



European Design Technicians League

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Integration of European Qualifications in National Qualifications Frameworks/Systems

Practical Guide

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Introduction

DESTINE is an Erasmus Plus project that identifies a new qualification in the European landscape - The European Metal AM Design Technician (EMAM-DT). The project aims to promote Vocational Education and Training (VET) excellence in the Additive Manufacturing (AM) sector by introducing young people to multi-skilled technology careers in industry.

DESTINE results are fully aligned with the New Skills Agenda¹, by preparing a new curriculum for European Metal AM Design Technician (EMAM-DT) qualification standards, designed to face the lack of qualification in the field of metal additive manufacturing, in particular in designing AM parts. The concept behind DESTINE project is the need to attract young people to the AM field by creating a new qualification, designed in line with European Qualifications Framework (EQF) level 4 (corresponding to the Independent proficiency level from the EWF Qualification Framework): the European Metal AM Design Technician.

This qualification is designed using the International Additive Manufacturing Qualification System (IAMQS) modular approach. This approach allows the progression between qualifications, which is possible due to the fact that there are common Competence Units (CUs) and common topics addressed by some CUs among the EMAM-DT qualification standard and the Metal AM Designer for Directed Energy Deposition (DED) and Metal AM Designer for Powder Bed Fusion (PBF) Qualifications. The DESTINE project, in addition to creating a new qualification, aligned with the European qualifications and recognition systems, introduced a distinctive element: The National and the European Skills Leagues, in line with the recognized WorldSkills.

This guide is aimed at policy makers, VET providers, Higher Education Institutions or other bodies whose intention is to integrate the qualification presented here into the respective national qualifications system. In this sense, we indicate a set of recommendations, each one with its lessons learned and the actions to be taken. In order to ensure the national roll out of the EMAM – DT Qualification and promote the formal recognition of this qualification within the VET National Systems in the partners countries, DESTINE project proposes a set of recommendations, encompassing the required alignment steps, tools and players involved.

¹ <https://ec.europa.eu/social/main.jsp?catId=1223>



Chapter 1 Background

1.1. Introduction to Additive Manufacturing

Additive Manufacturing (AM) is the term used to describe technologies for creating 3D objects, using a computer, 3D modelling software (Computer Aided Design or CAD), and by depositing material layer by layer, be it solid material (e.g., metal, plastic, concrete), liquid, powder or possibly some other materials. This is a process of joining materials to make parts from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing technologies.

Initially seen as a process for concept modelling and rapid prototyping, AM has expanded over the last years to include applications in many areas of our lives. From prototyping and tooling to direct part manufacturing in industrial sectors such as architectural, medical, dental, aerospace, automotive, furniture and jewellery, new and innovative applications are constantly being developed. The number of users of these technologies has been growing constantly, from artists, designers and individuals to large companies and enterprises using AM to manufacture a wide range of final products.

There are seven main additive manufacturing technologies: Vat photopolymerization, Material Extrusion, Material Jetting, Binder Jetting, Powder Bed Fusion, Directed Energy Deposition, and Sheet lamination. In industrial additive manufacturing, the materials are carefully selected for each type of manufacturing process. These materials have their own set of advantages and disadvantages. Some of the most common materials are Nylon or Polyamide, Photopolymer Resin, Titanium, Stainless Steel.

Typical applications for metal AM processes are summarised in the table below. Currently, metal AM is not a process suitable for the mass production of millions of identical simple parts. However, as systems and technologies advance and processing time is reduced, the use of AM for producing large quantities of parts will become a viable option.

Typical applications for metal Additive Manufacturing:

- Production of models and prototypes during a product's development phase
- Parts for pilot series production in medical, automotive and aerospace industry
- Short series production where tooling costs for casting or injection moulding would be too high
- Parts of high geometrical complexity which cannot be produced by means of conventional manufacturing (moulding, grinding, milling, casting, etc.)

Table 1 - Typical applications for metal AM processes

The advantages of AM result from its high flexibility due to the product being produced directly from a CAD model without the need for tooling. This also allows the AM process to produce almost any geometry that can be designed.



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There are some applications, for example dental restorations, that really tap the full potential of AM. In this highly individualised production process, it is economically viable to use AM technologies, speeding up the production time without inflating the costs per part.

