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White Paper

IoT eDIH Network activities

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Executive Summary

The network of IoT Digital Innovation supported by the AIOTI will play a fundamental role in building the community of developers contributing to IoT adoption in European industry, acting at local level. At the same time, it will emphasize on the business development strategies of the several IoT projects ran locally and eventually propose a roadmap for existing sectorial needs' fulfillments and unveiling of emergent ones through local economy's engagement. Thus, the program aims at supporting the creation and the operations of IoT DIH nodes EU- and worldwide focusing on the technical capacities but not exclusively.

Business hubs, determined to incubate and encourage new services, play an important role in the global ecosystem that AIOTI is spinning. As in webs, all nodes are essential to build a lasting and strong structure; but, in this case the wider the web, the stronger the structure. To encourage the growth of the digital economy, IoT eDIH network enables local digital hubs to enrich their services, to spin a network of enabling communities and to further support new internet-based business creation at local level. It is an effort to expand the reach of IOT technologies, so that as many companies or even individual developers as possible can have an easy first contact with IoT along with its leading promotion organization in EU, AIOTI, and take full advantage of it. However, the Digital Europe Program does only target HPC, AI and Cybersecurity domains and it is obvious that IoT is very complementary to AI and cybersec as most of the smart services (building, city, health, agriculture, energy, ...) need these 3 technologies to develop innovative services. Therefore, IoT eDIH should also support developments of solutions that encompass IoT with AI or IoT with cybersec or IoT with AI and cybersec.

This second paper developed by the AIOTI DIH task force is bringing additional contributions to provide a clear definition of what will the IoT eDIH network, addressing the governance, the business model, the cooperation rules, the certification, the services, the platform catalog and the market place.

This paper is describing a number of actions that AIOTI needs to put in place in order to set up a sustainable IoT eDIH network able to support IoT eDIHs. In the next Digital Europe program, €1.3 billion for ensuring the wide use of digital technologies across the economy and society to Build up and strengthen the network of European Digital Innovation Hubs, aiming to have a Hub in every region, to help companies benefit from digital opportunities.

With regards to this program, AIOTI is willing to be part of this initiative, taking advantage of the Digital Europe program to put in place such a network following the activities described in this paper.

To do so, there are a number of steps to climb but there is also a need to coordinate these steps with DIHNET.EU in order to secure the sustainability and the consistency of the action plan.

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1 Introduction

This paper has the objectives to describe the main actions that need to be developed in order to setup the IoT eDIH Network.

The European Commission, in its communication on a New Industrial Strategy for Europe¹ is willing to push innovation in order to help European industry to adopt digital technologies. For that purpose, the concept of European Digital Innovation Hub (eDIH) has been developed as one-stop-shops for companies to access technology-testing.

In this context, the Alliance for the Internet of Things Innovation (AIOTI) put in place a task Force to support eDIH which addresses the IoT domain. IoT technologies (device, platform and connectivity) are one of the key digital topics that will help European Industry in their way to digitalisation. However, the Digital Europe Program does only target HPC, AI and Cybersecurity domains and it is obvious that IoT is very complementary to AI and cybersecurity as most of the smart services (building, city, health, agriculture, energy, ...) need these 3 technologies to develop innovative services. Therefore, IoT eDIH should also support developments of solutions that encompass IoT with AI or IoT with cybersecurity or IoT with AI and cybersecurity.

In 2020, eDIH will be designated by member state and then invited to submit a proposal at the Digital Europe program call for projects and AIOTI is expecting a need to establish links between these eDIH in order to maximise the impact but also to share the cost of a number of services which are common to them.

In 2019, the Task Force has already developed a paper² which describes the role of such a network and the respective services offer by both "level" (i.e. eDIH Network level and eDIH level). If the role and mission of eDIH are well defined in the European Digital Innovation Hubs in Digital Europe Programme³, the task force felt the need to identify those services which can be offered at network level in order to get a stronger impact and save money through mutualisation.

In this paper, the task force proposed a number of actions that will pave the way of setting up such a IoT eDIH network. This work has been conducted with 37 contributors from 33 eDIH among 60 which declared being interested to join. This paper is also a contribution to the DIHNET.EU project that is coordinating all eDIH network initiatives.

This paper is making proposals on a number of activities that are necessary to put in place at network level in order to optimize the operation of eDIH. It is addressing the governance, the business model, the cooperation rules, the certification, the services, the platform catalog and the market place.

¹ https://ec.europa.eu/info/sites/info/files/communication-eu-industrial-strategy-march-2020_en.pdf

² <https://aioti.eu/wp-content/uploads/2019/10/AIOTI-WG2-White-Paper-DIH-Network-Activities-Published.pdf>

³ https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=62936

2 IoT eDIH Network governance

This chapter defines the structure and rules to help IoT eDIH Network to achieve the highest standards of governance and to promote the adherence to accepted good governance principles. The IoT eDIH Network governance aims to ensure that the organisation works within the relevant frameworks; the interests of the members are represented and addressed; the accountability of the actions and to maintain the network's mission.

2.1 Chairmanship

The presidency of the IoT eDIH Network will rotate among the Network members every 12 months. The presidency will be elected by the Board of the Network among the candidates volunteering for the presidency. The presiding officer of the network will be a Chairperson. The Chairperson will have a Deputy Chairperson. The Chairperson and the Deputy Chairperson will be designated by the network member having the presidency. The Chairperson, supported by the network member having the presidency shall ensure correct functioning of the IoT Network, and have the power to propose to the IoT Network Members the topics and the issues on which the Network shall drive its activities during its 12-month presidency. Through the IoT eDIH Network programme committee, other members will be also able to propose additional topics and issues for the Network activities, which will be considered by the Chairperson.

2.2 Board

The IoT eDIH Network board will ensure good governance by defining and agreeing key policies and procedures and by regulating conduct, behaviour and conflicts of interest. The Board will represent all network partners and can include other stakeholders, such as European Commission and member states representatives. Members of the Board will be designated by the Network members (1 Board Member per Network Partner) and should have appropriate skills and decision making powers. Board members are selected every 2 years.

Each Board Member will be granted with an equal right to vote; A decision relevant to a topic provided for herein will be taken, whether at least the Majority of the Board Members - which had voted within a timeframe to be agreed upon in good faith and on a case-by-case basis by the Parties and then set by the Chairperson - voted in favor of it. In an event of Deadlock, the Board member representing the partner having the presidency at the moment in which the voting operations started shall have a Casting Vote. The IoT eDIH Network Board will be responsible for electing the presidency member of the Network.

2.3 Community (eDIH)

IoT eDIH Network Partnership – The composition of the Network will directly support delivery of objectives and reflect the partnership structure. eDIHs will be chosen for their relevant interests, experience and expertise to best complement the work of the partnership. The IoT eDIH Network partnership will be regularly (every 12-month) reviewed to ensure it remains fit for purpose. The limits on the conditions and length of time and eDIHs can be a member of the Network will be specified. In addition, conditions about new-comers will be defined.

