

# Report Workshop Skills Belgium

## 1. Introduction

On Tuesday, February 6, and Wednesday, February 7, the Design and Technology Expertise Center, Research Line Sustainable Production of Thomas More, organized a workshop in Belgium for the Interreg project SUSTAIN3D focusing on the research area of required skills for 3D printing within SMEs.

The challenges surrounding 3D printing in SMEs and the importance of identifying the required skills are significant. SMEs are not reaping the expected benefits of investments in AM (Additive Manufacturing). Complex causes underlie this issue, including a lack of skills, digital infrastructure, and services. SUSTAIN3D seeks to address this challenge by analyzing root causes and developing new strategies to engage with companies.

The aim of the workshop on skills, was to gather insights into the skills necessary within the learning trajectory of individuals acquiring proficiency in 3D printing, to examine the current approach, and to envisage a future approach for educating individuals in 3D printing. Additionally, through brainstorming sessions, the workshop aimed to generate various pilot ideas that could be utilized and tested to educate individuals within SMEs about 3D printing.

## 2. Methodology

The preparation for the workshop began with thorough desk research into the available training programs in Belgium focused on acquiring the skills necessary for 3D printing. Subsequently, one of the colleagues within the research team was trained in 3D printing, during which the learning process and required skills were observed and documented for later application during the workshops.

A presentation for the workshop was developed, a brainstorming session was conducted, and various sheets and brainstorming tools were designed by the research team. Additionally, a survey was prepared and distributed among the participating countries of the Interreg project to gauge their current approaches to teaching 3D printing skills prior to the workshop.

The presentation covered the results of the desk research, an in-depth analysis of required skills with collected European data on 3D printing skills, different job profiles within Additive Manufacturing businesses, certification, an extensive description of the 3D printing learning journey (with insights from the colleague who was trained), discussions of literature applied to this learning journey,... During the presentation there were moments where the spectators could discuss the topics and where questions were asked in an interactive manner.

A brainstorming session with an accompanying presentation followed, starting with inspiring examples of innovative teaching methods. The brainstorming tools were based on the 3D printing learning journey, allowing participants to consider their current approaches on teaching 3D printing skills (based on the survey results) at each step and brainstorm alternative methods. Groups from different countries held brainstorming sessions for each step of the learning journey, jotting down ideas on post-its and collecting them on a large timeline of the 3D printing journey. These 'post-it ideas' were then discussed with all groups.

At the end of the brainstorming session, all the 'post-it' ideas were grouped into three possible pilots for teaching skills within SMEs. For this purpose, sheets were prepared in advance for participants to fill out.

### **Agenda**

On Tuesday, February 6, the following agenda items were scheduled:

- 9:00 am Introduction (presentation)
- 9:30 am Desk Research (presentation)
- 10:00 am Deep Dive Skills (presentation)
- 11:00 am 3D Printing Journey (presentation)
- 12:00 pm Lunchbreak
- 1:00 pm Interactive Workshop
- 5:00 pm Transfer to Hotel
- 7:00 pm Dinner @ Restaurant

On Wednesday, February 7, the following agenda items were scheduled:

- 8:15 am Checkout Mercure Centre
- + Transfer to Antwerp CS
- 8:37 am Train from Antwerp CS to Sint-Katelijne-Waver
- 9:15 am Campus tour De Nayer
- 10:00 am Sustainable AM Manufacturing by Amelie Kaysen, AM Hub (DE) (presentation)
- 10:30 am Lessons learned (discussion)
- 12:00 pm Lunchbreak
- 12:45 pm Transfer to Leuven (Taxi)
- 1:30 pm Visit Materialise
- 3:00 pm Transfer to Antwerp CS (Taxi)

## **3. Discussion**

During the presentation on Tuesday, February 6, several findings and remarks emerged from the mutual discussion as described below:

Comments on the Introduction:

Some individuals lack knowledge of 3D printing, while others learned through formal education, self-teaching, or on-the-job experience. Learning by doing was emphasized, with resources such as YouTube videos being utilized.

