

Enhance

Maintenance - Production - Quality

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Capacity Building in the field of Higher Education

**strENgthening skills and training expertise for TunisiAN
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1. Introduction

This document is developed as part of the ENHANCE project.

1.1. Purpose of the document

This document sum-up the articles published/submitted in/to conferences and journals during the first reporting period.

1.2. Reference documents

Deliverables D1.2, D1.3 and D1.6 of the project.

1.3. Applicability

N/A

1.4. Definitions

Digital Innovation Hub: one-stop-shops organisations proposing digitalisation services to industry.

1.5. Structure of the document

This document is organized in 9 sections:

- Section 1: introduction
- Section 2: ENANCE project overview
- Section 3: Conference article
- Section 4: Journal articles

1.6. List of acronyms

No acronyms used in this deliverable

2. ENHANCE project overview

ENHANCE – strENgthening skills and training expertise for TunisiAN and MorocCan transition to industry 4.0 Era – is an Erasmus Plus project founded under the KA2 Cooperation for innovation and the exchange of good practices (Capacity Building in the field of Higher Education) programme by the European Commission under Grant Agreement N° 619130, to be conducted in the period January 2021 until January 2024. It engages 7 partners from 5 countries with a total budget of 779k€. Further information can be found at <http://eplus-enhance.eu/>.

The emergence of industry 4.0 concepts and applications brings new paradigms impacting all the industrial business domains when they need to conduct successful digital transformations or increase workshops connectivity. The evolution of Maintenance, Production and Quality Engineering (MPQ 4.0) represents the main application domains where Industry 4.0 produces effective beneficial results.

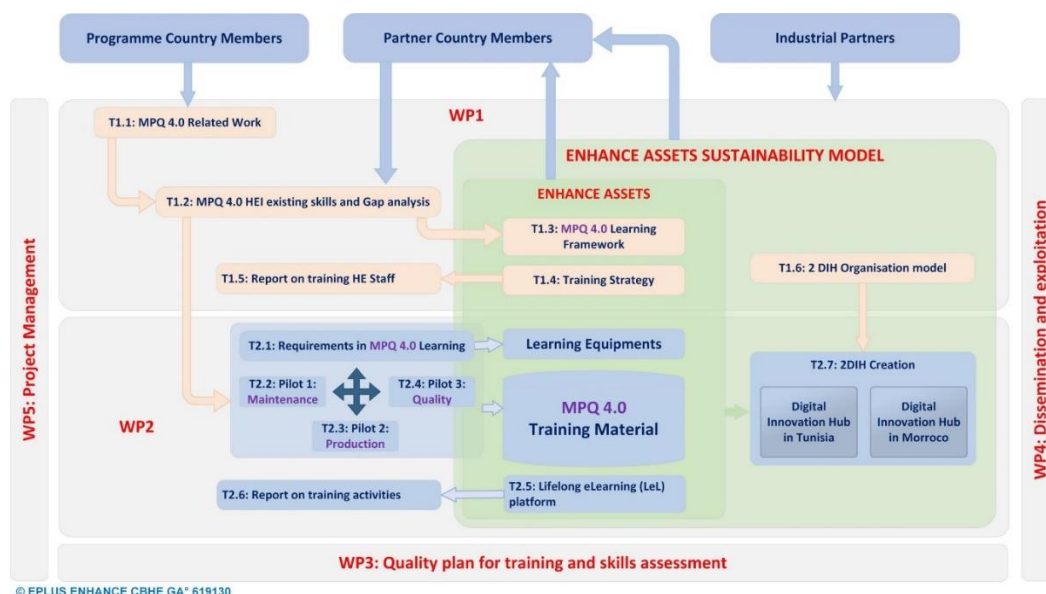


Figure 1: ENHANCE project organization.

The ENHANCE project focuses on building new MPQ training capacities at Higher Education Institutions (HEI) in Tunisia and Morocco to establish interactions between the following stakeholders:

- European universities and research institutions (from France, Germany and Portugal) confirmed MPQ 4.0 competencies, training materials, collaborative research projects, full operational Digital Innovation Hubs (DIH), technology transfer experiences, etc.
- Partner country universities (from Tunisia and Morocco) with teaching and training activities in MPQ and existing connections with their local industrial partners.

