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Specification and Design of DIH one-stop-shop Marketplace 2

WP3 - Network of Competence Centers and pan-EU DIHs in CPS/IOT

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Annexes:

Nº	File Name	Title
1	Glossary	Annex 1 - Glossary
2	DIHIWARE Platform V1 Starter-Kit	Annex 2 - DIHIWARE Platform V1 Starter-Kit
3	Feedback Gathering - Basic Survey	Annex 3 – Feedback Gathering - Basic Survey
4	Feedback Collection Questionnaire	Annex 4 – Feedback Collection Questionnaire
5	Semi Structured Interview Questions_IMR	Annex 5 – Semi Structured Interview Questions_IMR

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Executive Summary:

DIHIWARE is the MIDIH Innovation and Collaboration Platform that will act as a facility intended to support knowledge sharing and technology transfer, based on human to human interaction, communication and technology information between CCs and DIHs. The DIHIWARE was released in its first version at M9 according to the concept specified in D3.1 at M6. After the deployment of the DIHIWARE, the process of experimentation and testing started inside the MIDIH consortium. The experimentation involved all MIDIH CCs and DIHs (referred to in this document as the 16 MIDIH entities) and SMEs belonging to the ecosystem of the 16. The ultimate goal was to get the experimenters acquainted with the functionalities offered by the DIHIWARE and to provide feedbacks on its usability, functionalities, etc. The intention of this deliverable is to show how these activities brought to the identification of new requirements for the final release of the DIHIWARE at M33.

As mentioned, the development process and release of the DIHIWARE followed an iterative approach, as suggested by the RE Methodology (D2.1), according to the iterative feature of the MIDIH project: prototype version (DIHIWARE_v1 released at M9) and final version (DIHIWARE_v2 due at M33).

To run the transition from prototype to the final version two different scenarios have been foreseen. The first scenario implicated the installation of 16 different instances of the DIHIWARE_v1, each hosted by one member of the 16 MIDIH entities. The second scenario will foresee 1 single (integrated) instance of the DIHIWARE for the whole group of 16 MIDIH entities (referred as DIHIWARE users). They will be all access a unique virtual environment where the services offered by all the 16 can be made available. Moreover, also other organizations and institutions belonging to the ecosystem of DIHs and CCs both on the demand side (end-users) and the supply side (developers, IT companies, etc.) could benefit from the DIHIWARE (referred to as DIHIWARE beneficiaries).

Due to the fact that the DIHIWARE_v2 is expected to be the environment where cross-DIH and cross-CC collaboration and innovation should happen, new functional and system requirements must be identified. For that reason, the DIHIWARE_v1 was experimented both by users and beneficiaries, the feedbacks were collected and analysed, and finally translated into requirements.

The DIHIWARE_v1 experimentation by users followed three steps: installation of the DIHIWARE_v1, upload of 3 services from the user's portfolio on the DIHIWARE_v1 by using the best mapping among DIHIWARE_v1 functionalities and the user's service offer, feedbacks collection by use of a standard template. The beneficiaries were supported in the DIHIWARE_v1 experimentation by the MIIDH C and DIH that acted as tutors. In that respect, IMR and TUKE, showed their availability to be the two case studies for a "more in-depth" DIHIWARE Experimentation and Feedbacks collection by involvement of beneficiaries from their ecosystem, that are SMEs.

This experimentation supported the collection of feedbacks based on the perceived ease of use, usability and usefulness that were then translated into new requirements of the DIHIWARE_v2.

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1 Introduction

This section shows the main objectives achieved during the activities executed in WP3.1 and that are presented in this deliverable. This section provides the structure of this document, as well as the inter-links between this deliverable and other tasks and work packages inside the MIDIH project are also shown.

Premise.

This deliverable is intended to provide the inputs for the final release of the MIDIH Innovation and Collaboration Platform, the DIHIWARE.

From the DoA, the DIHIWARE platform is intended to be the one-stop-shop marketplace to guarantee the exchange of services, skills, technology, etc. between CCs and DIHs to serve their customers and support them in approaching digitalization.

During the evolution of the MIDIH Project, the consortium concluded that DIHWARE will support the realization of the MIDIH One-Stop-Shop[1] because other business oriented activities will be executed outside the DIHIWARE as part of the ecosystem management activities, or will rely on the activities already provided as services by the MIDIH Ecosystem.

In that light, for matters of coherence and continuity with the first iteration of the MIDIH Project, and in particular with D3.1, this deliverable in intended to provide the specifications and requirements for the new release of the DIHIWARE.

1.1 Scope of the deliverable and structure

One of the main purposes of WP3 "Network of Competence Centers and pan-EU DIHs in CPS/IOT" is the deployment of the MIDIH Innovation and Collaboration Platform, which will be referred to in the project as the DIHIWARE Platform. DIHIWARE will act as a facility intended to support knowledge sharing and technology transfer, based on human to human interaction, communication and technology information. The aim of this platform is to support Manufacturing Industries (especially SMEs) and Technology Innovators/Solution Providers (IT start-ups/web entrepreneurs) in accessing locally the services provided by regional CCs and European DIHs in order to support and speed up the digitalization of their products/services/supply chains.

According to WP3 overall objective, the purpose of this deliverable is to address the second iteration process of the specification of the requirements intended to guide the design of the final release of the DIHIWARE Platform.

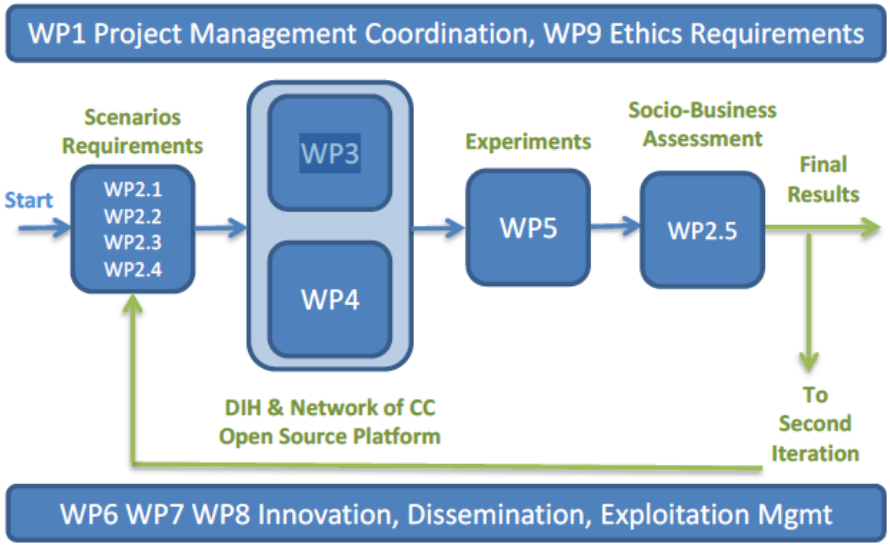
[1] For more details refer to Annex 1 - Glossary.

The experimentation for the first release of the DIHIWARE supported the elicitation of new business requirements by the experimenters, then translated into new functionalities of the DIHIWARE starting from the experimentation feedback collected from the field.

Chapter 2 introduces the relevance of experimenting the IDHIWARE_v1 and Chapter 3 details the process of experimentation of the DIHIWARE_v1 by both users and beneficiaries. The experimentation is necessary to collect feedbacks on the DIHIWARE_v1 usability, concept and content, etc. Therefore Chapter 4 specifies the process followed to collect feedbacks from the experimentation and presents the feedbacks collected, then managed and coded into new requirements for the final release of the DIHIWARE, including some preliminary software requirements in Chapter 5.

1.2 Contribution to other WPs and deliverables

D3.2 "Specification and Design of DIH one stop-shop Marketplace 2" is the first deliverable of the second iteration of **WP3** "Network of Competence Centers and pan-EU DIHs in CPS/IOT". The DIHIWARE is intended to implement the MIDIH DIH one-stop-shop marketplace where Manufacturing Industries (particularly SMEs) and Digital Innovators/Solution providers (start-ups/web entrepreneurs) may find access to relevant services intended to support and push the digitalization of the European Manufacturing at global scale.
From the experimentation of the DIHIWARE, new business requirements were elicited and further analysed in D2.4, while inputs for software requirements and functionalities are going to impact the final release of the DIHIWARE in D3.6.



2 Experiencing the DIHIWARE_v1

This section describes how the preparation and running of the experimentation of the first release of the DIHIWARE Platform (namely DIHIWARE_v1) was planned and conducted.

2.1 Towards the final release of the DIHIWARE Platform

The DIHIWARE Platform is "a collaborative environment intended to be a supportive facility for manufacturing players with a digital-oriented imprint or aiming at achieving a digitalization process of their products/operations". The DIHIWARE acts as a virtual place where the buying and selling of products and services in the digital industry is enabled and spread. Due to the plenty of beneficiaries that will be users of the Platform (as discussed further in this chapter), the DIHIWARE will be designed to meet multiple needs in support of the industrial interactions between buyer and seller that market products and services" [Extrapolated from chapter 2.2 of D3.1].

