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

FUTURE 4.0

FUTURE 4.0 POLICY RECOMMENDATIONS

DELIVERABLE D.T3.3.1

WP T3:, ACTIVITY A.T3.3

Version 1
11/2020

Project number and acronym	294 – FUTURE 4.0
Lead partner	Veneto Region
Prepared by	PP01, Veneto Region Antonio Mocci, Elisa Bertoni
Address	Veneto Region Industry Craft Commerce and Services Department Fondamenta S. Lucia – Cannaregio, 23 30121 Venice
Email	elisa.bertoni@regione.veneto.it
Date, Venue	Venice, 30/11/2020
Delivery Date	30/11/2020

REGIONE DEL VENETO

DOCUMENT CONTROL SHEET

Work package Number	WP4 T3
Work package Title	Local Pilot Action Design and Implementation
Activity Number	T3.3
Activity Title	Policy learning: Smart Learning in an Industrial Policy Prospective
Deliverable Number	T3.3.1
Deliverable Title	FUTURE 4.0 Policy Recommendations
Dissemination level	Public
Main author	PP01, Veneto Region
Contributors	Future 4.0 Partners
Quality Assurance	PP01 LP, PP02 SIAV

TABLE OF CONTENT

1. Introduction

FUTURE 4.0 is an ADRION - Interreg project which was carried out in five European regions: Apulia and Veneto for Italy, Western Greece for Greece, Primorje - Gorski Kotar County in Croatia and Albania. The project aimed at supporting the spreading of Industry 4.0 techniques and culture in the shipbuilding and maritime sector of partner countries.

According to FUTURE 4.0, the policy recommendations coming from the partnership at the end of the project should be in line with the first pillar of the European Strategy for the Adriatic - Ionian macroregion, which is about the Blue growth. More in detail, as specified by this pillar, the Adriatic and Ionian Region suffers a lack in "business resource efficient culture" and cooperation of business, research and the public sector. Blue Growth industrial sectors are short on clustering and fail to fully exploit the advantages of effective cooperation among research centres, public and private sectors and users. It is essential to transfer R&D results of Key Enabling Technologies (IT, robotics, materials, automation) in new end-users components & applications for the advanced manufacturing industries. EUSAIR Action Plan argues that some key sectors, such as shipbuilding, the boating industry and logistics, risk losing competitive leverage while others, such as marine technologies or blue bio-technologies, have not yet developed their full potential.

To face this challenge, the project worked for three years to drive innovative maritime and marine growth and employment by enhancing innovation and business opportunities in blue economy sectors, with a focus on developing human capital, promoting entrepreneurship, fostering cooperation among research, knowledge providers and industry to develop innovative products and knowledge and technology transfer. In the following pages, 18 recommendations are developed and proposed to ease the transfer of project results into industrial policy for the shipyard and maritime sector. Recommendations can be clustered in three groups: recommendation related to competence development; related to the support to Adriatic Ionian Region companies for understanding digitalisation and Industry 4.0; related to the relations between nautical and shipbuilding companies and their environments.

2. Recommendations related to competence development

Working on the analysis of involved territories - from an economic and social perspective - and investigating the impact of the Industry 4.0 on training and skills, Future 4.0 partners discovered several issues.

1. To begin with, in general, in order to support companies and workers to face successfully the changes in the nature of work induced by the technological development and the digitalisation of production linked to Industry 4.0, there is need to update constantly education and training. More in detail, the continuous analysis of new roles, new jobs and new skills produced by Industry 4.0 transformations brings out the need to equip companies and the workforce with the right skills to be prepared for the production and the jobs of the future and for a constantly changing industrial environment. Enterprises should always maintain reskill and upskill in their working environment in order to support the transit to a new industrial era. Then, the training offered should include further training or retraining. However, the most important thing is that the training offered is targeted according to the person's own wishes and needs, as otherwise, the results are easily insufficient.

