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D3.1

Specification and Design

of DIH one-stop-shop

Marketplace 1

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

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Deliverable Title: Specification and Design of DIH one-stop-shop Marketplace 1

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Executive Summary:

Deliverable 3.1 "Specification and Design of DIH one-stop-shop Marketplace 1" is the first deliverable of WP3 "Network of Competence Centers and pan-EU DIHs in CPS/IOT" whose purpose is the deployment of the MIDIH Innovation and Collaboration Platform, which will be referred to in the project as the DIHIWARE Platform and is setting the scene. 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.

Del. 3.1 is the first iteration of the specification of the requirements intended to guide the design of the DIHIWARE Platform. It gives an overview on the planned concept of the platform, the involved stakeholders and their requirements, the accessibility and the roles users can have in the platform (chapter 2). Furthermore, an initial outline for the services to be provided in the platform is presented (Chapter 3) including the "Access to" and "Collaborate with" services. Finally, a first iteration of the DIHIWARE platform is presented based on the indications/feedback from partners about what is currently already available in the different CCs and DIHs (Chapter 4). This deliverable also provides in the conclusions already an indication about the next steps planed for the second iteration that will be reported in D3.2.

The collection of the requirements' specification feeding the first instantiation of the DIHIWARE Platform as presented in this deliverable will provide the input for D3.3 "Specifications and Design of DIH/CC Services 1", whose main objective is to model and develop the "Access to" services as reference workflows guaranteeing the DIHs/CCs stakeholders to have access to technological solutions, funding opportunities and shared knowledge and featuring the DIHIWARE Platform.

In addition to that, D3.1 – as setting the scene – will guide the first release and deployment of the DIHIWARE Platform, which will be instantiated in **D3.5** "DIH Collaboration Platform v1".

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1 Introduction

1.1 Scope of the deliverable

The main purpose 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 first iteration process of the specification of the requirements intended to guide the design of the DIHIWARE Platform.

As MIDIH is characterized by a complex and multi-stakeholder ecosystem, different entities are required to contribute to WP3.1 (which guides the activities required to meet D3.1 objectives) by providing their experience and know-how to set the scene for the first instantiation of the DIHIWARE platform.

As WP3 follows the double iteration process logic characterizing the MIDIH project[1], the collection of the requirements' specification feeding the first instantiation of the DIHIWARE Platform will provide the input for D3.3 "Specifications and Design of DIH/CC Services 1", whose main objective is to model and develop the "Access to" services as reference workflows guaranteeing the DIHs/CCs stakeholders to have access to technological solutions, funding opportunities and shared knowledge and featuring the DIHIWARE Platform.

In the second iteration cycle of MIDIH project, we expect to be able to confirm or provide a refinement of the services provided to the MIDIH network of stakeholders through the DIHIWARE, including specification of workflows and best practices.

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[1] The majority of the deliverables in MIDIH has a first iteration at the beginning of the project which is setting the scene and a second iteration in the last months of the project where project work and results are matched with the first iteration and integrated in the second edition of the related deliverable.
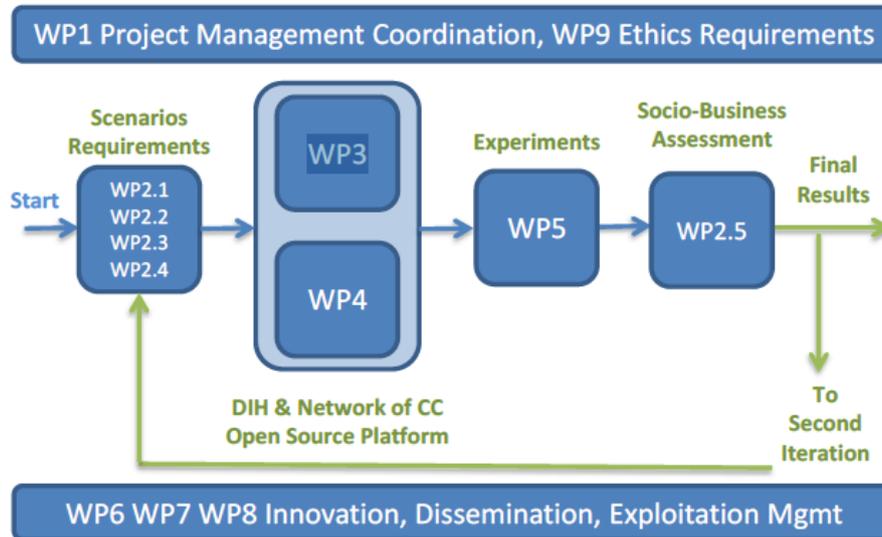
1.2 Contribution to other WPs and Deliverables

Figure 1 - D3.1 contribution to other WPs and deliverables

D3.1 "Specification and Design of DIH one stop-shop Marketplace 1" is the first deliverable of the **WP3** "Network of Competence Centers and pan-EU DIHs in CPS/IOT". This deliverable aims at defining the requirements, functionalities and specifications of the MIDIH Collaboration Platform (referred to as DIHIWARE Platform), which is intended to be a 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. According to the iterative structure of the MIDIH project (refer to **WP2**, D2.1 "Requirements Engineering Methodology and Tools 1" for further details), D3.1 will guide the first release and deployment of the DIHIWARE Platform, which will be instantiated in **D3.5** "DIH Collaboration Platform v1" and included in **WP7** (D7.1 Dissemination and Impact Action Plan") and part of **WP8** dissemination and exploitation activities (D8.1 "Exploitation Economic Impact Action Plan v1").