The development process and release of the DIHIWARE follows an iterative approach, as suggested by the RE Methodology (D2.1 and) according to the iterative feature of the MIDIH project:

- Prototype version: DIHIWARE_v1 (M9)
- Final version: DIHIWARE_v2 (M33)

The activity of experimenting the DIHIWARE_v1 is a direct consequence of task WP3.6 "DIH Collaboration for CPS/IOT Experimenters" where "*Access to* and *Collaborate with* services in MIDIH CCs and DIHs will be implemented by collaborative business processes supported by a specific IT Open Source Platform" [Extrapolated from the DoA].

To run the transition from prototype to the final version **two different scenarios** have been foreseen and graphically represented in Figure 1.

SCENARIO1. The first scenario foresees the experimentation of the DIHIWARE_v1 by the 16 entities that build the MIDIH DIH ecosystem: 9CCs, 3pan-EU DIHs, 2RMDIH and 2DFs**.** To this purpose, **16 different instances** of the DIHIWARE_v1 were created, each hosted by one member of the MIDIH DIH ecosystem. By doing so, each of the 16 entities was able to get acquainted with the capabilities (actual or potential) of the DIHIWARE as a virtual environment where the demand and offer of services/solution can meet one the others.

SCENARIO2. The second scenario foresees **1 single (integrated) instance** of the DIHIWARE for the MIDIH DIH ecosystem. In other words, all 16 entities were given access to a unique instance of the DIHIWARE, where all the services offered by the 16 entities can be made available in the same virtual environment. By doing so, each entity has visibility on how the service portfolio from the others looks like and might find opportunities to co-design new solutions by exploiting

complementary capabilities. The single instance of the DIHIWARE, namely the DIHIWARE_v2, is expected to have new functional and system requirements coming from the experimentation of the DIHIWARE_v1 in order to support the interaction of the different subjects belonging to the ecosystem. The opportunity of accessing services, knowledge and market among different subjects must be best supported by DIHIWARE_v2.

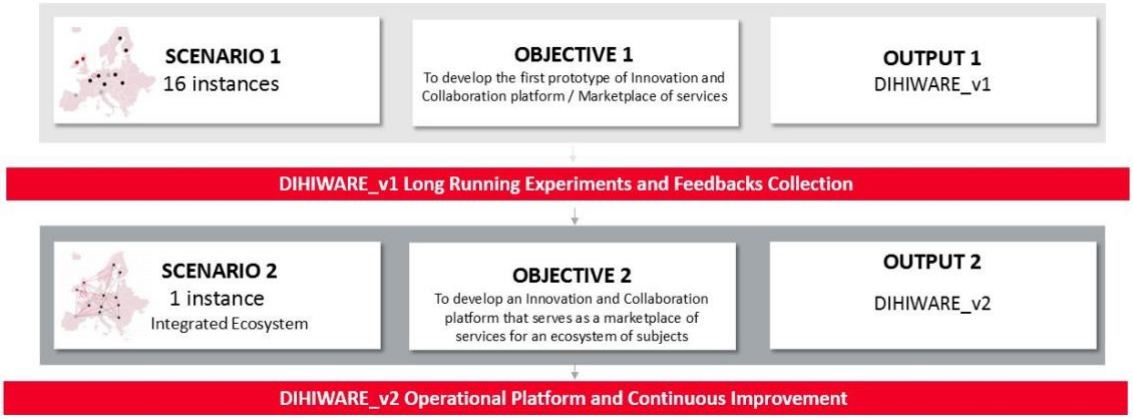


Figure 1 DIHIWARE development process: from the prototype to its final version

As additional note, also external communities have been evaluating the DIHIWARE in parallel to the DIHIWARE experimentation inside the MIDIH consortium. ENG, in fact, has provided the DIHIWARE as the collaboration platform for the EOSC-Hub project (https://www.eosc-hub.eu/) where its capabilities (functions and extensibility) are still under evaluation. In the same period ENG has started a collaboration with Confindustria (the General Confederation of Italian Industry is the Italian employers' federation and national chamber of commerce) and all its National hubs have started a pilot project to foster both the internal and external collaboration.

2.2 Objectives and process of the DIHIWARE_v1 experimentation

The preparation of the DIHIWARE_v1 experimentation was supported by a seminar held in Berlin in February 2019 co-organized by ENG and POLIMI. The seminar provided the opportunity for the MIDIH consortium to explore some of the important concepts associated with the DIHIWARE, the rationale behind it, its scope and role within the MIDIH network of networks and the purpose of experimenting the DIHIWARE inside the MIDIH consortium.

The process of development and release of the DIHIWARE is connected with one of the main objectives of the MIDIH project, which is to create a MIDIH DIH made of the MIDIH Ecosystem of DIHs and CCs and their related network. The aim is to facilitate the exchange of knowledge, skills, technology, etc. inside the MIDIH Ecosystem in order to support the digitalization of local SMEs giving them access both to regional/national and cross-border services.
In other words, the MIDIH DIH will be a network of DIHs and CCs behaving as a one-stop-shop Marketplace for SMEs to access technology, knowledge and the market and, in this context, the

DIHWARE will support the realization of the MIDIH One-Stop-Shop[2]. It is worth to notice that other business-oriented activities will be executed outside the DIHIWARE as part of the ecosystem management activities or will rely on the activities already provided as services by the MIDIH Ecosystem. The final release of the DIHIWARE is intended to empower the MIDIH community being a collaborative and innovative environment for an ecosystem of stakeholders. The **stakeholders** of the DIHIWARE are a variety of subjects that for simplicity have been grouped into two categories: **users** and **beneficiaries**.

- The users are the 16 MIDIH entities (9 CCs + 3 pan-EU DIHs + 2RMDIHs + 2DF);
- The beneficiaries are the ones that can benefit from getting access to the DIHIWARE functionalities as service providers or solution seekers. Their interaction with the DIHIWARE is intermediated by the users, since the beneficiaries are the users' customers or partners. Different beneficiaries have been identified: SMEs (Manufacturing Industries), SMEs (Solution providers), IT start-ups/web entrepreneurs, Incubators, Industry Associations, Governments & Official Institutions, Investors, and Research & Universities.

The DIHIWARE must be thought to support both the users and the beneficiaries in achieving their business objectives to create an impact on the digitalization of EU manufacturing (especially SMEs), that is the aim of I4MS Programme. Adopting a market logic, the users are those who decide to "buy or not buy" the DIHIWARE based on its ability to properly support them in the growth of their business (in the way they will benefit from using it), expressed in terms of the Business Requirements (BRs).
Given the nature of the users, their business objectives are related to meeting the needs of their customers (the DIHIWARE beneficiaries). In other words, the users should be able to better support the beneficiaries in achieving their business objectives by being part of a community that exchanges services and knowledge through the DIHIWARE. The more this is true, the more the beneficiaries will achieve their business objectives, and consecutively also the users, who then recognize a value added in using the DIHIWARE platform and being part of the MIDIH ecosystem.
Therefore, in order to develop the DIHIWARE_v2 correctly, it is necessary to solicit new requirements both for their business and for the DIHIWARE that is intended to support them. For this reason, the DIHIWARE_v1 Long-running Experiments involves both the users and beneficiaries.

The process of elicitation of new requirements for the DIHIWARE_v2 was shared and discuss with the MIDIH Consortium. This three-step process shows the method to define the DIHIWARE_v2 requirements starting from the BRs of users and beneficiaries that have experienced the DIHIWARE_v1 illustrated in Figure 2.

[2] For more details refer to Annex 1 - Glossary.

