SUSTAINABILITY ACTION PLAN

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1. Contents

2. Executive summary

This document aims to provide an overview on the sustainability of the project outcomes as required for Erasmus+ projects.

The action plan includes a brief introduction to the project (section 3), a description of the applied methodology (section 4) and a detailed description of the elements identified by the consortium as exploitable results after the end of the project together with their description of the sustainability model (section 5). A summary table of tangible actions to keep SAM activities alive is provided at the end of the document.

The IAMQS System compiles all international training guidelines updated during the project, which had been developed prior to the SAM project, the new guidelines created during SAM, and the future ones, to be created and/or adjusting the existing ones if needed, after the project, thanks to the feedback from the stakeholders involved (VET organisations, trainees and both councils). The implementation of the AM Qualification System will be supported by the methodology for revising/ creating professional profiles and developing skills, developed in the framework of WP3 and through the activity of the working groups, framed in WP4. The system will be supported by a number of "pillars" developed during the project and which are established to oversee the system on an ongoing basis.

These consist of:
- Observatory Team: The appointed European Management Organisation (EWF) is responsible for setting the rules and procedures for the implementation of the International AM Qualification System and its quality assurance cycle, with advice and inputs from the International Additive Manufacturing Qualification Council (IAMQC).
- International AM Qualification Council (IAMQC) is a grouping of AM qualification entities that is responsible for the updates to & developments of the qualifications of the AM Qualification System. The IAMQC also has the role of nominating Qualification Working Groups to revise or create Professional Profiles or Qualifications based on the Industrial Council indications, and the feedback from those participating in the training, which will be collected through the questionnaire developed in D2.7.
- International AM Industry Council (IAMIC) comprises a group of AM industry representatives which ensures the developments and findings of the AM Qualification System are undertaken in total alignment with industrial needs. The IAMIC also has the role of nominating Industry Advisory Groups to collaborate with Qualification Working Groups during the validation of the industrial requirements, which will favour the updating of existing AM qualifications or development of new ones (of which the AM Observatory will have information), thus allowing them to respond to these needs within periods of 1 year, 3 years and 10 years.

The performance of these sustainability pillars will be measured by the number of identified skills gaps in AM, an increase in the number of new qualifications and/or learning units, and the development of qualifications in two new areas, including non-metal materials or other industrial sectors.

The Methodology for designing and revising professional profiles, qualifications and skills is structured into three main steps, namely definition of creation and review processes for keeping profiles, qualifications, and Units of learning outcomes (ULO) up-to-date, creation and revision of the actual professional profiles, as well as outline the operational guideline on context and training tools.

Both methodologies for the forecast of skills need and designing and revising professional profiles/ qualifications and ULO are included in the International AM Qualification System and will be exploited after the project end by the Qualification Working Groups in its work of updating or creating Professional Profiles/Competence Units, if needed.

The responsibility for developing the final methodology lies with the International AM Qualification Council, which is tasked with appointing Qualification Working Groups dedicated to revising or creating professional profiles and their corresponding qualifications.

As the project approaches its conclusion, it has become evident that the sustainability of two key elements, namely the AM Observatory platform and the International AM Qualification System, along with the Sector Skill Strategy Roadmap, Forecast Methodology, Methodology for revising Professional profiles, Qualifications, and Skills, Raise Awareness Tools, and the AM community Network Mainstream Steering Committee, are pivotal for maintaining the project's achievements.

3. Introduction

SAM has engaged the stakeholders involved with Additive Manufacturing (AM) technologies in a fruitful cooperation, creating synergies for a common vision to support the growth, innovation, and competitiveness of the AM sector with tailored actions. The Action Plan represents the final deliverable within WP8, showing how the produced results will be exploited after the project end, therefore ensuring the sustainability of all the major outcomes and outputs.

An effective communication and dissemination strategy were the first activities towards raising awareness and arouse interest in the project scope and results – these were particularly useful for outreach activities supporting SAM. If the project outputs, such as website, will remain available and free of access for use by all interested subjects on the Observatory, little extra effort is necessary to ensure that the project outcomes and activities will continue to be carried out.

The current version of the Action Plan results from an iterative process initiated 2020, that entails the identification of exploitable results, the assessment of risks and the implementation of required activities that anticipate the results exploitation. The Action Plan addresses the description of seven exploitation results, their updated description as well as an update on the tangible actions required to ensure the future sustainability of SAM results.

4. Methodology

The methodology used to develop the SAM action plan was underpinned by a development and iterative process, involving the auscultation of partners and relevant stakeholder to identify, assess and conclude about: which results to explore (Exploitable results), by whom (i.e. Owner and engaged stakeholders), how (i.e. Exploitable Activities and Business Model) and until when (e.g. Timeline).

Along the process, a task force called "IAMQS Exploitation and promotion Working Group" was organised. It is composed of SAM partners (i.e. EWF, MTC, IDONIAL, IMR, ISQ and CECIMO) to tackle partners and associated partners expectations towards their future role and engagement with SAM results. During the final meeting (TM10), a detailed analysis of the resources required was entailed ensuring the validation of the tangible actions.

5. Description of SAM exploitable results

Seven main outcomes and outputs[1] were identified for exploitation:
1. **International AM Qualification System (IAMQS)**
2. **European AM Sector Skills Strategy Roadmap**
3. **SAM Observatory**
4. **AM Community Network**
5. **Forecast Methodology and the kits produced within this framework**
6. **Methodology for designing and revising professional profiles and developing skills**
7. **Raise Awareness campaign materials**

5.1 International AM Qualification System

The key Exploitation pillar of SAM is the existing and solid _International Qualification System for Additive Manufacturing_[1], thus, ensuring continuity and further exploitability in all European countries. The system, stemming from the consortium actors and their networks of stakeholders, is composed by a set of qualifications for different proficiency levels in the field of AM technologies, grounded in industry requirements and validated by experts.

