Lead Beneficiary: CETEM
Approved by: All Consortium
Dissemination Level: Public

Partners

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<td>Karlsruher Institut Fuer Technologie</td>
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<td>P11</td>
<td>European Association of Development Agencies</td>
<td>EURADA</td>
<td>BE</td>
</tr>
<tr>
<td>P12</td>
<td>Regional Service for Training and Employment</td>
<td>SEF</td>
<td>ES</td>
</tr>
<tr>
<td>P13</td>
<td>PILDOREA</td>
<td>PILDOREA</td>
<td>ES</td>
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</table>

Prepared
CETEM

Verified
All Partners

Approved
All Partners

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## Table of Track Changes

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<td>First version of the document</td>
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4. Conclusions and next steps

1. Executive summary

Background

Many observers believe that Europe is at the beginning of a new industrial revolution, considered to be the fourth such leap forward and hence labelled Industry 4.0. The ubiquitous use of sensors, the expansion of wireless communication and networks, the deployment of increasingly intelligent robots and machines (as well as increased computing power at lower cost and the development of 'big data' analytics) has the potential to transform the way goods are manufactured in Europe.

This new, digital industrial revolution holds the promise of increased flexibility in manufacturing, mass customization, increased speed, better quality and improved productivity. However, to capture these benefits, enterprises will need to invest in equipment, information and communication technologies (ICTs) and data analysis as well as the integration of data flows throughout the global value chain.

The EU supports industrial change through its industrial policy and through research and infrastructure funding. Member States are also sponsoring national initiatives such as Industrie 4.0 in Germany, "Industria conectada 4.0" in Spain, the Factory of the Future in France and Italy, and Catapult centres in the UK. However, challenges like training workers and future professionals remain.

One quarter of the world’s furniture is produced in the EU. In 2012, more than 900,000 EU workers were employed in approximately 126,000 firms, and production amounted to more than €84 Billion\(^1\). However, these figures are 13\% lower than in 2007, while the Asian market has increased its production a 230\% during the same period\(^2\). In this context, the implementation and transference of the state of the art technologies in the production chain is a crucial point for the European Furniture and Woodworking industries to remain competitive, coupled with the fact that Staff qualifications, along with the ageing workforce and the inability to attract young workers\(^3\) remain one of the crucial points in these industries. To boost the recruitment of highly prepared staff requires initiatives addressing training to make the sector attractive and to transform both the academic knowledge and high-level basic and transversal competences to be useful and applicable.

The furniture and wood sector has identified that it has a shortage of professionals with high qualification in ICTs and other emerging technologies. Some of the specific skills and competencies that stand out as critical for managers in the furniture sector are ICTs skills that are crucial to operate in a modern business environment.\(^4\)

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1 (Eurostat SBS Eurostat, (sbs_na_ind_r2)).
2 CSIL processing data from official sources: Eurostat, UN, National Statistical Offices, National Furniture manufacturers associations.
The present document compiles the suggestions from the VET providers, sector experts and educational authorities from the In4Wood alliance for the design and delivery of a joint curriculum for “Manufacturers of Furniture Smart Factories” on Industry 4.0 expertise in the wood and furniture manufacturing sector.

2. Methodology

For the design of the common curriculum, it was followed the learning Outcomes Approach according to the principles of ECVET so as to support lifelong learning, the flexibility of learning pathways and the assessment, recognition and accumulation of the learning outcomes of each individual.

According to the Recommendation on the European Qualifications Framework - EQF\(^5\), learning outcomes are statements of what a learner knows, understands and is able to do on completion of a learning process. The qualification frameworks usually detail the overall level of learning outcomes. For ECVET purposes, the EQF is used as a reference for levels. Learning outcomes may be acquired through a variety of learning pathways, modes of delivery (school-based, in-company, etc.), in different learning contexts (formal, non-formal and informal) or settings (i.e. country, education and training system ...).

Based on the main findings of the Skills Analysis developed in WP1, content developers defined the different learning outcomes with the suggestions of the sector experts and VET authorities using the terms of Knowledge, Skills and Competences according to the Council Recommendation on the European Qualification Framework for lifelong learning\(^6\).

**Knowledge** means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the EQF, knowledge is described as theoretical and/or factual.

**Skills** means the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments.

**Competences** mean the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development.

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Such learning competences were grouped in units and sub units. Being a Unit a component of a qualification, consisting of a coherent set of knowledge, skills and competences that can be assessed and validated. For this, a Unit Description Template was prepared, that includes the basic information for the description of units using ECVET principles:

- The generic title of the unit.
- The generic title of the qualification.
- The reference of the qualification according to the EQF and NQF levels.
- The learning outcomes contained in the units, in terms of knowledge, skills and competences.
- The procedures and criteria for assessment of such learning outcomes.
- The ECVET points associated.

Content developers completed four templates, one per each of the units that the In4Wood qualification comprises.

The In4Wood training curriculum has been designed to further implement those quality indicators that may be applicable to In4Wood, and proposed by the European Parliament and the Council for establishing a European Quality Assurance Reference Framework for Vocational Education and Training. Which will be used to support the quality assurance and improvement cycle, implemented within the European Quality Assurance Reference Framework.

![Quality Assurance and Improvement Cycle](image)

*Figure 1: The Quality Assurance and Improvement Cycle. Source: the European Quality Assurance in Vocational Education and Training.*

