

O2-R1: Curriculum

RESTART Training Toolbox
Digital Skills for Industry 4.0



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1. RESTART CURRICULUM DESCRIPTION

The Training Programme developed by the RESTART partnership is titled “DIGITAL SKILLS FOR INDUSTRY 4.0.”

The curriculum mainly elaborates on basic digital skills development that enables the reader to deepen into industry 4.0 applications and principles. It contains 15 modules distributed into 8 topics, offering more than 50 hours of training. The modules are complementary to each other and allow a step-by-step upgrade of learners’ knowledge, skills and competences.

The training contents and knowledge proposed by the RESTART consortium respond to the different dimensions of any industrial process, from product design to sales force.

The course design is modular, adaptable to different professional profiles, needs and levels of knowledge, which will enable the user to select training units based on interest and need.

2. RESTART Learning Programme:

Learning Modules and Units	Hours
1. Introduction to Industry 4.0	8h
1.1 Introduction to Industry 4.0	6h
1.2 Production Management	2h
2. Industry 4.0 Technologies for Product Design & Manufacture	15h
2.1 CAD	4h
2.2 RE & 3D Printing	8h
2.3 CNC	3h
3. Cloud Based Computing	8h
3.1 Definition of Cloud Computing: Key concepts	3h
3.2 Cloud Models	3h
3.3 Advantages of cloud computing for SMEs	2h
4. Digital Factory	4h
4.1 Digital Factory Tools	2h
4.2 Implementing the Smart Factory	2h
5. e-commerce	7h
5.1 Introduction to e-commerce	5h
5.2 e-commerce solutions for SMEs	2h
6. e-Leadership	3h
7. Big Data	8h
8. Industrial Security	2h
TOTAL DURATION	55 hours

3. Detailed Training Contents Framework/ Curriculum

Title of Module	Introduction to Industry 4.0
Duration	15 hours
Delivery method	Online, self-assessment
Description	This module introduces the history and concepts of the 4th Industrial Transformation. And it also gives an Introduction to Production Management
Units	<ul style="list-style-type: none"> • Introduction to Industry 4.0 • Production Management
Learning Outcomes	<p>-KNOWLEDGE:</p> <p>Be knowledgeable of how industry has evolved from the 1st to the 4th Industrial Revolution.</p> <p>Be knowledgeable in Production, project Management Techniques, skills and steps in Management methodologies.</p> <p>-SKILLS:</p> <p>Be able to recognise the most significant advancements of each era and how they affected each subsequent revolution, understand the latest reforms of Industry 4.0 and how they can be integrated in the Industry.</p> <p>Be able to recognise the basic concepts of Production Management.</p> <p>-RESPONSABILITIES & AUTONOMY:</p> <p>Have a working knowledge of the most important technological advancements brought about by the 4th Industrial Revolution and know how to integrate them in their sector without supervision and guidance.</p> <p>Identify the necessary competences of Production Management, Steps to Production Management, including Management Techniques; Planning; Skills</p>

	and Life Cycles.
Competences	<ul style="list-style-type: none">-Digital: Production.-Management & Personal: Communication, management teamwork, problem solving and organizational competences.

Title of Module	Industry 4.0 Technologies for Product Design & Manufacture
Duration	8 hours
Delivery method	Online
Description	<p>This module provides information about different CAD software used in the industry and in education.</p> <p>It is also aimed to offer learners an overview about of Reverse Engineering & 3D scanning technology</p> <p>And it provides information of the different types of CNC machines, and how these can be utilised to produce components</p>
Units	<ul style="list-style-type: none"> • CAD • RE & 3D Printing • CNC
Learning Outcomes	<p>-KNOWLEDGE:</p> <p>Be knowledgeable of the use of the CAD technologies and their application fields.</p> <p>Be knowledgeable of the use of Reverse Engineering, 3D Scanning Technology, 3D Scanners and different 3D Scanning Application.</p> <p>Be knowledgeable of the workflows from design to manufacture.</p> <p>-SKILLS:</p> <p>Be able to recognize different application fields and the utility of CAD. Be able to do simple designs</p> <p>Know about reverse engineering and why to use 3D scanning technology. And also know where and when to use 3D scanning.</p> <p>Be able to differentiate between the different types of CNC technologies. And outline how CNC technologies are used within Industry 4.0 applications.</p>

	<p>-RESPONSABILITIES & AUTONOMY:</p> <p>Recognize the importance of CAD in industry 4.0, its versatility and speed at the time of making designs of certain complexity.</p> <p>Recognize the need of using Reverse Engineering and 3D scanning Technology in their company, should they need it.</p> <p>Discern between diverse types of CNC, know how to use them and know about common CNC applications within Industry 4.0.</p>
Competences	Digital: Digital Models, automation, Big Data, cloud, production and software.

