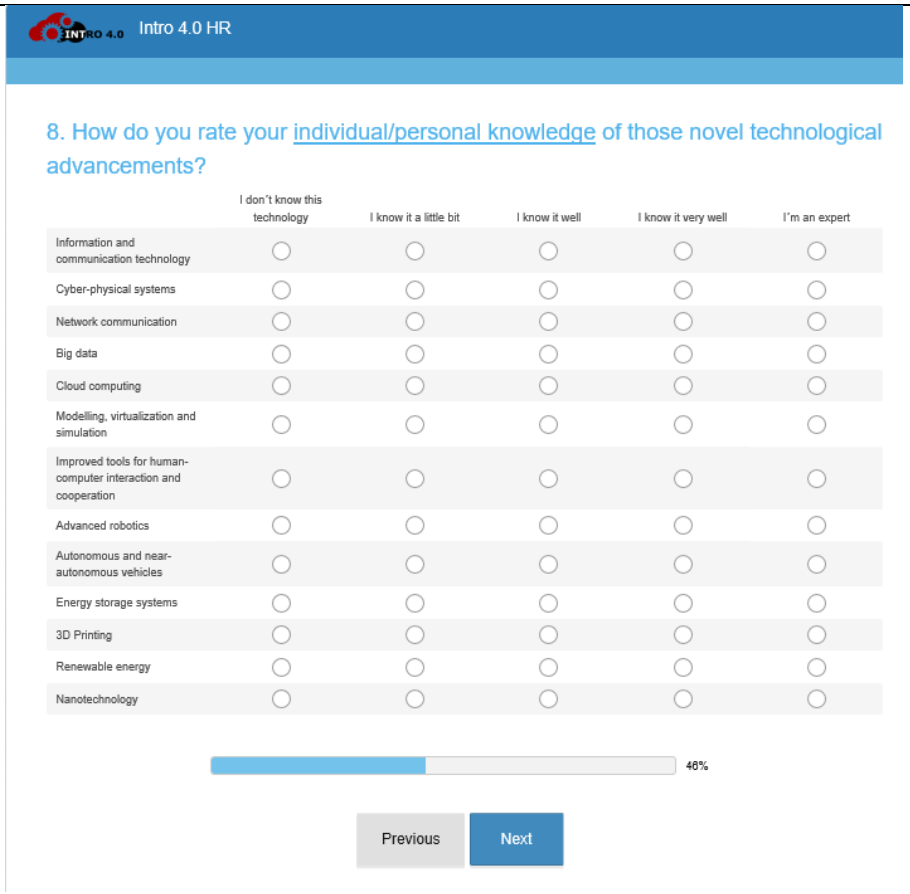
6. Which technologies had or have the most impact onto your business?

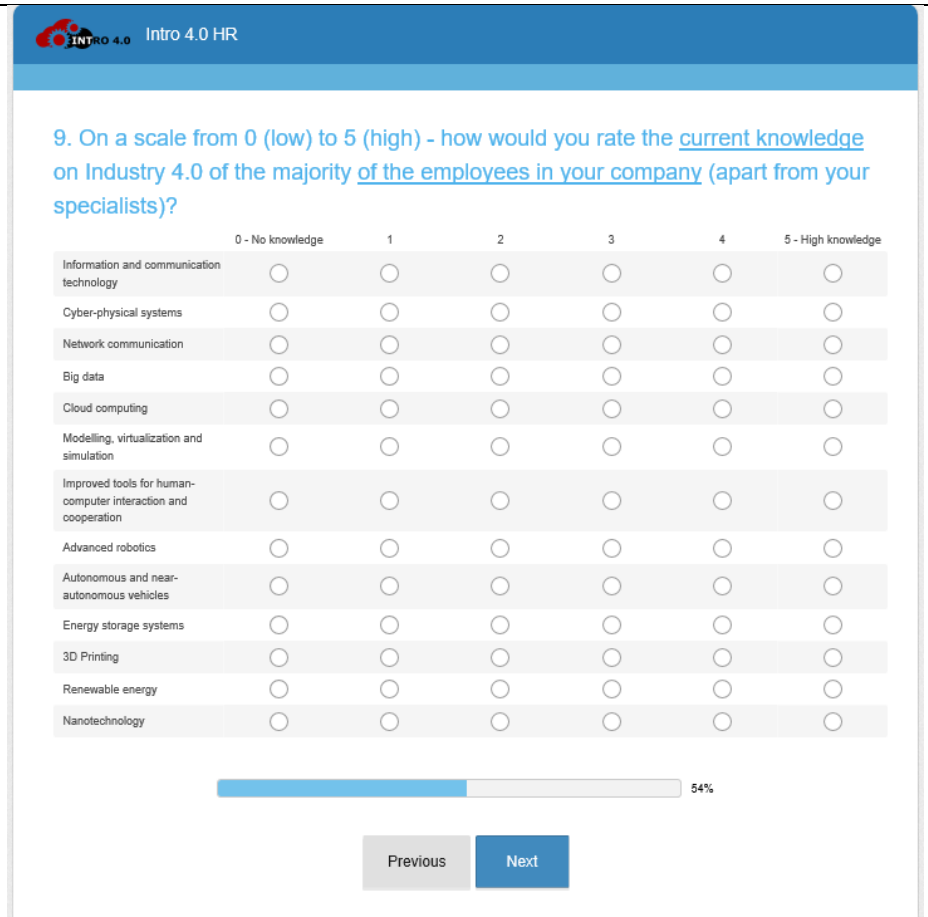
	No impact	Small impact	Medium impact	High impact	Very high impact
Information and communication technology	○	○	○	○	○
Please describe how the ICT Tools/Instruments (available to the Company) are used					
Cyber-physical systems	○	○	○	○	○
Please describe how the ICT Tools/Instruments (available to the Company) are used					
Network communication	○	○	○	○	○
Please describe how the ICT Tools/Instruments (available to the Company) are used					
Big data	○	○	○	○	○
Please describe how the ICT Tools/Instruments (available to the Company) are used					
Cloud computing	○	○	○	○	○
Please describe how the ICT Tools/Instruments (available to the Company) are used					
Modelling, virtualization and simulation	○	○	○	○	○
Please describe how the ICT Tools/Instruments (available to the Company) are used					
Improved tools for human-computer interaction and cooperation	○	○	○	○	○
Please describe how the ICT Tools/Instruments (available to the Company) are used					
Advanced robotics	○	○	○	○	○
Please describe how the ICT Tools/Instruments (available to the Company) are used					
Autnomous and near-autonomous vehicles	○	○	○	○	○
Please describe how the ICT Tools/Instruments (available to the Company) are used					
Energy storage systems	○	○	○	○	○
Please describe how the ICT Tools/Instruments (available to the Company) are used					
3D Printing	○	○	○	○	○
Please describe how the ICT Tools/Instruments (available to the Company) are used					
Renewable energy	○	○	○	○	○
Please describe how the ICT Tools/Instruments (available to the Company) are used					
Nanotechnology	○	○	○	○	○
Please describe how the ICT Tools/Instruments (available to the Company) are used					

