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HUBCAP

DIH Services

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Abstract

The eight HUBCAP Digital Innovation Hubs offer a wide range of services to support SMEs to innovate with digital technologies. It is the ambition of the HUBCAP project to integrate these individual services into a joint portfolio and to enable collaboration across the HUBCAP DIHs on that basis.

As a first step towards this goal, the HUBCAP DIH partners have collected and documented the innovation support services available at the hubs. This initial service inventory is presented in this report. The service descriptions adhere to a common structure in order to facilitate subsequent analyses in terms of potential gaps and opportunities for cross-DIH service offerings. Moreover, the services are mapped according to the established DIH service classification which comprises four categories of such services: *Test Before Invest*, *Skills and Training*, *Support to Find Investments*, and *Innovation Ecosystem & Networking*. The initial HUBCAP service inventory is both well-balanced and shows a good coverage across these categories, as each HUBCAP DIH offers services of at least three of the four categories.

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1 Introduction

One of the central objectives of HUBCAP is to create a network of Digital Innovation Hubs (DIHs) that will offer a comprehensive set of digital innovation services. These services will include supporting businesses to experiment with model-based design (MBD) for Cyber-Physical Systems (CPSs), finding investments and business opportunities, accessing the innovation ecosystem around the hubs, around other DIHs and across borders, and accessing skills and training. As a starting point, HUBCAP can build on eight such DIHs located in seven European countries, each embedded in its regional innovation ecosystem, offering complementary technical expertise, experimental capabilities, and specialist knowledge in CPS application domains.

The HUBCAP work programme comprises a set of activities to gradually build the network of HUBCAP DIHs and the desired portfolio of collaborative innovation support services. As a first step (within Task 2.1 of Work Package 2) the HUBCAP DIH partners in Austria (Virtual Vehicle), Denmark (Aarhus University), Germany (fortiss), Sweden (KTH), Italy (POLIMI and FBK), Romania (University of Sibiu), and the UK (Newcastle University) developed a comprehensive inventory of the innovation support services available at their hubs. Each hub collected its already existing services and described its portfolio according to a common structure. Subsequently, the HUBCAP collaboration platform will be used to present these service descriptions in order to establish an initial common HUBCAP service offering. This will serve as basis for further cross-DIH collaboration (within subsequent tasks of WP 2) by integrating these services into a joint service portfolio, where, for instance, services are deployed jointly by two or more hubs, or by establishing mechanisms that enable services be shared and used across the network, so that SMEs in a certain region can also use offerings from another DIH in the network.

1.1 Scope

This document reports on the results of Task 2.1 of Work Package 2 and presents the inventory of innovation support services that the HUBCAP DIHs currently support. Together, the DIH partners have documented around 70 individual services; in this document, the five key services per HUBCAP hub are presented. The full set of services will, of course, be used in further analyses of the portfolio to identify potential gaps and opportunities for collaboration between DIHs.

1.2 Approach

In order to facilitate subsequent analysis of the various services of the HUBCAP DIHs, a common structure was devised to describe the services. In addition to providing a succinct name for a service, the following attributes are used in the service descriptions:

Structure for service descriptions:

Service Type: A more abstract characterisation of the service; this can subsequently be used to identify commonalities of service portfolios across the HUBCAP DIHs.

Service Category: One of the four commonly used categories to classify DIH services, see Fig. 1:

- Test Before Invest
- Skills and Training
- Support to Find Investments
- Innovation Ecosystem & Networking

Description: A description of what the service is about.

Provided by: Information about who is providing the service, whether it is a team from the DIH, an external, invited expert, etc. Further details can be given regarding the profile or expertise of the instructor(s), e.g. whether they are technology experts, business developers, or investors.

Target audience: A description of who is typically using the given service, e. g. application engineers, CTOs, students, etc. Further detail can be given to describe if prior knowledge is expected from the participants.

Expected benefit: A description of what users of the given service can expect as valuable outcomes, or why they are typically engaging in the service.

Application domain: A description of whether the service targets specific application domains or is of general interest.

Execution scheme: A description of how the service is being offered, e. g. whether it is provided on request from a customer, or offered on a regular basis.

Service cost: Specifies whether the service is provided for free, whether the customers have to pay a fee, or if there different service levels with different cost, e. g. freemium / premium variants.

Part of a programme: Information regarding whether the given service is part of a broader scheme or programme of services that are typically taken in a certain order.

Additional information: Any additional useful detail, such as a link to a related webpage.

2 DIH Service Portfolio

This section presents the portfolio of innovation support services that are currently offered by the HUBCAP DIHs. Overall, some 70 services have been documented by the HUBCAP DIH partners. To keep the presentation within reasonable limits, however, we only list the five key services for each hub.

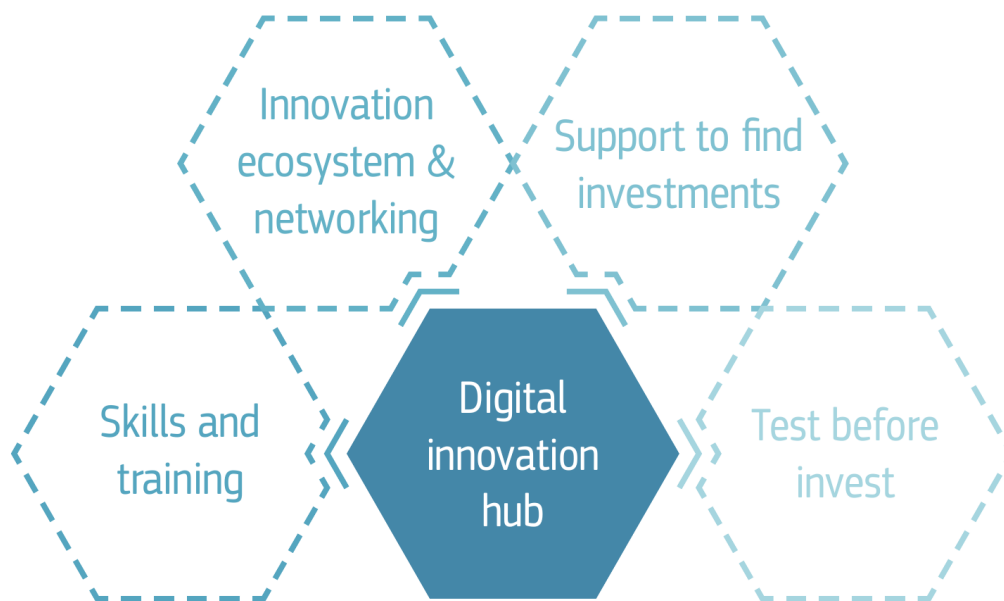


Figure 1: Categories of DIH services. (Source: [KST20])

2.1 HUBCAP Austria

HUBCAP Austria is hosted by the Virtual Vehicle Research Center GmbH, which is Europe's largest R&D center for virtual vehicle technology with 300 employees. Research priority is the linking of numerical simulations and hardware testing, which leads to a powerful HW-SW whole system design and automation of testing and validation procedures. Following this focus on industry-related research VIRTUAL VEHICLE is the innovation catalyst for future vehicle technologies.