Applications in aerospace, for example the fuel nozzles for the GE LEAP engine, highlight the possibilities of AM in this demanding sector. Additive Manufacturing allowed engineers to design a fuel nozzle which is 25% lighter and five times more durable than the previous part.

Additive Manufacturing complements the vast group of production processes, allowing designers and engineers to improve existing process chains, as well as offering new opportunities for production.

1.2. European Metal Additive Manufacturing – Design Technician: The Qualification

This qualification is created based on the International Additive Manufacturing Qualification System (IAMQS), using a modular structure composed by Competence Units structured in units for 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, resulting in the same qualification being awarded independently from the country.

DESTINE is focused on presenting a new qualification that allows industry and companies, all over Europe, to overcome a lack of design technicians for metal AM technology. This qualification has the purpose of being integrated in IAMQS, after a validation by the International AM Qualification Council.

The design of this qualification provides a clear definition of the professional profile as well as access conditions:

Professional Profile	This professional is someone who executes designs of Metal AM parts for Direct Energy Deposition (DED) and/or Powder Bed Fusion (PBF) Processes, develops solutions on basic and specific problems related to design of DED and/or PBF parts and contributes to projects in a teaming environment.
Access Conditions	Skills in using 3D CAD tools and EQF level 2 in technical areas, or VET diploma in technical areas, or Comparable professional experience of at least 2 years.

Table 2: Professional Profile and Access Conditions

The qualification standard for EMAM – DT is comprised of two general Competence Units (CUs) and two specific CUs (one for DED and other for PBF process):



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COMPETENCE UNITS		
	Recommended Contact Hours*	Expected Workload**
CU 00: Additive Manufacturing Processes Overview	3.5	7
CU: Designing Metal AM Parts	18	36
CU: Design for DED processes***	14	28
CU: Design for PBF processes***	7	14
TOTAL	42.5****	85**

Table 3 – EMAM – DT Competences Units overview

* Contact Hours are the minimum recommended teaching hours for the Standard Routes. One contact hour shall contain at least 50 minutes of direct teaching time.

** Workload is calculated in hours, corresponds to an estimation of the time students typically need to complete all learning activities required to achieve the defined learning outcomes in formal learning environments plus the necessary time for individual study (outside classroom context).

***It is mandatory that at least one of the Design for Processes CU is selected.

****Total hours depending on the selection of one or the two Design for Processes CUs. If only CU Design for PBF processes is selected, total hours will be 28.5; If only CU Design for DED processes is selected, total hours will be 35.5.

This progression is possible due to the fact that there are common Competence Units (CUs) and common topics addressed by some CUs among the EMAM-DT qualification standard and the Metal AM Designer for DED and Metal AM Designer for PBF Qualifications (Figure 1).

The IAMQS Qualifications imply the revision of EMAM-DT qualifications, which will then have two levels of complexity: one for EQF level 4 (addressed by the EMAMT-DT) and the other for the EQF levels.