The ENHANCE project will create several outputs and two primary tangible outcomes:

- New MPQ 4.0 equipment and training materials developed in connection with the existing training programmes and consolidated through three industrial pilots. The new material will be used to train the trainers and the students in the different partner country universities.
- Two DIHs, one in Tunisia and one in Morocco to sustain the project outcomes through their reuse for training in industry.

ENHANCE aims to become the reference model for creating effective and sustainable training material for MPQ 4.0 in both partner countries with content approved by academia and industry.

3. Conference paper

During the first reporting period, one conference article has been published.

3.1. ICE 2021 Article

The screenshot shows the IEEE Xplore article page for the paper 'Towards A Conceptual Framework for Developing Sustainable Digital Innovation Hubs'. The page includes the IEEE logo, navigation links, a search bar, and the article title. Below the title, there are options to 'Cite This' and 'PDF'. The authors listed are Majid Zamiri, José Ferreira, Joao Sarraipa, Claudio Sassanelli, Sergio Gusmeroli, and Ricardo Jardim-Goncalves. The abstract is visible, starting with 'As digitalization and smartification affect businesses of all kinds ever more profoundly...'. The page also shows document sections, authors, figures, references, keywords, and metrics.

Figure 2: ICE 2021 paper

Its details are given below:

3.1.1. Title of the article

Towards A Conceptual Framework for Developing Sustainable Digital Innovation Hubs

3.1.2. Abstract of the article

As digitalization and smartification affect businesses of all kinds ever more profoundly, the growing concern is about how such opportunities can promote companies' productivity through improved and customized smart solutions and also customer engagement. To meet these new requirements and engage in new collaborative initiatives, Digital Innovation Hubs (DIHs), by leveraging digital technologies and benefiting of diverse minds inclusion, from one side help companies to become more competitive with regard to their business/production processes, products, or services, and from the other side allow end users to benefit from more customized products and services. To create long term value and exploit new commercial opportunities, DIHs ideally need to embrace sustainability and/or develop their sustainability strategies. On that basis, this study by considering the related studies and considering the major needs and goals of DIHs, proposes a conceptual framework contains five dimensions that can be used as guide for establishing and developing sustainable DIHs. The potential application of the proposed framework in some projects and active DIHs are discussed.

3.1.3. Keywords

Productivity, Technological innovation, Conferences, Collaboration, Companies, Sustainable development, Business

3.1.4. Name of the conference

2021 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC)

3.1.5. DOI

The DOI is <https://doi.org/10.1109/ICE/ITMC52061.2021.9570120>

3.1.6. WP/Task/Deliverable

This article was part of the tasks 1.3 and A.6 which are related to the design of the learning framework and the design of DIH in Tunisia and Morocco. A part of the content of this article were presented in the deliverables D1.3 and D1.6 of the project.

4. Journal papers

During the first reporting period, one journal article has been published and another one is submitted.

4.1. Published journal Article

The screenshot shows the MDPI journal website interface. At the top, there is a navigation bar with links for Journals, Topics, Information, Author Services, Initiatives, and About, along with a Sign In / Sign Up button. Below this is a search bar with fields for Title / Keyword, Author / Affiliation, and a dropdown menu set to 'Computers'. The main content area displays the article details for 'computers' journal, Volume 11, Issue 1. The article title is 'Meta-Governance Framework to Guide the Establishment of Mass Collaborative Learning Communities' by Majid Zamiri, Luis M. Camarinha-Matos, and João Sarraipa. The article is marked as 'Open Access' and 'Article'. The abstract states: 'The application of mass collaboration in different areas of study and work has been increasing over the last few decades. For example, in the education context, this emerging paradigm has opened new opportunities for participatory learning, namely, "mass collaborative learning (MCL)". The development of such an innovative and...'. The page also includes an 'Article Menu' with options like Article Overview, Article Versions, Related Info Links, and Full Article Text (Introduction, Background Information, Research Method, Proposed Meta-Governance Framework, Case Studies, Limitations).

