

EXAM 4.0

Hub of Excellence Centres in Advanced Manufacturing November 27th 2019

EXAM4.0

THE EXCELLENT ADVANCED MANUFACTURING 4.0

The Excellent Advanced Manufacturing 4.0 -EXAM 4.0

Unai Ziarsolo

Tknika
LEKES APPLIKATIBOEN INBENTZIOA ETA BERBERRUNTASUN GELAKO ZENTROA
CENTRO DE INVESTIGACIÓN E INNOVACIÓN APLICADA DE LA FP DEL PAÍS VASCO
BASQUE CENTRE OF RESEARCH AND APPLIED INNOVATION IN VET

EUSKO JAURLARITZA



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The Excellent Advanced Manufacturing 4.0 -EXAM 4.0

Exam 4.0 is a projects approved within the call Sector Skills Alliances for the development of sectoral approaches through transnational platforms of vocational excellence skills needs identification,

EAC/A03/2018, Key Action 2 Sector Skills Alliances of the Erasmus+ Program

Budget : 799.332€

Duration : 24 months.

Partnership:

6 academic partners

3 industrial partners,

SPAIN



NETHERLANDS



CROACIA

GERMANY



SWEEDEN



+ 3 affiliate partners + 14 associate partners

The Excellent Advanced Manufacturing 4.0 initiative – EXAM 4.0 HUB

EXAM 4.0 HUB as a EU HUB of Excellence Centres for Advance Manufacturing

...will be built a common space where to

- Support the introduction of new **technological trends** in AM for the educative and industrial fields
- Anticipate **skills needs** in the AM sector and adapt the training provision
- Develop innovative **learning methodologies** and implement joint initiatives and projects
- Enhance the continuing **professional development of trainers** and facilitating their participation in joint research projects
- Support **regional development** and Smart Specialization Strategies
- Create effective protocols for **transferring new knowledge to SMES.**

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EXAM 4.0 HUB / What's an Advance Manufacturing HUB??

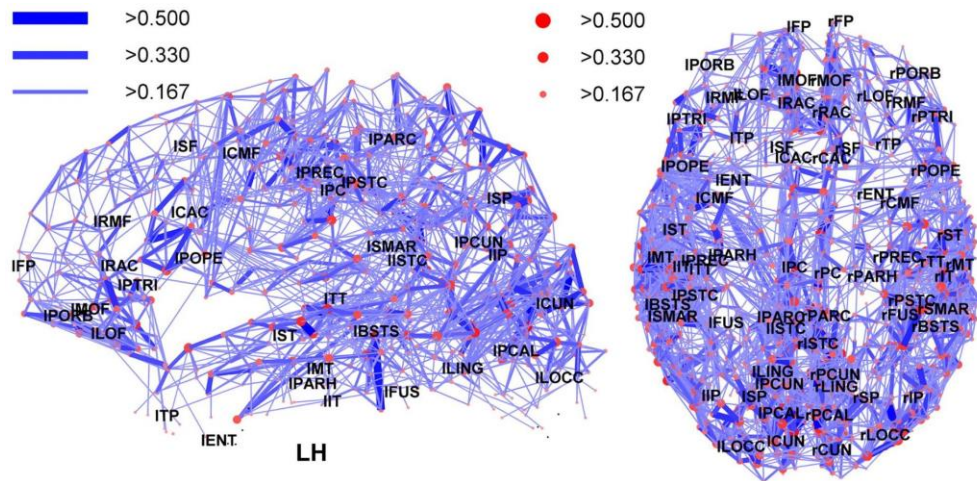
Network representation of brain connectivity

Hubs are highlighted.



A hub is a component of a network with a high-degree node.

Hubs have a significantly larger number of links in comparison with other nodes in the network.



Centres of VET Excellence in Advanced Manufacturing would be

REGIONAL HUBs Connecting a large number of agents related to Advanced Manufacturing

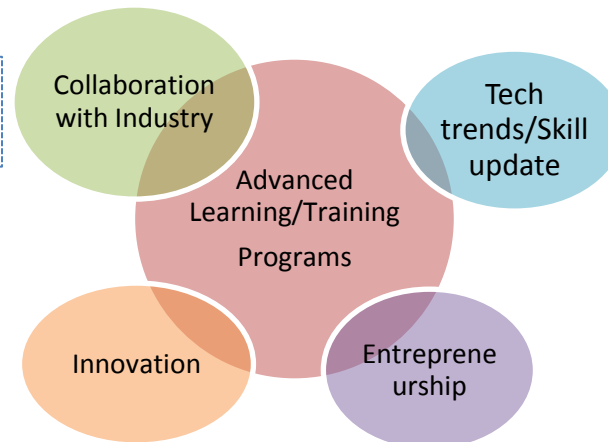
EXAM 4.0 HUB aims to create an EU HUB connecting a an important amount of CoVEs in Advanced manufacturing