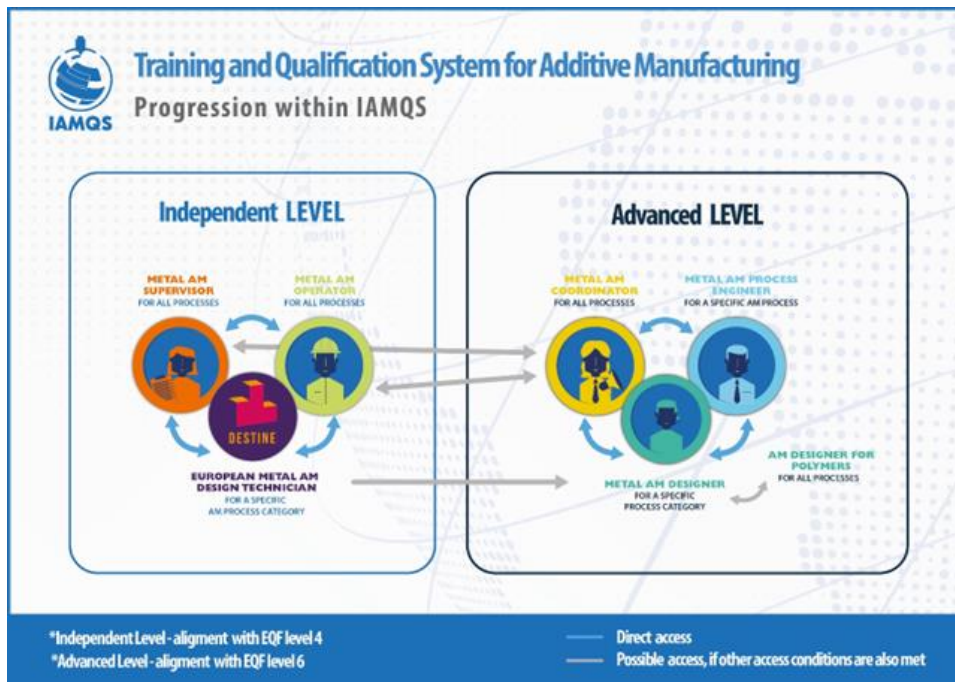


Figure 1 - The EMAM-DT within IAMQS: Progression from the EMAM-DT Qualification standard (Independent Level) to Metal AM Designer (Advanced Level)



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Chapter 2 Overview of National Qualifications Framework Developments in DESTINE Countries

2.1 State of art in each partners country

The aim of this chapter is to give an overview of the different approaches to the National Qualifications Agencies, in each partners country – Spain, Germany, Portugal, Italy - as well as the different realities in the structure of Educational and Qualification sector.

The state-of-the-art report was based on interviews made by partners to National Agencies, Sectoral Organizations, as well as a result of reflections and mapping of official information in educational institutions. This research revealed the following findings:

Spain

Regarding the development and implementation of National Qualification Framework (NQF), Spain is in the stage of negotiating objectives and designing the architecture of the framework. It involves the negotiation and design of governance structures, directly influencing the selection of stakeholders and the way these are to be involved. A critical part of this stage is the elaboration of learning-outcome-based level descriptors. While normally influenced by existing approaches, most NQFs adapt descriptors to national contexts and needs. This elaboration influences the NQF in two important ways: vertically by defining the number of levels and the relationship between these; horizontally by defining the relationship between the key domains of knowledge, skills and competence. The design stage, for the first time, brings the stakeholders involved together in a systematic way; triggering dialogue and potentially paving the way for longer term commitment.

In Spain there are 2 different National Qualification Frameworks: MECU and MECES.

MECU (Marco Español de Cualificaciones) is a national framework of qualifications (degrees, diplomas, certificates) that encompasses lifelong learning.

It is a structure of organization of qualifications by levels that ranges from the most basic learning to the most complex. It is based on learning outcomes and aims to link and coordinate different education and training subsystems. It has eight levels defined in terms of knowledge, skills and competence. The framework includes qualifications obtained in compulsory education, in post-secondary and in higher education, including non-formal and informal learning. One of the main objectives of the Spanish qualifications framework for lifelong learning is to make Spanish qualifications easier to understand by describing them in terms of learning outcomes; it also clarifies relations between them. MECU aims to support lifelong learning, and improve access and participation for everyone, including the disadvantaged.

It is important to understand that in Spain, formal vocational qualifications are regulated by the Ministry of Education and professional qualifications/certificates are regulated by Ministry of Labour. They are different in scope of learning they require but can be linked to the same level of the catalogue.

MECES (Marco Español de Cualificación para la Educación Superior) is the Spanish Qualifications Framework for Higher Education. This Spanish framework aims promoting the mobility of higher education in Europe.



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The scope of application of MECES is made up of official qualifications from university education, higher artistic education, advanced vocational training, professional teaching of plastic arts and higher-level design and higher-level sports education, as well as those other titles that have been declared equivalent.

MECES is structured in four levels with the following denomination for each of them:

- Level 1: Higher VET.
- Level 2: Degree.
- Level 3: Master.
- Level 4: Doctor.

The four levels of the Spanish Qualifications Framework for Higher Education correspond to the following levels of the European Qualifications Framework:

- Level 1 (Higher VET) of the Spanish Qualifications Framework for Higher Education corresponds to level 5 of the European Qualifications Framework.
- Level 2 (Grade) of the Spanish Qualifications Framework for Higher Education corresponds to level 6 of the European Qualifications Framework.
- Level 3 (Master) of the Spanish Qualifications Framework for Higher Education corresponds to level 7 of the European Qualifications Framework.
- Level 4 (Doctor) of the Spanish Qualifications Framework for Higher Education corresponds to level 8 of the European Qualifications Framework.