Figure 3: MDPI journal paper

The details of the published article are:

4.1.1. Title of the article:

Meta-Governance Framework to Guide the Establishment of Mass Collaborative Learning Communities

4.1.2. Abstract of the article

The application of mass collaboration in different areas of study and work has been increasing over the last few decades. For example, in the education context, this emerging paradigm has opened new opportunities for participatory learning, namely, “mass collaborative learning (MCL)”. The development of such an innovative and complementary method of learning, which can lead to the creation of knowledge-based communities, has helped to reap the benefits of diversity and inclusion in the creation and development of knowledge. In other words, MCL allows for enhanced connectivity among the people involved, providing them with the opportunity to practice learning collectively. Despite recent advances, this area still faces many challenges, such as a lack of common agreement about the main concepts, components, applicable structures, relationships among the participants, as well as applicable assessment systems. From this perspective, this study proposes a meta-governance framework that benefits from various other related ideas, models, and methods that together can better support the implementation, execution, and development of mass collaborative learning communities. The proposed framework was applied to two case-study projects in which vocational education and training respond to the needs of collaborative education–enterprise approaches. It was also further used in an illustration of the MCL community called the “community of cooks”. Results from these application cases are discussed.

4.1.3. Keywords

mass collaborative learning; meta-governance framework; mass collaboration assessment

4.1.4. Name of the journal

MDPI Computers 2022

4.1.5. DOI

<https://doi.org/10.3390/computers11010012>

4.1.6. WP/Task/Deliverable

this article was part of the task 1.3 which related to the design of the learning framework. A part of the content of this article was presented in the deliverable D1.3 of the project.

4.2. Submitted journal article

The screenshot shows the SAGE Author Dashboard for the journal 'Industry and Higher Education'. The dashboard includes navigation links for Home, Author, and Review. The main section is titled 'Submitted Manuscripts' and contains a table with the following data:

STATUS	ID	TITLE	CREATED	SUBMITTED
Under Review	IHE-22-0101	Gap analysis between curricula being offered and industrial needs related to Maintenance, Production and Quality in industry 4.0 Era in Tunisia and Morocco	22-Jul-2022	22-Jul-2022

Additional information visible in the screenshot includes the author's name 'ADM: Edmondson, John' and a 'View Submission' link.

Figure 4: IHE paper

The details of the article that is under review are as following:

4.2.1. Title of the article

Gap analysis between curricula being offered and industrial needs related to Maintenance, Production and Quality in industry 4.0 Era in Tunisia and Morocco.

4.2.2. Abstract of the article

To improve the attractiveness and the competitiveness of industry in Tunisia and Morocco, local authorities have adopted sustained strategies to support industrial companies to modernize their hardware, software and "humanware" infrastructures by embracing the industry 4.0 paradigm and technologies. Despite these continuous and sustained efforts to help engage with the industry 4.0 paradigm and technologies, the readiness and maturity of academic institutions and staff in Tunisia and Morocco to adhere to the industry 4.0 revolution is questionable. Therefore, more focus should be put on universities, teaching and training institutions and staff to promote a skilled and qualified workforce that is capable to take full advantage of the latest technologies and intelligence available. In this context, the objective of this article is to present the result of the analysis that was conducted to identify the gap between skills developed by offered curricula in Tunisia and Morocco and the ones required by local industry to digitalize Maintenance, Production and Quality processes (MPQ4.0).

4.2.3. Keywords

Digitalization, gap, industry 4.0, technologies

4.2.4. Name of the journal

Industry and Higher Education

4.2.5. WP/Task/Deliverable

this article was part of the task 1.2, which related to the analysis of the gap between programs being offered in Tunisian and Moroccan universities and skills required by local industry. This work was reported in the deliverable D1.2 of the project.

5. Future activities

The project partners will meet begin of 2023 to valorise the novelties proposed in D1.1, D1.2 and D1.3 and work out a contribution for potential publication activities.