The governance model of the IoT eDIH network will consider the expectations and needs of all Network partners. However, it will not be necessarily expected that all network members will fully apply or adopt suggested governance measures – the principle of proportionality should apply, especially in relation to operational costs. The main principles of the IoT eDIH Network governance are as follows:

- Shared values and understanding

IoT eDIH network Partners will prepare and sign a Cooperation Agreement to formally agree and record how the IOT eDIH Network operates, including structure, purpose and aims, vision, goals, activities, roles and responsibilities, membership, regulatory framework, entrance of newcomers and exit strategy.

- Responsibility

IoT eDIH Network Partners will take responsibility for actions through regular reporting, online and onsite meetings, oversight and critical observation of network performance, openness and active engagement, and complaints procedures.

- Decision-making

Clearly allocated roles, responsibilities and accountabilities among the IoT eDIH Network partners are crucial for effective governance. Moreover, open and transparent processes, as well as records of delegated representatives in the Board and Programme Committee, and key decisions made shall be established and kept promptly up-to-date under the responsibility of the IoT eDIH Network Chairperson.

- Corporate governance processes

Good network governance will contribute to delivering high-quality, cost-effective services for the IoT eDIH Network partners through effective systems and processes for managing issues, such as risk, performance, finance and information.

- Standards of conduct and leadership

High standards should be agreed to govern the way the partnership works, to ensure the needs of all partners are met, to identify conflicts of interest and to resolve disputes.

The IoT eDIH Network will have a Programme Committee, where all network partners will be represented. Moreover, the Programme Committee will have one public authority's representative per each member state of the involved partners. Last, but not least, the Programme Committee will have at least three representatives from the European Commission, from the respective DGs.

Members of the Programme Committee will be designated by:

- the Network members - the partner representatives,
- the Member States - the member states representatives,
- the European Commission - the EC representatives

The Programme Committee Members should have appropriate skills and experience in the digital innovation and transformation topics.

2.4 Cooperation Agreement

The IoT eDIH Network partners will sign a Cooperation Agreement, independent of any other agreements signed by or between the partners, which will define the basis and scope of the relationship between partner organisations. The Cooperation Agreement will cover partnership purpose and objectives, terms of reference, roles, responsibilities and accountabilities, information and resource sharing, management structure and exit strategy. The Cooperation Agreement will be periodically reviewed and updated as necessary to reflect any changes in partnership structure or aims.

2.5 European Commission and member states involvement

The involvement of the stakeholders outside of the IoT eDIH Network is foreseen through the Network Programme Committee. The Network will invite the Member States of the involved Network partners to designate members to be involved in the Programme Committee. Moreover, the Network will invite the European Commission to appoint members from the respective Units and DGs, to actively participate in the Programme Committee. Through the Programme Committee, the European Commission and the Member States will be able to propose topics and issues for the Network activities.

2.6 Operational staff

- Project office
- Administration
- Secretary
- Communications
- Treasurer
- Innovation Consultant to give a research and innovation support to the DIHs

2.7 Operational costs

Membership fee collection

Meeting organisation costs

Website, catalog, market place platform development and hosting costs

Dissemination material costs

2.8 Relation with other networks and DIHNET.eu

The IoT eDIH Network will be open to collaboration and other eDIH Networks, especially with the eDIH network and networks the IoT eDIH Network partners are already members, such as DIHNET.eu, AI eDIH Network, DIGIFED, ERNACT, DIH4CPS, OpenDEI, etc. When it comes to joint projects, the network will first consider its own Network partners, and would invite other networks and their partners only if it cannot find partners within its own Network.

3 IoT eDIH Network business model

3.1 Business model

In this section we will develop the business model of the IoT eDIH Network. A simplified Business Model Canvas will be used to analyse the different sections of the business model, as we will later focus on areas such as markets, distribution channels or financial resources.

3.1.1 Value proposition

The services offered by the IoT eDIH Network will have a high added value. These services are based on the IoT technology and are applied to numerous sectors, including smart cities, urban mobilities, smart living, smart health, advanced manufacturing, smart farming, smart energy and etc. The market segmentation will be very valuable to address the right value proposition for each type of customers / adopters / organizations. The capacity of having several DIH networks of different areas and sectors will also bring high value as each network is able to support others, if it lacks to solve a problem, this give more value to the network.

IoT is a novel technology that is one of the keys to the digitalization of the European industry. The using IoT technology will make significant progress given that to European SME's, regions and cities administrations and public organizations will receive support for the introduction of this technology in their processes and services. The IoT technology improves the performance of the companies' production processes, through the use and analysis of data, it facilitates the implementation of personalized solutions adapted to the objectives of a company. The cost of designing and implementing such solutions has been and continues to decrease.

3.1.2 Client relationships

The services offered by the IoT eDIH Network are highly varied, thus, the type of service provided to a client will determine the type of relationship with that client. According to the service offered, client relationships will be classified into the following types:

- Personal: direct communication with the client, whether it be in person or a phone call
- At a distance: through the use of email or instant messaging services.
- Individualized: when an exclusive or special service is offered to the clients.

- Collective: when services are offered to a group of clients in the form of workshops, talks or forums.

3.1.3 Key resources

There are a series of key resources that enable the IoT eDIH Network to offer its services, these include physical resources, such as the headquarters of eDIH participants; intellectual resources, such as the patents or copyrights held by every eDIH participant; human resources, such as experts or highly qualified employees; or financial resources, for example, the money received from different entities or from the clients through the payment models chosen by them. The very important resource could be the subcontracting services with physical infrastructure from the other members of IoT eDIH via the import / export contracts between different participating eDIH's

3.1.4 Key partners

The relationships that the participating eDIHs will establish with the different partners will be an important strategic element, key to the successful delivery and promotion of the offered services. In addition, thanks to the IoT eDIH Network, the needs of the partners of each eDIH may be supplied by the eDIHs in other countries, facilitating the delivery of services and solutions on the entire European territory.

3.2 Finance

This section tries to identify partners sources on funds

3.2.1 Innovation vouchers (optional)

- Cascade funding projects
- National initiatives
- Pre-commercial procurements (PCPs) projects

3.2.2 Innovation advisory services

- Public or private structures offering advice & guidance

3.2.3 Innovation support services (optional)

- Public or private structures offering advices & guidance

3.2.4 Skills / Talents

3.2.5 3.2.5 Digital campuses

- List of training campuses with topics / domains

3.2.6 Digitalisation and I4.0 training (demand capacitation)

- Specific training involving the tools / platforms available in this domain

3.2.7 Workshops 'train the trainer' (professional capacitation and training)

- Train the trainers program
- Anchoring skills
 - Human management - engaging humans
 - Impact of digitalisation on humans

3.2.8 Job Offering (optional)

- Public or private structures to match the requests and offers

3.2.9 Technology and trends foreseeing

3.3 Market

In this section we will carry out an analysis of the potential market for the services offered by the IoT eDIH Network.

In general terms, all the regions of the European Union are considered potential markets, since the aim of the eDIH Network is to provide services to companies, regions and cities administrations and public organizations located in any part of the European territory, through the collaboration between the eDIHs that operate in different countries.