The international partner network of VIRTUAL VEHICLE consists of around 100 national and international industrial partners (OEMs, Tier 1 and Tier 2 suppliers as well as software providers) as well as over 40 national and international scientific institutions.

Service portfolio of HUBCAP Austria

HUBCAP Austria offers the following key innovation support services to SMEs:

SERVICE *One Stop Shop*

Service Type: R&D consortia building & project development

Service Category: Support to Find Investments

Description: VV acts in most cases in form of a single point of contact for interested industrial partners for initiation of research projects

Provided by: First point of contacts are the department leaders whose are coordinating the incoming requests

Target audience: from application engineers up to C-level executives

Expected benefit: R&D: collaborative innovation development; standardisation and funding R&D K2: dedicated developments with short term project initiation engineering service: typically industrialisation of research outcomes

Application domain: application domains correspond to the DIHs fields of activities; mainly the automotive and rail domain; from very problem specific to more general development approaches and general purpose

Execution scheme: provided based on customer requests

Service cost: project initiation is typically free; within K2 there is the possibility to initiate a short term K2 Specification project (50% funded); within EU with external support a fraction for each partner

Part of a programme: day-by-day business covering all areas and departments at the DIH

Additional information: –

SERVICE *Living Innovation Lab*

Service Type: Funding programme

Service Category: Support to Find Investments

Description: The LIVING INNOVATION LAB facilitates the transfer of knowledge from academia to industry and the development of highly innovative product solutions. Together with academic and industrial partners, VIRTUAL VEHICLE is trying to bridge “The Chasm” between investigating innovative concepts and early technology adopters by funded open call experiments.

Successful demonstrations of highly innovative technologies lead to a maximum benefit in exploitation and realistic chances for market uptake. For this reason, the LIVING INNOVATION LAB initiates open calls for experiment proposals to expand and strengthen the transfer of technical capabilities and making innovative solutions, platforms and data available for experimentation.

Provided by: target is to enable 3rd parties to experiment with innovative solutions and outcomes from research projects at the DIH; the dedicated internal teams identify possible offers and issues the calls accordingly; the related technical experts are supporting the experiments later on

Target audience: SMEs; typically for application engineers in order to uptake the solution afterwards internally

Expected benefit: it enables a quick application of prototypically implemented solutions for evaluation of the benefits; also for enriching products with innovations;

Application domain: application domains correspond to the DIHs fields of activities; mainly the automotive and rail domain; development topics like MBSE/MBD or information linkage are of general purpose

Execution scheme: online calls via the DIHs website and new calls with 3 month; but it also can be very individual by a direct proposal from the 3rd party

Service cost: the experiments are typically supported by experts at the DIH; the effort at the DIH is free and up to 50% of the total effort (funding depends on the application itself)

Part of a programme: the Living Innovation Lab is part of the DIHs COMET K2 Programme (an Austrian national funding programme) and represents a separate K2 Area with a dedicated budget; the current K2 Programme “Digital Mobility” is approved till 2025

Additional information: –

SERVICE *PhD Funding Programme*

Service Type: funding programme

Service Category: Support to Find Investments

Description: To further strengthen international research collaboration with excellent PhD-awarding scientific institutions, VIRTUAL VEHICLE provides financial funding support for a PhD thesis.

The financial contribution for the supervising scientific institution is available for newly defined PhD theses and for already ongoing PhD projects with a very strong link to the advertised field. Depending on the stage of the thesis, a financial contribution from 20.000 EURO up to full PhD financing can be applied for by scientific institutions.

Provided by: organised within the DIH’s COMET K2 programme

Target audience: potential PhD students at relevant institutes

Expected benefit: institute = customer: external financed PhD student

Application domain: application domains correspond to the DIHs fields of activities; mainly the automotive and rail domain; from very problem specific to more general development approaches and general purpose

Execution scheme: calls for PhD students are defined internally based on the K2 “Digital Mobility” Programmes roadmap

Service cost: institutes have to report partly internal efforts

Part of a programme: the PhD programme is part of the COMET K2 programme; the current K2 programme “Digital Mobility” is approved until 2025

Additional information: –

SERVICE *Certified NVH Test Benches*

Service Type: Access to testing facilities

Service Category: Test Before Invest

Description: Noise, vibration and harshness (NVH) issues challenge NVH engineers throughout the entire vehicle development process. It also affects the operation phase of a vehicle. For an efficient and reliable solution, technical expertise covering the entire chain from sound and vibration generation, -transfer and perception are required- This includes optimal interaction between sophisticated simulation and advanced experimental investigation.

One of VV's strength is not only the exceptional testing and validation equipment and processes but also (further) develop best-suited experimental methodologies, testing procedures and reliable test facilities according to the customers' and partners' needs.

Provided by: dedicated internal teams and experts are supporting applications

Target audience: application engineers

Expected benefit: Access to available testing infrastructure and expertise without the need for high investments.

Application domain: power train engineering, NVH, HVAC, e-drive, battery testing, ADAS, etc.

Execution scheme: provided based on customer requests; different kinds of projects are possible from funded to contractual research

Service cost: Paid-for service; amount is depending on the project

Part of a programme: This service is provided in parallel to other activities.

Additional information: –

SERVICE *Functional Safety Community*

Service Type: Community building

Service Category: Innovation Ecosystem & Networking

Description: Series of information events and various topics

Provided by: a functional safety expert from VV is organising bi-monthly meetings for regional and interested stakeholders from industry and academia

Target audience: Functional Safety (FUSA) experts and those who want to become an expert

Expected benefit: presentation of ongoing activities w.r.t. FUSA, industrial insights and a meeting point for exchange and discussions

Application domain: functional safety (and security)

Execution scheme: offered on regular basis

Service cost: free

Part of a programme: This service is provided in parallel to other activities

Additional information: –

2.2 HUBCAP Denmark

HUBCAP Denmark specialises in software engineering for complex Cyber-Physical Systems, including system modelling methodologies and tools (Model-Based Design, Vienna Development Method), predictive and software analysis (formal methods, theorem proving, and machine learning), and co-simulation. These core areas of expertise are seamlessly integrated within Digital Twin platforms. Aarhus University's Digital Innovation Hub provides expertise to its collaborators in the areas covered by its two main centres:

- The Centre for Digitalisation, Big Data and Data Analytics (“DIGIT”)
- The AU Centre for Digital Twins.