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7 The European Credit System for Vocational Education and Training: Get to know ECVET better Questions and Answers.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Type of Indicator</th>
<th>Purpose of the Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overarching Indicators for Quality Assurance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No 1</td>
<td>Relevance of quality assurance systems for VET providers:</td>
<td>Promote a quality improvement culture at VET-provider level</td>
</tr>
<tr>
<td>(a) share of VET providers applying internal quality assurance systems defined by law/at own initiative.</td>
<td>Context/Input</td>
<td>Increase the transparency of quality of training</td>
</tr>
<tr>
<td>(b) share of accredited VET providers</td>
<td></td>
<td>Improve mutual trust on training provision</td>
</tr>
<tr>
<td>No 2</td>
<td>Investment in training of teachers and trainers:</td>
<td>Promote ownership of teachers and trainers in the process of quality development in VET</td>
</tr>
<tr>
<td>(a) Share of teachers and trainers participating in further training</td>
<td>Input/Process</td>
<td>Improve the responsiveness of VET to changing demands of labour market</td>
</tr>
<tr>
<td>(b) Amount of funds invested</td>
<td></td>
<td>Increase individual learning capacity building</td>
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<tr>
<td></td>
<td></td>
<td>Improve learners’ achievement</td>
</tr>
<tr>
<td><strong>Indicators supporting quality objectives for VET policies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No 3</td>
<td>Participation rate in VET programmes:</td>
<td>Obtain basic information at VET-system and VET-provider levels on the attractiveness of VET</td>
</tr>
<tr>
<td>Number of participants in VET programmes, according to the type of programme and the individual criteria</td>
<td>Input/Process/Output</td>
<td>Target support to increase access to VET, including for disadvantaged groups</td>
</tr>
<tr>
<td>No 4</td>
<td>Completion rate in VET programmes:</td>
<td>Obtain basic information on educational achievements and the quality of training processes</td>
</tr>
<tr>
<td>Number of persons having successfully completed/abandoned VET programmes, according to the type of programme and the individual criteria</td>
<td>Process/Output/Outcome</td>
<td>Calculate drop-out rates compared to participation rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Support successful completion as one of the main objectives for quality in VET</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Support adapted training provision, including for disadvantaged groups</td>
</tr>
<tr>
<td>No 5</td>
<td>Placement rate in VET programmes:</td>
<td>Support employability</td>
</tr>
<tr>
<td>(a) destination of VET learners at a designated point in time after completion of training, according to</td>
<td>Outcome</td>
<td>Improve responsiveness of VET to the changing demands in the labour market</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Support adapted training provision, including for disadvantaged groups</td>
</tr>
<tr>
<td>Indicator</td>
<td>Type of Indicator</td>
<td>Purpose of the Policy</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>the type of programme and the individual criteria (a) share of employed learners at a designated point in time after completion of training, according to the type of programme and the individual criteria</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**No 6**

Utilisation of acquired skills at the workplace:

(a) information on occupation obtained by individuals after completion of training, according to type of training and individual criteria.

(b) satisfaction rate of individuals and employers with acquired skills/competences

<table>
<thead>
<tr>
<th>No 7</th>
<th>Outcome (mix of qualitative and quantitative data)</th>
<th>Increase employability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment rate(*) according to individual criteria</td>
<td>Improve responsiveness of VET to changing demands in the labour market</td>
<td></td>
</tr>
</tbody>
</table>

Support adapted training provision, including for disadvantaged groups

**Context information**

<table>
<thead>
<tr>
<th>No 8</th>
<th>Context</th>
<th>Background information for policy decision-making at VET-system level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence of vulnerable groups:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) percentage of participants in VET classified as disadvantaged groups (in a defined region or catchment area) according to age and gender.</td>
<td>Context</td>
<td>Background information for policy decision-making at VET-system level</td>
</tr>
<tr>
<td>(b) success rate of disadvantaged groups according to age and gender</td>
<td></td>
<td>Support access to VET for disadvantaged groups</td>
</tr>
</tbody>
</table>

Support adapted training provision for disadvantaged groups

**No 9**

Mechanisms to identify training needs in the labour market:

(a) information on mechanisms set up to identify changing demands at different levels

(b) evidence of their effectiveness

<table>
<thead>
<tr>
<th>No 10</th>
<th>Process</th>
<th>Promote access to VET, including for disadvantaged groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schemes used to promote better access to VET:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Context/Input (qualitative information)**

Improve responsiveness of VET to changing demands in the labour market

Support employability
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Type of Indicator</th>
<th>Purpose of the Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) information on existing schemes at different levels</td>
<td>(qualitative information)</td>
<td>Support adapted training provision</td>
</tr>
<tr>
<td>(b) evidence of their effectiveness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) For IVT: a period of 6 weeks of training is needed before a learner is counted as a participant. For lifelong learning: percentage of population admitted to formal VET programmes.

(2) Besides basic information on gender and age, other social criteria might be applied, e.g. early school leavers, highest educational achievement, migrants, persons with disabilities, length of unemployment.

(3) For IVT: including information on the destination of learners who have dropped out.

(4) Definition according to ILO and OECD: individuals aged 15-74 without work, actively seeking employment and ready to start work.

Table 1: A Reference Set of Selected Quality Indicators for Assessing Quality in VET.

3. Groups of interests of the In4Wood common curriculum.

The main beneficiaries of this common curriculum are the target groups that the In4Wood defined and in which the six designed learning pathways have been based:

- CEOs from Furniture and Woodworking companies.
- VET students taking programmes linked with the furniture and woodworking sectors.
- HE students taking programmes linked with the furniture and woodworking sectors.
- Production Managers from Furniture and Woodworking industries.
- VET students taking ICT programmes willing to focus their careers in the Furniture and Woodworking industries.
- HE students taking ICT programmes/engineering degrees willing to focus their careers in the Furniture and Woodworking industries.

The harmonised Joint Curriculum of European Smart Wood Furniture manufacturers will recognise the I4.0 skills and competences of CEOs and production managers from furniture and woodworking industries, VET and HE students. IN4WOOD will equip them with the required skills for deploying the different I4.0 technologies in the wood industry leading to convert them in a "smart factory of the future".

Moreover, the In4Wood common curriculum will also have the following beneficiaries:
Educational Institutions from the furniture and woodworking industries, Higher Education and Vocational Education and Training, including both those participating in the proposal and those European VET and HE institutions that will be reached during and after the project’s lifetime, will be able to include the IN4WOOD training course expanding their training offer according to the labour market needs.

Educational authorities and policy makers, specially those from regions highly impacted by such sectors, will have the chance of including the new JCV in their offer. The regional development agencies under the umbrella of EURADA will be able to offer and disseminate the results among local industries that will raise awareness of and the capacity of deployment of I4.0 technologies among their enterprises. This will finally impact.

Furniture and Woodworking industries of the sector by Increasing and facilitating the integration of ICT tools and techniques at the early stage of their business activity.

4. Conclusions and next steps.

This common curriculum proposal includes the suggestions of the In4Wood Alliance according to the key findings obtained from the experts of the furniture, woodworking and ICT sectors and the Educational community. The following steps will be focused on:

-The development of the didactic materials that will address the defined learning outcomes, this will allow to define the associated ECVET points of each learning unit.

-The implementation of the common curriculum during the pilot test experience (WP5) and further activities at national and EU level under the frame of Dissemination and Exploitation (WP6).