The Qualification System uses a modular structure composed by units of learning outcomes to describe the expected knowledge and skills acquired by trainees after the successful completion of the training courses. Within the system, a single syllabus for each level is defined, supported by a harmonised system for assessment and quality assurance based on standards, resulting in the same qualification being awarded independently from the country where the training has been performed.

Such harmonisation process will strengthen the links between training centres and AM companies involved in the system, thereby helping to align understanding on skills-related AM data across European countries, all while increasing the mobility of talents in the sector. The International AM Qualification System englobes all the procedures and rules to ensure a Quality System of AM training providers across Europe. The System compiles all international training guidelines updated during the project, which had been developed prior to SAM project, the new guidelines created during SAM, and the future ones, to be created and/or adjusting the existing ones if needed, after the project, thanks to the feedback from the stakeholders involved (VET organisations, trainees and both councils). The System will, in fact, be aligned with the EQAVET (European Quality Assurance in Vocational Education and Training) principles.

5.1.1 Sustainability of the IAMQS

SAM Partners consider the IAMQS as the main tool to ensure that what has been developed during the project will have continuity in the upcoming years. As the system requires continuous update and revision, specific tasks need to be performed on regular basis, and subsequently criteria are needed to guarantee the smooth management of the activities related to the System.

The tasks identified to be carried on for the sustainability of the IAMQS are the following:
- Ensure that the AM skills strategy is updated according to the industrial needs in the different sectors.
- Report existing and new Qualifications/Competence Units developed under the system to Skills Intelligence and ESCO portal.
- Manage Compliance of organizations with Quality Assurance System.
- Accreditation of Training Centers -> to conduct comprehensive audit procedures for Training Centers within the system based on their scope of capability to deliver training. These audits are vital to ensure the adherence and compliance of Training Centers with the established standards.

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[1] _The implementation of the system remains at European level, but the designation 'International' is used on stakeholders' input, as it results more straightforward and it is also aligned with the standards used in AM, which are international standards and not just European ones._

- Undertake audit procedures to Training Centers withing the system every 5 years with a surveillance audit after 2/3 years.
- Manage International Training Guidelines
- Award Diplomas recognized by Industry
- Ensure the Delivery of training.

The requirements deemed as necessary for an organization to perform the above-mentioned activities are the following:

- High experience in managing robust Qualification Systems recognized by Industry at European level.
- Diploma Recognized at International Level.
- Experience in managing and implementing Quality Assurance Systems related to training and qualification of Personnel.
- Experience in development and update of European AM Training Guidelines.
- Recognised experience in application of skills identification methodologies (workshops, surveys, interviews, research).
- Experience in Accreditation of Training Centres.
- Experience in Audit procedures to Organisations.
- Industrial led organization/association.
- Non-for-Profit Organisation.
- European organisation.
- Organisation positioned at Global level.
- Organisation with a wide network of auditors at the international level.
- Vast experience in training/education for industry.
- Knowledge and significant experience in education methodologies.
- Organisation with experience in activities to boost skills in Additive Manufacturing and other industrial fields.
- Strong connections with AM Networks.
- Recognised presence in large Networks of Additive Manufacturing.
- Connection with Industry in all sectors addressed by AM.
- Partner with VET providers and Higher Education organisations in AM internationally.
- Connection with Training Providers and Training Associations in AM and AM related fields.
- Connection with Standardisation Bodies, more precisely ISO-ASTM Boards for AM Qualifications
- Connection with Certification Bodies in AM, internationally.
- Connection to political organisations (EC and National Authorities, namely National Qualification Agencies European wide).
- Connection with large companies and SMEs in the AM field of activities.
- Connection with Research and Development organisations, internationally.
- Connection with SMEs and Large Companies working or starting to work with AM internationally.
- Aware of the UN SDGs and the European Green Deal.

The organisation leading the exploitation was agreed to be **EWF** (project coordinator), due to its long-standing experience in developing and managing harmonised qualifications systems, underpinned by a quality assurance system in alignment with European standards. EWF complies with the criteria needed to perform the actions ensuring the management of the IAMQS after the project's end, and therefore it was selected to manage the International AM Qualification System. The implementation of the AM Qualification System will be supported by the methodology for revising/ creating professional profiles and developing skills, developed in the framework of WP3 and through the activity of the working groups, framed in WP4.

The continuous management of the IAMQS will continue to reply on EWF and will be supported by the roll-out by the AM Authorised Training Bodies (ATBs), under the supervision of the AM Authorised Nominated Bodies (AM ANBs). The (ATBs) will be subject to regular audits to maintain compliance and uphold quality standards. The delivery of training will follow a "pay-per-use" approach, ensuring that the

uptake of skills is appropriately aligned with the corresponding fees. Therefore, the beneficiaries of the IAMQS, including industrial associations, AM training centers, vocational education and training (VET) institutions, and research organizations with training activities, will be required to pay a fee for each issued diploma. This fee ensures the sustainability of the system and supports its continued operation.

These measures and payment mechanisms contribute to the overall effectiveness and long-term viability of the IAMQS. By establishing a sustainable funding model and implementing rigorous audits, the system can continue to provide valuable qualifications and training in the field of Additive Manufacturing, meeting the evolving needs of the industry.

So far, the IAMQS covers Metal AM Qualifications for Operators, Designers, Supervisors, Inspectors, Coordinators and Engineers and one Polymers AM Design Qualification. The objective is to be able to continue increasing the wide network of AM ATBs delivering trainings aligned with IAMQS and ensure its wide implementation at the European level after the project in alignment with the priorities and need identified by industry.