31%

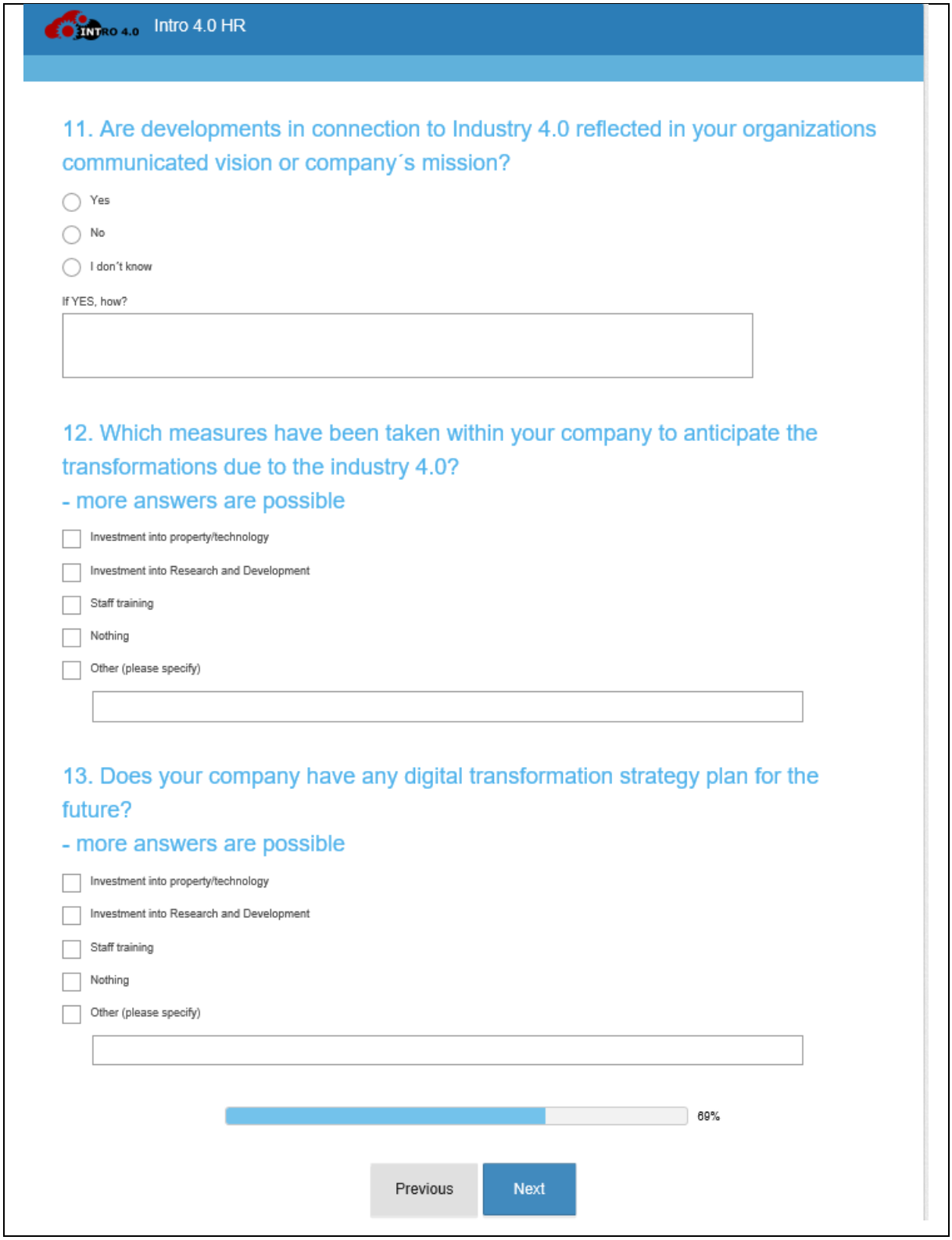
Previous Next

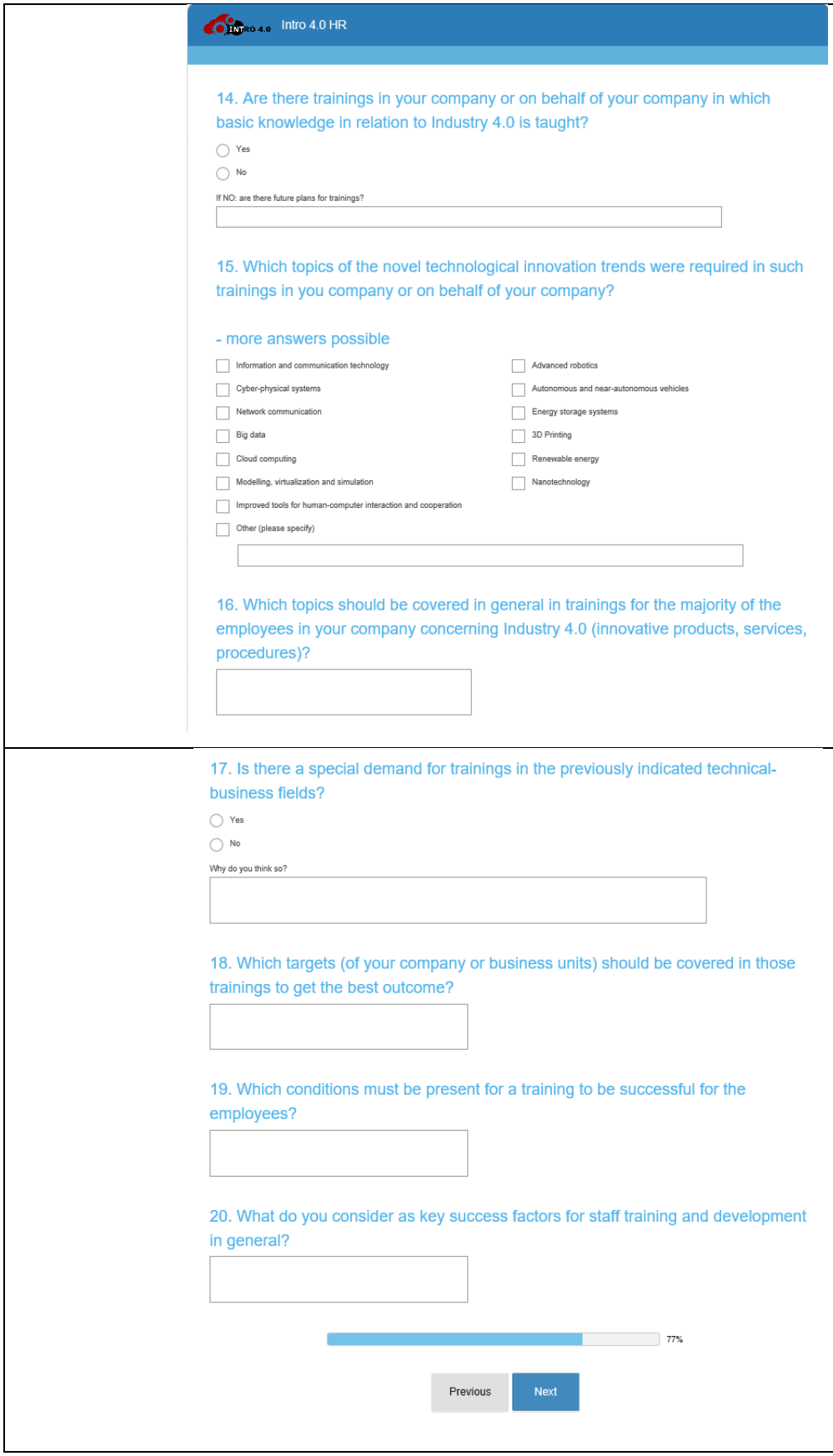

7. What do you think - how will the relevance of the following technologies change for your customers within the future? Please explain briefly for each answer why you think so.
less relevant
will stay the same
more relevant
Information and communication technology
Why do you think so?
Cyber-physical systems
Why do you think so?
Network communication
Why do you think so?
Big data
Why do you think so?
Cloud computing
Why do you think so?
Modelling, virtualization and simulation
Why do you think so?
Improved tools for human-computer interaction and cooperation
Why do you think so?
Advanced robotics
Why do you think so?
Autonomous and near-autonomous vehicles
Why do you think so?
Energy storage systems
Why do you think so?
3D Printing
Why do you think so?
Renewable energy
Why do you think so?
Nanotechnology
Why do you think so?
38%
Previous
Next


Intro 4.0 HR
8. How do you rate your individual/personal knowledge of those novel technological advancements?
I don't know this technology
I know it a little bit
I know it well
I know it very well
I'm an expert
Information and communication technology
Cyber-physical systems
Network communication
Big data
Cloud computing
Modelling, virtualization and simulation
Improved tools for human-computer interaction and cooperation
Advanced robotics
Autonomous and near-autonomous vehicles
Energy storage systems
3D Printing
Renewable energy
Nanotechnology
46%
Previous
Next


Intro 4.0 HR
9. On a scale from 0 (low) to 5 (high) - how would you rate the current knowledge on Industry 4.0 of the majority of the employees in your company (apart from your specialists)?
0 - No knowledge
1
2
3
4
5 - High knowledge
Information and communication technology
Cyber-physical systems
Network communication
Big data
Cloud computing
Modelling, virtualization and simulation
Improved tools for human-computer interaction and cooperation
Advanced robotics
Autonomous and near-autonomous vehicles
Energy storage systems
3D Printing
Renewable energy
Nanotechnology
54%
Previous
Next


Intro 4.0 HR
10. On a scale from 0 (not important) to 5 (very important) - how important do you consider having a basic knowledge of the following skills for the majority of the employees in your company (apart from your specialists)?
0 - not important
1
2
3
4
5 - very important
Information and communication technology
Cyber-physical systems
Network communication
Big data
Cloud computing
Modelling, virtualization and simulation
Improved tools for human-computer interaction and cooperation
Advanced robotics
Autonomous and near-autonomous vehicles
Energy storage systems
3D Printing
Renewable energy
Nanotechnology
62%
Previous
Next


Intro 4.0 HR
11. Are developments in connection to Industry 4.0 reflected in your organizations communicated vision or company´s mission?
Yes
No
I don´t know
If YES, how?
12. Which measures have been taken within your company to anticipate the transformations due to the industry 4.0?
- more answers are possible
Investment into property/technology
Investment into Research and Development
Staff training
Nothing
Other (please specify)
13. Does your company have any digital transformation strategy plan for the future?
- more answers are possible
Investment into property/technology
Investment into Research and Development
Staff training
Nothing
Other (please specify)
69%
Previous
Next



Intro 4.0 HR

14. Are there trainings in your company or on behalf of your company in which basic knowledge in relation to Industry 4.0 is taught?

- Yes
- No

If NO: are there future plans for trainings?

15. Which topics of the novel technological innovation trends were required in such trainings in you company or on behalf of your company?

- more answers possible

- Information and communication technology
- Cyber-physical systems
- Network communication
- Big data
- Cloud computing
- Modelling, virtualization and simulation
- Improved tools for human-computer interaction and cooperation
- Other (please specify)
- Advanced robotics
- Autonomous and near-autonomous vehicles
- Energy storage systems
- 3D Printing
- Renewable energy
- Nanotechnology

16. Which topics should be covered in general in trainings for the majority of the employees in your company concerning Industry 4.0 (innovative products, services, procedures)?

17. Is there a special demand for trainings in the previously indicated technical-business fields?

- Yes
- No

Why do you think so?

18. Which targets (of your company or business units) should be covered in those trainings to get the best outcome?

19. Which conditions must be present for a training to be successful for the employees?

20. What do you consider as key success factors for staff training and development in general?

77%

Previous Next

21. Does your company use a Learning Management System?

- ◯ Yes
- ◯ No
- ◯ I don't know

If YES: please specify which one

22. Does your company use one of the following Learning Technologies? And how would you rate the future relevance of those technologies for your company?

	Yes/No	What is the future relevance for the company? (1 = low; 5 = high)
Adaptive Learning Technologies *(adapting the course plan to the individual needs of the student)*	YES	4
Microlearning Technologies *(disaggregate content into small parts or units)*	YES	3
Mobile Learning *(use of mobile technology to enable learning anytime and anywhere)*	NO	3
Learning management system *(software environment that enables the management and delivery of learning content and resource to students, f.ex. Moodle, Sakai, Segue, Blackboard, eCollege,..)*	NO	3
Virtual/Remote Lab *(website or software for interactive learning/ecperiments based on the simulation of a real problem or phenomena)*	YES	1
Mobile devices/tablets educational apps	YES	1

Please explain and specify the Learning Technologies you are using in your company

23. If your company is using some of the previous presented Learning Technologies - what is your personal/individual experience with them? *(f.ex. positive/negativ; like/dislike; useful/not useful; time-consuming; etc..)* Please provide a view words of your associaton about each Learning Technology.

