Interreg
ADRION
ADRIATIC-IONIAN
EUROPEAN UNION
European Regional Development Fund - Instrument for Pre-Accession II Fund

FUTURE 4.0

PROJECT MAIN OUTPUT - T1.1

Technological Map of the Shipyard & Nautical Logistic supply chain

Veneto Region (IT)
Confindustria Veneto SIAV S.p.A. (IT)
Polytechnic University of Bari (IT)
Chamber of Achaia (GR)
University of Patras (GR)
Primorje-Gorski Kotar County (HR)
University of Rijeka Faculty of economics (HR)
Chamber of Commerce and Industry, Tirana (AL)
"Mesdheu" Center (AL)

DOCUMENT CONTROL SHEET

Project number and acronym	294 – FUTURE 4.0
Lead Partner	Veneto Region Industry Craft Commerce Services Department
Project Main Output	Technological Map of the Shipyard & Nautical Logistic supply chain
Work package Number	T1
Work package Title	Smart Industrial Change, Technologies and Future Jobs
Main author	PP3 - Polytechnic University of Bari Maria Pia Fanti, Beatrice Di Pierro, Valentino Sangiorgio, Giuliana Rotunno, Alessandro Rinaldi LP – Veneto Region Elisa Bertoni
Contributors	FUTURE 4.0 Partners
Quality Assurance	LP, PSC
Version no.	2
Date	30 March 2020

TABLE OF CONTENT

PROJECT SUMMARY

The challenges brought by the fourth industrial revolution are at the heart of the project FUTURE 4.0. The organization and management of the manufacturing industry is radically changing the concept of enterprise. The enterprises of the Adriatic and Ionian Region area (EUSAIR) are affected by this paradigm shift, which has effects on production, intercompany relations, human capital development. With particular focus on the Blue Economy, the shipyard & nautical logistic supply chain, the project intends to design a shared strategy to innovate the company's management and organization through a Smart Learning Model enhancing shipyard competitiveness in Italy (Veneto & Apulia), Croatia, Greece and Albania.

The project structure foresees the definition of a Technological Map of the Shipyard & Nautical Logistic supply chain thorough an inclusive road mapping and by defining the related competences and activities. The aim is to create a lay for the designing of a knowledge, competence and skills training/learning hub (FUTURE4.0 platform) involving Universities and training orgs., companies and PAs. The platform will be part of the above-mentioned Smart Learning Model and Strategy and it will be implemented and validated through local pilot actions. The platform will allow an effective industrial education and training for innovation, enhancing the University-Industry cooperation. The partnership includes public and private bodies, universities, business supp. orgs., higher education institutions active in Industry 4.0 which will cooperate together applying a Triple Helix approach. Accordingly, the project will impact on current situation stimulating a common and participatory rethinking of regional governance systems for training and innovation support towards Industry 4.0, with specific topic on the shipyard & nautical logistic supply chain. By the cooperation of the 4 universities, PAs, business actors (Large Companies, SMEs, KIBs, Business Supp. orgs.) and R&I players will be defined a sectorial technological roadmap and a foresight as basis for the subsequent development of a shared Training Model, tested and validated through its application at each local context.

FUTURE 4.0 will involve 105 companies (primary target group and beneficiaries along with PAs) of the Blue Economy in a knowledge and technology transfer tailored process, along with the production of tools and methods to facilitate a smart industrial change. Results are addressed at Adriatic-Ionian companies, human capital developers, public administrations and knowledge providers.

For further information visit https://future4.adrioninterreg.eu/.

1. INTRODUCTION

1.1. Reference context and Purpose of the document

Industry 4.0 focuses on new technologies that are currently changing the manufacturing and process industries in their form and in their operation, making the processes leaner and more efficient. The adoption of new technologies is a fundamental resource for a company, in order to be competitive. Nowadays, the companies have to face numerous organizational problems, as a highly flexible internal structure is needed, as well more and more skills are required.

By focusing on the shipbuilding industry, this document reports the main outputs of the first phase of the project: Smart Industrial Change, Technologies and Future jobs. In particular, the activity is focused on the factors towards the implementation and adoption of the technologies of Industry 4.0 and on the recommendations that should be given to a shipbuilding company to increase the chances of their implementation.

Industry 4.0 technologies, which are **Advanced Manufacturing Solutions**, **Augmented Reality, Cloud, Additive Manufacturing, Big Data and Analytics and Cyber-security,** have been analyzed in the regional context. These technologies have been studied on the basis of the following criteria:

- Required Professional skills
- Short-term economic benefit
- Long-term economic benefit
- Initial costs
- Operating costs
- Improvement of sustainability.

Different approaches have been studied for the industries of the ADRION area. A general analysis of the economic situations of the ADRION regions has been presented, from different perspectives and criteria: productivity, professional skills and improvement of sustainability. Each of these criteria is examined according to further sub-criteria: Demographic change ad labor market, New emerging markets, Scarcity of resources, Climate change, Acceleration of technological progress, Financial environment. In order to perform the analysis, **29 companies** from the ADRION area have been interviewed in the first phase, while other **9 companies** and many stakeholders have been involved for the validation of the achieved results.

A general perspective is reported for a shipbuilding company that wishes to begin the transformation process towards digitized technologies and the best practices are examined from the various methodologies. The process of mapping and data collection in the definition of the Technological

Road Map and Foresight has been studied.

Even if there are many benefits from implementing Industry 4.0 technologies in the Shipbuilding Industry, there are still many challenges that need to be solved before to completely adopt these technologies.

1.2. Overview of the activity

This report is part of the first activity of Future 4.0 that analyses the state of art of the Smart Industrial Changes, the Technologies and Future Jobs in the Adriatic–Ionian Countries. More in detail, the Activities focus on:

- analysis of the radical changes and transformation, the research priorities in manufacturing and production processes with the purpose of identifying the main technological trends and their impact on the competitiveness, growth and labour market of each region involved in the project;
- the study of the complexity of the systems interacting at regional, interregional and transnational level by identifying the manufacturing and logistic subsectors which contribute to the development and growth of the Blue economy in sustainable way;
- definition of a Technological Road Map in order to define the technological trends in each region and subsector; analysis of the existing skills and the emerging professionalism with the goal of defining key competencies for the success of SMEs, through contributions from the business community, professional and academic areas.

1.3. Structure of the document

This document is structured as follows:

- Section 2 reports the applied Methodology, based on the AHP analysis, Card Game analysis and Road Map, on the basis of a questionnaire survey;
- Section 3 reports the main results of the above cited methods per each region;
- Section 4 describes **the achieved target** and the **focus groups** in order to validate the obtained results, trying to create reference targets to carry out the research.

2. METHODOLOGY

Two **Desk Studies** have been defined on two specific topics of interest. In particular, the first Desk study deals with the analysis of the state of art of the global macroeconomic and technological megatrends, while the second focuses on the Industry 4.0 technologies.

Then, the following methodologies for **data acquisition and analysis** are applied:

i) multi criteria decision methods such as the **Analytic Hierarchy Process (AHP)** to derive quantitative data from the Desk Studies;

ii) **Card Game** method to analyze the perception of the involved companies;

iii) **the Road map** to define the technological trends in each region.

More in detail, the steps of the data acquisition are the following:

- a first Desk Study is defined to analyze the state of art of the Smart & Green Industry connected to the Blue Economy and the national and regional industrial development and transformation related to the global macroeconomic and technological megatrends;
- the AHP is applied to the first Desk Study for understanding how economic and technological megatrends have influenced the manufacturing sector in the last 20 years in the investigated regions;
- a second Desk Study is defined on the enabling technologies of Industry 4.0. This desk study aims to analyze the trends/mechanisms to forecast technologic developments and identify a set of needs and related technologies required to satisfy shipyard and logistics industry KSC updating;
- the AHP is applied on the second Desk Study to analyze the potential of enabling technologies of Industry 4.0;
- the Card Game analysis is applied with the help of the companies participants to analyze the perception of companies regarding the enabling technologies of Industry 4.0.;
- the Road Map is defined to analyze the technological trends in each region.

2.1. The Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP) provides the objective mathematics to analyze a problem from a qualitative and quantitative point of view (Saaty and Vargas 2001). The AHP is based on the

decomposition of the problem in independent criteria: such operation allows transforming a multidimensional scaling problem to a one-dimensional scaling problem. Therefore, every criterion is analyzed individually in order to identify the related priority vectors, i.e., the weights assigned to each alternative or criterion as reported in the following figure.

Fundamental scale of Saaty

a_{ij}	Verbal scale
$a_{ij} = 1$	Equal importance
$a_{ij} = 3$	Moderate importance of one over another
$a_{ij} = 5$	Strong importance
$a_{ij} = 7$	Very strong importance
$a_{ij} = 9$	Extreme importance
1.5 - 4 - 6 - 8	Intermediate value
1/9,1/8,….,1/2	The reciprocal expresses an opposite judgement

Figure 1 - Fundamental scale of Saaty

The AHP uses the principal eigenvalue method for deriving ratio scale priority vectors from positive reciprocal matrices. In particular, such matrices, named comparison matrices or judgement matrices, are established through pairs of comparisons (Barzilai et al. 1987; Saaty and Hu 1998).

2.1.1. The AHP applied to the first the desk study on the macroeconomic and technological megatrends

This desk study analyzes how economic and technological megatrends influence the manufacturing sectors.

In the analysis the following criteria are considered: Professional skills, Productivity and Improvement of sustainability.

In addition, the defined sub-criteria that can influence the desk study are:

1. demographic change and labour market (global population increase, ageing society, urbanisation);
2. new emerging markets (globalisation, exports' growth, growth of developing countries);
3. scarcity of resources (energy, water, raw materials, others);
4. climate change (e.g. CO2 increase, global warning);
5. acceleration of technological progress (exponential growth of technologies, cost reductions,

pervasiveness);

6. financial environment.

Fig. 2 shows the considered and structured desk study in a hierarchical flowchart.

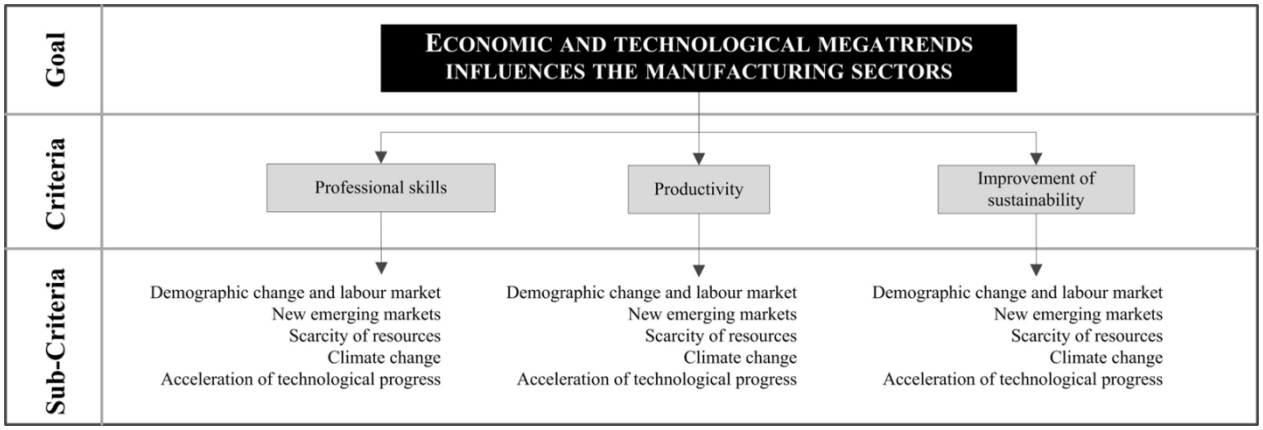


Figure 2 – First desk study: macroeconomic and technological megatrend

2.1.2. The AHP applied to the second Desk Study: Enabling technologies of industry 4.0

This second desk study aims to analyze the potentiality of the **six main enabling technologies of Industry 4.0** that are:

i) Advanced Manufacturing Solutions;

ii) Augmented Reality;

iii) Cloud Computing;

iv) Additive Manufacturing;

v) Big Data and Analytics;

vi) Cyber-security.

In particular the enabling technologies are analyzed on the basis of the following six **criteria**:

1) Professional skills;

2) Short-term economic benefit;

3) Long-term economic benefit;

4) Initial costs;

5) Operating costs;

6) Improvement of sustainability.

The weighting of the technologies that require more professional skills is obtained from the AHP. Also, in this case, a ranking is obtained for every region. This ranking is used to provide the second level of classification. Priority is given to the technology that requires more professional skills.

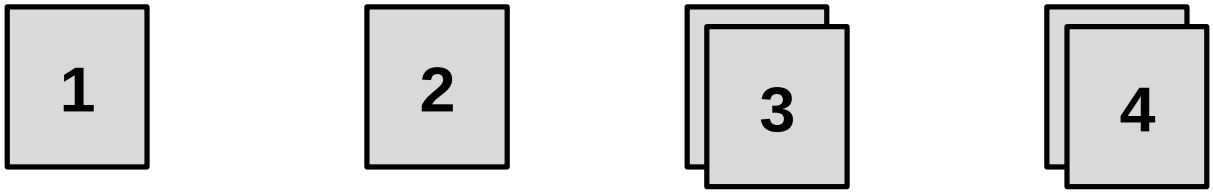
2.2. The Card Game Analysis

A novel method named Card Game Analysis (CGA) mainly consists of the following three steps.

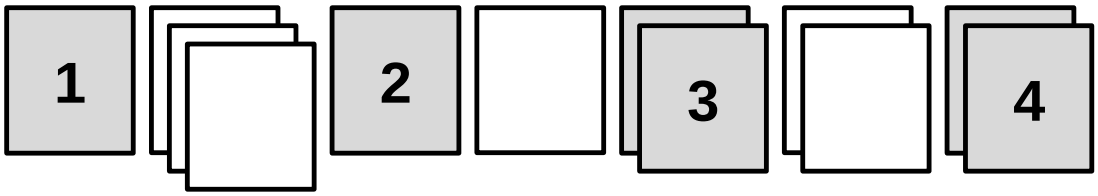
1) The game starts by giving a set of cards to the card game participant expressing the views of his/her company: the name of each criterion is written on each card together with additional information (if necessary). Therefore, we have n cards, where n is the number of criteria of a family. The participant also receives a set of white cards of the same size. The following figure shows the cards that are used for the performed analysis.

Figure 3 - Sets of cards related to professional skills

2) In the second step, the participant ranks the cards from the least important to the most important.



3) Finally, the participant compares the importance of two successive criteria. So, the user introduces white cards between two successive cards: one white card means that the first compared criterion is twice more important than the second one, two white cards mean that the first compared criterion is three times more important than the second one, etc.



The Card Game analysis provides the company perception related to the desired technologies of Industry 4.0. The company dimension is defined on the basis of the number of employees as follows:

- Small, less than 150 employees;
- Medium, 150<employees<500;
- Large, 500<employees<1000;
- Very large, more than 1000 employees.

2.3. The Road Map

Starting from the results of the desk studies and the company interviews, the **professional skills and competences required per technology** are defined in every ADRION region. This analysis provides a

global roadmap in the ADRION area by providing the priorities of the professional skills and competences to be offered by the trainers in every region.

Moreover, it is also specified the trainer that provides each of the professional skills in the considered DARION region:

- Company Training
- Doctorate
- University
- Technical College
- High school
- None

In these interviews it is also specified if public or private trainers provide skill and competences to the employees.

Table 1 reports the template of the survey to collect data.

Table 1 - Technologies of Industry 4.0

Technology	Professional skill per technology	Professional Training	Professional profiles needed
	Microsoft Azure ☒	High school ☐ Technical College ☒ University☐ Doctorate☐ Training in company ☐	IT consulting
	Amazon ☒	High school ☒ Technical College ☐ University☐ Doctorate☐ Training in company ☐	IT consulting

Example: Cloud	Google ☒	High school ☒ Technical College ☐ University☐ Doctorate☐ Training in company ☐	IT consulting
	VMWare ☒	High school ☐ Technical College ☐ University☐ Doctorate☐ Training in company ☒	IT consulting

In the second step, a weighting of the technologies that require more professional skills is obtained from the AHP applied to the second desk study. Also in this case, a ranking is obtained for every region.

3. MAIN RESULTS

3.1. Results of AHP application.

3.1.1. Result of AHP application on the first desk studies study on the macroeconomic and technological megatrends

By adopting the AHP method for each involved region, it turns out that the most important parameters that influence the macroeconomic and technological megatrends are, in order:

1) the demographic change and labour market;
2) financial environment;
3) the acceleration of technological progress.

More in detail, the main results are the following:

- In Italy (Puglia and Veneto regions), and Croatia the acceleration of technological progress is the most important parameter that have influenced the **professional skills** evolution, while in Greece and Albania the demographic change and labour market is the most important parameter.
- As regards the **productivity**, in Italy (Puglia and Veneto regions) the financial environment and the demographic change and labour market are the most influencing parameters, while in Croatia the three important parameters are Demographic change, scarcity of resources and Financial environment, in Albania the Climate change is the most important parameter, in Greece the acceleration of technological progress and the demographic change and labour market are the main parameters.
- As regards the **sustainability,** in all the regions the financial environment is the most important parameter, the second parameter is the acceleration of technological progress.

Globally, as regards the **manufacturing and shipyard sector**, in all the regions the demographic change and labour market is the most important parameter.

As a result of the first desk study, the weights are obtained which express (in %) the relative importance of the parameters that influence the enabling technologies of Industry 4.0. The following

figures report the detailed results per ADRION region.

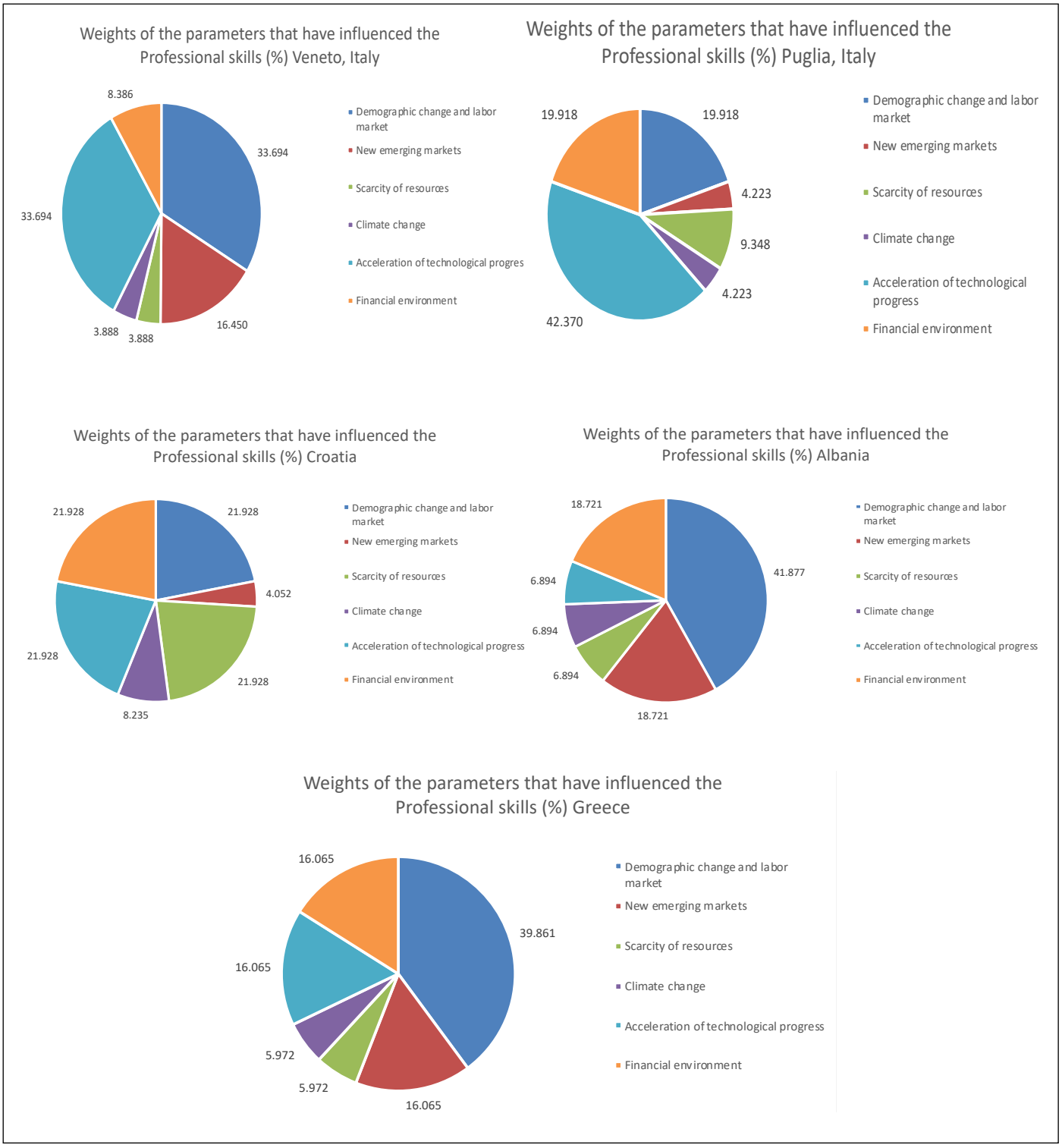


Figure 4 - Weights of Parameters influencing the Professional Skill in Veneto, Puglia, Croatia, Albania and Greece

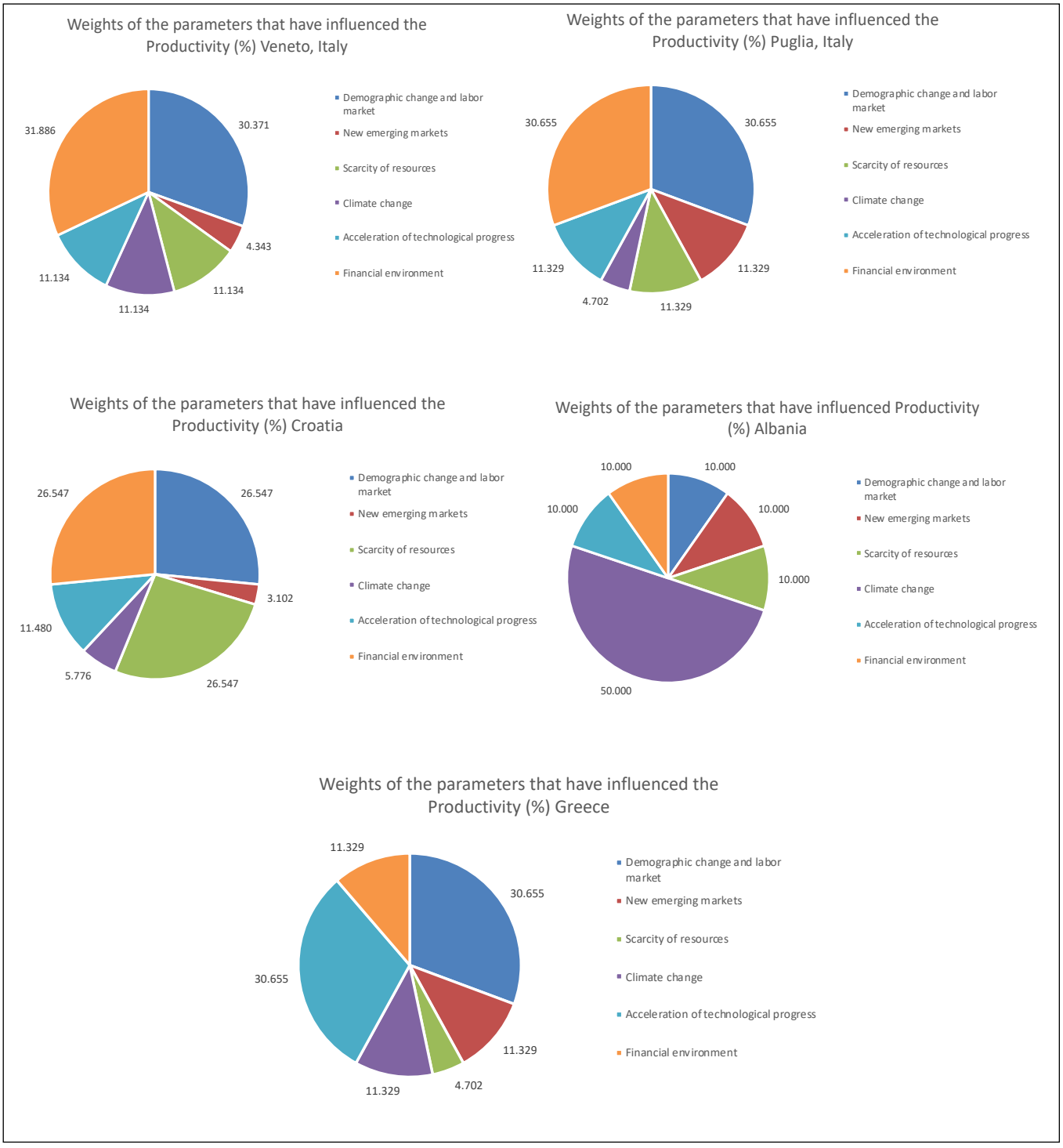


Figure 5 - Weights of the Parameters influencing the Productivity in Veneto, Puglia, Croatia, Albania and Greece

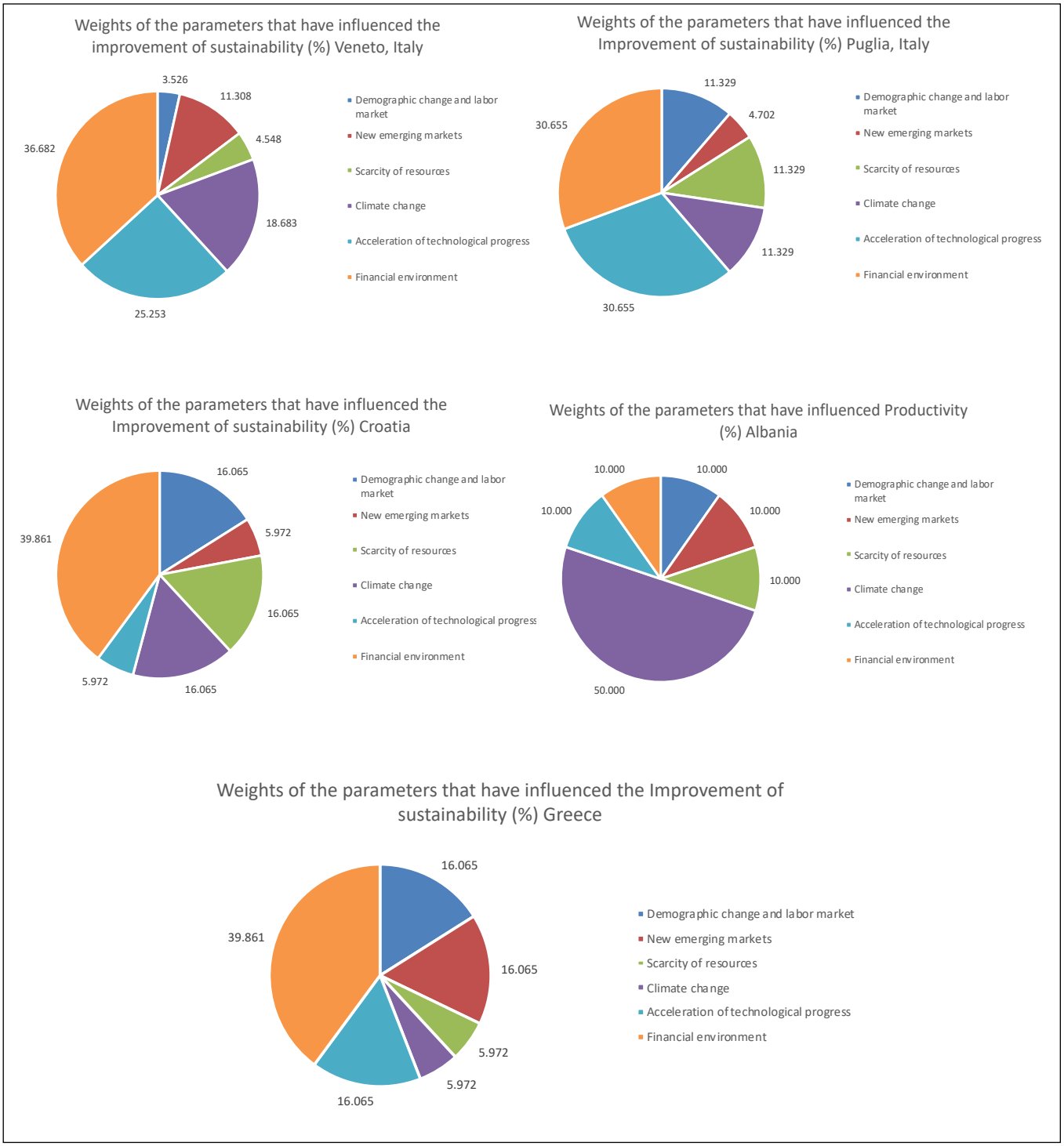


Figure 6 - Weights of the Parameters influencing the Sustainability in Veneto, Puglia, Croatia, Albania and Greece

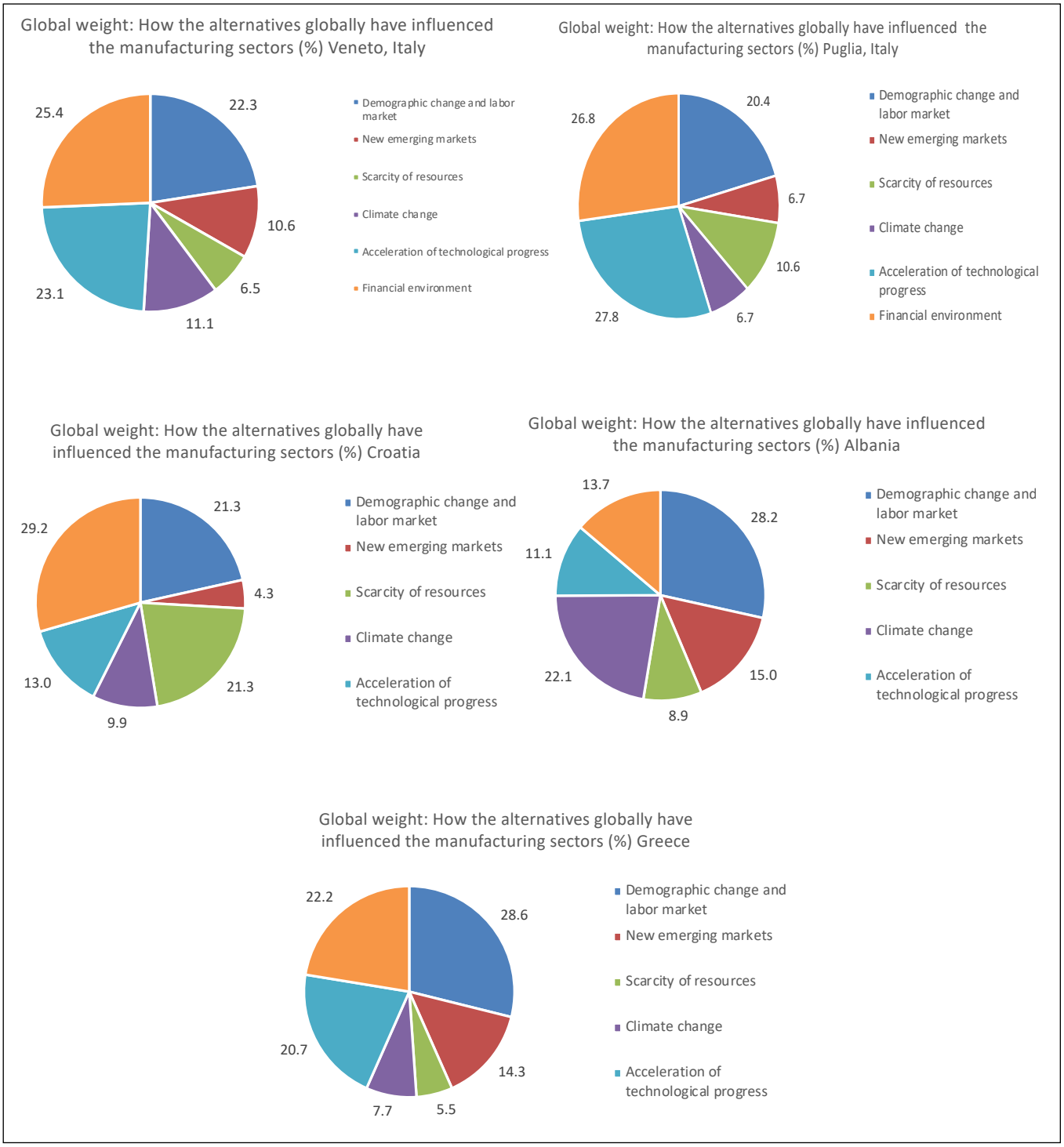


Figure 7 - Weights of the Parameters influencing the Manufacturing Sector in Veneto, Puglia, Croatia, Albania and Greece

3.1.2. Results of AHP application in the second desk study

By adopting the AHP method for each involved region, the **enabling technologies of Industry 4.0** are ranked per region as in the following figures.

