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# EXAM 4.0

THE EXCELLENT ADVANCED MANUFACTURING 4.0

## CoVEs Conference

Skills ecosystems for innovation,  
regional development, and social inclusion

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# EXAM 4.0, Platform of VET excellence for Advanced Manufacturing

The Excellent Advanced Manufacturing 4.0 project, EXAM 4.0 by its acronym, is one of the five Platforms of VET Excellence approved for funding by the Erasmus+ programme in 2019 under the Centres of Vocational Excellence (CoVE) pilot initiative launched by the European Commission in 2018.

[www.examhub.eu](http://www.examhub.eu)



# PARTNERS

## PROJECT COORDINATOR

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Centro de Investigación Aplicada de FP Euskadi  
Basque VET Applied Research Centre

## PROJECT PARTNERS



## AFFILIATED PARTNERS



## ASSOCIATED PARTNERS









## The EXAM 4.0 Project has **TWO MAIN OBJECTIVES:**

# 1

**Establishing a European platform of excellent Advanced Manufacturing VET and High VET centres.**

The EXAM 4.0 hub aims at becoming a **Innovation Community for CoVEs in Advanced Manufacturing** at European level, linking European regional **AM skills ecosystems** that bring together VET/HVET centres, companies, research centres, policy makers and individual lifelong learners linked with Advanced Manufacturing activities.

# 2

**To launch joint initiatives among CoVEs in Advanced Manufacturing sector in order to share knowledge and experiences**

During the lifespan of EXAM4.0

- **To Design and model a 4.0 labs for VET and HVET centres** defining their main features in terms of infrastructure, ICT applications, tools, skills needed and learning methodology.
- **To pilot I4.0 Labs in partners centers'** to verify the relationship and interaction among the different elements contained in the design



## OUR RESULTS



### LEARNING DIALOGUES

State of art and  
trend forecasting.

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### EXAM 4.0 PLATFORM

European platform of VET  
excellence in advanced  
manufacturing.

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### LABs for ADVANCED MANUFACTURING At VET centres

Designing and modelling  
a 4.0 labs for VET and  
HVET centres

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### LAUNCH AM pilot Labs

Turning the project  
achievements into  
impactful initiatives.

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## LEARNING DIALOGUES

State of art and trend forecasting

## Industry 4.0 - State of the Art of AM HVET/VET in Europe

### INDUSTRY PRESPECTIVE

Exam 4.0 Conceptual Framework: Leveraging  
the Potential for Adapted I4.0 Curriculum  
Design



[Determination of the Exam 4.0  
Framework](#)



A look inside the companies in EU



Future Trends



I4.0 Maturity Development Paths

# Exam4.0 framework

# Advanced Manufacturing Business Model

## Smart Applications

Instrumented    Interconnected    Inclusive    Intelligent

### Growth Driver

#### Smart Solutions

Smart Products

Smart Services

### Value creation Model

#### Smart Innovation

Extended Innovation

Connected Lifecycle Innovation

#### Smart Supply Chain

Agile Collaboration networks

Connected Supply Chain

### Efficiency Driver

#### Smart Factory

Decentralized Production Control

Data-driven Operational Excellence

## Ecosystem

Governance

People integration

Leadership

Strategy

Change

## Functions & Key Processes

Data acquisition and processing

Networking and integration

Self organization & autonomy

Decentralization & Service organisation

Assistance systems

## Technology Enabler (selection)

Embedded Systems (CPS)



Cloud Computing



Data / Analytics



Communication Networking



Additive Manufacturing



Robotics



Augmented reality



Cyber Security



M2M



Actuators Sensors







## LEARNING DIALOGUES

State of art and trend forecasting

### INDUSTRY PRESPECTIVE

Exam 4.0 Conceptual Framework: Leveraging the Potential for Adapted I4.0 Curriculum Design



Determination of the Exam 4.0 Framework



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I4.0 Maturity Development Paths

## Industry 4.0 - State of the Art of AM HVET/VET in Europe

### EDUCATION PRESPECTIVE

Skills and Competences for AM

- Competency Typologies
- Competency Models
- Comparison of four Competency Models of Industry 4.0 / Advanced Manufacturing

Qualifications in Industry 4.0

- Qualification and learning outcomes research in the context of I4.0
- The European Qualification Framework (EQF) and I4.0
- Industry 4.0 Technical Qualifications – Today
- Competences requirements in I4.0