Title of Module	Cloud Based Computing
Duration	8 hours
Delivery method	Online
Description	This module gives an introduction to the traditional deployment model, server virtualization, history of cloud computing and definition of cloud computing. It provides information relating to cloud computing features, deployment models, service models, etc. It also presents some advantages and disadvantages related to the use of cloud computing for SMEs.
Units	<ul style="list-style-type: none"> • Definition of Cloud Computing: Key concepts • Cloud Models • Advantages of cloud computing for SMEs
Learning Outcomes	<p>-KNOWLEDGE:</p> <p>Be knowledgeable of the key concepts about cloud computing.</p> <p>Be able to describe the different cloud models.</p> <p>Be knowledgeable of the advantages of the use of cloud computing for SMEs.</p> <p>-SKILLS:</p> <p>Be aware of the fundamentals of cloud computing and related definitions.</p> <p>Be aware of the most important cloud computing modules and services and their features.</p> <p>Know the pros & cons of cloud-based services, and examples from real cases.</p> <p>-RESPONSABILITIES & AUTONOMY:</p> <p>Identify cloud computing services and differences between cloud computing and other solutions.</p> <p>Choose which cloud solutions are more suitable for his/her needs.</p>

	Choose when cloud-based solutions are more suitable for his/her needs.
Competences	<ul style="list-style-type: none">-Digital: Digital Models, IoT, automation, Big Data, cloud, production, software and security.-Management & Personal: Communication, management, teamwork and organizational competences.

Title of Module	Digital Factory
Duration	4 hours
Delivery method	Online
Description	This module is a review of the different tools that make up the digital factory throughout the factory life cycle. The module provides information relating to the possible implementation means of a smart factory.
Units	<ul style="list-style-type: none"> • Digital Factory Tools • Implementing the Smart Factory
Learning Outcomes	<p>-KNOWLEDGE:</p> <p>Be knowledgeable of the different digital factory tools available on the market. Understand the importance of the smart factory and how this can combine with other elements of a digital enterprise.</p> <p>-SKILLS:</p> <p>Be capable of listing a number of digital factory tools and how these are related to the different phases of the factory life cycle. Capable of identifying different elements within a digital enterprise and distinguishing between an Industry 4.0 and traditional enterprise set up.</p> <p>-RESPONSABILITIES & AUTONOMY:</p> <p>Argue the need for an integrated data model/digital twin which unifies the different digital factory tools.</p> <p>Discuss the difference between a traditional and digital enterprise and how a transformation process may be undertaken to transform the business.</p>
Competences	<p>-Digital: Digital Models, Big Data, cloud.</p> <p>-Management & Personal: Communication and management.</p>

Title of Module	e-Commerce
Duration	7 hours
Delivery method	Online
Description	<p>This module provides essential knowledge about e-commerce. It provides the keys around the management of an online store, digital marketing, purchase processes or customer service. In addition, it provides tools to address industrial strategies of e-commerce and digital marketing.</p> <p>And it introduces different e-commerce solutions available on the market.</p>
Units	<ul style="list-style-type: none"> • Introduction to e-commerce • E-commerce solutions for SMEs
Learning Outcomes	<p>-KNOWLEDGE:</p> <p>Be familiar with the tools for creating and managing an online store.</p> <p>Understand the keys of ecommerce and digital marketing. And acquire the basic knowledge to implement strategies of e-businesses.</p> <p>Identify e-commerce needs and functions</p> <p>-SKILLS:</p> <p>Demonstrate capacity to identify e-commerce processes. Apply e-commerce strategies inside the company and carry out and supervise e-commerce developments.</p> <p>Be familiar with market solutions. And introduce most suitable solutions for SMEs.</p> <p>-RESPONSABILITIES & AUTONOMY:</p> <p>Design e-commerce strategies and projects and identify company requirements and challenges of implementation.</p> <p>Discuss the process of e-commerce implementation.</p>

Competences

-Digital: Digital Models, IoT, Automation, cloud and software.