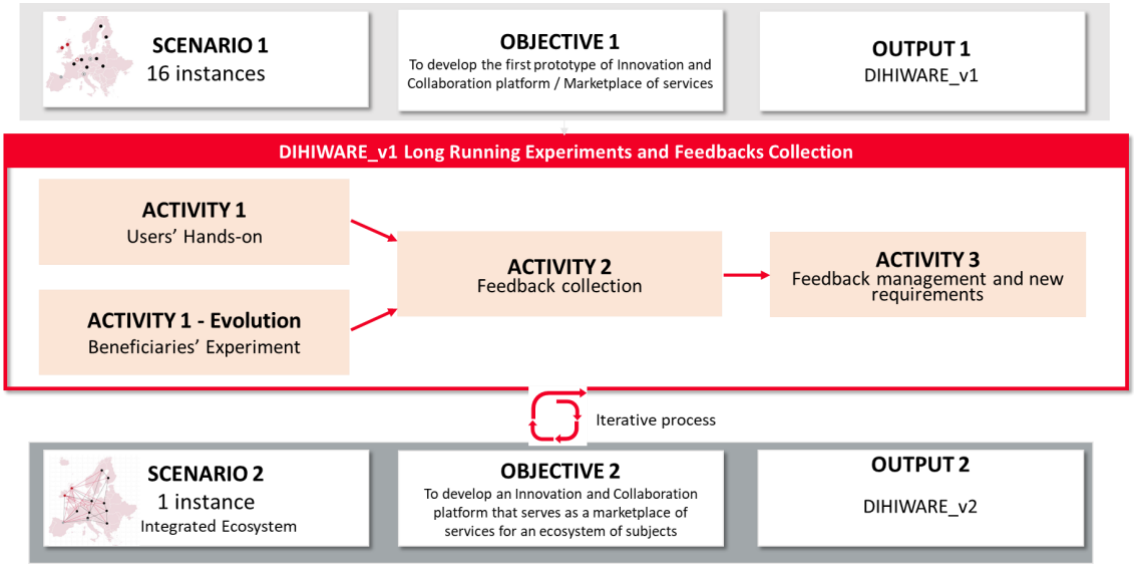


Figure 2 DIHIWARE_v1 Experimentation process

Below, the **objective** of the activities characterizing the DIHIWARE_v1 experimentation process are explained.

Activity 1 (and Evolution): User's Hands-on and Beneficiaries' experimentation.

- Objectives for users: to get acquainted with the member registration, service uploads and provisioning, content management, functionalities to support the collaboration among members, etc.
- Objectives for beneficiaries: to get acquainted with the capabilities (actual or potential) of the DIHIWARE Platform, in terms of functionalities that support them to provide services (for service providers) or to find competences and solutions to issues of different type (solution seekers).

Activity2: Feedback Collection.

To design different methods of collecting feedback and, as a result, getting feedback from stakeholders (users and beneficiaries) in order to gather the required information for the platform provider.

Activity3: Feedback Management and new Requirements.

Elicitation, modelling and analysis of stakeholder needs and wants, for purposes of deriving specifications for the DIHIWARE V2.

In order to support the refinement of the DIHIWARE_v1 specification and the implementation of the second (and final) release, an experiment the three-step based process in Figure 2 was followed in order to validate the process using an approach based on the Stakeholder Requirements that will be turned into software requirements and specifications.

The validation of requirements, in fact, is a fundamental step in the development process of the DIHIWARE Platform as outcome of WP6.

The method followed started with the experimentation of both users and beneficiaries of the DIHIWARE. The users' hands-on started with a preparation phase including the set-up and installation of the DIHIWARE instances, followed by the experimentation phase. The DIHIWARE instances provided are empty virtual environment that the users populated with a selection of services taken from their services portfolio. In order to run a more exhaustive experimentation, users were asked to involve some beneficiaries from their network that would be involved in the DIHIWARE experimentation as well. The beneficiaries were tutored by the users in surfing the DIHIWARE filled in with the selection of services done by the partner-user.

Both the users' and beneficiaries' experimentation were relevant to make them confirm or elicit business requirements as useful feedback for the final release of the DIHIWARE. It is important that the DIHIWARE meet the needs of its stakeholders, which are then translated in business requirements. The feedbacks collected are then managed and elaborated into new requirements for the DIHIWARE, which will be then translated into software requirements in WP3.6.

3 Users' and beneficiaries experimentation

This section is intended to give specifications on how the three-step based process described in chapter 2.2 was implemented on the field. In particular, the focus in this chapter is on the Activity 1 of the process dealing with the trial of the DIHIWARE by the users (chapter 3.1) and the beneficiaries (chapter 3.2). The experimentation process for the two followed a similar but different process due to the dissimilarities in the objectives and business strategy of the two types of stakeholder involved.

3.1 Users' hands-on experimentation

The users' experimentation of the DIHIWARE_v1 needed a preparation process and initially only involved DIHIWARE users because they are the customers of the DIHIWARE, as explained above.

In **Activity1**, each user involved was asked to provide a **list of contacts** of who will handle the process to setup and run the experimentation. In particular for each one was important to foresee four different profiles:

- *Main Contact Person*: Task Manager/leader. Who oversees the completion of the experimentation phase;
- *System Administrator*: Who handles the Docker installation, Configuration and Management process;
- *Portal Administrator*: Who configures the portal, registers and manages Users and Organizations and assign roles to the portal users;
- *Content Manager*: Who collects and publishes the most relevant data to share through the platform.

- The System Administrator proceeded with the DIHIWARE_v1 set up and installation. ENGINEERING, as the main developer of the DIHIWARE, has released a **starter kit** (Annex 2 – DIHIWARE Platform V1 Starter-Kit), containing all the operative instructions useful to support the adopters during the DIHIWARE_v1 **setup** process. In particular ENG provided the following files:
  - a Manual for the Administrator, containing Docker Host Requirements, Platform Installation Steps and Platform Administration Steps;
  - a User Manual (it is worth to notice that since DIHIWARE is not a final product, this guide will be continuously revised, also following your suggestions);
  - An Admin and User Manual, specifically dealing with the Marketplace subsystem.

  The installation of the DIHIHWARE_v1 was organized by dividing the users into two groups in order to allow ENG to better support the **installation** process not having 16 instances to manage at the same time. The picture below shows the planning and the execution of the installation monitored by ENG until the completion of the DIHIWARE_v1 set-up by all 16 users.

Figure 3 DIHIWARE_v1 setu-up timeline planning and progress monitoring

- The Portal Administrator and Content Manager got acquainted with the DIHIWARE members' registration, service uploads and provisioning, content management, functionalities to support the collaboration among members, etc. and they made a conceptual simulation of how the DIHIWARE_v1 will support the MIDIH ecosystem dimension.
- The Content Manager uploaded 3 services from the user's portfolio on the DIHIWARE_v1 by using the best mapping among DIHIWARE_v1 functionalities and the user's service offer. The services selected have been registered also in a shared file excel in order to have an overview of the potential MIDIH service portfolio;
- Each of the 16 MIDIH entities experimented the DIHIWARE platform (hands-on experience) once populated with the services above, and provided some qualitative feedbacks according to the templates provided (details in chapter 4.1).

3.2 Beneficiaries' experimentation

For a "more in-depth" DIHIWARE experimentation and feedback collection, also DIHIWARE beneficiaries were involved in the experimentation activity. The DIHIWARE_v1 experimentation by the beneficiaries (**Activity1 Evolution**) can be defines as an evolution of the hands-on activity done by the users.

Users were asked to identify beneficiaries inside their network, both technology seekers and providers (i.e. Manufacturing SMEs, Technological SMEs, IT start-ups/web entrepreneurs, Incubators, Industry Associations, Governmental & official institutions, Investors, Research and universities). Moreover, the users' were asked to support the selected beneficiaries in experimenting/overviewing the ("access to" and "collaborate with") services with

representatives of the above mentioned beneficiaries to validate/provide substantial feedback on the implementation of the DIHIWARE_v1 (chapter 4.1).

IMR and TUKE, shown their availability to be the two case studies for a "more in-depth" DIHIWARE Experimentation and Feedbacks collection. Operatively speaking this means that, differently from the other partners, the experimenters were not just them, but they were asked to involve and support some SMEs in the experimentation of the DIHIWARE_v1. The SMEs involved were not mandatorily required to provide services on the DIHIWARE, but their partner-user acted as a mentor in guiding them in experimenting the DIHIWARE and giving feedbacks for its improvement from (also) a business-related perspective.

3.2.1. TUKE use case

Technical University of Košice (TUKE) was one of the partners selected for testing the DIHIWARE platform. This choice was valuable, particularly due to two reasons – TUKE guarantees the developed competence center (*CC5/TUKE - Competency Centre for Knowledge Technologies Aimed at Smart Innovation of Production Systems in Industries and Services*), which is in the process of transformation to industrial DIH, and on the other hand TUKE is an institution operating in the region of Central and Eastern Europe. Thus, one of the important planned outcomes was testing of the DIHIWARE platform with goal to monitor the usability, scalability and benefits of the developed and tested services of this platform. Incorporated in TUKE, the CC5/TUKE is part of the newly established University Science Park (USP) TECHNICOM. This information is relevant, as it helps to understand the selection (identification) of SMEs for testing and environment in which the platform has been tested.

USP TECHNICOM has the following functions:

- To ensure and develop the original Business Acceleration Program for small and medium-sized "Hi-Tech", in a concept of Start-up or "Spin-off" companies, formed mainly on the basis of relevant research and development (R&D) outputs, carried out as a part of research and innovation activities, and projects of universities and institutes of Slovak Academy of Sciences (SAS). Since 2014, the acceleration program is provided in the form of two institutes: "Startup center TUKE" (the pre-incubation process) and "Incubator TUKE" (own incubation process), both are managed by USP TECHNICOM.
- To support broad, efficient and mutually beneficial R&D cooperation between the universities' departments, institutes of the SAS and relevant organizations from social and economic practice within the scope of TUKE.
- To create conditions for sustainable R&D and development with a permanent impact on the transfer of knowledge and technology, or impact on the innovative practices at international, national and regional levels.
- It is the first point of contact for the companies interested in innovative collaboration, or technology transfer, with R&D teams from the university departments, and partner academic and commercial R&D institutions.