Service portfolio of HUBCAP Denmark

HUBCAP Denmark offers the following key innovation support services to SMEs:

SERVICE *Rent a Researcher*

Service Type: Brokerage

Service Category: Innovation Ecosystem & Networking

Description: Facilitate innovative SME-university collaborations

Provided by: The head of the “Business Relations and Partnerships” section at the Aarhus University Department of Engineering

Target audience: The target are businesses with a digitalisation challenge or opportunity that requires research expertise to solve or develop.

Expected benefit: Get feedback on research and approaches options and expertise from our members. Potential contract between AU and the Company for the collaboration.

Application domain: Any of the digitalisation challenges covered by the centre experts: Big data analysis, machine intelligence, cyber-physical systems, blockchain, cyber-security, IoT, Digital Business, Automated Verification and Synthesis, and Scientific Computing.

Execution scheme: The service is offered on demand. It is advertised in the centre page and through our network.

Service cost: Free or by contract

Part of a programme: No.

Additional information: –

SERVICE *Academic Research Collaboration Office*

Service Type: Collaborations

Service Category: Innovation Ecosystem & Networking

Description: Facilitate research among AU research centres.

Provided by: The head of the Academic Research Collaboration Officer

Target audience: The target are researchers from other Aarhus University research centres, and we expect them to bring complementary expertise and to have a specific need for expertise we provide.

Expected benefit: Match-making, finding complementary expertise, work package leads for research proposals.

Application domain: Any of the digitalisation challenges covered by the centre experts. It is also focused on other AU's thematic centres as the iFOOD, centre for Innovative Food Research, <https://ifood.au.dk/>, and WATEC, the centre for Water Technology <https://watec.au.dk/>

Execution scheme: The service is offered on demand. It is advertised in the centre page and through our network.

Service cost: Free

Part of a programme: No.

Additional information: –

SERVICE AU Digital Transformation Lab - Ringkøbing-Skjern

Service Type: Demonstration Facilities

Service Category: Test Before Invest

Description: Develop a local demonstration lab on Machine Intelligence, Computational Simulations, Connectivity, Cyber-Security Systems and Robotics.

Provided by: A team of experts from the DIH in collaboration with a Danish municipality.

Target audience: Local companies, students, and the local society, which we expect to know about the basics on the expertise to be demonstrated.

Expected benefit: The need to develop a local ecosystem around digital technologies.

Application domain: Machine Intelligence, Computational Simulations, Connectivity, Cyber-Security Systems and Robotics.

Execution scheme: Offered on a regular basis based on a contract.

Service cost: Customers co-finance the expenses.

Part of a programme: No.

Additional information: –

SERVICE Grant proposal ramp-up and sharing pool.

Service Type: R&D Consortia Building

Service Category: Support to Find Investments

Description: Senior members coach on grant proposal writing. The proposals written by the members are shared in a common repository to foster sharing and idea exchange.

Provided by: Digit members through academic/industry projects

Target audience: The target are other researchers and companies.

Expected benefit: Research expertise and access to funding schemes requiring academic partners.

Application domain: Any of the digitalisation challenges covered by the centre experts

Execution scheme: On demand

Service cost: Free

Part of a programme: No.

Additional information: –

SERVICE *Tutorial sessions*

Service Type: Training and Traineeships

Service Category: Skills and Training

Description: Provide training on tools and expertise in our member base.

Provided by: Digit members through academic/industry projects

Target audience: The target are other researchers and professionals looking to adopt tools and techniques.

Expected benefit: Expertise on tools/techniques.

Application domain: Any of the digitalisation know-how covered by the centre experts

Execution scheme: On demand

Service cost: Free/Premium

Part of a programme: No.

Additional information: –

2.3 HUBCAP Germany

HUBCAP Germany is hosted by fortiss in Munich. fortiss provides expertise in a range of fields including model-based software and systems engineering, model-based synthesis,

design space exploration, analysis and design of dependable systems, and software engineering of smart CPS in various domains such as automotive, smart energy, or industrial automation. A particular emphasis is laid on the intersection of software engineering and the increasingly important field of Artificial Intelligence. To this end, HUBCAP Germany builds on the Munich Innovation Hub for Applied AI, which integrates AI research with innovation support activities for entrepreneurs, startups, and SMEs, to foster and accelerate the adoption of AI solutions by industry.

Service portfolio of HUBCAP Germany

HUBCAP Germany offers the following key innovation support services to SMEs:

SERVICE *Technology information events*

Service Type: Technology awareness raising

Service Category: Test Before Invest

Description: Information events cover current trends in digitalisation and AI are designed to help SMEs understand how these technologies can be implemented in their company.

Provided by: Provided by fortiss researchers in cooperation with regional partners such as the chambers of commerce and industry (IHK), the Bavarian Center for Digitalization (ZD.B) and the SME 4.0 Center of Competence in Augsburg.

Target audience: SMEs, especially managing directors, decision makers, managers, but also engineers.

Expected benefit: Bringing experts from science and industry together to share the results of current developments and trends with companies. Attendees get insight to new digitalisation solutions for SMEs and how to implement them. Interactive workshops enable to better assess the potential of leading-edge software and AI technologies.

Application domain: Application domains correspond to the research areas of the HUB, including AI and Machine Learning, Industrial Automation, Autonomous Driving, IIoT, and Smart Infrastructures.

Execution scheme: Provided on a regular basis several times a year with varying themes.

Service cost: Free of charge.

Part of a programme: The technology information events are part of the “fortiss Mittelstand” offerings.

Additional information: <https://www.fortiss.org/en/about-fortiss/fortiss-mittelstand/information-event>

SERVICE *Living Lab*

Service Type: Demonstration facilities

Service Category: Test Before Invest

Description: The living lab consists of demonstrators from research projects that visualise the prototypical implementation before the realisation in practice. The living lab offers different possibilities to SMEs to implement and evaluate first solution concepts and ideas. Demonstrators cover various applications domains and include automated configuration of robots, model-based systems engineering for safe autonomous driving functions, and software-based computation systems for Industrial IoT.