AM ANBs, considering IAMQC's recommendations, will issue AM Diplomas to trainees who complete AM Qualifications successfully and Record of Achievements to the trainees who complete Units of Learning Outcomes / Competence Units. To comply with that, the IAMQS is supported by education resources, part of them developed for the project pilot courses, as well as marketing and communication materials available on the project website, which highlight the added value for a Training Centre to align its trainings with the newly established IAMQS.

The established IAMQS network has proactively planned the next set of courses to ensure the long-term sustainability of the system. As part of this vision the following courses are planned to take place until the end of 2023 and beginning of 2024:

- Powder Bed Fusion (PBF) - Laser Beam (LB) Engineer and Metal Binder Jetting courses in Italy;
- Shorter courses addressing specific CUs 00, 08 and 47) in Germany;
- Process Engineer PBF LB in France;

Additionally, a joint training among partners is under discussion, either to deliver a range of CUs, either a full Qualification, such as the AM Coordinator, in the United Kingdom and Ireland.

More courses will be conducted within the IAMQS framework, continuously offering new courses and training opportunities in the field of Additive Manufacturing.

5.2 Sector Skills Strategy Roadmap

The Skills Strategy Roadmap provides the overall guidance for implementing SAM's strategy until 2030, outlining how to address the evolving sector needs and challenges towards AM skills development. Two versions of the roadmap were published for different periods, 2020 and 2023, in order to reflect the dynamic features of the sector and increasing speed in which AM technologies are evolving.

The updated Skills Strategy roadmap from 2023 presents a clear analysis of the path taken in the past four years, particularly on how the Skills Strategy for AM necessarily evolved, adapted and adjusted to the trends in the sector. The strategy includes information on:
- **Challenges in Additive Manufacturing (Gap Drivers),** which have resulted from the continuous consultation, from the outset of project, with sector professionals and industry representatives, as illustrating the foremost obstacles to the development of the European AM sector.

- **Strategic objectives,** which represent a macro-level approach to a specific challenge. Objectives were defined as purpose statements, grounding the overall sector skills roadmap vision and measurable steps to overcome the challenges faced by the AM sector.

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- **Actions**, concrete and feasible solutions addressing each gap. For the strategy to succeed, specific Supporting Actions were considered together with support activities helping to maximize the success of the strategy.

- **Impact** represents the expected degree of success at countering each gap driver successfully.

- **Recommendations** formulated as proposals, best practices, and guidance actions for further implementation by the different target groups, to take the best course of actions.

- **Target groups**, correspond to four main groups of stakeholders (e.g. Education, Industry, EU citizens/workers, legislators and policy makers) responsible for, directly or indirectly, contributing and/or benefiting to the recommendations.

Figure 1 - Sector Skills Strategy Roadmap link with SAM impact

5.2.1 Sustainability of the Sector Skills Strategy Roadmap

The sustainability of the Sector Skills Strategy Roadmap relies heavily on the successful implementation of the forecast methodology and the International AM Qualification System (IAMQS) by the AM Observatory. To ensure its longevity, common sustainability activities are applied and managed by EWF, including the development of a viable business model.

The strategic objectives outlined in the Skills Roadmap encompass 30 recommendations, such as:
- Strengthening collaboration between industry and training organizations.
- Addressing the shortage of AM personnel at the European level.
- Equipping European, national, and regional organizations to provide relevant AM training across different educational levels.
- Catering to the diverse sectors and applications of AM.
- Ensuring the continuous updating of skills among the European AM workforce.

- Preparing the future workforce for the field of AM.
- Leveraging existing funding programs and mechanisms.

The partner selected to be the main responsible to exploit this result is **EWF**, due the strong linkage between the Skills Strategy and the IAMQS, managed by EWF. For effective implementation, the target groups addressed by the strategy encompass stakeholders from education, industry, social actors, legislators, policy makers, and local, regional, national, and European authorities. The performance indicators for the roadmap include the qualification of 100,000 AM workers by 2050, including upskilling and reskilling of the existing workforce. Additionally, it involves the design, review, and rollout of 100 up-to-date AM skills development by 2025, along with a 25% increase in the network of training centres and infrastructure.

The skills roadmap's sustainability relies on the collective efforts of various stakeholders to ensure the successful development and progression of the AM sector's skills and qualifications.

5.3 SAM Observatory

The Observatory is an important pillar to ensure the sustainability of the whole AM skills strategy developed in the SAM project.

The observatory has an online repository of AM related subjects, with special focus on skills and employability data. Its unique features will support the AM sector towards sustainable growth. The main function of the Observatory is to monitor skills' gaps and shortages and identify new professional profiles or skills for other relevant AM sectors, whilst at the same time updating existing ones. Essentially, the Observatory Platform will act as a single point of reference for skills analysis and requirements in AM by gathering information from a variety of EU-funded initiatives, AM stakeholders and the update of its sections with latest news, relevant articles, amongst others. In doing so, it will be a unique knowledge platform in the AM community, providing readily available AM skills data to EU taxonomies like ESCO or the CEDEFOP's Skills Intelligence. Thanks to its informative value, the Observatory will ultimately contribute to more accurate training policymaking on additive technologies at European and national level and contributing to information exchange and networking among all the stakeholders involved in AM.