In following table, it is summarized the correspondence between Spanish Qualification Frameworks and the European Qualifications Framework.

EQF	MECU	MECES
8	8	4
7	7	3
6	6	2
5	5	1
4	4	
3	3	
2	2	
1	1	

As explained previously, there is a relationship between Spanish qualifications and the EQF. For years, attempts have been made to implement the system of EQF levels within the national qualifications framework in Spain. However, the education system, which is not entirely centralized in Spain due to the



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existence of autonomies, does not take this relationship into account in practice since in each Spanish Autonomous Community a series of freedoms are granted and among them is the level of education.

Italy

The complexity of the Italian system of General Education (GE), Vocational Education and Training (VET) and Higher Education (HE) is a challenge, especially VET provisions whose competency is shared among the Ministry of Education and local authorities (Regions and Autonomous Provinces).

The national legal framework is also very articulated and complex, providing a higher level of difficulty to the entire process.

Another factor of difficulties relies in all stakeholders (Ministries, Regions, labour market agencies, research institutes) involved in the process with different objectives.

Such complexity requires a holistic approach to analyse and understand the way competent bodies interoperate, work overtime and function within the context of a larger, evolving system. This becomes essentially a system made up of several interwoven and interconnected systems, representing the diversity of national and regional approaches. This diversity leads to emergent challenges in sharing models and common understandings, but it is also a source for pilot actions and innovations.

Designed as a comprehensive framework; it includes all levels and types of qualification from formal education and training and regional qualifications.

According to the CEDEFOP², the scope of the framework is settled as a comprehensive framework and it includes all levels and types of qualifications, from formal education and training and regional qualifications.

Italy is in the Activation Stage of development, which is characterised by the consolidation of governance and the concrete building up of administrative and technical capacity and expertise.

During this stage, there are a gradual but distinct shift from an internal focus (on the design and adoption of the framework) to an external focus where end users of different categories are addressed. During this stage the practical interaction of the NQF with the existing qualification system(s) and qualifications is determined.

Some of the stage indicators are the NQF; it's a reference point for the use of learning outcomes and for the continuous revision and renewal of qualifications and is gradually playing a role in improving transparency and comparability of qualifications at national and international level.

Also, there is probably a need for a high demand at the industrial level of the professional figure in question, in order for a dedicated qualification to be introduced.

² <https://www.cedefop.europa.eu/en/publications/8611>



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Germany

In the German governmental vocational training system, additive manufacturing is mentioned, but no specific content has been defined yet. It is not possible to incorporate individual guidelines because Germany has a comprehensive vocational training system (3.5 years) that is not modular in itself. The framework guidelines apply throughout Germany. Changes to or realignments of the comprehensive vocational training framework guidelines, are only possible if a corresponding need for this has been identified on a nationwide basis. The legal basis then requires the elaboration and approval of corresponding representatives from employers, employees and teachers.

The challenge is evident, among other things, because there are currently still too few companies that manufacture additively and show a need for qualified skilled workers. Thus, no basis has yet been created throughout Germany to justify and enable changes in a completed technical vocational training program.

Therefore, there is not yet a sufficient basis in Germany to change the contents of the Vocational Training Act. In Germany, a distinction is made between private continuing education and state-recognized continuing education. In the case of state-recognized continuing education courses, which are generally offered, conducted and certified by the Chamber of Industry and Commerce or the Chambers of Crafts, a minimum number of hours is required in addition to the content.

This currently still low demand for further training could be covered in the short term by private training providers, such as welding technology institutes (SLV), possibly university institutes or VET providers.

Changing the occupational profiles is only possible by amending the vocational training regulations. The Vocational Training Act stipulates that only occupations described in a training regulation can be recognised training occupations. Young people under the age of 18 may not be trained in occupations other than recognised training occupations, unless the vocational training prepares them for attendance of further education courses. The tendency in Germany is to integrate new subjects into existing training occupations through additional qualifications, when training regulations are amended. In the last amendment to the Ordinance amending the Ordinance on Vocational Training in the Industrial Metal Occupations

Therefore, integrating an additional qualification "additive manufacturing", which is, however, only taught on a voluntary basis if the trainee agrees this with his or her training company. At the trainee's request, he or she is also examined in the additional qualification.