-The assessment and review of the common curricula according to the feedback from pilot testers, In4Wood partners and external stakeholders through different tools to be implemented under Quality Assurance (WP7) and Monitoring and Evaluation (WP8).
<table>
<thead>
<tr>
<th>Qualification</th>
<th>Manufacturers of Smart Furniture and wood factories.</th>
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</thead>
<tbody>
<tr>
<td>Unit</td>
<td>Digital and physic world hybridising</td>
</tr>
<tr>
<td>EQF Level</td>
<td>NQF levels</td>
</tr>
<tr>
<td></td>
<td>Spain</td>
</tr>
<tr>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Associated ECVET points</td>
<td>To be defined</td>
</tr>
</tbody>
</table>

### Learning Outcomes

#### Sub-unit: 3D Printing and Additive Manufacturing for furniture manufacturing.

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Skills</th>
<th>Competences</th>
</tr>
</thead>
<tbody>
<tr>
<td>The learner...&lt;br&gt;- Knows the steps to follow since you get the 3D model up to the printed piece.</td>
<td>The learner is able to...&lt;br&gt;- Obtain and print a 3D object.&lt;br&gt;- Identify what is printable or not.&lt;br&gt;- Know what types of software are needed for each step of the 3D printing process.</td>
<td>The learner is able to...&lt;br&gt;- Make decisions within the printing process.&lt;br&gt;- Analyze the part before printing.</td>
</tr>
<tr>
<td>The learner...&lt;br&gt;- Knows the Influence of additive manufacturing on the design and prototyping of a product.&lt;br&gt;- Knows the application of the additive manufacturing for the production of pre-mold or molds for short series.</td>
<td>The learner is able to...&lt;br&gt;- Recognize what types of pieces of furniture can be printed in 3D.&lt;br&gt;- Increase the added value of the product through this technology.&lt;br&gt;- Know when and how to use rapid tooling.</td>
<td>The learner is able to...&lt;br&gt;- Adapt the prototype to the specifications of the customer.&lt;br&gt;- Analyze the production and improve costs and times in the production process.&lt;br&gt;- Work with hybrid technology (Pieces of wood assembled with 3D printing parts).</td>
</tr>
</tbody>
</table>
### Augmented Reality and intelligent tools may be used during the design and fabrication of the product.

<table>
<thead>
<tr>
<th>The learner...</th>
<th>The learner is able to...</th>
<th>The learner is able to...</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Knows how 3D printing is being used in the furniture market.</td>
<td>- Identify the different uses of 3D printing in the furniture market.</td>
<td>- Analyze and optimize the design for 3D printing, adapting it to market trends.</td>
</tr>
<tr>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>- Understands the functioning of augmented reality and its differences with virtual reality.</td>
<td>- Define and determine what Augmented Reality is and how it works.</td>
<td>- Identify programs used in Augmented Reality.</td>
</tr>
<tr>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>- Knows the influence of Augmented Reality on the design and prototyping of a product.</td>
<td>- Recognize the different uses of augmented reality in the production chain.</td>
<td>- Recognize the different types of Augmented Reality.</td>
</tr>
<tr>
<td>- Knows the uses of Augmented Reality throughout the production chain of furniture, from the design to the final piece.</td>
<td>- Start working with this technology within a company.</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>- Adapt the prototype to the specifications of the customer through the use of AR.</td>
<td>- Analyze the production and improve costs and times in the production process.</td>
<td>- Understand the new way of work with AR.</td>
</tr>
<tr>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>- Understand the new way of work with AR.</td>
<td>- Know how AR can reducing costs and times in the production process of a furniture.</td>
<td>- Recognize programs used in Augmented Reality.</td>
</tr>
<tr>
<td>Examples of performance activities developed in BLM department for the dissemination.</td>
<td>- Knows how Augmented Reality is being used in the furniture market.</td>
<td>- Identify the different uses of Augmented Reality in the furniture market.</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>- Learns through practical examples.</td>
<td>- Know how to apply Augmented Reality and 3D Printing.</td>
<td>- Get an object using 3D printing or to show this 3D object with AR.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensors and Wearables</th>
<th>The learner...</th>
<th>The learner is able to...</th>
<th>The learner is able to...</th>
</tr>
</thead>
<tbody>
<tr>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
<td></td>
</tr>
<tr>
<td>- Understands what sensors and wearables are and how they work. Knows about the context of sensors and wearables in the industry and their main characteristics</td>
<td>- Define what sensors and wearables are.</td>
<td>- Understand the use of sensors and wearables in different industrial scenarios. Recognize main characteristics of sensors and wearables</td>
<td></td>
</tr>
<tr>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
<td></td>
</tr>
<tr>
<td>Acquires knowledge about different types of those sensors and wearables widely used in the industry</td>
<td>Distinguish among different types of sensors and wearables, according their characteristics, operation mode or use</td>
<td>Analyze and take decisions about the better sensor or wearable to use for a specific purpose, facility, operation mode, etc.</td>
<td></td>
</tr>
<tr>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
<td></td>
</tr>
<tr>
<td>- Knows about different use cases of sensors and wearables, mainly focused on industrial scenarios</td>
<td>- Recognize use cases of sensors and wearables.</td>
<td>- Analyze an industrial scenario in order to identify if the use of sensors and/or wearables could</td>
<td></td>
</tr>
<tr>
<td>RFID&amp;NFC</td>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>----------</td>
<td>----------------</td>
<td>--------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td></td>
<td>Knows the main characteristics of RFID and NFC</td>
<td>- Understand what RFID and NFC Technologies are.</td>
<td>- Define what RFID technology is</td>
</tr>
<tr>
<td></td>
<td>Knows the different operation modes of RFID and NFC</td>
<td>Knows about the context of RFID and NFC in the industry</td>
<td>- Define what NFC technology is</td>
</tr>
<tr>
<td></td>
<td>Acquire knowledge about the standards behind NFC and RFID</td>
<td>The learner is able...</td>
<td>- Understand the use of RFID and NFC in different industrial scenarios.</td>
</tr>
<tr>
<td></td>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>- Recognize main characteristics of RFID and NFC</td>
</tr>
<tr>
<td></td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td></td>
<td>Acquire knowledge about the standards behind NFC and RFID</td>
<td>The learner is able to...</td>
<td>Analyze and take decisions about the type of RFID and NFC technologies and features fit with an specific use, operation mode or standard</td>
</tr>
<tr>
<td></td>
<td>Knows about real business success stories, how sensors and wearables have improved an industrial facility or industrial process. Knows the future of sensors and wearables in industry.</td>
<td>Propose uses of sensors and wearables in different industrial sectors. Identify differences between current and future sensors and wearables</td>
<td>- Get a sensor or wearable and suggest use cases of it</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Take decisions about the most suitable sensor/wearable for a specific industrial need.</td>
</tr>
<tr>
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<td>Analyze the future of sensors and wearables and their use cases</td>
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<td>The learner is able to...</td>
</tr>
</tbody>
</table>

The learner...