To perform all its heterogeneous and horizontal functions, the Observatory was structured in a way to ensure that all the features can be constantly updated and that the methodologies developed in the projects are used and revised. SAM project has identified four groups of relevant stakeholders that will oversee, perform, and support the activities related to the sustainability of the Observatory, namely:
- **Observatory Team**: The appointed European Management Organisation (EWF) is responsible for setting the rules and procedures for the implementation of the International AM Qualification System and its quality assurance cycle, with advice and inputs from the International Additive Manufacturing Qualification Council (IAMQC). The Observatory team will also elaborate and apply the surveys needed to collect data from Education and Industry, based on the adopted forecast methodology. This is described in D4.1 'AM Observatory operational procedure and structure'.
- **International AM Qualification Councils -IAMQC:** Grouping of AM qualification entities that is responsible for the updates to & developments of the qualifications of the AM Qualification System. The IAMQC also has the role of nominating Qualification Working Groups to revise or create Professional Profiles or Qualifications based on the Industrial Council indications, and the feedback from those participating in the training, which will be collected through the questionnaire developed in D2.7. It will also be responsible for advising the Observatory team on the rules and procedures to promote the proper implementation of the European AM qualification/training system, thus being responsible for the administration of the IAMQS, including the AM ANBs (Authorised Nominated Body for AM) and AM ATBs (Authorised

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Training Bodies for AM). The participation in this Council will be made free of charge, however, it is possible that the appointment as (AM ANB) might have a fee associated with it.

- **International AM Industry Council - IAMIC:** comprises a group of AM industry representatives which ensure the developments and findings of the AM Qualification System are undertaken in total alignment with industrial needs. The IAMIC also has the role of nominating Industry Advisory Groups to collaborate with Qualification Working Groups during the validation of the industrial requirements, which will favour the updating of existing AM qualifications or development of new ones.
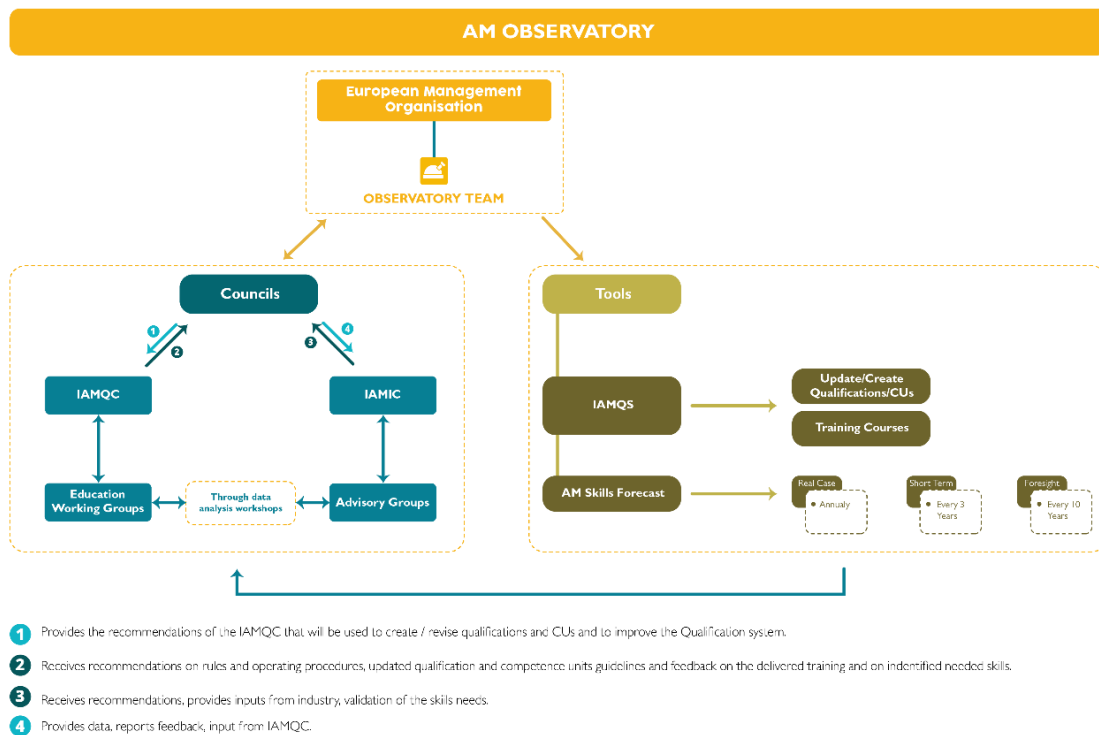

Figure 2: Observatory structure and tools

During the project lifetime, organizations or companies wishing to be part of the two Councils were recommended to become Associated Partners and actively contribute to the project development. The Qualification Council was divided by areas of expertise, having in consideration that, according to the results achieved so far in SAM project, the main "division" in AM Qualification is related to the type of AM Material used (I.e., metals and polymers).

The **Education Working Groups,** nominated by the IAMQC, were composed by these experts in order to allow a prompt review of the AM Qualifications, based on the AM needs analysis results provided by the AM Observatory Team.

The Industry Council, IAMIC, was composed of experts from industry and technology, namely end-users and machinery fabricators, to validate the results provided by the AM Observatory Team and provide a roadmap on technological trends. This Council nominates the Industry Advisory Group, which will work in close contact with the Education Working Group for the revision of AM Qualification Guidelines.

The activity and nomination of both the Education Working Group and the Industry Advisory Group will continue in the future strongly linked with the needs to create and /or revise AM Qualifications (i.e. Professional Profiles and/or Competence Units) based on data collection and validation of needs.

5.3.1   Sustainability of the AM Observatory

In terms of future exploitation, the tasks to be performed to keep the Observatory running and constantly updated with latest trends from AM are the following:

- • Regular Updates to the Information contained in the Observatory Platform. Namely, AM skills gaps and demands, AM future needs and technological trends, mapping of AM projects and AM initiatives.
- • Updates on new functionalities (list and description of AM training offers, available AM courses, job offers, "find your path" which is a suggestion of AM course based on users' interests) to the Observatory Platform.
- • Diffusion of the Observatory Platform throughout the AM Community.
- • Apply skills identification Methodologies.
- • Guarantee the usage of the Platform by Training Centers of the European Network.