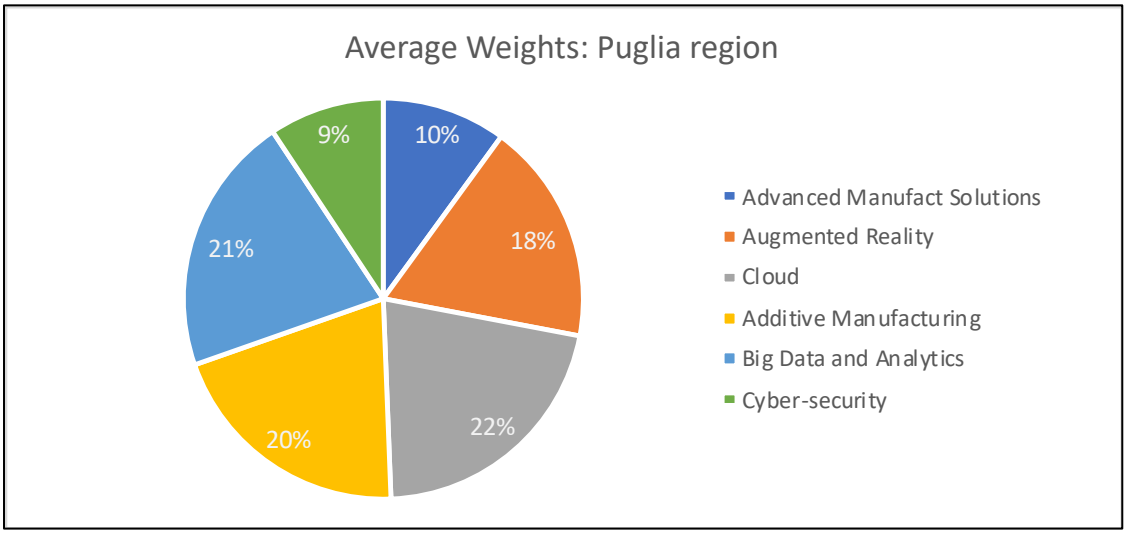


Figure 8 - Puglia Region: the perception analyzed considering the Regional Context

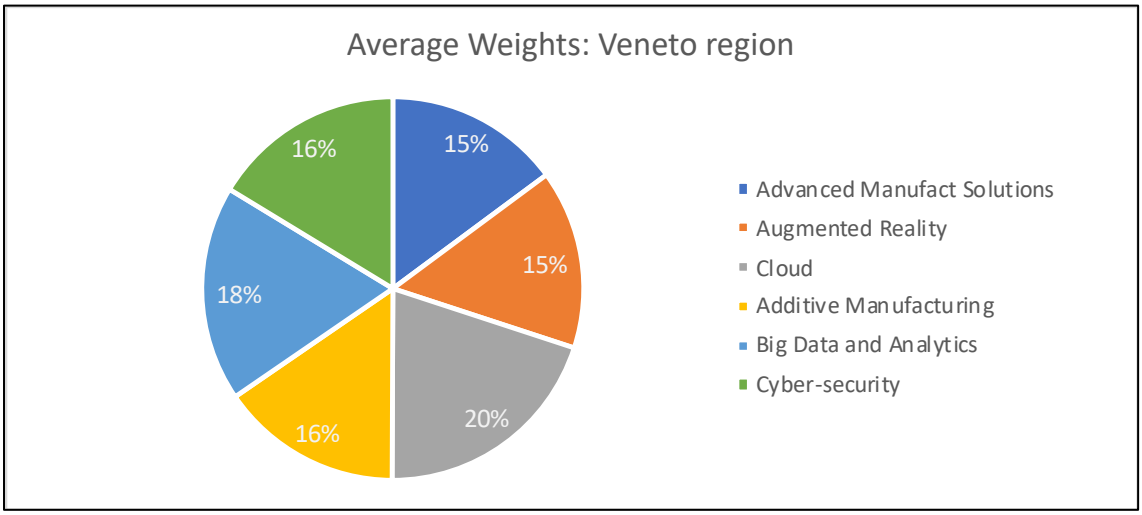


Figure 9 - Veneto Region: the perception analyzed considering the Regional Context

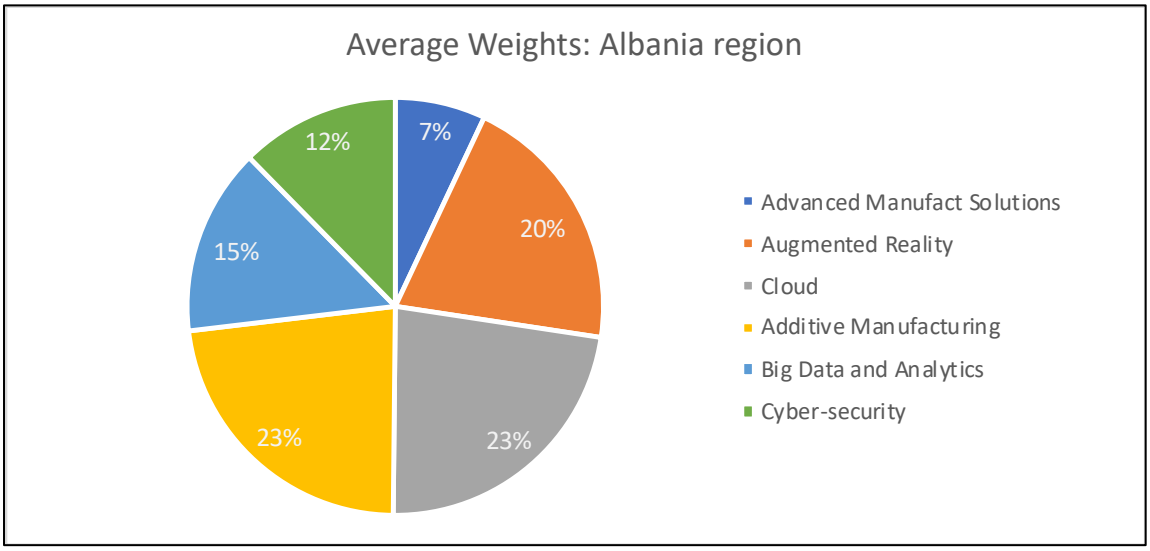


Figure 10 - Albania: the perception analyzed considering the Regional Context

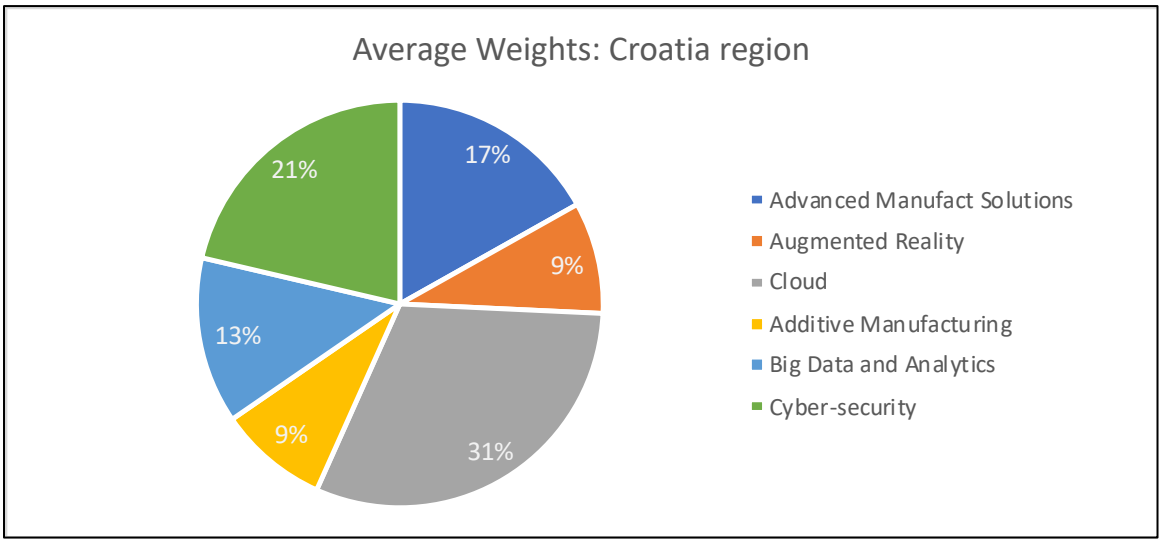


Figure 11 - Croatia: the perception analyzed considering the Regional Context

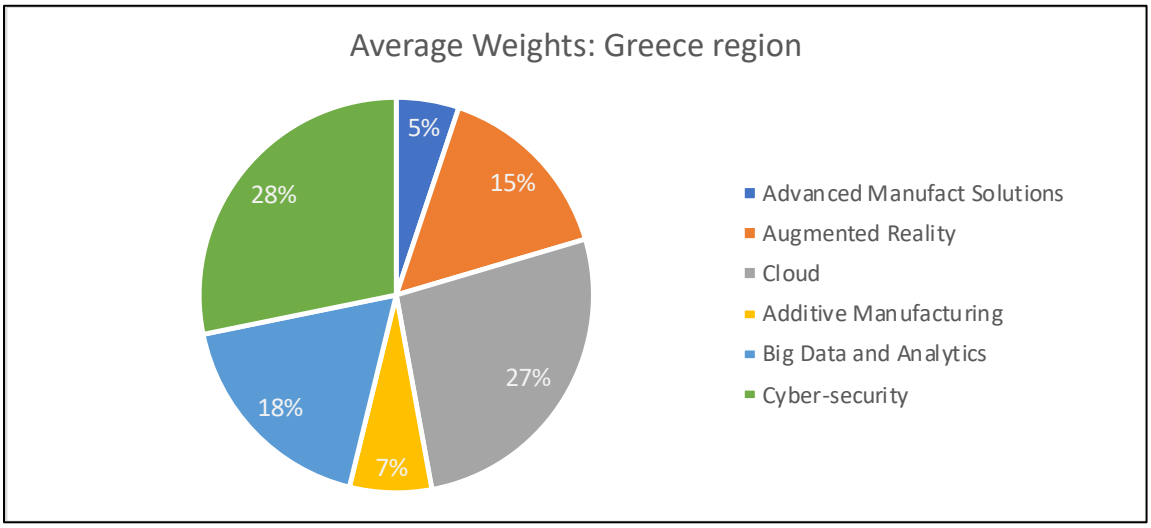


Figure 12 - Greece: the perception analyzed considering the Regional Context

3.2. The results of Card Game analysis

In this section all the results carried out by the card games are analysed. The analysis is performed by considering the following parameters: **Company size and Type of production**. The ultimate goal is to identify the factors that influence the company's perception towards the enabling technologies of Industry 4.0.

3.2.1. Card Game results: The analyzed perception and the company size

The first comparison of the data is carried out considering the size of the companies. The main considerations obtained from this analysis are listed below.

Very Large and Large companies

The common parameters for all the "large" and "very large" companies are the need of Big Data and Cloud technologies. This result is predictable and coherent since large companies have to manage a large amount of data.

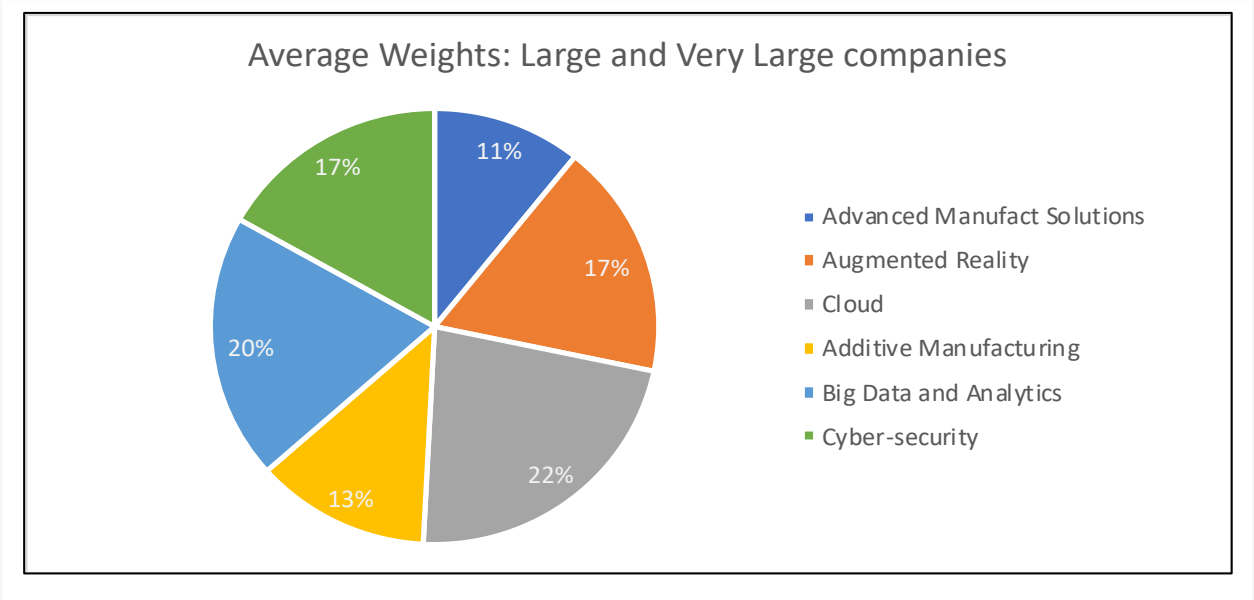


Figure 13 - Perception result considering the large and very large companies

Medium Companies

The common parameters for the medium companies are the need of Cloud and Cyber security technologies.

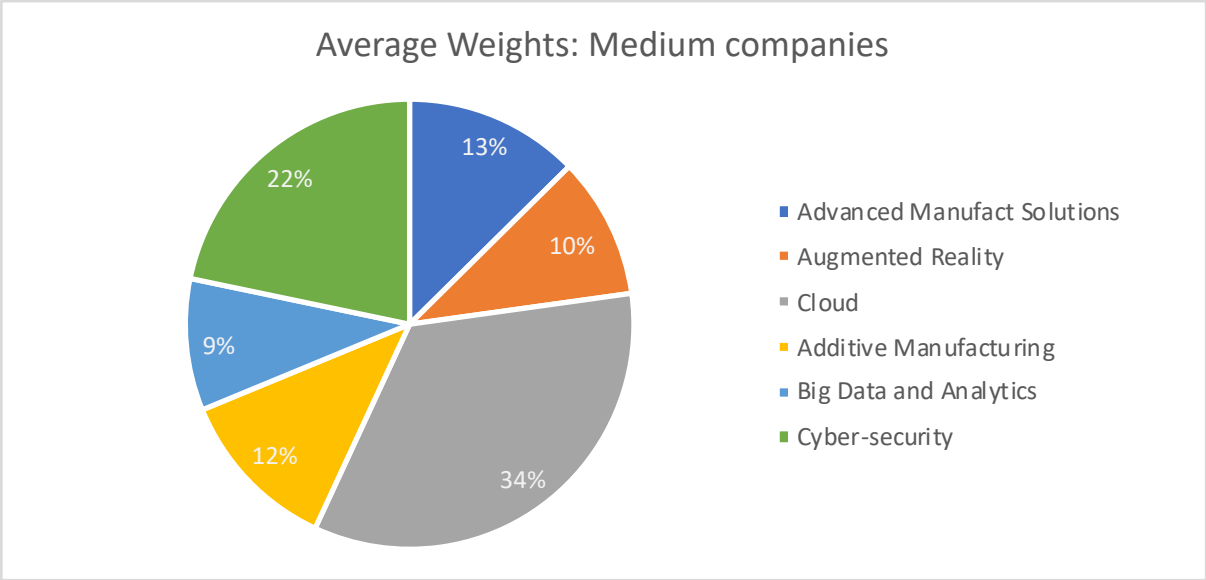


Figure 14 - Perception results considering medium companies

Small Companies

Small companies have a different perception that is expressed by different ranking and weights compared with the large and medium companies.

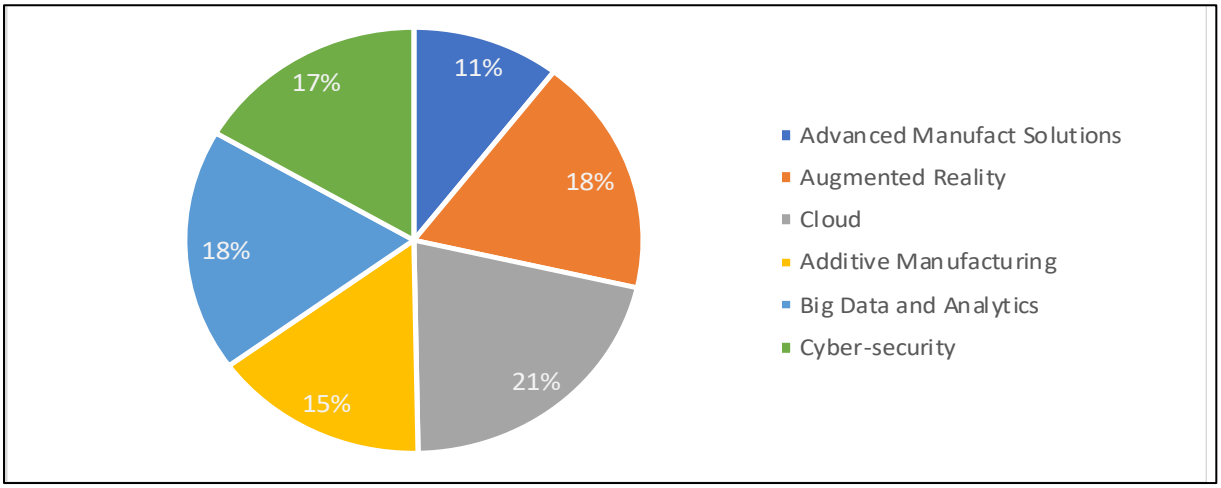


Figure 25 - Perception result considering small companies

3.2.2. Card Game results: The analyzed perception and the type of production

In the second comparison, the Card Game analysis is applied by analyzing the companies considering the type of activity and production.

Handcraft (Nautical)

The companies based on the Handcraft production of nautical typology have a similar perception of the technologies. Instead, it is worth noting that only the Large companies prioritize the technologies of Cloud and Cyber security. Small and medium nautical companies use traditional and artisanal production processes and they do not perceive the potential of Advanced Manufacturing technology.

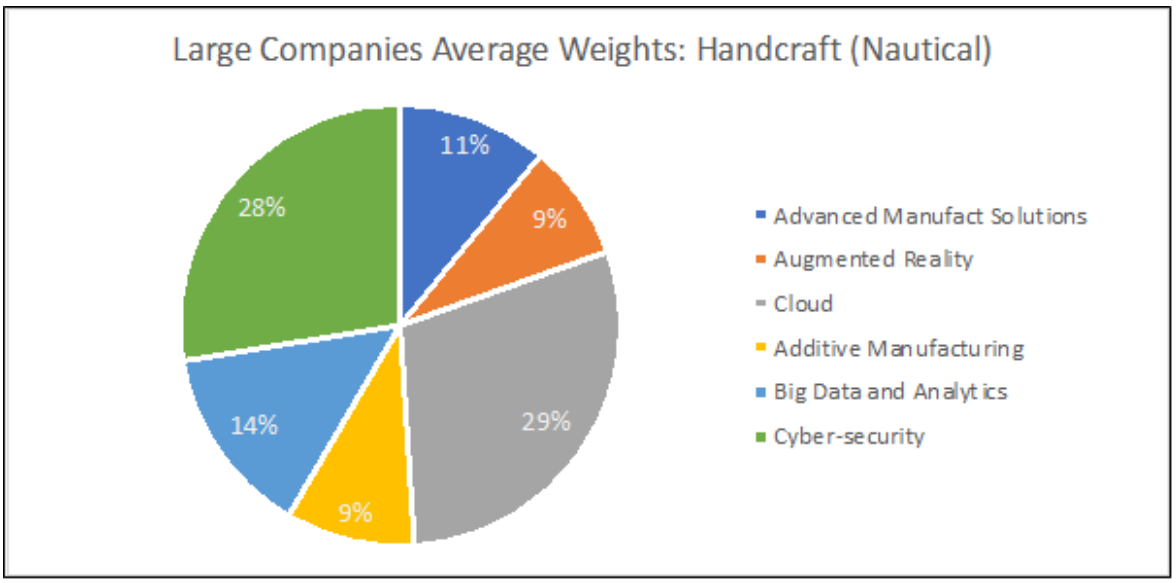


Figure 16 - Perception result considering Nautical companies

Shipping and transport

The most significant technology is considered the Cloud necessary to store all relevant data of transport companies.

As it was easily foreseeable, Advanced Manufacturing Solution is not a necessary technology for shipping and transport companies.

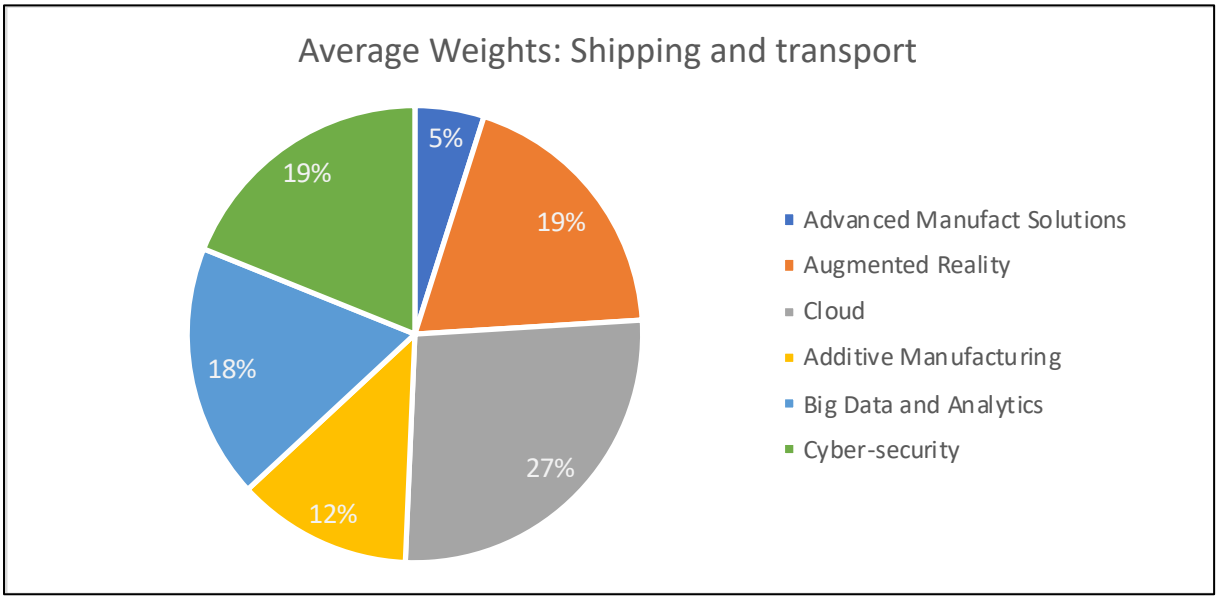


Figure 37 - Perception result considering Shipping and transport companies

3.2.3. Card Game results: The company perception and the enabling technologies

For every region and every card game provided by the companies, the perception of the required professional skills by the enabling technologies is extracted. The results quantify how in each region it is considered difficult to have the skills for each enabling technology. In particular, the following pie charts show the required professional skills for every enabling technology by expressing the results in percentage.

Average Adrion						
Technologies 4.0	Advanced Manufact Solutions	Augmented Reality	Cloud	Additive Manufacturing	Big Data and Analytics	Cyber-security
Average weight	0.160	0.178	0.126	0.155	0.204	0.177

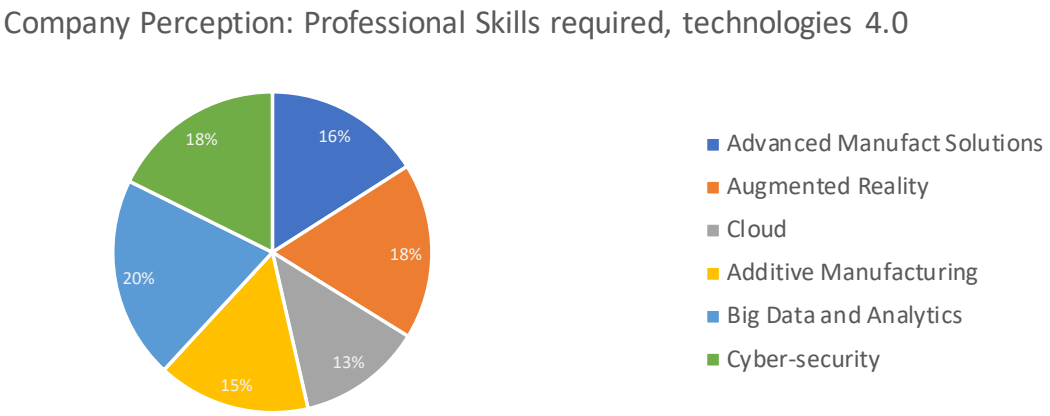


Figure 18 - Average Company Perception: Professional skills required

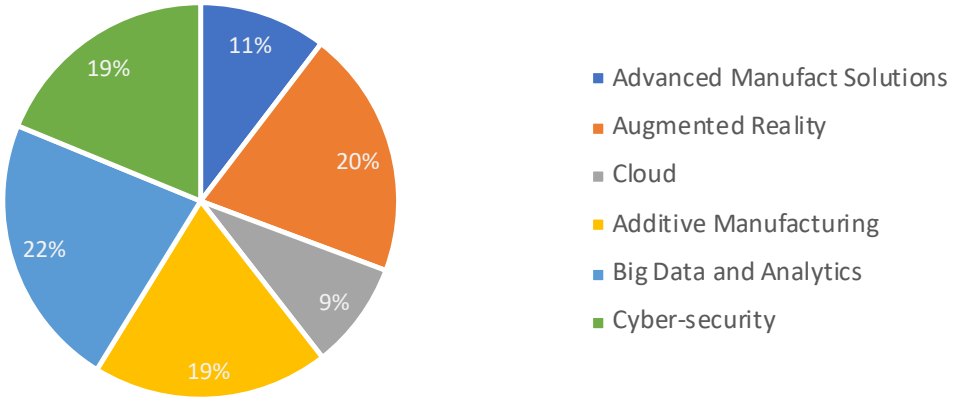


Figure 19 - Veneto: Required Professional skills by companies

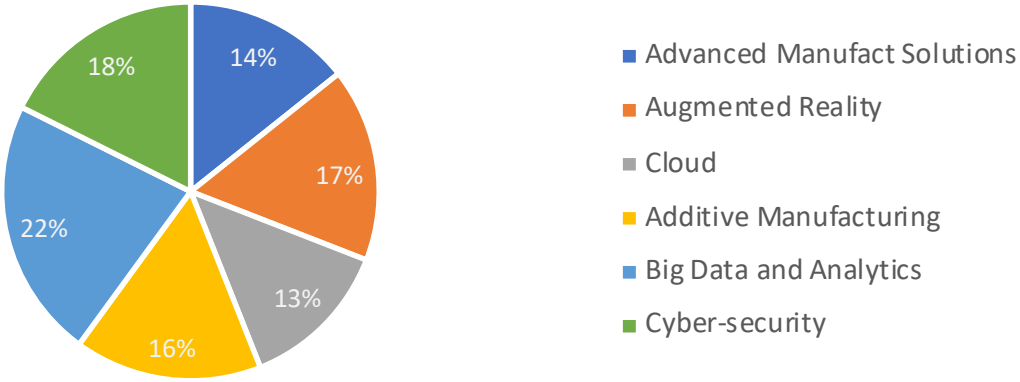


Figure 40 - Croatia: Required Professional skills by companies

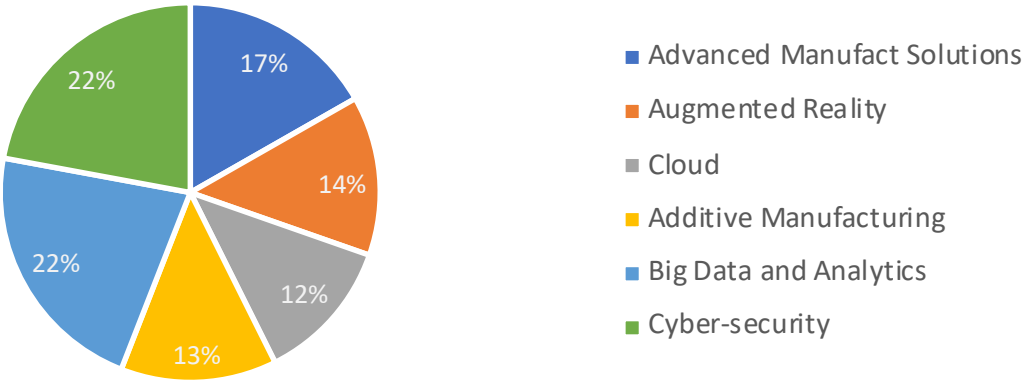


Figure 21 - Puglia Region: Required Professional skills by companies

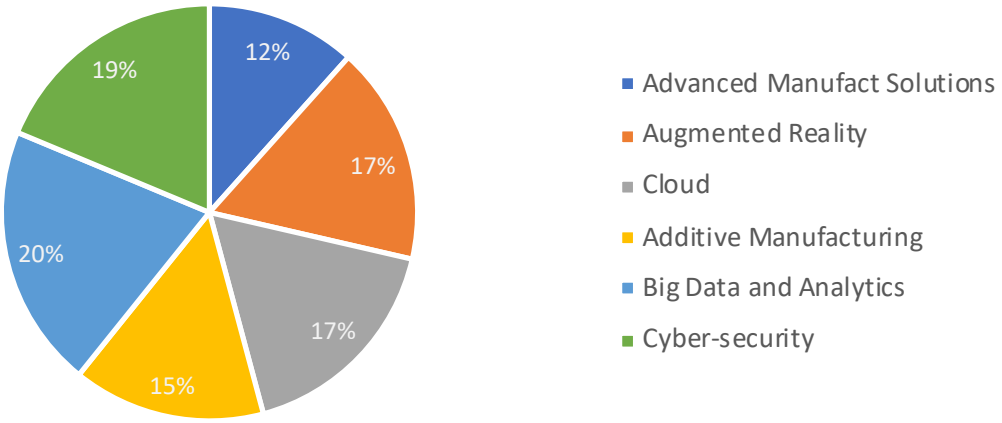


Figure 22 - Albania: Required Professional skills by companies

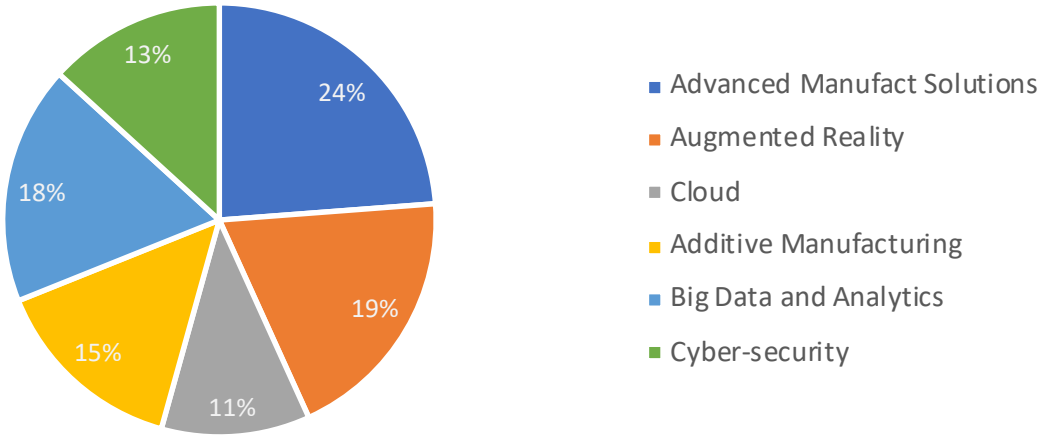


Figure 23 - Greece: Required Professional skills by companies

3.3. Road Map of the education for Industry 4.0 technologies

By exploiting synergistically the results of the first two steps, it is possible to define the priorities of the education for the considered technologies. In particular, the first selection is done on the basis of the professional skills and competences for which there are no trainers on the territory. Among such professional skill and competences, the ranking is performed on the base of the technologies that requires more professional skills.

In the following tables, the Road Maps of learning content of every region are specified.