-Management & Personal: Communication, management and organizational competences.

Title of Module	e-Leadership
Duration	3 hours
Delivery method	Online
Description	The e-leadership acquires a key importance in the processes of transformation towards the industry 4.0 and incorporation of the new digital technologies. The digital environments require new tools for the successful management of businesses and their innovation. This section will focus on e-leadership skills and competences.
Units	n/a
Learning Outcomes	<p>-KNOWLEDGE:</p> <p>Be knowledgeable of leader characteristics and functions in 4.0 environments. Understand how to develop e-leadership models</p> <p>-SKILLS:</p> <p>Be able to recognize main transformation processes affecting leadership and new organization models.</p> <p>-RESPONSABILITIES & AUTONOMY:</p> <p>Create internal conditions for collaborative environments and recognize skills and competences to lead 4.0 organizations.</p>
Competences	-Management & Personal: Communication, management, teamwork, problem solving, risk and organizational competences.

Title of Module	Big Data
Duration	8 hours
Delivery method	Online
Description	Big Data is one of the main drivers for the advance and development of Industry 4.0 technologies. Thus, it is important to showcase the advantage Big Data gives to companies which are eager to get onboard Industry 4.0. This module is meant to provide an introduction to Big Data and some technologies related to it. In addition, it will help the participant out in discovering what Big Data really is, how does it work and how it can benefit a business.
Units	n/a
Learning Outcomes	<p>-KNOWLEDGE:</p> <p>Be knowledgeable of the basics of Big Data, advantages and challenges presented by Big Data.</p> <p>Know about the processes related to Big Data management: what are the basics steps when developing a Big Data Strategy, what to look for in a Big Data Solution...</p> <p>Know what to expect from Big Data in the future strategy.</p> <p>-SKILLS:</p> <p>Be able to draft a basic big data strategy.</p> <p>Be able to make a more informed decision regarding what Bid Data solution is better suitable for their company.</p> <p>-RESPONSABILITIES & AUTONOMY:</p> <p>Recognize the need of using Big Data in the company, should they need it.</p>
Competences	<p>-Digital: Digital Models, IoT, Big Data, cloud and software.</p> <p>-Management & Personal: Management, teamwork, problem solving and risks.</p>

Title of Module	Industrial Security
Duration	2 hours
Delivery method	Online
Description	Provides an introduction to the concepts of industrial networking and security.
Units	n/a
Learning Outcomes	<p>-KNOWLEDGE:</p> <p>Understand the basics of cybersecurity. Be knowledgeable of how security issues affect the Digital Factory. Be knowledgeable of the different type of network setups and their implementation. And understand the different ways in which cybersecurity can be implemented within the digital enterprise.</p> <p>-SKILLS:</p> <p>Be able to list a number of cybersecurity risks, and be able to define the concept of security zones within a digital enterprise.</p> <p>-RESPONSABILITIES & AUTONOMY:</p> <p>Can argue that 100% cybersecurity is not possible to achieve, and a system will always be vulnerable to cyber-attacks.</p> <p>Understanding what precautions and approaches may be employed to minimize the risk to an industrial control system.</p>
Competences	<p>-Digital: Digital Models, IoT, automation, cloud and security.</p> <p>-Management & Personal: Organizational competences.</p>

4. CURRICULUM RESTART 4.0: SUMMARY

Module No.	Knowledge Area / Module Title	Module Description	Learning Outcomes			Hours
			Knowledge	Skills	Responsibility and Autonomy	
1	Introduction to Industry 4.0					
1,1	Introduction to Industry 4.0	This module will introduce the history and concepts of the 4th Industrial Transformation	Be knowledgeable of how industry has evolved from the 1st to the 4th Industrial Revolution	Be able to recognise the most significant advancements of each era and how they affected each subsequent revolution, understand the latest reforms of Industry 4.0 and how they can be integrated in the Industry	Have a working knowledge of the most important technological advancements brought about by the 4th Industrial Revolution and know how to integrate them in their sector without supervision and guidance	6
1,2	Production Management	This module gives an Introduction to Production Management	Be knowledgeable in Production - Project Management Techniques, skills and steps in Management methodologies	This Unit will explain the Principals of Production Management, Planning and Control. On completion you will recognise the basic concepts of Production Management.	Participants will be able to identify the necessary competences of Production Management, Steps to Production Management, including Management Techniques; Planning; Skills and Life Cycles.	2
2	Industry 4.0 Technologies for Product Design & Manufacture					
2,1	CAD	This module provides information about different CAD software used in the industry and in education.	Be knowledgeable of the use of the CAD technologies and their application fields	After receiving this module, students will be able to recognize different application fields and the utility of CAD. In the same way, they will be able to do	Students will be able to recognize the importance of CAD in industry 4.0, its versatility and speed at the time of making designs of certain complexity	4