Provided by: Access to the demonstrators and support to experiments is provided by fortiss researchers

Target audience: Typically for application engineers from SMEs.

Expected benefit: Familiarise with new technologies and prototypically implement solution ideas and evaluate benefits.

Application domain: Industry 4.0, IIoT, model-based design for autonomous driving functions, smart energy.

Execution scheme: On demand

Service cost: Free of charge as part of information events or hackathons. Extended projects are based on a paid-for contract.

Part of a programme: The living lab is part of the “fortiss Mittelstand” offerings.

Additional information: <https://www.fortiss.org/en/research/living-lab>

SERVICE *Machine Learning Training Camp*

Service Type: Training

Service Category: Skills and Training

Description: The ML training camp provides participants the mathematical foundation and basic technologies of machine learning, beginning with common tools for dimensionality reduction, to current deep learning approaches and reinforcement learning. Practical examples and programmer tutorials help participants develop a solid understanding of the tools and how they are used in real applications.

Provided by: Instructors are researchers from fortiss specialised in ML.

Target audience: Developers; a background in one of the STEM disciplines, particularly a basic understanding of mathematical analyses, linear algebra and probability theory is required.

Expected benefit: In the introductory module, participants will get a general overview of ML concepts and methods and will be able to develop and apply simple ML models. In a subsequent module participants become familiar with more complex ML applications, such as through deep learning models in industrial environments.

Application domain: machine learning for industrial applications

Execution scheme: Provided every once in a while.

Service cost: A course fee is charged.

Part of a programme: The Machine Learning Training Camp is one of several education and training programmes offered by the “fortiss Mittelstand”.

Additional information: <https://www.fortiss.org/en/events/machine-learning-training-camp-ml>

SERVICE *Software Development Check*

Service Type: Maturity self-assessment

Service Category: Skills and Training

Description: The analysis format helps SMEs identify potentials for methods and competences and measures for the improvement of their development activities in order to use software successfully and future-oriented - starting with requirements management, testing, up to the provision of software. During an interview session, participants record their essential daily activities, and the collected information is put into relation to quickly yield a first automated analysis regarding quality attributes. The results are discussed in an individual workshop at the SME’s premises, to identify possible improvement potentials for methods and competencies, to develop goals and step-by-step measures to achieve these goals.

Provided by: Provided by fortiss researchers of the Center for Code Excellence.

Target audience: SMEs with a need to understand potentials to improve their software development; software developers, as well as project managers and company managers.

Expected benefit: Participants can identify how much and where there is potential in the software development of their product in order to jointly develop measures for action, as well as address and eliminate possible barriers to productivity in a targeted and prioritised manner.

Application domain: General software development

Execution scheme: Provided continuously.

Service cost: Free of charge.

Part of a programme: The Software Development Check is part of the offerings of the Center for Code Excellence at fortiss.

Additional information: <https://cce.fortiss.org/check>

SERVICE *Best Practices: Digitalisation and Artificial Intelligence for SMEs*

Service Type: Ecosystem learning

Service Category: Innovation Ecosystem & Networking

Description: This is a workshop that presents a concrete practical example to provide insights to SME participants how to implement AI and digitisation projects in their company in a practical and profitable way.

Provided by: Provided by fortiss researchers in cooperation with regional partners such as the Lars and Christian Engel Foundation (LUCE), the BAM GmbH, and the berbetriebliches Bildungszentrum in Ostbayern gemeinntzige GmbH.

Target audience: SME managing directors, decision makers and managers

Expected benefit: The workshop helps participants identify the need for action, regardless of how far their company has progressed with its digitalisation efforts. Participants also benefit from contact with other small-to-medium enterprises and enjoy the opportunity to network and share ideas and experiences.

Application domain: General digitalisation interests.

Execution scheme: Community events are organised on a regular basis with differing technical themes.

Service cost: Free of charge.

Part of a programme: The Best Practices workshop is one of several information events offered by the “fortiss Mittelstand”.

Additional information: <https://www.fortiss.org/en/about-fortiss/fortiss-mittelstand/network-event-best-practices-digitalization-and-artificial-intelligence-for-smes>

2.4 HUBCAP Sweden

In Sweden HUBCAP is represented by the KTH Digital Innovation Hub on Industrial Digitalization, the DIHID. Located at the Mechatronics Division at KTH in Stockholm, the DIHID acts as a meeting ground for Tech Scaleups, Industry and Academic Faculties. It offers expertise, testbeds and professional training within the domains of Robotics, Model-Based Design, Autonomous Systems, and Machine Learning. DIHID also organises expert talks and conferences to share knowledge between engineering/scientific disciplines and academia-industry. Furthermore, DIHID is involved in the newly launched PECA initiative, which offers a new approach on life-long learning for Swedish Industry.

The hub's clients work with industrial digitalisation on both a strategic and technical level. They are leaders and visionaries, practitioners and strategists who develop and produce products, services and knowledge. The hub has a close partnership, via its industry network ICES, with more than 30 companies and organisations.

Service portfolio of HUBCAP Sweden

HUBCAP Sweden offers the following key innovation support services to SMEs:

SERVICE *Navigating the Ecosystem*

Service Type: Ecosystem learning

Service Category: Innovation Ecosystem & Networking

Description: Are you looking for strategic partners or to source new innovations in Sweden or in Europe? We could help you connect with national and international organisations and companies. Our Ecosystem is made up with both private and public organisations in Sweden and in Europe.

Provided by: This service is provided by the DIHID team together with partners from other DIHs.

Target audience: This is a service is available for anyone, from student to large corps that need to extend their network in any direction or domain.

Expected benefit: This service shortens lead-times to find strategic partners across the European ecosystem.

Application domain: General interest.

Execution scheme: This service is provided on requests and will be organised as a couple of meetings and workshops.

Service cost: Free

Part of a programme: No.

Additional information: –

SERVICE *Tech Design Support*

Service Type: Feasibility studies

Service Category: Support to Find Investments

Description: With our network of Technical Experts we could support and guide you in developing your own products and services.

Provided by: This services is managed by the DIH team but performed together with different resources depending of the specific need.

Target audience: This service is primarily targeted towards SMEs and Startups.

Expected benefit: This service aims to complement the expertise that already exist within the company and to reduce the risk in the design phase of a R&D project.

Application domain: AI & Machine Learning, VR & AR, Cyber Security, Robotics, Additive Manufacturing, Autonomous Systems

Execution scheme: This service is provided on requests and will be organised as a couple of meetings and workshops.