In the second iteration of MIDIH project, D3.1 will serve as streamline for the release of **D3.2** "Specification and Design of DIH one stop-shop Marketplace 2". The feedback loops on D3.1 will be included in D3.2, providing further inputs for an improved specification and then instantiation of the DIHIWARE Platform according to the elicited needs and expected functionalities that the one-stop-shop marketplace is expected to satisfy. In this respect, the nine CCs, the three pan-EU DIHs, the two Regional Manufacturing DIHs and the two Didactic Factories will contribute to model and develop the "Access to" and "Collaborate with" services the DIH one-stop-shop marketplace should provide to the Manufacturing Industry and Digital Innovators in order to boost the European Manufacturing competitiveness by supporting the manufacturing digitalization. The specification of requirements and the design of the services

the DIHIWARE Platform is going to provide will be the very first input then for **D3.3** "Specifications and Design of DIH/CC Services 1".

The final specification and implementation of the DIHIWARE Platform and its instantiation for DIHs and CCs in the MIDIH ecosystem will be the core of **D3.6** "DIH Collaboration Platform v2".

The specification of requirements of the DIHWARE Platform is strictly connected to the functionalities and services to be offered through the platform itself.

2 DIHIWARE: The Innovation and Collaboration Platform for Digital Innovation Hubs

Digital technologies are dramatically changing the way we design, produce and commercialise all types of goods and services. They will shape the markets of the future. To reap the potential of digital technologies across the European economy, industry in all sectors and everywhere in Europe needs to integrate digital innovations as an essential part of value creation in enterprises' business strategies. As opportunities of digitisation are recognized around the world (triggering a corresponding level of investments across the globe) digitisation can be either an opportunity or a threat, depending on the timeliness and the adequacy of one's response to it.

The way companies use information and communication technology (ICT) has a major impact on their productivity and their innovation capacity. The "smart" use of ICT is an important success factor for the competitiveness of European companies, particularly for SMEs.

With the rapid pace of change in digital technologies, most decision makers in industry have difficulties to decide when to invest, up to what level and in which technologies. Around 60% of large industries and more than 90% of SME feel lagging behind in digital innovation[2]. Similarly, there are strong digitization discrepancies between industrial sectors. In this context, Digital Innovation Hubs (DIHs) can help ensure that every company, small or large, high-tech or not, can grasp the digital opportunities.

As it is well known, DIHs are ecosystems that consist of SMEs, large industries, start-ups, researchers, accelerators, and investors with the aim of creating the best conditions for long-term business success for all involved[3]. DIHs **act as a one-stop-shop**, serving companies **within their local region and beyond** to digitalize their business. They **help customers addressing their challenges** in a business-focused way and **with a common service model**, offering services that would not be readily accessible elsewhere.

As **an innovation ecosystem** that provides access to the services, facilities and expertise of a wide range of partners, DIHs ensure that different customer segments get the services they need, that DIHs co-operate effectively with each other, and that the supporting competence centres (CCs) create solutions that are easy to scale. The core of DIHs is in fact CCs, which have proven to be very valuable in helping companies tackling their digitization challenges and that have a strong sectoral/regional focus. The services available through DIHs enable companies not just to identify technical solutions, but to finance and nurture their digital innovations to a level that they can actually implement within their business and contribute to improve their competitiveness.

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[2] "Digital Single Market Policy: Pan-European network of Digital Innovation Hubs (DIHs)" by EU available at: https://ec.europa.eu/digital-single-market/en/digital-innovation-hubs

[3] "Digital Single Market - Glossary" by EU available at: https://ec.europa.eu/digital-single-market/en/glossary#letter_d

In this context, MIDIH project attempts to play an important role: it aims at implementing the fast, dynamic, borderless side of the innovation collaborative network. The wish is to ensure that every industry in Europe can fully benefit from digital innovations aiming at upgrading products, improving processes and adapting business models to the digital age. This requires the possibility to have fully access to digital innovations through a new platform, whose objective will be jointly working as a "one stop shop" of services, providing industry with access to the most advanced digital solutions and industrial competencies.

2.1 The DIHIWARE Platform Concept

In the overall industrial scenario, enterprises have to face a lot of difficulties. According to several surveys, close to two-thirds of managers in industry say they[4]:

- have difficulties in **assessing the Return on Investment** ascribable to digital innovations;
- have problems with **trusting** the technology;
- are not sure about the **maturity** of the latest technologies (Big Data, AI, robotics, …);
- are not clear about **compatibility/interoperability** with legacy systems;
- are afraid of **being locked in with one vendor**.

For SMEs, the proportion is even higher. Thus, there is a clear need from industry not just for information but also to be able to assess and understand the practical implications of digital innovation, and then to test and experiment before implementing it.

In this global scenario, the **DIHIWARE Platform** will represent a **support facility** that helps companies to become more **competitive by improving their business/production processes** as well as products and services by means of digital technology. The Platform will act as a one-stop-shop marketplace for DIHs, serving companies **within their local region and beyond** to digitalise their business.