- Except for CC5/TUKE, it supports the development of the VUKOZE competence center through the development of efficient system applications of renewable energy sources.
- To provide consultations, training and expert activities.

More than 70 start-ups and SME companies have been part of the USP TECHNICOM ecosystem and gone through the incubation process. The management of the USP TECHNICOM actively communicates with these companies and through its Business Acceleration Program provides them with relevant services and training. It helps them grow and develop their potential as a successful "Hi-Tech" company.

As a part of the pilot testing of the DIHIWARE services, the first objective was to select the appropriate companies from the above described environment that were to participate in testing of the platform. Seven companies were approached, based on a good knowledge of the local environment. Three of them showed interest in the testing. The reason of refusal to participate in the testing of the other candidates were their limited time options. Following the selection process, overall three companies were selected for testing.

- Vizualizacky, s.r.o.
- CorOne, s.r.o.
- ceelabs, s.r.o.

Vizualizacky, s.r.o. is a spin-off company offering services in the area of 3D graphics and virtual reality (includes construction, architecture and design). The company cooperates with the academia in the development of the new applications for desktops, smart phones and tablets that are designed to support the communication between participants of construction projects, and for marketing purposes of development projects. It offers 3D visualization services (3D visualization of houses, residential areas, interiors, furniture, products, etc.) and virtual reality services (interactive virtual tours of projects using Oculus Rift 3D glasses, 360° virtual tours of exterior and interior, mobile and tablet apps).

CorOne, s.r.o. is a spin-off company focused on non-destructive corrosion monitoring in various fields of industry, from gas pipelines, metal structures in the construction industry, packaging materials in the food industry, to the testing of coating quality. Its focus also includes the highly innovative area of nanosecurity, particularly the development of the techniques for estimating unknown redox, thermodynamic and corrosion properties of nanoobjects. It is involved in the research on industrial corrosion accidents and offers consultation services. The company is part of the management team of the international conference series called *Corrosion and Surface Treatment in Industry*. It organizes corrosion trainings, also in cooperation with the international partners.

Ceelabs, s.r.o. is a spin-off company dedicated to the development of distributed hardware and software solutions for collection of data, and control of SmartGrid networks. It develops metering devices for collection of electricity consumption data through a secure communication infrastructure and its subsequent transfer to the cloud environment for later processing. The

resulting solutions can be used in practice by the end customers, as well as by electricity distributors in Slovakia.

Testing process:

At the introductory meeting, the DIHIWARE platform was comprehensively introduced and separate member accounts were created for the company representatives. The very early work with the DIHIWARE brought useful comments for its creators. The received feedback was sent to the creators who promptly addressed it and thus improved the quality of the provided services.

DIHIWARE testing preparation and support:

TUKE provided services through a local team of experts. They were trained to operate and manage the DIHIWARE_v1. FREEMIUM[3] services have been introduced into the "Marketplace". Trained representatives of the companies had thus the opportunity to use the DIHIWARE_v1 and obtain the services that were PREMIUM. However, these services were reclassified as free in order to attract users and get them accustomed to their use. Sample of such services offered in the platform include:

- IPR support services for SMEs (consultancy or hands on training activities for new and innovative SMEs in the area of Intellectual Property Rights);
- IoT demonstration lab access (practical support and infrastructure for development of Industry 4.0 IoT hardware and software (in energy monitoring and control) solutions);
- Hands-on Training on video (hands on training activities for beginners to gain the knowledge of various videoconferencing technologies, protocols and access to streaming infrastructure services).

DIHIWARE testing benefits:

Utilization services on the DIHIWARE platform represents an important element for TUKE CC in the transformation process from CC to DIH. Deployment of this service will bring the following benefits:

- centralization and unification of access to the services, provided within the USP TECHNICOM for business entities it brings together, as well as for the potential candidates from the practice,
- significant facilitation and streamline of communication towards the entities within the emerging industry oriented DIH in the MIDIH ecosystem,
- utilization of MARKETPLACE to effectively offer and provide, both FREEMIUM and PREMIUM, services,
- development of knowledge base and its dissemination and exploitation towards the development of the TUKE ecosystem, as well as,

[3] FREEMIUM is used as a terminology inside the MIDIH project to indicate services offered free of charge

- the sustainable development, update and notification of the relevant conferences, workshops, education and training, provided in the environment of USP TECHNICOM at TUKE.

During the pilot phase of testing at TUKE, the valuable knowledge and experiences were gained from the DIHIWARE platform. The offered solutions prove to be very beneficial, within the services of the forthcoming DIH at TUKE, they mainly automate and make processes more transparent. Test subjects provided feedback, which was subsequently made available to DIHIWARE platform creators. TUKE CC plans to continue the testing, utilize the platform and further verify both, already announced CC5/TUKE services and new services that are still under the development.

Access to the local instance of TUKE DIHIWARE platform (midih.uvptechnicom.sk) as a service is promoted through the top menu located at front page of USP TECHNICOM (uvptechnicom.sk/en). Face to face support for users and potential customers is provided during the business hours by relevant personnel in frame of the "One stop shop" contact point of the USP TECHNICOM.

3.2.2. IMR use case

The testing was carried out from 29th April to 2nd May 2019, inclusive, in various locations around Ireland including: Dublin, Athlone, Limerick, Shannon and Mullingar. 17 SMEs were contacted regarding this testing of which 10 participated.

17 Irish SMEs were contacted by email. They were given a standardised email which briefly described the platform and offered a breakdown of the testing session. Of the 17 Irish SMEs, 10 were available to participate in platform testing sessions. The SMEs represent a range of industry sectors including; Agri-Food (Sustainable Food Production), Engineering (Electronic Services, Construction Equipment, Transport, Medical and Aerospace, Injection Moulds) and Technology (Software Solutions, Data Analytics, Automation, Aerospace). This representative sample offers real insights from these industry sectors, specialising in a variety of disciplines. The participating SMEs represented companies at various stages in growth, from established SMEs to those less established.

Table 1 SMEs Participants' profile

SME	Company Type	Industry Sector
Country Crest	Sustainable Food Production	Agri-Food
RealTime Technologies	Electronic Services	Engineering
Dromone	Construction Equipment	Engineering
PEM	Transport	Engineering

TEG	Medical and Aerospace	Engineering
Thormac	Injection Moulds	Engineering
Overhaul	Software Solutions	Technology
Transpoco	Data Analytics	Technology
Allied Automation	Automation	Technology
Arralis	Aerospace, Automotive	Technology

Testing conditions:

- Each session was conducted on a one-to-one basis (SME participant and interviewer). The interviewer for this testing was performed by a UX Researcher from Irish Manufacturing Research (IMR).
- The platform was tested on a DELL laptop using the Firefox browser within the Windows operating system.
- The prototype was created using Microsoft Lunacy (Sketch Windows equivalent) and Invision. The prototype was tested using Invision on the Firefox browser.
- Network speeds varied from location to location as testing was conducted onsite using the interviewer's mobile hotspot (3G, 4G) and in some cases using company WiFi when mobile connection was too slow. Most sessions were conducted in meeting rooms; however some were conducted in the participant's office.

DIHIWARE platform testing itinerary:

- Each session began with an initial greeting and brief verbal introduction of the DIHIWARE platform – its functionality and goals. The participants were assured that *they* were not being tested but rather the platform.
- The participant was then asked to login to the platform (using prepopulated login details) and describe their first impressions of the Homepage/Timeline – its content and aesthetics.
- The participant was asked to explore the platform while 'thinking aloud'. Navigation to each platform tab (Competence, Technology, Knowledge, Social Networking and Market) and member section (People/Teams and Resources) was included in this exploration.

Prototype platform testing itinerary:

- The participant was then presented with an alternate Login page and Homepage (prototype) and asked for their first impressions.
- They were asked to compare and contrast the prototype with the original platform under criteria such as *User Interface* (general look and feel), *Ease-of-use* and *Search functionality*.

Recording results:

- After exploring both platform and prototype, each participant was asked to complete the DIHIWARE questionnaire.
- After completion of this questionnaire, the tester asked several open-ended questions composed by IMR, in the format of a semi-structured interview, offering insights into:
  - SME needs and requirements
  - SME user journeys
  - Platform competitors
  - Primary functionalities of the platform
  - Features of the platform, notably Social Networking and internal messaging/chat
  - Areas for development or later phasing of the platform
  - Platform ease-of-use
  - Platform relevance
  - Target markets
  - Overall platform successes and failings

Notes were taken during the exploration of the platform and prototype, together with screen recordings of their navigation, facial reactions and commentary. These notes and video footage have been compiled and combined with the DIHIWARE questionnaire data and IMR semi-structured interview to offer a comprehensive assessment of the platform. Video footage of testing offers stakeholders real insight into how the platform is received and perceived.