Service cost: Premium

Part of a programme: No.

Additional information: –

SERVICE *Funding Opportunities*

Service Type: Business Development

Service Category: Support to Find Investments

Description: Most innovative organisations need funding from time to time and there is a jungle of private and public opportunities out there. We could help you understand all the different alternatives that exists and how to best apply for them.

Provided by: This service is provided by the DIHID team.

Target audience: This service is primarily targeted towards SMEs and Startups.

Expected benefit: This service aim to jumpstart a companies efforts to find funding for its projects.

Application domain: General interest

Execution scheme: This service is provided on requests and will be organised as a couple of meetings and workshops.

Service cost: Free

Part of a programme: No.

Additional information: –

SERVICE *Access to Testbeds*

Service Type: Testing and validation

Service Category: Test Before Invest

Description: Being able to test and evaluate the result is a key component of any R&D Project. The DIHID could provide access to various testbeds within KTH.

Provided by: This services is managed by the DIH team but performed together with different resources depending of the specific need.

Target audience: This service is primarily targeted towards SMEs and Startups.

Expected benefit: Gaining access to advance testbeds could be time consuming and costly. This services shortens lead-time.

Application domain: General interest.

Execution scheme: On demand.

Service cost: Freemium

Part of a programme: No.

Additional information: –

SERVICE *Rapid Prototyping*

Service Type: Bootcamps

Service Category: Skills and Training

Description: The DIHID offers a tailor-made boot camp for SME that need to develop prototypes for a new product.

Provided by: This service is provided by the DIHID team together with the Prototype lab at KTH.

Target audience: This targets R&D teams or engineers within SMEs

Expected benefit: This service makes it easy to develop and evaluate early prototypes of a potential product.

Application domain: This services mainly focuses around embedded systems including both hardware and software components. It also includes access to 3d-printing, laser cutting, milling etc.

Execution scheme: This service is provided on request and is organised as a couple of meetings and workshops.

Service cost: Premium

Part of a programme: No.

Additional information: –

2.5 HUBCAP Italy

HUBCAP Italy led by Politecnico di Milano, is located in Milan, while a satellite centre hosted by Fondazione Bruno Kessler is located in Trento. The Milan site focuses on manufacturing industry, hosting an Industry 4.0 Lab experimental facility, a CPS-based training and experimental facility. The centre plays a leading role in the Milan Competence Center (MADE in Italy) of the Industry 4.0 Italian National Plan, carrying out experiments in Industry 4.0 including CPS manufacturing. The Trento satellite focuses on high quality research with impact to market and society, including expertise and tools for MBD, verification, validation, and safety analysis. Besides the physical spaces, both sites offer services such as training courses, support for participating in research projects, sharing of utilities costs and IT services.

Service portfolio of HUBCAP Italy at POLIMI

HUBCAP Italy at POLIMI offers the following key innovation support services to SMEs:

SERVICE *World Manufacturing Forum*

Service Type: Brokerage

Service Category: Innovation Ecosystem & Networking

Description: The World Manufacturing Forum is an open platform that aims to enhance and spread industrial culture worldwide, as a means to ensure economic equity and sustainable development. The WMF promotes innovation and development in the manufacturing sector, with the fundamental goal of improving competitiveness in all nations through dialogue and cooperation among the manufacturing sector's key players. The WMF will pursue its goals by: - Supporting and influencing national and international industrial agendas - Providing a framework through which top-level companies, governments, academic institutions and social organisations can meet and exchange opinions, acting as a catalyst for finding innovative solutions to major global challenges - Disseminating knowledge through international and regional meetings and publications

Provided by: World Manufacturing Foundation

<https://www.worldmanufacturingforum.org/foundation>

Target audience: Industrials, students, researchers, policy makers

Expected benefit: Raise awareness about digital technologies adoption. Up to date information, participating to the community

Application domain: General interests in the manufacturing digital domain

Execution scheme: Regular basis (annual)

Service cost: Access Cost per day

Part of a programme: No.

Additional information: –

SERVICE *Industry4.0 Overview*

Service Type: Training & Traineeships

Service Category: Skills and Training

Description: Our training camp for manufacturing managers approaching Industry 4.0 provides a complete background over the technologies Industry4.0 is referring to. Managers and commercials are trained through a technical perspective on the “pillars” of Industry 4.0. The main technologies are analysed in their pros and cons. Success stories are analysed and the participants are made aware about how to make fruitful the technology investments. Common errors are also debated and live demo of these technologies integrated in a lab environment are provided.

Provided by: Academics (the faculty of Polimi that is part of the DIH)

Target audience: entrepreneurs, production managers, commercials, technologists

Expected benefit: Raise awareness about digital technologies adoption. Up to date information.

Application domain: General interests in the manufacturing digital domain

Execution scheme: Regular basis

Service cost: Services are sold with a fee per hour, based on the trainer

Part of a programme: Postgraduate MBA level

Additional information: –

SERVICE *Predictive Maintenance*

Service Type: Training & Traineeships

Service Category: Skills and Training

Description: Our training activities related to the predictive maintenance is a data-oriented workshop, whose aim is not only to present the technical solutions (usually ML algorithms) supporting this topic, but mainly to guide the participants understanding the data-related issues. In this perspective, a first distinction is provided basing on the data source (the machine itself, the operator reports, external sensors...), then the participants are guided in a discussion about the data pipeline to feed the algorithm with the data (from the pipeline to the aggregation, passing through the filtering). Finally, different strategies about the data visualisation are presented.

Provided by: Academics (the faculty of Polimi that is part of the DIH)

Target audience: production and maintenance managers, technicians

Expected benefit: Shortage of competences about predictive maintenance. Through the course the customers expect to own specific operative competences about predictive maintenance.

Application domain: Predictive maintenance applied to Manufacturing industry

Execution scheme: both on request and on a regular basis

Service cost: Services are sold with a fee per hour, based on the trainer

Part of a programme: Postgraduate MBA level

Additional information: –

SERVICE *MOVE TO 4.0*

Service Type: Training & Traineeships

Service Category: Skills and Training

Description: The “Move to 4.0” project is a European initiative supported by EIT Manufacturing. The project will lead the transformation of existing manufacturing companies in Europe by diversifying or renovating their businesses through innovative technology and business models. The core challenges and business opportunities will be identified, defining the transformation roadmaps for 50 European companies and matching their needs with the capabilities from technological partners, during some workshops and events. The first workshop is dedicated to identify the main challenges and business opportunities for each of the participants, in order to facilitate them in starting their transformation toward the Industry 4.0.