#### Comments on Skills:

There is a growing demand for additive manufacturing (AM) technicians, requiring a blend of hard and soft skills. Interviews revealed limited educational opportunities in certain regions, indicating a potential skill gap.

#### Comments on Infrastructure:

Participants expressed concerns about inadequate infrastructure, including issues with noisy or malfunctioning printers, highlighting the importance of reliable equipment.

#### Comments on Services:

Challenges faced by 3D print service providers included difficulties in establishing viable business models and a lack of material knowledge. Some individuals expressed a desire for mentorship and support in navigating 3D printing.

#### Comments on Sustainability:

Participants discussed challenges in quantifying sustainability and emphasized the need for context-specific solutions to achieve sustainable production.

#### Summary Thoughts on the Presentation:

A holistic approach is necessary to fully understand the challenges and opportunities surrounding 3D printing in SMEs.

#### Comments on Desk Research:

Regional differences in skill gaps were observed, with varying emphasis on CNC and AM/3D printing skills. Motivations for learning 3D printing included job prospects and market demand, although perceptions of 3D printing varied across countries.

#### Comments on Deep Dive Skills:

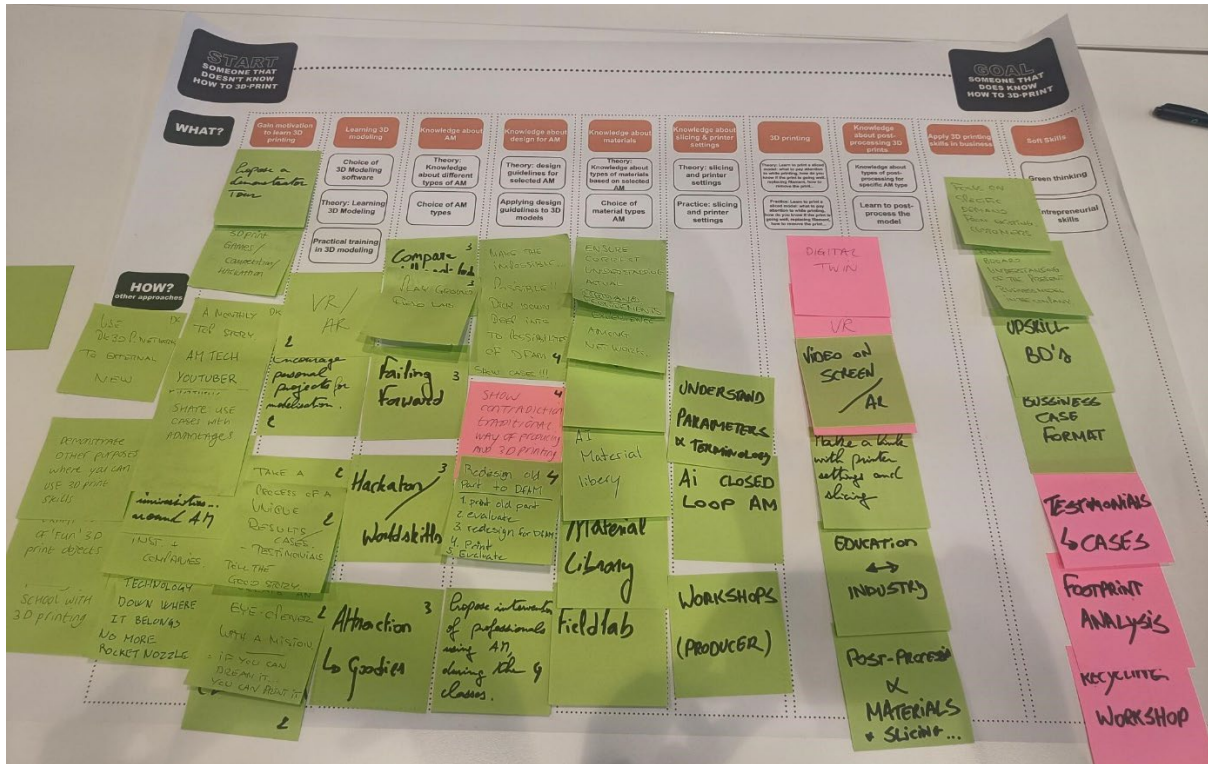
The UK leads in advanced AM skills, primarily at the doctoral level, posing challenges for SMEs. Training opportunities are limited due to market demand and equipment availability, with a focus on technical, entrepreneurial, green, and digital skills.