2. As well, companies should be aware that the interaction man - machine that is so frequent in Industry 4.0 working environments, made the necessary set of skills composed not only of technical competences but also of soft and relational skills. Moreover, it is fruitful to consider machine - to - machine relations and human - to - machine interaction. Therefore, it might be useful to foresee the investment on specialists of the training and skills development focussed on specific technologies and on the whole spectrum of relational skills. The organisation of specialist skills training activity in the path of digital transformation helps develop and consolidate a digital culture and digital skills over time to innovate continuously.

3. From a methodological point of view, partners found that the rapid technological development has as result the introduction of new training and learning approach and methodology. To be specific, the training experimentations made during Future 4.0 project encompassed several learning methods and actions: synchronous and

asynchronous delivery, on - site and distance content delivery; learning games and simulation tools techniques. One of the most interesting testing was the Teaching Factory paradigm and its application the Academy-to-industry scheme. Teaching Factory is the concept where manufacturing practitioners “teach” students in Engineering Schools about manufacturing problems, manufacturing issues and manufacturing practices. The concept also involves the other direction, that from a classroom to a factory, where students and faculty “teach” manufacturing practitioners about advances made in manufacturing technology, new trends, results of research and development work.

An example of this approach taken from the FUTURE 4.0 project is the “Academy-to-industry” scheme that aims to transfer knowledge from academia to industry and is used for training and re-training operators and engineers on Industry 4.0 enabling technologies. Within the teaching factory approach, an industrial or didactic equipment is installed into academic classrooms and is used as test beds and demonstrators for new technological concepts that are validated by researchers. Afterwards this innovative technology is transmitted back to industry to meet the learning needs of employees

4. Partners investigated deeply the concept of knowledge transfer. In fact, there is a tendency to consider technological transfer as limited to technological dimension in the strict sense, without considering instead the need to extend and integrate it within the wider logic of knowledge transfer. The acquisition of new external knowledge must be completed with its adaptation and integration of use within the new organisational and production context. It might be better therefore to speak about transformation, rather than transfer. This transformation is driven by the learning process.

5. As a consequence of the point above, partners experimented a methodology for knowledge transfer in the shipbuilding sector companies, 132 of which were involved in the testing. Beside the use of the FUTURE 4.0 Learning platform, enterprises were involved in seminars, in-company action learning interventions and webinars with the aim of enhancing their final capability to effectively absorb the new external knowledge, unknown respect to the previous experience, developing in this way new routines to integrate the stock of pre-existing know-how and mutually adapting the

new codes and cultural models to assimilate them. The acquired knowledge requires some sort of a conversion of knowledge in order to make it useful for innovation; the receiver will be then able to produce new knowledge or improve knowledge skills or capabilities and innovation. This kind of conversion is preceded by dissemination activity and is articulated in the following steps. Awareness, that is the identification by the company of the new knowledge deemed most appropriate to use and that responds adequately to its innovation needs. Acquisition, that is the identification of the supplier and the acquisition of the knowledge. Receiver and source must ensure the ability and the willingness to manage complex processes. And finally transformation, that is to say that the acquired knowledge requires to be processed, worked out so that it can become usable by the company. So an activity should be performed in order to adapt the new knowledge so as to integrate it into the heritage of already existing business knowledge.

6. After elaborating the smart learning model, partners tested it with companies from the shipbuilding sector using seminars, in-company action learning and webinars. One of the results of the testing was the fine - tuning of 4 professional profiles whose competences have been analysed and designed for the maritime industry. The 4 profiles are:
    - the IT Manager. IT professional profile is changing; from deep knowledge on traditional information technologies (such as Intranet, internal software,…), and specific software that enable the core process of the company, to tasks related to managing Cloud, to protect confidential information and data, to solve data breaks and to cyber security. The IT manager need to “stay tuned” continuously with the fast evolution of digital technologies that connect more and more people, devices suppliers, customers, … The perception of IT specialists indicates that they need to make an additional effort to reach a deeper level of expertise required by new technological contexts and to improve their communication and collaboration skills. Finally, IT managers must work in team with their colleagues in a more effective way.
    - The Technical Area - R & D Manager. For the Technical Area - R & D Manager it seems necessary to improve the level of knowledge on new technologies significantly and to improve the skills that are related to the acquisition and transformation of the new knowledge, such as managing change, managing

people, managing technological progress, communication and collaboration.