The second workshop aims at elaborating a customised roadmap, identifying technical, methodological and business needs for a set of selected companies

Provided by: Academics (the faculty of POLIMI that is part of the DIH)

Target audience: Manufacturing companies managers

Expected benefit: To acquire competences about Change Management to efficiently and effectively implement Industry 4.0.

Application domain: Production companies

Execution scheme: both on request and on a regular basis

Service cost: Services are sold with a fee per hour, based on the trainer

Part of a programme: Postgraduate MBA level

Additional information: –

SERVICE *Projects Open calls*

Service Type: Funding

Service Category: Support to Find Investments

Description: Open calls launched throughout research projects. Several calls have been launched by Polimi in the last years thanks to its belonging to different consortia. Some examples are:

- L4MS (Logistic for Manufacturing SMEs)
- MARKET4.0 (joining an IDS-based connection with their customers and suppliers)
- Lombardy Call for Industry 4.0 innovative solutions: promoting the development of innovative solutions, products and / or services focused on new digital skills and technologies in implementation of the strategy defined in the National Business Plan 4.0.
- Bando Soluzioni Innovative I4.0: to promote the implementation of projects for the experimentation, prototyping and marketing of innovative solutions, applications, products and services for Enterprise 4.0, stimulating the long-term demand for these solutions and encouraging the collaboration of companies with the subjects

Provided by: Researchers of Politecnico di Milano, belonging to or participating in several project consortia

Target audience: Academics and industrials.

Expected benefit: To provide funds to develop innovative projects fostering the adoption of digital technologies in manufacturing industries

Application domain: Depending on the project

Execution scheme: Per project

Service cost: For free

Part of a programme: No.

Additional information: –

Service portfolio of HUBCAP Italy at FBK

The Trento satellite of HUBCAP Italy at FBK offers the following key innovation support services to SMEs:

SERVICE *Access to research lab for analysis and testing purposes*

Service Type: Technological infrastructures

Service Category: Test Before Invest

Description: 3,500 square meters of laboratories and scientific infrastructures working on ICT, AI, Big Data in various application domains (Digital Industry, Energy, Health, Smart Community, Cybersecurity) and a clean room. FBK manages together with University of Trento and Trentino Sviluppo the PROM facility, which provides equipment to companies for demonstration in the industry 4.0 scope.

Provided by: FBK – Fondazione Bruno Kessler

Target audience: Co-located ventures, spin-offs, companies in general

Expected benefit: To work and develop innovative solutions in an expert environment

Application domain: Application domains are in line with FBK ones (cybersecurity, sensors, materials, digital industry, smart agriculture, health and wellbeing, smart society) but also open to new ones

Execution scheme: On customer request. In common projects. For co-located ventures. Training opportunities.

Service cost: According to the nature of the use, the services are offered for free (common projects, training opportunities) or for a fee (customer request).

Part of a programme: Supporting FBK R&I activities and the application of the research in real domain.

Additional information: –

SERVICE *Collaborative and Contractual Research*

Service Type: Contract research

Service Category: Test Before Invest

Description: One-off contract. Individual research contracts (third party research) developed by FBK with companies and public administrations based on specific needs.

Provided by: FBK - Fondazione Bruno Kessler internal personnel

Target audience: FBK, Co-located ventures, spin-offs, companies in general

Expected benefit: To solve specific technological issues To meet new technology providers and researchers and to create a stable cooperation To test new solutions in innovative technological infrastructures

Application domain: Application domains are in line with FBK ones (cyber-security, sensors, materials, digital industry, smart agriculture, health and wellbeing, smart society) but also open to new ones

Execution scheme: On customer request, on FBK proposal

Service cost: Contractual research (services for fee according to the nature of the service agreed)

Part of a programme: These activities are part of FBK Third Mission as defined for academia/research entities

Additional information: –

SERVICE *Funding/investment support*

Service Type: Business services

Service Category: Support to Find Investments

Description: FBK has an internal service (Financing Unit) that scouts funding and investment opportunities. FBK SMKS Unit supports also companies in scouting of funding opportunities and R&D incentives. In close collaboration with the Province Office in Brussels, the unit is committed to developing synergies on research and innovation issues in order to identify new opportunities. The same unit, offers companies support in the development of new products and innovative ideas by encouraging their participation in projects financed by local, national and European public agencies

Provided by: FBK - Fondazione Bruno Kessler internal personnel

Target audience: Industry, SME, start-ups, researchers

Expected benefit: To find business and financing support to implement innovations and financing advice

Application domain: Application domains are in line with FBK ones (cyber-security, sensors, materials, digital industry, smart agriculture, health and wellbeing, smart society) but also open to new ones

Execution scheme: On customer request

Service cost: For free

Part of a programme: These activities are part of FBK Third Mission as defined for academia/research entities

Additional information: –

SERVICE *Innovation & Entrepreneurship for social change*

Service Type: Training & Traineeships

Service Category: Skills and Training

Description: Training of personnel, including new hires, for a partner company. The training takes place at FBK, mainly in the form of tutoring, in the context of projects with the partner company. FBK offers training support for its MBD tools. This is achieved by setting up collaboration projects funded by the customers. FBK has a set of material (presentations, examples, tutorials) to train on the usage of FBK tools, and provides special licenses for trial purpose of its tools. Industrial doctorate: a three-year PhD Program based on the development of projects carried out in collaboration with companies. It allows companies to train their employees, through a doctoral course, by alternating training periods at the university and FBK with work periods by the company.

Provided by: FBK – Fondazione Bruno Kessler internal personnel and external experts, collaboration with various Universities

Target audience: Industry, SME, start-ups, researchers, students

Expected benefit: To improve technical and scientific knowledge and skills to successfully face the digital transformation

Application domain: Application domains are in line with FBK ones (cybersecurity, sensors, materials, digital industry, smart agriculture, health and wellbeing, smart society) but also open to new ones.

Execution scheme: On customer request. Periodical events

Service cost: For free or for fee according to the type of course. FBK funds internships.

Part of a programme: Training as part of FBK mission

Additional information: –

SERVICE *International networking*

Service Type: Community building

Service Category: Innovation Ecosystem & Networking

Description: International networking, contributing to strengthening the network of contacts by developing new international relations with public agencies, public and private companies, research centres and universities that can generate opportunities for collaboration and exploitation of the Foundation's research results.