To keep the sustainability of the AM Observatory platform components, partners have defined the mechanisms and tools to ensure the continuous update of the sections within the AM Observatory. Whereas the skills data update on the platform will be ensured through the delivery of the D4.5 Report on the Skills Analysis and Validation and through the availability of, automatic forms for users to submit their inputs regarding AM Training Offers, Jobs in AM as well as projects and initiatives in AM.

The Observatory Management Team will lead the exploitation a of the Observatory to ensure the sustainability of this pillar. Being the manager of the Observatory Platform, this body fulfils the range of criteria identified to regularly ensure the update of the platform, namely:

- • Management of Education Programs at the International level.
- • Experience in managing and implementing training and qualifications at the international level and in collaboration with a network of training centres.
- • Vast experience in training/education for Industry.
- • Experience in the development and updates of European Training Guidelines.
- • Recognized experience in application of skills identification Methodologies.
- • Knowledge in the Development and Management of Online Platforms.
- • Strong Connection with AM Networks.
- • Connection with Industry in all sectors addressed by AM.
- • Connection with Training Providers and Training Associations in AM and AM related fields
- • Strong Connection with European Commissions DGs (DG Education, DG Employment, DG RTD)
- • Connection with Research and Development organizations in the AM field, internationally
- • Connection with Standardization Bodies, more precisely ISO-ASTM Boards for AM Qualifications
- • Connection with Certification Bodies, internationally
- • Connection with Recruitment Agencies in AM, internationally
- • Connections with SMEs working or starting to work with AM internationally

With the project end, the IAMQC will continue inviting new members to the Council. However, external organizations can also ask to join the IAMIC. Moreover, the European AM Observatory Management team can suggest to the IAMIC new potential members.

The experts of the Working Groups, as well as the Members of the Industrial Advisory Group, are committed with a period of 2 to 3 years with the potential of extension by mutual agreement clearly stating rights and commitments as members of the Working Group. The Chairmen are appointed for a specific group and periodic rotativity is foreseen.

The selection of experts, that can apply directly through an open call in the platform, for the Educational Working Groups and Advisory Groups are based on specific quality criteria:

IAMQC   - Education Working Groups

• Age / experience within metal and polymers processes - although there is a bias towards established experts;
• Provenience of RTO, Education /Training Centers or Academia (Universities)
• Balance of industry, RTO and education providers
• Balance of geographical coverage, to ensure that the European dimension is presented
• Coverage of the full scope of WS (for Metal AM different processes and for Polymers)

IAMIC - Advisory Groups

• Age / experience within metal and polymers processes
• Profile of End-users Manufacturers and/or Technology providers – across a range of sectors and across the AM supply chain
• RTO with strong connection with industry
• Balance in the relation 1 to 1; although it could be possible to have more End-users and technology providers than RTOs

Either in the Qualification (IAMQC) or Industry (IAMIC) councils are responsible for nominating, respectively their working groups and advisory groups in line with industry requirements and specific activities.

The continuous involvement of people and experts will continue in a voluntary basis. A source of motivation to keep the Councils interests is linked with their recognition as experts and involvement in networking events (such as, AM skills events, AM platform or EWF General Assembly) and dedicated working sessions. The plan to keep the Working Groups activity entails the following:

• Proposal of 2 year terms mutual agreement, with possibility for extension;
• Formal review of qualifications is expected for 3 years, unless any adverts/trigger led to the anticipation
• Possible trigger for review and development aligned with the methodology to review and design qualifications defined in SAM (e.g. negative feedback/dissatisfaction about the course; new standards; new technological developments…)
• Enrolment of AM skills meeting

5.4 Forecast methodology

SAM forecast approach to track current and upcoming skills' gaps and shortages on AM is framed according to different scenarios:

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

The tools applied for this purpose vary according to the scenario and refer to surveys, interviews, literature review and explanatory methods (e.g., world cafe, brainstorming and analysis and validation workshops) This activity will be kept updated through the Observatory, as illustrated in the diagram below (see Figure 3).
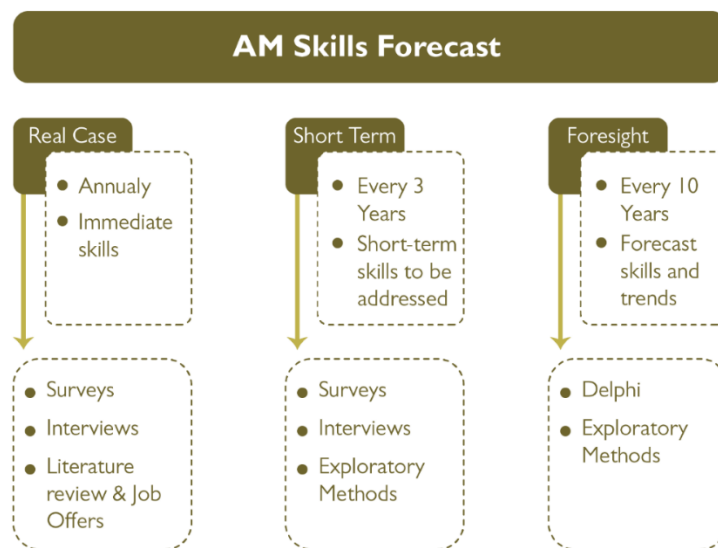
Figure 3: Skills Forecast Strategy

The tools developed within the Forecast Methodology for skills identification and anticipation addressed in WP2 will be used to feed the AM Observatory, enabling the collection, analysis, and publication of relevant data regarding skills gaps, shortages and trends related with the sector.