4 Feedback Collections

This section describes how the feedbacks' collection was structured and run and which feedbacks were collected.

4.1 Feedback collection process

For the feedback collection process (**Activity2**), ENG and POLIMI have collaborate for the design of two different survey template. This activity was intended to collect qualitative feedbacks from both users and beneficiaries. The feedbacks collection was relevant to understand users' new business requirements (which will be made available in D2.4).

Users were asked to provide feedbacks and impressions arose during the DIHIWARE_v1 hands-on activity according to a basic template provided by ENG and POLIMI (template available in Annex 3 – Feedback Gathering – Basic Survey). This template was intended to gather feedbacks with a simple and easy to use form where users specified feedback type as a comment, bug report or question and describe their feedback.

Beneficiaries were supported by the users' in the process of both experimentation and feedbacks collection. In a first step, the users were involved in a process of revision of the first draft of interview protocol provided by ENG and POLIMI that was intended to be adopted by the users' when supporting the collection of the beneficiaries' feedbacks. Flaws in question design and further adjustments to the questionnaire where made (template available in Annex 4 – Feedback Collection Questionnaire).

This questionnaire template focuses on three evaluation elements: Perceived ease of use, Usability and Perceived usefulness.

- **Perceived ease of use**, refers to "the degree to which a person believes that using a particular system would be free of effort." This follows from the definition of "ease": "freedom from difficulty or great effort."
- **Usability:** is the degree to which a software can be used by specified consumers to achieve quantified objectives with effectiveness, efficiency, and satisfaction in a quantified context of use.
- **Perceived usefulness** is defined here as "the degree to which a person believes that using a particular system would enhance his or her job performance." This follows from the definition of the word useful: "capable of being used advantageously."

The users were also given the opportunity to create a new survey template in order to obtain the most accurate feedbacks from the beneficiaries. In line with the different approach used, IMR provided a third template containing a semi-structured Interview composed by open-ended

questions aiming to carry out a UX Researcher analysis of the platform, including competitive benchmarking (template available in Annex 5 – Semi Structured Interview Questions_IMR).

4.2 Collected feedbacks

The main activities done on the feedback collected was the coding, that allow us to distill the raw feedback and rephrase it in a more concise and actionable way, and the determination of the types used to split feedback into three main categories (User experience, Concept and content, installation and Administration).

4.2.1. User Experience:

- Public section for newcomers
    - Short video walk-through of the platform
    - Introduction to DIHIWARE platform
    - Put some info (case studies, featured products, package details preview) in the public section of platform (case studies, featured products, package details preview)
- New layout
    - Homepage looked very busy and cluttered (too many boxes) and required more colour
    - New Improved English translation for sections and descriptions
    - A dedicated user profile section (PEOPLE/TEAMS and RESOURCES) would de-clutter the Homepage
    - A back button contained in the platform's navigation would be useful
    - The Timeline was too dominant on the Homepage
    - Use of universally recognised iconography, especially for Upload is recommended
- Highlighted information (Highlight news, hot topics, new opportunities) (Push notification of platform activity (e.g. idea/project, events etc.)
- Calendar synchronisation (i.e. Microsoft Outlook)
- Content Management
    - Preview content before publishing would be useful
    - Share this preview with platform contacts
    - Draft Items recovery
- User Guide: some kind of help or tutorial information inside the tool could help user to get started with the platform and use it.
- Improving the platform learnability

4.2.2. Concept and Content:

- Sections' title, position and description review
- Applications Check
    - Multi-Pol (considered useless)

- IMS Evolution from Idea to Project to Market (MARKET tab and subsections) would be beneficial for SMEs

- Highlight Marketplace section: The majority of SMEs were confused about the platform's Marketplace (TECHNOLOGY subsection) and MARKET sections' placement within the platform, they felt the Marketplace section was a very useful concept and deserved a dedicated section (or tab) on the platform
- Customer/SME should have access courses and programs offered by CCs/DIH
- Customer/SME should have access to webinar through the platform
- Customer/SME should have the possibility to see the available Experiments and Book he visit
- Customer/SME should have the possibility to access to reference project done by CCs/DIH
- the user should be able to find the contact of the selected CC to exploit the service
- The DIHWARE platform should periodically send reports to CCs about number of visitors and number of viewed services
- Content Visibility: dividing potential users into meaningful subgroups based on their characteristics and applying user segments to restrict viewing access to community content. User should know and set those restriction rules
- Creating alert-based subscription to ensure that users are automatically notified by email when a specific section is updated
- Research (Advanced search filters would be very useful)

4.2.3. Installation and Administration:

- Expose an HTTPS frontend to access web gui
- Automatic docker stack restart after server reboot
- Data Backup
- Portal Logs examination
- Roles and permissions management clarification

4.2.4. FIWARE Business API Ecosystem (BAE)

The Business API Ecosystem (BAE) consists of the FIWARE Business Framework and a set of standard APIs provided by TMForum. The component allows for monetization of assets, both digital and physical, in the form of charging, accounting, revenue settlement and sharing. This component offers managing, publishing, and revenue generating possibilities to sellers of products, apps, data and services.

Within the MIDIH project we have dealt only with the integration between the FIWARE BAE and the portal and among the different components of the framework (more details in D3.5). This is

the reason why the feedback received regarding this subsystem cannot been analysed as new requirements for the DIHIWARE V2.

We can voice our stakeholders needs, that revealed deficiencies in some product characteristics (learnability, functional appropriateness and completeness) and report it to the FIWARE Foundation.

Learnability:

- In order to create a product a seller has to create a product specification and then an offering in which the product specification is included. The fact that you have to create two different entities in order to sell one product is not very obvious.
- The difference between catalogues and categories can be confusing.
- There are a lot of features and settings that are mandatory, but whose benefit is not exactly clear.

Functional appropriateness:

- There are a number of complications to consider when a new user is introduced to the BAE. Firstly, the new user is not assigned the seller role, and cannot add himself to become a seller without having access to the FIWARE IdM BAE application. As such, only administrators can administrate the roles of the users. This is of course intended to be able to vet the potential sellers, but it complicates the process of selling your data, and could discourage the user altogether.
- The entities descriptions have a text limit of 30 characters maximum. This is not considered enough

Functional completeness:

- There is no way of specifying who made a product. In our opinion it would be preferred if you knew what user or which company is offering/made the product. The only option now is to specify a category (only creatable by the administrator) or catalogue, which anyone can specify and add products to. This could be done to make a more reliable platform

5 Feedback Management and New Requirements

This chapter shows how the feedbacks collected from both users and beneficiaries were coded and translated in new requirements for the DIHIWARE_v2, including also some preliminary software requirements.

5.1 The DIHIWARE v2 concept

The release of the DIHIWARE_v2 will not just include the refinement and changes according to the feedback collected during the experimentation of the DIHIWARE_v1, but it is meant to change the way in which services are made available and the way in which collaboration and innovation take place.

It is worth to underline that the DIHIWARE is not intended to deliver pure e-commerce functionalities, but mainly a user-centric collaboration environment to facilitate the matchmaking between product/service providers and consumers, oriented to facilitate knowledge and technology transfer, provision of tailored technological solutions, exploitation of best practices and use cases, access to experimental facilities, access to market and finance.

The DIHIWARE is coupled with the MIDIH one-stop-shop overall concept, but it is not the only tool needed to create and sustain the MIDIH one-stop-shop, which is also facilitated by the business interconnections of the network of the MIDIH partners.

This shows how the multitude of relations empowers the development, offer and fruition of services of multiple types.

Following this reasoning, the DIHIWARE_v2 is intended to exploit the power of the network providing the stakeholders with the access to a single instance of the DIHIWARE, rather than multiple instances accessible by single organizations.

The virtual environment enables the creation of a community where complementary needs and synergies are exploited. All the DIHIWARE_v2 stakeholders will make available their services not just to their network, but to other stakeholders and their related ecosystem multiplying the soundness of their offer. On the other side, customer will be given the opportunity to select among a wide variety of solutions and services of any kind to address their struggles with technology, skills and market penetration. Starting from the background service offer, customized solution can be co-designed between DIHs with different competencies, but similar goals.

Moreover, the service provision and service innovation assume a European dimension as the virtual environment enables cross-border collaborations.

According to the final aim of deploying the DIHIWARE_v2 and taking into account synergies with other ongoing activities and inter-relations between tasks inside the MIDIH project, the DIHIWARE_v2 deployment and experimentation would proceed as below.