Specifically, the countries that have a eDIH in their territory could be considered as an important potential market, since it will be easier for companies, regions and cities administrations and public organizations to contact the corresponding eDIH and seek the best services from a nearby source[1].

Finally, the most specific and concrete potential market would be the one that comprises various countries of the European Union that have a eDIH on their territory. These are the regions where companies will benefit most from the services offered by the eDIH and where the greatest number of partners can be found, as communication between companies and the eDIH is very close and may even allow for personal contact between eDIH coordinators and company representatives.

3.4 Marketing and distribution strategy[2]

To offer and market the services of the IoT eDIH Network it is necessary to establish a marketing and distribution strategy that will promote IoT eDIH Network's services among companies as good solutions for their business.

First of all, the websites of each eDIH could be used to advertise the IoT eDIH network services, because this is where the eDIHs discuss the technologies they use, the projects in which they participate and the coordinators of each centre.

In addition, making use of social networks, such as LinkedIn, would also be useful. A professional network could be created along with the different partners of each eDIH and thus promote the services in that network. Thanks to this, it would be possible to get eDIH partners from other countries to find solutions that could not be found in their country's eDIH. Collaboration is the key.

However, social networking and digital marketing are not only important elements of successful service marketing and distribution; there are other alternatives. These alternatives include the organization of events and congresses where both the IoT eDIH

network and potential clients can meet; the organization of workshops to strengthen the relationship between partners and current clients, where new services may be presented; the organization of hackathons where companies can find solutions to their needs; promotional campaigns through various state agencies; the organization of showrooms; and the organization of networking events, among others.

3.5 Funding

This section will describe the different sources of funding of the eDIH Network.

Firstly, we could consider obtaining funding through the programme Digital Europe, a European Union programme which supports the digital transformation of the European society and economy and which has a budget of EUR 9.2 billion for the period 2021-2027.

Secondly, funding could be considered through the European Structural and Investment Funds (ESIF), which in turn comprises funds such as the European Social Fund or the European Regional Development Fund. Their areas of investment include strategies for employment, growth and investment and the creation of a single digital market. We are currently in the 2014-2020 funding period and for that period the European Social Fund has had a budget of 120,717 million euros, while the European Regional Development Fund has had a budget of 278,551 million euros.

Thirdly, a series of payments, in the form of dues, could be made by the partners that are involved in the eDIHs, as they benefit from the advances made by them. The fee rate could be the same for all the partners, regardless of the eDIH they are associated with or the country in which the partners operate, although it would be fairer to pay the same fee if all partners benefited from the same advantages.

Finally, eDIH could charge a fixed % of the money that is allocated to projects from European funds and thanks to this money it would be possible to build services and offer them to companies[3].

3.6 Risk and Contingency Plan

Every organization faces some risks that may threaten its successful operation, so it is necessary to identify and understand those risks, in order to minimize them. It is also important to have a contingency plan, since it can serve as a tool for prevention, anticipation and control of possible contingencies that require an immediate response to minimize the negative effects of a risk.

The eDIH Network may face different types of risks:

External risks

- Economic cycle: depending on whether the economy is expanding or is in recession, companies may have more or less financial resources to hire the services offered by the IoT eDIH Network.
- Regulatory risk: there is a risk that new regulation will appear at a national or European level restricting the use of certain technologies and prohibiting the provision of services to companies.
- Country risk: there may be risk factors such as the nationalization of companies or the setting up of entry barriers that hinder and reduce the supply of services.
- Major force: unlikely situations that may occur such as fires at eDIH centres, natural disasters, coups d'état, etc.

Internal risks

- Lack of liquidity: inability to obtain financial resources with which to finance the development of services and products
- Operational risk: risk derived from human failure such as a bad negotiation strategy with a client that results in losses for the company[4].
- Strategic and reputational risk: risk associated with the deterioration of brand image due to, for example, the improper behaviour of eDIH members, inaccurate statements, or poor strategic planning
- Sales dependency: a large number of services may be offered to only a small number of companies and this is where much of the funding comes from. This implies a great risk since the client portfolio will not be diverse and the whole structure of the business will depend on just a few clients.

It is equally important to prepare a contingency plan so that in the event that these risks arise, the associated losses can be minimized.

Some of the recommendations that can be included in the contingency plan are:

- The services offered by the eDIH should not be delivered to a small amount of companies, since if these companies decide not to continue using the services offered by the eDIH, new partners would have to be found to whom to offer the services. This situation could entail many problems; thus, it would be best to distribute the services among several companies.
- Try to have companies use services offered in different IHL so that there is regional diversification and the risks are not concentrated in the same geographical area, since this would make it easier to face periods of recession that only affect certain regions.
- The sources of funding should not be limited to either European funds or contributions from partners, but instead should be a mixture of both, given that in case one of the sources of funds fails, it will be possible to continue to rely on the other, making it possible to continue eDIH's activity and have sufficient liquidity.
- Always act in accordance with a code of ethics and in accordance with the law in force, since breaking the law can lead to fines that would put the eDIH Network's activity and financial stability at risk.
- Analyse the current and future financial situation and establish possible scenarios in which funds are cut or there is a lack of funding, so that in the event of a recession there is a plan to which the eDIH can adapt its activity

4 Cooperation rules between eDIHs

4.1 General view

When we are speaking about cooperation between eDIHs, the first question would be: which is the objective of the cooperation? A win-win situation should be achieved in terms of:

- knowledge access
- knowledge transfer
- solving digital problems (technology or use cases)
- resources and know-how sharing

Apart of general rules as IPR or Confidentiality, we have identified 3 main issues to be tackled in this section:

- General rules of cooperation between eDIHs (manifesto, collaboration ethics): why eDIHs are cooperating. The cooperation can be between eDIHs, but also between companies of the eDIHs
- Cooperation protocol (operational). How the cooperation through the network can cover local gaps. Transparency protocols and exchange of information mechanisms. Link with national/regional priorities
- Recommendations (suggestions for implementation)

4.2 Objective of Cooperation

When defining a frame of cooperation, the parties involved need to have a clear understanding on the objectives of cooperation. As a general rule, cooperation between eDIHs should be based in reciprocity and a win-win situation and they should commit to actively cooperate transnationally in order to create value for their ecosystems / members.

In this sense, it is recommended to sign a MoU or agreement in which these objectives could be clearly defined

Some of the main objectives identified are:

- Promote activities to disseminate a specific technology (IoT) in a sector
- Generate cooperation projects in the field of digital transformation, in a specific sector
- Mutually provide capabilities that can complete the service portfolio of the parts involved.
- Facilitate the transnational transfer of knowledge, resources and technologies between the cluster members and promote available R&D and uses cases results for better commercial use.
- Help to make competencies and technologies visible and facilitate their application into various markets and sectors.
- Encourage and support SMEs to participate in joint European projects and to access other sources of public and private financing.