The DIHIWARE Platform is intended to be an IT integrated platform to support both the "Access to" and "Collaborate with" services of a network of CCs and pan-EU or Regional DIHs. The services available through the Platform will enable any business to **access the latest knowledge, expertise and technology** for testing and experimenting with digital innovations relevant to its products, processes or business models. Services will also **provide connections** with investors, facilitate access to financing for digital transformations, and help connecting users and suppliers of digital innovations across the value chain. These services are of particular relevance to **companies which currently have a relatively low level of digitisation** and which do not have the resources or personnel to address the digitisation challenge (for instance SMEs).

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[4] "Working Group 1 - Digital Innovation Hubs: Mainstreaming Digital Innovation Across All Sectors" available at: https://ec.europa.eu/futurium/en/content/report-wg1-digital-innovation-hubs-mainstreaming-digital-innovation-across-all-sectors-final

Furthermore, the Platform will also support communication among different DIHs: considering every DIH specialisation, through the networking of DIHs, competences not available within the regional DIH may be found easily in another DIH using suitable services. This mechanism will lead to specialisation and excellence and will avoid that every region needs to invest in all competences necessary for the digital transformation.

The DIHIWARE Platform tries to reflect industry needs; this amounts to more than simply a list of solutions and services, in particular:

- Acting as **a one-stop-shop** for companies and providing **a gateway** to specialist platforms and infrastructures;
- Possessing **significant know-how** spanning, for example, across technical disciplines and between technology and non-technology areas (e.g. business, finance, law, IPR);
- Ability to market themselves and **proactively identify relevant customers** for their services;
- Ability to **'speak the language' of SME businesses** and understand their needs.
- Understanding of **business models and business transformation** and being able to help companies transform;
- Ability to work with companies at **all levels of digital maturity**, including offering low-tech transfer to companies lower down the maturity curve;
- Ability to **broker** between the needs of industry and relevant technology providers in **an independent and unbiased way**;
- Ability to **assess current and future skills needs** and provide appropriate support;
- Providing **funding or facilitating access to funding** from external sources.

These aspects are reflected in the platform service offer and operating characteristics as described below (Chapter 3).

During the first experimentation in the MIDIH project, different configurations are needed for three typologies of MIDIH ecosystem entities, each one characterized by a particular attention to different aspects: pan-EU DIHs, with a specific focus on the multilingual aspect; regional DIHs, including also CCs willing to transform; regional CCs, with a distinctive attention to knowledge management aspects rather than the e-consultancy feature (synchronous in some cases, as in the download of documents or reports, but very often asynchronous, as embedding complex negotiations transaction). Details concerning the setup for the first iteration will be proven in Chapter 4.

2.2 The Platform Users and Stakeholders

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. 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 stakeholders that will be users of the Platform (as outlined further in this chapter), the

DIHIWARE platform will be designed to meet multiple needs in support of the industrial interactions between buyer and seller that market products and services.

The DIHIWARE main stakeholders are every kind of business, technical or research partner of the network identified among the Manufacturing Industries, Digital Innovators and entities featured by different nature and scope which may share interests and intents commonality with the DIH:

- SMEs (Manufacturing Industries). Manufacturing companies operating in different domain, areas that market products/services in their regional area;
- SMEs (Solution providers). Innovative incumbents whose main characteristic is the high level of technological know-how, providing the market with new digital solutions;
- IT start-ups/web entrepreneurs. Innovative new comers whose strengths lie in the human capital employed;
- Incubators. They support the starting-up and scaling-up of manufacturing companies towards the definition of business models, processes and plan to move forward the I4.0 digitalization;
- Industry associations. They operate at local/regional level, being spoken person and information amplifier of the I4.0 potentials and opportunities for the manufacture;
- Governments & official institutions. They represent the European Commission I4.0 foreseen goals and plans at local/regional level;
- Investors. Financing I4.0 projects and initiatives;
- Research & universities. Educational and training poles on Digital Innovation, forming professionals ready to enter the manufacturing word with awareness and digital competencies.

The DIHIWARE stakeholders can join the Platform both as individual users and organization members. Each user has to belong to an organization to have access to the DIHIWARE, but she will be able to contribute to the ecosystem by herself (e.g. participating to the discussions or publishing new content), as well as a restricted number of users will be entitled to be the voice of the referred organization (e.g. publishing lesson learned and success stories of their businesses). The organization's contact person determines who of its members has the possibility to perform selected functions rather than others. In any case the users of the portal are generated by the platform administrator.

2.3 DIHIWARE requirements from the Stakeholders

Due to the fact that the Platform users are all stakeholders, a wide understanding of the stakeholders' needs is functional to the design and instantiation of the DIHIWARE Platform. MIDIH stakeholders are part of a complex network and are plenty, thus specific requirements are individually elicited, defining the type of support/services each of them looks for when accessing and experiencing the Platform services.

SMEs (Manufacturing Industries)

- Access to experts' advice and a real experimental environment, increase knowledge, train employees in innovative technologies;
- Access to funding;
- Accessing Innovative Digitalization process and solutions related to an R&D environment by tiling of technological solution choice;
- Learning how to apply digitization (i.e. up-to-date software and networking standards / technologies / methods / development processes) to improve IT and control systems in the plant (e.g. support in processes optimization through the integration of CPS systems already existing or planned at shop floor level);
- Learning how to apply digitization to improve control/automation technology embedded in own products;
- Solving technical problems seeking for rental of premises, rental of cloud services and IT support and for advice/assistance with the adoption of CPS/IoT technologies;
- Support in strategy and business development;
- Technology transfer through a theoretical approach (competences and knowledge transfer and training) and practice (use of physical assets for simulations, pilot tests, etc.).