According to CEDEFOP, Germany is now in the Operational stage, or the stage of full implementation, which means that NQF is a permanent and visible feature of the national education, training, and qualifications system, improving transparency and comparability of qualifications by providing a map of, and reference to, all nationally recognised qualifications. Also indicates NQF levels on certificates and diplomas as well as Europass supplements and supports cross-border mobility of students and workers, among others.

Portugal



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Since 2011, Portugal has its NQF aligned with EQF. Comprehensive NQF including all levels and types of qualifications, from formal education and training and from the national system for the recognition, validation and certification of competences is implemented in Portugal.

Portugal is in the operational stage meaning the stage of full implementation/development of national qualification framework. The NQF is a permanent and visible feature of the national education, training and qualifications system. Improving transparency and comparability of qualifications is a goal.

Currently, the national Catalogue for professional training is being revised, but AM /3D printing for metal is an emerging tendency in the country, therefore some CUs or a full range could also be integrated in the National Catalogue, if a new area/subarea per sector is created into the catalogue.



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Overview of National Qualifications Framework Developments in DESTINE countries

Country	Scope of the framework	Number of levels	Level descriptors	Legal basis/stage of development	NQF linked to EQF
Portugal	Comprehensive NQF including all levels and types of qualification from formal education and training and from the national system for the recognition, validation and certification of competences.	Eight	knowledge skills attitudes	Ministerial order on the NQF (2009) Operational	2011
Spain	Designed as a comprehensive NQF for lifelong learning; will include all levels and types of qualifications from formal education and training.	Eight proposed	knowledge skills and abilities competence	Royal Decree 1027 (2011) establishing the Spanish qualifications framework for higher education (MECES): levels 5-8 Advanced design stage of NQF for LLL (MECU)	N/A
Germany	Comprehensive NQF for lifelong learning; includes qualifications from general education, VET (initial VET and regulated further training), and from higher education.	Eight	professional competence (knowledge and skills); personal competence (social competence and autonomy)	Joint resolution of the Standing Conference of the Ministers for Education and Cultural Affairs, the Federal Ministry of Education and Research, the Standing Conference of the Ministers of Economic Affairs and the Federal Ministry for Economic Affairs and Technology (2013) Operational	2012
Italy	Designed as a comprehensive framework; it will include all levels and types of qualification from formal education and training and regional qualifications.	Eight	knowledge skills autonomy and responsibility	Interministerial decree of the Ministry of Labour and Social Policies and of the Ministry of Education, University and Research on the establishment of the NQF (2018) Activation stage	2013 major national qualifications from formal education and training linked directly to EQF

Table 4: Overview of National Qualifications Framework Developments in DESTINE Countries – CEDEFOP

Source: Adapted from <https://www.cedefop.europa.eu/en/publications/8611>



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Chapter 3 Integration of EMAM – DT in NQF/Systems - Recommendations

This chapter gather a set of Recommendations, Lessons learned and Future Actions to help in the integration of an international qualification in National Qualifications Framework or systems, based on DESTINE experience and developed work.

It starts with an overarching recommendation, and is developed in three *steps* or recommendations, as follows:

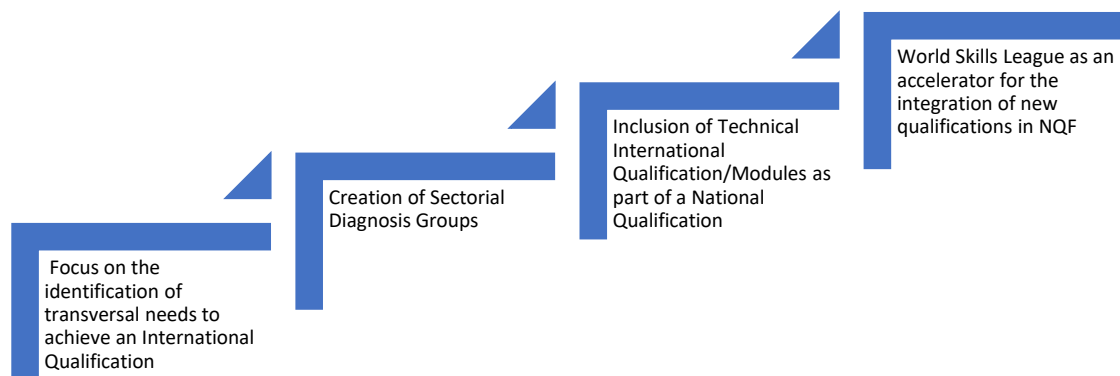


Figure 2 – Recommendations Overview

Overarching Recommendation – Focus on the identification of transversal needs to achieve an International Qualification

The identification of international transversal needs in industry and labour market is the answer to the challenge of keeping VET programmes and qualifications updated and avoiding deliver outdated skills and competences. The closed link between players, meaning the strengthen collaboration between industry and training organizations, will allow a more comprehensive result, in terms of quality and applicability.

Lesson Learned

DESTINE project shows us how to conduct the process to have a qualification that is aligned with the industrial macro needs, in an international level.

The first task is to consult and map out the needs in industry stakeholders, in different countries.

This map out will allow the identification of the specific common needs and provide consistent clues for the main subjects to include in the curriculum, in a harmonized way.



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Future Actions

The clear identification of needs and subjects to be performed is crucial, but it will be valued if these needs are mapped out in a specific local, regional, and national context, complementing what is defined in the curriculum.

The modular structure will allow the easy inclusion of these topics in an agile way, at the same time, that allows a much more individual approach, meaning that each local, regional or national needs are settled and included.

Recommendation 1 – Creation of Sectorial Diagnosis Groups

The alignment of the European Metal AM- Design Technician (EMAM – DT) Qualification and Competence Units with EQF / NQF enables the integration of this qualification in each country framework. The competence units of this new qualification are structured in Learning Outcomes - on what a learner is expected to know, be able to do and understand – which provides us with a much more direct insight into national content priorities and intentions.

At the same time, one of the challenges for policy makers and stakeholders in Vocational, Educational and Training segment is, on one hand, how to keep up the current speed of technological, economic and societal changes, and, on the other, how to identify future needs regarding skills developments.

The development of sectorial groups made of policy makers, VET providers, experts, industry stakeholders, among others, allow the definition of a diagnosis, identifying the needs and the opportunities for all the players. These sectorial groups can be identified at a European level or at a national level. These groups provide inputs and validate the skills needed and technological trends in industry.

By working in collaborative with education groups during the validation of industrial requirements will provide the updating and development of new qualifications in close connection to labour market and industry.

Lesson Learned

With the International AM Qualification System (IAMQS)³ we learned how this qualification system addresses the specific industry needs and involves trainers from industry and case studies based on real industrial issues. The modular approach of this system allows a link on emerging front-end technologies and the periodical revisions of qualifications and competences units by experts working groups⁴ add value and recognition.

³ <https://www.ewf.be/qualification/iamqs.aspx>

⁴ <https://www.skills4am.eu/callforexperts.html>



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Also, the Portuguese National Agency for Qualification⁵ is defined here as a model, with the qualifications compiled in a National Catalogue. The qualifications are reviewed occasionally, by the sectorial groups. Among its objectives are the production of qualifications and competences that are critical for the competitiveness and modernization of the economy and for the personal and social development of people and the development of a readable and flexible qualifications framework that favours the comparability of qualifications at national level. and international.

In Germany there is a similar system to the Portuguese with a national framework of available and recognised professional trainings. A training frame workplan as a component of a training regulation introduces a recognised training occupation. A training regulation specifies the vocational skills, knowledge and abilities which are at least the subject of the vocational training (training occupation profile). The review of the training frameworks is regularly done by the working groups – Chamber of Commerce and Chamber of Crafts – that collect the needs of changes in the professional profile from the member companies.

With the IAMQS, the bases for the structure of training in AM was set up, and with the rising demand from industry, the European Metal AM Design Technician profile could be a starting point to introduce AM qualifications into national frameworks.

Future Actions

The future action in this recommendation is based on the promotion of initiatives on local, regional and national level, that feed and map out the most important needs from industry and that keep involved the most relevant stakeholders, allowing a curriculum as much closed to the reality as possible, and on time.