The Excellent Advanced Manufacturing 4.0 initiative – EXAM 4.0 HUB

Features of HVET excellence centres to be considered a HUB in Advanced Manufacturing

- Anchored in the regional strategies for Smart Specialisation, RIS3 strategies.
- Participates in national and international Advance Manufacturing related networks, both academic and industrial
- Training VET provider for the AM sector, with the ability to adapt and create new specialized programs, to give quick answers to the AM sector's technological demands
- Access to cutting edge facilities and laboratories in advance manufacturing
- Provides a set of technical services and applied innovation apart from just training.
- Carry out Collaboration projects with Universities, Research and Development Centres, Businesses, and other local stakeholders.
- Part of the staff is devoted to research activities, specially focused in activities with industrial partners

Regional HUBs in Advanced manufacturing CoVE



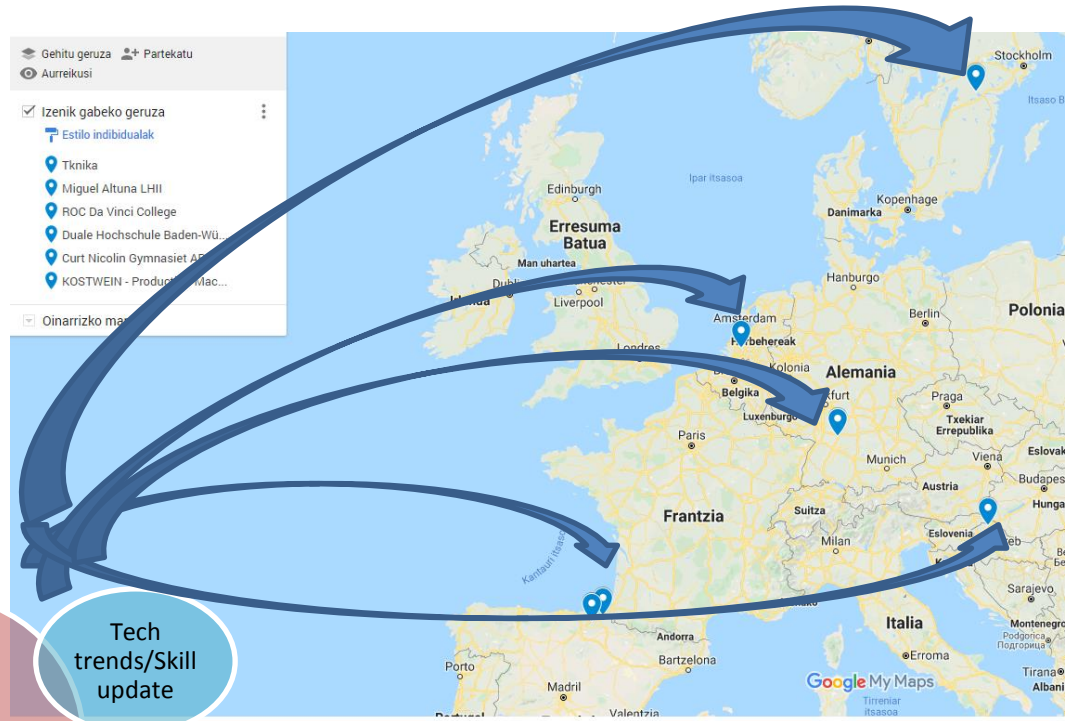
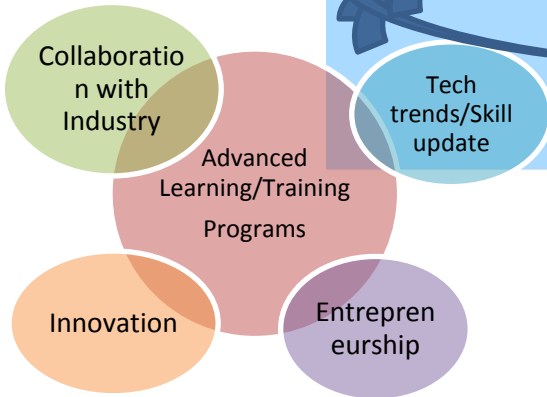
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EU HUB of Advanced Manufacturing CoVEs



Exam 4.0 is open to other CoVEs in AM across EU

Regional HUBs in Advanced manufacturing CoVE

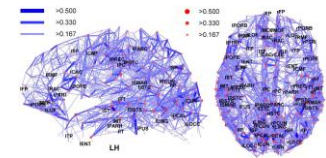


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What would be found in an Advance Manufacturing HUB for HVET?