- Content population with new MIDIH services planned in WP3
- Feedback collection on the DIHIWARE_v2 to test:
  - usability and accessibility
  - user experience based on the DIHIWARE_v2 one-stop-shop features and "innovation and collaboration" features in a European context (cross-border)
- Engagement of stakeholders external to the MIDIH Consortium to populate the DIHIWARE with services
- Engagement of stakeholders for feedback collection on the DIHIWARE_v2

The involvement of external stakeholders needs a careful planning of the tutoring support they may need to experiment the DIHIWARE. These aspects will be further discussed inside the MIDIH Consortium.

5.2 The DIHIWARE v2: from feedback to requirements

For the DIHIWARE specification and the implementation of the second (and final) release, it was decided to use an approach based on the Stakeholder Requirements that will be turned into software requirements and specifications.

This is why the feedback collection phase has been followed by their analysis and the translation of those stakeholder needs into requirements. In this activity we have refined the raw requirements (the feedback received) to make them tangible (ideally making them testable).

One of the problems occurring during services provision is a matching problem: it is due to the little coupling between services providers and services consumers. Therefore, an approach that emphasizes goal identification (with respect to the MIDIH project and outcomes) and decomposition (Cauvet, 2010) can provide more suitable insights for requirements elicitation. This approach is known in literature as goal-driven or goal-oriented methodology, which is also popular among developers in the IT field (Ide, Kishida, Aoyama, & Kikushima, 2014). Therefore, this approach is applicable to the DIHIWARE both for being the one-stop-shop for service offer and for providing a virtual environment for matchmaking (being a platform based on IT components).
In that light, an internal exercise between ENG, POLIMI and EITD was done to see whether new requirements could be elicited by looking at the potentialities of the MIDIH project. In other words, the achieved and expected outcomes of the MIDIH project provide the basis to understand whether and how the DIHIWARE could be of support and through which functions.

Therefore, the requirements of the DIHIWARE_v2 extrapolated from the feedback collected through the direct experimentation done by the selected stakeholders were double-checked and reinforced.

5.2.1. New DIHIWARE Requirements

5.2.1.1. The DIHIWARE Usability requirements

Req/UX	UX-001
Requirement	Public section for newcomers
Acceptance Criteria	At the moment the platform does not have a home page but only a landing page containing only the login form. A home page giving a comprehensive overview of what it is possible to do / find logging the platform it is needed
Rationale	User engagement
Priority	Medium
Reference[4]	

Req/UX	UX-002
Requirement	New Platform private pages layout
Acceptance Criteria	A new layout to emphasize the platform sections and content, improve the platform navigation and make the platform more user friendly
Rationale	User-friendliness
Priority	Medium
Reference	

Req/UX	UX-003
Requirement	User profile Section as Private Home Page
Acceptance Criteria	An home page containing User Profile details and other applications to navigate the platform should be useful

[4] Indicates the connection of the elicited requiremen with other requirements

Rationale	User-friendliness
Priority	Medium
Reference	

Req/UX	UX-004
Requirement	Improved Section description and site map
Acceptance Criteria	The platform should have a model of the content designed to help users navigate the sections. Improved sections description will guide user along his journey
Rationale	User-friendliness
Priority	Medium
Reference	

Req/UX	UX-005
Requirement	Back button functionality
Acceptance Criteria	A back button able to navigate user back to the previous page should be useful
Rationale	Platform Navigation
Priority	Medium
Reference	

Req/UX	UX-006
Requirement	Universal Iconography
Acceptance Criteria	A standard iconography can enhance the platform usability
Rationale	Platform Usability

Priority	Medium
Reference	

Req/UX	UX-007
Requirement	Calendar synchronisation (i.e. Microsoft Outlook)
Acceptance Criteria	Synchronization and access to external services
Rationale	Content Management
Priority	Medium
Reference	

Req/UX	UX-008
Requirement	Draft Content Preview
Acceptance Criteria	Making content creation much simpler and easier
Rationale	Front-End editing Capabilities
Priority	Medium
Reference	

Req/UX	UX-009
Requirement	Sharing draft content preview with platform contacts
Acceptance Criteria	Users will be able to generate a preview private link which can be shared securely with anyone.
Rationale	Front-End editing Capabilities
Priority	Medium
Reference	UX-008

Req/UX	UX-010
Requirement	Draft Items recovery
Acceptance Criteria	The view and edition of draft contents is limited to the author.
Rationale	Front-End editing Capabilities
Priority	Medium
Reference	UX-007

Req/UX	UX-011
Requirement	Make easier the interaction with the system revising the User Interface Design
Acceptance Criteria	Make commands and menu options highly visible and easy to find in order to allow efficient and error-free interaction with the system
Rationale	Platform learnability
Priority	High
Reference	

5.2.1.2. The DIHIWARE Concept and Content requirements

Req / CC	C&C-001
Requirement	Sections' title review
Acceptance Criteria	Clear sections heading.
Rationale	Platform and content organization
Priority	Medium
Reference	UX-004 UX-009

Req / CC	C&C-002
Requirement	Sections description review
Acceptance Criteria	Content readability and sections identification
Rationale	Platform and content organization
Priority	Medium
Reference	UX-004 UX-009

Req / CC	C&C-003
Requirement	Applications Check
Acceptance Criteria	Instantiate only useful applications
Rationale	Platform applications usefulness
Priority	Medium
Reference	

Req / CC	C&C-004

Requirement	Highlight Marketplace (E-market) section
Acceptance Criteria	The e-commerce section needs a dedicated space within the platform
Rationale	Resources organization
Priority	High
Reference	

Req / CC	C&C-005
Requirement	Highlight important Content
Acceptance Criteria	Promote and highlight important platform content to the right users.
Rationale	Resources organization
Priority	Medium
Reference	SR-003

Req / CC	C&C -006
Requirement	User Segmentation: to divide potential users into meaningful subgroups based on their characteristics
Acceptance Criteria	User segmentation to determine access to content
Rationale	Content Visibility
Priority	High
Reference	

Req / CC	C&C -007
Requirement	Restriction Rules: restrict viewing access to community content and section

Acceptance Criteria	Level of access to data specification
Rationale	Content Visibility
Priority	High
Reference	C&C -006

Req/CC	CC-008
Requirement	Search (Advanced search filters would be very useful)
Acceptance Criteria	Advanced search options able to narrow the scope of user search query
Rationale	Content searchability
Priority	High
Reference	

Req/CC	CC-009
Requirement	Analytics Integration to provide stakeholders insights into beneficiaries behaviours
Acceptance Criteria	Tracked metrics: Users, Pageviews, Goal Completions
Rationale	User Journey analysis
Priority	Medium
Reference	

5.2.1.3. The DIHIWARE Installation and Administration requirements

Req/IA	I&A-001
Requirement	Expose an HTTPS frontend to access web gui
Acceptance Criteria	The e-commerce section needs a dedicated space within the platform
Rationale	Hypertext Transfer Protocol Secure
Priority	High
Reference	

Req/IA	I&A-002
Requirement	Automatic docker stack restart after server reboot
Acceptance Criteria	How to handle Server reboot
Rationale	Hypertext Transfer Protocol Secure
Priority	High
Reference	

Req/IA	I&A-003
Requirement	Data Backup
Acceptance Criteria	Create a data backup plan
Rationale	Data Protection
Priority	High
Reference	

Req/IA	I&A-004

Requirement	Portal Logs examination
Acceptance Criteria	Monitoring portal logs helps you identify errors, troubleshoot problems, and address issues with your portal.
Rationale	Capture, query, and view events
Priority	Medium
Reference	

Req/IA	I&A-005
Requirement	Roles and permissions management clarification
Acceptance Criteria	Defining user-role and role-role relationships to make simple to perform user assignments.
Rationale	Roles and permissions organization
Priority	Medium
Reference	C&C -007

5.3 Softw*are* Requirements Specification/System Features

Modelled on the basis of the Business Requirements (detailed in D2.4) the following Software requirements specification describe some of the functionalities the product needs to fulfil stakeholders needs.

What we have done during this phase is a high level definition of some of the system features in order to start to design how some of the Business Requirements can be delivered.

In particular the stakeholders' requirements underline the necessity to:

- Create a growing common knowledge as for the MIDIH Ecosystem leveraging on already existing information in different ecosystem entities.
- Build dialogue and establish relationships with potential business partners.
- Engage the beneficiaries highlighting most relevant information.