Adaptive Learning Technologies

Microlearning Technologies

Mobile Learning

Learning Management System

Virtual/remote Lab

Mobile devices/tablets educational apps

85%

Previous Next

24. What is the name of the company you are working at the moment?

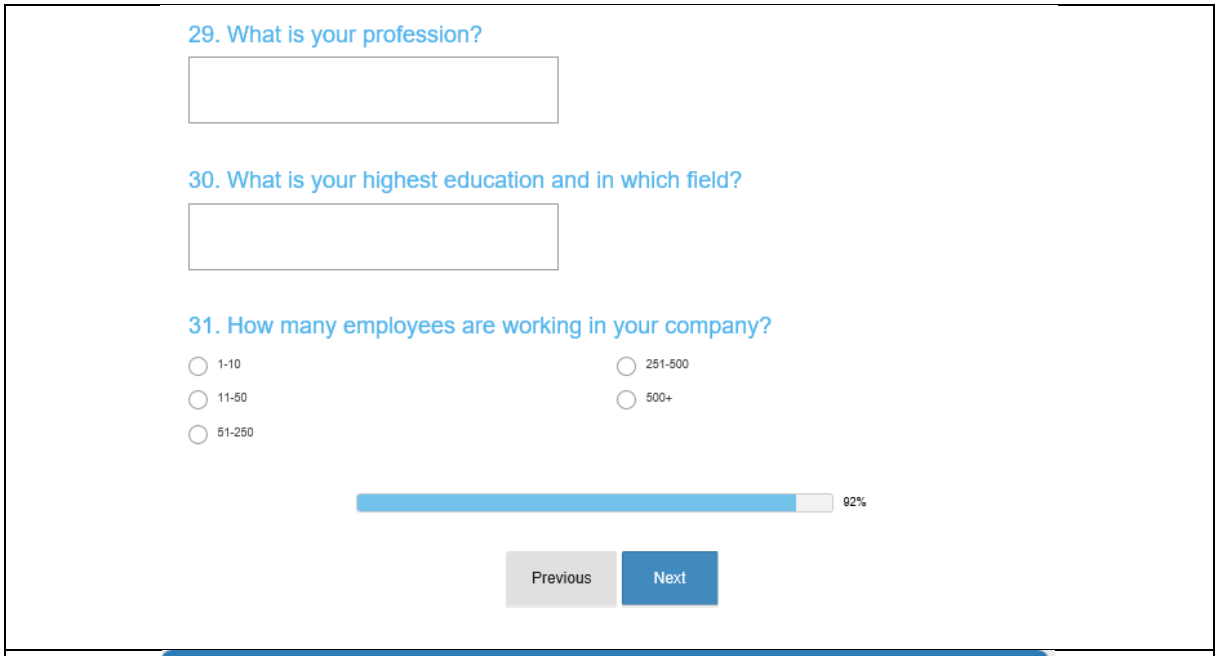
25. What is your current position in the company?

26. To which industry is your company assigned (major field of business?

27. In which country is your company located?

- Austria
- Spain
- Portugal
- Czech Republic
- Other (please specify)

28. In which department of the company are you working at?


29. What is your profession?
30. What is your highest education and in which field?
31. How many employees are working in your company?
1-10
11-50
51-250
251-500
500+
92%
Previous
Next


