SAM
SECTOR SKILLS STRATEGY
IN ADDITIVE MANUFACTURING

Report on the Analysis and Validation of Needs

Executive Summary

The SAM (Sector Skills Strategy in Additive Manufacturing) project, aims to deliver a shared vision and collaborative skill solutions capable to foster and support the growth, innovation and competitiveness in the Additive Manufacturing (AM) sector, in close interactions with key sector stakeholders.

The project's initial phase has already shown that implementing Additive Manufacturing (AM)/3D printing requires investment in workers' skills and know-how at an unprecedented scale, in such a way as to allow the current workforce to reskill and adjust to the new reality.

The work conducted by the SAM consortium is of crucial importance to ensure that the European AM sector expands and grows relying on a highly trained and knowledgeable workforce.

SAM's data collection and feedback phases allowed for the identification of gathered skills gaps and demands of the AM gaps and shortages were framed according to different scenarios:

> **• Scenario 1:** Real case, in which extent skills need to be addressed in less than 6 months.
> **• Scenario 2:** Short-term, how relevant skills / trends need to be addressed in the less than 2 years.
> **• Scenario 3:** Foresight scenarios, how relevant skills / trends need be addressed in the future, within the next 10 years.

The current Summary will focus on the efforts carried out the by the Consortium in setting up a baseline to identify skills gaps and demands of the AM Sector for the real case and short-term scenarios. It represented the project's initial phase of auscultation with key target groups, namely Companies, and Research and Technology Development Organisations (RTOs)

It did so by combining datasets from industrial organisations and RTO experts, it was possible to draw a clear picture of the current skills needs and gaps for each of the scenario variants, as per the below.

Current Skills Needs and Gaps | Real Case Scenario, 2019

AM Professional Profiles
Process Engineer, Designer and Materials Engineer
Business related profiles

Materials
Metals followed by Polymers

Technological Skills
Certification, Validation, Topology Optimisation, Design, Numerical modelling, Standards

Entrepreneurship, Digital and Green Skills
Costs, Resource Efficient Management/ Sustainability

Short Term Skills Needs and Gaps | Short Term Scenario, from 2020 to 2021

AM Professional Profiles
Process Engineer, Designer and Materials engineer

Materials
Metals followed by Polymers

Technological Skills
AM processes, Testing & Quality Control, Design, Pre-processing & Material Handling, Topology Optimization, Certification and Validation

Entrepreneurship, Digital and Green Skills
Resource Efficiency / Sustainability, Marketing and Sales

Technology Trends that will need to be considered in the near future |
Foresight Scenario, from 2022 to 2021

AM Professional Profiles
Designer, Process Engineer, Non-destructive testing and Inspection Technicians

Materials
Metals followed by polymers

Processes
PBF and DED

Technological Skills
Numerical Modelling, Non-destructive Testing, Metallurgical analysis and characterization, Pre-processing & material handling; Data analytics Design, Materials and process development.

Entrepreneurship, Digital and Green Skills
Resource Efficiency / Sustainability, Marketing and Sales

AM technology trends for R&D&I | Trends for 2020-2025

Real time control / monitoring systems, New materials, Zero-defects manufacturing

Upskilling / Reskilling Existing Professionals
(independent analysis from the scenarios)

Consultants, Civil engineers, Mechanical engineers, Design Engineers, Inspection Technicians (NDT/DT Technicians, DT Technicians), Project Managers, Process Managers, RTD Professionals from different industries and what to change in industry, Software Personnel; Business developers; programmers.

AM Training / Education
(Data collected from RTO that include training in their activity)

From the RTO relying to the surveys, the majority (67%) is involved in training activities. The training/education courses correspond mostly to internal courses followed by technological workshops (>1 day) and external training at customers' location.

Training courses mostly target AM Processes, followed by Design, Post-processing and Topology Optimization. Skills less addressed are linked to non-technological areas, namely Communication, Marketing and Sales, and Resource Efficiency / sustainability.
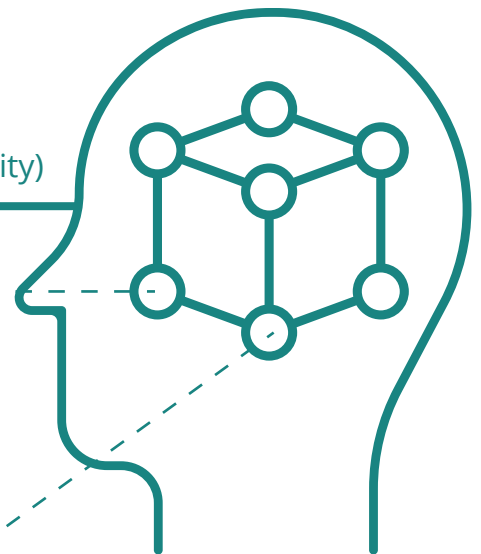
Drawing from this information, SAM agreed as a whole to address and give priority to technological skills linked to **Health and Safety, Quality Control, AM defects** (per group of process/process based), **AM Processes, Post Processing** and **End of Life**, as these were found to be critical gaps. Nevertheless, along the project the remaining categories (i.e. **Entrepreneurship, Digital** and **Green Skills**) will be tackled.

Moreover, based also on this initial survey round, it was considered critical for the industry that Metals will continue to be required and as the most required AM Professional Profiles are already integrated in the International Metal AM Qualification System (IAMQS), namely the Designers and Process Engineers and Specialist/ Coordinator at Engineering level, it would make sense to keep this Profiles updated and to develop new AM Qualifications for metals and polymers. something which is closely related to the work being implemented through the project's other Work-Packages.

Four criteria were used to determine the priorities to tackle the above-mentioned skills needs and gaps:

  - Sectors relevance in alignment with ISO activities,
  - Urgency,
  - Impact on employability and
  - Relevance towards raising awareness on AM.

The data collected through the various surveys and interviews to industry and RTO partners has proven extremely valuable to other project Work packages, namely WP4 looking at the European AM Skills Strategy, as well as for the pilot courses that are being planned and organized through WP5.