- Understands what RFID and NFC Technologies are.
- Knows about the context of RFID and NFC in the industry

The learner is able to...

- Define what RFID technology is
- Define what NFC technology is

The learner is able to...

- Understand the use of RFID and NFC in different industrial scenarios.
- Recognize main characteristics of RFID and NFC

The learner is able to...

- Enumerate the main characteristics of RFID and NFC
- Enumerate the operation modes of RFID and NFC
- Identify the standards of RFID and NFC

The learner is able to...

- Analyze and take decisions about the type of RFID and NFC technologies and features fit with an specific use, operation mode or standard
- Acquire knowledge about different use cases of RFID and NFC focused on factories, traceability, logistic, etc.
- Knows about real business success stories, about the use of RFID and NFC in industrial facilities and industrial process.

Knows the future of RFID and NFC in industry

- Enumerate use cases of RFID and NFC in different industrial sectors.
- Identify the advantages of RFID and NFC in an industrial scenario

To provide an analysis about the future of RFID and NFC

- Analyze an industrial scenario in order to identify if the use of RFID and NFC for improving the performance of the industrial activity.
- Given a type of RFID or NFC device, to enumerate features of it and suggest use cases in industrial scenarios
- Take decisions about the most suitable RFID or NFC technology for a specific industrial need.

Analyze the future of RFID and NFC as well as their use cases

**Robotics applied to furniture production at the different production stages**

The learner...
- knows how to use a robotics mobile platform for **logistics and transportation tasks** in the furniture market

The learner is able to...
- program using the programming language such as:
  - C/C++
  - Python
  - Java
  - Basic/pascal
  - LISP
- use robotics middleware such as:
  - ROS (Robot Operating System)
  - YARP (Yet Another Robot Platform)

The learner is able to...
- define **mapping algorithms** in order to a robot understands the environment where it works
- define **localization algorithms** in order to a robot knows where it is to successfully carry out tasks
- implement robotics **motion planning algorithms** for mobile platforms that have to navigate in industrial environments from a start to a goal position among a...
<table>
<thead>
<tr>
<th><strong>The learner...</strong></th>
<th><strong>The learner is able to...</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>knows how to use a robot for palletizing and de-palletizing tasks in the furniture market</td>
<td>collection of static and dynamic obstacles</td>
</tr>
<tr>
<td>The learner...</td>
<td>improve the efficiency of logistics process because robotics can sort through incoming and outgoing packages faster, place on shipping containers which would avoid unnecessary returns or delays in the order fulfillment process.</td>
</tr>
<tr>
<td>knows how to use a robot for:</td>
<td>Improve costs and times in the logistics process.</td>
</tr>
<tr>
<td>o Cutting tasks</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>o Polishing, Sanding &amp; Finishing tasks</td>
<td>- implement manipulation algorithms to grasp, hold and handle furniture pieces</td>
</tr>
<tr>
<td>o Painting and Coating tasks</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>o Material removal tasks</td>
<td>- implement perception ability of the robot, extracting information from sensors and interpreting these data. In particular :</td>
</tr>
<tr>
<td></td>
<td>o implement recognition algorithms to detect the workpiece</td>
</tr>
</tbody>
</table>

- Mechanical knowledge such as:
  - analytical mechanics issue
  - applied mechanics issue

- Using robots in the furniture market can improve costs and times in the logistics process.
The learner...
- knows how to use a robot for assembly tasks

| Implement sensing fusion algorithms to merge force control and vision to successfully carry out tasks |
| Guarantee higher levels of output, enhanced process and product quality, greater efficiency and flexibility |

The learner is able to...
- implement manipulation algorithms to grasp, hold and handle furniture pieces
- implement perception ability of the robot, extracting information from sensors and interpreting these data. In particular:
  - implement recognition algorithms to detect the workpiece
  - implement sensing fusion algorithms to merge force control and vision to successfully carry out tasks
  - implement planning and execution of sequences
<table>
<thead>
<tr>
<th>Simulation, modelling and virtualization in the design, virtual catalogues, 3D scanning.</th>
<th>The learner...</th>
<th>The learner is able to...</th>
<th>The learner is able to...</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>
|  | - Realizes modelings in order to complete the rendering through the application of materials and finishes  
- Realizes 3D modeling techniques in order to correctly represent the contents of the project | - Transfer the design contents expressed by designers into 3D drawings  
- Realize 3d models  
- Realize photorealistic images  
- Define presentation rendering of the project to be proposed to the company or the market | - Build the transition from CAD tools to CAM tools to ensure correct industrialization of the product  
- Develop virtual modeling of projects presented by designers to communicate content of the same (shapes, dimensions, materials, colors) to the managers of the company and/or the market (representatives, retailers, consumers-sample)  
- Manage virtual product archives |

**Delivery Methods**

3D Printing and Additive Manufacturing for furniture manufacturing.

- 26 Video pills.
- 1 pdf document.
- Additional material.
Augmented Reality and intelligent tools may be used during the design and fabrication of the product. | -19 Video Pills.  
-1 PDF document.  

Examples of performance activities developed in BLM department for the dissemination. | -2 PDF documents  

Sensors and Wearables | -8 video pills.  
-2 PDF documents.  
-Additional documents with use cases and business success stories.  

RFID&NFC | -12 video pills.  
-2 pdf documents.  
-Additional documents with use cases and business success stories.  

Robotics applied to furniture production at the different production stages | -33 video pills  
-1 PDF document.  

Simulation, modelling and virtualization in the design, virtual catalogues, 3D scanning. | -33 video pills  
-6 ppt-.pdf additional documents  

**Assessment Criteria**

3D Printing and Additive Manufacturing for furniture manufacturing. | - Practice work: students have to analyse the advantages and disadvantages of using 3D printing in the furniture sector and describe how additive manufacturing can improve business competitiveness. They will put in practice the knowledge gained in this unit.  
-Multiple choice questionnaire.  