SMEs (Solution providers)

- Access to experts' advice;
- Access to new technology;
- Access to potential collaborators/new partners and customers;
- Access to Real Life Proof of Concepts (e.g. Demos, simulations, pilot tests, etc.)
- Access to rental of premises, rental of cloud services and IT support;
- Learn about new software/networking standards, technologies and methods that are specific to the manufacturing domain, while examining their benefit and applicability;
- Opportunities to showcase products/solutions;
- Support in broadening the current business/market;
- Technology development support including the integration/connection with current technologies.

IT start-ups/web entrepreneurs

- Access to business trainings and couching;
- Access to experts' advice to increase knowledge;
- Access to funding;
- Access to incubation and entrepreneurship acceleration program;
- Access to innovation projects;
- Access to talents;
- Test bench (testing technology), connection with institutional / industry associations and matchmaking opportunities with new potential customers, training courses, etc.;
- Testing and hardening of products and services.

Incubators

- Access to acceleration schemes;
- Access to experts' advice, increase knowledge, develop new skills;
- Access to incubation programs and consultations;
- Access to network of Investors;
- Access to potential collaborators/new partners;
- Scientific advisory in selected aspects related to factories of the future;
- Support in strategy and business development.

Industry associations

- Access to competences / create a link to associated companies to solve problems;
- Access to potential new members;
- Broad relevant expertise and professional development;
- Increase the take up of Digital to reinforce competitiveness;
- Joint events;
- Members education and training in selected innovative topics;
- Promoting of technologies and standards;
- The associations are the spokesperson for the needs of solution providers and manufacturing industries, seeing DF as a matchmaking environment between supply and demand.

Governments & official institutions

- Access to advice and support for the DIH development;
- Access to industry;
- Access to knowledge transfer (e.g. workshops);
- Access to new/enhanced opportunities for economic development;
- Achieve local/regional competence in digitization and Industry 4.0;
- Find support in the DIH, which should act as innovation leader and communication hub for their customers;
- Contribute to acceleration of value creating ecosystems;
- Support manufacturing SMEs to approach the I4.0 technological solutions, aiming at the development of the manufacturing sector and its competitiveness on a global scale.

Investors

- Access to promising investment opportunities;
- Connect the university to the labour market.

Research & Universities

- Access to experts' advice to increase internal knowledge;
- Access to new innovation projects and experimentations;
- Creating models to support industrial digitalization;

- Increase the scientific publications in the I4.0 topics;
- Innovating and the renewing the knowledge of the professional figures already employed in companies);
- New research projects;
- Research Education Innovation (e.g. providing advances courses and lectures on digital topics;
- Searching for potential research and experimentation partners;
- Support for collaboration services between research labs and start-ups/SMEs.

2.4 The Platform Accessibility and the Enrolment Process

2.4.1 Enrolment process

The registration process changes with the type of user, and who is going to access the platform, could be an ICT provider or a manufacturer. Those two entities can access the platform as Organizations, or as single workers associated to the organization.

When entering the login or new registration page for the enrolment process you are asked if you register as individual or as an organization.

o Registration process for organizations

The basic registration requirements are:
- General Information (name of the company, address, telephone, details of contact persons)
- Detailed information on the application domains, competencies, projects they are involved in, affiliations to associations, etc.
- Information on who is entitled to act on behalf of the Company
- Email address of the delegated worker (to whom the access credential will be send)

o Registration process for individual

The basic registration requirements are:
- Name and Surname
- Email address[5]
- Company name
- Role (internally the organization

Once registered and get the access credentials, the user can update his profile (either organization or individual) and start collaborating within the ecosystem.

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[5] Usually the email address constitutes the UserId.

2.4.2 Access to the Platform

Users can login with their credentials (received by email after registration) in the DIHIWARE Platform, selecting the «Login» button. Once logged-in users will be able to access both, all platform applications and the marketplace for buying / selling activities.

The access to the platform is performed by use of the credentials associated with the individual user and what appears at the time of access are: workspace, applications granted to the profile associated with the logged user, search bar for universal content retrieval, notifications.

2.5 Platform Roles

To access the DIHIWARE functionalities, several user roles and permissions are associated with the Platform. The main foreseen roles are presented here below:

- **System Administrator**: The system administrator is the person who is responsible for the upkeep, configuration, and reliable operation of the DIHIWARE Platform, seeking to ensure that the uptime, performance, resources, and security of the system she manages meeting the needs of the users. System administrator responsibilities are, fundamentally, about the care of the general system and also cover the specific applications. She is responsible for effective provisioning, installation/configuration, operation, and maintenance of systems hardware and software and related infrastructure. The main responsibilities are related to: install and configure software, set up users' accounts, manage technology tools, monitor system performance, ensure security through access controls, providing technical support.

- **DIH Content Manager**: The DIH Content Manager is a professional who provides expert advice in a particular area, such as security, industry, management, education, or any of many other specialized fields. She represents an expert or an experienced professional in a specific domain and has a wide knowledge of the subject matter, being able to use it for business purposes. She has no administrative role, but he acts as an honest broker, trying to help people and organisations to resolve a problem or arrange a deal by talking to all sides and finding out what they want, without favouring any one side but factorizing competences and solutions. Besides being a mediator, considering his long business experience and domain knowledge, she will represent an animator of discussions, becoming also an innovation booster.