Intro 4.0 HR
Thank you very much for your participation!
If you would like more information about the project please visit the website: http://www.intro40.eu/
If you are interested in the results of the survey, please enter your email address in the field below and we will contact you after the survey has been completed.
Please click below the DONE Button and all your answers will be saved.
32. E-Mail
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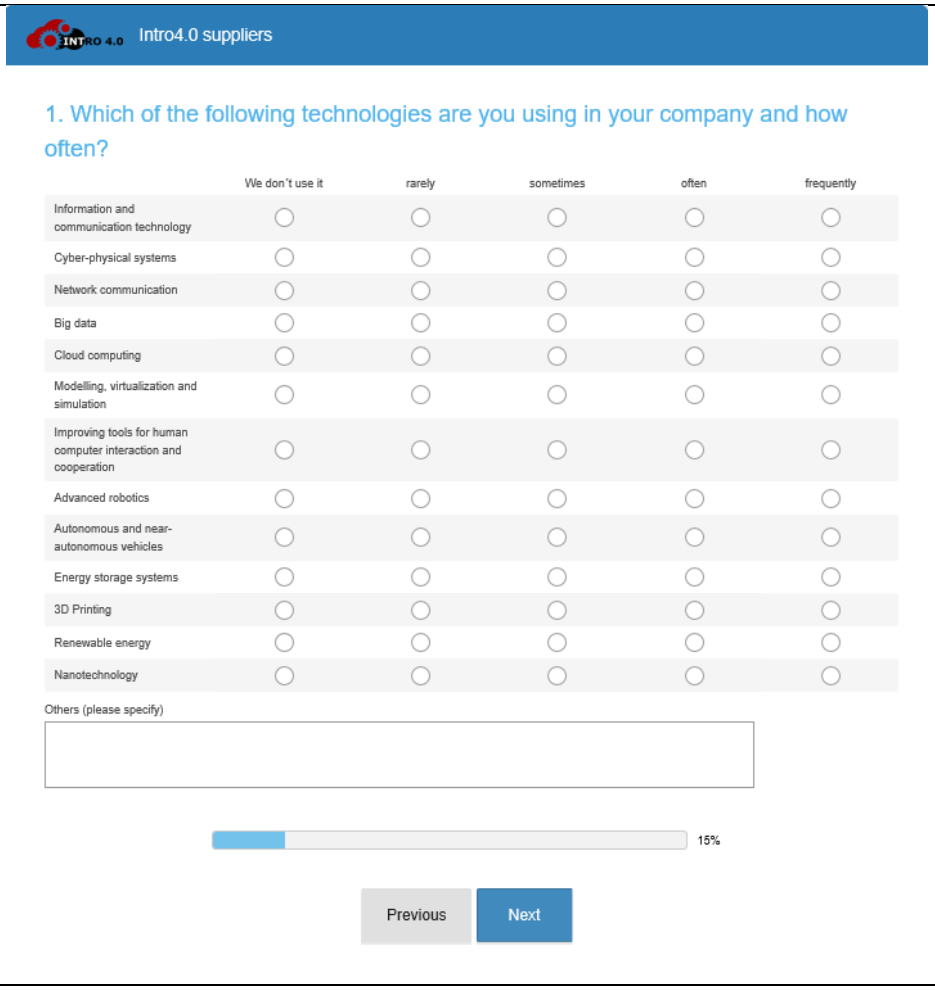
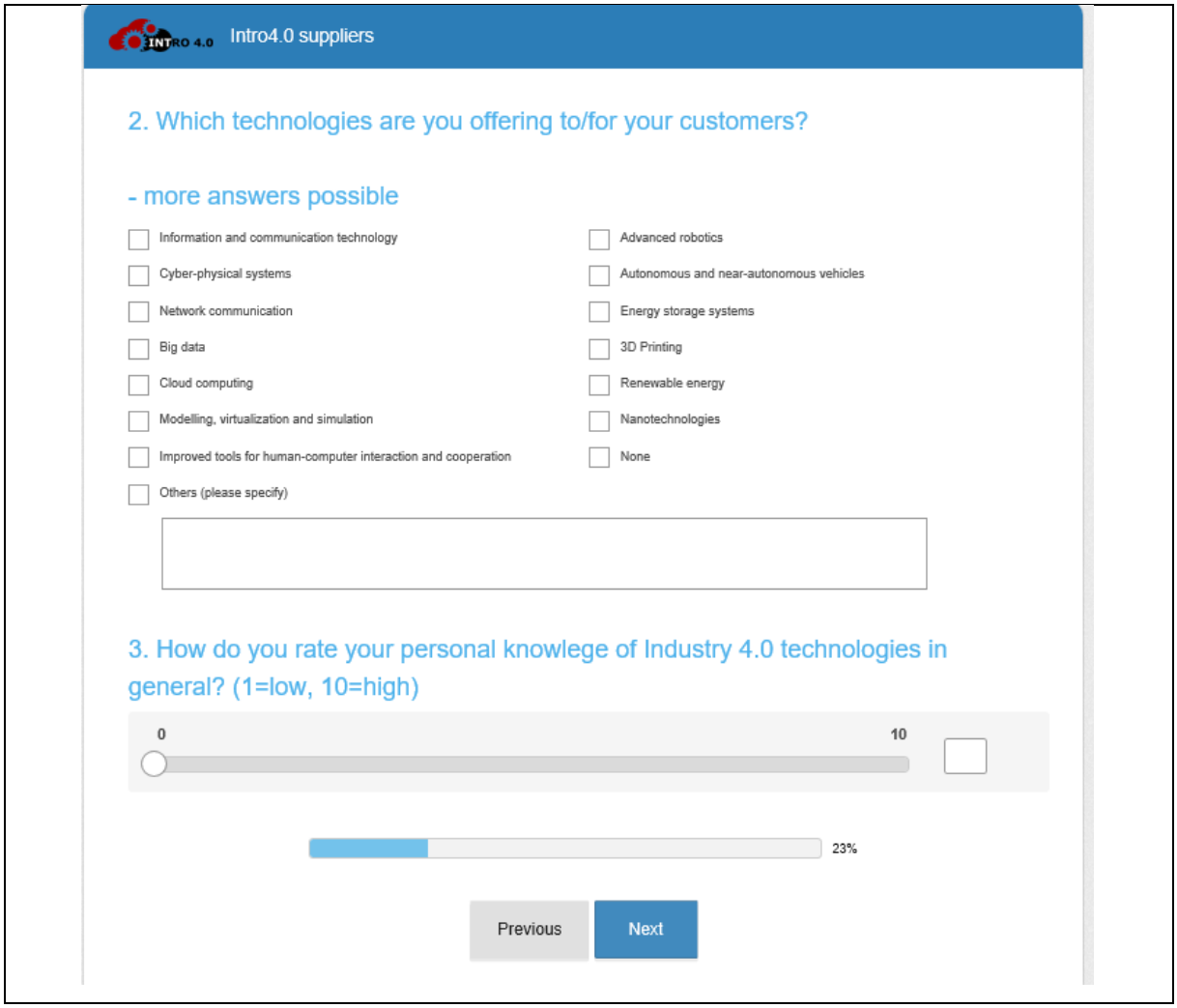
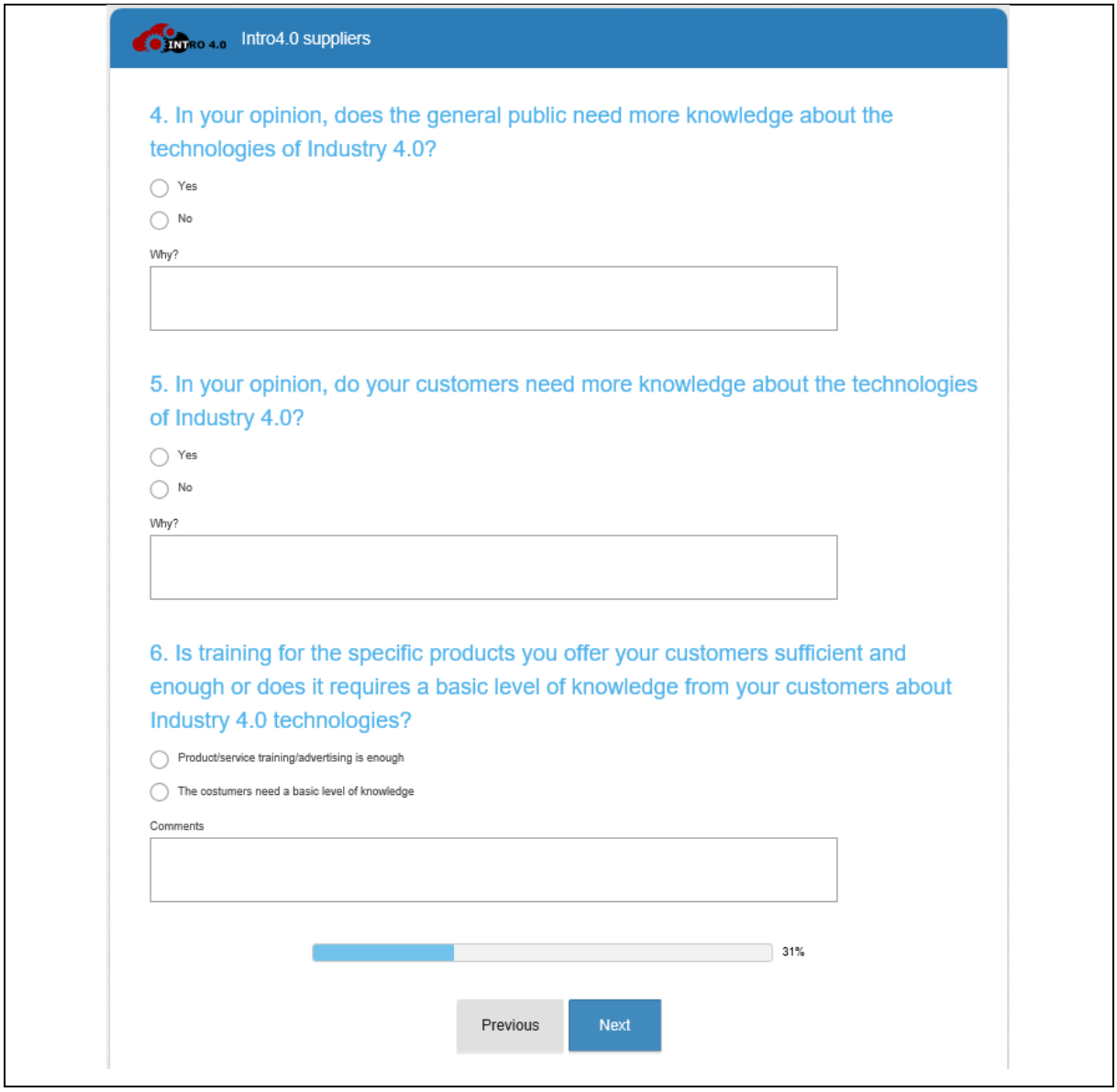
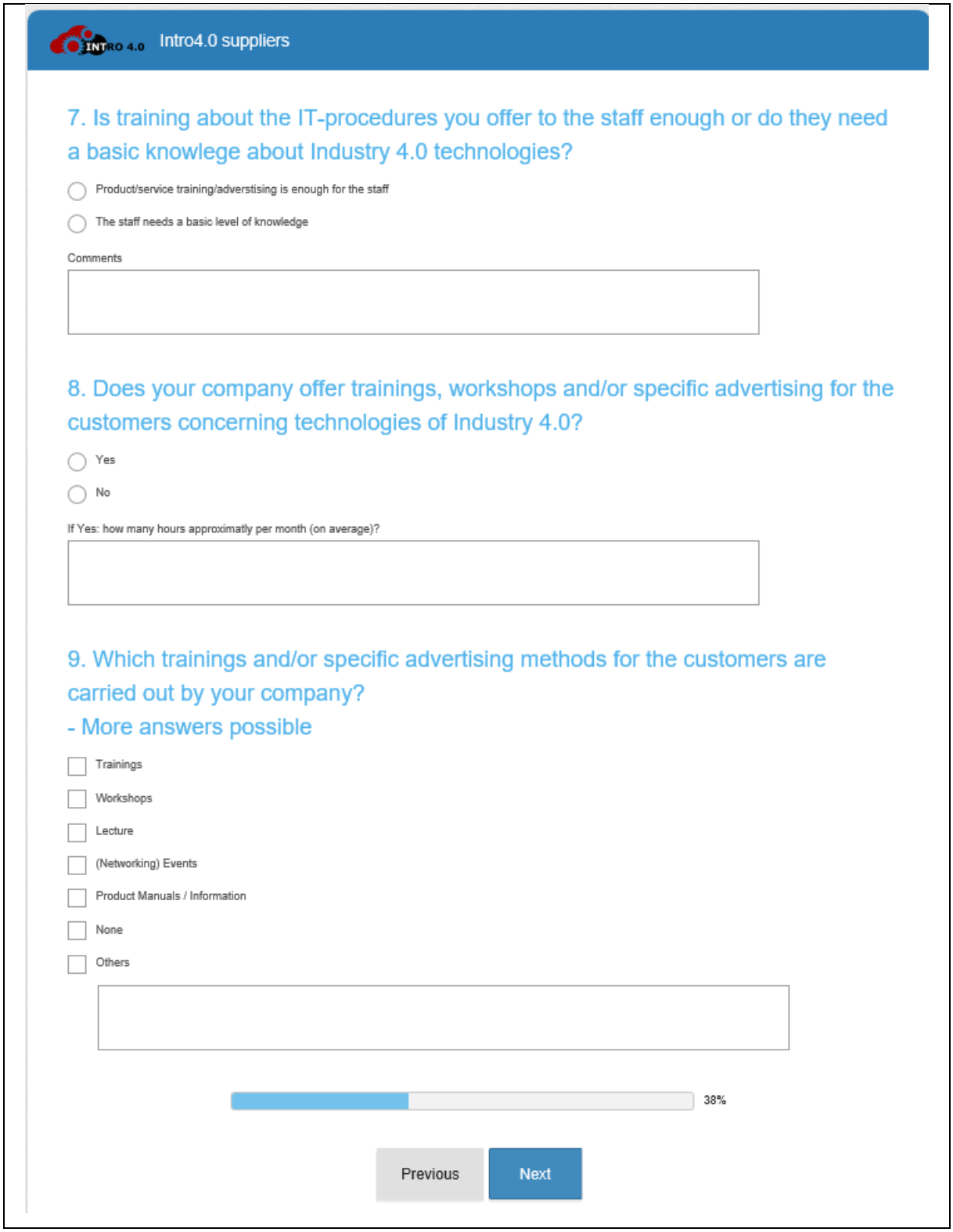
100%
Previous
DONE