Augmented Reality and intelligent tools may be used during the design and fabrication of the product. | -Practice work: students have to do a little research on how augmented reality can be used in the first transformation
<table>
<thead>
<tr>
<th>Course Area</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensors and Wearables</td>
<td>Processes of wood. As for example, geolocate by augmented reality the trees that are ready to be cut in a plantation. - Multiple choice questionnaire.</td>
</tr>
<tr>
<td>RFID &amp; NFC</td>
<td>Practice work: students have to analyse an industrial scenario where a sensor network can be implemented. They will have to evaluate the type of sensors to use, the communication protocols (learnt in other training unit), and interaction with the cloud (learnt in other training unit), or with other systems (RFID/NFC, learnt in other training unit). - Multiple choice questionnaire.</td>
</tr>
<tr>
<td>Robotics applied to furniture production at the different production stages</td>
<td>Practice work: students have to analyse an industrial scenario where RFID and NFC technologies could be used to improve the manufacturing processes. The students will have to decide the type of RFID and NFC technology to use, making use of the contents learnt in the training unit. - Multiple choice questionnaire.</td>
</tr>
<tr>
<td>Simulation, modelling and virtualization in the design, virtual catalogues, 3D scanning.</td>
<td>Practice work: students will be asked to use simulation, modelling and virtualization techniques in order to realize 3D models, photorealistic images and virtual modelling of a specific selected project and show them in a presentation rendering as it was to be proposed to a company or the market. - Multiple choice questionnaire to evaluate knowledge acquired.</td>
</tr>
</tbody>
</table>
### Qualification
Manufacturers of Smart Furniture and wood factories.

### Unit
Telecommunications and Data

<table>
<thead>
<tr>
<th>EQF Level</th>
<th>NQF levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spain</td>
<td>UK</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

### Associated ECVET points
To Be Defined

### Learning Outcomes

#### Sub-units

- **Internet of Things**

  - The learner...
    - Describe Internet of Things and its uses.
    - Understand the features of IoT.

  - The learner...
    - Is familiar with both IoT technologies and IoT-related technologies.

  - The learner...
    - Is knowledgeable about the SOFIA2 IoT platform.

#### Knowledge

#### Skills

- The learner is able to...
  - Understand the advantages and disadvantages of Internet of Things.
  - Describe possible uncertainties of IoT and how to mitigate them.

- The learner is able to...
  - Can understand the pros and cons of technologies to be used in an IoT environment.

- The learner is able to...
  - Can generate a SOFIA2 client and connect it.
  - Can generate basic rules in SOFIA2.

#### Competences

- The learner is able to...
  - Make decisions related to the development of IoT projects.

- The learner is able to...
  - Can start working in an IoT environment.

- The learner is able to...
  - Can start working in a SOFIA2 environment.
<table>
<thead>
<tr>
<th>Integrated systems</th>
<th>Big data and Analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Knows the concept of complex systems and related concepts. &lt;br&gt; - Knows the mathematical foundations of complexity theory.</td>
<td>- The learner... &lt;br&gt; - Learns the foundations of big data.</td>
</tr>
<tr>
<td>- Can identify the advantages and disadvantages of complex systems.</td>
<td>- The learner is able to... &lt;br&gt; - Define big data concepts.</td>
</tr>
<tr>
<td>- Start working with complex systems with aprovechamiento. &lt;br&gt; - Provide informed opinion on the changes and evolutions of an integrated system. &lt;br&gt; - Mitigate undesirable loops and accelerate positive evolutions in a complex systems.</td>
<td>- The learner is able to... &lt;br&gt; - Define big data concepts.</td>
</tr>
<tr>
<td>The learner... &lt;br&gt; - Understands the architecture in a complex system and several of its nuances. &lt;br&gt; - Understand pros and cons of different architectures and its implementation.</td>
<td>The learner is able to... &lt;br&gt; - Define big data concepts.</td>
</tr>
<tr>
<td>The learner is able to... &lt;br&gt; - Identify several kinds of architectures for integrated systems.</td>
<td>The learner is able to... &lt;br&gt; - Define big data concepts.</td>
</tr>
<tr>
<td>The learner is able to... &lt;br&gt; - Make decisions in the architecture stages of an integrated systems with an understanding of the implications.</td>
<td>- Define big data concepts.</td>
</tr>
<tr>
<td>- Knows about features of middleware for distributed applications. &lt;br&gt; - Knows about integration of distributed systems, pros and cons of each choice and its challenges.</td>
<td>- Define big data concepts.</td>
</tr>
<tr>
<td>The learner is able to... &lt;br&gt; - Start working in the implementation of a distributed architecture. &lt;br&gt; - Identify different network-based integration topologies. &lt;br&gt; - Identify pros and cons of each integration alternative.</td>
<td>- Define big data concepts.</td>
</tr>
<tr>
<td>The learner is able to... &lt;br&gt; - Define big data concepts.</td>
<td>- Define big data concepts.</td>
</tr>
<tr>
<td>- Start working with middleware software. &lt;br&gt; - Contribute to the progress of a network-based middleware architecture. &lt;br&gt; - Work in the implementation of a network-based architecture.</td>
<td>- Define big data concepts.</td>
</tr>
<tr>
<td>Cloud Computing</td>
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<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>The learner...</td>
<td>The learner is able to...</td>
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<td>- Acquires basic knowledge about Cloud Computing and its main features.</td>
<td>- Give a definition about what Cloud Computing is</td>
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<td>- Knows the utility of Cloud Computing in the industrial context.</td>
<td>- Enumerate the main characteristics of cloud computing.</td>
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<tr>
<td>- Differentiate between different analytics technologies.</td>
<td>- Describe some industrial scenarios where Cloud Computing can be deployed.</td>
</tr>
<tr>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>- Perform basic data analytics on real sources.</td>
<td>- Give a general view of cloud computing.</td>
</tr>
<tr>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>- Provide uses of cloud computing in industrial scenarios.</td>
<td>- Work with big data platforms under controlled conditions.</td>
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<td>The learner...</td>
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<tr>
<td>- Knows the influence of big data in current businesses.</td>
<td>- Understand the concepts of big data, data mining and analytics, and their use.</td>
</tr>
<tr>
<td>- Understand the concepts of big data, data mining and analytics, and their use.</td>
<td>- Identify the concepts related with big data.</td>
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<td>The learner...</td>
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</tr>
<tr>
<td>- Identifies technologies and platforms of big data.</td>
<td>- Start working with big data platforms in basic operations.</td>
</tr>
<tr>
<td>- Identifies the basic operations of big data.</td>
<td></td>
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<tr>
<td>- Understand more complex operations of big data.</td>
<td>- Work with big data platforms under controlled conditions.</td>
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<td>The learner...</td>
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<tr>
<td>- Understand mathematical foundations of analytics.</td>
<td>- Identify patterns and relationships in data.</td>
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<tr>
<td>- Differentiate between different analytics technologies.</td>
<td>- Perform basic machine learning and predictive modeling.</td>
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<tr>
<td>The learner...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>- Acquire knowledge about the hierarchy of Cloud Computing.</td>
<td>- Describe the models of Cloud Computing.</td>
</tr>
<tr>
<td>The learner...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>- Acquires knowledge about different configurations available to develop cloud services.</td>
<td>- Enumerate and explain the different deployment models in Cloud Computing.</td>
</tr>
<tr>
<td>The learner...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>- Knows the advantages and disadvantages of developing services in the cloud versus locally.</td>
<td>- Enumerate the advantages and disadvantages of Cloud computing versus local servers.</td>
</tr>
<tr>
<td>- Knows business experiences where Cloud Computing has been used.</td>
<td>- Describe the current use and the future of cloud computing in the industry.</td>
</tr>
</tbody>
</table>