Puglia

Table 2 - Road Map of learning Content: Puglia

Road Map of learning Content: Puglia

Hyerarchy	Professional skill	Professional Training	Technology
1º	**Wikitude**	Not provided in the region	AugmentedReality
2º	**Security information management**	Training in company	Cyber sec.
2º	**SIEM**	Training in company	Cyber sec.
3º	**Make-to-Order ERP & MRP Manufacturing Software**	Training in company	Advanced Manufact.Solutions
3º	**Manufacturing Software (JAMS)**	Training in company	Advanced Manufact.Solutions
3º	**JAAS Advanced**	Training in company	Advanced Manufact.Solutions
4º	**Database NoSQL**	Doctorate	Big Data and Analytics
4º	**Hadoop**	Doctorate	Big Data and Analytics
5º	**ARToolKit**	Doctorate	AugmentedReality
5º	**NyARToolkit**	Doctorate	AugmentedReality
5º	**Vuforia**	Doctorate	AugmentedReality
5º	**Maxst**	Doctorate	AugmentedReality
5º	**DeepAR**	Doctorate	AugmentedReality
6º	**Amazon**	Doctorate	Cloud
7º	**Apache Spark**	University	Big Data and Analytics
7º	**Database In-memory**	University	Big Data and Analytics
8º	**EasyAR**	University	AugmentedReality
8º	**Kudan**	University	AugmentedReality
9º	**Microsoft Azure**	University	Cloud
9º	**Google**	University	Cloud
9º	**VMWare**	University	Cloud
10º	**Anti-malware**	High school	Cyber sec.
10º	**Anti-spyware**	High school	Cyber sec.
10º	**Anti-keyloggers**	High school	Cyber sec.
10º	**Antivirus software**	High school	Cyber sec.
11º	**3d modelling**	High school	Additive Manufacturing
11º	**Slicer software**	High school	Additive Manufacturing

Veneto

Table 3 - Road Map of learning Content: Veneto

Road Map of learning Content: Veneto

Hierarchy	Professional skill	Professional Training	Technology
1º	**Hadoop**	Not provided in the region	Big Data and Analytics
1º	**Apache Spark**	Not provided in the region	Big Data and Analytics
1º	**Database NoSQL**	Not provided in the region	Big Data and Analytics
1º	**Database In-memory**	Not provided in the region	Big Data and Analytics
2º	**EasyAR**	Not provided in the region	AugmentedReality
2º	**ARToolKit**	Not provided in the region	AugmentedReality
2º	**Kudan**	Not provided in the region	AugmentedReality
2º	**NyARToolkit**	Not provided in the region	AugmentedReality
2º	**Wikitude**	Not provided in the region	AugmentedReality
2º	**Vuforia**	Not provided in the region	AugmentedReality
2º	**Maxst**	Not provided in the region	AugmentedReality
3º	**Slicer software**	Not provided in the region	Additive Manufacturing
4º	**SIEM**	Not provided in the region	Cyber sec.
5º	**Manufacturing Software (JAMS)**	Not provided in the region	Advanced Manufact.Solutions
5º	**JAAS Advanced**	Not provided in the region	Advanced Manufact.Solutions
6º	**Microsoft Azure**	Not provided in the region	Cloud
6º	**Amazon**	Not provided in the region	Cloud
6º	**Google**	Not provided in the region	Cloud
6º	**VMWare**	Not provided in the region	Cloud
7º	**3d modelling**	High school	Additive Manufacturing
8º	**Anti-malware**	High school	Cyber sec.
8º	**Anti-spyware**	High school	Cyber sec.
8º	**Anti-keyloggers**	High school	Cyber sec.
8º	**Antivirus software**	High school	Cyber sec.
9º	**Make-to-Order ERP & MRP Manufacturing Software**	Technical College	Advanced Manufact.Solutions
10º	**Security information management**	University	Cyber sec.

Croatia

Table 4 - Road Map of learning Content: Croatia

Road Map of learning Content: Croatia

Hierarchy	Professional skill	Professional Training	Technology
1º	**Hadoop**	Not provided in the region	Big Data and Analytics
1º	**Database NoSQL**	Not provided in the region	Big Data and Analytics
1º	**Apache Spark**	Not provided in the region	Big Data and Analytics
1º	**Database In-memory**	Not provided in the region	Big Data and Analytics
2º	**Wikitude**	Not provided in the region	AugmentedReality
2º	**DeepAR**	Not provided in the region	AugmentedReality
2º	**Vuforia**	Not provided in the region	AugmentedReality
2º	**Maxst**	Not provided in the region	AugmentedReality
2º	**EasyAR**	Not provided in the region	AugmentedReality
2º	**ARToolKit**	Not provided in the region	AugmentedReality
2º	**Kudan**	Not provided in the region	AugmentedReality
2º	**NyARToolkit**	Not provided in the region	AugmentedReality
3º	**Slicer software**	Not provided in the region	Additive Manufacturing
4º	**Make-to-Order ERP & MRP Manufacturing Software**	Not provided in the region	Advanced Manufact.Solutions
4º	**Manufacturing Software (JAMS)**	Not provided in the region	Advanced Manufact.Solutions
4º	**JAAS Advanced**	Not provided in the region	Advanced Manufact.Solutions
5º	**Microsoft Azure**	Not provided in the region	Cloud
5º	**Amazon**	Not provided in the region	Cloud
5º	**VMWare**	Not provided in the region	Cloud
5º	**Google**	Training in company	Cloud
6º	**3d modelling**	University	Additive Manufacturing
7º	**Anti-malware**	High school	Cyber sec.
7º	**Anti-spyware**	High school	Cyber sec.
7º	**Anti-keyloggers**	High school	Cyber sec.
7º	**Antivirus software**	High school	Cyber sec.
7º	**Security information management**	High school	Cyber sec.
7º	**SIEM**	High school	Cyber sec.

Greece

Table 5 - Road Map of learning Content: Greece

Road Map of learning Content: Greece

Hierarchy	Professional skill	Professional Training	Technology
1º	**VMWare**	Training in company	Cloud
2º	**Anti-malware**	Training in company	Cyber sec.
2º	**Anti-spyware**	Training in company	Cyber sec.
2º	**Anti-keyloggers**	Training in company	Cyber sec.
2º	**Antivirus software**	Training in company	Cyber sec.
3º	**Make-to-Order ERP & MRP Manufacturing Software**	University	Advanced Manufact.Solutions
3º	**Manufacturing Software (JAMS)**	University	Advanced Manufact.Solutions
3º	**JAAS Advanced**	University	Advanced Manufact.Solutions
4º	**Wikitude**	University	AugmentedReality
5º	**3d modelling**	University	Additive Manufacturing
5º	**Slicer software**	University	Additive Manufacturing
6º	**Vuforia**	Technical College	AugmentedReality
6º	**EasyAR**	Technical College	AugmentedReality
	DeepAR	University	AugmentedReality
6º	**ARToolKit**	Technical College	AugmentedReality
6º	**Kudan**	Technical College	AugmentedReality
6º	**Maxst**	Technical College	AugmentedReality
6º	**NyARToolkit**	Technical College	AugmentedReality
7º	**Microsoft Azure**	Technical College	Cloud
8º	**Hadoop**	Technical College	Big Data
8º	**Apache Spark**	Technical College	Big Data
9º	**Security information management**	Technical College	Cyber sec.
9º	**SIEM**	Technical College	Cyber sec.
10º	**Amazon**	High school	Cloud
10º	**Google**	High school	Cloud
11º	**Database In-memory**	High school	Big Data and Analytics

Albania

Table 1 - Road Map of learning Content: Albania

Road Map of learning Content: Albania

Hierarchy	Professional skill	Professional Training	Technology
1º	**Hadoop**	University	Big Data and Analytics
1º	**Database NoSQL**	University	Big Data and Analytics
1º	**Apache Spark**	University	Big Data and Analytics
2º	**Database In-memory**	University	Big Data and Analytics
3º	**Anti-malware**	University	Cyber sec.
3º	**Anti-spyware**	University	Cyber sec.
3º	**Anti-keyloggers**	University	Cyber sec.
3º	**Antivirus software**	University	Cyber sec.
3º	**Security information management**	University	Cyber sec.
3º	**SIEM**	University	Cyber sec.
4º	**Microsoft Azure**	University	Cloud
4º	**Amazon**	University	Cloud
4º	**Google**	University	Cloud
4º	**VMWare**	University	Cloud
5º	**EasyAR**	University	AugmentedReality
5º	**ARToolKit**	University	AugmentedReality
5º	**DeepAR**	University	AugmentedReality
5º	**Kudan**	University	AugmentedReality
5º	**NyARToolkit**	University	AugmentedReality
6º	**3d modelling**	University	Additive Manufacturing
6º	**Slicer software**	University	Additive Manufacturing
7º	**Make-to-Order ERP & MRP Manufacturing Software**	University	Advanced Manufact.Solutions
7º	**Manufacturing Software (JAMS)**	University	Advanced Manufact.Solutions
7º	**JAAS Advanced**	University	Advanced Manufact.Solutions
8º	**Wikitude**	Technical College	AugmentedReality
8º	**Vuforia**	Technical College	AugmentedReality
8º	**Maxst**	Technical College	AugmentedReality

4. OUTPUT PROGRAMME INDICATOR

In this paragraph, an overview of the involved companies is provided, more specifically the details of enterprises cooperating with the research institutions.

In particular, two phases are considered: during the first phase a set of **29** companies of the ADRION area has been interviewed with the aim of defining the *Technological Road Map;* in the second phase **9** additional companies participated to the Focus Group in order to validate the results obtained from the previous analysis.

In this way, a total of **38** companies has been involved, positively exceeding the indicator set at 25 enterprises.

4.1. Companies' interviews phase

In the interview phase, 29 companies (5 per Region and 9 for Albania since there are two partners) have been involved. For each company, the Partners provided the results of the Card Game Analysis and carried out a very useful interview mostly about the INDUSTRY 4.0 status of the company. In the following the interviewed companies are listed:

Albania

Mesdheu Center

1. Mediterranean Shipping Company MSC
2. Shega Trans sh.a
3. Finikas Company
4. Pelikan Ltd

Chamber of Commerce and Industry

5. LIBURN MARINA & MERCURY MOTORS ALBANIA
6. Pasha Liman Base- Shipyard
7. Kaldaja SH.a
8. Hudson sh.a
9. Denor Yachting & Decortion

Croatia

10. JLM Perković d.o.o.
11. SCAM marine d.o.o.
12. IHC Engineering Croatia d.o.o.
13. Interadria SC d.o.o.
14. Brodogradilište Viktor Lenac d.d.

Greece

15. Karel Boats Company
16. SAMMYACHT - For Smart Marinas and Yachters Company
17. Seatrips-Yachting & Maritime Training Company
18. Dynacomp Company
19. ROTA Shipping Company

Puglia

20. Bosch Bari
21. Francesco Divella S.p.A
22. Giuliano Puglia Fruit
23. AS Labruna
24. Explosion Marine Srl

Veneto

25. Cantieri Vizianello Srl
26. Italia Yachts srl
27. Marelli Motori
28. Viraver Technology Srl
29. Wiforce Italia S.R.L

4.2. Focus Group phase

In the Focus Group phase, the partners met the companies in different ways: through meetings or by involving them electronically, pursuing the common objective of validating the results obtained and planning future objectives in the Industry 4.0 field.

Some of these companies took also part to the previous companies' interview phase. For this reason, in each field we report separately the additional companies present only in the Focus Group phase and the ones already presented. Moreover, some partners interviewed also a set of Stakeholders, as reported in the following.

Albania

Modality: Workshops

- Additional companies: Not specified
- Already interviewed companies: Not specified

1^ Focus group:

The focus group was a good platform to share the FUTURE 4.0 project, more than 50 people have been involved that are representatives from businesses, policy making, education institutions and civil societies.

2^ Focus group:

This focus group was formed of 26 participants, companies operating in the field of nautical sector, representatives from the business sector and business support organizations and people from academia and research institutions, people with a very strong professional background as naval engineers, as well as other representatives from the main Albanian Ports operating in the northern and south part of Albania.

Croatia

Modality: Workshops

- Additional companies: none

- Already interviewed companies:
  - JLM - Perković d.o.o.
  - SCAM Marine d.o.o.
  - IHC Engineering Croatia d.o.o.
  - Brodogradilište Viktor Lenac d.d.
  - Interadria SC d.o.o.

***Focus Group Stakeholders**:*

- Primorje-Gorski Kotar County
- Faculty of Tourism and Hospitality Management
- City of Rijeka
- Business Club PartneRi
- Students' Council of Faculty of Engineering.

Greece

Modality: Questionnairs

- Additional companies: none
- Already interviewed companies:
  - Karel Boats Company
  - SAMMYACHT - For Smart Marinas and Yachters Company
  - Seatrips-Yachting & Maritime Training Company
  - Dynacomp Company
  - ROTA Shipping Company

Puglia

Modality: Questionnairs

- Additional companies:
  1. **Climb 3D Srls**

2. **Automation in Logistics and Service Systems s.r.l.**

- Already interviewed companies:
  - Bosch Tecnologie Diesel S.p.a. (Bari plant)
  - Organizzazione di Produttori Giulano Srl
  - AS Labruna Srl

Veneto

Modality: Workshop

- Additional companies:
  3. **Cantiere Navale Vittoria S.P.A**
  4. **Venezia Terminal Passeggeri S.P.A.**
  5. **Conepo Servizi S.C.A.R.L.**
  6. **Atroos S.R.L.**
  7. **Vf Elettronica S.A.S**
  8. **Marina Del Cavallino S.R.L.**
  9. **Marine Tech Ccyd S.R.L**

- Already interviewed companies:
  - Wiforce Italia S.R.L

Focus Group Stakeholders:

- VENETO LAVORO (Regional body for labor policies)
- VENETO INNOVAZIONE (Regional body for promotion and development of R&I)
- UNIONCAMERE VENETO (Regional Union of Chambers of Commerce)
- GALILEO VISIONARY DISTRICT (Science and Technology Park)

- FGP CONSULENZE (Business consulting)
- CUOA (Business school)
- UNIVERSITÀ DI PADOVA (University)
- UNIVERSITÀ IUAV VENEZIA (University)
- POLITECNICO DI BARI (University)
- UNIVERSITÀ CA FOSCARI VENEZIA (University)
- UNIVERSITÀ DI TRENTO (University)
- IFOA (Training and consulting body)

Annex 1 – Evidence of Indicator reached - Enterprises cooperating with the Project research institutions for the definition of the Technological Map of Shipyard & Nautical Logistic supply chain

Albania

1. Mediterranean Shipping Company MSC
2. Shega Trans sh.a
3. Finikas Company
4. Pelikan Ltd
5. LIBURN MARINA & MERCURY MOTORS ALBANIA
6. Pasha Liman Base- Shipyard
7. Kaldaja SH.a
8. Hudson sh.a
9. Denor Yachting & Decortion

1. Mediterranean Shipping Company MSC

The Company Interview was held on 25 September 2018 and was facilitated by "Mesdheu" Center of Tirana, Albania.

Mediterranean Shipping Company MSC Albania has an established fleet of 510 container vessels with an intake capacity of about 3.1 million TEUs. Their global sailing schedules cover 200 routes, calling at 500 ports, allowing them to deliver the cargo almost anywhere in the world.
Their sea freight offers are complemented by their integrated warehousing and haulage services, which offer a true door-to-door service.
As a company, MSC Albania's Mediterranean Shipping Company believes in operating as independent national carriers, this means they are able to offer a global service with unrivaled local knowledge.
The company has trained, experienced experts available for a full range of services including reefer, out-of-gauge, break-bulk and each of our trade services - each operating in tandem with the business. This gives the company the ability to uphold the personal service. MSC is globally recognized and offers peace of mind that we will be on hand to help whenever anyone needs.

- Have you taken action regarding industry 4.0?

The company has information about Industry 4.0, being the branch of the MSC Geneva-based Mediterranean Shipping Company, which extends its activity to many countries around the world, and the application of new technologies is indispensable. Mediterranean Shipping Company MSC Albania is not limited by the main company but has freedom to create software for data base management.

- Have you encountered difficulty in implementing industry 4.0? What kind?

Work processes are constantly updated because the business object itself requires it. There were no significant problems, but it was noticed that the international technology module was partly used in Albania.

- Has the region helped you implement the industry 4.0?

There have been no special policies that have favored or assisted the company in implementing new technologies. We think that Albanian state policies should be easier for companies operating internationally.

- What cost have you supported for adapting new technologies?

The costs supported by the Mediterranean Shipping Company MSC Albania have not been very high given the fact that the company is the one that manages the implementation of new technologies as well as their costs. The higher costs, such as the purchase of patents for use, are supported by the main company.
1. Advanced Manufacturing Solutions - Work and Progress
2. Augmented Reality - NO
3. Cloud - YES
4. Additive Manufacturing - YES
5. Big Data and Analytics - YES
6. Cyber-security – YES

Future Developments:
What is company policy with respect to industry 4.0? What are the objectives? Does the company have the industry's best standards or best practices and standards 4.0?
Mediterranean Shipping Company MSC Albania has in its objectives the continuous implementation of new technologies, focusing on what is most necessary for the company in carrying out its activity. Applying new technologies is inevitable. I think our company has acceptable standards for technological development in the country and the region.
Profiles Professional:

- Does the market meet the requirements of industries 4.0?

The company has had difficulties in recruiting specialized staff in specific areas of the shipping industry, and for this it has often referred to the human resource market, relying on the capabilities of its parent company.

- What are the gaps between the job and offer request?

The differences between the bid and the bid are those mentioned above, the company constantly requires skilled labor force but has not always managed to dispose of it within the borders of the country.

- Does the company provide training courses for staff?

Mediterranean Shipping Company MSC Albania continuously conducts trainings that are carried out in the work environment, generally once every two weeks or more often if needed. Given that one of the company's goals is to use human resources efficiently and in long periods of time, the training results are measurable.

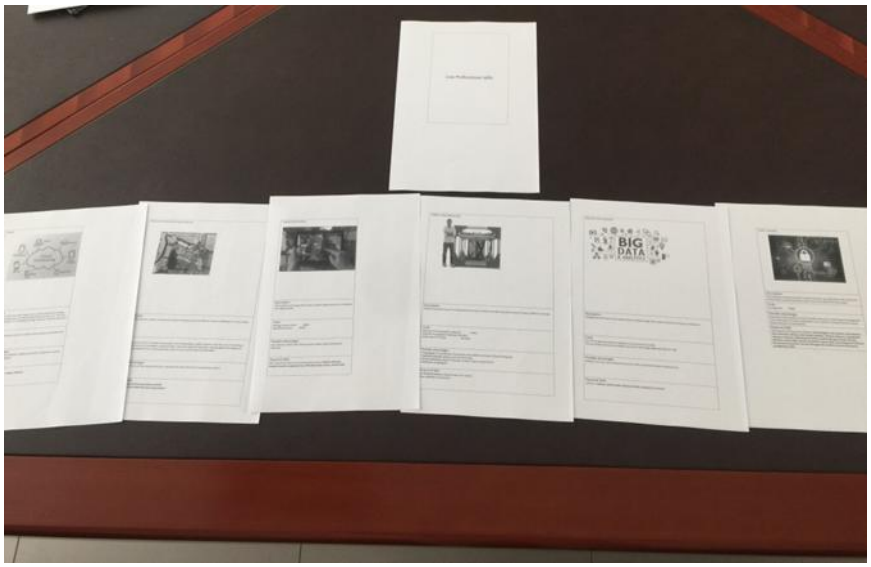
- Identify 4 (already existing or emerging) professional resulting from the development of Industry 4.0: What are the ideal Professional Profiles (Preferably for each company?)

The most requested profiles are:
Professional in shipping.
Engineer of Information Technology Development.
Engineer of Information Technology Development specifically in the field of transport.
Naval engineer.

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.

Low Professional skills
1. Cloud
2. Advanced Manufacturing Solutions
3. Augmented Reality
4. Additive Manufacturing
5. Big Data and Analytics
6. Cyber-security



2. Shega Trans sh.a

The Company Interview was held on 27 September 2018 and was facilitated by "Mesdheu" Center of Tirana, Albania.

Shega Trans Sh.a. is the most reliable partner in goods transport, for most of the largest and important businesses in Albania and beyond.
Shega Trans Sh.a. is a company that operates in the market for 15 years and is a company having an Albanian capital. The company operates in two main areas of international transport, road transport and container shipping, offering the highest and most important quality services within the time limit. Shega Trans Sha offers container shipping from any port of the world to Albania and vice versa. It has all the transport and processing capacities for this kind of transport, with a specialized staff that follows each step of the procedure until to the final destination of the load. The company also offers custom cargo services.
Have you taken action with regard to industry 4.0?

- Have you encountered difficulty in implementing industry 4.0? What kind?

The company has not had any difficulty since the implementation of new technologies emerges as stimulation from the market. The company has encountered difficulties with the supportive policies that should be offered with regard to the implementation of new technologies. The problems are related to the current legislation that does not provide facilities for Albanian companies operating in the field of shipping.

- Has the region helped you implement the industries 4.0?

The company has encountered some difficulties with state institutions since its requirements are not met with regard to the required procedures, which are more advanced than the services provided by the relevant Institutions. Also, often the company has encountered legislative barriers, especially with public administration, which have affected the non-timely completion of the work cycle.

- What cost have you supported for adapting new technologies?

The costs have been high due to the diversification of the company's business object, linking it to the fact that the company is wholly Albanian and must cover the costs of all patents for the use of new software.
1. Advanced Manufacturing Solutions - NO
2. Augmented Reality - NO
3. Cloud - YES
4. Additive Manufacturing – Work i progress
5. Big Data and Analytics - YES
6. Cyber-security - YES

Future Developments: What is Company Policy with regard to Industry 4.0? What are the objectives? Does the company have the best standards or best practices and standards in industries 4.0?
The company has its continuous technological development objectives, adapting it to the demands of the international market. Currently, the company is in constant contact with state institutions to obtain the necessary legal support and improve the quality of public service offered to the company.
Profiles Professional:

- Does the market meet the requirements of industries 4.0?

The company finds it difficult to find transport specialists because the market does not offer such specialists and the company is obliged to train them to create specialists in the field of shipping.

- What are the gaps between the job and offer request?

Currently, exports to Albania are at a minimum while exports are steadily increasing, and are the latest ones that bring advanced technology models. Precisely these new technological models require specialists in the field of maritime transport for which the market does not provide sufficient capacity.

- Does the company provide training courses for staff?

Staff training is one of the problems the company has. Universities in Albania do not offer profiles in such study programs to adapt to the labor market. The domestic market has no potential for great technological development.

- Identify 4 (already existing or emerging) professional resulting from the development of Industry 4.0: What are the ideal Professional Profiles (Preferably for each company?)

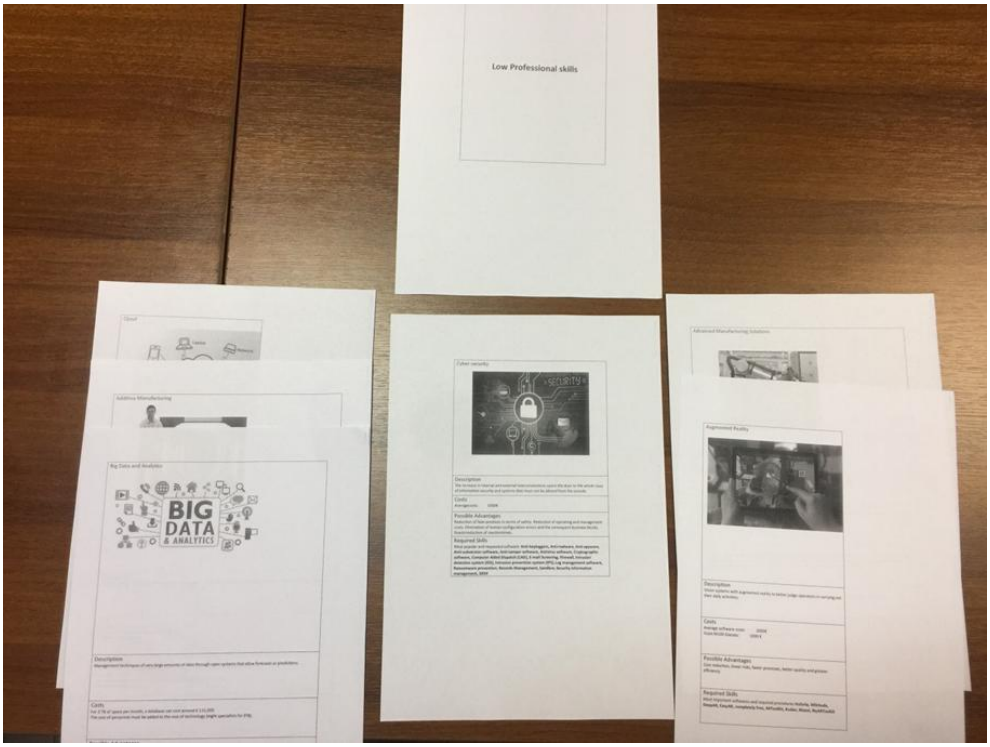
A transport specialist who must know all the procedures to be followed, the legislation that regulates this activity as well as the potential development of the industry.

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.

Low Professional skills

1. Cloud = Additive Manufacturing = Big Data and Analytics
2. Cyber-security
3. Advanced Manufacturing Solutions = Augmented Reality



3. Finikas Company

The Company Interview was held on 26 September 2018 and was facilitated by "Mesdheu" Center of Tirana, Albania.

Finikas line is a company which provides transport services for citizens in the city center of Saranda. Saranda is a city located in the South of Albania and it is valued as a city where tourism is the main route.
Finikas Ltd. covers tourism activities by conducting its transport to the island of Corfu in Greece and vice versa and bringing tourists along the Ionian and Adriatic coasts. As stated in its object, the company, in addition to its overall tourist and commercial orientation, it is focused on navigation, shipping, passenger transportation, and mending and navigation maintenance. Located in the south and in a city of tourism destination, its directions are for development and investment in the completion of tourist packages and modernization of its maritime and land services in fulfillment and satisfaction of its customers' service.
The fact that the Ionian and Adriatic seas lie in Albania where some states get wet, standards, and technical, technological and digital evolution are seen as a priority of time to cope with a growing competition stemming from the quality of services and the costs of these services.

Current state of the company: the company FINIKAS LTD operates on four ship, two of which are for passengers and the others for car transports and for other services in the function of tourism and other activities it covers. The object of the company activity is: Trade of industrial items, bakeries, building materials, fuel, wooden articles, import and export of them, wholesale and retail trade, shipping and road transport of goods and passengers, tourism activity , and solid waste lubricant cleaning services for ships and other navigational vehicles. Marine and tourist agency. Management agency. Piloting and managing. Insurance agent. Renting cars. International Road Transport for passengers. The company exercises its activity under the conditions of a competitive market and they are looking for their technological and digital revolutions. During their interview with the Fourth Technology and Digital Revolution, they were familiar with their demands and attended the meeting held in Corfu under the Interreg 4 project. They were familiar with the demands and started the application of the new technology in the company.

The application of new technologies: FINIKAS Ltd Company:

No	Technology	Status
1	Advanced Manufact. Solutions	NO
2	Augmented reality	NO
3	Cloud	YES+Work in progress
4	Additive Manufacturing	YES+Work in progress
5	Big Data and Analytics	YES+Work in progress
6	Cyber-security	YES+Work in progress

Technologies that do not know and do not use them are as follows:

a. Advanced Manufacturing solutions
b. Augmented reality

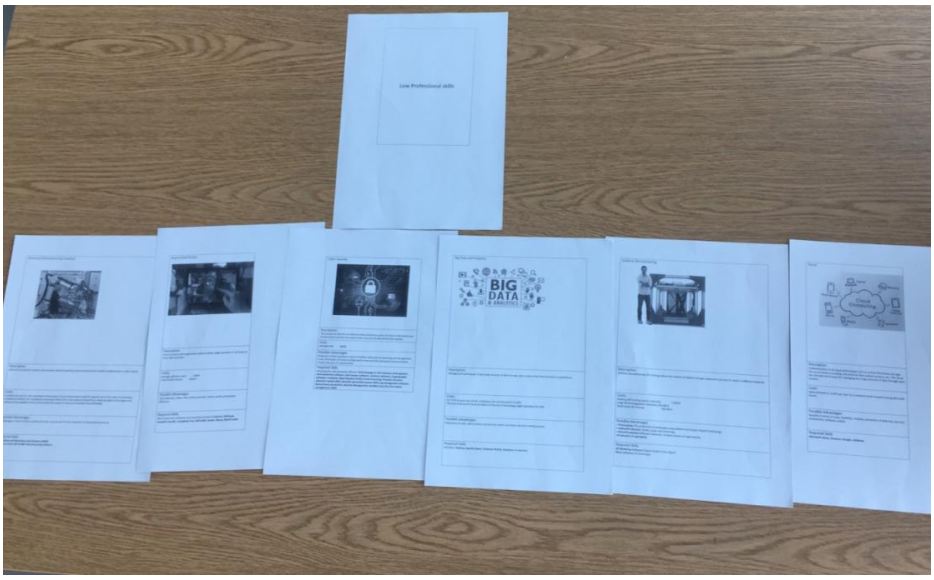
The technologies they use:

a. Cloud
b. Additive manufacturing
c. Big data and analytics

d. Cuber-security
e. Cloud

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.



4. Pelikan Ltd

The Company Interview was held on 27 September 2018 and was facilitated by "Mesdheu" Center of Tirana, Albania.

Pelikan Ltd was established on March 22, 1995, with scope of Logistics Services, forwarding, Shipping Agencies, Domestic and International Transport, warehousing, customs assistance etc. Since then, the company has been aiming at providing a complete service of full logistic chain with the highest possible quality for various import and export activities for its customers.
Pelikan is the main shipping and forwarding agent of Durres Port (Main port of Albania) and has been a reference point for all foreign investors performing activities in our country, by assisting their import of machineries, investments project cargoes etc. It has been part of realizing and implementing of Chinese industry in Albania like cement factories, mines, Hec, etc. by assisting, discharging, transporting to the sites of different projects. Pelikan counts in its assets and investments like more than 150 trucks, flat rack, , and all specialized machineries for minerals and container handling like front loaders, forklifts, reach stackers, specialized machines etc.
From 2008 onwards, Pelikan, has built the biggest dry terminal outside of Durres Port, specialized mainly for chrome ore minerals. Via this terminal of 100.000 square meters, Pelikan Ltd.controls most of chrome ore exports of Albania. This terminal is placed in a very good strategic position, only 5 km away from Durres Port and 1.2 km from the Tirane-Durres Highway recessing and export of Albanian chrome. Last years, Pelikan Ltd.controlled about 70% of chromium ore exports, an indicator of the role of our management and quality that our company has in this field. At least the same figures are expected for 2018. Actually, they are extending the warehouse with 8,000 m2 covered bonded warehouse, and 12,000 m2 opened are for project cargo.
Taking in consideration their experience in connection with the main actors of chrome industry in Albania, their role as guarantor between miners and international buyers, and their good name as independent forwarders in the country, make them be part of chrome industry, by bringing their contribution to a new professional level. They think that their decision to enter in this industry by building factory to produce ferrochrome in Durres Area, nearby the zone of operation, is in line with all indications of today trend of world economy and specifically with interests and incentives of the country.
Regarding the application of industry 4.0, the company has taken measures in using it since it is a necessary tool for the services they offer. At the beginning, they have encountered difficulties in finding and purchasing the licensed programs in Albania and therefore, their big challenge was purchasing them abroad. In addition, another problem of industry 4.0 implementation was untrained staff, which did not have any prior knowledge how to use these technologies.
The implementation of these technologies in logistic services has been based upon the best practices and standards of the regional countries. In order to adapt the necessary technology for the company, they have put a considerable amount of money in terms of improvements, updates and service cost. From time to time, the company has to maintain and update all this technology system so that they can be in coherent with recent developments and follow the new innovation in the benefit of the company. Thus, work processes are constantly updated because the business object itself requires it. There were no significant problems, but it was noticed that the international technology module was partly used in Albania.
There are few companies which offer logistics services in Albania because Albanian labor market does not offer study programs in specific fields such as logistics, transport, etc. and as a result, finding a trained staff with qualified professional skills is really hard for these types of companies. Therefore, the company offers periodic training to its staff according to their profiles and field of expertise, so that they can make use of industry 4.0 easily and facilitate in company services.
According to the company, the most preferable professional profiles are import and export agent, logistic, and operative agent.

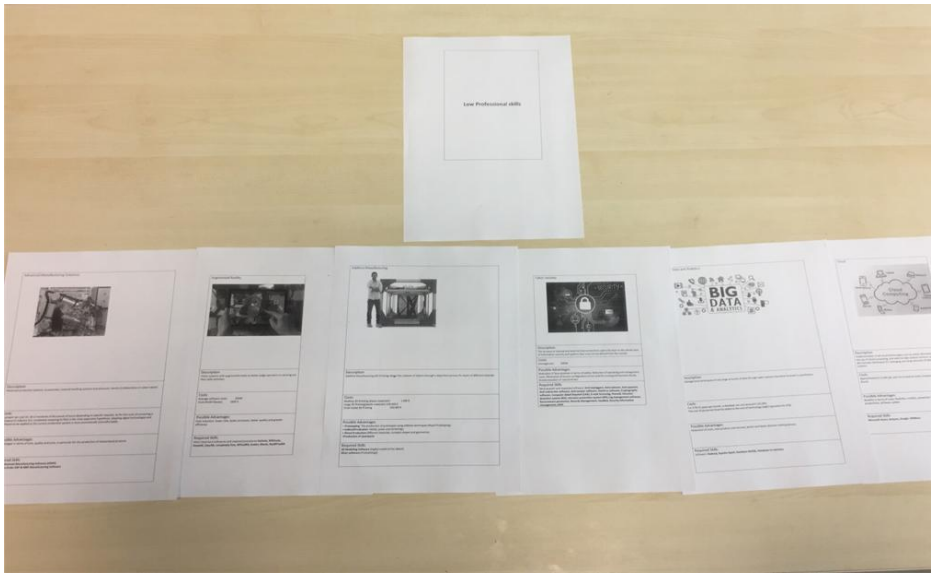
The application of new technologies:

Technology	Pelikan Ltd
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
AugmentedReality	Yes ☐ No ☒ Work in progress ☐
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☒ No ☐ Work in progress ☐
Cyber-security	Yes ☒ No ☐ Work in progress ☐

The types of technologies that are not used by the company:
c- Advanced Manufacturing solutions
d- Additive Manufacturing
The types of technologies used by the company are as follows:
a- Augmented reality
b- Cloud
c- Big data and analytics
d- Cyber security

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.