#### Comments on Certification:

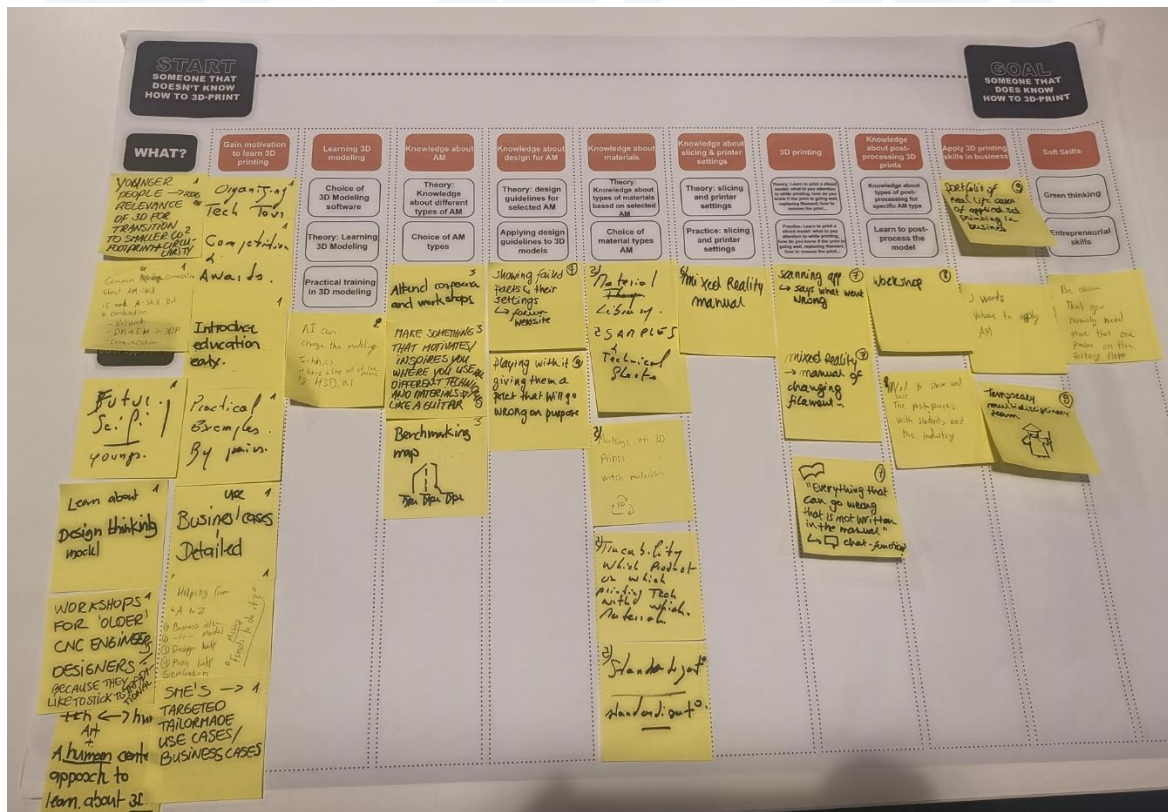
Participants acknowledged the importance of certifications for entry into the workforce, emphasizing the need for international recognition to maintain value across borders.

## 4. Results

As described earlier in the "Methodology" section, the ideas generated during the brainstorming sessions were represented on post-it notes and placed on a timeline corresponding to the learning trajectory of 3D printing skills. Subsequently, these ideas were clustered into three concepts for potential pilot projects aimed at teaching individuals within a company 3D printing skills.