Other additional objectives might be:

- Support and encourage experience and information exchange among members by identifying and showcasing achievements, best practices and flagship cases, which might be a benchmark for the rest of actors involved
- Facilitate cross-border positioning of the members' action niche, identifying own strengths (services, competences, technologies, etc.) of each network node, and provide tools to map the ecosystem and find potential solution providers
- Foster not only the exchange of assets through a common platform but also of needs that each member may have
- Organize specific pan-European studies, cartography of actors in the field of IoT, identifications of possible mutualized events, mutualisation of technology & competitive intelligence, follow-up of Europe R&D calls etc.

4.3 General Rules of Cooperation between eDIHs

Once the objectives of the collaboration are defined, this collaboration will be Implemented following a number of actions and activities that should be based In general principles as:

- Trust, confidentiality, professionalism
- Transparency when expressing interest and willing to participate in project proposals or other initiatives.
- Give priority to network members when preparing/participating in new project ideas/proposals related to the network field/area of interest (exclusivity principle).
- As regards knowledge transfer, it is crucial to establish appropriate mechanisms to recognize authorship of information, technology, best practices, etc. subject to be reused/recycled by the network actors.
- Sharing platforms and technologies In order to minimize the operational costs

As a network, IoT eDIH could define a manifesto or collaboration ethics, to be signed among the eDIHs willing to collaborate.

It is important to identify strengths and weak points or capabilities of each eDIH, in order to create synergies with other hubs. As an example, if a hub has its weaker point on providing a type of technology or service, you could establish a cooperation agreement with other hub deal with that, exchange good practices, create collaboration projects etc.

Each IoT eDIH will provide a SWOT positioning of their activities and a list of what they can propose to each members and a list of what they are looking for from their participation in the hub.

We may foresee a cartography of what the eDIH are requesting and what they are expecting from other eDIH. This information could be listed for Technical services, and at the Business and Ecosystem services. This classification would help a lot in the collaboration and the rules of collaboration to set between eDIH.

The network may act as a strategic contact point for the members in order to support and improve their services in different domains/sectors (multidisciplinary approach that benefits potential local gaps).

Furthermore, the IoT eDIH network should provide the necessary (virtual plus physical) spaces for sharing expertise, giving recommendations, strategic planning, fostering

peer learning and mentoring/coaching, exchanging ideas, conducting meetings, promoting success stories, etc.

On the other hand, collaboration should not only be between eDIHs but also between the companies part of these eDIHs (which is a service offered by the eDIHs).

A collaboration agreement form should probably be designed for regulating the relationship between companies with the network. In case cooperation projects among SMEs from eDIHs of the network are put in place, they should be monitored by the network (and regulated internally to avoid disputes between companies or eDIHs), which may act as a referee, provide support during the process and disseminate the results.

The respect of the GDPR should be clear as a condition sine qua non for a successful collaboration. The parties undertake the commitment to comply, in the terms of application, with the provisions of Organic Law 15/1999, protection of Personal Data and development provisions, as well as Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of individuals with regard to the processing of personal data and on the free movement of such data and repealing Directive 95/46/EC (General Data Protection Regulation).

When working together and establishing collaboration links, the exchange of knowledge and information can be confidential. Therefore, Non-Disclosure sentences should be introduced when negotiating the collaboration. The parties express that any technical or strategic information shared between the parties during the term of the Agreement shall be confidential, related to any subject not known in advance or of a public nature, by committing themselves to keep this agreement of non-disclosure within X years from its signature.

4.4 Cooperation protocol

eDIHs work at local level and generally they are aligned with regional and national policies, as well as the specialisation strategy of the region (RIS3). Sometimes, the characteristics of the region, their dependency of a specific sector or the lack of Investment in Innovation makes that some territories present gaps that eDIHs can no cover by their own and therefore, they need the support of the network to acquire knowledge, resources, training, etc. to be able to Implement their functions successfully.

IoT eDIH network can support eDIHs in finding within the network other eDIHs that can contribute to support In closing these gaps. In this frame, transparent protocols and exchange of Information mechanisms can be defined. In order to ensure that all eDIHs members of the network work at the same level and under the same conditions.

It could be good to create a marketplace, where eDIHs can upload their strengths and weaknesses and then do a matchmaking between the hubs, to see with which one you could get a better synergy....

There should be at least one physical event per year like a general assembly of the IoT eDIH hub where each members can meet the others, present their current activities and roadmap and share success and failures with the others.

The detailed characterization of the different participants is crucial for this marketplace, so each actor can clearly know even its own role within the network. Therefore, categorization and profiling of each eDIH (services, competences, etc.) is needed, not only to the end of building potential partnerships but also due to organizational issues (to consider how each actor contribute to the network aims and the services that it provides). Clear and fair criteria should be established for this purpose.

The whole ecosystem should be accessible through a common platform, so that besides eDIHs, companies and organizations taking part of them can also benefit from the network advantages. In this platform, the service catalogue of the IoT eDIH network could be found, as well as detailed information of each actor, which could encourage cooperation among them.

Communication plan

It is important to define a coordinated communication plan both for internal and external purposes. Internally, it would serve to define strategies to keep the network alive and support cooperation with a win-win approach, through notice boards for relevant aspects (projects, news, experience sharing, etc.), establishing regular meetings, etc. On the other hand, at an external level, it would help to build and promote the brand image of the network, as well as it would support the dissemination of results and activities carried out by the network and the generation of joint ideas and projects.

Monitoring plan:

It would be interesting to have tools not only to evaluate how the network is performing as a whole but also to measure the interaction level between network participants. As a suggestion of possible KPIs to this aim: monitoring reference citations in publications, number of bilateral interactions among members (and companies part of eDIHs), possible collaboration agreements signed between companies of different eDIHs, etc. These might be useful ways of approaching this.

Contingency plan

It would be important to have a strategy and a standard protocol that could help to solve potential conflict of interest.

4.5 Recommendations

IoT eDIH as a network can set a number of recommendations on how eDIHs can collaborate in order to strengthen the network thanks to strengthen of its own members.

At the same time, the existing collaboration activities between different eDIHs can be used as an example to collect best practices and to share them to the network.

There should be a light governance board of the IoT eDIH hub that can represent the hub towards EU politics and commissioners, act on behalf of the IoT eDIH hub in some European events and congress and organize the animation and collaboration within the IoT eDIH hub and ensure that the cooperation rules are enforced. Silicon Europe has experience on this process with a rotating president, vice president and treasurer and can share its practice.

Success stories:

It might be useful to have a look at how other projects and/or networks are tackling cooperation. In this regard, success actions and experiences might be collected and adapted to be applied by this network.[PYD1]

5 Qualification/certification of IoT eDIH process

The Qualification/Certification of IoT eDIH process has three main objectives:

1. Assess the eDIHs part of the IoT eDIH Network in terms of coverage, quality of services and achievements;
2. Maintain a fair and transparent label award procedure to classify the management capabilities and the quality of services provided by the eDIHs in Europe;
3. Provide improving recommendations to the evaluated eDIHs and apply measures in the IoT eDIH Network, in order to balance the performance provided by the eDIHs which compose the IoT eDIH Network.