Provided by: FBK - Fondazione Bruno Kessler internal personnel (SMKS)

Target audience: Industry, SME, start-ups, researchers

Expected benefit: To enlarge the network increasing cooperation, investment, funding opportunities To better know the market (opportunity and competitors)

Application domain: Application domains are in line with FBK ones (cyber-security, sensors, materials, digital industry, smart agriculture, health and wellbeing, smart society) but also open to new ones

Execution scheme: On customer request; Continuous activities

Service cost: For free

Part of a programme: These activities are part of FBK Third Mission as defined for academia/research entities

Additional information: –

2.6 HUBCAP Romania

HUBCAP Romania is hosted by Lucian Blaga University of Sibiu and led by the Connected Intelligence Research Center (INCON) complemented by the Hasso Plattner Institute for Knowledge Transfer (HPI). INCON focuses on theoretical and application-driven research for modelling, simulation and deployment of cyber-physical social systems. It provides a CPS-based experimental facility comprising: a standard Festo MPS500 Didactic System, a custom OTG-USB stick assembly demonstrator (small-scale “Industry 4.0” (I4.0) production system), a custom production system for assembling smart products (large-scale I4.0 production system) and finally a training station with Augmented and Virtual Reality for manual operations to assemble smart products considering the operator’s state (I4.0 training station). HPI is a ULBS foundation established in 2018 focusing on linking regional companies and clusters (e.g. Smart City Sibiu, Cluj IT, PrelMet Transilvania, etc.) to support research, development, and innovation (RDI), and training in the field of digitisation. It provides RDI and training services to all interested organisations based on the INCON infrastructure.

Service portfolio of HUBCAP Romania

HUBCAP Romania offers the following key innovation support services to SMEs:

SERVICE *Model-based design using the ADOxx platform*

Service Type: Experimentation with hardware/software

Service Category: Test Before Invest

Description: The service provide training in understanding the overall ADOxx platform and applying different tools and modelling tools (e.g. UML, Petri nets etc.) for simulation purposes and/or deployment on given prototypes (e.g. chocolate manufacturing, transport vehicles etc.)

Provided by: ULBS staff primarily; they are computer science professionals working at the university with experience in model-based design.

Target audience: B.Sc. / M.Sc. students and/or industrial professionals. They should be familiar with algorithmics and programming.

Expected benefit: The students gain experience in MBD tools and especially computer science students get familiar with industrial products /processes. Industry professionals are interested in this service for gaining experience in the conceptual modelling.

Application domain: Model-based design of products and processes. Current prototypes/demos cover the manufacturing domain.

Execution scheme: It is provided on a regular basis within ULBS study programmes or by request if customers outside ULBS request it.

Service cost: Free for ULBS students with a good application score, otherwise a fee must be paid.

For outside customers, a fee must be paid. Depending on the external customer requests, a fee is calculated.

Part of a programme: Yes - for students. The B.Sc. or M.Sc. curricula provides the scheme. No - for customers outside ULBS.

Additional information: Service not yet provided standalone to customers outside ULBS. It was provided only in B.Sc./M.Sc. Curriculum.

SERVICE *M.Sc. In Embedded Systems*

Service Type: Training & Traineeships

Service Category: Skills and Training

Description: The M.Sc. programme aims to train elite specialists (B.Sc. graduates in computer science and engineering) able to develop innovative technologies, products (hardware / software) and services with direct applicability in the field of dedicated systems. The M.Sc. programme takes 2 years to complete.

Provided by: ULBS staff, with experience in hardware and software for embedded systems

Target audience: B.Sc. / M.Sc. Students.

Expected benefit: To develop innovative technologies, products and services with direct applicability in the field of dedicated systems.

Application domain: Embedded Systems for the automotive domain

Execution scheme: It is provided on a regular basis within ULBS study programmes.

Service cost: Free for ULBS students with a good application score, otherwise a fee must be paid.

Part of a programme: Yes - for students. The B.Sc. or M.Sc. curricula provides the scheme http://csac.ulbsibiu.ro/pi_mas_2010_2012_es.php

Additional information: Service is currently being provided.

SERVICE *Living Lab*

Service Type: Demonstration facilities

Service Category: Test Before Invest

Description: The service idea is to provide access for third parties to the DIH's research infrastructure in order to experiment different products, technologies or services. The prototypes are described here: <https://centers.ulbsibiu.ro/incon/index.php/prototypes/>

Provided by: ULBS staff, with experience in hardware and software as well as human-machine interaction.

Target audience: Industrial companies, technology providers, and engineers. They should be familiar with industrial and/or hardware/software technologies.

Expected benefit: To test and validate different ideas, concepts and technologies in a Lab environment

Application domain: Manufacturing, human-machine interaction, automation

Execution scheme: By request for all customers.

Service cost: Free to introduction. Depending on requirement, a fee is calculated

Part of a programme: No.

Additional information: Service available but not yet provided.

SERVICE *Prototyping*

Service Type: Testing and validation

Service Category: Test Before Invest

Description: The service entails activities for rapid prototyping, design and construction of demonstrators as well as validation of different technologies.

Provided by: ULBS staff, with experience in the specific topic.

Target audience: Industrial companies, technology providers, and engineers. They should know and define their requirement.

Expected benefit: To provide a solution (e. g. hardware, software, HW & SW) to demonstrate or validate an idea/technology/approach

Application domain: Not restricted to a specific domain.

Previously, prototyping solutions in the fields of mechanical engineering (<https://centers.ulbsibiu.ro/incon/index.php/amt-development/>) as well as software (<https://centers.ulbsibiu.ro/incon/dih/index.php/data-mining/>) were provided.

Execution scheme: By request for all customers.

Service cost: Depending on requirement, a fee/contract is calculated

Part of a programme: No.

Additional information: Service was provided to a large industry company.

SERVICE *Innovation ecosystem building*

Service Type: Community building

Service Category: Innovation Ecosystem & Networking

Description: The idea is to link third parties (problem owners) with solution providers within the DIH network. On a higher plane, the idea is to create a regional innovation ecosystem, with all relevant actors collaborating for improved products/processes/services

Provided by: ULBS staff for the initial match-making.

Target audience: Industrial companies, technology providers, and engineers. No prior knowledge is required.

Expected benefit: Support them in order to find solution for their problem within the ecosystem

Application domain: Not restricted to a specific domain.

Execution scheme: By request for all customers.

Service cost: Free to introduction. Depending on requirement, a fee is calculated

Part of a programme: No.

Additional information: Service available but not yet provided.