3.2. Questionnaire suppliers




Intro4.0 suppliers
2. Which technologies are you offering to/for your customers?
- more answers possible
Information and communication technology
Cyber-physical systems
Network communication
Big data
Cloud computing
Modelling, virtualization and simulation
Improved tools for human-computer interaction and cooperation
Others (please specify)
Advanced robotics
Autonomous and near-autonomous vehicles
Energy storage systems
3D Printing
Renewable energy
Nanotechnologies
None
3. How do you rate your personal knowlege of Industry 4.0 technologies in general? (1=low, 10=high)
0
10
23%
Previous
Next


Intro4.0 suppliers
4. In your opinion, does the general public need more knowledge about the technologies of Industry 4.0?
Yes
No
Why?
5. In your opinion, do your customers need more knowledge about the technologies of Industry 4.0?
Yes
No
Why?
6. Is training for the specific products you offer your customers sufficient and enough or does it requires a basic level of knowledge from your customers about Industry 4.0 technologies?
Product/service training/advertising is enough
The costumers need a basic level of knowledge
Comments
31%
Previous
Next



Intro4.0 suppliers

7. Is training about the IT-procedures you offer to the staff enough or do they need a basic knowlege about Industry 4.0 technologies?

- ○ Product/service training/adverstising is enough for the staff
- ○ The staff needs a basic level of knowledge

Comments

8. Does your company offer trainings, workshops and/or specific advertising for the customers concerning technologies of Industry 4.0?