5. LIBURN MARINA & MERCURY MOTORS ALBANIA

The Company Interview was held on 15 July 2018 at company office and was facilitated by Chamber of Commerce and Industry of Tirana.

"LIBURN MARINA & MERCURY MOTORS ALBANIA" is new company (only 2 years in market) started with just a hand full of well experienced. "LIBURN MARINA constantly striving to improve its line of product, company manufacture fiberglass boats to fit almost all the boating needs, including fishing, recreations.

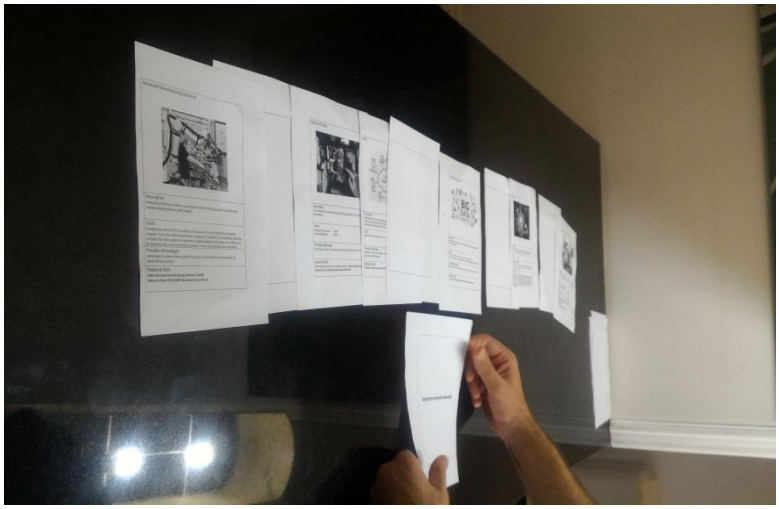
Company always dedicated to the concept of innovative, high performance boats for the fishing community recreational boating people and those who need a service of a boat. The boats are 100% Albanian products.

The application of new technologies:

Technology	LIBURN MARINA & MERCURY MOTORS ALBANIA
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
Augmented Reality	Yes ☐ No ☒ Work in progress ☐
Cloud	Yes ☒ No ☒ Work in progress ☐
Additive Manufacturing	Yes ☒ No ☐ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☒ Work in progress ☐
Cyber-security	Yes ☐ No ☒ Work in progress ☐

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.



6. Pasha Liman Base- Shipyard

The Company Interview was held on 17 September 2018 at company office and was facilitated by Chamber of Commerce and Industry of Tirana.

Pashaliman Naval Base, located near Vlorë, has been used by the Albanian Navy from the 1950s. In that time it was one of few naval bases in the Mediterranean. Currently, four retired Whiskey-class submarines previously owned by the Soviet Union are still located on the facility alongside Albania's active-duty naval vessels. Three of the Albanian Navy's four Damen Stan patrol vessels were built at Pashaliman, the most recent completed in 2014. The Naval Force often operates naval exercises in the Bay of Vlorë, out of Pashaliman. The most recent exercise was in April 2016. A civilian naval engineering firm and shipyard also operate out of the military facility at Pashaliman.

Recently the second of a series of four Damen Stan Patrol Vessels 4207, going by the name of 'Oriku', has been finalized in the Pashaliman Shipyard in Vlorë (Albania) and delivered to the Albanian Coast Guard. The third Stan Patrol Vessel (SPa), called 'Lisus', is presently under construction. The Spa's were ordered by the Albanian Ministry of Defence. Their main purpose is to execute patrol duties and Search and Rescue missions in the territorial waters. The project included extensive knowledge transfer and the reconstruction of a naval shipyard.

The first ship of the Stan Patrol 4207 project was built in the Netherlands and delivered to the Albanian Coast Guard in August 2008. Frank de Lange, sales director South, North and West-Europe at Damen Shipyards, recalls: "When the first Stan Patrol, the 'Illyria', arrived in the Durres harbour it received a great ceremonial welcome. People were deeply touched, some of them having tears in their eyes."

The project also included the thorough reconstruction of the Vlorë Naval Shipyard and the building of a new assembly hall, in which vessels as large as 60 meters can be constructed. Both projects were handled by Damen Services. The whole operation has been carried out under the late ORET program of the Dutch Ministry of Foreign Affairs. Its objective was to support sustainable investment in infrastructural projects in developing countries.
Building locally

Under the Damen Technical Cooperation (DTC) concept the complete, prefabricated material packages for the construction hall and the patrol vessel were sent to Albania. The well-proven and standardised material packages can be used to build a Damen-designed vessel according to the builder's own wishes and requirements and at a shipyard in the customers' country. Often, these building 'kits' include instruction and supervision from Damen teams during assembly, as was the case with this project.
Knowledge transfer

The assembly hall stands tall. During the first year there was a permanent Damen team in Vlorë of eight people to train and assist their Albanian counterparts in the building process. The transfer of their working skills to the local workers was one of the key success factors of this project. In order to enhance their skills several Albanian teams visited Damen's HQ in Gorinchem (The Netherlands) to receive intensive training and instruction. On return, they trained their colleagues. The result of this knowledge transfer is that all one hundred people currently working at the Vlorë shipyard are now qualified and, where applicable, certified. They have mastered a wide range of specializations in construction techniques, be it in steel, aluminum or electrics.

The application of new technologies:

Technology	Pasha Liman Base- Shipyard
Advanced Manufact.Solutions	Yes ☒ No ☐ Work in progress ☐
Augmented Reality	Yes ☐ No ☐ Work in progress ☒
Cloud	Yes ☐ No ☒ Work in progress ☐
Additive Manufacturing	Yes ☒ No ☐ Work in progress ☐
Big Data and Analytics	Yes ☒ No ☐ Work in progress ☐
Cyber-security	Yes ☒ No ☐ Work in progress ☐

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.

7. Kaldaja SH.a

The Company Interview was held on 20 September 2018 at Tirana International Hotel Premises taking the chance that the expert was present there and was facilitated by Chamber of Commerce and Industry of Tirana.

Kaldaja sh.a is a company with a large activity in the mechanical industry sector since 1969 and has consistently maintained the same structure of product, even after its change in stock company in June 1998 and its full privatization in November 2001.
Situated in the industrial area of Durres, Kaldaja sh.a has a large establishment of 8'500 sqm, and 6'200 sqm covered surface. It is positioned strategically between three main ways that go throughout Albania, near the Highway connecting with Tirana and Kosovo, as well as near the Highway that goes to the southern cities of Fier and Vlora, favorably it is also located only 1km away from the Port of Durres.
In 2008, from "KALDAJA" sh.a company , a new company was born "DR-KALDAJA" sh.p.k, which is specialized mainly in installations and out of the workshop works.
Including the technical-administrative personnel both companies altogether have a workforce of permanent employees of approx 40 persons with an average age of 36 years old, from which 4 engineers (mechanic, structural and environmental), 4 technicians with 30 years of experience, 3 accountants with middle and higher qualification and 28 production workers.
With today's number of employees and inventory of existing machinery it can achieve a working volume (production and installation) of 60-100 ton/month and with an increased workforce we can achieve up to 120-200 ton/month , this assuming we increase by 50% the number of our permanent employees.
Routine maintenance is key activity of company in area of shipbuilder. Kaldaja sh.a can provide the skills and materials necessary to keep boat and ship in top working condition
Partial lists of services offered:

- Steel & Aluminum Repair/Fabrication/Welding
- Repower & Align Engines
- Remove & Renew Generators
- Steel/Stainless/HDPE Plumbing & Pipefitting
- Installation & Renewal of Propulsion & Rudder Seals
- Repair, Renew, & Maintain Rudder Systems

The application of new technologies:

Technology	Kaldaja
Advanced Manufact.Solutions	Yes ☒ No ☐ Work in progress ☐
Augmented Reality	Yes ☐ No ☒ Work in progress ☐
Cloud	Yes ☐ No ☒ Work in progress ☐
Additive Manufacturing	Yes ☒ No ☐ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☒ Work in progress ☐
Cyber-security	Yes ☐ No ☒ Work in progress ☐

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.

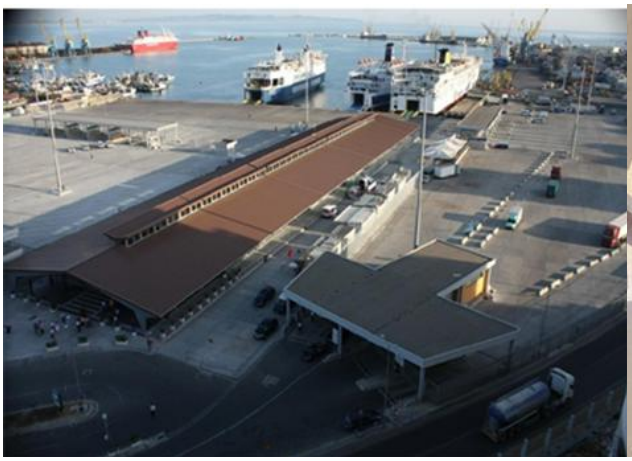
8. Hudson sh.a

Company experience based on build and helped build different types of steel structures and buildings, including the construction and assembly of 25.000 m² metallic warehouses, with and without cranes, and production plants of several dimensions and purposes.

FUEL INDUSTRY
One of the fields we operate in is also the construction and maintenance of fuel tanks and technological lines and fire security systems for the companies, we also produce other vessels under pressure for this industry as well as oil distribution tents.

STEEL CARPENTRY
We work with steel carpentry, we have a wide range of commissioned products, and high capabilities in production range and quantity.
We work for the internal and European market and have steady business relationships with our clients.

VARIOUS SECTORS
Working for other industrial companies we have often produced structures for various industries including: Silos of various capacities,
bridge structures, overpasses, but also with piled foundations, maritime constructions, cranes, naval structures etc.



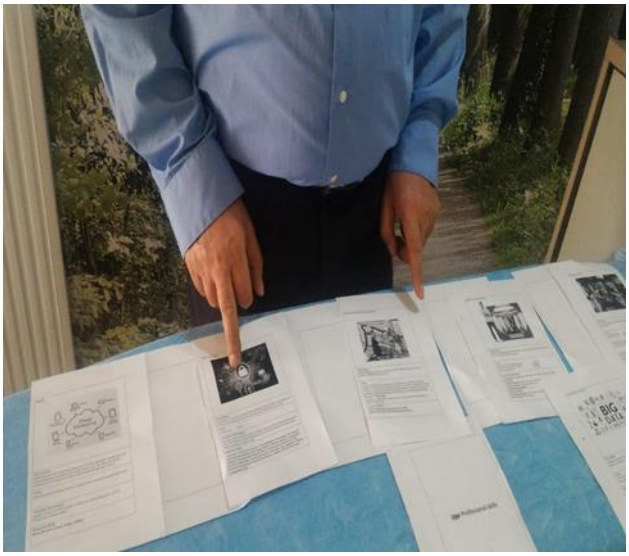

The application of new technologies:

Technology	Hudson
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
Augmented Reality	Yes ☐ No ☒ Work in progress ☐
Cloud	Yes ☐ No ☒ Work in progress ☐

Additive Manufacturing	Yes ☒ No ☐ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☒ Work in progress ☐
Cyber-security	Yes ☐ No ☒ Work in progress ☐

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.



9. Denor Yachting & Decortion

The Company Interview was held on 25 September 2018 at company office and and was facilitated by Chamber of Commerce and Industry of Tirana.

Company experience is more than 20 years, combined with workmanship, qualitative and sustainable materials, guarantees to make the Yacht. Company work with projects with a contemporary technology, which guarantees the final results.

Company start by projecting the Yacht in an accurate way according to her proposal. After choosing the right type of wood, implementing the machines and needed engines, electronic circuits, furniture components, etc. Company proceed with the detailed manufacture process. Depending on the size and special details, a Yacht takes 1 – 2 years to be ready.

Denor Yachting & Decortion System is designed to measure and control the draught of ships and vessels during the loading process. One of the most important factors in evaluating draught, trim and list are the measuring points used. In its standard configuration, the system uses four level sensors: one each at the bow, stern, mid-ship port and mid-ship starboard. The signals generated from these four reference points work in concert to determine draught and horizontal position. The draught measuring system (DMS).

The DMS is a fully electronic PLC based measuring system, designed to measure and control the draught of ships and vessels during loading or moving at low speed. Barksdale UPA2-LMK-457-GL submersible pressure transmitters are used for the exact draught measurement. The transmitter has a housing manufactured in CuNiFe, IP68 rated, providing reliable protection against humidity as well as high resistance against the corrosive influences of seawater or brackish water.

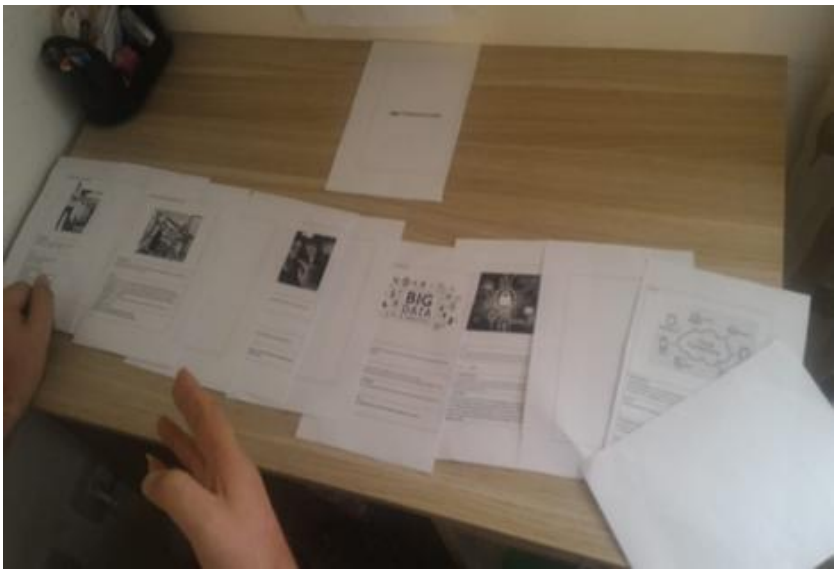
The application of new technologies:

Technology	Denor Yachting & Decortion
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
Augmented Reality	Yes ☐ No ☒ Work in progress ☐

Cloud	Yes ☐ No ☒ Work in progress ☐
Additive Manufacturing	Yes ☒ No ☐ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☒ Work in progress ☐
Cyber-security	Yes ☐ No ☒ Work in progress ☐

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.



Croatia

1. JLM Perković d.o.o.
2. SCAM marine d.o.o.
3. IHC Engineering Croatia d.o.o.
4. Interadria SC d.o.o.
5. Brodogradilište Viktor Lenac d.d.

1. JLM Perković d.o.o.

On behalf of the Primorje – Gorski Kotar County, Aestus d.o.o. conducted interview on 10th and 11th October 2018.

JLM Perković is a company with over 30 years of experience in converting marine engines, and a well-known manufacturer of marine gearboxes. The company does mostly job production, and for small quantities like this the machines used are not as important as the people operating them.

The technology they would be interested in is not profitable yet. JLM Perković is currently undergoing process of implementing ERP which will be operated by all the employees. When implementing new technologies, they find investing in employee education on how to use them a crucial part.

They hope to receive financial support from the Structural Fund and the Cohesion Fund. The perception of the company is that it is easier to find an engineer than a CNC operator with finished high school. Engineers tend to avoid using the machines, but they must get experience on it as part of educational process in the company. Additional educations are growing in importance.

The application of new technologies:

Technology	JLM Perković
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
AugmentedReality	Yes ☐ No ☒ Work in progress ☐
Cloud	Yes ☐ No ☐ Work in progress ☒
Additive Manufacturing	Yes ☒ No ☐ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☒ Work in progress ☐
Cyber-security	Yes ☒ No ☐ Work in progress ☐

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.

2. SCAM marine d.o.o.

On behalf of the Primorje – Gorski Kotar County, Aestus d.o.o. conducted interview on 10th and 11th October 2018.

SCAM marine is a company manufacturing and exporting of marine engines, marine generators, high quality boat equipment with optimal prices for domestic and export markets. Their plans entail connecting the machine park with technical office, and possibly build laboratory for testing in the future. The projects are currently on hold because there were no adequate professional profiles in production. Long-term plan includes getting a 3d printer to be used for prototypes.

The workers must be available to process the data sent from the technical office, and not a lot of them are able to do so. Investing in a new technology is only seen as initially high cost, that wouldn't pay off because of not enough people who would be able to work on it to put it in function for longer than one daily shift. Sending an employee on that sort of education is perceived as expensive because for a long period of time neither the employee or the machine he operates are in function. However, employees are often sent on educations because the formal educational system doesn't follow technological development.

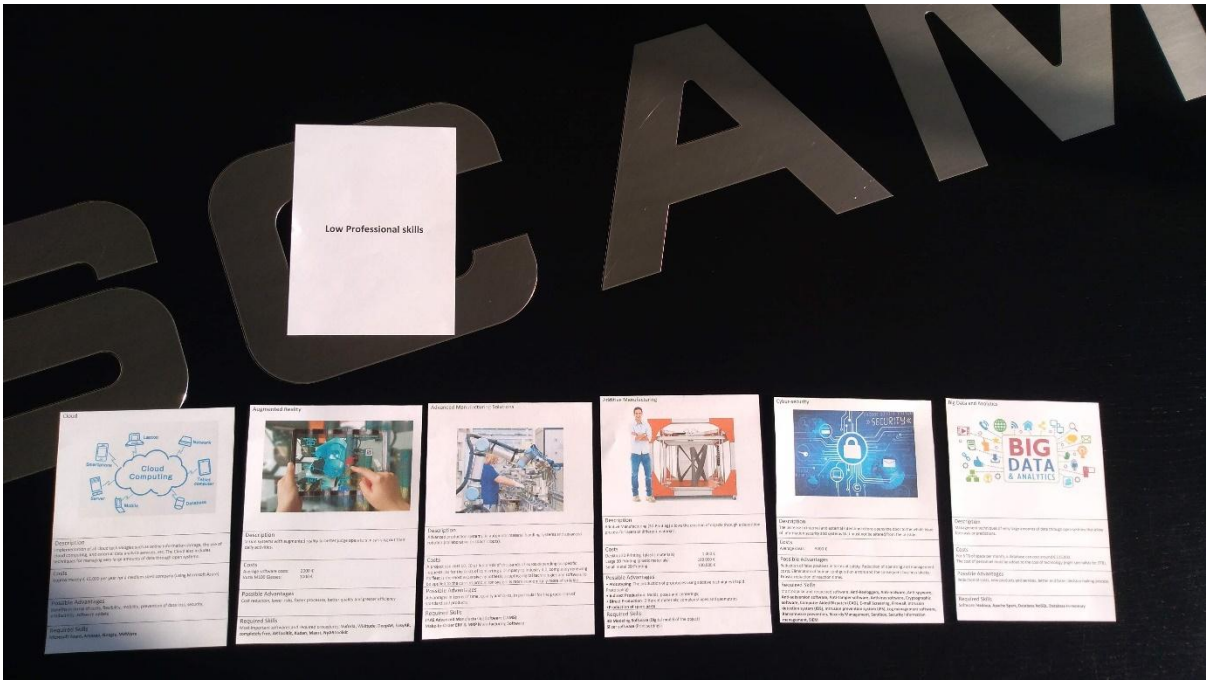
The application of new technologies:

Technology	SCAM marine
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
AugmentedReality	Yes ☐ No ☒ Work in progress ☐
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☒ No ☐ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☒ Work in progress ☐
Cyber-security	Yes ☐ No ☐ Work in progress ☒

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.

The technologies are ordered from the one that requires less Professional skills to the one that requires more Professional skills.



3. IHC Engineering Croatia d.o.o.

On behalf of the Primorje – Gorski Kotar County, Aestus d.o.o. conducted interview on 10th and 11th October 2018.

IHC Engineering Croatia (IEC) is a subsidiary of Dutch-based company Royal IHC. The headquarters in Netherlands are the centre of development and testing new technologies, so only the ones that turn out to be profitable get to be implemented in the subsidiary. Currently IHC Engineering Croatia is testing possibilities of implementing Augmented Reality in their production.

Professional profile for using the technology will be engineers with interest and experience in 3d modelling and developing. Additive Manufacturing is in use in the headquarters, but not in the subsidiary. Cyber security is completely taken care of by the headquarters and has strict rules to avoid misuse. Big Data is implemented on a level of analysing past projects on a deeper-than-excel level. While Advanced Manufacturing solutions have no perspective in the engineering work of this kind, Additive Manufacturing and Augmented Reality are related to the core business, and Cloud, Cyber-security and Big Data are seen as more of supportive systems.

The company feels no gap on the job market because for every opening there are a lot of highly educated candidates applying, and believe it has lot to do with being on the list of best employers and enabling their employees' constant education and support. The one thing they note is missing knowledge of modern software when it comes to fresh graduates.

The application of new technologies:

Technology	IHC Engineering
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
AugmentedReality	Yes ☐ No ☐ Work in progress ☒
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☒ No ☐ Work in progress ☐
Cyber-security	Yes ☒ No ☐ Work in progress ☐

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.

The technologies are ordered from the one that requires less Professional skills to the one that requires more Professional skills.

4. Interadria SC d.o.o.

On behalf of the Primorje – Gorski Kotar County, Aestus d.o.o. conducted interview on 10th and 11th October 2018.

In Interadria SC, a small shipbuilding company, there are no smart technologies implemented in production process. The company feels no need to implement them and are not very acquaintance with the possibilities of using, for example, a 3d printer for prototypes. However, there is a plan to get a new machine if the finances are gained through the Structural Fund and the Cohesion Fund.

In case of getting the new manufacturing machine the company would hire more of existing professional profiles; mechanics, electricians, and plastic craftsmen. The company feels the gap of the job market when hiring craftsmen. They educate them through internships while the potential employees are still in school and later educate their employees yearly on mechanical topics.

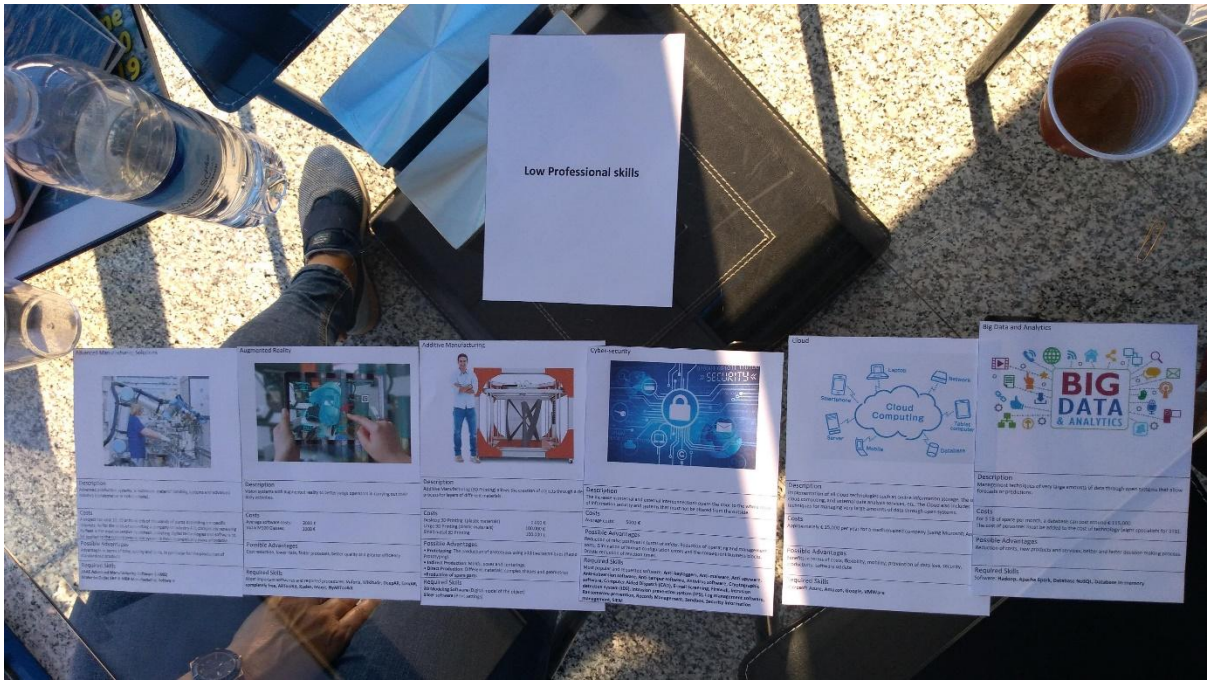
The application of new technologies:

Technology	Interadria SC
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
AugmentedReality	Yes ☐ No ☒ Work in progress ☐
Cloud	Yes ☐ No ☒ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☒ Work in progress ☐
Cyber-security	Yes ☒ No ☐ Work in progress ☐

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.

The technologies are ordered from the one that requires less Professional skills to the one that requires more Professional skills.



5. Brodogradilište Viktor Lenac d.d.

On behalf of the Primorje – Gorski Kotar County, Aestus d.o.o. conducted interview on 10th and 11th October 2018.

Shipyard Viktor Lenac is a large-sized company, employing over 500 workers. It is specialized for ship repair, conversions and offshore.

The company currently doesn't plan to invest in Industry 4.0 technologies. From listed technologies, only Cyber-security is fully implemented and on a high level because of international business orientation, whilst applying Cloud technologies is currently in progress. The company feels the biggest gap on job market is concerning manufacturing work force.

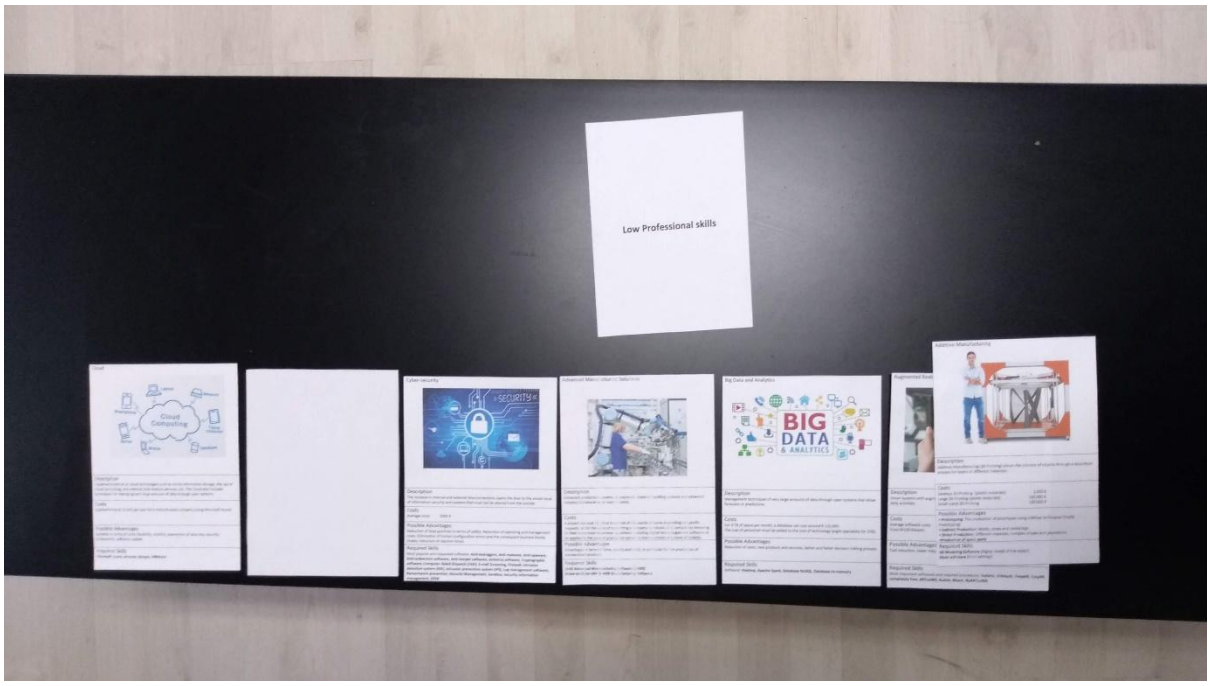
Through the conducted interviews it is notable that the subjects see the upsides of Industry 4.0, but don't forecast it being employed in their production processes in the near future. One of identified motivators is what the trends are in competing companies, so implementing the technologies in the rest of the region, and by their business partners, can possibly speed up the industrial change in shipbuilding industry in Croatia.

The application of new technologies:

Technology	Viktor Lenac
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
AugmentedReality	Yes ☐ No ☒ Work in progress ☐
Cloud	Yes ☐ No ☐ Work in progress ☒
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☒ Work in progress ☐
Cyber-security	Yes ☒ No ☐ Work in progress ☐

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.

The technologies are ordered from the one that requires less Professional skills to the one that requires more Professional skills.



Greece

1. Karel Boats Company
2. SAMMYACHT - For Smart Marinas and Yachters Company
3. Seatrips-Yachting & Maritime Training Company
4. Dynacomp Company
5. ROTA Shipping Company

1. Karel Boats Company

LMS and Chamber of Achaia Prefecture conduct interview to Karel Boats on 3/10/2018 with Nicolaos Karellas (CEO).

Karel Boats company is back from 1977 where George Karelas began his activity as a boat builder at Kotroni Patrwn. At 1985 the company stopped production of old fashion fishing boats and the new planning boats are introduced with the ability to plane with 15Hp. After three years the range of boats for karel boats is increased with central console boats and 1 cabin 5,4. His son Nikolaos Karelas, graduate of Southampton Solent B.Eng Yacht and Powercraft Design Course and with work experience at Fletchers International and other shipyards at UK , joined the company. New methods and models are made with co-operation with famous British model makers and the range is being expanded. At 2007, George Karelas the younger, graduate of Patras economic course and with personal experience on boat construction, joined the company as well. Karel boats today is building boats with aesthetics and function being improved depending on the market demands and technical team experience.

Karel Boats Company declare familiar with the use of Additive Manufacturing and he states that 3D printing introduction to the company is in his direct plans. This occurs also with Advanced Manufacturing Solutions and AR. Cyber Security and Cloud Systems are already used for the safe storage of company's material. At last, the introduction of Big Data and Analytics have considered indifferent for the company.

The application of new technologies:

Technology	Karel Boats
Advanced Manufact.Solutions	Yes ☐ No ☐ Work in progress ☒
AugmentedReality	Yes ☐ No ☐ Work in progress ☒
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☐ Work in progress ☒
Big Data and Analytics	Yes ☐ No ☒ Work in progress ☐
Cyber-security	Yes ☒ No ☐ Work in progress ☐

Which of the above technologies of Industry 4.0 require the less professional skills and which more? Nikolas Karelas believes that additive manufacturing training and implementation requires the most professional skills by far, then advanced manufacturing is following having a major gap from the first. Cyber security is placed after Advanced having a pretty gap in terms of professional skills requirements. Though, there are following AR, Big Data & Analytics and at least Cloud having less professional qualifications than the others.

Professional Skills

2. SAMMYACHT - For Smart Marinas and Yachters Company

LMS and Chamber of Achaia Prefecture conduct interview to SaMMYacht on 2/10/2018 with Spyros Mazarakis (Electrical Engineer).

SAMMYACHT - For Smart Marinas and Yachters Company. Sammy is a smart app in the world of yachting marinas, aspiring to be the ultimate travel companion for yachters, skippers and marina administrators. it supports e-booking services, navigational & parking assistance features and mobile guidance to the nearby coastal areas. Sammy combines different technologies and services to an integrated powefull & realtime platform that hosts multiple yachting marinas, connecting them with the yachting community. Sammy's advanced technologies transform a regular Marina into a 'Smart' one. A Multi-purpose sensor grid consisted of waterproof wireless sensors is enrolled in order to feed a central system and provide booking, meteorological & environmental information. These services are facilitated through the installation of different types of sensors (ultrasound, meteorological, water quality, wave measurement etc.) which collect data and monitor the conditions within the Marina in real-time.

SaMMY company already has used a Cloud based infrastructure that is exploited for serving a large number of marinas. Furthermore, Cyber Security Systems are already used for the safety of systems and information, as well as Big Data and analytics technology that is used for the monitoring of marines and vessels in real time from sensors and data acquisition systems. Nevertheless, it is observed that the utility of Advanced and Additive manufacturing as well as AR is indifferent for the company.

The application of new technologies:

Technology	saMMY
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
AugmentedReality	Yes ☐ No ☒ Work in progress ☐
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☒ No ☐ Work in progress ☐
Cyber-security	Yes ☒ No ☐ Work in progress ☐

Which of the above technologies of Industry 4.0 require the less professional skills and which more? SaMMY company consider that the first technology with high skills requirements is Augmented Reality and the next in line is Big Data and analytics with an importance gap from cyber security that is next. Advanced manufacturing, Additive manufacturing and at last Cloud computing are following having less professional skills requirements, in a descending order.

