



Learner Centric Advanced Manufacturing Platform



3D SCANNING

WPN° 3 Observatory



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GLOSSARY AND/OR ACRONYMS

AI - Artificial Intelligence

AM - Advanced Manufacturing

Cedefop - European Centre for the Development of Vocational Training

CoVE - Centres of Vocational Excellence

EaFA - European Alliance for Apprenticeships

EC - European Commission

ECVET - European Credit System for Vocational Education and Training

EntreComp - The Entrepreneurship Competence Framework

EQAVET - European Quality Assurance in Vocational Education and Training

EQF - European Qualifications Framework

ESCO - European Skills, Competences and Occupations

ETF - European Training Foundation

EU - European Union

HE - Higher Education

HVET - Higher Vocational Education and Training

I4.0 - Industry 4.0

KET - Key Enabling Technology

OECD - Organisation for Economic Cooperation and Development

SME - Small and Medium Enterprises

SWOT - Strengths, Weaknesses, Opportunities, Threats

TVET - Technical and Vocational Education and Training

VET - Vocational Education and Training

WBL - Work Based Learning



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EXECUTIVE SUMMARY

Advanced Manufacturing (AM) and Higher Vocational Education and Training (HVET) need to update training, implement new technologies, and get quick access to data.

The causes behind these needs are technological factors (Industry 4.0), factors conditioned by education systems and education methodologies, social factors and environmental factors (the European Green Deal with its emphasis on the greening industry).

Under the CoVE initiative, the LCAMP project aims to support regional skill ecosystems and various stakeholders in providing new skills and implementing new or updated technologies in VET centres. LCAMP will tackle this by incorporating a permanent European Platform of Vocational Excellence for Advanced Manufacturing.

By collaborating across borders, LCAMP's goal is to support and empower regional Advanced Manufacturing CoVEs to become more resilient, innovative, and better equipped to train, upskill, and reskill young and adult students, to successfully face the digital and green transitions. We will help European regions and countries grow and be more competitive through their VET systems.

Therefore, the LCAMP OBSERVATORY is one of the services in the LCAMP platform. The observatory is led by the French cluster *Mecanic Vallée* and the French VET provider *Campus des Métiers et des Qualifications d'Excellence Industrie du Futur*.

This present document details the first results of the LCAMP Observatory, through the methodology that the LCAMP consortium used to set up and run the Observatory. We had set up a process cycle for the observation consisting of 5 stages:

- Stage 1: Diagnosis and priority
- Stage 2: Search and information gathering
- Stage 3: Information Analysis
- Stage 4: Creating value. Elaboration of LCAMP reports
- Stage 5: Dissemination and communication.



1. INTRODUCTION

The LCAMP observatory is one of the services of the LCAMP platform.

The LCAMP Observatory must be a reliable and easily accessible source of information and data for trainers, VET teachers, and professionals, updated on Digital / Advanced Manufacturing / Smart Industry, delivered through a multimedia and interactive platform -LCAMP platform-, that can be customized according to individual interests (Work in progress in WP8).

This observatory must feed other Work packages (WP), for instance, WP 5 on Learner Centric Training, or Open innovation Community in the WP4.

In a first document about methodology, are set up a process cycle for the observation consisting in 5 stages:

- Stage 1: Diagnosis and priority
- Stage 2: Search and information gathering
- Stage 3: Information Analysis
- Stage 4: Create value. Elaboration of LCAMP reports
- Stage 5: Disseminate-communicate.

Following this process cycle, are detailed the main aspects of the observation methodology:

- Identify reliable sources that we can find in Europe about Advanced Manufacturing.
- Classify and filter data gathered from different sources.
- Present several ways to collect data and to analyse them.
- Define the methods for the creation of annual reports.
- Validate process for those reports.

The observatory will publish periodical reports for VET and HVET target audiences about technology trends, labour market changes, skill needs, and occupations in Advanced Manufacturing. It is expected that SMEs, industry clusters and other associations will also find valuable information in the observatory.

The publication of a yearly report is planned.

- Report 1: June 2023,
- Report 2: June 2024,
- Report 3: June 2025.

This first annual report is gathering sub-reports written by around twenty different writers, from the main partners involved in the LCAMP project. 39 Topics were determined, and 22 TOPICS were analysed and worked on during this first period.



2. 3D SCANNING

The purpose of this chapter is to present some of the development areas related to AM.

These are topics that concern all or some of the stakeholders

1. CoVEs and VETs: teachers, trainers and heads of VET schools.
2. Learners: students, active workers, job seekers.
3. Companies.
4. Policy makers and other stakeholders.

2.1 INTRODUCTION

3D scanning is the process of capturing the shape, texture, and colour of physical objects using specialized equipment and software. This technology creates a digital model of the object that can be used for a wide range of applications, from design and manufacturing to quality control and inspection.

2.1.1 USE OF 3D TECHNOLOGIES IN EDUCATION

3D scanning has become an increasingly popular tool in education, as it provides students with a hands-on and interactive way to learn about various subjects. Here are some ways 3D scanning is used in education:

Engineering and technology: 3D scanning can be used in engineering and technology courses to create digital models of parts and components. This allows students to explore and experiment with different designs and configurations, and helps them understand how different parts fit together to create a working product.