The kits that are contained in the Forecast methodology are the following:

- **Surveys and Interviews**: addressed to Training Centers, AM workers, and Industry, this kit provides questions to assess skills' gaps and shortages.
- **Real Case Scenario:** guidelines for the collection of Real Case Scenarios, meaning it addresses the skills needs to be deployed in less than 1 year.
- **Short Term Scenario**: guidelines for the collection of Short-Term Scenarios, meaning it addresses the skills needs to be deployed in 3 years.
- **Foresight Scenario:** collection of Foresight Scenarios, meaning it addresses the skills needs to be deployed in 10 years.
- **ESCO and EU Skills Intelligence**: guidelines and templates used for feeding the multilingual classification of European Skills, Competences, Qualifications and Occupations (ESCO) and the EU Skills Panorama.
- **Tracking of students:** This kit encompasses guidelines and templates for ensuring the tracking of AM students, future employees and job seekers in AM and their integration within AM labour market.
- **Collecting feedback**: This kit encompasses guidelines and templates for collecting AM students' feedback about the training / learning courses, which is aligned with the European Quality Assurance Reference Framework for VET (EQAVET).
- **Workshops and working sessions**: This kit encompasses guidelines and templates for organizing and delivering workshops held during the analysis and validation phases of industry needs concerning AM professionals' skills development, as well for the working sessions used for revising and creating new professional profiles, qualifications and ULOs if needed.

5.4.1 Sustainability of the Forecast Methodology

The IAMIC has the responsibility of identifying **new industrial requirements in terms of education and training**, and certification based on market data, and of establishing priorities for the development of new products according to different time frames. The IAMIC also has the role of nominating **Industry Advisory**

Groups to collaborate with the Qualification Working Groups for the **validation of industrial requirements**, which will ultimately favour the updating of existing AM qualifications or development of new ones (of which the AM Observatory will have information), thus allowing them to respond to these needs within periods of 1 year, 3 years and 10 years.

With SAM end, the kits will be used by the **Observatory Team** to perform the skills needs analysis in the future. To facilitate this, the management team and IAMIC have voluntarily agreed to sign a Collaboration Protocol with relevant organizations, granting them access to data on AM skills needs, such as the AM Platform network.

The Forecast Methodology will be employed to conduct surveys and interviews, as well as facilitate working sessions and workshops, aimed at analysing and validating skills needs and priorities. These activities will engage various stakeholders, including groups from education, industry, social actors, legislators, policy makers, and local, regional, national, and European authorities.

The performance of this sustainability pillar will be measured by the number of identified skills gaps in AM, an increase in the number of new qualifications and/or learning units, and the development of qualifications in two new areas, including non-metal materials or other industrial sectors.

5.5 Methodology for designing and revising professional profiles, qualifications and developing skills

The **Methodology for designing and revising professional profiles, qualifications and skills** is structured into three main steps, namely definition of creation and review processes for keeping profiles, qualifications, and Units of learning outcomes (ULO) up-to-date, creation and revision of the actual professional profiles, as well as outline the operational guideline on context and training tools.

Both methodologies for the forecast of skills need and designing and revising professional profiles/ qualifications and ULO are included in the International AM Qualification System and will be exploited after the project end by the Qualification Working Groups in its work of updating or creating Professional Profiles/Competence Units, if needed.

5.5.1 Sustainability of the methodology

The creation and review of professional skills are integral components of the activities conducted within the **AM Observatory**. The responsibility for developing the final methodology lies with the International AM Qualification Council, which is tasked with appointing Qualification Working Groups dedicated to revising or creating professional profiles and their corresponding qualifications. The decision to establish these groups is guided by a thorough analysis of the actual skills demand, carried out in close collaboration with the Industrial Advisory Group, which validates the results. This assessment occurs approximately every two years, as outlined in D5.2 (1st Stage Real Case Scenario) and its initial review phase.

Similarly, the IAMQC, overseeing this sustainability pillar, will voluntarily conduct working sessions to update and create new training guidelines for students, trainees, job seekers, and workers in need of upskilling. The success of this pillar will be measured by the number of revised or newly developed professional profiles, qualifications, and/or learning units in AM.

5.6 AM community Network

The AM Community Network represent the wide network of organisations "gathered" by SAM, including SAM partners, Associated partners, AM ANBs, AM ATBs, the IAMQC and the IAMIC, the AM Platform as well as AM students /graduated students coming from industry, education, and research organizations in AM. The AM Community Network primary goal is to enhance the outreach of the SAM project to stakeholders in the AM ecosystem. The network serves as a platform for effective dissemination of project outcomes through activities like events, knowledge exchange, and best practice sharing. It also promotes AM qualifications and training programs, expands the network, and fosters partnerships among diverse stakeholders in the European AM training system.

The AM Community Network plays a crucial role to effectively represent and advocate the shared interests of its members. The network strives to represent the interests of its members in all relevant European institutions and member states, in close consultation with the national representatives of each state. Furthermore, the AM Community Network operates on a non-profit basis, prioritizing its primary goal of fostering collaboration and knowledge exchange rather than engaging in economic or commercial transactions.

 To enable efficient communication and broaden engagement with stakeholders across diverse European countries, the network has adopted English as its primary working language. This intentional choice promotes inclusivity, facilitating effective communication and understanding among network members. It also grants the network the opportunity to gain extensive visibility and recognition on a broader scale. The official commencement of the network alliance is scheduled for [specific date], with coordination and facilitation entrusted to EWF. As the central coordinating entity, EWF plays a crucial role in fostering collaboration, synergy, and fruitful partnerships among the network's members.