- **Organization Content Manager**: The Organization Content Manager represents a specific role dedicated for detailing organization characteristics for each specific organisation registered. The organization content manager will be responsible for developing the voice for all aspects of the organization's online presence. He has good communication skills and advanced knowledge of organizations' main distinctive elements, so she will be in charge of writing, editing and proofreading these contents generally referring to the

overall organization itself. For example, only certain organization members will be allowed to add industrial success stories provided by the selected organization.

- **Community Member** (individual or organization member): This role represents every single user accessing the Platform and using its functionalities; she can belong to a specific organization or could be an individual member. She can access a collaboration workspace where she can collaborate with other users and exploits all platform functionalities according to her requirements. Through the Platform, she can find all that she needs to know about, navigating and using the community, taking advantage of the tools provided to make the most of the potential in a network. The platform member manages to stay informed, to seek experts and specialists, to find and get expert shared knowledge.

3 The DIHIWARE services

The objective of the **DIHIWARE Platform** is to overcome the current barriers preventing start-ups and SMEs to directly address the Manufacturing Industry market. Through the Platform, users will be able to find information about market-related events (e.g. webinars, hackathons, corporate-brokerage events, etc.) and to post their requests/challenges while potential providers will be able to get in touch with them and start discussing concrete deals. In addition, SMEs need to be supported in their request for new funds for growth (access to capital). In fact, access to finance is one of the most critical factors currently limiting the implementation of Industry 4.0 by manufacturing SMEs. The proposed Platform also includes primitives for collaboration, including idea management and collaborative decision making.

The services available may be categorized under three pillars – see Figure 2:

- **Innovation activities**, concerned with identifying opportunities for digitization, and developing and validating innovative solutions based on cutting-edge technology;
- **Business development**, concerned with helping companies to apply their solutions, assess the business implications, and manage the resultant changes; and
- **Skills creation**, concerned with building innovation capacity through enriching human capital.

Figure 2 - DIHIWARE Platform pillars

In particular the Platform offers a catalogue of **B2B services** that are connected to the idea that the Platform has to behave as a one-stop-shop for industrial partners to access technology, knowledge and market and to enable collaborative processes. Therefore, it is important also to model and take an inventory of organizational assets and human competencies. Main services that will be offered can be divided into two main categories: the "Access to services" will enable users gather information about skills, technological and business matters (Competencies, Technology, Industrial Experiments, Knowledge, Market), while the "Collaborate with services" will enable dynamic interactions and collaborative creative processes among users (Open Innovation and Social Networking).

These services will be complemented by **cross functionalities** supporting the general mode of operation, that are: Searching Functionalities, Multi-lingual support, Guide for content creation, Workflow monitoring and support.
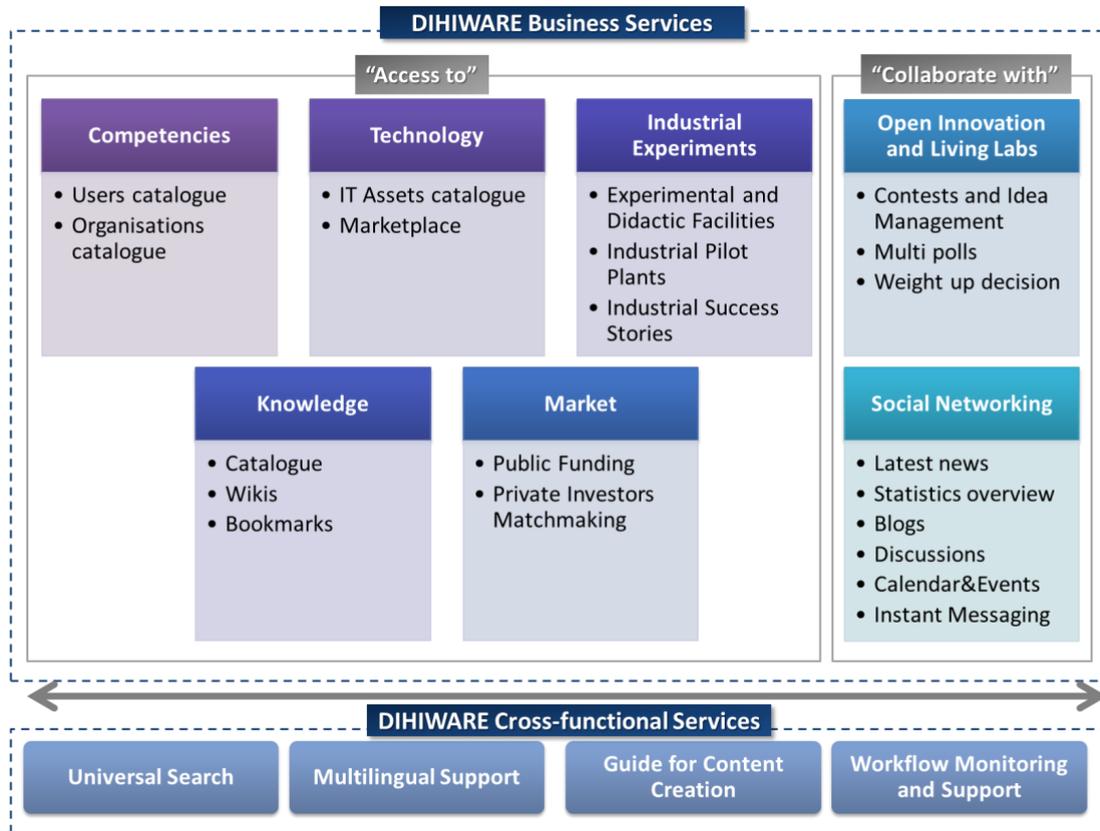
Figure 3 - DIHIWARE Portfolio of services