Recommendation 2 - Inclusion of Technical International Qualification/Modules as part of a National Qualifications

International Qualifications are recognised by the industry as an added value for their employees, either during recruitment stages or as part of professional development and career management policies.

Nevertheless, the principle of “think globally, act locally” is being more and more implemented worldwide, therefore, it’s important that national qualifications consider not only national needs, but also provide the development of skills to work in a global environment.

Considering each of the national specificities, we can find different status for the implementation of new qualifications in the national framework:

⁵ <https://catalogo.anqep.gov.pt/>



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- Emerging qualification that may give rise to a new area/qualification
- Existing qualification that can be valued with the EMAM- DT qualification

Lesson Learned

Using the example of the Portuguese case there are a few existing national qualifications where the EMAM-DT could be integrated, and become part of the curricula of these qualifications, namely: CAD/CAM Technician / Technician Design of Molds and Models – Casting / Mechanical Construction Design Technician / Metallurgy and Metalworking Industrial Planning.

The EMAM-DT qualification will value the existing curriculum offer. VET providers can select the Competence Units from a National qualifications catalogue. The Portuguese system have competence units, in the technological training component, that the system foresees mandatory and others that are optional.

VET providers can select from a group of available competence units, the inclusion of the EMAM-DT competences units in these options is one of the focuses of DESTINE project.

In the table below there is a summary of formal national qualifications where the EMAM – DT competences units can be integrated:

National Qualifications Portugal	National Qualifications Spain	National Qualifications Germany	National Qualifications Italy
CAD/CAM Technician	Technician in Forming by Moulding of Metals and Polymers	Technical product designer specializing in machine and plant construction	Mechanical designer
Technician Design of Molds and Models – Casting	Machining Technician	Technical product designer specializing in product design and construction	
Mechanical Construction Design Technician	Higher Technician in Design in Mechanical Manufacturing		
Metallurgy and Metalworking Industrial Planning	Specialization Course in Additive Manufacturing		

Table 5: Possible Integration of EMAM DT Qualification and Competence Units within and National Qualifications in Partnership Countries



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Future Actions

Education and Qualification development and implementation is a challenge for each country members of European Union, when the aim is to harmonize qualifications and enable workers to see recognised their skills and knowledge regardless of the region, or to give confidence to industry when hiring.

The alignment between National Qualifications Framework (NQF) and the European Qualifications Framework (EQF) is the trigger point, it provides harmonization, transparency and comparability of qualifications add quality and reliability, in national and international context.

Recommendation 3 – World Skills League as an accelerator for the integration of new qualifications in NQF

The WorldSkills Occupational Standards reflect the global occupations or work roles that are represented by the WorldSkills Competition.

This world competition intends to cover the specialist, technical and generic skills that comprise intermediate work roles across the world and indicates the relative importance of each section of the standards, as advised by industry and business. Also, the competition is monitored by technical and vocational WorldSkills Experts and have an updated with industry and business worldwide.

In a nutshell, the WorldSkills Competition establish the baseline from which to grow and reward authentic vocational performance for WorldSkills Members and more widely they provide a benchmark for national and regional standards as economies and markets become increasingly international.

Lesson Learned

One of the pillars of DESTINE project is to provide excellence in the AM sector by developing a competition to provide visibility and motivation for this qualification while introducing AM technologies in skills competition: The National and the European Skills Leagues. The DESTINE competition was designed in the same way as the world competition: WorldSkills. The result is present in the in the video of testimonies made by the 2nd European Skills League⁶, by the end of the project. The main remarks were on the visibility that this experience add to their personal curriculum, as well as the applicability of the case study itself.

Future Actions

EMAM-DT can be included in the Cluster/ Activity Area of Manufacturing and Engineering Technology in WorldSkills. Alongside with the World Skills, also in Portugal this cluster/activity will be performed as demonstration in the national competition WorldSkills Portugal.

⁶ <https://www.youtube.com/watch?v=MEs4PXMy3uY>



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DESTINE National and European Skills League performed a true example of applicability as a new proposal, and as a good practice, this qualification can accelerate the implementation of this new qualification in National Qualifications Framework.