**Communication Networks**

<table>
<thead>
<tr>
<th>The learner...</th>
<th>The learner is able to...</th>
<th>The learner is able to...</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Acquires basic knowledge about communication networks and their specific uses in the industry.</td>
<td>- Provide a definition about the different communications networks and their context in the industry.</td>
<td>- Identify the need and usability of communication networks in different industrial scenarios.</td>
</tr>
<tr>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>- Enumerate the main industrial communication networks,</td>
<td>- Take decision about what kind of industrial communication network</td>
<td></td>
</tr>
<tr>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td>Knows about some the standards behind the industrial communication networks.</td>
<td>Knows about some the standards behind the industrial communication networks.</td>
<td>Knows about some the standards behind the industrial communication networks.</td>
</tr>
<tr>
<td>Knows some business experiences (use cases) where the communication networks have been used.</td>
<td>Knows some business experiences (use cases) where the communication networks have been used.</td>
<td>Knows some business experiences (use cases) where the communication networks have been used.</td>
</tr>
<tr>
<td>Acquires a general view about the future of communication networks in the industrial sector.</td>
<td>Acquires a general view about the future of communication networks in the industrial sector.</td>
<td>Acquires a general view about the future of communication networks in the industrial sector.</td>
</tr>
<tr>
<td>Gets an extensive knowledge about the different types of current communication networks.</td>
<td>Gets an extensive knowledge about the different types of current communication networks.</td>
<td>Gets an extensive knowledge about the different types of current communication networks.</td>
</tr>
<tr>
<td>Knows about some of the standards behind the industrial communication networks.</td>
<td>Knows about some of the standards behind the industrial communication networks.</td>
<td>Knows about some of the standards behind the industrial communication networks.</td>
</tr>
<tr>
<td>The learner...</td>
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<td>The learner...</td>
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<td>The learner is able to...</td>
</tr>
<tr>
<td>Knows about some of the malwares that could reach a business network.</td>
<td>Knows about some of the malwares that could reach a business network.</td>
<td>Knows about some of the malwares that could reach a business network.</td>
</tr>
<tr>
<td>Cyber-Security</td>
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<tr>
<td>Cyber-Security</td>
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<td>The learner...</td>
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<tr>
<td>The learner...</td>
<td>The learner...</td>
<td>The learner...</td>
</tr>
<tr>
<td>Acquires basic knowledge about cybersecurity, its main features and its role in the industry.</td>
<td>Acquires basic knowledge about cybersecurity, its main features and its role in the industry.</td>
<td>Acquires basic knowledge about cybersecurity, its main features and its role in the industry.</td>
</tr>
<tr>
<td>Knows about some of the malwares that could reach a business network.</td>
<td>Knows about some of the malwares that could reach a business network.</td>
<td>Knows about some of the malwares that could reach a business network.</td>
</tr>
</tbody>
</table>
- Knows how to distinguish malwares.
- Knows the main symptoms that a network could have if a malware is running on it.

The learner...
- Acquires knowledge about some of the different cybersecurity methods and devices used to increase protection in a network.
- Acquires knowledge about sanity checks in networks to mitigate malware effects.

- Describe the symptoms of a malware infection in a network system
- Test a system in order to identify a malware infection.

The learner is able to...
- Enumerate devices and methods to mitigate malware effects
- Enumerate to prevent networks of malware infection.

The learner is able to...
- Check an infected system to provide of devices and methods to mitigate the malware effect.
- Prevent the malware installation.
- Isolate an infected device.

The learner...
- Knows a guideline explaining, step by step, what are the best security practices to follow in the industry.
- Acquires a general view about the future of the cybersecurity in the industry, focused on I4.0.

The learner is able to...
- Enumerate, step by step, the best practices for protecting or mitigating cybersecurity attacks in the industry.
- Describe the importance of cybersecurity in Industry 4.0.

The learner is able to...
- Take decisions about the steps to follow in order to reduce the impact of a malware.
- Identify the need of cybersecurity polices in an industrial deployment.

**Delivery Methods**

| Internet of Things | -30 video pills.  
|                    | -1 pdf document.  
|                    | -Additional documents with use cases,business success stories and guidelines.  |