Potential activities of a EU HUB of CoVE in Advanced Manufacturing

- Mapping Advanced Manufacturing CoVEs all across EU & worldwide
- Organize crossed Study visits
- Technology repository, Contents exchange.
- Best practices exchange
- Labs concepts exchange. Piloting of experimental learning labs.
- Skills observatory
- Organize AM related Thematic workshops / conferences
- Launch collaboration projects among CoVEs
- Mobility of trainers. Train the trainers
- Students exchange
- Create a virtual AM platform
-



PILOT Experience to be implemented within EXAM 4.0

INTEGRATION OF 4.0 ENVIRONMENTS IN LEARNING ACTIVITIES

Some features of Industry 4.0 in industry

- People, equipment's and systems are connected throughout the entire value chain
- All relevant information is available in real time "through suppliers, manufacturers and customers
- Parts of the value chain can be constantly optimized based on different criteria, eg. ex. costs, use of resources, customer needs

Sources: BITKOM, BCG

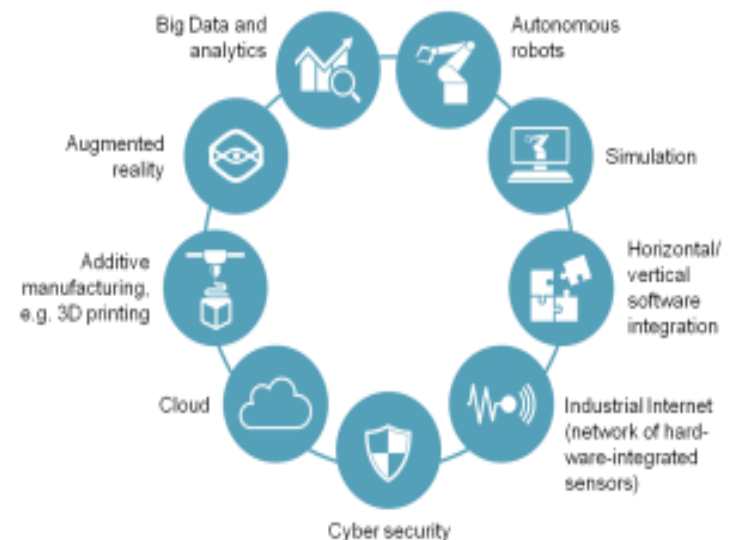
HOW TO TRASFER THIS ENVIROMENT TO TRAINING ECOSYSTEMS?

Digitalization

Technologies

4.0

4th Industrial Revolution



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Advanced manufacturing technologies targeted (so far) in HVET education programs within EXAM 4.0

- Advanced manufacturing processes.
 - Automatization. Connectivity. Industrial communication
 - Industrial IoT
 - Learning factories concepts.
 - Additive manufacturing. Metallic / plastics. Topological design
 - Robotics. Collaborative Robotics
 - Data acquisition. Big data analysis.
 - Data management systems.
 - Advanced material testing.
 - Lightweight concepts. Composites design and production.
 - Advanced metrology
 - Digital twins/ Virtual commissioning
 - Machine learning
 - Process simulation. FEM analysis.
 - Cybersecurity
 - Energy efficiency systems
 - Augmented reality/ Virtual reality.
- Knowledge management systems.
- Social & green innovation
- Trainers digitalization. Digital skills in learning methodologies.

The EXAM 4.0 HUB will pilot a **model of a VET/HVET centre 4.0.**

A proposal for an AM Workshop/LAB 4.0 Model in terms of its infrastructure, ICT applications, tools, skills needed and working processes is the following