The IoT eDIH Network strategy to support these objectives is explained throughout chapter 5, including a description of the assessment procedure through benchmarking of the eDIHs, an overview of the label award method, an outline of the expected recommendations report to the evaluated eDIHs and finally a section advising potential initiatives to be implemented in the IoT eDIH Network to equalise the performance of all eDIHs which are part of it.

5.1 Assessment of eDIH through benchmarking

Digital opportunities are expected to unlock growth in the industry and public sector while IoT combines a set of relevant technologies which will disrupt and deeply transform the EU economy and society. In this context, the IoT eDIH Network while bringing together eDIHs spread all over Europe has a unique chance of contributing to their capacity building not only through cooperation, exchange of best practices and even services or assets, but also by performing a transparent and fair evaluation process which can effectively improve eDIHs performance over time and balance mismatches in the maturity and quality of services provided by the eDIHs in the IoT eDIH Network. Having in the mind the ever-changing and dynamic process of innovation and in particular the constant and exponential evolution of digital technologies embraced by IoT, a dynamic method able to evolve over time should also be considered to evaluate eDIHs performance. Therefore, benchmarking defined as a comparison tool among organisations for performance improvement seems to provide the best means to comply with an evolving landscape of potential activities aligned with the digital transformation expectations and the maturity that eDIHs will face in the coming years.

The process of benchmarking consists in gathering data through a survey inquiring important parameters related to the eDIH activities (addressed in subsection 5.2). Through the collection of data, a broad understanding of the processes and practices adopted by eDIHs with different performance levels can be achieved together with a landscape mapping which will allow to define quantitative criteria to establish a label award mechanism aligned with the reality and the evolving maturity of eDIHs. Therefore, benchmarking allows a constantly evolving performance assessment which is crucial for the constant growth and maturity process that eDIH are expected to face. Through this process and the information gathered from analyses and comparisons, the IoT eDIH Network will also evolve accordingly by implementing initiatives focused on the improvement of all eDIHs performance and services (more information in subsection 5.4).

The benchmarking process and all related initiatives will be implemented by the IoT eDIH Network Evaluation Committee. This evaluation committee should include the interested eDIH members of the IoT eDIH Network and its mission will include the update of the benchmarking process, update the survey and the label award procedure, support interested eDIHs in assessing their performance or in joining the IoT eDIH Network, and foster new initiatives inside the IoT eDIH Network that balance and/or improve the performance of eDIHs. It will have a chair and vice-chair elected by the IoT eDIH Network members.

5.2 Application process

The application process is open to all eligible IoT eDIHs. In addition to the IoT technologies in the portfolio of services and capabilities covered by the eDIH, the minimum requirements defined by the European Commission for the Digital Innovation Hubs catalogue will apply as minimum eligibility criteria to apply:

- “Be part of a regional, national or European policy initiative to digitise industry;”
- “Be a non-profit organisation;”
- “Have a physical presence in the region and present an updated website explaining the eDIHs’ activities and services provided for the digital transformation of SMEs/Midcaps;”
- “Have at least 3 verifiable examples of how the eDIH has helped a company with its digital transformation.”

Two dates per year will be defined in which all submissions are collected and processed by the IoT eDIH Network Evaluation Committee members ("cut-off dates"). Applications will consist on a single survey set online by the IoT eDIH Network Evaluation Committee in. All answers provided by IoT eDIHs must be submitted in English. Through this process, IoT eDIHs may obtain a specific label award: Basic, 1 star, 2 stars or 3 stars.

The survey questions should address the services to be provided by eDIHs as presented below and addressing not only the processes and activities to ensure such services, but also partners, skills, resources and results. Geographical coverage in the region should also be covered in the survey to understand the outreach of the eDIH with its local ecosystem in the region, together with alignment with the smart specialisation, local government support and concrete initiatives to accelerate the digital transformation of the territory. eDIHs will be asked to submit documents and evidences proving the activities performed during the previous year (count one year before the submission date).

In short, the aspects to be covered by the survey are presented below:

- Structure of the eDIH: age, legal form, composition, specialisation, strategy, cooperation mechanisms, geographical coverage, venue information;
- eDIH governance and financing: governance structure, management and implementation mechanisms and processes, alignment with smart specialisation, government support, financial sustainability, repartition shares among different financial sources, internal evaluation processes
- Services provided by the eDIH aligned with the IoT eDIH Network expectations and processes and activities to ensure such services, but also partners, skills, resources and results
- Achievements, communication and recognition of the eDIH

5.3 eDIH Label Award

Qualification/Certification applications submitted to the IoT eDIH Network will be reviewed and processed by the IoT eDIH Network Evaluation Committee, which will compile the information in a database and will award accreditation in one of the four labels defined below.

The labels awarded after the evaluation process are valid for two years. To request a biennial qualification renewal (which should be required every two years), an IoT eDIH must fill out the survey including the required documentation for evidence during the previous calendar year. If an existing IoT eDIH does not submit the necessary documentation after two year of the last evaluation, it will lose the label.

The following classification should serve as a guide to applicants to identify technical and professional requirements as an IoT eDIH. Concrete KPIs aligned with this classification criteria should be created and updated by the IoT eDIH Network Evaluation Committee while assessing the evolution of the services provided by IoT eDIHs. At a later stage, while eDIHs are growing in demand and capacity to provide services at the EU level, this classification should evolve into assessing also the level of the maturity of the entities that benefit from the IoT eDIH services.

IoT eDIHs should be devoted to instructing and educating, but also to helping SME's and advising the local communities including public sector, matching the demands of their local market.

Applicants must carry out this task through a strong multidisciplinary team with relevant experience in similar activities. It is necessary that IoT eDIH staff can demonstrate their capacity in technology counselling using IoT technology. IoT eDIH need to demonstrate that they have or are planning to have resources to provide services. Financial self-sufficiency is a critical requirement.

Specific information on which criteria an IoT eDIH must meet to be a Basic, 1 Star, 2 Stars or 3 Stars IoT eDIH is detailed above.

IoT Basic eDIH

The IoT eDIH offers the minimum services presented in section 3.6 of the "Mission and Activities of IoT Digital Innovation Hubs Network" White Paper. In addition, the IoT eDIH offers teaching and training through dissemination events and it is active at fairs and congresses promoting IoT technology where it facilitates the presence of startups and SMEs. Liaising with local industry, it organizes workshops with businesses and associations. It should be a physical venue capable to host and to support presentations and hold technical equipment.

1 Star IoT eDIH

The IoT eDIH will offer all the basic services above, but at an advanced level. It runs an IoT platform which offers workshops and testing of IoT solutions and IoT Platforms. It organizes IoT eDIH Network dissemination events and collaborates with local RTOs and universities. It runs basic workshops for trainers, research groups and public staff, collaborates with other IoT eDIH, promotes IoT Accelerator programs and manages community user accounts for the IoT platform. The IoT eDIH gives access to dedicated IoT eDIH staff for IoT training/coaching and IoT testing/certification activities. The IoT eDIH should connect to the local industry and public authorities through agreements with technology parks and city councils.