Professional Skills

3. Seatrips-Yachting & Maritime Training Company

LMS and Chamber of Achaia Prefecture conduct interview to Seatrips – Yachting & Maritime Training on 11/10/2018 with Spyros Krotsis (CEO).

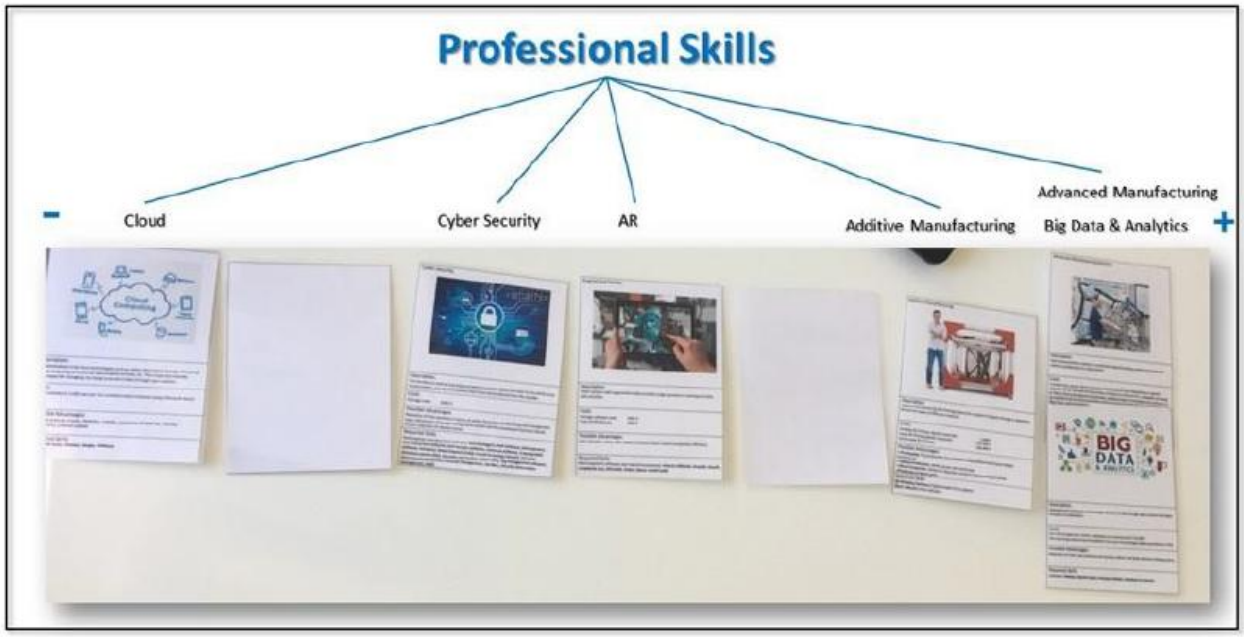
Seatrips-Yachting & maritime Training is in the yacht industry since 1995 providing a real and unique experience of the life, customs, history, culture, food and nightlife of Greece and making it a trip of a lifetime. Company's Mission offers maritime training, yacht charters and tailor made quality travel solutions to clients. With family or friends, celebrating a special time, on a team building trip, for training or pleasure, giving a unique real taste of Greece.

Seatrips has already used a cloud based infrastructure that offers maritime training, yacht charters and tailor made quality travel solutions clients. Cyber Security Systems are already used for the safety of its systems and information. The development and implementation of Big data systems, that can monitor vessel in real time and analyses ship performances and navigation data, and AR for design and support customization of Yachts are in progress. Nevertheless, the usage of Advanced and Additive manufacturing is considered indifferent for the company.

The application of new technologies:

Technology	SeaTrips
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
AugmentedReality	Yes ☐ No ☐ Work in progress ☒
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☐ Work in progress ☒
Cyber-security	Yes ☒ No ☐ Work in progress ☐

Which of the above technologies of Industry 4.0 require the less professional skills and which more? As for professional skills requirements Advanced manufacturing and Big Data & Analytics are placed first with the same importance. Next is following Additive manufacturing, while AR and Cyber Securing are pursuing having the first a pretty difference in terms of professional skills importance with additive. Cloud manufacturing is in the end having a quite difference from CS and as well.



Professional Skills

4. Dynacomp Company

LMS and Chamber of Achaia Prefecture conduct interview to Dynacomp aebe on 12/10/2018 with Theodoros Tsoubelis (CEO).

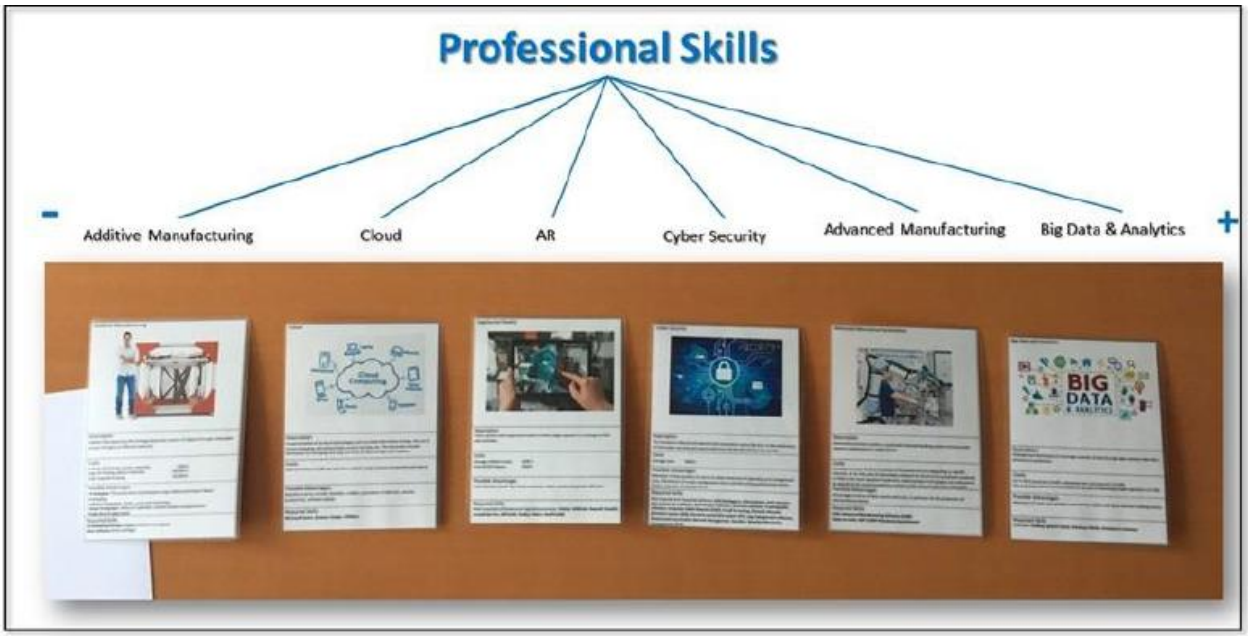
DYNACOMP S.A. is a company offering integrated software and hardware solutions within the frames of new ICT technologies. Company is specialized in studying, design and development of integrated systems and it offer high tech integrated services on data processing, computer and network infrastructure, smart energy management and renewable sources of energy. The objective of DYNACOMP is not only to offer and support integrated software solutions, but also to provide to client's technological superiority on Information & Technology sector and on high tech systems. Dynacomp continuously focus on innovation believing on simplicity and not on complexity.

Dynacomp solutions is based on Cloud and Big Data technologies and on AR at beginning level. Dynacomp develops a Reporting system and business intelligence (BI) via the use of Hybrid Cloud. The system regards the creation of a flexible and adaptable solution, enhancing the operational capabilities of the enterprise by exploiting Communication and Technology Information. Through the electronic processing and production management information, in parallel development with a Web Portal can provide information both for sellers and officials as also for the company's administration and for even more. Nevertheless, the implementation of Advanced and Additive manufacturing is indifferent for the company.

The application of new technologies:

Technology	Dynacomp
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
AugmentedReality	Yes ☐ No ☐ Work in progress ☒
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☒ No ☐ Work in progress ☐
Cyber-security	Yes ☒ No ☐ Work in progress ☐

Which of the above technologies of Industry 4.0 require the less professional skills and which more? As for professional skills Big data and Analytics is the first of requirements. Next is listed advanced manufacturing Cyber security and AR in a decreasing order, while cloud and additive manufacturing are placed after with additive technology at the end of the list having the least requirements.



Professional Skills

5. ROTA Shipping Company

LMS and Chamber of Achaia Prefecture conduct interview to ROTA SHIPPING on 23/10/2018 with Pylarinos Petros (CEO).

ROTA Shipping company was founded in 1983. It is mainly active in Shipping Agency services and also in brokerages of international transport companies and General Tourism services. It is able to cover the needs of their clients towards all the ports of the Adriatic and Europe. Company specifically, provides ship brokerage services, logistic space services, excellent services for trips and holidays and professional renting services as well.

ROTA Shipping is a company that provides brokerage services, shipment management solutions and also services in organizing consumer holidays. It is clear that all the services are provided through computing system, so the usage of cloud and cyber security systems is necessary for current existence and development of the business. The implementation of Big data and analytics technology is ongoing due to the fact that big data application can provide logistics and transportation optimization safety and energy efficiency improvement. For the company Advanced manufacturing, AR and Additive are considered indifferent.

The application of new technologies:

Technology	ROTA
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
AugmentedReality	Yes ☐ No ☒ Work in progress ☐
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☐ Work in progress ☒
Cyber-security	Yes ☒ No ☐ Work in progress ☐

Which of the above technologies of Industry 4.0 require the less professional skills and which more?
According to ROTA the most demanding technology in terms of professional skills is AR and then Advanced Manufacturing, Additive manufacturing is following having a pretty difference from the previous, then Cyber security is getting place having a quite importance difference from previous. At last, Big Data & Analytics and Cloud are located with the same importance at the end, considered that they are having the least professional qualifications.


Professional Skills
Big Data & Analytics
Cloud
Cyber Security
Additive Manufacturing
Advanced Manufacturing
AR
-
+
BIG DATA

Puglia Region

1. Bosch Bari
2. Francesco Divella S.p.A
3. Giuliano Puglia Fruit
4. AS Labruna
5. Explosion Marine Srl
6. Climb 3D Srls
7. Automation in Logistics and Service Systems s.r.l.

1. Bosch Bari

ZONA INDUSTRIALE - VIA DEGLI OLEANDRI, 8/10
70026 MODUGNO (BA) ITALIA

Interviewees: Eng. Carmine Vox, Director Powertrain Solutions Bari Plant - Manufacturing IT & Innovation Health, safety and environment Protection security
Eng. Scarpetta Claudio Giuseppe

The Bosch Group is a leading global supplier of technology and services. It employs roughly 400,500 associates worldwide (as of December 31, 2017). According to preliminary figures, the company generated sales of 78 billion euros in 2017. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT company, Bosch offers innovative solutions for smart homes, smart cities, connected mobility, and connected manufacturing. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source. The Bosch Group's strategic objective is to deliver innovations for a connected life. Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is "Invented for life."

Bosch already has a strategic partnership with Politecnico di Bari, established with the rector Eugenio Di Sciascio (whose representatives are the professors Soria, Ruta and Pontrandolfo). Bosch is one of the big companies that are part of the team supporting the Center of Competence, promoted by the Ministry, both from the point of view of production as well as engineering and design. Their function within the center of competence is to develop and carry out the expertise within that field by assisting small businesses, thus spreading the culture of the company.

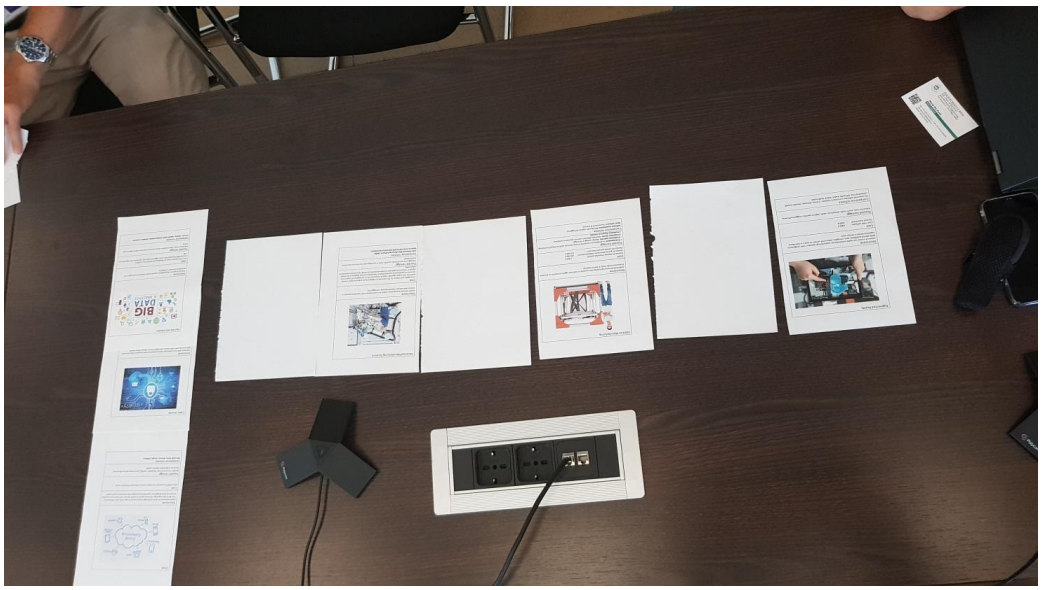
Technologies
ADDITIVE MANUFACTURING (3D): Bosch does already apply it; there are 2-3 working 3D printers. For now they are printing plastic material with carbon fibers (they are not in production, since 3D printing is not suitable for mass production because of costs). We're talking about small 3D printing (desktop 3D printing) and currently do not plan to go large because they do not need it. In this context they have a collaboration with Robooze, which has also made available its machinery (here we speak of composite fibers), to print therefore small pieces. Of skills required in Bari there are to excess, but if they were missing they could ask outside or the Head Office.
ADVANCED MANUFACTURING SOLUTIONS: in the Bari branch in Bosch there are no collaborative robot relationships, while in Germany, yes. There are also some cases of employment. In Bari there is no need to invest in collaborative robots. The leading principle in selecting their projects (or even ideas coming from the workshop) is that there is a PBP of at least less than 2 years. In the robotics field they are carrying out a project of AGV, therefore robot for automatic transfer of material. In this project there is a collaboration with companies and local authorities, for a loan of € 2 million, which will end in 2019 when it goes into production
AUGMENTED REALITY: Currently there isn't any application; they have evaluated a maintenance project at central level (therefore in Germany), but at the moment it has been frozen.
CLOUD & BIG DATA: At the central level, we are moving towards a cloud platform, with the aim of putting on the platform the software that will then be used by the various plants to process data. There is a lot of work being done on this at a central level, not with little difficulty, since we have to collect and unite different needs, also from the hardware point of view. In fact, it starts from a very heterogeneous situation regarding the machines, and the first step is to take data from the machines, take them out and send them to the cloud. In Bari data collection has been done for many years on the assembly, also for a need for traceability of products, so this approach has been around for 20 years. Now these data are available on the central servers, and once they are available on the databases they are processed using software, so they are brought with data analysis, trends etc. Through a new product being implemented, it will soon be possible for Bari to connect directly to the Stuttgart server. A university collaboration is in progress aimed at studying the machines, making predictive analyzes that can provide indications on the useful life and breakage of the machine; later

we will try to predict the breaking of the tools. They are also collaborating with SKF because they as bearing manufacturers have developed powers and technologies that allow to verify and predict, on the basis of the dilational analysis, what the life of the bearing may be. Therefore, the Politecnico of Bari gives theoretical support (dilation analysis etc.), Bosch which gives the operational support with the machines (as regards the project with SKF). They also pay the license software.
CYBER SECURITY: Bosch has a very closed network; Bosch is big: it has 300 plants all over the world, 400k employees, so if it were to connect externally it would create chaos. An external PC cannot be connected to Bosch. Bosch does not use other software; the central decision of the software, which are then shared worldwide and so on. This can also be a problem because it takes away a bit of flexibility.

Technology	BOSCH
Advanced Manufact.Solutions	Yes ☐ No ☐ Work in progress ☒
AugmentedReality	Yes ☐ No ☒ Work in progress ☐
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☒ No ☐ Work in progress ☐
Big Data and Analytics	Yes ☒ No ☐ Work in progress ☐
Cyber-security	Yes ☐ No ☒ Work in progress ☐

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.



QUESTIONS

- **Did you receive regional or national or European incentive funds?**

Many funds have been received to implement industry 4.0; Emiliano (the president of the Puglia region) went to the company several times and said: ask me anything you want and I'll give you the money; more regional and European funding has been received

- **Professional profiles: does the labor market in Puglia meet the requirements of Industry 4.0?**

Yes. They consider themselves lucky to have the Polytechnic of Bari as a partner, in the sense that there are many engineers graduated every year; currently they are in a cyclical crisis so they cannot hire due to the diesel crisis

- **Professional profiles: are there gaps between supply and demand?**

Yes, since Software engineer are very required

- **Does the company provide staff training courses?**

Yes

- **Identification of [four] (already existing or emerging) professional profiles resulting from the development of Industry 4.0**

Computer scientists, Software engineer, electronic engineers, mechanic engineer, mechatronic engineers, automation engineers

2. Francesco Divella S.p.A

LARGO D. DIVELLA, 1
70018 RUTIGLIANO (BA)

Interviewee: Enzo Marrone, Energy Manager presso F. Divella Spa

Francesco Divella S.p.A. is an Italian company operating in the food sector. It produces durum wheat semolina pasta, biscuits, vinegar, olive oil, rice and sauces.
The company was founded in 1905, when the founder Francesco Divella built the first mill for grinding wheat in Noicattaro (BA), a small agricultural town in the center of the vast Apulian plains, a place of hard wheat cultivation.
In the factories of Rutigliano and Noicattaro (where a total of 900 employees work, every day 1000 tons of durum wheat semolina, 350 tons of soft wheat flour and 700 tons of pasta are produced.The company exports its products all over the world. .
The managing director is the entrepreneur Vincenzo Divella.

Technologies
First of all, Cyber security is very important to avoid data leakage.
The 6 technologies are all important; some of these are already used because they are not all completely innovative. Maybe robotization is a bit behind other nations because we have a labor cost that is still very affordable compared to other countries, so the investment on robots is left out when it is obviously not essential. An account is a production line, an account is a packaging line, an account is the management of logistics flows within a warehouse. Within a warehouse the flow can be managed or totally robotized and therefore in total automation, or it can be managed with a mixed system, therefore partly automated, partly with men and vehicles, or only with men and vehicles. The choice is more than anything related to a question of investment costs. It is normal that at this moment with everything that is out of measure "Iper Ammortamento-Hyper Depreciation", Industry 4.0 and more, investment in automation has certainly become much more affordable for everyone. It is normal that with robotization you can gain precision, but you lose flexibility because everything is still controlled by software, and if you block the software anyway for a couple of hours the company is still. With men this is difficult, so you lose flexibility, while in precision you certainly earn a lot, both in the management of the First in First out, both on the management of inversions, both on the handling of manipulations. So robotization, at least for the Italian industry, is a point of arrival, at least for Italian companies.
AR: The virtual management of faults is certainly extremely important because it avoids the direct maintenance on the machines, because through this management you can also control a robot, make an intervention on a machine, without there being a man who intervenes directly. From a security point of view, the risks are lowered considerably, without touching the social part, because it is true that there is no worker on the machine, but there is a specialized operator who governs the tablet and the robot.
As for the robotization (ADVANCED MANUFACTURING SOLUTIONS), they will start with the management of storage with AGVs in December, even if you still have to look at the social side because having any workers hired, you cannot decide to drastically pass everything automatically . It is also important to understand the strength and everything that employees have given so far. This is a new technology, because it was presented at the last fairs in Düsseldorf and Stuttgart in the logistic field; there is also the management of the positioning in the vertical warehouses that is done now directly through a reader without directly positioning a piece with the hands inside the warehouse.
CLOUD: The interconnection of IPs with all the various phases of the industrial process already exists, as already exists the BIG DATA and DATA ANALYSIS, because the forecasting model is at the basis of a correct management of the flows. They could not have a planning of the correct production if they did not have a forecast management of the output volumes. The strength of this type of analysis is precisely that it is a dynamic model, and therefore through algorithms it is continuously updated, also in relation to delivery dates and to a whole series of variables that are put together.

CYBER: security as mentioned above is at the base of every company and everyone would be interested in being shielded from the outside and not having problems of data leakage.
ADDITIVE MANUFACTURING: is the least important (but only) from their point of view as far from their field

Technology	DIVELLA
Advanced Manufact.Solutions	Yes ☒ No ☐ Work in progress ☐
AugmentedReality	Yes ☐ No ☐ Work in progress ☒
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☒ No ☐ Work in progress ☐
Cyber-security	Yes ☒ No ☐ Work in progress ☐

Card Game

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.

QUESTIONS
Have measures already been adopted concerning Industry 4.0?
what difficulties did not allow its implementation?
Difficulty none: with Industry 4.0, if someone did not want to go to automation, he had big help and big incentives. European colleagues will give different results because they are ahead of Italy
regional policies?
Of projects on Industry 4.0 the referent does not believe he has made any, apart from a regional call. He remembers having done everything with the POR (Regional Operative Programs) so no project with Industry 4.0. Industry 4.0, however, foresees an innovative phase, which must be linked to the realization of a prototype, which should also be patented. This is a problem because looking at other

nations, which are ahead, it makes no sense to make prototypes, so risking a European project only by manipulating data is risky: everything has already been invented!

Future developments: company policy on Industry 4.0
As for robotization, the process regarding the logistic nature is starting; the industrial process is already almost all automated at almost 60%.
As for the use of virtual reality, the referent thinks that it is the future of the company so they will certainly be interested in operations of this type because also for the safeguard of security we are going increasingly in that direction.
Big data & cloud computing are already implemented, the cyber is implemented but it is never enough, so we will continue to study new solutions.
Additive Manufacturing does not interest.
Professional profiles:
the referent accuses a flattening of the engineer's figure, in the sense that he has forgotten that the engineer's mindset is to solve problems. Surely the robotization part is badly studied, perhaps because it takes a lot of practice.
The university should start a more complete training.
The company in terms of training costs: if a person devoted 2 hours a day to train people, the accounts would not square. Substantial help should be given to companies, because if these should take the place of staff training, this help they give to their staff must be recognized in some way. If a person were to devote 2/8 hours of their day for staff training, for example, there should be other people who for the 2 hours replace you in your job and therefore the company has to consider an increase in personnel, and therefore it suffers a cost. This cost must be recognized. This type of thing cannot be left to the choice of the company, but within each company it would be necessary to identify professional figures and tell the company that by force, by ministerial directive, must dedicate full hours of its professionals to train the students university students who are graduating. A measure of this kind clashes with what is now university education, otherwise the Masters would lose their usefulness. So this should not depend on the benevolence of companies or tutors but must depend on the ministry. Even the internship is not useful because everything depends on the benevolence of the tutor. It is useful and desirable for a professional like him to go to university to make seminars based on his experience, things neither professors nor books can explain. We must therefore "connect" the university and the company.
4 professional profiles ideal for the implementation of Industry 4.0:
the required profiles are however of an economic or engineering nature. Of an economic nature because in any case for Industry 4.0 a project must be managed both from a financial point of view and from a feasibility point of view. From a mechanical point of view certainly mechanical and computer, but there is a very interesting discipline that is mechatronics.

3. Giuliano Puglia Fruit

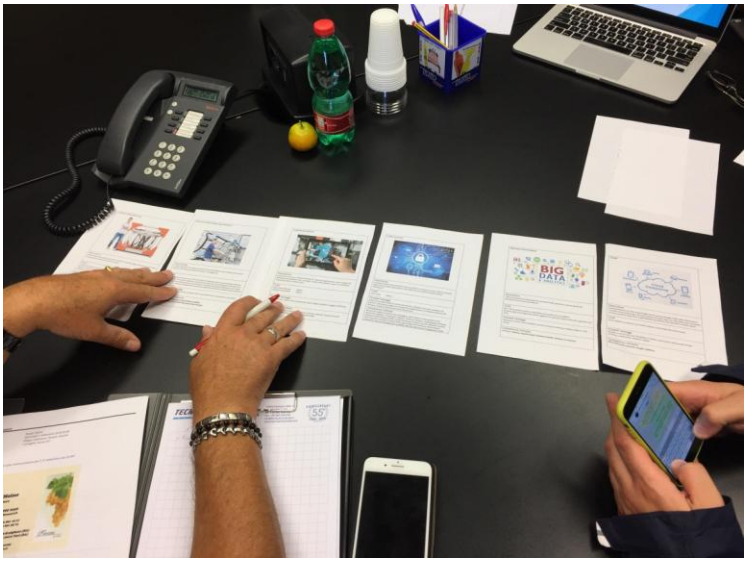
STRADA PROVINCIALE 65 KM 4.8,
70010 TURI BA

Giuliano S.r.l. is born in the year 2000 with the intent to continue and develop the commitment of the Giuliano brothers in the fruit and vegetable sector, which in the past had in Puglia Fruit the corporate and commercial reference.
The company is located in the countryside of Turi, a territory renowned for its fruit and vegetable vocation. The production plant is spread over a total area of over 70,000 square meters, where all the latest technologies are concentrated, which allow the best products of the earth to stay young and fresh for a long time and to conserve their nutritional qualities with vigor. To guarantee the quality of the products placed on the market, the production and subsequent packaging take place in strict compliance with all food regulations, carefully selecting the products through strict quality criteria. Part of the marketed production comes from the family farms, located in suitable and strategic areas of Puglia that allow the availability of early and late ripening products. Almost 1000 hectares of table grapes, peaches, melons, apricots, citrus fruits and salads certified according to the standards of good agricultural practices "Global G.A.P" and "Nurture".

Introduction to technologies
Of the machines that are in the company, many are already remotely connected and exchange data with each other; there is a process of control and production already automated, but only concerns some assets of the company, for example the production of cherries; as regards the production and harvesting of grapes, it is a little different because it would require greater control.

Card Game Analysis
For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.

Ordering the technologies from the one that requires the most (in this case Additive Manufacturing) to the one that requires less. On the left we find those that have more than the required skills: does the company use that technology to hire a person who has low or high skills?
3D printing: not needed at the moment; in the future it could also be interesting to create certain types of particular packaging. AR: it would be interesting to have a device such as a handheld that projects the necessary information



QUESTIONS
Have measures already been adopted concerning industry 4.0?

yes, the cherry grader;
Are you planning to adopt them?
Yes, in the field of automation: as well as that on fresh products, a future investment on refrigeration and on the movement of fruit stands automatically in a huge cell is also planned to prevent the worker from entering. In the future they will be oriented on Cloud. At Cyber Security there is already something (cloud and cyber security are well suited to each other). As for the AR, we plan to implement it in the future, but for now the interest is marginal.
Have you received regional or European subsidies?
For cherry grader they made a Hyper Depreciation and used the tax credit that had been raised to 25%. Being a large company, the percentages that are going to be asked are always lower than SMEs, which has often held back investments. Thanks to Industry 4.0 they managed to recover at least a little bit, but in the past the big companies never had anything. There was PSR 4.2 (Support for tangible and intangible investments for processing, processing and marketing, carried out by processing / processing companies aimed at improving the profitability, competitiveness and sustainability of farms), which finally did something even for large companies, but the formula Iper amortization + business credit more suited. In their case the idea was the automation of a computerized and electronic system of goods storage, which is not done all year round but in 3-4 months. This is one of the last things that remains to be done in the company, because as regards the calibrators were also purchased those for other fruit in addition to cherries; grapes cannot be mechanized. All this automation is at the expense of quality and flexibility, instead gaining traceability.
Professional profiles
there is a good part of the staff that is already ready for technological challenges. If there is a need to have dedicated people, the problem will be addressed. It would still be necessary to train people. If you could replace manual dexterity with the electronics or mechanics, it is clear that you will need to take courses. However, it would be a reconversion of the staff currently employed that must be passed from the mere manual to the use of the computer, but this is very difficult in the reality of the company.
4 ideal professional profiles:
it is a question of adapting figures already present in companies, therefore reconversion of personnel to preserve the staff even socially. But the question arises: to use Cloud and similar technologies, you do not need different minds ?! The answer is yes in theory; in practice, anything related to information systems has been entrusted to third parties. Engineering or highly specialized figures would be unsuitable, at best a computer engineer or an electronic would be needed to supervise the entire project concerning storage and handling.

Technology	Giuliano
Advanced Manufact.Solutions	Yes ☒ No ☐ Work in progress ☐
AugmentedReality	Yes ☐ No ☒ Work in progress ☐
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☒ No ☐ Work in progress ☐
Cyber-security	Yes ☒ No ☐ Work in progress ☐

4. AS Labruna

CONTRADA SANTO STEFANO N. 72
70043 MONOPOLI (BA)ITALY

Interviewed: Massimo Labruna

Founded in 1971, today AS is a company that specializes in two main strategic business areas:

ENERGY
Diesel engines for industrial, agricultural, rail, automotive, marine applications
Diesel generator sets
Marine propulsion systems

MOVEMENT
Hydraulic truck mounted cranes
Loaders
Aerial platforms

For these two areas AS has high qualification and know-how with exclusive goal: the full satisfaction of the specific requirements of the Customer, realized with continuous innovation, personalized products and solutions for quality, safety, functionality and convenience, prompt and organized technical assistance in after sale.

In addition to its line of products, AS is also official dealer of:
FPT (Fiat Powertrain Technologies, formerly IVECO Aifo, for diesel engines and generator sets;
Ing. Bonfiglioli for cranes;
Colombo for aerial platforms
For all products AS also provides spare parts, components and accessories, consulting and experienced technical assistance.

Thanks to solid organization in all production processes, from design to construction, AS aims to solutions of maximum productivity,
savings in fuel consumption and simple maintenance, according to a winning balance between quality and safety, always operating in an environmentally and all applicable regulations .

The Quality Management System since 1994 is certified according to ISO 9001 and renewed annually. In addition, since 2008 AS has adopted the Ethics Code.
In Puglia there are some shipyards that make boats with outboard motors so up to 12-14 meters, especially in Lecce; it is fiberglass boats. In the professional sector there are construction sites that build in wood and steel. The main sites are in Monopoli, Molfetta, and there is someone in Margherita di Savoia and Lesina, who build boats for professional use. In Puglia, the accessories sector is very strong: in the Lecce area, there are companies that build stainless steel components, ie boats, tanks, handrails, walkways, supports for boats, air conditioning systems for boats (we speak of production, not marketing). Then there is the fast rubber boat sector, of which an example is the company Explotion Marine; in Manfredonia there is another shipyard that builds fast inflatable boats with very high costs. As for propulsion there is Isotta Fraschini in Bari, which belongs to the Fincantieri group; then there is the company in question that in addition to being FPT distributors (FIAT Power Train), has its own line of marine engines and a system of marine propulsion patented by them which is an eco-friendly system as it can also be in the diesel-electric hybrid configuration. This is produced in one of the company's 2 locations, where these marine engines are assembled starting from the Iveco crankcase, while the propulsion system is their own.
As for the perception of Industry 4.0 in the boating sector, at least on production processes in Puglia (except perhaps Isotta Fraschini on production lines), it is presumably very low. Labruna is carrying out a project called Mare 4.0 with a StartUp that deals with IT and with Dell as a partner for the hardware, where essentially on their engines have mounted a data acquisition unit; this data is sent

to a server through various types of connections such as GPRS or satellite if it goes beyond 12 miles, and all the information acquired is used not only to perform engine maintenance, but also predictive maintenance. So if, for example, there is an abnormal pattern of oil consumption, there may be a problem with the engine piston rings. If they see the fuel supply pressures starting to drop, it may be time to change the filters. From the use of similar data, therefore, predictive maintenance is made, as well as obviously the location of the vehicle. The idea is to give the customer the engine of the right power for the mission that they have. Often there is a tendency to over motorize boats, which means that the engine does not work in full efficiency but that it consumes even more than necessary. In summary, therefore, the idea is to analyze the data, and in addition to making a predictive maintenance see exactly the absorptions during a medium work cycle, so that with the next re- motorization the right size can be recommended or confirm the same.