				simple designs		
2,2	RE & 3D Printing	This module is aimed to offer learners an overview about of Reverse Engineering & 3D scanning technology	Be knowledgeable of the use: Reverse Engineering 3D Scanning Technology 3D Scanners and Different Type 3D Scanning Application	After receiving this form, participants will have acquired the following skills: - Participants will learn what is reverse engineering and why use 3d scanning technology. They will also learn where and when to use 3D scanning.	The most important thing which the participants will gain after completing this course, will be to recognise the need of using Reverse Engineering and 3d scanning Technology in their company should they need it.	8
2,3	CNC	This module will provide information of the different types of CNC machines, and how these can be utilised to produce components	Be knowledgeable of the workflows from design to manufacture	- Understand the differences between the different types of CNC technologies - Capable to outline how CNC technologies are used within Industry 4.0 applications	Participants will be capable of understanding the difference between different types of CNC, how it is utilised and some common CNC applications within Industry 4.0	3
3	Cloud Based Computing					
3,1	Definition of Cloud Computing: Key concepts	This module gives an introduction to the traditional deployment model, server virtualization, history of cloud computing and definition of cloud computing	Be knowledgeable of the key concepts about cloud computing	After receiving this form, participants will have acquired the following skills: - awareness of the fundamentals of cloud computing and related definitions	The participants will be able to identify cloud computing services, and differences between cloud computing and other solutions	3

3,2	Cloud Models	This module provides information relating to cloud computing features, deployment models, service models	Can describe the different cloud models	After receiving this form, participants will have acquired the following skills: - be aware of the most important cloud computing modules and services and their features	The participant will be able to choose which cloud solutions are more suitable for his/her needs	3
3,3	Advantages of cloud computing for SMEs	This module presents some advantages and disadvantages related to the use of cloud computing for SMEs	Be knowledgeable of the advantages of the use of cloud computing for SMEs	After receiving this form, participants will have acquired the following skills: - Participants will learn pros & cons of cloud-based services, and examples from real cases	The participant will be able to choose when cloud-based solutions are more suitable for his/her needs	2
4	Digital Factory					
4,1	Digital Factory Tools	A review of the different tools that make up the digital factory throughout the factory life cycle	Be knowledgeable of the different digital factory tools available on the market	- Capable of listing a number of digital factory tools and how these are related to the different phases of the factory life cycle	Be able to argue the need for an integrated data model/digital twin which unifies the different digital factory tools	2
4,2	Implementing the Smart Factory	Provides information relating to the possible implementation means of a smart factory	Understand the importance of the smart factory and how this can combine with other elements of a digital enterprise	- Capable of identifying different elements within a digital enterprise - Capable of distinguishing between an Industry 4.0 and traditional enterprise set up	Be able to discuss the difference between a traditional and digital enterprise and how a transformation process may be undertaken to transform the business	2
5	e-commerce					

5,1	Introduction to e-commerce	This module provides essential knowledge about e-commerce. It allows to know the keys around the management of an online store, digital marketing, purchase processes or customer service. In addition, it provides tools to address industrial strategies of e-commerce and digital marketing.	<ul style="list-style-type: none"> - Be familiar with the tools for creating and managing an online store. - Understand the keys of ecommerce and digital marketing. - Acquire the basic knowledge to implement strategies of e-businesses. 	<ul style="list-style-type: none"> - Demonstrate capacity to identify e-commerce processes. - Apply e-commerce strategies inside the company - Carry out and supervise e-commerce developments 	<p>Be responsible for design e-commerce strategies and projects</p> <p>Be responsible for identify company requirements and challenges of implementation</p>	5
5,2	e-commerce solutions for SMEs	This module introduces the reader to the different e-commerce solutions available on the market.	Identify e-commerce needs and functions	<ul style="list-style-type: none"> - Be familiar with market solutions - Introduce most suitable solutions for SMEs 	Be able to discuss the process of e-commerce implementation	2
6	e-leadership					
6	e-leadership	The e-leadership acquires a key importance in the processes of transformation towards the industry 4.0 and incorporation of the new digital technologies. The digital environments require new tools for the successful management of businesses and their innovation. This section will focus on e-leadership skills and competences.	<ul style="list-style-type: none"> -Be knowledgeable of leader characteristics and functions in 4.0 environments -Understand how to develop e-leadership models 	Be able to recognize main transformation processes affecting leadership and new organization models	<ul style="list-style-type: none"> - Be responsible for creating internal conditions for collaborative environments - Recognize skills and competences to lead 4.0 organizations 	3
7	Big Data					