Req / SR	SR-001
Requirement	The system must provide functionalities to allow the federation of Services catalogues: create a common Knowledge base with Import/Export options for easy data backup purposes. A unique hub able to give information and contextualize entities.
Acceptance Criteria	Offering a single access point for researches leveraging on already existing information in different organisations by creating a federation of catalogues for a scalable system (data blending). Combining data from multiple sources into a single place enabling Interoperability of organizations catalogues
Rationale	Services Catalogues Hub
Priority	High
Reference	

Req / SR	SR-002
Requirement	The system must provide functionalities to schedule appointments and matchmaking meetings

Acceptance Criteria	Users (stakeholders and beneficiaries) will be able to create an event, register for an event, see who's going, and book meetings with other participants.
Rationale	B2B Services Value
Priority	High
Reference	

Req / SR	SR-003
Requirement	The system must provide a way to organize suggestions for platform users to highlight important information
Acceptance Criteria	The site/content administrators will be able to categorize certain content as tips that will be shown to the user
Rationale	Users engagement
Priority	High
Reference	C&C-005

6 Conclusions

This deliverable shows the process to drive the experimentation of the first release of the MIDIH Innovation and Collaboration Platform (DIHIWARE_v1) to provide feedbacks for the identification of the new requirements expected for the final version of the platform (DIHIWARE_v2). The process of development and release of the DIHIWARE is connected with one of the main objectives of the MIDIH project, which is to create a MIDIH DIH made of the MIDIH Ecosystem of DIHs and CCs and their related network.

For that reason, the DIHIWARE_v1 was thought to be experimented by the MIDIH 16 entities (9CCs + 2 RMDIH + 2DF + 3Pan-EU DIHs) individually, by installing 16 instances of the DIHIWARE_v1. The DIHIWARE_v2, on the contrary, will be a unique instance where all 16 will have access to facilitate the exchange of knowledge, skills, technology, etc. inside the MIDIH Ecosystem in order to support the digitalization of local SMEs giving them access both to regional/national and cross-border services.

In that light, the DIHIWARE stakeholders were identified in two main categories, users and beneficiaries. The users are the DIHIWARE potential customers (the 16 entities among CCs and DIHs inside the MIDIH consortium), and the beneficiaries are the indirect DIHIWARE customers as they are direct customers or partners of the 16 MIDIH entities (SMEs, academia, etc.). The DIHIWARE is expected to support both users and beneficiaries in achieving their business objectives and creating an impact on the digitalization of EU manufacturing (especially SMEs). Therefore, both were involved in the experimentation of the DIHIWARE_v1 and feedbacks collection.

The experimentation of the DIHIWARE_v1 was intended to promote hands-on experience on the virtual environment for matchmaking of demand and offer of services and was structured in three steps: installation of the DIHIWARE_v1, content population with services offered (hands-on) and feedbacks collection by use of a pre-defined template to evaluate Perceived ease of use, Usability and Perceived usefulness.

The new requirements for the DIHIWARE_v2 were then retrieved by managing and coding the raw feedbacks received by users and beneficiaries.

A goal-oriented approach led us to the analysis of user centric requirements, need and prospects to be used in the development, implementation and validation of the platform.

It is worth to highlight that the collection of requirements followed two different paths: on one hand we have try to derive functional requirements from the feedback collected during the experimentation phase.

On the other hand, we start to design how some of the Business Requirements, performed through different interviews, collected in the D2.4 and followed by brainstorming among technology partners, can be delivered deriving new Software requirements specification.

7 References

8 Annexes

Annex 1 - Glossary

#	VOCABULARY	DEFINITION
	SECTION A – Platforms	
A.1	**One-stop-shop marketplace**	The MIDIH one-stop-shop marketplace will be a central portal, used to provide access to all the services provided within the MIDIH federated ecosystem of DIHs/CCs. The portal will be realized through an inclusive DIHIWARE platform installation, providing collaborative tools supporting the typical functions of a marketplace. It is worth to notice that other business oriented activities will be executed outside the collaboration platform, as part of the ecosystem management activities, or relying on the ones already provided by the DIHs/CCs constituting the ecosystem itself.
A.2	**DIHIWARE platform**	It is the Platform providing innovation and collaboration tools, aside other knowledge management capabilities, supporting the realization of the MIDIH Marketplace. The DIHIWARE platform is where the "Access to" and "Collaborate with" services are made available to both users and beneficiaries (for the underlined words please see the related definitions).
A.3	**MIDIH Reference Architecture**	The MIDIH Reference Architecture and its open source implementation are the outcomes of WP4 from the DoA. These solutions have not a direct connection with the DIHIWARE Platform, since they are more related to the components used to manage operational data and business applications characterizing the industrial experiments developed in WP5.
	SECTION B – Personas	
B.1	**Users**	"Users" of the DIHIWARE platform are the 16 MIDIH entities (9 CCs + 3 pan-EU DIHs + 2RMDIHs + 2DF). Following a market logic, the users are the ones that are going to "buy or not to buy" the DIHIWARE platform. For more details refer to Chapter 2.2 of D3.1.
B.2	**Beneficiaries**	"Beneficiaries" of the DIHIWARE platform are the organizations that can benefit from getting access to the DIHIWARE services, as service providers or solution seekers. Their interaction with the platform is intermediated by the users, since the beneficiaries are the users' customers or partners. Different beneficiaries have been identified: SMEs (Manufacturing Industries), SMEs (Solution providers), IT start-ups/web entrepreneurs, Incubators, Industry Associations, Governments & Official Institutions, Investors, Research & Universities. For more details refer to Chapter 2.2 of D3.1.

SECTION C – Services		
C.1	**Services**	Services are the ones referred to in WP3.2 "Development of access to Technology/Experiments services" WP3.3 "Development of access to Competencies/Knowledge services" and WP3.4 "Development of access to Market/Finance services". For more details refer to deliverable D3.3. The services can be provided by the 16 MIDIH entities or by their beneficiaries (that are service providers) through the population of the DIHIWARE platform. During the experimentation, a restricted number of services from both users and stakeholders will be made available on the DIHIWARE platform. At the end of the project, the goal is to have a large number of services available on the DIHIWARE platform. Service description will be collected as part of the content managed by the DIHIWARE Platform, while the supply of the service may be external (e.g. a 30 hours training course).
C.2	**New MIDIH Services**	They are a sub-set of the services (given old and newly create services). These are the services that should be developed by the 16 MIDIH entities according to the discussion held in the MIDIH Paris meeting and will be included in the D3.4 "Specifications and Design of DIH/CC Services 2" (M27). The development of the New MIDIH Services is an activity currently independent from the DIHIWARE experimentation and validation. Once developed, the New MIDIH Services could be included as services to be uploaded on the DIHIWARE_v2.
C.3	**Business Requirement (BR)**	Business requirements (BR) have been defined in Chapter 3.1.1 of D2.1 "Requirements Engineering Methodology and Tools 1" as follows: *BR states the **"why"** for a project…are related to business objectives…provide the scope of a business need or problem that needs to be addressed through a specific activity…provide enough information and guidance to help ensure that the project fulfils the identified need.* The definition of BR for CCs/DIHs (the DIHIWARE platform users) are detailed in Chapter 4 of D2.1. More specifically, BR for CCs/DIHs must be related to the business objectives of the CC/DIH itself and its ecosystem (the DIHIWARE platform beneficiaries). The collection of the revised BR will be addressed in this way in D2.4 "Scenarios, Use Cases and Requirements for MIDIH 2" in order to feed the DIHIWARE_v2. For this reason, the DIHIWARE experimentation and feedbacks collections must involve both users and beneficiaries for the elicitation of revised BR. It is important to remember that the users are in charge of understanding the

		requirements of their beneficiaries (the users have to do the work, not the beneficiaries). Every BR should be described in terms of which I&C services (or IT tool) may support the achievement of the BR itself.
C.4	**Functional Requirement (FR)**	The Functional Requirements (FRs) for the DIHIWARE_v2 will be derived (as part of WP3 activities) from the business requirements that will be collected in D2.4 "Scenarios, Use Cases and Requirements for MIDIH 2" (as part of WP2 activities), and taking into account updated or newly created business models (as part of WP6 activities). The new requirements for the DIHIWARE_v2 will be collected in D3.2 "Specification and Design of DIH one-stop-shop Marketplace 2".
SECTION D – Experimentation		
D.1	**DIHIWARE experimentation setup**	The DIHIWARE experimentation setup encompasses 2 processes: installation & configuration and population of the DIHIWARE platform by each of the 16 MIDIH entities. The instruction for the experimentations are enclosed in the Starter-kit available on the repository at the following link.
D.2	**1) DIHIWARE installation & configuration** **2) DIHIWARE population**	It is the process through which each of the 16 MIDIH entities make the DIHIWARE platform available on a local server. It is the process through which services are uploaded on the DIHIWARE platform. The users must do the upload. That means that each user must collect the services from the stakeholders involved in the experimentation and do the upload for them.
D.3	**DIHIWARE feedbacks collection**	The process of feedback collection of the DIHIWARE involves the users. Each user will provide feedbacks on the specification (paper work) and implementation (IT tool) of the DIHIWARE functionalities, by taking into account its experience as user and of the experience of the beneficiaries that have been involved during the experimentation phase. The final aim is to revise and/or re-define the Business Requirements for the CCs/DIHs (D2.4 "Scenarios, Use Cases and Requirements for MIDIH 2") and for the marketplace (D3.2 "Specification and Design of DIH one-stop-shop Marketplace 2").
D.4	**Conceptual simulation**	It consists of a guided interview that will be conducted with a representative of each user of the DIHIWARE platform. The goal is to support the DIHIWARE_v1 feedbacks collection.
D.5	**DIHIWARE new functionality specification**	The DIHIWARE functionality specification is related to a functional capability provided by the DIHIWARE, as per the nature of being an Innovation and Collaboration platform. The DIHIWARE functionality specification responds to the question **"What"** function the platform supports the user/stakeholder to perform.