- The Supply Manager. As well, the professional profile of Supply manager who operates in the sector of naval business and shipbuilding is rapidly evolving. First, changes within the ecosystem advice to consider a larger number of suppliers, sometimes different from the usual ones. Besides that, the new technologies linked to Industry 4.0 and digital transformation propose a whole set of new skills to develop and perform. Last, in managing suppliers the manager has to care for aspects linked to sustainability and environment respect.
- The Human Resource Manager. In SMEs the role of the Human resource manager is often associated with other responsibilities, such as the head of administration and finance, the CEO. Human resource management is a key role in innovative companies, especially when they are designing and implementing change processes such as Industry 4.0 and digital transformation. However, the competences of this profile are in general limited to basic aspects of people management. Therefore, the profile should extended to the following areas: competence assessment tools, the ability to manage reskilling and upskilling plans, change and innovation management, communication with employees.

3. Recommendations related to the support to Adriatic Ionian Region companies for understanding digitalization and Industry 4.0

Working with 132 shipbuilding companies and entrepreneurs for the testing of the smart learning model and the realisation of local action plans, partners discovered that the Fourth industrial revolution implied a technological and cultural change to be fully understood.

1. Project partners became aware that the change towards Industry 4.0 is not merely a matter of investments: it is a technological and cultural change that needs a strategy. The experience done with companies and stakeholders during the local

action plans advices to start even with small projects and reduced investments to explore the scalability of Industry 4.0 technologies. In fact, digital transformation can begin with modest ambitions and investments, as the key element is to set up a clear strategy for the transformation aligned with company priorities. Starting with small steps through exploratory projects allows you to understand short-term dynamics and assess feasibility and benefits. To do this it can be useful to take advantage of demonstrators to test technologies and highlight opportunities.

2. A second point regards the importance of the awareness of the implications on company organisation. IT infrastructures are important, but it is not enough to have 4.0 operators and more digital skills. The mind-set of managers and workers is equally critical and still lacking. Moreover, cross-communication between the business units is pivotal. Similarly, the manufacturing value chain will undergo transformative change in light of the greater complexity of manufacturing companies' processes and supply networks as well as cost pressures and more demanding customer expectations. In turn, it is foreseen that this will lead to more collaboration and agility in the manufacturing value chain built upon responsive, flexible and rapid change. In this process, manufacturing is also likely to become more human centred. Among other reasons, this will result from more use of human-oriented interfaces in the manufacturing environment, requiring knowledge in the interaction with technology, and a need to enhance opportunities for education, training, support functions and continuous learning, which fits with the new needs of company innovation. Overall, while manufacturing environments were previously perceived as production-centred operations, they will increasingly face the need to incorporate workers, suppliers and customers in a innovation pathway and human-centred business.

3. A third point is to frame investments within a specific strategy, avoiding isolated implementations of one new technology. This allows the definition of a technological roadmap, the formulation of a whole strategy for digitization and the identification of key factors to improve competitiveness. To choose a technology without considering resources, materials and efforts in related terms of time would lead to misleading results and no practice application. To boost the strategy, managers should be supported in their strategic choices for the correct use of financial

resources for the purpose of improving the value proposition.

4. Companies - and, in general, human capital developers - should be aware of policies and existing support implementation measures and combine them to real business needs. Local synergies and market opportunities can be created on the basis of clustering companies and by promoting stakeholder partnerships among companies with different competences and size in a given field. When industries and territories are looking for venues to explore, open standards represent one path towards facilitating collaboration in the value chain. Not only do they allow for interoperability in terms of data and applications, but they also enable a more compatible framework through which different enterprise systems can co-interact. Similarly, the take-up of ICT technologies will further enhance the constant feedback loops covering the full cycle involving product designers, engineers, production facilities and customers.