<p>| Integrated systems | -16 video pills. |</p>
<table>
<thead>
<tr>
<th>Assessment Criteria</th>
<th>Big data and Analytics</th>
<th>Cloud Computing</th>
<th>Communication Networks</th>
<th>Cyber-Security</th>
<th>Internet of Things</th>
<th>Integrated systems</th>
</tr>
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<td>-8 video pills.</td>
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</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>-Additional documents with use cases and business success stories.</td>
<td></td>
</tr>
<tr>
<td>Internet of Things</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-Optional practice work: Students try to build a test IoT environment with a microcontroller information producer and a web browser-based consumer, with a free-of-charge server framework.</td>
<td></td>
</tr>
<tr>
<td>Integrated systems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-Multiple choice questionnaire.</td>
<td></td>
</tr>
<tr>
<td>Course</td>
<td>Practice Work</td>
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<tr>
<td>Big data and Analytics</td>
<td>Optional practice work: Students can connect to a distributed big data service, free of charge, and put in practice the theory learned in the unit (to be discussed). Multiple choice questionnaire.</td>
<td></td>
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<tr>
<td>Cloud Computing</td>
<td>Practice work: students have to analyse the advantages and disadvantages of using cloud computing in an industrial scenario. They will put in practice the knowledge gained in this unit. Multiple choice questionnaire.</td>
<td></td>
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<tr>
<td>Communication Networks</td>
<td>Practice work: students have to analyse an industrial scenario where some of the communication network technologies studied in this unit are implemented. Multiple choice questionnaire.</td>
<td></td>
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<tr>
<td>Cyber-Security</td>
<td>Practice work: students have to analyse a security use case in an industrial scenario, putting in practice the skills acquired in this unit. Multiple choice questionnaire.</td>
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</tr>
<tr>
<td>Qualification</td>
<td>Manufacturers of Smart Furniture and wood factories.</td>
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<tr>
<td>Unit</td>
<td>Management Systems</td>
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<td>EQF Level</td>
<td><strong>NQF levels</strong></td>
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<tr>
<td></td>
<td>Spain</td>
<td>UK</td>
<td>Italy</td>
<td>Germany</td>
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<td>3</td>
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<tr>
<td>Associated ECVET points</td>
<td>To Be Defined</td>
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</table>

### Learning Outcomes

**Application of Logistics**

<table>
<thead>
<tr>
<th>Sub-units</th>
<th>Knowledge</th>
<th>Skills</th>
<th>Competences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td></td>
<td>-Knows the principles and basics of Warehouse Management.</td>
<td>-Adapt WMS tools to a Furniture/Woodworking company.</td>
<td>-Manage the warehouses from furniture and woodworking industries.</td>
</tr>
<tr>
<td></td>
<td>-Identifies the different kind of Plant Layouts.</td>
<td>-Carry out industry plant layouts.</td>
<td>-Carry out the most suitable plant layout at a furniture/wood products manufacturing plant.</td>
</tr>
<tr>
<td></td>
<td>-Knows and recognizes the most relevant Warehouse Management System (WMS) tools.</td>
<td></td>
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<tr>
<td></td>
<td>The Learner is able to...</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>-Adapt Inventory Management and Distribution Resource Planning tools to a Furniture/Woodworking company.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td></td>
<td>-Knows the principles and basics of Inventory Management.</td>
<td>-Manage the Inventory from Furniture and Woodworking industries.</td>
<td>-Manage the Inventory from Furniture and Woodworking industries.</td>
</tr>
<tr>
<td></td>
<td>-Knows and recognizes the most relevant Inventory Management (WMS) tools.</td>
<td>-Distribute and plan all resources from Furniture and Woodworking industries.</td>
<td>-Distribute and plan all resources from Furniture and Woodworking industries.</td>
</tr>
<tr>
<td></td>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td></td>
<td>-Gains knowledge and expertise on Key Performance Indicators (KPI) analysis and advanced techniques.</td>
<td>-Create and define KPI that help any business unit.</td>
<td>-Implement a manage monitoring and evaluation management system that helps the logistics of any</td>
</tr>
<tr>
<td></td>
<td>The learner is able to...</td>
<td>-Analyze and Infer KPI results.</td>
<td></td>
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<tr>
<td><strong>Workflow Management Systems</strong></td>
<td><strong>Collaborative platforms</strong></td>
<td><strong>furniture/wood products manufacturing company.</strong></td>
<td></td>
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<tr>
<td>---------------------------------</td>
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<td>-----------------------------------------------</td>
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</tr>
<tr>
<td>The learner... -Correctly identifies and knows the different data capture system for logistics control. -Gets familiar with the different types of radio frequency data collection devices.</td>
<td><strong>B2B (business to business) –</strong> The Learner ... Knows the key requirements for communicating with partners and suppliers</td>
<td>The learner is able to... -Identify the implementation of RFID technologies in any industrial process and the most suitable interaction means with any software/hardware system.</td>
<td>The learner is able to... -Analyse the use of RFID technologies in different processes from any furniture/woodworking company.</td>
</tr>
<tr>
<td>The learner... -Gets familiar with the production management systems and their main tool.</td>
<td><strong>B2C (business to consumer),</strong></td>
<td>The learner is able to... -Define Strategic and Production plans. -Create and execute workflow management systems.</td>
<td>The learner is able to... -Define and execute strategic and production planning in furniture/woodworking companies.</td>
</tr>
<tr>
<td>The learner... -Knows the uses and functionality of the Enterprise Resource Planning (ERP).</td>
<td>The learner... -Know the basics of the most relevant Lean Manufacturing tools.</td>
<td>The learner... -Acquires the basic skills for working with a ERP system.</td>
<td>The learner is able to... -Identify and implement improvements in different manufacturing processes from furniture/woodworking companies.</td>
</tr>
<tr>
<td>The learner... -Is able to implement Lean tools in a production plan.</td>
<td>The Learner is able to identify... Mechanisms by which they can engage with other businesses and collaborate and potentially offer complimentary products</td>
<td>The Learner is able to ... Identify potential partners see what other businesses in the market are looking for in terms of supply opportunities</td>
<td></td>
</tr>
<tr>
<td>The Learner is able to identify...</td>
<td>The Learner is able to identify...</td>
<td>The Learner is able to...</td>
<td></td>
</tr>
<tr>
<td>The Learner...</td>
<td>How to engage with the customer base in order to identify current and emerging customer wants and needs</td>
<td>Identify ways to engage with the customer base to determine current and future needs and how they can produce products which do or will meet their needs</td>
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</tr>
<tr>
<td><strong>C2C (consumer to consumer)</strong>, The learner...</td>
<td>The Learner... Will gain the skills to be able to discuss these interactively with other consumers and provide an insight to be used by the industry</td>
<td>The Learner... Will understand the trends of other consumers and the trends in the market which may influence their choices and decision making</td>
<td></td>
</tr>
<tr>
<td><strong>U2B (university to business)</strong></td>
<td>The Learner.... Will gain an insight into what they can develop and what businesses in the marketplace actually need to satisfy their customers</td>
<td>The Learner... Will have a much clearer understanding of what the businesses need and what they should be focusing their students on and what innovations they can prototype for them.</td>
<td></td>
</tr>
<tr>
<td><strong>U2S (University to Student)</strong></td>
<td>The Learner... Will understand the priority and upcoming areas of focus for the market.</td>
<td>The Learner... Will know how to focus their studies to add the best values to their skills and also be successful in a career in the market.</td>
<td></td>
</tr>
<tr>
<td>S2S (Student to Student)</td>
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<tr>
<td>The Learner...</td>
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</tr>
<tr>
<td>Knows what area of the market they would like to work in and the opportunities in it.</td>
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<tr>
<td>The Learner...</td>
<td></td>
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<tr>
<td>Will understand the trends in the market and where the best opportunities exist for career progression from their peers</td>
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<tr>
<td>The Learner...</td>
<td></td>
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<tr>
<td>Will be able to make an informed decision on their areas of focus from their careers</td>
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</tbody>
</table>