Science: 3D scanning can be used to create digital models of specimens such as bones, rocks, and plants. This allows students to examine and study these objects in detail without the need for a physical specimen, which may be difficult to obtain or handle.

Art and design: 3D scanning can be used to capture and create digital models of physical objects, which can be used in art and design projects. This allows students to explore different design concepts and experiment with various materials and shapes.

History and culture: 3D scanning can be used to create digital models of artefacts, historical sites, and cultural landmarks. This provides students with a more immersive and interactive way to learn about history and culture, allowing them to explore these subjects in greater depth.

Overall, 3D scanning provides a powerful tool for educators to enhance student learning and engagement in a variety of subjects.

2.1.2 MOST RELEVANT FIELDS

In the industry, 3D scanning is used in a variety of ways, such as:



Product design and development: 3D scanning is used to capture the shape and geometry of physical objects, which can then be used to create digital models for product design and development. This allows designers to work with real-world objects and make accurate modifications to the design before producing the final product.

Quality control and inspection: 3D scanning is also used for quality control and inspection purposes. By scanning parts and components, manufacturers can compare the digital model to the original design and identify any discrepancies or defects that may impact performance or safety.

Reverse engineering: 3D scanning is often used for reverse engineering, which involves creating a digital model of an existing physical object in order to reproduce it or modify it. This can be useful for creating replacement parts or improving the design of existing products.

Cultural heritage preservation: 3D scanning is also used for cultural heritage preservation, allowing museums and other institutions to create digital models of artifacts and historic sites. This allows them to share the objects with a wider audience and preserve them for future generations.

In industries such as **architecture**, **engineering**, and **construction**, 3D scanning is used for building documentation, inspection, and quality control. It helps in the creation of accurate and precise models of structures, providing a more in-depth understanding of the physical space.

In the **manufacturing** industry, 3D scanning is used for quality control, reverse engineering, and prototyping. It helps in the detection of defects or irregularities in products and the creation of digital models that can be used to develop new products or improve existing ones.

3D scanning is also used in the **entertainment** industry for creating special effects, video games, and animation. It helps in the creation of realistic characters and environments by capturing real-world objects and scenes.

In the **medical** industry, 3D scanning is used for patient diagnosis, treatment planning, and prosthesis.

Overall, 3D scanning has become an essential tool in different industries, allowing manufacturers to create more accurate and efficient processes while improving product quality and safety.

2.1.3 TRANSVERSAL SKILLS

The use of 3D scanning in education can help develop several transversal skills in students, including:

Problem-solving: 3D scanning requires critical thinking and problem-solving skills, as students need to identify the best approach to capture the object, clean up the resulting data, and create a usable digital model.



Spatial reasoning: 3D scanning involves the use of spatial reasoning skills, as students need to understand how physical objects translate into digital models and how to manipulate these models in a virtual environment.

Creativity: 3D scanning can help develop students' creativity, as it allows them to experiment with different designs and shapes and explore new possibilities for creating and modifying objects.

Digital literacy: 3D scanning involves the use of specialized software and equipment, which can help students develop digital literacy skills, including the ability to use digital tools to create, edit, and manipulate data.

Communication: 3D scanning can help develop communication skills, as students need to be able to explain their approach and thought process to others, and collaborate effectively with their peers.

Overall, the use of 3D scanning in education can provide students with a range of transversal skills that are essential for success in the 21st century workplace.

2.1.4 CONCLUSIONS AND CHALLENGES TO BE ADDRESSED

The use of 3D scanning technology presents several challenges for the vocational education and training system. Here are a few of the challenges that need to be addressed:

Access to equipment and software: 3D scanning requires specialized equipment and software, which may be expensive and difficult to obtain. Vocational education and training institutions need to ensure that students have access to these resources in order to gain practical experience with the technology.

Training and skills development: 3D scanning requires a range of technical skills, including the ability to use scanning equipment and software, process and manipulate data, and create digital models. Vocational education and training institutions need to provide comprehensive training programs that cover these skills in order to prepare students for the workforce.

Keeping up with technological advancements: 3D scanning technology is constantly evolving, and vocational education and training institutions need to keep up with the latest developments in order to ensure that students are prepared for the latest industry trends and practices. + **Integration with the curriculum:** 3D scanning technology is still relatively new, and vocational education and training institutions need to ensure that it is integrated effectively into the curriculum. This requires collaboration between educators and industry experts to identify the key skills and knowledge required for success in the workforce.

Overall, the use of 3D scanning technology presents several challenges for the vocational education and training system, but with effective planning and implementation, it can provide students with the practical skills and knowledge needed for success in the next future workforce.



3. SOURCES

METALS European Erasmus + project. <http://www.metalsalliance.eu/>

Use of Creaform scanners in an innovation lab <https://www.creaform3d.com/blog/3d-scanning-in-a-design-and-innovation-lab/>

Aniwaa: 3d scanners catalog. <https://www.aniwaa.com/>

3DNatives Review: <https://www.3dnatives.com/en/>





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