2 Stars IoT eDIH

A 2 Stars IoT eDIH offers all services defined in section 3 of the “Mission and Activities of IoT Digital Innovation Hubs Network” White Paper. In addition, the eDIH is expected to host training workshops for teachers, students, research groups and even municipal staff at advanced or expert level, as well as online or on-site business mentoring. It features training facilities to run workshops, hackathons, training courses and a Smart Lab open to the public. This IoT eDIH can operate environments for testing and holds an IoT showroom solutions and IoT technologies in demo phase. It should create IoT working groups with local industry, academia and public authorities, associations and clusters of enterprises. In addition, the IoT eDIH should provide ‘innovation advisory services’ to SMEs - e.g. consultancy, assistance and training in the fields of knowledge transfer, acquisition, protection and exploitation of intangible assets, use of standards and regulations embedding them. It should have the capacity to provide the digitalisation maturity and cyber security audits for SMEs. Furthermore, the IoT eDIH should connect to the rest of the IoT eDIH community, including an active presence in its official events. A 2 stars IoT eDIH should also promote products and solutions through other IoT eDIHs, get involved in IoT Accelerator programs, and actively collaborate at European and worldwide level.

3 Star IoT eDIH

This is the highest and most complete level of proficiency of all IoT eDIH. The IoT eDIH will offer all the services defined above for the 2 Star IoT eDIH, but at an advanced level. In this category, the IoT eDIH should offer training and workshop events, company mentoring, SMEs or startups incubation and bring support to development of IoT pilots and prototypes. The IoT eDIH should meet the requirements to certify developers and trainers of IoT solutions, IoT devices and software enablers. It should support the deployment of IoT pilots in the market, create promotion events for IoT solutions and technologies, help SMEs to reach clients and/or investment, grow

business for companies, and communicate and disseminate activities in local or regional media.

IoT eDIH Network dissemination events and training workshops should be at expert level. The IoT eDIH should feature a showroom where products in pilot and production/commercial phases are showcased.

IoT eDIH should provide the 'innovation support services' means, including the provision of office space, data banks, libraries, market research, laboratories, quality labelling, testing and certification for the purpose of developing more effective products, processes or services. It should have capability to help SMEs to make use of a variety of advanced technologies, e.g. advanced computing facilities of the HPC centers, artificial intelligence, cybersecurity, among others.

Finally, a 3 Star IoT eDIH should connect with the rest of the IoT eDIH Network Community, actively participate in the administration boards and provide certification services to other IoT eDIH. It should have agreements with regional Governments and connections to the rest of the IoT eDIH Network Community, where part of the staff are members of the IoT eDIH Network and are certifiers of certifiers.

5.4 IoT eDIH Network initiatives to improve assessed IoT eDIHs performance

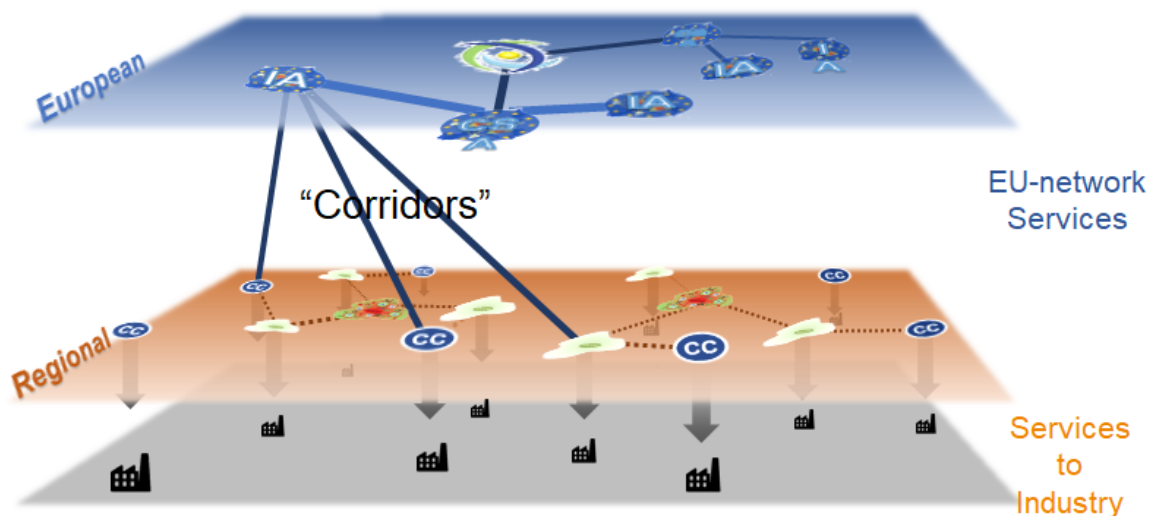
Performing a benchmarking process will lead to a database of the eDIH performance landscape, which will be a relevant asset for the IoT eDIH Network to organise trainings, events, repositories of useful information, working groups, concrete observatories, among other initiatives that will be relevant to balance the IoT eDIHs performance and quality of services. Examples are provided in the table below. The aim is to take prevention and to correct imbalances in maturity between different eDIHs, using information gathered during the biennial evaluation, from analyses and comparisons, to implement IoT eDIH Network recommendations and initiatives that will improve the performance and services of all eDIHs.

Initiative of the IoT eDIH Network	Activities that the benchmarking process will unlock
Database	<p>Repository of data submitted in the evaluation survey:</p> <ul style="list-style-type: none"> - Mapping of services and resources provided by all IoT eDIHs - Processes that drive improved performance by IoT eDIHs - Activities of IoT eDIHs
Trainings and Mentorships	Identification of IoT eDIHs with a high level of maturity which can train and mentor other IoT eDIHs
Events	Identification of relevant themes for events aligned with the IoT eDIH network needs
Working Groups	Definition of working groups to tackle common difficulties and barriers faced by most IoT eDIHs
Observatory	Initiative to monitor specific initiatives related to the digital transformation (e.g. emerging sectors) in which most IoT eDIHs need support, so that a comprehensive source of knowledge among the IoT eDIH Network can be created supporting all IoT eDIHs part of it.

6 Services offered by IoT eDIH Network

IoT eDIH network is planning to offer a number of services to help IoT eDIH to operate in good conditions. These services blow is a provisional list that could be completed in the future looking to eDIH recommendations.

The global vision of the different services can be described as below, a set of Services at the EU-Network level, and another set of Services dedicated to the industries.



EU-network Services have been classified in 4 categories which encompass most of the cases:



1. Marketplace with extension of catalogue of use cases with a certain organisation three dimensional logic by domain
2. Policy activities
3. Best Practices and Skills - Knowledge management
4. Support Functions

eDIH Services offered to Industry (eDIH customers) have been structured over 6 pillars representing the main requests coming from the companies. (see AIOTI paper Mission and Activities of IoT Digital Innovation Hubs Network ⁴)



6.1 Market place and catalogs

This activity is providing online tools that collect a number of useful information but also contact names and access modalities

6.1.1 Training catalog & session

This service is clearly linked to the Training session, it will propose an online catalog with contacts in order to help eDIH staff to train to specific IoT technologies.