Exam 4.0 framework: Competencies for Advanced Manufacturing

## EXAM 4.0 COMPETENCIES FRAMEWORK FOR ADVANCED MANUFACTURING

	TECHNICAL	QUALITY, RISK & SAFETY	MANAGEMENT & ...	COMMUNICATION	INNOVATION	EMOTIONAL INTELLIGENCE
<b>General competencies</b>	<ul style="list-style-type: none"> <li>• Knowledge in STEM</li> <li>• ICT skills</li> <li>• Programming</li> <li>• Coding</li> <li>• Computer skills</li> <li>• Design methodology</li> <li>• Systems analysis</li> <li>• Data management skills</li> <li>• Ability to interact with human-machine interfaces</li> <li>• Interdisciplinary understanding (processes/technologies/organisations)</li> <li>• Manufacturing skills</li> <li>• Modelling &amp; simulation</li> </ul>	<ul style="list-style-type: none"> <li>• Quality management</li> <li>• Risk assessment</li> <li>• Health &amp; security</li> <li>• Industrial hygiene</li> <li>• Equipment safety</li> <li>• Emergency response &amp; management</li> <li>• Data security</li> <li>• ethics</li> </ul>	<ul style="list-style-type: none"> <li>• Strategic analysis</li> <li>• Technology strategy</li> <li>• Marketing</li> <li>• Customer orientation</li> <li>• Project Management</li> <li>• Time Management</li> <li>• Teamwork &amp; ability to work in interdisciplinary environments</li> <li>• Change management</li> <li>• Risk management</li> <li>• Leadership</li> </ul>	<ul style="list-style-type: none"> <li>• Interpersonal skills</li> <li>• Verbal communication</li> <li>• Written communication</li> <li>• Presentation skills</li> <li>• Public communication</li> <li>• Virtual collaboration</li> </ul>	<ul style="list-style-type: none"> <li>• Integration skills</li> <li>• Continuous experimentation</li> <li>• Complex problem solving</li> <li>• Creativity</li> <li>• Abstraction ability</li> <li>• Critical thinking</li> </ul>	<ul style="list-style-type: none"> <li>• Flexibility &amp; Adaptability</li> <li>• Responsibility</li> <li>• Stress tolerance</li> <li>• Ability to thrive on failures</li> <li>• Work-life balance</li> <li>• Self-control &amp; discipline</li> <li>• Decision making</li> <li>• Mindset towards lifelong learning &amp; continuous improvement</li> <li>• Self management &amp; organisation</li> <li>• Cooperation &amp; collaboration skills</li> <li>• Intercultural competencies</li> <li>• Attention to detail</li> </ul>
<b>Specific competencies</b>	<ul style="list-style-type: none"> <li>• Life cycle analysis</li> <li>• Scalability analysis</li> <li>• Specific lab skills</li> <li>• Computer aided manufacturing/engineering</li> </ul>		<ul style="list-style-type: none"> <li>• Management of Personal resources</li> <li>• Management of financial resources</li> <li>• IP management</li> <li>• Deal negotiation skills</li> </ul>			



## EXAM 4.0 PLATFORM

European platform of VET excellence in advanced manufacturing

The EXAM 4.0 Platform aims at becoming a reference in skills governance in the participating regions/countries and at European level.

A digital platform of Vocational Education and Training (VET) and High VET in Advanced Manufacturing will be established, setting up European regional AM skills ecosystems

bringing together VET/HVET centres, companies, policy makers and individual lifelong learners. The platform will act as a catalyst for vocational excellence in the European regional context, with a long-term vision.



### VET-HVET Innovation community of CoVEs in AM

- Share knowledge and best practices
- Launch joint projects
- Organize networking teams, by subgroups on AM/I4.0 topics
- Connect with existing related networks and associations
- Organize workshops, conferences, motilities, job shadowing, trainers trainings...