3.1 The DIHWARE "Access to" services portfolio

3.1.1 "Access to Competencies" services

In case a new application requires specific knowledge, a collaborative process may be initiated to share information and competences available at the CC of the DIH. This is the reason why it is necessary to develop a common repository for human competencies and industrial assets in the chosen manufacturing domain, in order to profile and cluster all the human entities gravitating around the CC's specific technology and to enable partners' selection. Access to Competencies services includes an inventory of Industrial capabilities and Human Skills needed to implement Industry 4.0 projects.

This section is composed by two different applications:

- **Users catalogue**: a collection of platform users, characterized by their skills and competencies (according to a predefined vocabulary), belonging to specific organisations; users' role, skills, activities, etc. are detailed in this section. A table containing a list of all users is shown, and for each user a detailed description is available.

- **Organisations catalogue**: an application used to define organization main characteristics and offered competencies, described according to a predefined taxonomy for organization description; their main characteristics such as application domains, competencies, projects

they are involved in are detailed here. A table containing a list of all partners will be shown, and for each partner a detailed description will be available.

3.1.2 "Access to Technology" services

The "Access to Technology" services provide an overview of technology information, useful for users and organisations looking for a solution, addressing needs and requirements specific to a specific area. This section involves structured applications to help and support SMEs and industrial companies to find the solution to a specific wicked problem they are experimenting, for which they do not know if a solution exists or if existing solutions really fit their needs and actually solve their problem, leveraging on specific technological competences: identification of IT assets and Open Source Software (OSS) catalogue; consultancy activities on the reference architectures; access to applications marketplace to support the business scenario. The company can be redirected to the DIHIT Technologies Repositories to refine their products by means of Open Source components for the most generic and commoditized functions.

The section is composed of two main applications:

- **IT Assets Catalogue**: it is a collection of technological solutions and components; for each component, details concerning technical implementation are provided. This catalogue of components, services and tools developed and existing could be useful to an organization or user to solve a technological problem, business, etc. Each solution will be provided with information on the last update of the component, owner of the component, description of what the component does and related useful information (manuals, documentation, and connection to multimedia resources that can better present the characteristics of the product or service).
- **Marketplace**: it represents a Technologies and Services Repository, providing user with the access to different types of products. The Marketplace is the virtual place where it is possible to have access to components and services that are made available through the platform with mechanisms related to the business model chosen for the marketing of the single product or service (free, pay per use, etc.). The products currently available and marketed on the platform are displayed here. The products' details include general information, description, characteristics, business model (for free or not)). The products can also be organized within catalogues, according to user's considerations, and they will have social characteristics (e.g. in order to visualize the most popular products).

3.1.3 "Access to Industrial Experiments" services

SMEs get inspiration for their Industry 4.0 projects, by analysing the existing experiments. It is possible to take advantage of the best practices and exploit test open results and environments provided by the Industrial Experiments. The objective is to develop structured services to support SMEs and industrial companies in understanding new experimental and technological trends in specific domains and explore and test new technologies that can be interesting for SMEs and that potentially can be applied to processes or products, with a "hands on" approach.

This section should comprise:

- **Experimental and Didactic Facilities**: this section collects a list of buildings shared by academic institutions and available to carry out experiments; the final purpose is to evaluate and develop new technologies and practices, aiming at meeting the expectations of the industry, consumers and citizens. Experimental means are made available and can be adapted according to the needs of external partners to evaluate different production strategies.
- **Industrial Pilot plants**: It is a section dedicated to the most useful facilities made available from organizations to the platform's users who need to make experiments and tests. Information about the organization, the person who is responsible for the facilities, contact info, etc. will be provided.
- **Industrial Success Stories**: it is a showcase of successful industrial cases. Companies that have implemented products or services, utilizing the MIDIH platform and assets, and that have been successful in experiments tell what their process was (their story), to be an example for other companies. Companies report their implementation cases they implemented to solve a given problem (situation before the trial). For each story, the company can report information on what has been done, the actors involved, results achieved expressed with KPI, technological partners involved, contact information of the trial.

3.1.4 "Access to Knowledge" services

"Access to Knowledge" services include online access to educational information and materials and consultancy services related to different thematic domains. The Platform aims also to deliver effective training programs for industrialists to enable the uptake of the technologies. Particular attention will be paid both to industrial users and to SMEs customers. In particular, education activities could be offered, e.g. industry 4.0 courses and workshop, seminars (i.e. on cloud infrastructures) and interactive creative sessions.

It will be a multimedia library based on three main services:

- **Catalogue**: it represents a knowledge base, structured according to partners' needs; here it will be possible to find information about tools and methodologies useful for managers at all levels to evaluate the effectiveness of their performance in all areas of responsibility, and determine what improvements are required (e.g. self-assessment services; maturity models; migration pathways; 6P models, DREAMY).
- **Wikis:** it is a collaborative tool to share user's knowledge in a formal structured way, making it available to all Platform members. Several policies can be built in order to enable a specific role to populate the Wiki, or it could be possible to open this service to the whole community.
- **Bookmarks:** it offers the opportunity to share interesting links, organizing them in folders, and exchange comments upon the referred resources.