It is crucial that the Committee's leadership is balanced and inclusive, comprising representatives from industrial, educational, and research organizations. The chairperson should be selected from a diverse pool of candidates, including SAM partners, Associated partners, AM ANBs, AM ATBs, the IAMQC and the IAMIC, the AM Platform as well as AM students and graduated students affiliated with industrial, educational, and research organizations in the field of Additive Manufacturing. This approach ensures a diverse and well-rounded leadership that can effectively guide the network, drawing on a range of perspectives and expertise.

By prioritizing a balanced representation from different sectors and involving both experienced professionals and aspiring individuals, the Committee can drive continuity and foster collaboration within the network. This diverse leadership ensures that the network remains dynamic, adaptable, and responsive to the evolving needs of the Additive Manufacturing ecosystem.

5.6.1 Sustainability of the AM Community Network

The responsibilities of the AM Community Network for the SAM Project will encompass several areas to facilitate effective communication and outreach to stakeholders across various European countries:

1. **Presenting Papers and Research Findings:** The community network takes proactive measures to identify relevant papers and research findings generated by the SAM project. It ensures the presentation of these outcomes at national and European events, conferences, and workshops. By actively disseminating these findings, the committee facilitates knowledge sharing, stimulates collaboration, and broadens the project's impact among a wider audience.

2. **Organizing Engaging Roundtables, Seminars, and Cluster Meetings:** The community network plays a crucial role in organizing dynamic and interactive roundtable discussions, seminars, and cluster meetings. These platforms serve as catalysts for bringing together project partners, promoters, policymakers, and stakeholders from various backgrounds. Through these engaging events, the committee fosters a collaborative environment that encourages fruitful exchanges of ideas, facilitates

the sharing of best practices, and establishes a strong foundation for the seamless integration of project results.

3. **Collaborating with Diverse European Groups**: The community network takes proactive steps to establish connections and collaborate with diverse European groups identified by all project partners. This collaborative approach expands the project's impact beyond its immediate participants, forging partnerships with a wide network of organizations and individuals. By leveraging these relationships, the network ensures the comprehensive integration of the project and enhances its long-term influence.

4. **Cultivating and Nurturing European Contacts:** The community network takes on the responsibility of cultivating and maintaining a comprehensive database of European contacts. These contacts serve as valuable connections for ongoing communication and potential future collaborations, ensuring the sustained integration of the project's outcomes even after its formal conclusion. The network actively nurtures these relationships, enabling continued knowledge transfer, cooperation, and collective growth.

IDONIAL will be the leader organization **exploiting** the AM Community Network **,** due to expertise of this organisation in managing the AM Platform. To maximize the impact of the AM Community Network, a series of events have been strategically planned to promote the achievements of SAM. These events will include **at least one annual** gathering dedicated to showcasing SAM's outcomes, including in the AM platform and/or the EWF General Assembly. Moreover, other relevant events for the AM community may be used for this purpose. Furthermore, we anticipate organizing a minimum of one online meeting to keep to community aware on the progress and extension of the exploitable outcomes, such as one in September 2023 and another in September 2024. These events and meetings will serve as important opportunities to engage with stakeholders, share progress, and ensure continued collaboration and dissemination of SAM's results.

5.7 Raise Awareness Campaign Materials

The Raise Awareness Materials (RAC), aims to enhance awareness among various groups, including existing workers, academic and vocational talents, pupils, and the general public, about the numerous benefits of Additive Manufacturing. The RAC materials encompass a diverse range of formats, such as translated posters, YouTube videos, podcasts, presentations, animations or videos, quizzes, Tech4Kids activities, and more.

The main accomplishments in terms of raising awareness regard the development of a Webinar series to respond to the pandemic restrictions which have gathered a wide audience of varied participants. Moreover, the added value consisted in involving different kinds of target groups in SAM activities through events in schools, fairs, venues, universities and accessible materials such as podcasts, newsletters, publications, YouTube videos.

5.7.1 Sustainability of the Raise Awareness Campaign Materials

All the promotional and raise awareness campaign materials will be available on the SAM website (https://www.skills4am.eu/) for the next five years, maintained by EWF, free of charge to allow the AM community to access it when organizing an activity aligned with the scope of the project in any EU country. Apart from, an English version of the materials that will always be available to ensure inclusivity and usability for anyone interested the translated versions in Portuguese, Spanish, Greek, Italian, French and German will also be accessible through the project website to reach out youngest.

Furthermore, these materials will be regularly updated as necessary, ensuring they remain aligned with the latest trends and advancements in the AM sector. In the same vein, active engagement and collaboration with schools will be fostered to deliver the Raise Awareness materials and Educational Kit,

with the aim of encouraging more schools to implement them into their curriculum and educational programs. By expanding the reach of these materials, the SAM project seeks to cultivate a wider understanding and appreciation of AM's sustainable benefits, inspiring individuals from various backgrounds to explore and embrace this innovative technology.

The campaign materials targeting children, students, professionals, and teachers require updating or designing new ones in line with the latest trends and advancements in the AM sector. **MTC will be responsible for updating** the English version of the existing RAC materials (posters, podcasts, presentations) and ensuring their easy accessibility at no cost.

The performance indicator for this aspect will involve the development and/or updating of a minimum of two new Raise Awareness Campaign tools. This effort aims to sustain the visibility of the SAM initiative and attract new participants.

6. Conclusion

During the initial three years of the SAM project, the consortium successfully identified seven exploitable outcomes which are crucial for ensuring the project's long-term success. As the project approaches its conclusion, it has become evident that the sustainability of two key elements, namely the AM Observatory platform and the International AM Qualification System, along with the Sector Skill Strategy Roadmap, Forecast Methodology, Methodology for revising Professional profiles, Qualifications, and Skills, Raise Awareness Tools, and the AM community Network Mainstream Steering Committee, are pivotal for maintaining the project's achievements.