This service will also propose to organise online training sessions on specific topics that have an interest for eDIH staff but also for eDIH "customers". Webinars could also be organised on demand.

Both services mentioned here will include a "train of trainers" action for university professors as explained in point 6.1.5.

6.1.2 A common market place where each companies solutions could be highlighted (technology providers)

A number of innovative services and technologies will be developed through the IoT eDIH, this service will offer a marketplace where anyone could advertise a product or a service. The targeted Market Place proposes access to the following stakeholders:

⁴ <https://aioti.eu/wp-content/uploads/2019/10/AIOTI-WG2-White-Paper-DIH-Network-Activities-Published.pdf>

- Technology Providers: to publish and promote their IoT related services using a selected licensing model.
- User Communities: to explore, use and annotate the proposed services

6.1.3 A common success stories repository where real successful operations for industry users can be highlighted

Industries that will use eDIH to introduce IoT technologies in their process should be able to communicate on the benefits of a specific solution if it is a success. An online repository will be available for eDIH to communicate on their success stories

6.1.4 Technical IoT open platform catalog

(Description, remote access conditions, shared agenda)

This service is closely linked to the platforms section, it should offer an online agenda where one could look to the availability of a specific platform, the condition of access and can also book a slot online for a specific usage.

6.2 Policy activities

This activity is giving support to eDIH regarding liaison with public bodies at European and national level

6.2.1 Liaison with the European Commission

This service is dealing with communication with the 2 main DG Connect units that are interested by the initiatives (Unit A2: technologies and systems for Digitising European Industry and Unit E4: Internet of Things). A number of events and workshops are organised each year and obviously anyone is not able to attend all of them. Reporting provided by participants will be shared on the web site.

This service will include monitoring of Partnerships to be launched within Horizon Europe. In particular, focus will be put on relations with Partnerships essential for IoT domain and eDIH's activities, namely: Key Digital Technologies (KDT) Partnership, European Partnership on Smart Networks and Services, European Partnership on Photonics and European Partnership on AI and Robotics.

AIOTI as a community which makes a considerable part of the European IoT ecosystem will make an effort to present needs and interests of the European IoT stakeholders at the EC level. It will be done through collecting of the opinions and viewpoints and

presenting them to the Commission In the form of Reports, Position papers and White Papers.

6.2.2 Building Relations with member States

AIOTI will support local IoT stakeholders in Member States in their relations with governmental and Regional authorities providing opinions, reports as well as identifying experts (providing on-line contact list) who should be contacted to get help. This service is meant to strengthen integration of the IoT ecosystem in Europe. (ex European Committee of the Regions)

6.3 Best practices and skills

This activity is encompassing a number of services which will help information sharing among the eDIH

6.3.1 Technology watch

The services will provide to eDIH a collected information report regarding IoT technologies evolution and also side technologies such as big data, connectivity, AI, security, ... All this information will be updated on the website and email push should also be possible on demand.

Should also provide real use cases demonstrated the technology in order to help eDIH to better understand the usage of a specific technology.

6.3.2 Technical skills

IoT technology is a very wide domain with a number of technologies that are adapted to one or another vertical domain. More than 300 protocols have been identified by AIOTI so it is quite impossible for anyone to be an expert of all these technologies. Novelty and complexity of the IoT field makes university education in this domain challenging and therefore, support of eDIHs and interaction of university professors with experienced industrial experts is of fundamental importance.

This service offers an online contact list that identifies the experts for each technology and these experts should be contacted to get help. Furthermore, expert will be ready to provide consultation and support to universities carrying on curricula in the IoT domain.

6.3.3 Best practices Sharing

In eDIH daily activities there are a number of problems which rise up and it could be helpful to management a FAQ online tool where people could find support. It could for technical aspects as well as regulatory topics or any useful information.

This service covers also the analysis of a eDIH service level in order to help it to reach higher levels.

6.3.4 Access to technology and design services (support in)

This service offers an online contact list that identifies the experts for each technologies and these experts should be contacted to get help. Beside of the expert technical knowledge the service will guide customers to technology providers offering access to technologies proposed by experts to solve the specific problem. Wherever possible and desired, the service will include consultancy regarding available funding, supporting trans-border access to technology and design services.

6.3.5 Mentoring of eDIH

The knowledge acquired at network level thanks to all the services already mentioned will serve to establish relationships with other eDIH at international/national/regional level to support them in their growth and development. IoT eDIH will offer a mentoring service consisting in teaching, and support, and making recommendations with the objective to generate a strong and well-balanced (in terms of development) ecosystem. This will include collaboration with and support to universities carrying on curricula in the IoT domain (training of trainers).

6.4 Support functions

This activity is covering the support services that the eDIH network organisation is able to provide to eDIH

6.4.1 Collaborative tools

This service is supported by AIOTI, it covers Document Repository, Mailing list, Market place, Platform agendas (book a slot), Website with services offered and link to each eDIH websites, and IoT eDIH catalog.

6.4.2 Workshop, meeting organisation, event planning, Hubs visit (for eDIH and SMEs)

In order to build our community, there is a need to meet at least once a year, this service will take in charge the organisation of the workshop and potential meetings that are needed

6.4.3 News

IoT domain evolves very fast and AIOTI is following closely the actuality, this services will offers to eDIH the latest news circulating on IoT such as events, regulations, policy, security, ethics, ... this service is also supporting news letters publication.

6.4.4 Identification of European projects and funds

(ref to ERDF which are part of the ESIF program)

European research program is very wide with a number of calls and it is not obvious to find the most relevant one. This service will offer a catalog of the most relevant calls for IoT projects.

6.4.5 Certification of solutions (i.e. European label)

Interoperability should be required in some cases in order to facilitate exchange of data between different technologies. Standardisation institutes have already specified a number of standards and it should be interested to check compliance of products to these standards.

6.4.6 IPR Management

Customers of eDIH should disclose confidential information that need to be saved and kept between authorised stakeholders. For that reason, there will be a need to establish an agreement that will secure the information exchange.

There a number of cooperative agreements which are existing, in order to facilitate cooperation between eDIH, it should be interesting to use a common document.

The above models may help to personalise/complete a consortium agreement. Have, however, in mind that they show only examples of possible approaches and do not show all alternatives for a given situation – you may adjust them for the specific needs of your particular consortium to the extent that such modifications are not in conflict with the Grant Agreement or the Horizon 2020 Rules for Participation.