2.7 HUBCAP UK

HUBCAP UK, hosted at Newcastle University, offers expertise in model-based design for embedded systems and Systems of Systems, and a shared programme of research, engagement, innovation and technology transfer on digitally enabled urban systems. This cluster contains labs on CPS, the National Innovation Centre for Data, and national centres for research and innovation in green infrastructure and energy systems integration, an Urban Observatory, and a “Decision Theatre” exploring human decision-making through interaction with large and complex data. HUBCAP UK aims to lower barriers to innovation in CPS and CPS-enabled products and services. Its two main focuses are:

- Development of application domains in digitally enabled sustainable urban systems.
- Support for model-based CPS design by collaborative modelling and co-simulation, and transfer of well-founded techniques in the engineering of dependable systems into CPS engineering.

Service portfolio of HUBCAP UK

HUBCAP UK offers the following key innovation support services to SMEs:

SERVICE *Collaborator Identifier*

Service Type: Brokerage

Service Category: Innovation Ecosystem & Networking

Description: Identification of academic and SME collaborators. An example of this would be an SME looking for an academic collaborator or to contact another DIH within HUBCAP. Alternatively, a DIH seeking contacts (SMEs or academic) within UNEW.

Provided by: HUBCAP UNEW Team

Target audience: CTOs within SMEs; DIH leads or members. Sector and skill-specific knowledge would be required.

Expected benefit: Benefit is accessing local knowledge at the DIH to rapidly identify potential collaborators within the DIH ecosystem. The customer benefits from sector and regional expertise in the UNEW DIH and the HUBCAP network. Typically asked for by businesses or academics seeking project partners.

Application domain: General interest

Execution scheme: On request

Service cost: Currently for free.

Part of a programme: Part of the Business Development and Enterprise offering at UNEW

Additional information: –

SERVICE *Bespoke Continuing Professional Training (CPD)*

Service Type: Training

Service Category: Skills and Training

Description: Short training courses developed to address needs identified by employers and professional groups.

Provided by: Technology experts from within Newcastle University, typically with a background combining industry experience with research skills.

Target audience: Target groups include businesses requiring to upskill groups of staff, or professional groups wishing to develop training for their members. For example, a recent collaboration with Health Education England created the first programme in Health Informatics to be accredited by the Faculty of Clinical Informatics, aimed at clinicians in all health service professions new to Informatics will help develop CCIOs and CIOs of the future.

Expected benefit: The main benefit is typically to give professionals a grounding in current technology advances.

Application domain: The service targets foundational knowledge and skills in areas relevant to specific applications domains identified by the potential participants.

Execution scheme: The vast majority of courses are developed and offered on demand. Where demand is sustained, they may be offer on a regular basis.

Service cost: There is a fee, depending on the character of the training offered.

Part of a programme: These training courses are part of the wider Continuing professional Development programme offered by Newcastle University and by the Institute of Coding

Additional information: –

SERVICE *Development of Training Material*

Service Type: Training

Service Category: Skills and Training

Description: We offer the opportunity to work alongside technology experts to develop training materials that can be delivered by organisations as and when required.

Provided by: A team from the DIH will work with customers and subject matter experts to develop materials that can be accessed online or handed over for delivery by a customer organisation.

Target audience: The target group is businesses or professional groups requiring training materials that they can deliver themselves, often asynchronously to members or staff. The prior knowledge expected of the participants will vary according to the needs of the client organisation.

Expected benefit: The expected benefit is a capability to provide (typically in-house) training in a specialised topic.

Application domain: The service can be configured to the needs of any domain that can be served by the areas of foundational expertise that we can offer. For example, training material on model-based design can be delivered in a manner relevant to specific domains.

Execution scheme: This service is on request from customers.

Service cost: A fee is charged for the development and delivery of learning materials.

Part of a programme: No.

Additional information: –

SERVICE *Mindsphere Innovation Network Lab*

Service Type: Access to Facilities

Service Category: Test Before Invest

Description: The MindSphere Innovation Network (MiNe) brings UK and global universities together to enable co-development of new Industrial Internet of Things (IIoT). This service provides access to MindSphere, Siemens' Internet of Things

(IoT) operating system and data analytics services, together with support from Siemens engineers.

Provided by: The service is a partnership between the University and Siemens.

Target audience: The service is primarily targeted at regional businesses in the technology sector.

Expected benefit: This service provides opportunities for businesses to develop diverse and innovative digital solutions to their industry challenges through collaborations with students and academics.

Application domain: Industrial Internet of Things (IIoT), energy, manufacturing

Execution scheme: On request

Service cost: Currently for free.

Part of a programme: There are no pre-requisites.

Additional information: <https://www.ncl.ac.uk/press/articles/archive/2018/05/mindsphere/>

SERVICE Assistance in Developing Proposals

Service Type: Access to Finance

Service Category: Support to Find Investments

Description: Enabling SMEs to identify and apply for collaborative funding from local, regional and national sources

Provided by: The DIH team in association with Business Development and Enterprise provides this service

Target audience: The service is provided for SMEs and businesses internationally looking to access

Expected benefit: Access to expertise within the DIH relating to appropriate sources of funding

Application domain: General interest

Execution scheme: On request

Service cost: Currently for free.

Part of a programme: Part of the Business Development and Enterprise offering at UNEW

Additional information: <https://www.ncl.ac.uk/work-with-us/expert-solutions/research/> and <https://www.ukri.org/funding/>

3 Summary and Outlook

In this report we have presented the initial portfolio of innovation support services that the eight HUBCAP DIHs are currently offering. Altogether, the hubs have documented around 70 services, of which the five key services of each hub have been presented here.

The description of the services according to a common structure enables subsequent analyses of the portfolio regarding potential gaps or overlaps that could be used to define further DIH-specific or cross-DIH service. The mapping of the services to the well-known four categories of DIH services shows that the HUBCAP hubs are well-positioned with their offerings, as each hub provides services in at least three of the four categories, and overall the portfolio shows a good balance across the categories: for each of the categories *Test Before Invest* and *Skills and Training* 11 services are presented here, while *Support to Find Investments* and *Innovation Ecosystem & Networking* each comprise nine services.

In the near future, the services will be deployed on the HUBCAP collaboration platform, and assessed with respect to opportunities to develop new services that could be provided by two or more of the HUBCAP DIHs jointly, so as to enable a stronger cross-DIH collaboration. Such opportunities can be exploited by, for instance, combining similar or complementary training services of two hubs into an extended training programme that can be offered by each of the hubs, or by jointly facilitating brokerage across the hubs, thus enabling collaboration between stakeholders of different regions.

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