Regarding the 3D printing of prototyping, this is often used to make model boats here in Puglia, because there are some design studios. Among other things, there is the Micad Srl (a Design House active in all related industries) based in Trieste and Brindisi which is a design company. On the production lines, apart from the fact that they are almost all professional production orders (so nothing in series) on the fiberglass molds of small boats there is nothing. However, it is all very artisanal.
Regarding other technologies:

- cloud platform: that of the project we spoke about (Mare 4.0) so this technology is already implemented
- cyber security: they have very basic procedures

From the point of view of **skills**, have there been any difficulties? In the context of the 4.0 no project: 3 companies met, each of which had its own engine competence. There was therefore no need to go and take external expertise.
Have there been sufficient **incentives**? There is a national incentive. From the regional point of view there are financing instruments where the investment for Industry 4.0 can also be included. In Puglia there are and we must know how to exploit them.
From the point of view of adjustment for new technologies, has there been an economic effort to make this kind of project? This was quite simple, again with regard to Mare 4.0. in Puglia the production situation (naval) is still very artisanal, it is not of a standard type as may be other types of production which, however, in Puglia has greatly benefited from Industry 4.0 as interconnection of machinery and so on. For the boating industry, being very artisanal work, it becomes very complex to be able to enjoy Industry 4.0: everything is very much in demand of the craftsmanship of the person rather than the machinery. The use of labor is very present. What we can do on the other hand is the interpretation of all the data of all the production processes.
Is it possible to identify professional profiles? The problem of boating in Puglia splits a bit 'from the speech 4.0: despite the Apulian nautical market is very flourishing and also represents a major share of export turnover, there are not the right skills just on the boating. The nautical skills in themselves are lacking, also because the 4.0 strand is complementary, it triggers below. The Polytechnic of Bari itself is very oriented towards big players like Bosch, Getrag, etc., but has never devoted much space to the nautical discourse. It would probably be a sector that could be profitable from an employment point of view. Apart from the aforementioned Micad there is perhaps only one other body.
They would need specializations or degree courses that focus on nautical. There has been no innovation in the sector in Puglia, also because the incentives have come to be lacking, new people approaching boating. Same for Calabria and Sicily; Campania is a bit better, but only with regard to some types of boats. We would need technicians and engineers as well: most of the shipyards in Puglia have the design of the boat, but the design is very empirical to the detriment of the boating design that the boat would need. In fact, while on the road it is very easy to predict the absorption of the load, for boats the propeller is never an exact calculation: we refer to the systematic series of similar models, so it is an approximation that goes behind a threshold of uncertainty that requires a certain professionalism and the nautical industry suffers from the lack of this. Everything is very

artisanal, so it could be improved with more pushing craftsmanship.

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.

All the technologies require high professional skills; however AR and CYBER SECURITY require more because they are more particular and less widespread

Technology	Labruna
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
AugmentedReality	Yes ☐ No ☐ Work in progress ☒
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☒ No ☐ Work in progress ☐
Cyber-security	Yes ☒ No ☐ Work in progress ☐

5. Explosion Marine Srl

via Giovan Battista Pirelli NC
70019 Triggiano (BA) - Italy

Interviewee: Alfredo Russo

Explosion Marine is a builder of boats and dinghies.

2012 has been a bad year for the Apulian nautical sector for political / financial reasons. The pre-existing shipyard, with a history of contractors (built for a Milanese brand with a fairly serious history), was taken over by the owner and by friends with a similar passion. It is a matter of reloading: they are built dinghies, not boats.

With a unique project (at the time even unique in the world) because of the unique technological and innovative characteristics for a dinghy, the company in question is a start-up from October 2015. They build from the raw material up to the product finished. They bring the product under vacuum (packed, all closed), they deliver it in water. It pays particular attention to the environment, being careful not to disperse chemical substances. Jobs of the pre-existing shipyard have been restored; currently there are 24 employees within three working years. Turnover starts to become important, they work with foreign countries and gradually, after detecting machines already present, they are moving towards a modernization of these, some of which have already been replaced, also looking at the sphere 4.0 which is currently the object of study.

The company was born on its own and continues to operate alone, without any contribution from the state and the region. Young workers are favored, even if they are facing many difficulties in training: it would be necessary to have a serious training program in terms of manpower, which is not there. Within the company, from the point of view of qualifications, they also have middle management qualification “quadri”in the accounting and in the project part; until recently there were two engineers: currently there is only one but they are looking for another one. Even for the highest qualifications there are staff shortages: a solution is to draw from experience, even though in this field in Puglia there is not much and therefore it becomes a very rare matter. Training staff is very difficult, as is looking for it.

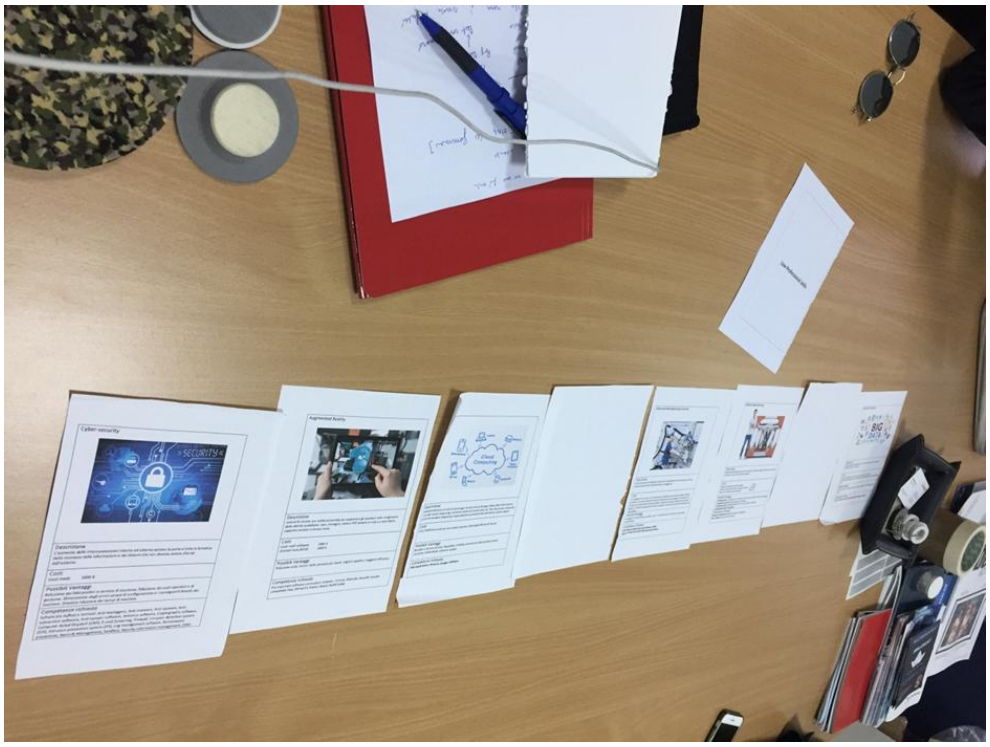
Currently 3 boys have been included under the age of 29, but it took 6 months to get them to approach the subject. Forming means dedicating time; their training recognized a quid to trained personnel, which involved expenses and the company's willingness to invest. Human resources are the first investment of a company: if you do not have human resources, you will not go anywhere. In the meantime, a second company has been opened, for which the speech 4.0 has already been dealt with because it is the company with which the synthetic material that replaces PET for the coating of boats is marketed exclusively for Italy; they are certified and work is performed by them. This is a material of US origin, covered by numerous patents. For this reason they are providing special drills and numerical control benches. They are investing a lot and having excellent results focusing on the quality and the outside of the Italian market, while in Italy we encounter many difficulties in the nautical sector.

Technologies
3D: the company knows the technology and have already used it
Advanced Manufacturing Solutions: they would like to adopt it, if it were possible
AR: it is already far ahead as a technology so it becomes a little more difficult for them; the possible applications could be identified in their activities (rather than maintenance) of re-fitting the inflatable boats of their customers

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.

Which of the following technologies according to the perception of the company require more professional skills?
Surely Big Data require more training; Cyber security puts it at the end because it is not a business skill but is outsourced.
The machine has not been used for a long time due to the fact that the CNC machine has not been used for a long time.
AR is a bit premature. Cloud use it from every point of view, even for administrative management; however it requires less professional skills as it is more intuitive.



QUESTIONS

Have measures been adopted concerning Industry 4.0?
Not at the moment; 3D printing has been used but through external support to the company

Are there any difficulties in implementation? What kind?
• Difficulty of costs
• Difficulty in finding qualified personnel, such as special coachbuilders, people who work fiberglass, who knows how to make infusions etc.

Did you receive any kind of subsidies?
No, absolutely nothing; this year they are registering for the Industry 4.0 national list

Would the costs of adapting existing technologies to Industry 4.0 be large?
To adapt yes; it would be more advantageous to replace them completely. This requires a concrete and substantial economic aid. Through periodic check you could reward meritocracy, achieving results. The company's success in the Refitting business derives from the quality of its work and the skills acquired. At the same time they are very expensive, perhaps the most expensive in Italy. They

have created labour that is not around. Nobody builds outboard boats in the water.
You need the skills to deal with any job, whether it is technologically advanced or not. Once upon a time there were training schools that instruct young people to a trade. Today there are many qualified but less practical people. It would be appropriate to convey the two things: even a mechanic can be a graduate, it is also good that he has theoretical knowledge for his work. Engineers are not very practical, even from the point of view of practical thinking. School and university should work in this sense.

According to you in Puglia there are the professional figures that you would need?
Not in Puglia

How is a new figure trained in your company?
When a young man enters the company, he makes 15 days of observation; then a tutor is appointed according to the sector of belonging and the various phases of the construction of the boat; after 6 months the person begins to become autonomous. Working in a sector means becoming autonomous, taking responsibility for oneself, making mistakes only once

4 professional roles
In 4.0 world, he is useful anyone who is able to make these technologies work, so that he can be a machine operator, an engineer, who inserts or extracts data from a machine that makes him a worker or more qualified staff, from this point of view, it is not very relevant (ie machine operator, engineer, project development or data entry in a machine). No naval address is required.

Technology	ALFREDO RUSSO
Advanced Manufact.Solutions	Yes ☐ No ☐ Work in progress ☒
AugmentedReality	Yes ☐ No ☒ Work in progress ☐
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☒ No ☐ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☐ Work in progress ☒
Cyber-security	Yes ☐ No ☐ Work in progress ☒

Additional companies involved in the LOCAL FOCUS GROUP for Puglia area, additional to those already interviewed, are the following**:**

6. **Climb 3D Srls**
7. **Automation in Logistics and Service Systems s.r.l.**

Climb 3D Srls

Climbing sockets and volumes

Automation in Logistics and Service Systems s.r.l.

AutoLogS S.r.l., whose name stands for Automation in Logistics and Service Systems, is a spin-off company founded in 2013 and supported by the Polytechnic of Bari and the University of Trieste.

It is the first university spin-off company with two Italian Universities as members.

Core Business

The core business of AutoLogS is:

- developing innovative services and smart solutions based on ICT tools,
- developing and providing services and tailored products related to:
    - advanced Decision Support Systems,
    - feasibility studies,
    - management, modelling of complex problems,
- development of custom-made optimization and simulation components.

Know how

The know-how of AutoLogS is specifically focused on:

- Optimization
- Simulation
- Modeling
- Automation
- ICT solutions
- IoT applications
- Mobile apps development

Description of the Focus Group

On the basis of the results obtained from the research on Industry 4.0 conducted in Puglia, the Polytechnic of Bari has developed a questionnaire ad hoc and forwarded it to a sample of Apulian companies made up of 5 medium-small companies.

Feedback from questionnaire

Below are the results of the questionnaires proposed to the companies which have given a feedback. First of all, it was asked to provide the business name of the company and the role in the company of the person who compiled the questionnaire:

It results that the roles for each companies are:

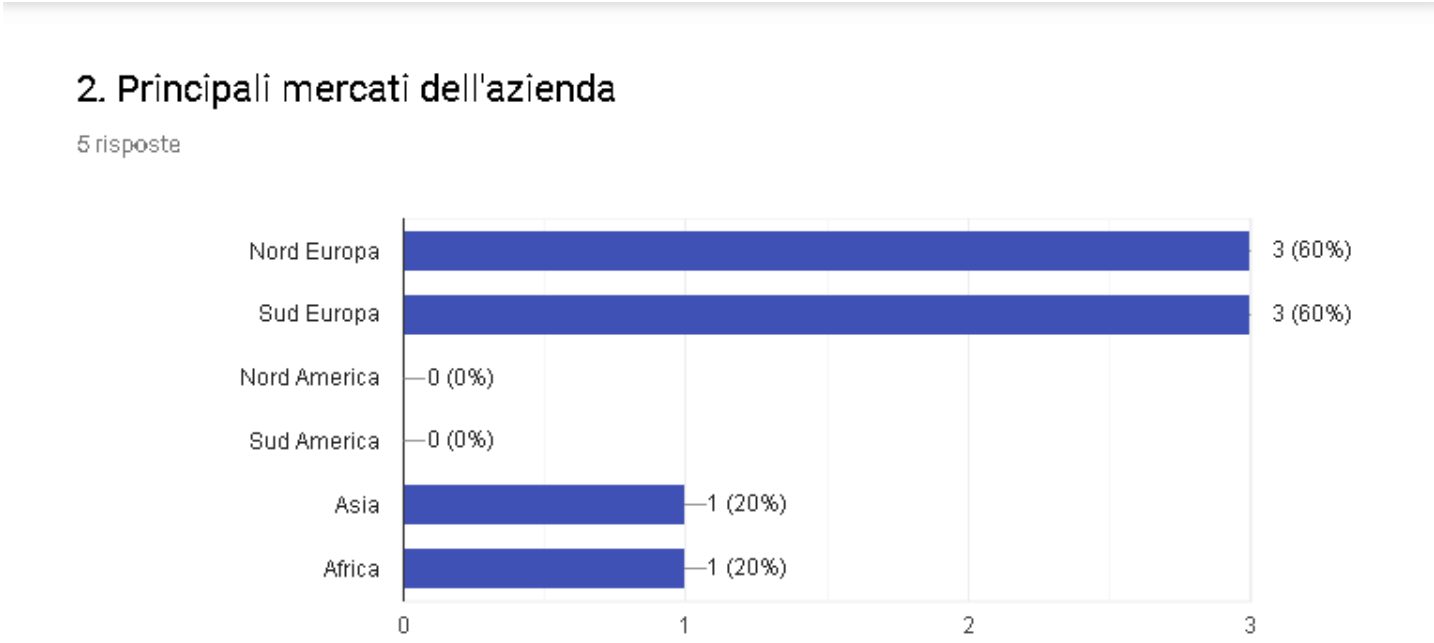
Companies and roles

AS Labruna srl	Massimo Labruna/CEO
Srls	Co-founder
Automation in Logistics and Service Systems srl	Fabio Parisi – R&D Officer
Bosch Tecnologie Diesel spa	Project Coordinator I4.0
Organizzazione di Produttori Giuliano srl	Sergio Maino – General Manager

Secondly, it was asked to specify which is the output of the company:

AS Labruna srl	Diesel engines
Srls	Climbing sockets and volumes
Automation in Logistics and Service Systems srl	Fabio Parisi – R&D
Bosch Tecnologie Diesel spa	I4.0 Project Coordinator
Organizzazione di Produttori Giuliano srl	Sergio Maino – Director- General

Then, it was asked to indicate the main markets of the company:



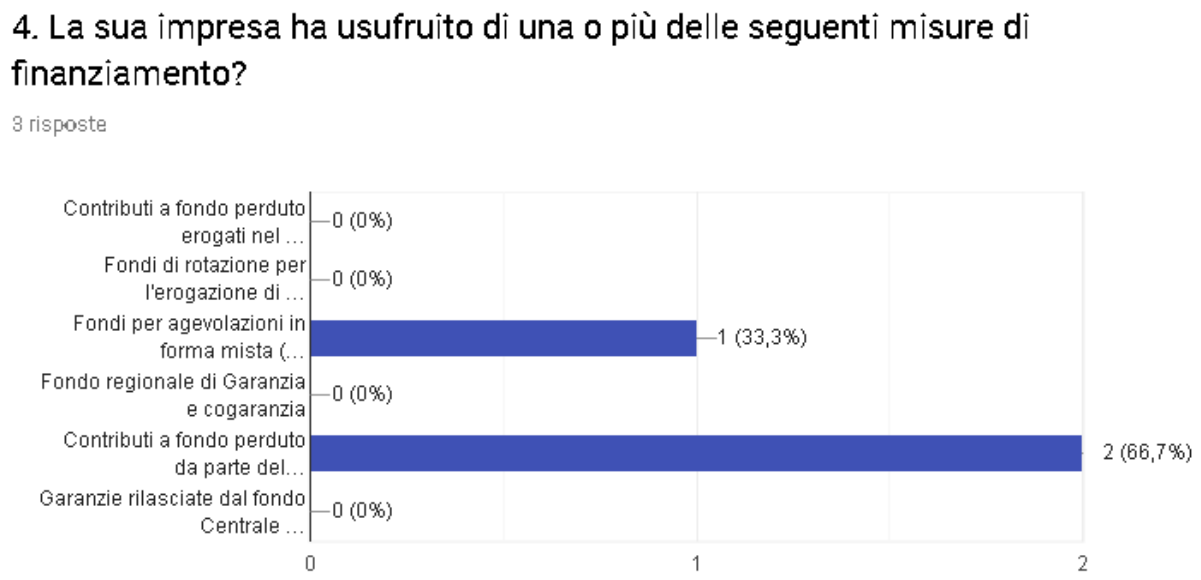
Main markets of the company; from the top down: Nothern Europe, Southern Europe, North America, South America, Asia, Africa

As for the turnover, it resulted as follows:

Turnover trend of the company in recent years (BLUE: turnover decreased; RED: turnover remained stable; ORANGE: increased)

It follows that in 40% of cases the turnover has increased, in another 40% it has decreased and for 20% of the companies interviewed, it has remained stable.

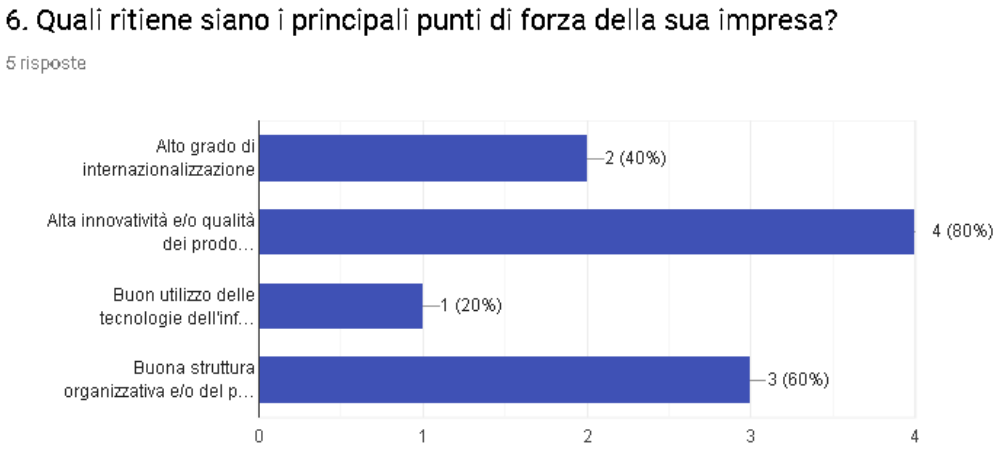
Regarding the source of funding, Figure 6 shows which source the company has drawn on:



"Has your company benefited from one or more of the following financing measures?"; from the top down: Non-refundable contributions disbursed under the 2014-2020 ERDF ROP; Revolving funds for the provision of bank loans and subsidized leases; Funds for concessions in mixed form (subsidized financing + non-repayable contribution); Regional Guarantee Fund and co-guarantee; Non-repayable contributions from the Ministry of Economic Development or from Invitalia; Guarantees issued by the Central Guarantee Fund.

In particular, it results that the most commonly used source of founding are the straight grants from the Ministry of Economic Development or from Invitalia, and in second place we find the funds for concessions in mixed form (subsidized financing + non-repayable contribution). However, none of the companies in question found difficulty in accessing credit.

The figure below shows the main strengths of the companies in question:

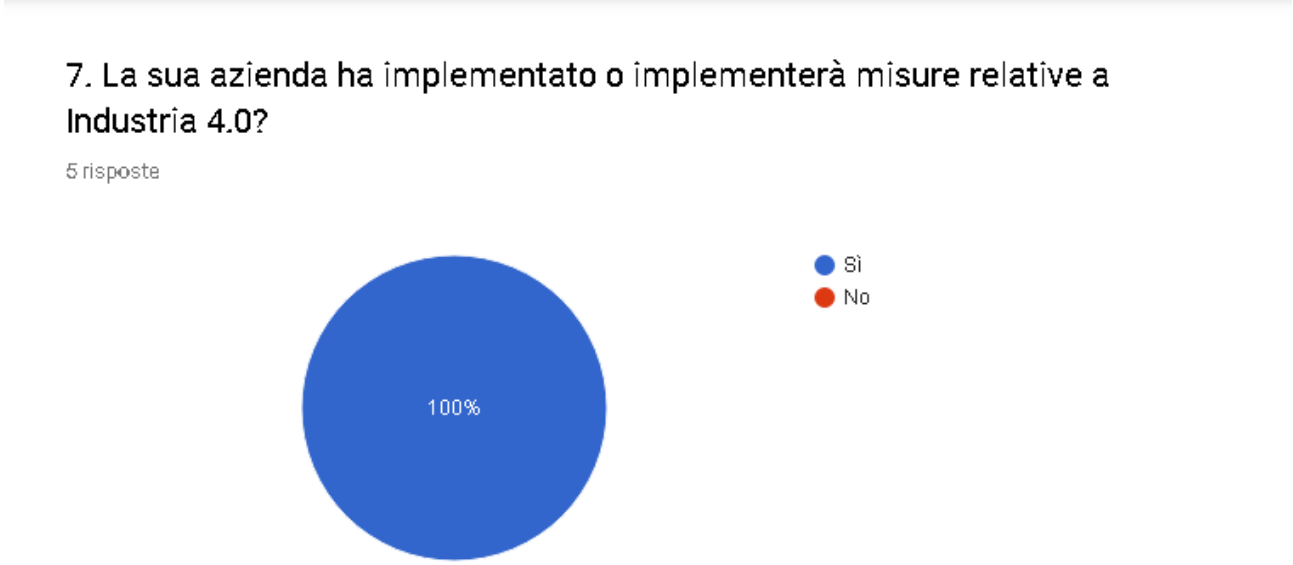


Strong points of the company (from the top down): High degree of internationalization; High

innovation and / or quality of the products / services offered; Good use of information and communication technologies (ICT); Good organizational structure and / or production process

For four of the five companies, their strong point is the high innovation and / or quality of the products/services offered. For three out of five companies the strong point is the good organizational structure and/or the production process, while for two companies out of five it is the high degree of internationalization. The good use of information and communication technologies (ICT) is favored by a single company.

From a more technical point of view, they have been asked questions about Industries 4.0.
In particular, the questions were aimed at validating the results obtained from the research carried out in the early stages of WPT1.
First of all, it results that all the companies of the Focus Group have already implemented some Industry 4.0 measure:



"Has your company implemented or will implement measures related to Industry 4.0?"BLUE: yes; RED: no

By this point, it follows the report of the companies' feedbacks about Industry 4.0 technologies, according to the results of the Technological Roadmap.

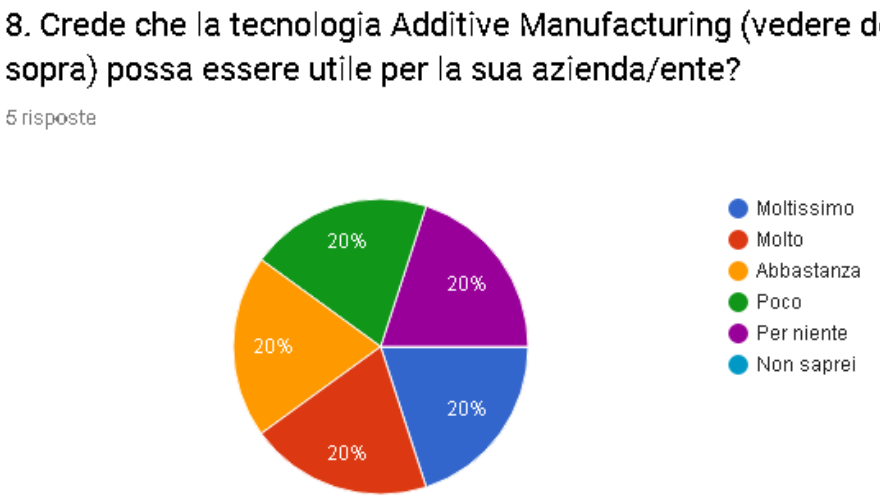
As already discussed during WPT1, the focus is on the following Industry 4.0 technologies:

- Advanced Manufacturing Solutions
- Augmented Reality
- Cloud
- Additive Manufacturing
- Big Data and Analytics
- Cyber-security

First of all, it was asked if the Industry 4.0 technology Additive Manufacturing can be useful for the company. As Figure 9 shows, the answers have been very heterogeneous.

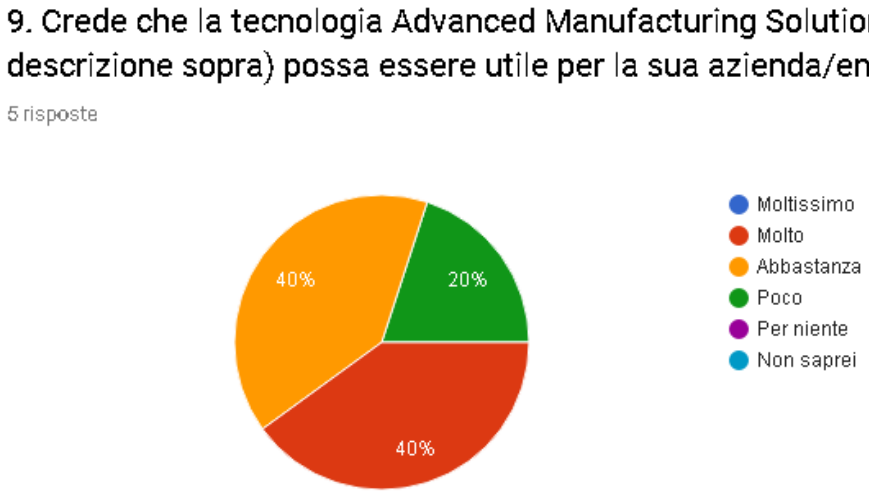
If for some companies this technology can be useful, for others it is absolutely not.

This may be due to the heterogeneity of the interviewed companies.



"Do you believe that the Additive Manufacturing technology (see description above) can be useful for your company?"From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue)

Subsequently, it was asked if the Advanced Manufacturing Solutions technology could be useful for the company.

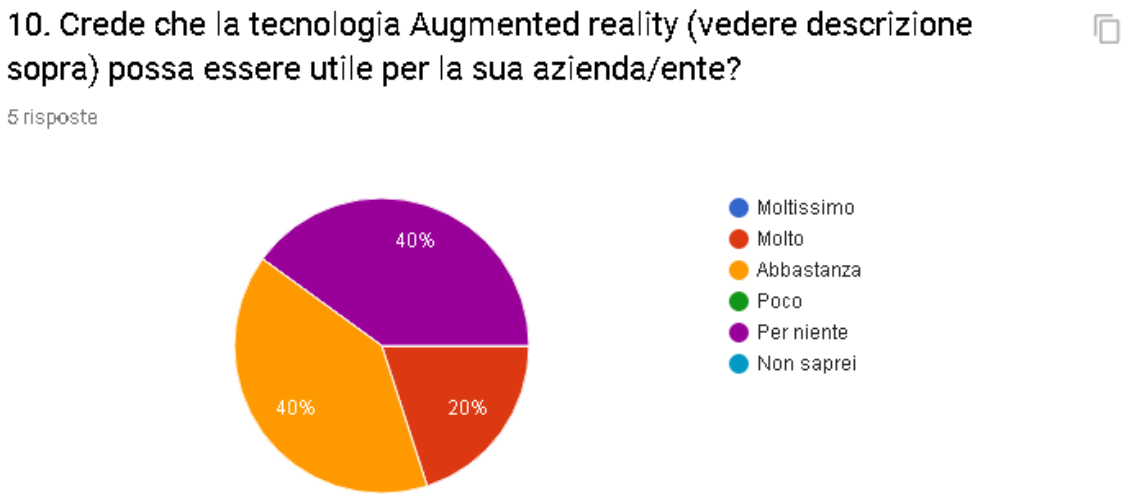


"Do you believe that the Advanced Manufacturing Solutions technology (see description above)

can be useful for your company?" From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue)

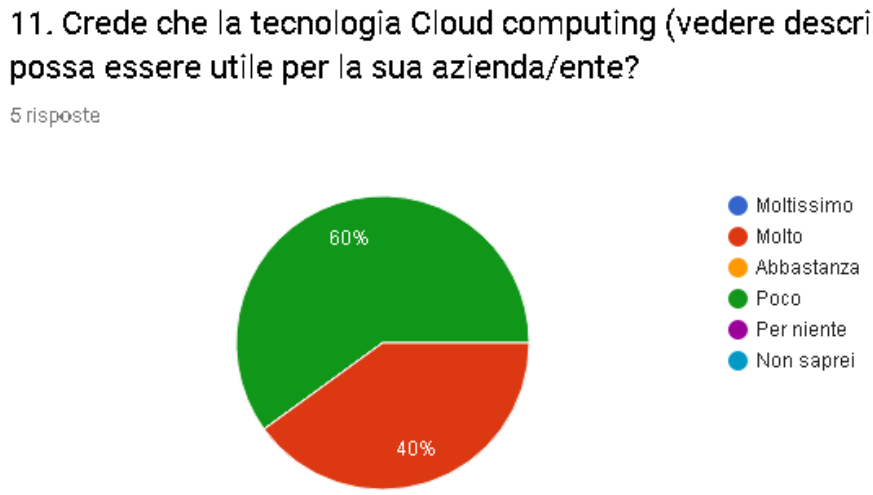
We can see that in 40% of cases the technology results to be very important (red part of the diagram), and quite important in the other 40% of cases (orange part). In 20 % of cases, the Advanced Manufacturing Solutions technology results to be not very important (green).

As for Augmented reality, it was asked if it can be useful for the company. This technology results to be very important only in 20 % of cases, while in 40% it is not important at all and quite important in the other 40%.



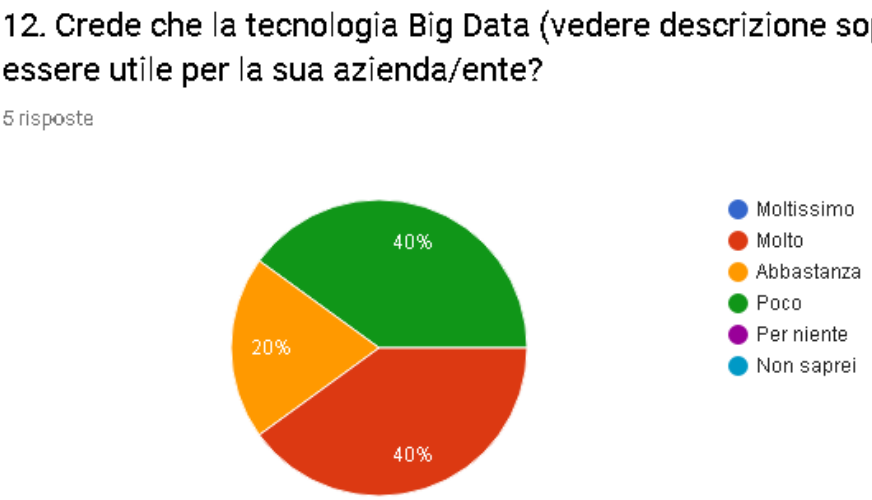
"Do you believe that Augmented reality technology (see description above) can be useful for your company?" From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue)

On the other hand, the technology Cloud Computing appears to be not very important in most cases (green part of the diagram) and very important (red) in 40 % of cases.



"Do you believe that cloud computing technology (see description above) can be useful for your company / organization?" From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue)

Finally, the technology Big Data results to be equally much important and not very important (40% of cases), while in 20 % of cases it results to be quite useful for the company.

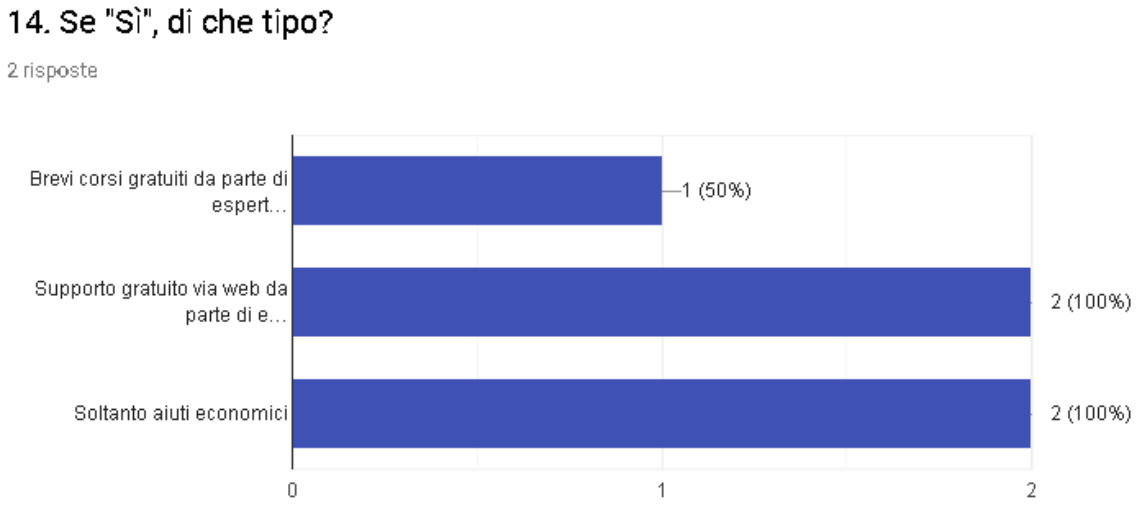


"Do you believe that Big Data technology (see description above) can be useful for your company / organization?" From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue)

Afterwards, it was asked if the companies need external help for the implementation of Industry 4.0; in most cases (60 %) they answered “No”.