### Platform of VET excellence in Advanced Manufacturing

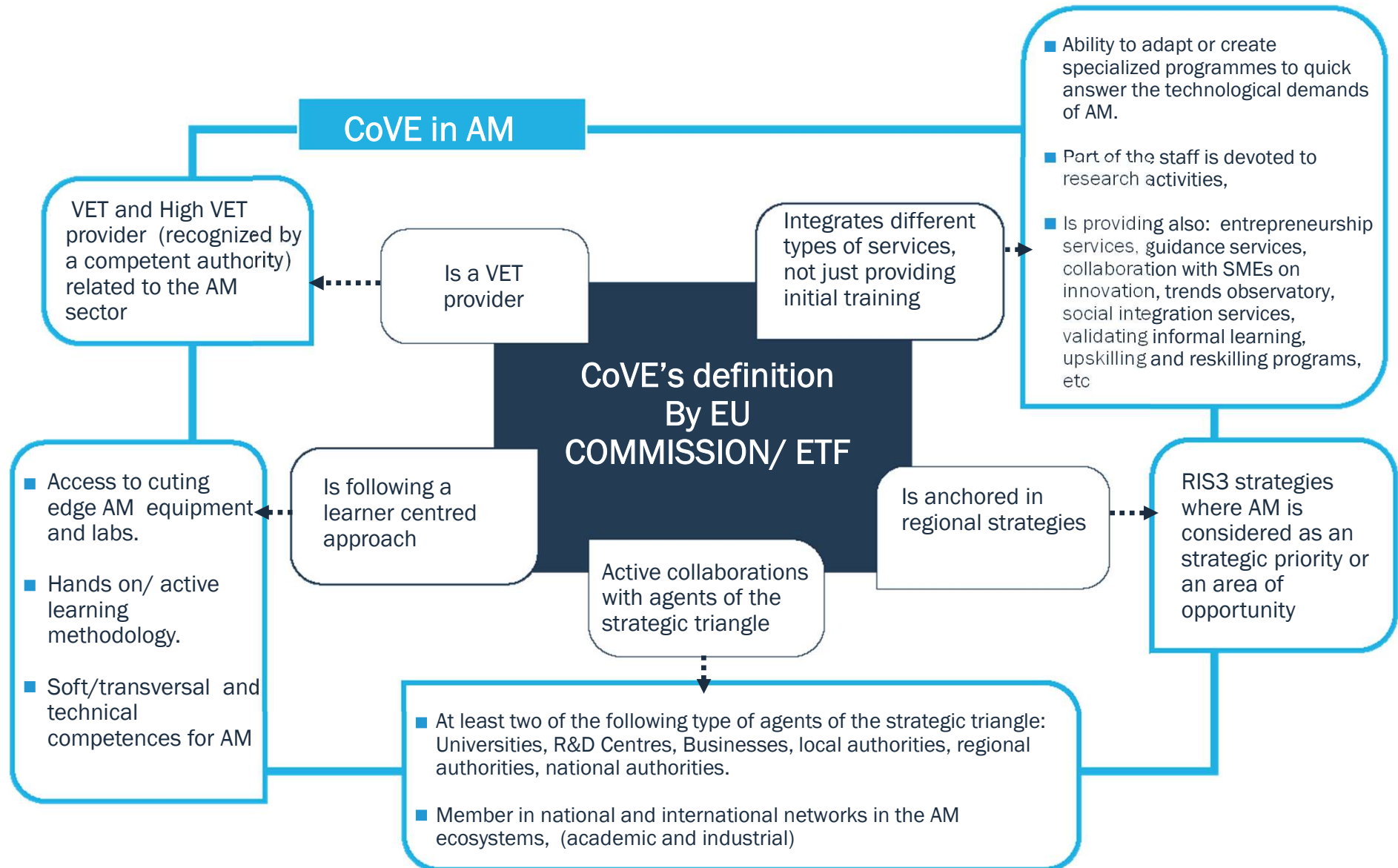
- Structure, Governance, statutes, members and membership...
- Guidelines for the platform am
- Strategic plan of the platform
- Activity framework of the platform



### Common understanding of CoVEs in Advanced Manufacturing

- To our understanding a VET centre will be considered as a CoVE in Advanced Manufacturing if and only if...

# Common understanding of CoVEs in Advanced Manufacturing As part of regional skill ecosystems





## **LABs for ADVANCED MANUFACTURING At VET centres**

**Designing and modelling a 4.0 labs  
for VET and HVET centres**

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The EXAM 4.0 partnership will identify the requirements that a VET centre must fulfil to be able to provide students with competences relevant for the AM Sector, focusing on emergent needs. AM 4.0 lab(s) where to implement 4.0 technologies will be designed, modelled, and validated through pilot actions at VET centres.

Active methodologies prone to be used in such labs will be identified and included



## **Launch AM pilot LABS**

**Turning the project achievements  
into impactful initiatives**

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Partners will pilot the implementation of AM labs based on the EXAM 4.0 model in each of the consortium's centres.

Defined set ups, equipment, connectivity systems, qualifications and learning methodologies will be piloted.





## CONCLUSIONS

- **EXAM4.0 will be the Platform of VET Excellence in Advanced Manufacturing**, a platform of skills ecosystems for innovation, regional development, and smart specialization.
- An AM Innovation Community of CoVEs will be joining forces behind the platform. Centres of VET and High VET excellence are welcome to join the community .
- The report “Exam 4.0 technology and competence frameworks – Challenges for the human factor in advanced manufacturing scenarios ” will be available in September 2020
- Models for AM labs and the experience of their implementation will be available
- Further Network activities to improve regional skill ecosystems for Advanced Manufacturing will be launched

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## THANK YOU



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