3.1.5 "Access to Market" services

This set of services will enable different organisations, especially manufacturing SMEs, to look for possible access to public/private capital sources in order to implement their Industry 4.0 projects.

- **Public funding**: these services will make available to companies, information about funding opportunities, both public and private, provided on a regional/national or EU level and will provide the chance to directly contact the relevant organization through the portal. Through it, SMEs and start-ups will be able to find all information about the investment program that best suits their needs and will be provided with indications concerning how to get in touch with the persons in charge of the different programs. They will consist in a set of services in order to catch opportunities (Proposal preparation, project management, and dissemination and exploitation booster services).

- **Private Investors matchmaking (elevators pitch)**: to support in filling the gap in funding, this service connects entrepreneurs with investors, enabling the access to resources well beyond their geography. As a result, start-ups in more rural communities or in places with a shortage of venture investors will benefit from the geographic neutrality of this application, enhancing the ability to refer business opportunities. Through the search function and deal-matching capability, it connects users who are seeking capital with those who are actively pursuing private equity investment opportunities, enabling potential business mechanisms.

3.2 The DIHWARE "Collaborate with" services

3.2.1 Open Innovation and LivingLabs services

"Access to Open Innovations and Living Labs" services gather a set of tools useful for industrial solution providers (mostly start-ups and web entrepreneurs) to share and validate their ideas, to design and deploy a growth plan towards the market. New ideas are generated and assessed by different types of services, such as opportunity management. This set of applications has a twofold perspective: for industrial solution providers (mostly start-ups and web entrepreneurs) to validate their ideas and to design and deploy a growth plan towards the market and investors.

- **Contests and Idea Management**: this application will be used to start a competition to involve other people interested in a particular subject, and will enable users to participate to contests, creating and sharing their ideas in a collaborative creation way.

- **Multi polls**: it will be a useful tool for voting mechanism in a large audience to reach group consensus through a simple iterative process.

- **Weight up decision**: it will represent an easy way to share new decisions in order to collect users' opinions; it encourages each member of the community to consider other points of view for a well-balanced decision.

3.2.2 Social Networking services

"Access to Social Networking" services will offer the opportunity to connect and interact with all individuals and organizations contributing to the ecosystem. Social networking spaces have been created to facilitate communication between all the players accessing to the DIHIWARE Platform, sharing information in the easiest way. In particular it is possible to find:

- **Latest news**: this section collects recent information internal to the DIH or belonging to organisations within the DIH;
- **Statistics overview**: this includes descriptive information on the individuals as gender, age, education level, professional position, pages viewed, services accessed, etc. The results could be used to make an analysis on the usage of the platform and eventually to better tailor the DIHIWARE platform in terms of features and functionalities.
- **Blog**: it represents an informal way to share and publish different types of contents (e.g. news, experiences, observations, opinions, etc.); posts are displayed in reverse chronological order, so that the most recent post appears first, at the top of the web page
- **Discussion**: it is a dedicated space for informal debate; discussions represent consideration or examination by argument, comment, especially to explore solutions, enabling consideration of a question in open and usually informal debate.
- **Calendar&Events**: it represents a useful solution to share information about interesting events, project meetings, etc.
- **Instant Messaging**: all the members of the Platform can use an IM service to chat with the other online users.

3.3 The DIHIWARE cross functional services

There are two features of the DIHIWARE Platform that represent important cross functional services:

1. **Universal Search**: the universal search functionality is transversal over the multiple platform applications; in particular, it allows to search for the topic of interest in several applications at the same time (e.g. documents, discussions, etc.). It is possible to find everything that can be useful and interesting by applying the filter of categories and domain. It is also possible to benefit from the suggestions shown in real time in the search box when typing in the query if the user decides to search for a resource from a term.
2. **Guide for content creation**: this is a useful functionality that supports users during the generation of information made available through different services; it is a sort of template helping, step by step, the creation of standardised content for the different categories of "Access to" applications.
3. **Workflow monitoring and support**: this service consists in the modelling and execution of B2B typical interaction workflows, so that users can be constantly monitored in their interaction with the system and can receive useful advice in order to improve and maximise their platform utilisation.

4 DIHIWARE Platform: First iteration

The MIDIH Platform offers access to different types of services targeted for different actors belonging to ecosystems; for example, manufacturing SMEs face specific problems related to the need to rejuvenate their working and business models to fully grasp the benefits of Industry 4.0, while start-ups undergo a first assessment concerning their products/services portfolio.

For the first platform iteration, different configurations are needed for the 3 typologies of MIDIH entities:

- Pan-EU DIHs;
- Regional DIHs (also CCs willing to transform);
- Regional CCs.

In order to set the scene for the design of the DIHIWARE, the following table reassumes the current services provided by the MIDIH entities. This information will be used as starting point in D3.3 "Specifications and Design of DIH/CC Services 1" to turn the current service offer into a valuable portfolio of services managed through the DIHIWARE Platform.