7	Big Data	Big Data is one of the main drivers for the advance and development of Industry 4.0 technologies. Thus, it is important to showcase the advantage Big Data gives to companies which are eager to get onboard Industry 4.0. This module is meant to provide an introduction to Big Data and some technologies related to it. In addition, it will help the participant out in discovering what Big Data really is, how does it work and how it can benefit a business.	<p>This module will give knowledge to its participants related to:</p> <ul style="list-style-type: none"> - Basics of Big Data - Advantages and challenges presented by Big Data - Processes related to Big Data management - What are the basics steps when developing a Big Data Strategy - What to look for in a Big Data Solution - What to expect from Big Data in the future strategy 	<p>After receiving this module, the participants will have gained the following skills:</p> <ul style="list-style-type: none"> - The participants will learn how draft a basic big data strategy. - Make a more informed decision regarding what Bid Data solution is better suitable for their company 	The most important thing which the participants will gain after complete this course, will be to recognise the need of using Big Data in their company should they need it.	8
8	Industrial Security					
8	Industrial Security	Provides an introduction to the concepts of industrial networking and security	<ul style="list-style-type: none"> - Understand the basics of cybersecurity - Be knowledgeable of how security issues affect the Digital Factory - Be knowledgeable of the different type of network setups and they can be implemented - Understand the different ways in which cybersecurity can be implemented within the digital enterprise 	<p>After receiving this module, the participants will have gained the following skills:</p> <ul style="list-style-type: none"> - Capable of listing a number of cybersecurity risks - Capable of defining the concept of security zones within a digital enterprise 	Can argue that 100% Cybersecurity is not possible to achieve, and a system will always be vulnerable to cyber-attacks. Capable of understanding what precautions and approaches may be employed to minimise the risk to and industrial control system.	2

ANNEX 1: Training Paths

PROFESIONAL PROFILE: Manager

The managers and decision-makers of industrial SMEs interested in developing digital transformation processes in their businesses should learn about the main concepts of 4.0 as well as familiarize with the new processes and technologies.

TRAINING

LEARNIING MODULES	Hours
Introduction to Industry 4.0	6h
Cloud Based Computing	8h
Digital Factory	4h
Introduction to e-commerce	5h
e-Leadership	3h
Big Data	8h
Industrial Security	2h
Total duration	36 hours

PROFESIONAL PROFILE: Middle Manager

The middle managers of industrial SMEs interested in developing digital transformation processes in their businesses should learn the concepts of 4.0 as well as familiarize with related processes and technologies.

TRAINING

LEARNIING MODULES	Hours
Introduction to Industry 4.0	6h
Production Management	2h
Technologies for Product Design & Manufacture: CNC	3h
Cloud Based Computing	8h

Digital Factory	4h
Introduction to e-commerce	5h
e-Leadership	3h
Big Data	8h
Industrial Security	2h
Total duration	41 hours

PROFESIONAL PROFILE: Technician

The technicians of industrial SMEs interested in developing skills to follow up the transformation processes in their companies should know about the main concepts of 4.0 as well as familiarize with related processes and technologies.

TRAINING

LEARNIING MODULES	Hours
Introduction to Industry 4.0	6h
Production Management	2h
Industry 4.0 Technologies for Product Design & Manufacture: CAD, RE & 3D printing and CNC	15h
Cloud Based Computing: Definition of Cloud Computing: Key concepts	3h
Digital Factory Tools	2h
Introduction to e-Commerce	5h
e-commerce solutions for SMEs	2h
Industrial Security	2h
Total duration	37 hours

RESTART 4.0

Project Partners:



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