- ○ Yes
- ○ No

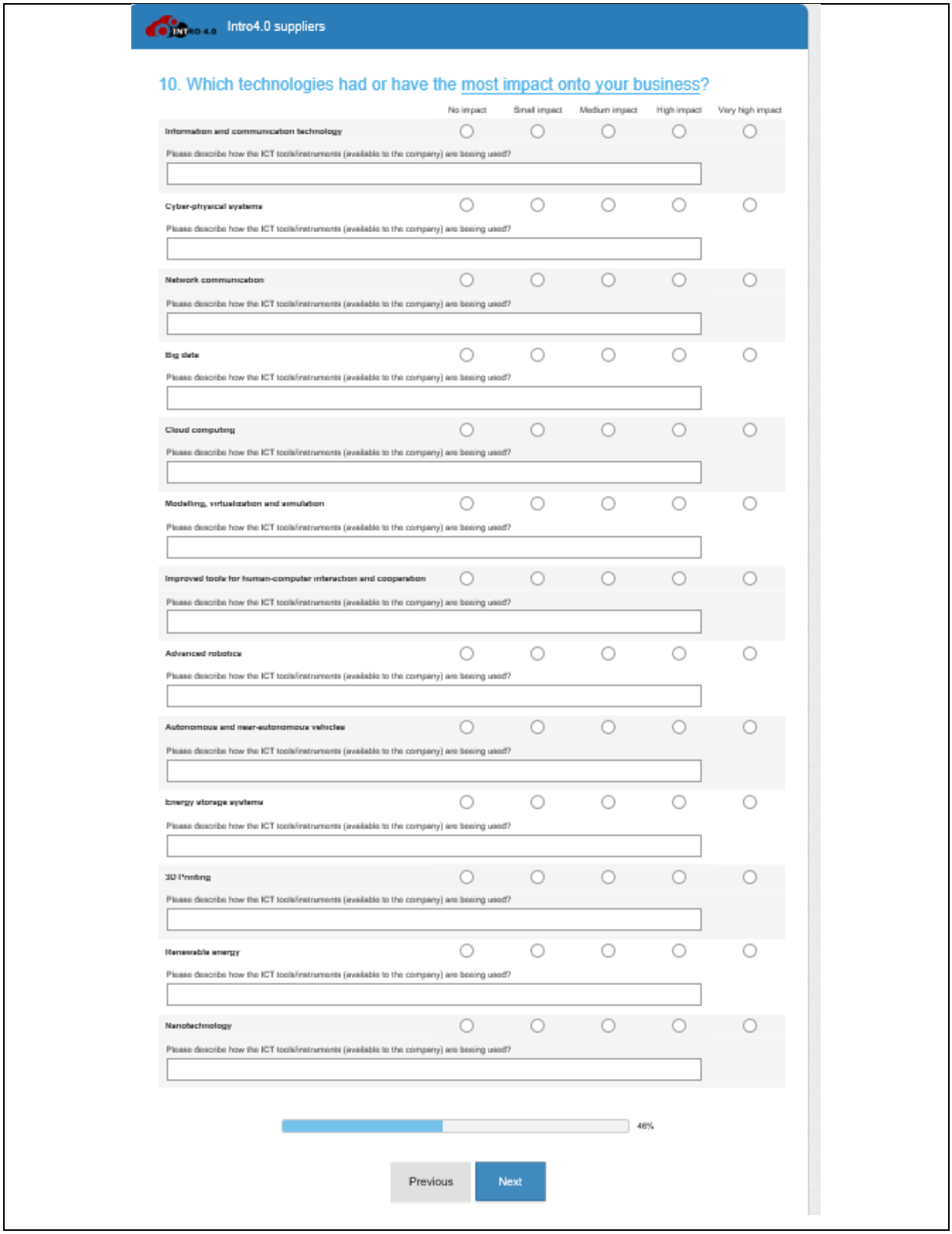
If Yes: how many hours approximatly per month (on average)?

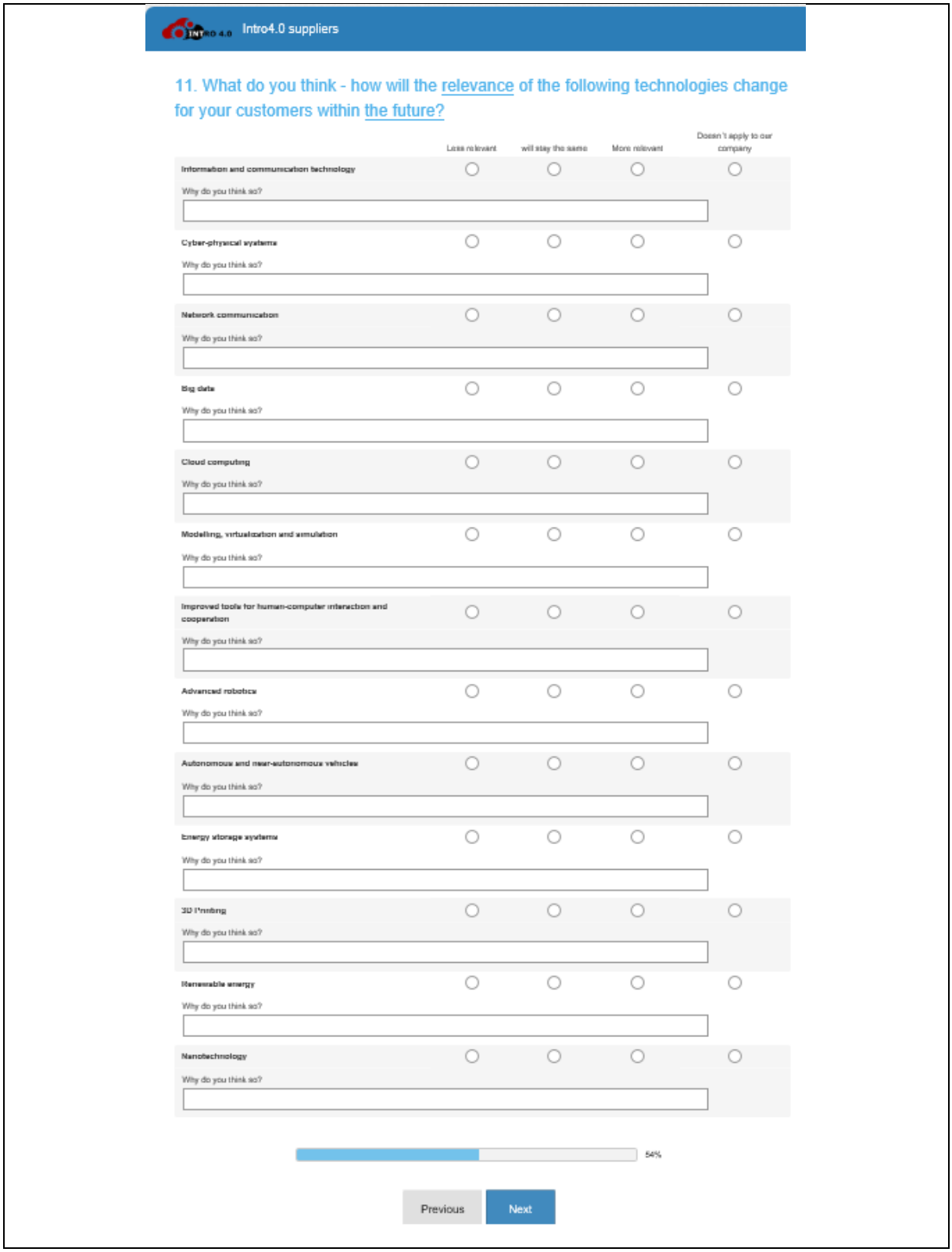
9. Which trainings and/or specific advertising methods for the customers are carried out by your company?
- More answers possible