**Delivery Methods**

<table>
<thead>
<tr>
<th>Application of Logistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 28 Video pills</td>
</tr>
<tr>
<td>- 1 PDF document</td>
</tr>
<tr>
<td>Workflow Management Systems</td>
</tr>
<tr>
<td>- 22 Video pills</td>
</tr>
<tr>
<td>- 1 PDF document</td>
</tr>
<tr>
<td>Collaborative Platforms</td>
</tr>
<tr>
<td>- 20 Video Pills</td>
</tr>
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</table>

**Assessment Criteria**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>- Multiple choice questionnaire.</td>
</tr>
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<td>Workflow Management Systems</td>
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<tr>
<td>- Multiple choice questionnaire.</td>
</tr>
<tr>
<td>Collaborative Platforms</td>
</tr>
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</table>

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This project has been funded by the Sector Skills Alliances in Vocational Education and Training from the Erasmus Programme. Project Number 575663-EPP-1-2016-ES-EPPKA2-SSA.
<table>
<thead>
<tr>
<th>Qualification</th>
<th>Manufacturers of Smart Furniture and wood factories.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>Standard Certifications and Legal Issues</td>
</tr>
<tr>
<td>EQF Level</td>
<td>NQF levels</td>
</tr>
<tr>
<td></td>
<td>Spain</td>
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<tr>
<td>Associated ECVET points</td>
<td>To Be Defined</td>
</tr>
<tr>
<td>Learning Outcomes</td>
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### EQF Levels

<table>
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<tr>
<td>Spain</td>
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<td>UK</td>
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<td>Italy</td>
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<tr>
<td>Germany</td>
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</table>

### Associated ECVET points

- To Be Defined

### Learning Outcomes

#### Sub-units

<table>
<thead>
<tr>
<th>Sub-units</th>
<th>Knowledge</th>
<th>Skills</th>
<th>Competences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Standardization</td>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td></td>
<td>- Acquires knowledge about the context of standardization in Industry 4.0</td>
<td>- Identify the need of standardization in Industry 4.0</td>
<td>- Analyze standardization issues in the use cases of companies/factories implementing technologies of Industry 4.0</td>
</tr>
<tr>
<td></td>
<td>- Knows challenges of standardization in Industry 4.0</td>
<td>- Describe the challenges regarding standardization in Industry 4.0</td>
<td>- Evaluate the RAMI 4.0 architecture model in order to follow the right steps to implement Industry 4.0 in a company/factory</td>
</tr>
<tr>
<td></td>
<td>- Knows how to address standardization in Industry 4.0 through the Reference Architecture Model for Industry 4.0 (RAMI 4.0)</td>
<td>- Extract from RAMI 4.0 a simple and manageable architecture model as reference for Wood and Furniture Sector</td>
<td></td>
</tr>
<tr>
<td>Consortium and Organizations</td>
<td>The learner...</td>
<td>The learner is able to...</td>
<td>The learner is able to...</td>
</tr>
<tr>
<td></td>
<td>- Acquires knowledge about the consortia and organizations bodies behind Industry 4.0 standardization: their roles and the</td>
<td>- Identify the international organizations and entities behind Industry 4.0 standardization</td>
<td>- Provide useful information about what standardization bodies are involved in what standards and vice versa.</td>
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<tr>
<td>Working Group Committees</td>
<td>Standards in factories and legal issues</td>
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<tr>
<td><strong>The learner...</strong></td>
<td><strong>The learner...</strong></td>
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</tr>
<tr>
<td>- Acquires deep knowledge about the working group committees focused on the standards behind the Key Enabling technologies</td>
<td>- Knows a guideline about how to apply standards in factories applying Industry 4.0, mainly for wood and furniture sector.</td>
<td></td>
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</tr>
<tr>
<td>- Knows about the most relevant standards, focused on the key enabling technologies</td>
<td>- Acquire knowledge about the legal issues in Industry 4.0</td>
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<tr>
<td><strong>The learner is able to...</strong></td>
<td><strong>The learner is able to...</strong></td>
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</tr>
<tr>
<td>- Describe the most important working groups involved in Industry 4.0 standardization</td>
<td>- Enumerate the steps to follow in the implementation of Industry 4.0 in companies/factories under the current and future standards.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Link the working groups with the standards of Industry 4.0 under their approval or supervision.</td>
<td>- Describe the legal issues concerning the Industry 4.0</td>
<td></td>
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</tr>
<tr>
<td>- Enumerate the standards focused on the most relevant key enabling technologies of Industry 4.0</td>
<td><strong>The learner is able to...</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>The learner is able to...</strong></td>
<td><strong>The learner is able to...</strong></td>
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</tr>
<tr>
<td>- Identify existing and future working groups and standards, distinguishing those that work on technologies of interest for the wood and furniture sector</td>
<td>- Analyze the need of standardization and set the way to obey standards in an Industry 4.0 development.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Identify the subset of standards for rapid implementation of partial content for Industry 4.0</td>
<td>- Analyze the legal issues behind a implementation of an industrial process improved with a key enabling technology of Industry 4.0</td>
<td></td>
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</tr>
</tbody>
</table>

**Introduction to Standardization**

-11 video pills.
<table>
<thead>
<tr>
<th>Delivery Methods</th>
<th>Assesment Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consortium and Organizations</td>
<td>Practice work: students have to analyse an industrial scenario where some of the technologies reviewed in other units will take place. They will have to identify the reference standards and norms to follow for the I4.0 adoption.</td>
</tr>
<tr>
<td>Working Group Committees</td>
<td>-1 PDF document.</td>
</tr>
<tr>
<td>Introduction to Standardization</td>
<td>Multiple choice questionnaire.</td>
</tr>
<tr>
<td>Consortium and Organizations</td>
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<tr>
<td>Working Group Committees</td>
<td></td>
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