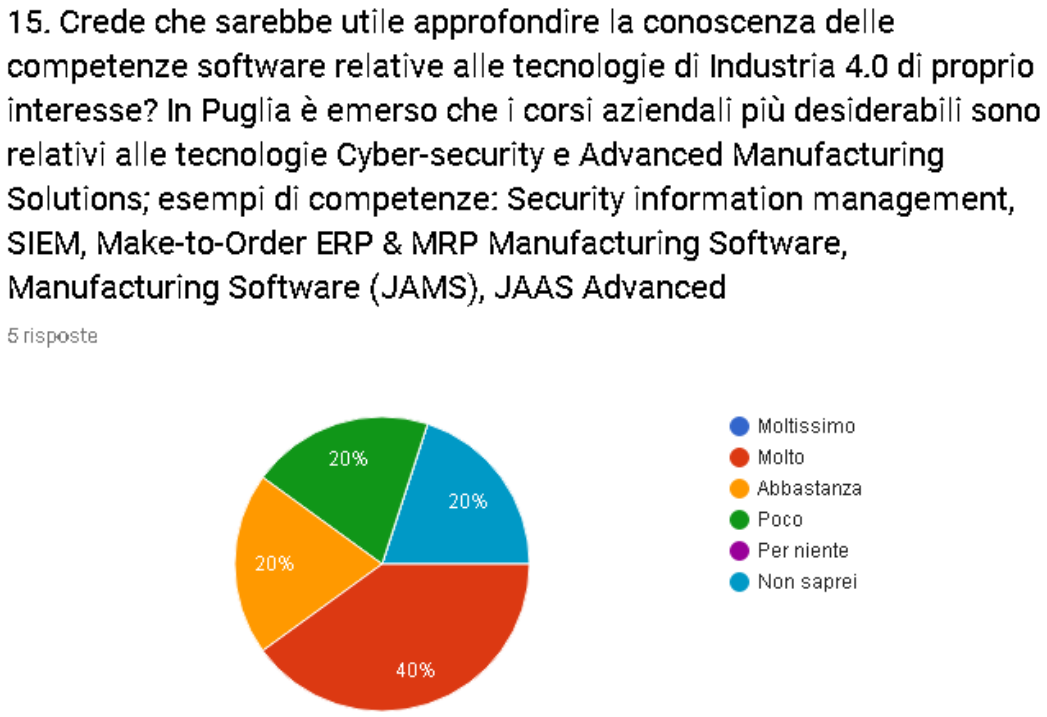
“Would your company need external help for the implementation of Industry 4.0?” (BLUE: yes; RED: no)

If the answer was “yes” (40 % of cases), the companies were asked to answer to question in Figure 15: if the companies need external help for the implementation of Industry 4.0, which kind of help do they need? All companies that have answered “yes”, consider both free web-based support by experts and mere financial aid useful. Only a company believes that free courses by technologies’ experts in plant are useful.



“If yes /at the previous question), what kind of external helps?” From the top down: Short free courses by company experts; Free expert web support; only economic support

On the matters of the implementation of the Industry 4.0 technologies, it has been asked if the company believes that it would be useful to deepen the knowledge of the software competences related to the technologies of Industry 4.0 of own interest? In Puglia it emerged that the most desirable company courses relate to Cyber-security and Advanced Manufacturing Solutions technologies; examples of skills: Security information management, SIEM, Make-to-Order ERP & MRP Manufacturing Software, Manufacturing Software (JAMS), JAAS Advanced.



"Do you think it would be useful to deepen the knowledge of the software competences related to Industry 4.0 technologies of your own interest? In Puglia it emerged that the most desirable company courses relate to Cyber-security and Advanced Manufacturing Solutions technologies; examples of skills: Security information management, SIEM, Make-to-Order ERP & MRP Manufacturing Software, Manufacturing Software (JAMS), JAAS Advanced". From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue)

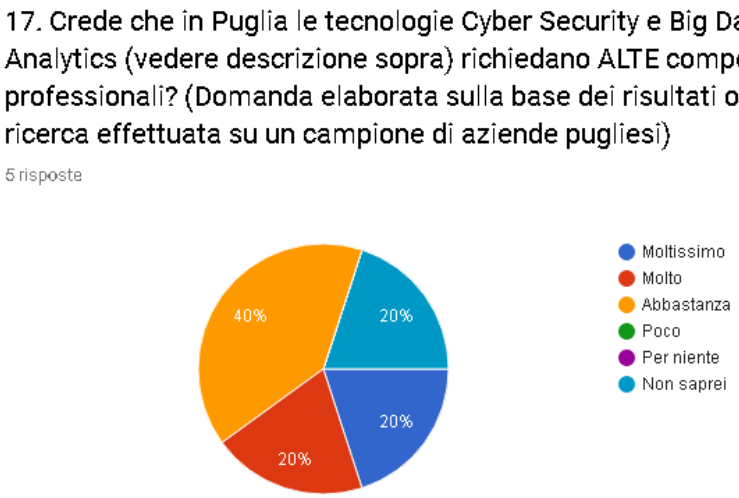
For most of the companies' sample, it resulted that it would be useful to deepen the knowledge of the software competences related to the technologies of Industry 4.0 of own interest, while the other companies appear uncertain about this aspect.

As for the Shipyard & Nautical Logistic supply chain in Puglia Region, it was asked if the shipbuilding sector in Puglia can benefit from the new Industry 4.0 measures.
The nautical companies of the sample agree that Industry 4.0 measures can be very important for the sector.

"Do you believe that the shipbuilding sector in Puglia can benefit from the new Industry 4.0 measures?". From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue)

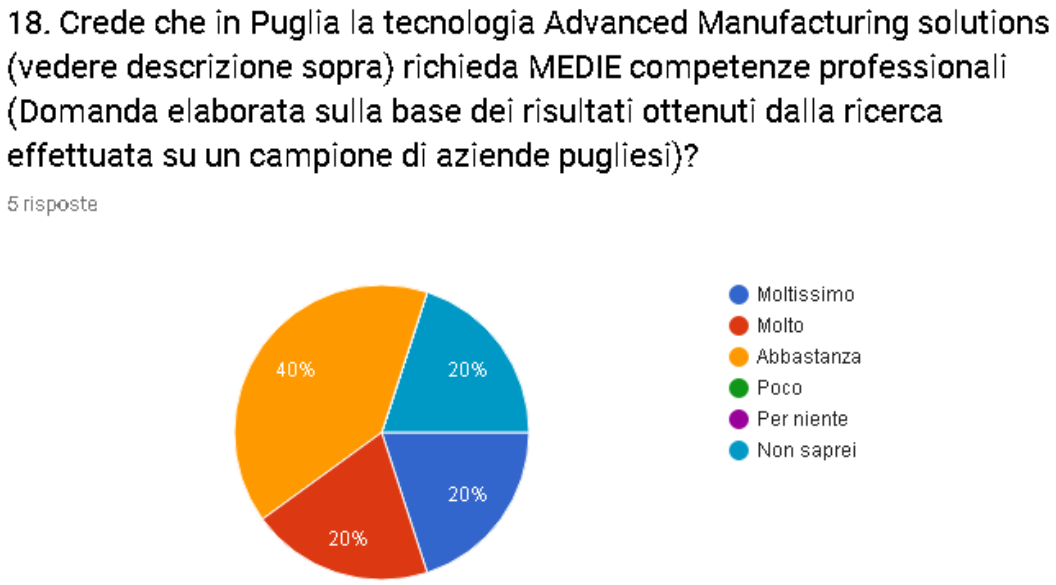
As for 4.0 technologies, questions about the results of WPT1 have been asked in detail.

First of all, companies were asked if in Puglia Cyber Security and Big Data and Analytics technologies require HIGH professional skills. For almost all the sample, this statement is true to a different extent.



"Do you believe that in Puglia the Cyber Security and Big Data and Analytics technologies (see description above) require HIGH professional skills? (Question prepared on the basis of the results obtained from the research carried out on a sample of Apulian companies)". From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue).

In the same way, company agree about the following statement: the company believes that in Puglia the Advanced Manufacturing solutions technology requires MEDIUM professional skills.

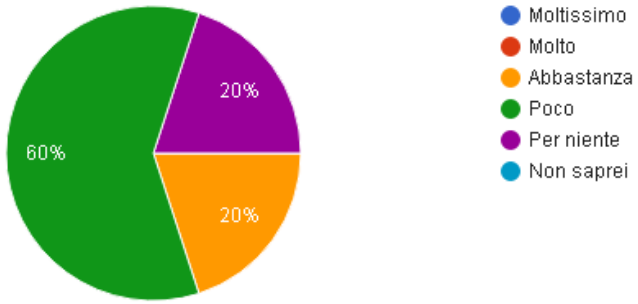


"Do you believe that in Puglia the Advanced Manufacturing solutions technology (see description above) requires MEDIUM professional skills (Question prepared based on the results obtained from research carried out on a sample of Apulian companies)? From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue).

Instead, companies disagree about the following result of WPT1 research: in Puglia, Augmented reality, Cloud and Additive Manufacturing solutions require LOW professional skills. This means that according to the companies, these technologies require a big effort in terms of workforce and professional skills.

19. Crede che in Puglia le tecnologie Augmented reality, Cloud e Additive Manufacturing solutions (vedere descrizione sopra) richiedano BASSE competenze professionali (Domanda elaborata sulla base dei risultati ottenuti dalla ricerca effettuata su un campione di aziende pugliesi)?

5 risposte

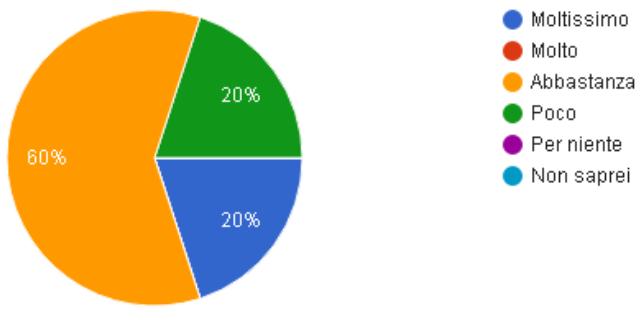


"Do you believe that in Puglia the Augmented reality, Cloud and Additive Manufacturing solutions technologies (see description above) require LOW professional skills (Question prepared on the basis of the results obtained from the research carried out on a sample of Apulian companies)?". From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue).

Moreover, companies quite agreed with the following statement: in Puglia Region, the parameter that most influences professional skills is the advancement of technological progress.

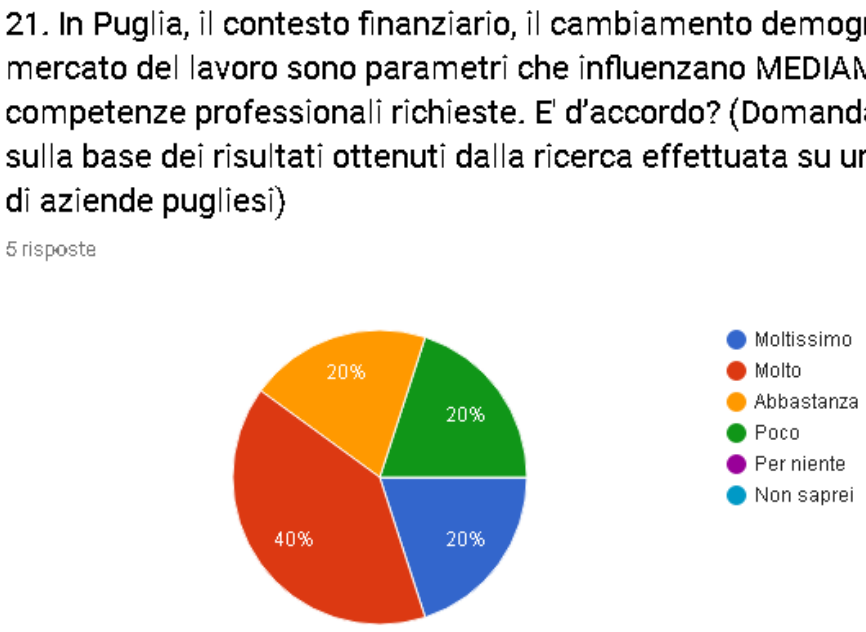
20. In Puglia, il parametro che più influenza le competenze professionali è l'avanzamento del progresso tecnologico. E' d'accordo? (Domanda elaborata sulla base dei risultati ottenuti dalla ricerca effettuata su un campione di aziende pugliesi)

5 risposte



"In Puglia, the parameter that most influences professional skills is the advancement of technological progress. Agree? (Question prepared on the basis of the results obtained from the research carried out on a sample of Apulian companies)". From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue).

At the same time, companies agreed on the fact that in Puglia the financial context, demographic change and the labor market are parameters that influence MEDIALLY the required professional skills.

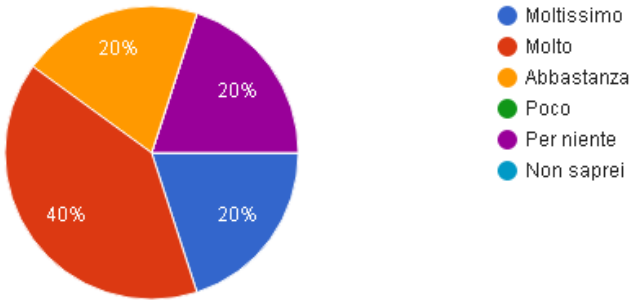


"In Puglia, the financial context, demographic change and the labor market are parameters that influence MEDIALLY the professional skills required. Agree? (Question prepared on the basis of the results obtained from the research carried out on a sample of Apulian companies)". From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue).

On the other hand, companies think that new emerging markets, resource scarcity and climate change are parameters that MINIMALLY influence the professional skills required.

22. In Puglia, i nuovi mercati emergenti, la scarsità delle risorse e il cambiamento climatico risultano essere parametri che influenzano MINIMAMENTE le competenze professionali richieste. E' d'accordo? (Domanda elaborata sulla base dei risultati ottenuti dalla ricerca effettuata su un campione di aziende pugliesi)

5 risposte

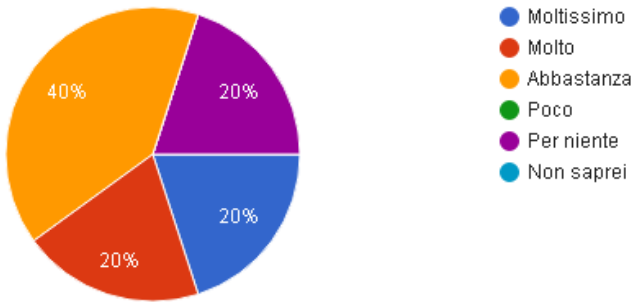


“ In Puglia, new emerging markets, resource scarcity and climate change appear to be parameters that MINIMALLY influence the required professional skills. Agree? (Question prepared on the basis of the results obtained from the research carried out on a sample of Apulian companies)”. From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don’t know (fair blue).

Instead, uncertainty regarding the following statement appears from the feedback of the companies: in Puglia Region, the financial and demographic context are the parameters with the most influence on productivity.

23. In Puglia il contesto finanziario e quello demografico risultano essere i parametri con più influenza sulla produttività. E' d'accordo? (Domanda elaborata sulla base dei risultati ottenuti dalla ricerca effettuata su un campione di aziende pugliesi)

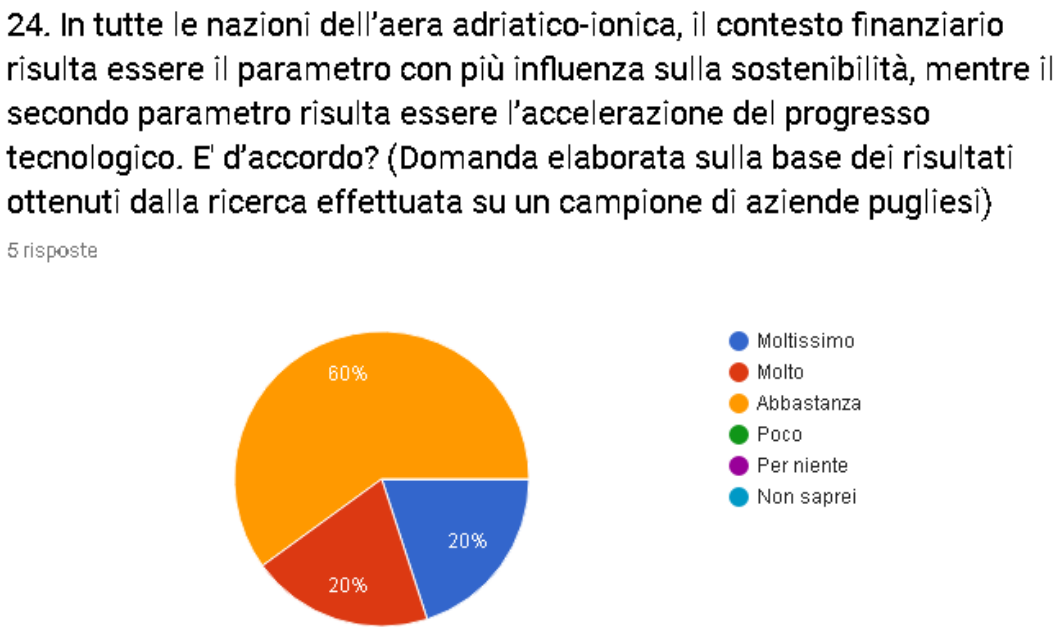
5 risposte



“In Puglia the financial and demographic context are the parameters with the most influence on productivity. Agree? (Question prepared on the basis of the results obtained from the research carried out on a sample of Apulian companies)”. From the top down: very much (BLUE); much

(RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue).

Companies averagely agree on the following statement: in all the countries of the Adriatic-Ionian area, the financial context appears to be the parameter with the most influence on sustainability, while the second parameter appears to be the acceleration of technological progress.

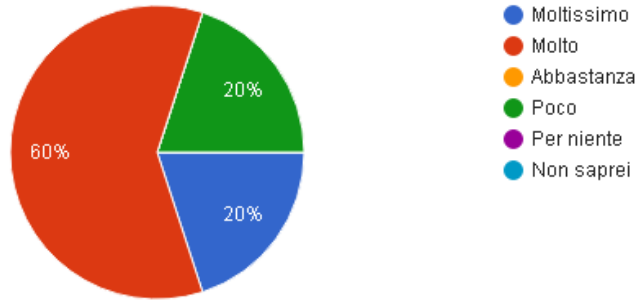


"In all the Adriatic-Ionian countries, the financial context appears to be the parameter with the most influence on sustainability, while the second parameter appears to be the acceleration of technological progress. Agree? (Question prepared on the basis of the results obtained from the research carried out on a sample of Apulian companies)". From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue).

Companies agree as well also about the following statement: in general, the most important parameters with the most influence on macroeconomic and technological megatrends are: the financial context, the acceleration of technological progress, demographic change and the labor market.

25. In generale, i più importanti parametri con più influenza sui megatrend macroeconomico e tecnologico sono: il contesto finanziario, l'accelerazione del progresso tecnologico, il cambiamento demografico e il mercato del lavoro. E' d'accordo? (Domanda elaborata sulla base dei risultati ottenuti dalla ricerca effettuata su un campione di aziende pugliesi)

5 risposte

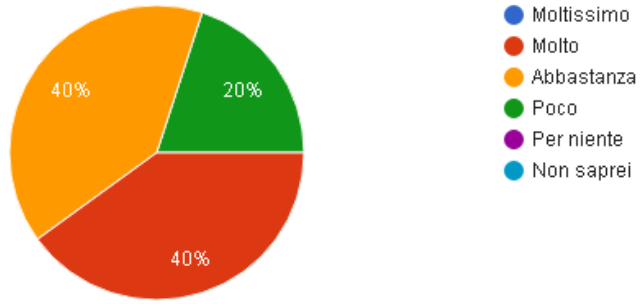


"In general, the most important parameters with the most influence on macroeconomic and technological megatrends are: the financial context, the acceleration of technological progress, demographic change and the labor market. Agree? (Question prepared on the basis of the results obtained from the research carried out on a sample of Apulian companies)". From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue).

As for the professional profiles, companies have been asked a very popular question in the Apulian business environment: "more than new specialized figures, in Puglia the need for traditional professional figures emerges, such as engineers or more "practical" figures, especially technicians, mechanics and mechatronics. Agree?" Companies partially agreed.

26. Più che di nuove figure specializzate, in Puglia emerge il bisogno di figure professionali tradizionali, come ingegneri o figure più "pratiche", in particolar modo di tecnici, di meccanici e meccatronici. E' d'accordo?

5 risposte



" More than new specialized figures, in Puglia the need for traditional professional figures

emerges, such as engineers or more "practical" figures, especially technicians, mechanics and mechatronics. Agree?". From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue).

As for the Shipyard sector, the involved companies totally agree with this statement: to encourage the development of shipbuilding in Puglia, degree courses and/or specializations focused on the naval field would be needed.

"To promote the development of shipbuilding in Puglia, degree courses and / or specializations focused on the naval field would be needed. Agree?". From the top down: very much (BLUE); much (RED); quite (ORANGE); a little (GREEN); none (PURPLE); I don't know (fair blue).

About the most required professional figures in Puglia Region, by the answers provided by the companies it is possible draw up a ranking:

1^ : Computer scientist and Computer engineers;

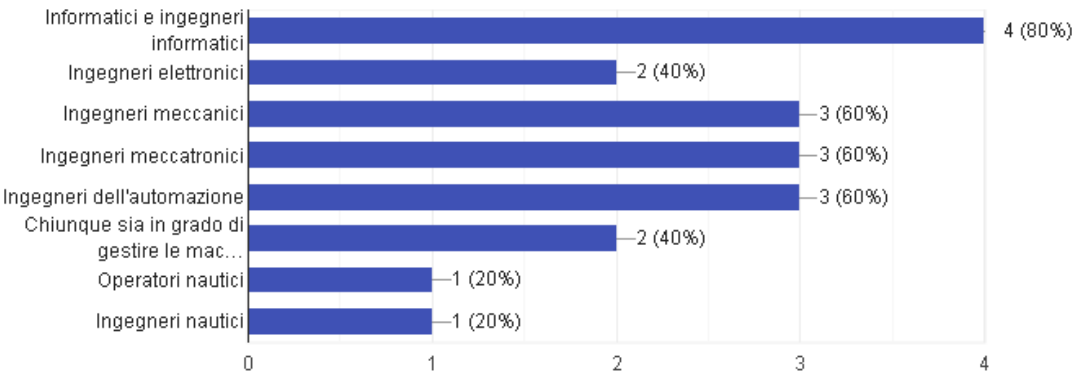
2^ : Mechanical engineers, Mechatronic engineers, Automation engineers;

4^ : Electronic engineers, Anyone able to manage the machines;

5^ : Nautical operators, Nautical engineers.

28. Conferma che le seguenti siano le professioni più richieste per l'implementazione di Industria 4.0 in ambito manifatturiero (e navale)?

5 risposte

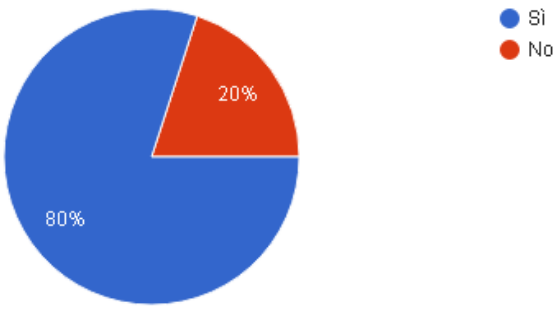


"Do you confirm that the following are the most requested professions for the implementation of Industry 4.0 in the manufacturing (and naval) sphere?". From the top down: Computer scientist and Computer engineers; Electronic engineers; Mechanical engineers; Mechatronic engineers; Automation engineers; Anyone able to manage the machines; Nautical operators; Nautical engineers.

Finally, companies were asked about their willingness in receiving Future 4.0 courses in their plant; four companies have expressed their interest.

29. E' interessato/a ai corsi di formazione previsti dal progetto Future 4.0 per aggiornare gratuitamente le aziende sulle tecnologie 4.0?

5 risposte



"Are you interested in the training courses provided by the Future 4.0 project to upgrade companies on 4.0 technologies for free?" (BLUE:yes; RED: no)

Veneto Region

1. Cantieri Vizianello Srl
2. Italia Yachts srl
3. Marelli Motori
4. Viraver Technology Srl
5. Wiforce Italia S.R.L
6. Cantiere Navale Vittoria S.P.A
7. Venezia Terminal Passeggeri S.P.A.
8. Conepo Servizi S.C.A.R.L.
9. Atroos S.R.L.
10. Vf Elettronica S.A.S
11. Marina Del Cavallino S.R.L.
12. Marine Tech Ccyd S.R.

1. Cantieri Vizianello Srl

MALCONTENTA – Via dei CANTIERI 10
30176 VENEZIA (VE)

Presentation of the company – material gathered on desk and during the interview.

The company carries out construction, repair, maintenance and storage boat activities with specific attention to public line transport boat.

In particular Cantieri Vizianello works in the following sectors:

- Craft for: Police, Coast Guard and ambulance service
- Public transport boat for people (with special attention to people with reduce mobility)
- Taxi service
- Maintenance and repair of boat (15% total turnover).

The company produces professional boat with high level of duration and reliability. To differentiate themselves from competitors Cantieri Vizianello works with two different production lines:

- Boat for people with disabilities: This specific type of product allows to people with Handicap and wheelchair to go up inside in their boat. The Company has developed some pilot's license in this field.
- Hybrid propulsion: for a few years the company implemented electric propulsion to boat. The autonomy of the system is adapted to needs of customers and quality of battery applied. In this field Cantieri Vizianello developed "Shock Project". It manufactured the first boat operated by electric power for the transport of people in Venice. Shock project is a sustainable mobility project with the main goal to reduce fuel consumption in the field of mobility and transport.

The main customers of the company are professional users. They include: Alilaguna S.p.a. (public line transport company), Tourism Association of Venice, Cooperative Taxi of Venice, Ministry of Interior, Ministry of Defence, Coast Guard, Ormeggiatori di porto of Venice, ACTV.

Since 2010 Cantieri Vizianello works in accordance with ISO 9000.

Current techological status of the company

Have you already adopted measures concerning industry 4.0?

At the moment the company invested just in the cloud technology. One of the most important issues consists in the controlling the advancement of work. The cloud technology allows to control the progress of work step by step and improves communications between company and its employees.

Cantieri Vizianello use this type of technology to check the outside workers, for example. Cantieri Vizianello is developing new mobile app to check the boat system. In this way if the app finds an error or operational problem company can operates remotely.
The mobile app works with simple analytics system and using a small number of data, therefore the app cannot be seen as a big data system. The company uses CAD 3D software to design work without any other connection with production systems. Moreover company makes small investments within the cyber security sector.

Have you had difficulties in the implementation of industry 4.0? What kind?
The cloud system has been developed by an external company without any problem during the implementation.

The region has helped you in the implementation of measures concerning industry 4.0?
No.

What cost of adaptation to new technologies have you supported? Hig or low?
The company supported low cost concern the development of cloud technology.

Future developments: what is the company policy regarding Industry 4.0? What are your goals?
In the short – medium period Cantieri Vizianello considers that the use of robotic technology can't be advantageous inside of the production process. The company produces goods with high level of customization where this technology cannot be implemented. The 3D print technology is used by some suppliers in some parts of Cantieri Vizianello's products. For this reason the company doesn't have interest to internalize those parts of production.

Professional profile:

Does the labor market in the region meet the requirements of industry 4.0?
Considering the limited experience that company has developed in the field of industry 4.0, CEO has focused the attention in two important aspects:

- A lack of professional profiles as carpenters and upholsterers
- A lack of flexibility, capability for adaptation and ability to think outside the box about the professional profiles with high level of skills such as naval engineers.

What are the gaps between job demand and supply?
The main effects of economic crisis have led to bankruptcy of many companies and high level of unemployment within our sector. This situation has reduced the gaps between job demand and

supply.

Does the company provide staff training course?

The company invests in the following areas of training:

- Soft skills in particular in leadership, motivation and communication field
- Corporate structure field to streamline the production process

Furthermore the company invests in training courses concern the innovation in diagnostic field.

Identification of four professional profiles resulting from the development of Industry 4.0: what are the ideal professional profiles?

Cantieri Vizianello can't answer. The next step of Industry 4.0 will be the development of hybrid motors will be able to recover wave energy.

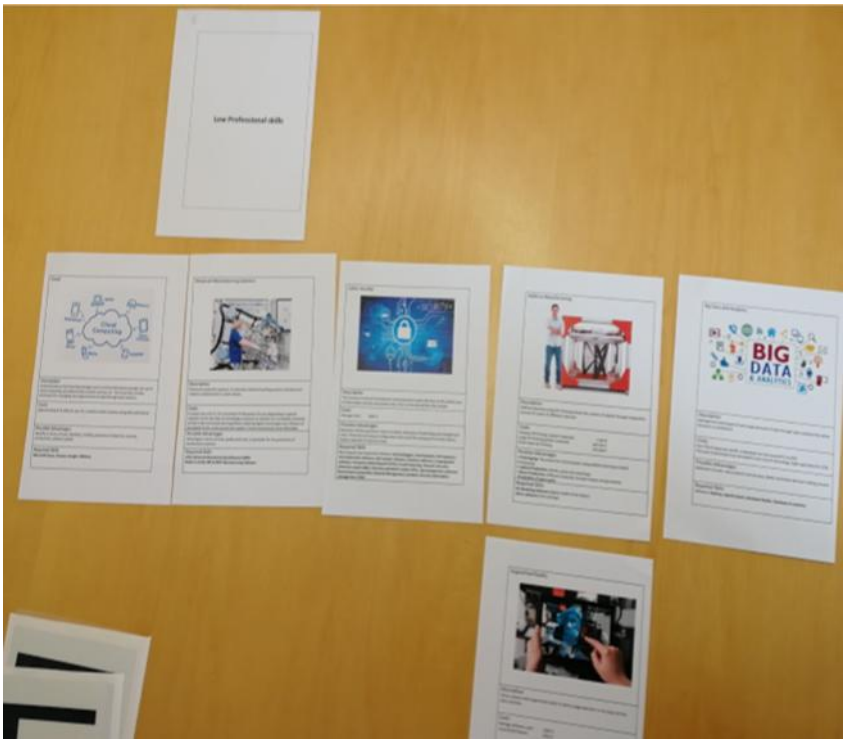
Does the company have standards or have best practices and standard as for industry 4.0? What are future objectives of the company about industry 4.0?

No, the company does not have standard or best practices.

Technology	VIRAVER
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
AugmentedReality	Yes ☐ No ☒ Work in progress ☐
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☒ Work in progress ☒
Cyber-security	Yes ☒ No ☐ Work in progress ☐

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.



2. Italia Yachts srl

ISOLA MORIN, 2
30015 CHIOGGIA (VENEZIA) – ITALY

Report of the interview to Franco Corazza, project manager at Italia Yachts

Presentation of the company – material gathered on desk and during the interview
Italia Yachts established in 2011 in Chioggia (Venice) with the specialization to project design and production of high - end sailboats. The company won several international awards such as European Yacht of the year in 2013, USA Cruising World Best Performance Cruiser and USA Best Yacht of the Year – Sail Magazine in 2015.
Italia Yachts signed an important strategic partnership with Cantieri Baruffaldi based in Chioggia (http://www.cantierebaruffaldi.it/) to externalize some part of their production until 2016. From that year the company decided to internalize the whole production prosses and opened an important production site in San Giorgio di Nogaro (UD).
After two years, in 2018 the company closed the production site for coming back to the older business model. In this way Italian Yacht was able to focus its core business in project design, production, marketing and sales area. Nonetheless, the company continues to coordinate the external suppliers and the others stages of production.
The experience gained within the production process has led to identify the best suppliers and gave them the support during the industrialization phase. It is for this reason that the company represent an important case – study due to their wide knowledge in all phases of production.

Current technological status of the company

Have you already adopted measures concerning industry 4.0?
Italia Yachts has invested in cloud technology connecting project design software with the external suppliers. Furthermore, the company has invested in the cyber security field. The robotic technology could be used to realize the hulls of the boats even if the low level of production units of the company (20 sailboat, of 6 typologies, produced annually) doesn't allow to invest strongly in this type of technology.
At the moment the company use numerical control machines and machines with 5 axis.
The 3D print is used just to create prototype or unique items but the impact is very limited.

Have you had difficulties in the implementation of industry 4.0? What kind?
The cloud and cyber security system have been developed by an external company without any problem during the implementation.

The region has helped you in the implementation of measures concerning industry 4.0?
No, as the company never asked for support in this sense.

What cost of adaptation to new technologies have you supported? Hig or low?
The company supported low cost to adapt themselves to new technologies. The technologies represent "infrastructure technologies" which improved some parts of production such as sharing the design phase of projects

Future developments: what is the company policy regarding Industry 4.0? What are your goals?
The company is planning to invest in the ICT applied in marketing area (front end technology). Moreover, Italia Yachts is considering to use the Augmented Reality technology (AR), with regard to some existing applications in the nautical sector, to rendering their project even if this type of technology may not be appropriate to highlight the features and quality of products manufactured.