D.6	**DIHIWARE new functionality implementation**	The DIHIWARE functionality implementation is related to the current tool available on the Platform (it can be referred to the usability of the tool, but it is more related to the **"How - the way in which"** the DIHIWARE platform supports the users in accessing the DIHIWARE functionalities.

Annex 2 – DIHIWARE Platform V1 Starter-Kit

The DIHIWARE Platform V1 starter-kit is available at the following URL:

https://cloudmidih.eng.it/starterkit/DIHIWARE_Platform_v1_Starter-kit.zip

Annex 3 – Feedback Gathering - Basic Survey

Feedback Type:

☐Bug Reports ☐Comment ☐Question ☐Feature Request

Describe Feedback:

Annex 4 – Feedback Collection Questionnaire

General Information

Your Organization Details:

Type of involved Beneficiaries:

Number of involved Beneficiaries:

Time Spent:

Type of provided Services:

Numbers of provided Services:

1. DIHIWARE SERVICES/FUNCTIONALITIES - PERCEIVED EASE OF USE

[Evaluation element PERCEIVED EASE OF USE=> Observed parameters: FUNCTIONALITIES/SERVICES]

1. **In the following you will find some statements concerning the functionalities and services of the** DIHIWARE**. Please indicate how far you agree with these statements.**

   The values span from 5 (I strongly agree) to 1 (I strongly disagree)

EVALUATION ELEMENTS	OBSERVED PARAMETERS	SPECIFIC OBJECTIVES	ITEM	Strongly agree (5)	Agree (4)	Neither agree nor disagree (3)	Disagree (2)	Strongly disagree (1)
PERCEIVED EASE OF USE	FUNCTIONALITIES/SERVICES	Access to Expertise	I can easily *search* for expertise through the Users and Partners Catalogues					
		Access to Knowledge	I can easily *find* a section dedicated to the success stories					
		Access to Knowledge	I can easily find a section dedicated to the Knowledge access					

		Access to Knowledge	I can easily access to information and materials (ecosystem mentoring services) ?					
		Collaborate with	I can easily move from the community exploration (access to knowledge, expertise and technology) to active participation (contacting somebody/sharing knowledge/launching new products/collaborate)					
		Collaborate with	I can easily create and manage challenges and contest in a collaborative way through the available innovation and collaboration tools (IMS system, weigh-up, multi poll)					
		Building the community	I can build and grow my network through collaboration tools accessible via dedicated functions (blogs, discussions, calendars, notifications)					
		Making Business (Supply Side)	I can easily launch new products and services using the *IT Assett Catalogue* "As proprietary" and *Marketplace* "As seller"					

1.1 Missing functionalities/services

In the following you will find a statement concerning the missing functionalities/services of the DIHIWARE. Please answer.

- Did you miss certain functionalities when using the DIHIWARE? (EVALUATION ELEMENT: MISSING FUNCTIONALITIES)

  a. Yes, namely _____
  b. No

- You'd like to have others/different services to achieve your goals (*knowledge transfers, expertise discovery, business innovation, community building and growth, new collaborations activation and business opportunities creation)?*
  a. Yes, namely _____
  b. No

- Do you think that this framework is suitable for achieving success within your business process?

2. DIHIWARE FUNCTIONALITIES – USABILITY

[Evaluation element USABILITY => Observed parameters: FUNCTIONALITIES]

In the following you will find some statements concerning the usability of the DIHIWARE. Please indicate how far you agree with these statements.

The values span from 5 (I strongly agree) to 1 (I strongly disagree).

EVALUATION ELEMENT	OBSERVED PARAMETERS	ITEM	Strongly agree (5)	Agree (4)	Neither agree nor disagree (3)	Disagree (2)	Strongly disagree (1)
Usability	EFFECTIVENESS	I can identify any learning support tools and functions useful to my special requirements					
	EFFECTIVENESS	I can easily understand contents because supported by clear and effective graphic illustrations					
	EFFECTIVENESS	I can understand the terms, names, abbreviations, symbols etc. used					
	EFFECTIVENESS	I can easily use the search function					

	EASY TO LEARN	DIHIWARE works like other sharing platforms I know					
	ERROR TOLLERANCE	I can easily go back to the previous section					
	ERROR TOLLERANCE	I understand if I made a wrong research					
	EASY TO LEARN	I can easily navigate through the workspace					
	EASY TO LEARN	DIHIWARE can be understood easily and used intuitively					

3. DIHIWARE RESULTS DEMONSTRABILITY - PERCEIVED USEFULNESS

[Evaluation elements PERCEIVED USEFULNESS => Observed parameters: RESULTS DEMONSTRABILITY, JOB RELEVANCE]

In the following you will find several statements concerning the final assessment of the DIHIWARE. Please indicate how far you agree with the statements.

The values span from 5 (I strongly agree) to 1 (I strongly disagree).

EVALUATION ELEMENT	OBSERVED PARAMETERS	ITEM	Strongly agree (5)	Agree (4)	Neither agree nor disagree	Disagree (2)	Strongly disagree (1)

					(3)		
PERCEIVED USEFULNESS	RESULTS DEMONSTRABILITY	DIHIWARE is reliable and trustworthy					
	RESULTS DEMONSTRABILITY	Using DIHIWARE can save much time					
	JOB RELEVANCE	DIHIWARE can support companies with piloting, testing and experimenting with digital innovation					
	JOB RELEVANCE	DIHIWARE provides very good possibilities to enhance collaboration among DIHs					
	JOB RELEVANCE	DIHIWARE can improve the quality of my job					
	ENGAGEMENT	DIHIWARE has all the functionalities I need to learn and share innovation contents					
	ENGAGEMENT	Dihiware updates my skills on industry 4.0					
	ENGAGEMENT	DIHIWARE is stimulating for the level of interactivity					

3.1 DIHIWARE PERMANENTE USE => PERCEIVED USEFULNESS

3.1. What is, in your opinion, the greatest advantage of using DIHIWARE and what is the functionality you think could be the most useful for you?

(EVALUATION ELEMENT: PERCEIVED ADVANTAGES)

_____

3.2. What are, in your opinion, the greatest disadvantages or problems with using DIHIWARE? (EVALUATION ELEMENT: PERCEIVED DISADVANTAGES)

_____

3.3. Do you recommend to use DIHIWARE at your workplace permanently? (EVALUATION ELEMENT: PERMANENT USE AT WORKPLACE)

a. Yes, for the following reason: _____

b. No, for the following reason: _____

Annex 5 – Semi Structured Interview Questions_IMR

The following are proposed open-ended questions. Answers with additional comments will be recorded.

- What is your role at XXX? When you need to source material or information for your work, what do you do, and where do you go? (Establishes context and user needs)

- If you would choose to use this platform, what would you use it for? How often would you use it? Do you know of any similar platforms? How do they compare? (Provides insight into SME user journeys and SME opinion of platform competitors)

- What is the main purpose (or function) of this platform, as you see it? (Provides insight into primary functionalities of the platform, this may be useful for 'less is more' recommendations)

- Would you use this platform to communicate (message and/or chat) with other members? Why? If no, why not? How do you prefer to communicate with your colleagues/members of the platform? (Provides insight into preferred methods of communication and possible alternatives)

- Do you think you would use the Social Networking part of this platform? Why? If no, why not? (Quantitative response as to the need for email and chat functionality and social networking)

- What would you consider to be this platform's USPs? What should this platform's USPs be? What functionality would you like to see here, that you can't get anywhere else? (Provides direction for growth or later phasing of the platform)

- Do you think you would upload content to the platform? If yes, what kind of content? If no, why not? (Gives insight into attitudes relating to IP and platform content population, while asking if the platform has relevance for the user and his peers)

- Could you describe the platform in 6 words: 3 positive and 3 negative? (Provides focused description)

TASK 1: You are a member of the platform. You are hosting a webinar for your company and would like to let people know about it. Please login to the platform and share the information about your webinar. And/or (depending on time available).

TASK 2: You are not a member of the platform. You are a medium sized Data Analytics enterprise and would like to explore new project ideas. Please visit the platform landing page (prototype) and seek out project ideas for data Analytics.