SMART factory



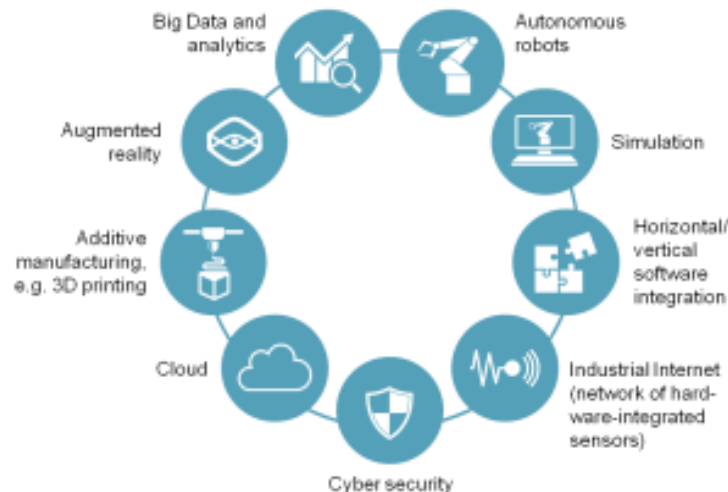
SMART workshops/lab at HVET centres

Smart workshops at VET. Learning Cyber Physical Spaces

Goal

Integration of Industry 4.0 technologies in VET centre's advance manufacturing workshop to get students and trainers used to work in "intelligent" environments

To deal with technical competences + transversal digital skills



What should we integrate at an Learning Cyber Physical Space?

Main Features

- Connected machines
- Data acquisition systems
- Access control
- Intelligent Warehouses
- Stock's control
- Augmented reality
- Maintenance
- Integrated robotics
- Cibersecurity (local)
- Big-data systems (local)

ERP (*Enterprise Resource Planning*)

Other Workshops

- *Specific workstations for Mehcatronic's*
- *Aditive manufacturing*
- *Flexible robotic*

SMART ADVANCE MANUFACTURING workshop in VET

INPUTS

Students

- Grouped by program, level, year

Trainers, teachers

- Grouped by programs, expertise

Facilities

- Equipment
- Spaces, distribution

Resources

- Support material
- CLBC by program

ERP

Structure of programs, groups, years. Including CLBC projects, subprojects, permissions. Identification of tasks. Traceability.

Communication

Real time data from the workshop

Connected machines

Intelligent warehouse

Stock's control

Maintenance

OUTPUTS

System's data for its exploitation

Facilities usage time (machines & tools). Tool life

Reports per student: Working time /student/machine/tool

Data for evaluation. Metrology, measurements & quality

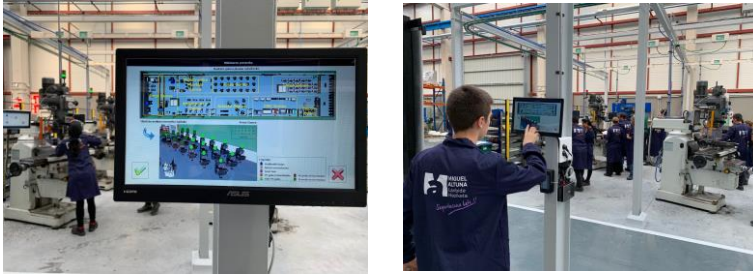
Energy consumption. Data for maintenance

Data monitoring at real time (remote)

Data for decision making & improvements



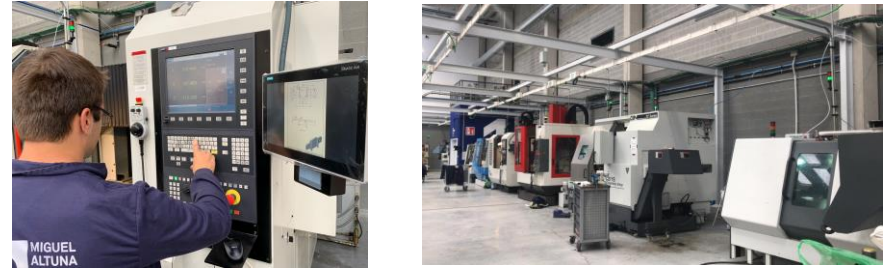
Machine booking control



Workshop's connectivity. Industrial wifi network and Server



Connected CNC areas



Intelligent warehouse RFID systems for tool control



Automatized areas



Mechatronics and robotics labs



Expected results from Smart Manufacturing Lab

- Student's work in 4.0 environments so that they get used to new ways of working.
- Accelerate the acquisition of digitalization skills.
- Students, equipment's and systems are connected throughout the entire process chain
- All relevant information is available in real time for trainers and students
- CBCL methodology approached as an industrial process.
- Student's progress individual traceability. Accurate information for the evaluation plans.
- Machine's working time information, time machine's on/off and real machining time. Exact information about machine's use.
 - Accurate Maintenance planning
 - Booking of machines, usage of the facilities
 - Tool control. Information available about who is using the tool, what machine, what task is carrying out, material, process. Data for life analysis.
- Stock control.
- Cybersecurity managed in a local environment. Basics applied.
- Big data managed in a local environment. Basics applied
- Showroom for SME's and microSMEs

Thank you for your attention

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