Table 1 Services actually provided by MIDIH Partners

			Pan-EU DIHs	Regional DIHs	Regional CCs
Access to Competencies	*Users catalogue*	a collection of platform users, characterized by their skills and competencies	IDSA		CC2, CC5, CC1
	Organisations catalogue	an application used to define organization main characteristics and offered competencies	IDSA, FF		CC2, CC4, CC5, CC6, CC1
Access to Technology	*IT Assets Catalogue*	a collection of technological solutions and components; for each component, details concerning technical implementation are provided	IDSA, FF		CC2, CC4, CC5, CC3, CC1
	Marketplace	a Technologies and Services Repository, providing user with the access to different types	FF		CC2, CC1

		of services. The Marketplace is the virtual place where it is possible to have access to components and services			
Access to Industrial Experiments	*Experimental and Didactic Facilities*	a section dedicated to experimental/didactic facilities made available from organizations to the platform's users	IDSA		CC2, CC4, CC5, CC3
	Industrial Pilot plants	a section dedicated to the most useful facilities made available from organizations to the platform's users who need to make experiments and tests	FF		CC2, CC1
	Industrial Success Stories	a showcase of successful industrial cases	IDSA, FF	Strat	CC2, CC6, CC1
Access to Knowledge	*Catalogue*	for example access to maturity models; migration pathways; 6P models, DREAMY	IDSA, FF		CC2, CC6
	Wikis	a collaborative tool to share user's knowledge in a formal structured way, making it available to all Platform members	IDSA, FF		CC2, CC3, CC1
	Bookmarks	it offers the opportunity to share interesting links	IDSA		CC2, CC4, CC5
Access to market	*Public funding*	these services will make available to companies' information about funding opportunities, both public and private	IDSA		CC2, CC5
	Private Investors matchmaking (elevators pitch)	for example, elevators pitch			CC5, CC8
Open Innovation and LivingLabs	*Contests and Idea Management*	it enables users that share interest to a particular subject to participate to contests,	IDSA, FF		CC1

		creating and sharing their ideas in a collaborative creation way			
	Multi-polls	tool for voting mechanism in a large audience to reach group consensus through a simple iterative process	IDSA		CC1
	Weight up decision	easy way to share new decisions in order to collect users' opinions; it encourages each member of the group to consider other points of view for a well-balanced decision	IDSA		
Social Networking services	*Latest news*	this section collects recent information internal to the DIH/CC or belonging to organisations within the DIH/CC	IDSA, FF	Strat	CC2, CC4, CC6, CC3, CC1
	Statistics overview	of various types	IDSA, FF		CC1
	Blog	informal way to share and publish different types of contents	IDSA, FF		CC2, CC6, CC3
	Discussions	dedicated space for informal debate	IDSA, FF		CC2
	Calendar&Events	share information about interesting events, project meetings, etc	IDSA, FF	Strat	CC4, CC5, CC1, CC3
	Instant Messaging	the members of the Platform can use an IM service to chat with the other online users	IDSA		
Multi-lingual support			IDSA		CC6, CC1

5 Conclusions

With D3.1 deliverable, task T3.1 reaches the end of its first iteration as expected on M6. D3.1 gathers all the work performed by DIH/CC owners and technical partners to define the different business scenario tackled by the DIHIWARE Platform, how it looks like now and how it will look like in the future, after MIDIH second iteration. Problems and bottlenecks of the services provided by each DIH/CC have been identified and gathered as challenges to be solved by the MIDIHWARE Platform. The information gathered on D3.1 is this first stage, so it will need to be completed and refined in the future, once the development and validation of the MIDIH solutions begin for each DIH/CC. But the ideal targets are clearly identified here so that all the consortium can work with a clear objective.

The information in D3.1 feeds the initial activities in Tasks 3.2, 3.3 and 3.4 to identify and prioritise the key challenges to be overcome by MIDIH. It is used as well as common ground to refine the initially proposed reference implementation of the DIHIWARE Platform and define the service portfolio offered by the MIDIH ecosystem.

The services defined above will be refined during the next iteration, and the user will be provided with additional features. In particular, the main features currently under investigation for the next steps are:

1. An improvement and extension of news shared through the Platform based on the implementation of spider web sniffers, in order to get changes and sniff news in the organisations associated with the DIH.

2. A further development of search function based on an advanced semantic search and discovery engine, that goes beyond the usual browsing capability, linking the DIH content base with other external sources (e.g. Google).

3. The employment of workflows to implement Freemium business models, as well as e-billing for premium services.

4. The integration with a B2B data sovereignty architecture and mechanism based on smart contracts, including encryption of the data and of the DIH players (like in Media Industry DRM), not just for authentication, authorisation and accountability procedures. AAA. Hyperledger Fabric implementation of IDS embedded

5. The introduction of virtual money, the so called "the DIHcoin", to implement all transactions inside the DIH. This could allow awards, challenges, DIHthons beyond usual training, education and formation services.

6. On the basis of the workflow templates, the definition of KPIs to be constantly measured and assessed (e.g. number of visits, percentage of visits concluded with a business transaction, percentage of visits concluded with a B2B smart contract, even free of charge).

7. The installation of simulation services and «play-me» services, i.e. when providing a small input dataset, the system could complete the datasets and shows results.

8. <u>An improved multi-lingual support</u> to ease the information retrieval among contents generated in different languages. This feature allows to use different, translated versions of DIHIWARE Platform, facilitating its adoption in multiple heterogeneous European communities.

List of Acronyms and Abbreviations

Acronym	Meaning
CC	Competence Center
DF	Didactic Factory
DIH	Digital Innovation Hub
DIHIWARE	MIDIH Innovation and Collaboration Platform
ICT	Information and Communication Technology
SME	Small and Medium-sized Enterprise