- ☐ Trainings
- ☐ Workshops
- ☐ Lecture
- ☐ (Networking) Events
- ☐ Product Manuals / Information
- ☐ None
- ☐ Others

38%

Previous Next


Intro4.0 suppliers
10. Which technologies had or have the most impact onto your business?
No impact
Small impact
Medium impact
High impact
Very high impact
Information and communication technology
Please describe how the ICT tools/instruments (available to the company) are being used?
Cyber-physical systems
Please describe how the ICT tools/instruments (available to the company) are being used?
Network communication
Please describe how the ICT tools/instruments (available to the company) are being used?
Big data
Please describe how the ICT tools/instruments (available to the company) are being used?
Cloud computing
Please describe how the ICT tools/instruments (available to the company) are being used?
Modelling, virtualization and simulation
Please describe how the ICT tools/instruments (available to the company) are being used?
Improved tools for human-computer interaction and cooperation
Please describe how the ICT tools/instruments (available to the company) are being used?
Advanced robotics
Please describe how the ICT tools/instruments (available to the company) are being used?
Autonomous and near-autonomous vehicles
Please describe how the ICT tools/instruments (available to the company) are being used?
Energy storage systems
Please describe how the ICT tools/instruments (available to the company) are being used?
3D Printing
Please describe how the ICT tools/instruments (available to the company) are being used?
Renewable energy
Please describe how the ICT tools/instruments (available to the company) are being used?
Nanotechnology
Please describe how the ICT tools/instruments (available to the company) are being used?
46%
Previous
Next


Intro4.0 suppliers
11. What do you think - how will the relevance of the following technologies change for your customers within the future?
Less relevant
will stay the same
More relevant
Doesn't apply to our company
Information and communication technology
Why do you think so?
Cyber-physical systems
Why do you think so?
Network communication
Why do you think so?
Big data
Why do you think so?
Cloud computing
Why do you think so?
Modelling, virtualization and simulation
Why do you think so?
Improved tools for human-computer interaction and cooperation
Why do you think so?
Advanced robotics
Why do you think so?
Autonomous and near-autonomous vehicles
Why do you think so?
Energy storage systems
Why do you think so?
3D Printing
Why do you think so?
Renewable energy
Why do you think so?
Nanotechnology
Why do you think so?
54%
Previous
Next

12. On a scala from 0 (low) till 5 (high) - how do you rate the current knowledge of your customers of those novel technologies?

	0 - No knowledge	1	2	3	4	5 - High knowledge
Information and communication technology	○	○	○	○	○	○
Cyber-physical systems	○	○	○	○	○	○
Network communication	○	○	○	○	○	○
Big data	○	○	○	○	○	○
Cloud computing	○	○	○	○	○	○
Modelling, virtualization and simulation	○	○	○	○	○	○
Improved Tools for human-Computer interaction and cooperation	○	○	○	○	○	○
Advanced robotics	○	○	○	○	○	○
Autonomous and near-autonomous vehicles	○	○	○	○	○	○
Energy storage systems	○	○	○	○	○	○
3D Printing	○	○	○	○	○	○
Renewable energy	○	○	○	○	○	○
Nanotechnology	○	○	○	○	○	○

82%

Previous Next

Intro4.0 suppliers

13. On a scale from 0 (not necessary) till 5 (totally necessary) - where would customers need to improve their knowledge regarding technologies of Industry 4.0?

	0 - not necessary at all	1	2	3	4	5 - Totally necessary
Information and communication technology	○	○	○	○	○	○
Cyber-physical systems	○	○	○	○	○	○
Network communication	○	○	○	○	○	○
Big data	○	○	○	○	○	○
Cloud computing	○	○	○	○	○	○
Modelling, virtualization and simulation	○	○	○	○	○	○
Improved tools for human-computer interaction and cooperation	○	○	○	○	○	○
Advanced robotics	○	○	○	○	○	○
Autonomous and near-autonomous vehicles	○	○	○	○	○	○
Energy storage systems	○	○	○	○	○	○
3D Printing	○	○	○	○	○	○
Renewable energy	○	○	○	○	○	○
Nanotechnology	○	○	○	○	○	○

69%

Previous Next

Intro4.0 suppliers

14. On a scale from 0 (not important) to 5 (very important) - how important do you consider having a basic knowledge of the following skills for your customers?

	0 - Not important	1	2	3	4	5 - Very important
Information and communication technology	○	○	○	○	○	○
Cyber-physical systems	○	○	○	○	○	○
Network communication	○	○	○	○	○	○
Big data	○	○	○	○	○	○
Cloud computing	○	○	○	○	○	○
Modelling, virtualization and simulation	○	○	○	○	○	○
Improved tools for human-computer interaction and cooperation	○	○	○	○	○	○
Advanced robotics	○	○	○	○	○	○
Autonomous and near-autonomous vehicles	○	○	○	○	○	○
Energy storage systems	○	○	○	○	○	○
3D Printing	○	○	○	○	○	○
Renewable energy	○	○	○	○	○	○
Nanotechnology	○	○	○	○	○	○

77%

Previous Next

Intro4.0 suppliers

15. Which measures have been taken from your HR to provide your employees with sufficient knowledge so that they can train your customers?

16. Is there a special demand for trainings for the customers in the previously indicated technical fields?

○ Yes
○ No

85%

Previous Next

Intro4.0 suppliers

17. What is the name of the company you are working at the moment?

18. What is your current position in the company?

19. To which Industry is your company assigned (Major field of business)?

20. In which country is your company located?

- Austria
- Portugal
- Spain
- Czech Republic
- Other (please specify)

21. In which department of the company are you working at?

22. What is your profession?

23. What is your highest education and in which field?

24. How many employees are working in your company?

- 1-10
- 11-50
- 51-250
- 251-500
- 500+

92%

Previous Next

Intro4.0 suppliers

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Please click below on the **DONE Button** and all your answers will be saved.

25. E-mail

Co-funded by the
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