The EMAM-DT is aligned with the WorldSkills Occupational Standards (WSOS) and this fact will increase the argumentation for the integration of the EMAM-DT qualification in NQF. Also, there are a range of qualifications that already exist in WorldSkills (table 6).

WorldSkills Occupational Standards (WSOS)	National Qualifications Portugal	National Qualifications Spain	National Qualifications Germany	National Qualifications Italy
Manufacturing and Engineering Technology	Refrigeration, Fashion technology, Mechatronics, Cooking, CAD/CAM, CNC milling, welding, carpentry, electricity, hairdresser, beautician, goldsmithery, restaurant ⁷	Mechatronics, CAD Mechanical Design, CNC Milling, Welding, Body Repair, Plumbing and Heating, Electronics, Web Development, Electrical Installations, Industrial Control, Joinery, Carpentry, Floristry, Hairdressing, Aesthetics, Fashion Technology, Automotive Technology,	Polymechanics and Automation, Mechatronics, CNC Turning, CNC Milling, Architectural Stonemasonry, IT Software Solutions for business, Print Media Technology, Wall and Floor Tiling, Plumbing and Heating, Electronics, Carpentry, Concrete Construction Work.	Tilers, Florists, Hotel Receptionists, Carpenters, Mechatronics, Landscape Gardeners, Painters and Varnishers, Bricklayers, Multimedia designers, Beauticians

⁷ Portugal is one of the founders of WorldSkills. It may participate in all areas, from which we highlight the ones from this year (2022 special edition).



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		Cookery, Restaurant and Bar Service, Automotive Painting, Landscape Gardening, Refrigeration and Air Conditioning, ICT Network Systems Administration, Social and Health Care, Bakery, 3D Animation and Games.		
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Table 6: WorldSkills Qualification Standards in Partnership Countries



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Useful Links

DESTINE Project webpage

<https://www.destineproject.eu/>

DESTINE Project Video

<https://www.youtube.com/watch?v=Da9iPEILsyM>

DESTINE Skills League - Testimonies video

[2nd European Skills League - Testimonies video](#)

WorldSkills

<https://worldskills.org/>

Portuguese National Qualifications Catalogue

<https://catalogo.anqep.gov.pt/>

WorldSkills Portugal - Worldskills Portugal

<https://worldskillsportugal.iefp.pt/>

Italian National Institute for Public Policy Analysis

<https://inapp.org/>

Atlante del lavoro e delle qualificazioni - Italy

<https://atlantelavoro.inapp.org/index.php>

Berufsbildungsgesetz - Germany

https://www.gesetze-im-internet.de/bbig_2005/index.html

https://www.bibb.de/dienst/berufesuche/de/index_berufesuche.php/regulation/neufassung_metallberufe_2018.pdf

Ministerio de Educación y Formación Profesional

<https://todofp.es/que-estudiar/loe/fabricacion-mecanica.html>

Spain Skills

<https://spain-skills.es/>

Compare national qualifications frameworks across Europe

<https://europa.eu/europass/en/compare-qualifications>



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Conclusion

The Integration of European Qualifications in National Qualifications Frameworks/Systems is one of the challenges. But also an opportunity in DESTINE project.

A harmonised system of recognition of qualifications all over European countries can benefit all the players: industry, policy makers in education, VET providers or trainees, and its benefits are linked to one the fundamental principles in European Union: the mobility of people.

By sharing Destine partnership experiences during the project development, in particular trough the lessons learned regarding each recommendation, future steps towards the integration of European/international qualifications can be furtherly explored by VET providers and Local/national authorities in the field of vET .

In conclusion, this document achieved its purpose: to be a starting point and to provide guidance in the reflection process for the integration of European Qualification, transversal and linked to the labour market, in national qualification frameworks or systems, regardless its country or context.



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References

Introduction to Additive Manufacturing:

<https://www.metal-am.com/introduction-to-metal-additive-manufacturing-and-3d-printing/applications-for-additive-manufacturing-technology/> [Accessed September 2022]

<https://additivemanufacturing.com/basics/> [Accessed October 2022]

Overview of National Qualifications Framework Developments in DESTINE countries – CEDEFOP

<https://www.cedefop.europa.eu/en/publications/8611> [Accessed September 2022]