Professional profile:

Does the labor market in the region meet the requirements of industry 4.0?
The shipbuilding sector stresses the lack of training courses specialised to train professional figures to employ in the production process. Moreover, the company pointed that industry 4.0 in shipbuilding sector is at the beginning and it relies on "classical" profiles such as the furniture assembler.

What are the gaps between job demand and supply?
The gap concern just the classic professional figures and not the professional figures within industry 4.0.

Does the company provide staff training course?
Italian Yachts has provided training courses in project design field.

Does the company have standards or have best practices and standard as for industry 4.0? What are future objectives of the company about industry 4.0?
No, the company does not have standard or best practices. Italia Yachts is starting to use some already existing tools based on the Augmented Reality technology for rendering the design project.

Identification of four professional profiles resulting from the development of Industry 4.0: what are the ideal professional profiles?

Technology	Italia Yatchs
Advanced Manufact.Solutions	Yes ☐ No ☒ Work in progress ☐
AugmentedReality	Yes ☐ No ☐ Work in progress ☒
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☒ Work in progress ☐
Cyber-security	Yes ☒ No ☐ Work in progress ☐

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.

Low professional skills

3. Marelli Motori

VIA SABBIONARA 1
36071 ARZIGNANO (VI)

Paolo Buratto, Chief HR and Change Officer.

Company presentation - Material taken from the website, from the web search and from the interview
The company was founded in 1891 and nowadays enjoys worldwide brand recognition thanks to its extended sales, distribution and service networks across four continents and two manufacturing facilities, based in Italy and Malaysia, which produce technologically advanced products sold in more than 120 countries.

Marelli Motori is currently part of the Carlyle Group, which is the exclusive shareholder

The production is concentrated in the factory in Italy and in Malaysia, to which are added a series of branches that deal with assistance / commercial support.

Marelli Motori provides electric rotating machines and a wide range of aftersales services to six major market sectors:

- Cogeneration
- Industrial
- Power generation
- Oil and Gas
- Hydropower
- **Marine**

Marelli Motori manufactures electric motors and generators for all marine applications where power is required[1]. The product applications include:
• propulsion, thrusters, FI-FI system, auxiliaries, dredge pumps, winch and PTO-PTI system
• shaft generators, hybrid machines, offshore, generators at variable speed and emergency.
Motors up to 10.000 kW
Generators up to 12.500 kVA

Today, revenues from the marine sector weigh about 10% of total revenues. In the past the share was much higher. The reduction is not due to a strategic choice but to the scarce investments that have characterized the oil and gas world, which is one of the main sectors of use of the naval vessels using Marelli Motori products.
On the standoff of the marine market and its repercussions on the company, see the newspaper article in Vicenza.

http://www.ilgiornaledivicenza.it/territori/arzignano/nuovo-piano-in-marelli-avviata-la-trattativa-1.6486285

Certificazioni
ISO 9001:2015
BS OHSAS 18001:2007
ISO 14001:2015

Current techological status of the company

Have you already adopted measures concerning industry 4.0?
1. The company is experiencing the implementation phase of SAP. The decision to introduce it is part of an investment plan of 5 million euros over three years, which has also affected the areas of Industry 4.0. In particular, the company has invested (and is investing) in the cloud (on which the managament workflow system is supported) and on the cyber security front. In recent years Marelli Motori has worked extensively on "Product Lifecycle Management (PLM)" in particular on data management and technical documentation, product configuration and integration between technical information and machines.
Robots were then introduced to assist mainly the two production phases that today justify an investment of this type: the loading of the metal sheets in the shearing department and the taping of the electric cables. On this front there are no other types of investments: an important part of the production of the Italian plant is focused on large-scale engines with a strong personalization that, at least for now, does not justify the introduction of further automations. In the future, the automation tested in these two production phases will be extended to the plant in Malaysia and upgraded to the one in Italy (see also the answer to question 5).

Have you had difficulties in the implementation of industry 4.0? What kind?
2. The most significant problems concerned the "interfacing" activities between the various systems already present in the company, introduced at different times and therefore characterized by a strong heterogeneity of languages. As regards the implementation of Sap and therefore the revision of the company's IT infrastructure, a certain resistance to change was found, especially in the areas of logistics and production planning.

The region has helped you in the implementation of measures concerning industry 4.0?
3. No, they did not ask for it due to the mechanisms that drive the financing and the reporting of the expenses incurred. The difficulty is operational: it is summarized by a sentence of the interviewee who says "you can finance the sugar you put in the cake, but we have to make the cake and in the end it is impossible or very expensive to distinguish sugar from the result, which often, however, they ask us to make calls. "

What cost of adaptation to new technologies have you supported? Hig or low?
4. See answers 1 and 2

Future developments: what is the company policy regarding Industry 4.0? What are your goals?
5. Other automations are expected mainly in the production phases in which they have already been introduced. The investments will be made mainly in the factory in Italy (for a question of costs) but also in Malaysia to affect the lead time, thus following two different strategic motivations.
Another area of interest is that of maintenance, where a line of services has already been developed for customers (see the file MM_Diagnostica Predittiva_EN.pfd) but which could be enhanced through investments in the virtual reality and data analytics .

Professional profile:

Does the labor market in the region meet the requirements of industry 4.0?
What are the gaps between job demand and supply?
6 and 7. No. The skills that are needed for Industry 4.0 are very similar to those of the specialized technicians that Marelli Motori has in the company and that it is difficult to find on the market. The deficiency concerns above all the figure of mechatronics which are very rare figures and which concentrate skills on the mechanical, electrical and information technology front. These figures are not only required technical skills but also the availability to mobility, in particular with regard to language skills. (95% of customers are foreign).
Marelli Motori has tested with ITS (that of the Rossi Institute of Vicenza, of which they are partners) but too few technicians are churned out every year with respect to market demands.
The company has long started collaborations with the universities of the region (Padua, in particular

with the faculty of engineering, Vicenza, Verona and Venice). Participate in the career days organized by the Universities. Supports students in the preparation of the degree theses (see the video posted on LinkedIn regarding the recent recruitment of two graduates who have carried out their thesis in Marelli Motori https://it.linkedin.com/company/marelli-motori).

Does the company provide staff training course?

8. Marelli Motori invests in training organizing courses for both internal staff and that of its customers, following a logic of integration along the value chain.
The training covers different areas and responds to different objectives. In these months, given the project of implementation of SAP, a substantial part of the training is dedicated to the introduction of the system. Other areas of training concern the linguistic skills that are addressed to all staff, not only to those who interface directly with customers or customers, but also to line staff who are increasingly confronted with technical documentation in English.
With regard to technical skills, the most critical area regards those in the electrical sector.

Identification of four professional profiles resulting from the development of Industry 4.0: what are the ideal professional profiles?

Does the company have standards or have best practices and standard as for industry 4.0? What are future objectives of the company about industry 4.0?
10. The company has not yet developed standards. "We are only at the beginning"

Technology	MARELLI MOTORI
Advanced Manufact.Solutions	Yes ☒ No ☐ Work in progress ☐
AugmentedReality	Yes ☐ No ☐ Work in progress ☒
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☐ Work in progress ☒
Cyber-security	Yes ☒ No ☐ Work in progress ☐

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.

Low professional skills

4. Viraver Technology Srl

VIA DELL'ARTIGIANATO, 8
35020 SAN PIETRO VIMINARIO - PD

Marco Mazzarolo, General manager

Company presentation - Material taken from the website, from the web search and from the interview

The company was founded in the early 2000s specializing in the production of glass for shower enclosures and kitchen hoods. The strong competition of low cost products pushes the company to adopt a strategy of upgranding both of product and organization, but above all to differentiate the markets moving, since 2004, towards the sector of marine glass, in particular for the sector of yachts, which today feeds about 70% of the turnover.

In those years, investments in technology are important and allow the company to internalize some phases (for example that of chemical tempering) that until then had been outsourced.

2006 is a turning point. From that moment on, the company's plants are designed in-house, activating forms of collaboration with the technology suppliers. This allows Viraver to push on product innovation. The most recent example is the realization of the plant dedicated to the treatment of individual glass sheets with the chemical hardening process of 8 meters by 3 meters and 21 centimeters which, to date, is the largest and most performing plant in the world.

The two-year period 2007/2008 is marked by an important growth in turnover that stops the following year, thanks to the crisis affecting yacths yards, triggered by the global crisis of 2008. The situation drives Viraver to look for new outlet sectors . Today the company also operates in the large-scale architectural glass sector: Parapetti

- Scale
- Partition panels
- Covers
- Floors

but also in the automotive sector, supplying glasses for:

- Style Prototypes or Concept Car
- Pre-series or small series prototypes
- Racing car (polycarbonate windscreen)

To enter the automotive sector, and in particular in the sub-segment of racing cars, in 2001 the company made an important investment both in terms of skills (recruitment of specialized personnel

already trained) and machinery to produce polycarbonate elements.
In 2015 the shipbuilding market showed important signs of recovery. Viraver has started to invest in a new bending furnace (in 2015) and in 2017 in the new chemical hardening plant mentioned above.

One of the company's strengths is its ability to manage the project in an integrated manner.
In the nautical sector the services offered by the company are:

- Pre-sales support
- Design and co-design
- 3D digital survey on site
- Product development
- Design
- Engineering
- Quality check
- Testing and Approval of registers
- Installation
- International post-sales assistance
- Refitting

The average age of the 73 employees is around 35 years.

Certifications

Viraver meets the quality management regulations according to ISO9001 and a number of other certifications
(http://www.viraver.com/index.html)

Current techological status of the company

Have you already adopted measures concerning industry 4.0?

1. In recent years the company has invested all of the integration between design systems (using the autocad 3D rhinoceros), management and machines. The project, starting from the need for integration with the management of the data, has been extended to the Viraver value chain with projects . Another area of investment is that of the cloud. The area in which the company is established does not have adequate infrastructure. But from 2019 will start a project that aims at the total virtualization of information systems. Another area of investment concerns cybersecurity.
No significant investments have been made in robotics, Viraver's production process at the moment.
The company has worked for some time on the front of 3D technologies, in particular for the survey of interiors.

Have you had difficulties in the implementation of industry 4.0? What kind?

2. The greatest difficulties are related to vertical integration along the value chain and are due to

the heterogeneity of the systems involved and the need to make data transactions secure.

The region has helped you in the implementation of measures concerning industry 4.0?

3. The Sabatini law was used as a support tool for investments, a facility made available by the Ministry of Economic Development with the aim of facilitating access to business credit. This measure supports investments to acquire or acquire leasing machinery, equipment, plants, capital goods for productive use and hardware, as well as digital software and technologies.

Other forms used are hyper-depreciation and super-amortization.

Hyper-amortization: over-valuation of 250% of investments in new tangible assets, devices and technologies enabling the transformation in key 4.0 purchased or leased

Super-amortization: over 130% of investments in new capital goods purchased or leased. For those benefiting from over-amortization, it is also possible to benefit from a 140% over-valuation for investments in intangible capital goods (software and IT systems).

The measures mentioned are managed by MISE (Ministry of Economic Development).

Regional funds have been used above all in the field of training.

What cost of adaptation to new technologies have you supported? Hig or low?

4. In organizational terms, the cost has been low thanks to the flexibility of internal staff (the average age is around 35 years). Therefore, it was not necessary to proceed with reskilling training projects to prepare employees for the era of automation and digitization. Compared to the productive technologies, the fact of planning them internment guarantees the drastic reduction of the costs of adaptation.

Future developments: what is the company policy regarding Industry 4.0? What are your goals?

5. In 2019 a new machine will be built (autoclave) that will serve to eliminate what is today a bottleneck of the production process. The new machine will be connected to the company's management systems.

Professional profile:

Does the labor market in the region meet the requirements of industry 4.0?

What are the gaps between job demand and supply?

6 and 7. In terms of ICT staff, there are no particular problems in recovering these skills. On CAD design, the company has invested a long time on the training front to add new skills to the skills of the 7 designers currently employed (mainly electronic, mechanical experts).

Does the company provide staff training course?

8 We will continue to invest in training in the field of CAD design.

Identification of four professional profiles resulting from the development of Industry 4.0: what are the ideal professional profiles?

9 See attached table

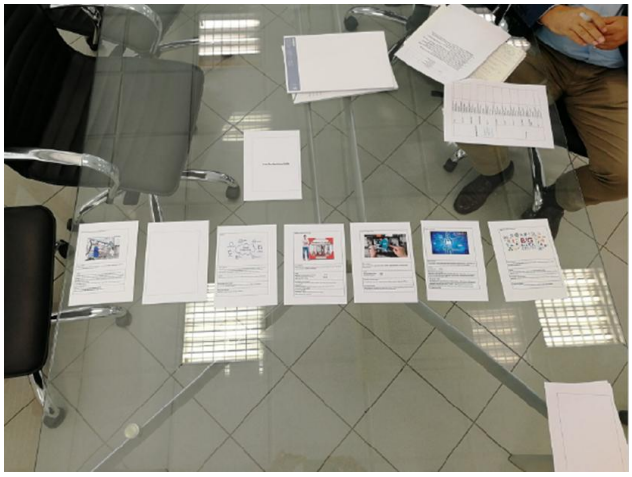
Does the company have standards or have best practices and standard as for industry 4.0? What are future objectives of the company about industry 4.0?

10. No, the company has no best practices. In futures you want to invest on the front of augmented reality, especially from a marketing perspective.

Technology	VIRAVER
Advanced Manufact.Solutions	Yes ☒ No ☐ Work in progress ☐
AugmentedReality	Yes ☐ No ☐ Work in progress ☒
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☒ Work in progress ☐
Cyber-security	Yes ☒ No ☐ Work in progress ☐

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.



Low Professional skills

5. Wiforce Italia S.R.L

Via Mestrina, 94
30173 Mestre (Venezia)

WIFORCE is a service provider supplying qualified personnel and contract services to the ship, onshore, and offshore industry in Europe.
The main customers are cruise lines, docking and shipyards such as Fincantieri, Vard, Nuovo arsenale Cartubi, Carnivale and MSC.

As for the naval sector, the main services offered are:
• hull construction and repair
• mooring machinery installation
• naval outfitting supply and installation
• piping installation, repair and maintenance
• installation of firefighting system
• Low & Hight electrical istallation
• Routine maintenance of the decks, hull and restructuring, paintng, removing rust accumulations etc.

The company manufactures and installs on board a series of products such as man hole covers, public area balustrades, hatces, fire rating doors, mounting & supply catwalk, windows and side scuttles pian, safety line, vertical escape ladders, mounting & supply, intrusion grids, manholes, handrail, rail window washing machine, satellite antennas base plate, fork lift, supports flag dressing winch, pilot ladder, spare anchor basement, beaming inside the bunker stations, mounting and window washing system, windows and side scuttles, flag mast, mounting and testing desk scuttle or manholes, mounting man overboard life ring support on the bridge wing, lashing system forklift, windlass, spare anchor basement, bow telescope mast, services of complete fitting, refitting (also with “turn-key” formula) of common areas and cabins and refurbishing.

A new interesting trend is the one concerning environmental technologies. The International Maritime Organization (IMO) has adopted stricter regulations on emissions, most prominently restrictions on Sulphur oxide (SOx) emissions, which will be implemented into force first of January 2020. and improve fuel efficiency. In this context WIFORCE has been a partner as a sub-contractor in exhaust gas scrubber installations.

Part of the production takes place in Romania (20 people) - client Borda a Tulcea, a subsidiary of Fincantieri, the assembly is done in Italy.

Current techological status of the company

Have you already adopted measures concerning industry 4.0?
1. The company has invested in two areas: the cloud, where it has migrated all the software systems, including the one that supports the administrative processes and the advanced manufacturing solution, introducing a welding robot 3 years ago. The decision to opt for cloud solutions also responds to the need to integrate different production sites but above all the communication between people. The employees of the company are engaged in external work sites for most of their time and the sharing of information in a timely manner becomes a crucial aspect in project management.

Have you had difficulties in the implementation of industry 4.0? What kind?
2. There were no particular difficulties with the implementation of the cloud. In this context, the greatest challenges were linked to the interconnection between different systems, especially in the production sector (data exchange between computer / machine, for example).

Those related to the welding robot are more related to the difficulty of finding specialized personnel with the authorizations (licenses) necessary to operate in the sector in which the company operates.

The region has helped you in the implementation of measures concerning industry 4.0?
There was no help from the region.

What cost of adaptation to new technologies have you supported? Hig or low?
Low ones as there were no particular problems compared to the two technologies implemented.

Future developments: what is the company policy regarding Industry 4.0? What are your goals?
In the future we would like to invest on the area of (big) data and analystics. Working on a project the ability to accurately manage the cost budgets (in particular the one related to labor) becomes crucial for the company. Today the company has a data history that begins to settle and, according to the entrepreneur, should be analyzed to more accurately determine the standard production costs and to make more accurate the estimation activity.
Another area of investment concerns the collaboration between companies that work at the same time as a contract. Today a group of companies produces separately each piece that is then assembled. The evolution seems to be moving towards the introduction of a logic of "single first level supplier" which concentrates a substantial part of the coordination activities of the second and third level suppliers. It is therefore necessary to program the final assembly, with the various assembly tasks. A possible evolution in logic 4.0 could be that determined by the introduction of software for the simulation and synchronization of the different production and assembly tasks.

Professional profile:

Does the labor market in the region meet the requirements of industry 4.0?
What are the gaps between job demand and supply?
The most interesting professional figures for the company are technicians, especially in the field of mechanics and information technology. The big difficulty that the company finds today is that of finding figures that have technical skills but above all flexibility and relational skills, two fundamental characteristics in a sector such as the one in which the company operates, which involves moving but also the need to interface with people. and different companies on construction sites. Today, if you find (even if with increasing difficulty) trained technicians, the relational skills (soft skills) are those that are missing.
The company has never collaborated with ITS – HVET Institutes.

Does the company provide staff training course?
In the last few years, the company's training has focused mainly on the issue of safety, a central theme for the company, so much so that the company's motto is SAFETY FIRST! And on the website, you can read: "Our policy is 'Safety First'. It is the core value in everything we do. We have to do the job properly the first time we do it - every time! "
No training was organized on the topics of Industry 4.0.

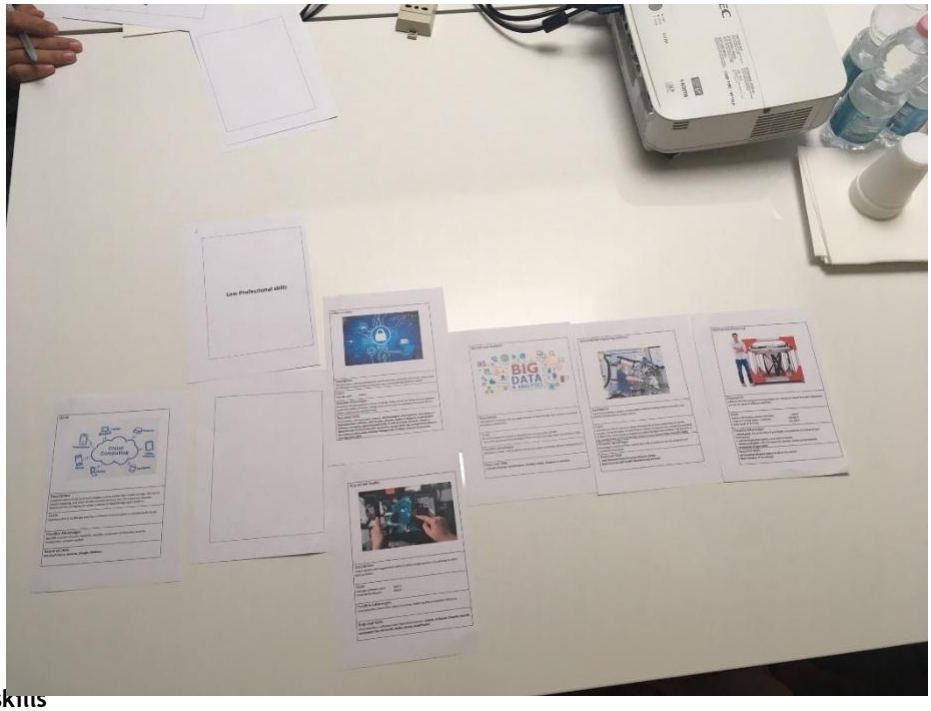
Identification of four professional profiles resulting from the development of Industry 4.0: what are the ideal professional profiles?
The professional profile, within the 4.0 industry, is the one of the "Cost Estimator" that combines analytics skills (even not necessarily on Big Data) necessary to determine the standard costs of the company depending on the type of service provided, and then to overturn it on the contract budget. It is a figure that has skills between data analysis techniques and accounting for decisions making.

Does the company have standards or have best practices and standard as for industry 4.0? What are future objectives of the company about industry 4.0?
There are no standards.

Technology	WIFORCE ITALIA SRL
Advanced Manufact.Solutions	Yes ☒ No ☐ Work in progress ☐
AugmentedReality	Yes ☐ No ☒ Work in progress ☐
Cloud	Yes ☒ No ☐ Work in progress ☐
Additive Manufacturing	Yes ☐ No ☒ Work in progress ☐
Big Data and Analytics	Yes ☐ No ☐ Work in progress ☒
Cyber-security	Yes ☐ No ☐ Work in progress ☒

Card Game Analysis

For the sake of brevity, we report only the photo of the Professional skills criterion. The same procedure has been followed for the other criteria i.e. Short-term economic benefit, Long-term economic benefit, Initial costs, Operating costs, Improvement of sustainability.



Professional skills

Additional companies involved in the LOCAL FOCUS GROUP for Veneto area, additional to those already interviewed, are the following**:**

6. **Cantiere Navale Vittoria S.P.A**
7. **Venezia Terminal Passeggeri S.P.A.**
8. **Conepo Servizi S.C.A.R.L.**
9. **Atroos S.R.L.**
10. **Vf Elettronica S.A.S**
11. **Marina Del Cavallino S.R.L.**
12. **Marine Tech Ccyd S.R.L**

CANTIERE NAVALE VITTORIA S.p.A: Vittoria Shipyard works in all sectors of naval construction, with a production of more than 800 boats such as: cargo-boats, fishing vessels, tankers, dredgers, ferry boats and passengers ships. Production is sustained with a diversity of materials: aluminum alloy, high performance carbon steels, Duplex type stainless steel resistant to all chemical agents, and epoxy or polyester resins reinforced with fiberglass, carbon or Kevlar. Vittoria Shipyard was created in 1927 through the initiative of the family Duò. All the three generations, who have run until today, have worked continuously toward product innovation; this being due to a deep commitment to bringing diligence, passion and social responsibility to their business. With these principles in mind, Vittoria Shipyard has developed an international presence that, despite of these hard times and the crisis, continues to expand today. Vittoria Shipyard's current success is possible because of the efforts of more than 300 employees both within the company and external. This agile and flexible body of professionals crafts the ships with quality and rapidity. The workspace, set in Via Leonardo Da Vinci in Adria, extends across a 22.000 meters surface, 8.000 of which are covered by mobile hangars that allow production to continue on different projects simultaneously, without restraint from the external climate. For more info: **https://www.vittoria.biz**.

VENEZIA TERMINAL PASSEGGERI S.p.A.: V.T.P. S.p.A. was founded in 1997 by the Venice Port Authority. It manages 10 multifunctional terminals, 1 provisions storehouse, 6 parking lots and 7 quays across the areas of Marittima, St. Basilio and Riva dei Sette Martiri, providing high quality services to any ships (cruise, hydrophoils, catamarans) calling at the Port of Venice. Thanks to big investments (over 70M Euro) made by the Company between 1997 and 2017 for improving the efficiency of the port facilities, reducing the impact of the port activities on the environment and enhancing travelers' comfort and safety, the Port of Venice welcomed over the years over 30 million passengers, thus ensuring a prominent position among the best worldwide cruise ports and destinations. Leadership, know-how and proactivity in facing the increasing challenges set by the cruise industry are the key skills that allowed Venezia Terminal Passeggeri S.p.A. to spread its field of action throughout Italy becoming a major player in the creation and upgrading of cruise facilities

as well as in the implementation of innovative technological products for better managing passenger flows. As a matter of fact, the Company is a shareholder of: Ravenna Terminal Passeggeri S.r.l. (R.T.P. S.r.l.), managing the Cruise Terminal 'Porto Corsini' in Ravenna; Catania Cruise Terminal S.r.l. (C.C.T S.r.l.), managing the cruise terminal of Catania; Cagliari Cruise Port S.r.l. (C.C.P S.r.l.), managing the cruise terminal of Cagliari; Brindisi Cruise Port S.r.l. (B.C.P S.r.l.), established to manage the cruise terminal of Brindisi. In addition VTP has two fully owned and controlled specialized companies: Venice Yacht Pier S.r.l. (V.Y.P.), established to increase yachting in Venice; VTP Engineering S.r.l., specialized in engineering solutions for improving the effectiveness and efficiency of port processes. For more info: **https://www.vtp.it**.

CONEPO SERVIZI S.c.a.r.l.: Conepo Servizi has been providing environmental services in the port of Venice since 1970, deriving from a company that in the post-war period carried out nautical services to remove waste from the ships calling at the Venetian capital. Initially equipped with only boats, the company has progressively expanded its vehicle fleet with road vehicles and new equipment to meet the specific needs of the ships and guarantee the best services, especially those for cruising. Conepo Servizi is the most important private operator of environmental services and transport, specialized in the field of special and non-special waste disposal, in Venice historic center and mainland. It also takes care of removing the waste itself as well as its destruction. Among the wastes that are disposed of by our company we highlight paper, plastic, toners, furniture, oils, guano, asbestos, raee (electronic waste) and documents (even sensitive documents). Conepo Servizi also deals with the disposal of medical waste and construction waste. Active for over 45 years in the service of removal, disposal and destruction of waste from the ships of the ports of Venice and Marghera, equipped with an important and diversified fleet of vehicles, both nautical and road as well as specific infrastructures. Conepo guarantees individuals and companies (including the Public Administration) certified and versatile services with specialized and qualified equipment and personnel. It manages the removal, transport and disposal of all types of waste, including hazardous waste, in Venice's historic center, islands and mainland, through immediate interventions that are also difficult to access. Conepo Servizi guarantees maximum correctness in the management and disposal of waste of all types. It is attentive to the current environmental legislation, making use of the help of specialized centers, authorized and accredited for the destination of waste. The organization avails itself of the assistance of professional consultancy offices in environmental and transport matters, as well as the support of specific sections of national territorial associations (ANSEP UNITAM, CONFINDUSTRIA). For more info: **http://www.conepo.it**.

ATROOS S.r.l.: Atroos is an innovative start-up that offers customized software development for SMEs and large companies, using advanced technologies and technical know-how guaranteed by long-

term collaborators, supporting the customer throughout the development process and also ensuring assistance post sales. Atroos also deals with Industria 4.0, developing customized solutions for its customers in both hardware and software, the main tools developed are: IoT; MES and ERP and customized hardware to allow the interconnection of machinery with factory information systems. For more info: **https://atroos.com**.

VF ELETTRONICA S.a.s: small enterprise active in the naval electronics.

MARINA DEL CAVALLINO S.r.l.: Founded in 1970 MARINA DEL CAVALLINO has 400 berths between Jesolo and Venice. The berths, in fresh water, are equipped with: electricity, water intakes, fire prevention, car parks and trolleys, toilets. We carry out hauling and launching operations with: travel-lift (tons 70) and crane (tons 15), slide for trailerable hulls. MARINA DEL CAVALLINO has sheds and large squares for winter shelter, a workshop for mechanical and electronic assistance, carpentry for the assistance and repair of hulls of each material. For the "do it yourself" there are large work areas and a well-stocked spare parts and accessories warehouse. For more info: **http://www.marinadelcavallino.com**.

MARINE TECH CCYD S.r.l: Marine Tech CCYD is a shipyard located in Marghera, Venice. For more info: **https://marine-tech-ccyd-srl.business.site/**.

Focus Group development:

The Focus Group for the Veneto area was organized by the LP Veneto Region in strong collaboration with the PP2 SIAV, and took place on the morning of Friday 22 February 2019, in Venice, at the Veneto Region premises. During **the session dedicated to companies**, 3 groups were formed, consisting of representatives of the participating companies, and were coordinated by Prof. Gianluca Toschi (University of Padua-Department of Economics and Management and Fondazione Nord Est think tank). Tracing the methodology used in WP2 during the reconstruction of the case studies, the three groups were given “cards” containing information regarding the following technologies:

- Augmented Realty
- Big Data and Analytics
- Cyber-security
- Advanced Manufacturing Solutions
- Additive Manufacturing
- Cloud

The groups were then asked to order the cards of the various technologies based on:

- Long-term economic benefits deriving from the adoption of technologies;

- Professional skills, considering both the difficulty in finding and the level of skills required for implementation/use;
- How they support the environmental sustainability strategies of companies;
- Costs of implementing the technology, considering the acquisition costs of licenses/technologies (software and hardware) and the cost of training human capital.
-

Furthermore, the various groups were asked to identify for one of the technologies and indicate possible consultancy paths necessary for adoption.

Feedback from companies

The two most representative groups were composed as follow:

Group A:

- Karin Tasinato (VENEZIA TERMINAL PASSEGGERI S.p.A – H.R. Education and training)
- Matteo Teodori (CANTIERE NAVALE VITTORIA S.p.A - Business Development)
- Alessandro Furlan (V.F. Elettronica S.a.s. - Industrial Engineer)
- Andrea Semenzato (MARINE TECH-CCMD S.R.L. - Manager)

Group B:

Riccardo Celin (ATROOS S.r.l. – Manager)

Nicolò Targhetta (EURIS, European Researches Investments Services - Manager)

Roberta Basato and Renzo Basato (WIFORCE ITALIA S.r.l - CEO)

Andrea Semenzato (MARINE TECH CCYD S.r.l - Technician)

Monica Righetto and Giorgio Menegati (VENEZIA TERMINAL PASSEGGERI S.p.A -Commercial and Customer Assistance)

1. Expected long-term economic benefits deriving from the adoption of technologies.

Table 1 - Long-term economic benefits

	Group A	**Group B**	**Group C**
- less impact technology	Cloud	Additive Manufacturing	Cloud
+ grater impact technology	Cyber-security	Big Data and Analytics Cyber-security	Augmented Realty

Group A sequence:

- Cloud, Additive Manufacturing, Big Data and Analytics, Augmented Realty, Advanced Manufacturing Solutions, Cyber-security

Group B sequence:

- Additive Manufacturing, Advanced Manufacturing Solutions, Augmented Reality, Cloud, Cyber-security, Big Data and Analytics

2. Professional skills, considering the difficulty of availability and the level of skills for implementation/use.

Table 2 - Professional skills

	Group A	**Group B**	**Group C**
-	Cloud	Advanced Manufacturing Solutions	Cloud
+	Augmented Realty	Big Data and Analytics Cyber-security	Augmented Realty

Group A sequence:

- Cloud, Cyber-security, Big Data and Analytics, Additive Manufacturing, Advanced Manufacturing Solutions, Augmented Realty

Motivation: According to the group, adopting a technology such as augmented reality requires a high degree of training and important soft skills.

Group B sequence:

- Advanced Manufacturing Solutions, Augmented Reality, Additive Manufacturing, Cloud, Big Data and Analytics / Cyber-security

3. How they support companies' environmental sustainability strategies

Table 3 - Sustainability

	Group A	**Group B**	**Group C**
-	Cyber-security	Cyber-security	Cyber-security
+	Advanced Manufacturing Solution	Advanced Manufacturing Solution	Cloud

Group A motivation: Advanced production systems could prevent the dispersion of harmful substances (e.g. thin powder resulting from the removal of paint from ships).

Group B sequence:

- Cyber-security, Cloud, Big Data, Augmented Reality, Additive Manufacturing, Advanced Manufacturing Solutions

4. Technology implementation costs, considering licensing / technology acquisition costs (software and hardware) and human capital formation costs.

Table 4 - Initial costs

	Group A	**Group B**	**Group C**
-	Augmented Realty	Additive Manufacturing	Cyber-security
+	Advanced Manufacturing Solution	Augmented Realty Big Data and Analytics	Advanced Manufacturing Solution

Group A sequence:

- Augmented Realty, Cloud, Cyber-security, Big Data and Analytics, Additive Manufacturing, Advanced Manufacturing Solutions

Group B sequence:

- Additive Manufacturing, Cloud, Advanced Manufacturing Solutions, Cyber-security, Augmented Realty, Big Data and Analytics

5. Technologies and possible consultancy paths necessary for adoption.

Table 5 - Technologies and consultancy paths

	Group A	Group B	Group C
Technology	Big Data and Analytics	Big Data and Analytics Cyber-security Advanced Manufacturing Solution	Cloud
Consulting	Strategy	Project Management	Software Selection

Group A suggests a path where at first it must be understand and analyze the phases of the company/micro situations and then request a business plan and decide whether to proceed with staff training. The group has leveraged the budget in the business plan phase as a decision-making indicator to continue or not with consultancy.

Group B suggests:

- mapping of company systems
- separation of service companies and manufacturing companies
- training longer than 8 - 32 hours
- give continuity to the individual paths proposed
- assess the impact of personnel costs
- prefer technologies: Big data, cyber security, robotization