Significant progress has already been made regarding the structure and operational procedures of these elements. The appointment of the managing organization responsible for overseeing all activities has been finalized, and a European AM Community network of stakeholders has been established. Also, with the end of the project, partners have invested on empowering experts and associated partners to operate independently within the platform. Additionally, IAMQC meetings and platform development, already were conducted autonomously, independent of direct project support.

Overall, the project consortium recognizes the project achievements and legacy, thus being committed to secure their long-term continuation to ensure the lasting impact of the SAM project.

7. Actions

The table below summarizes the tangible actions and operations details supporting the exploitation and future sustainability of SAM results.

Exploitation Pillars	Exploitation Activities	Exploitation leader	Business and Sustainability Model	Stakeholders/ Target	Performance Indicator	Timeline
IAMQS	• Update of the AM skills strategy in accordance to the needs of the sector. • Report existing and new Qualifications/Competence Units developed under the system to Skills Intelligence and ESCO portal. • Manage the compliance of organizations with Quality Assurance System. • Accreditation of Training Centers by scope the organsiation is capable to deliver training (e.g. AM Operators, AM Designer, CU 00, CU 36). • Undertake Audit procedures to Training Centers within the System every 5 years with a surveillance audit after 2/3 years. • Manage International Training Guidelines. • Award Diplomas recognized by Industry. • Delivery of training.	EWF	Payment of fee per issued diploma; Audits to ATBs; Delivery of training based on a "pay-per-use" approach to ensure the uptake.	Industrial associations, Training Centres in AM, VET and HE: Research Organisations with training activities	70% of the awarded diplomas in AM in Europe are given by the system. Size of the AM training network (number AM ATBs 100.000 Diplomas and Record of Achievements issued until 2050	2019 Onwards
Sector Skill Strategy Roadmap	**30 recommendations were identified by SAM Sector Skills Strategy Roadmap** linked to each strategic objectives: (1) Strengthen the collaboration between industry and training organisations (2) Tackle the lack of AM Personnel at European level (3) Prepare European, National and Regional organizations to provide relevant AM training for different educational levels (4) Tackle the diversity of sectors and applications of AM (5) Constant update of the AM European workforce (6) Prepare the AM	EWF	Combined IAMQS and AM Observatory	Target groups from education, industry, social actors, legislators, Policy Makers, local, regional, national and	Guarantee the Qualification of 100.000 AM workers by 2050, including upskilling/reskilling of the existing workforce Design, review and roll out of AM Skills	2021 onwards

Exploitation Pillars	Exploitation Activities	Exploitation leader	Business and Sustainability Model	Stakeholders/ Target	Performance Indicator	Timeline
	future workforce (7) Leverage on existing funding programs and mechanisms. See detailed list available in - link			European Authorities	Development of 50 up to date skills in AM in 2025 Increase by 25% the network of training centres and infrastructure	
AM Observatory	• Regular updates to the information contained in the Observatory Platform (e.g. AM skills gaps and demands, AM future needs and technological trends, mapping of AM projects and AM initiatives) • Display AM training offers, and job offers • Diffusion of the Observatory Platform throughout the AM Community. • Implement the forecast methodology. • Develop reports with major findings from the auscultation for the different scenarios	Observatory Management Team	Executive reports free of access	Each of the target groups identified	% of EU countries Involved % of Contributors Number of users Annual report on AM skills shortages and demands.	2020 onwards
Forecast Methodology	• Update the surveys and interviews. • Develop working sessions /workshops to analyze and validate skills needs and priorities	Observatory Management Team Protocol collaboration with relevant organizations to have access to AM skills needs data (e.g. AM Platform network)	Voluntary basis	Target groups from education, industry, social actors, legislators, Policy Makers, local, regional, national and European Authorities	Number of skills gaps identified in AM Increased number of new qualifications and/or learning units Qualifications in 2 new areas of development (being in non--metal materials or other industrial sectors)	2020 onwards

Exploitation Pillars	Exploitation Activities	Exploitation leader	Business and Sustainability Model	Stakeholders/ Target	Performance Indicator	Timeline
Methodology to revise Professional profiles, Qualifications and Skills	• Undertake working sessions to update and create new training Guidelines	IAMQC	Voluntary basis	Students, Trainees, Job seekers, Workers with upskilling necessities	Number of revised or new Professional Profiles, Qualifications and /or learning units	2020 onwards
Raise Awareness Tools	• Update and/or create new tools for raising awareness among Children, Students Professionals and Teachers	MTC will ensure the update of English version of existing RAC materials (Posters, Podcast, presentations)	Open Access – free use/	Wide public, policy makers, STEM students, children	At least 2 new RAC tools developed /updated	2019 onwards
"AM community Network" Mainstream Steering Committee,	• Organize events, Roundtables, Seminars, and Cluster Meetings • Mapping of articles, papers • ensure that the valuable outcomes produced by the project are well disseminated through events (Dissemination of AM qualifications/suitable papers through events/workshops) • Collaborating with Diverse European Groups • Cultivating and Nurturing European Contacts:	IDONIAL	Voluntary basis Events Registration Fee	SAM partners Associated partners AM ANBs AM ATBs AM students /graduated students	At least 1 annual event organized to promote SAM results and IAMQS progression (e.g. AM platform; EWF GA) At least one online meeting for preparation Number of organizations involved in the IAMQC and IAMIC	2022 onwards

8. References

The deliverable has been outlined based on partners' inputs and other project deliverables.