5. Companies have to be supported to understand how the business model of the enterprise changes following the adoption of 4.0 technologies. In fact, new technologies strongly impact the business model, bringing multiple and multi-level benefits. Partners found that digital technology acquisition is more successful when integrated in a smart digital business model. Besides that, enterprises should be aware of the continuous increase in accessibility and exploitability of many of the 4.0 technologies. In fact, the cost of many technologies decreases rapidly and this is a key element in implementing the digitization strategy.

6. The challenge of sharing knowledge is pivotal: it is fundamental to adopt a collaboration perspective with other companies, suppliers and customers to integrate digital technologies into the supply chain. It is also important to collaborate with universities and knowledge providers (also at international level) for cooperation on research and innovation development. As well, it is relevant the cooperation with international analysts and reference companies to predict future technological trends and match them with customer needs. Eventually, networking with suppliers is significant to understand the technologies and market trends.

7. Finally, it is important to increase the knowledge of I 4.0 technologies and to

develop specific skills to use them correctly and to overcome the resistance to change and the lack of experience. In fact, partners found that the greatest difficulty in transferring knowledge affects workers, in particular those elderly who need to increase their knowledge and transform their skills to keep up with new technologies.

4. Recommendations related to the relations between nautical and shipbuilding companies and their environments

Enterprises wishing to adopt the Industry 4.0 technology and culture do not operate in a separated world, their action is in a globalised economy and takes place at global, European, national and local levels. That is why the relation between companies and their natural environments is so central.

1. Analysing territorial and economic megatrends for the shipbuilding and maritime sector, partners found that sustainable development is an emerging issue in the process of realising Industry 4.0. The issue is relevant against the background of cross - cutting issues and social challenges like climate change and energy transformation in the industrial context. In particular, partners observed that technological and productive organisation related to Industry 4.0 leads to a highly adaptive and thereby efficient and ergonomic production. Within this framework, the project Future 4.0 focussed on the energy-intensive shipbuilding industry and related services: as a result partners reported on smart green potential evolution and implemented concrete upskilling action plans.

2. As well, it is important to take advantage of connections with the local ecosystem, by making agreements with universities, research centres, knowledge providers, technology parks and agencies for innovation. Connections are also very useful with the Public administrations, for issues related to research, territorial development and employment and for contributing to the policy - making process.

3. One interesting experience for enhancing the link between companies and the local ecosystem was designed and used in Rijeka. The university involved and selected about 15 young researchers/PhDs in the field of 4.0 technologies, as mentors of some companies belonging to the naval sector and its related supply chain. Each researcher/mentor selected one of the 6 KETs technologies, according to company needs, and tried to support and drive its implementation into the company, thanks also to the adoption and testing of FUTURE 4.0 platform.

4. The role of the entrepreneur is central in the process of acquisition and development of new skills connected with Industry 4.0 and digital transformation in companies. The leadership of the owner - manager enables the innovative company to place learning at the centre of their business activities and relations. Moreover, it makes sure that employees develop skills by taking advantages of all learning opportunities that may arise. Finally, it plays a vital role in orienting the attitude, behaviours and actions of employees regarding up- and reskilling programs. Entrepreneurs who were involved in Future 4.0 actions showed their interest in the acquisition of the new enabling skills related to Industry 4.0 for improving innovation. They expressed the need to be supported and accompanied in the process of transformation and incorporation of new knowledge into processes and practices of the company. Besides that, they stated the necessity to develop and improve their skills to manage technological, cultural and organisational changes.

5. In Industry 4.0 ecosystems, socio-economic sustainability trends are anticipated to involve a shift towards lean, clean and green energy in order to reduce resource consumption, achieve sustainability in production processes and material as well as preserve scarce resources. Alongside the need for more sustainable and green manufacturing, the manufacturing environment is expected to move closer to citizens in cities or metropolitan areas, and taking accelerated population aggregation into account, too. As the close proximity of plants and production facilities will impact citizens living nearby, factories must be increasingly integrated and accepted in the living environment.