Post-its on Timeline Group 1



Post-its on Timeline Group 2

Pilot 1 (key words)

**CENTRAL IDEA THAT UNDERPINS THE INNOVATION**

ACTIVITIES / PROVISION	WAYS OF WORKING	ORGANISATIONAL MODELS
<p><b>PRODUCTS AND SERVICES</b> offered to a customer or user, in physical or virtual form</p> <p><b>PROGRAMMES</b> - sets of activities or measures with a long-term aim</p>	<p><b>PRINCIPLES, VALUES, PROCESSES OR GUIDELINES</b> that can be applied in different contexts</p> <p><b>ROLES</b> - tacit knowledge, mindsets, skills residing in people</p>	<p><b>STRUCTURES AND RELATIONSHIPS</b> that enable an organisation to work in a specific way that makes the innovation successful</p>
<p>Workshop c-level about business case 3D-printing:</p> <ul style="list-style-type: none"> <li>-&gt; sustainability</li> <li>-&gt; Price</li> <li>-&gt; advantages</li> <li>-&gt; Business value</li> <li>-&gt; Strategy</li> <li>-&gt; Philosophy</li> </ul>	<ul style="list-style-type: none"> <li>• Discussion around the table to share experiences at the same C-level.</li> <li>• Exploring the Business Model Canvas from technicians to directors.</li> <li>• Demonstrator tour featuring examples from other companies.                             <ul style="list-style-type: none"> <li>-&gt; Technicians/operators, bring your bosses along.</li> </ul> </li> </ul>	<p>Annual innovation dinner: a component of the 3D printing training program, focusing on discussions about sustainability and business models.</p>

### Pilot 2 (key words)

## CENTRAL IDEA THAT UNDERPINS THE INNOVATION

ACTIVITIES / PROVISION	WAYS OF WORKING	ORGANISATIONAL MODELS
<p><b>PRODUCTS AND SERVICES</b> offered to a customer or user, in physical or virtual form</p> <p><b>PROGRAMMES</b> - sets of activities or measures with a long-term aim</p>	<p><b>PRINCIPLES, VALUES, PROCESSES OR GUIDELINES</b> that can be applied in different contexts</p> <p><b>ROLES</b> - tacit knowledge, mindsets, skills residing in people</p>	<p><b>STRUCTURES AND RELATIONSHIPS</b> that enable an organisation to work in a specific way that makes the innovation successful</p>
<p>1. Assisting technical 3D printing specialists in effectively communicating the advantages of 3D printing to colleagues and management, emphasizing soft skills and business acumen.</p> <p>2. Conversely, facilitating the reverse process where non-technical personnel are supported in understanding and appreciating the benefits of 3D printing technology.</p>	<p>Developing a teaching module that integrates design thinking (as a methodology) and the unique selling points (USPs) of 3D printing.</p> <p>Design thinking is an iterative process.</p>	<p>We will identify five real companies and specialists who are experiencing difficulties in selling the advantages of 3D printing within their organizations. Our plan is to provide on-site assistance as well as conduct classroom sessions using teaching modules to support them.</p>

### Pilot 3 (key words)

## CENTRAL IDEA THAT UNDERPINS THE INNOVATION

ACTIVITIES / PROVISION	WAYS OF WORKING	ORGANISATIONAL MODELS
<p><b>PRODUCTS AND SERVICES</b> offered to a customer or user, in physical or virtual form</p> <p><b>PROGRAMMES</b> - sets of activities or measures with a long-term aim</p>	<p><b>PRINCIPLES, VALUES, PROCESSES OR GUIDELINES</b> that can be applied in different contexts</p> <p><b>ROLES</b> - tacit knowledge, mindsets, skills residing in people</p>	<p><b>STRUCTURES AND RELATIONSHIPS</b> that enable an organisation to work in a specific way that makes the innovation successful</p>
<p>We offer a new way of learning based on 'failure'.</p>	<p>We will create CAD parts intentionally designed to fail during printing. Participants will be tasked with identifying the issues causing the failures and rectifying them within a specified timeframe. This activity will utilize the 'serious game' teaching method.</p>	<p>A student contest.</p>

### Clustered Ideas from Group 1 and 2: Three Potential Pilots