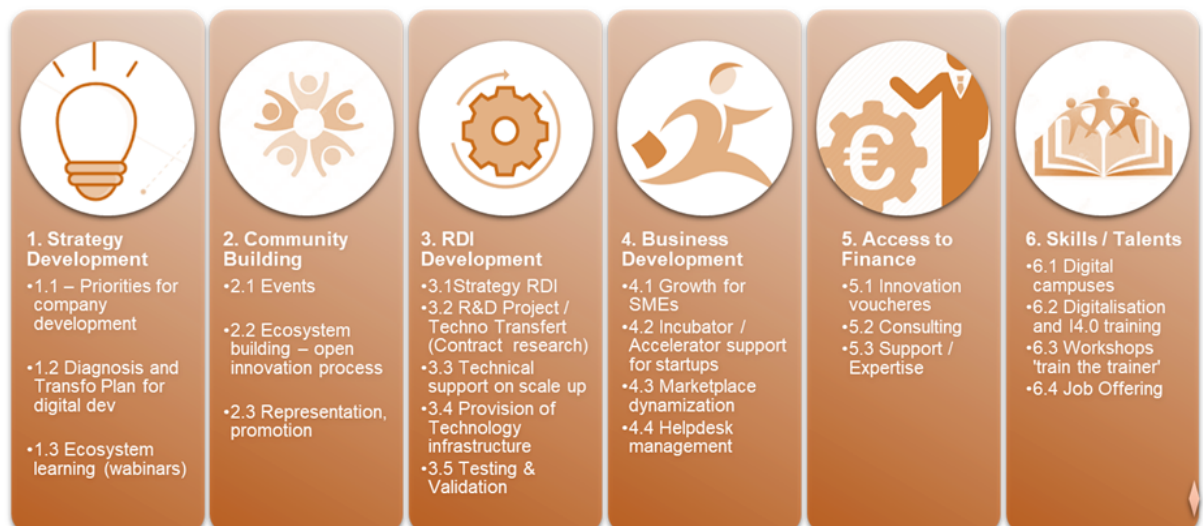
- [DESCA Model](#)
- [EUCAR Model](#)
- [MCARD Model](#)
- [LERU Model](#)
- [BAK Model](#)

Based on one of these existing models, a specific CA could be proposed by the Network of eDIH.

6.4.7 User communities for pilots and experiments

In order to validate a service, there is often a need to run pilots/experimentation with real users. This service offers a number of users in many European location that could be used to validate a specific service developed in one country in respects with Ethics and GDPR regulation. So that, the service provider can check if the service is fitting the needs of other users in other countries. Wherever possible and desired, the service will include consultancy regarding available funding, supporting trans-border access pilot and experiment services.

6.5 eDIH Services that could be provided to Industry



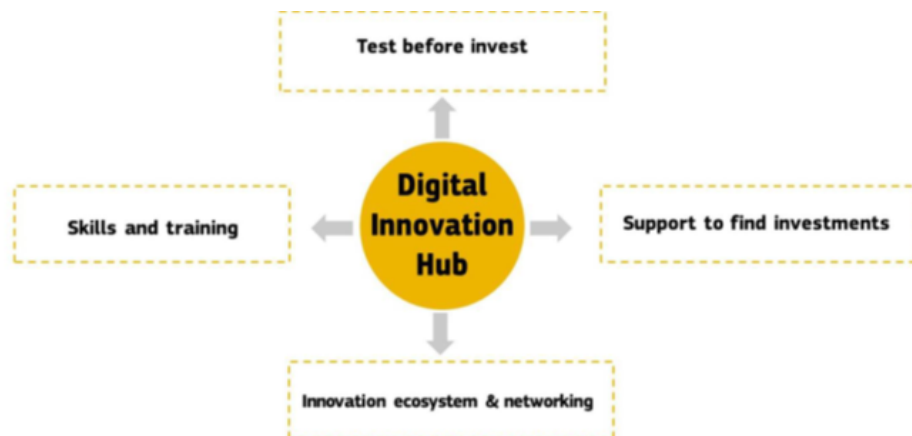
Based on the here above structuration, the below table is identifying the eDIH services that could be offered to Industry because common to all eDIH

1. Strategy Development		
1.3	Ecosystem learning	<ul style="list-style-type: none"> • Best practices videos & media
2. Community Building		
2.2	Ecosystem building – open innovation process	<ul style="list-style-type: none"> • Best practices videos & media
3. R&D / Offer / Industrialisation		
3.1	Strategy in RDI	<ul style="list-style-type: none"> • Round tables in Meetups / Congresses • Vertical / Sector Specialized workshops
3.2	Technology and digitalization foresight – Technology, competitive advantage and market intelligence	
3.4	Provision of technology infrastructure	<ul style="list-style-type: none"> • Digitalisation platform (see section 4)
4. Business		
4.1	Growth for SMEs	<ul style="list-style-type: none"> • MARKETPLACE (Business) - Brokerage events & Strategies • internationalisation
4.4	Helpdesk Management	<ul style="list-style-type: none"> • Admin/tech interlocution with eDIH members • Services documentation support. • Collaboration agreements templates and samples, guide to documentation handling • Documentation and guidance to Property and industrial rights handling procedures
5. Access to Finance		

6. Skills & Talents		
6.1	Digital Campuses	<ul style="list-style-type: none"> List of training campuses with topics / domains
6.2	Digitalisation and I4.0 Training	<ul style="list-style-type: none"> Specific training tools / platforms available for such a domains
6.3	Workshops "train the trainer"	<ul style="list-style-type: none"> Train the trainers training Support for anchoring skills

6.6 eDIH Services contribution to the 4 pillars

In the eDIH specification document, 4 main functions have been identified, the table below provide a synthetic view of the role of each service for each pillar in order to show where the network will help eDIH to achieve their role.



	Innovation ecosystem & networking	Skills and training	Test before invest	Support to finding investments
6.1 Collaborative tools		X		
6.2 Liaison with the European Commission (EC)	X			
6.3 Building Relations with member States	X			
6.4 Workshop, meeting organisation, event planning, Hubs visit (for eDIH and SMEs)		X		
6.5 News	X			
6.6 Technology watch	X			
6.7 Training catalog & session		X		
6.8 Technical skills		X		
6.9 Identification of European projects and funds				X
6.10 A common market place where each companies solutions could be highlighted			X	
6.11 A common success stories repository where real successful operations for industry users can be highlighted	X			
6.12 Certification of solutions		X		

6.13 Best practices Sharing	X			
6.14 Technical IoT open platform catalog			X	
6.15 IPR Management		X		
6.16 Access to technology and design services			X	
6.17 User communities for pilots and experiments			X	
6.18 Mentoring				

6.7 eDIH Services ranking

In order to be sure that the IoT eDIH network will implement the most relevant services at first, a survey among the participants has been conducted. They were invited to bring their position on 2 aspects:

1/ The importance of each services

2/ The interest for their own case

The conclusion is that the top 5 services are i) Liaison with the European Commission, ii) Identification of European projects and funds, iii) Access to technology and design services, iv) Workshop, meeting organization, v) A common market place.

Total	Ranking	Interest (2: high, 1: medium, 0:low)	Service
38,81	27	24	6.2 Liaison with the European Commission (EC)
41,18	22	23	6.9 Identification of European projects and funds
23,04	99	19	6.16 Access to technology and design services (support in)
21,44	90	17	6.4 Workshop, meeting organisation, event planning, Hubs visit (for DIH and SMEs)
21,81	105	18	6.10 A common market place where each companies solutions could be highlighted
18,85	104	15	6.14 Technical IoT open platform catalog
19,42	117	16	6.7 Training catalog & session
18,88	103	15	6.1 Collaborative tools
18,49	89	14	6.6 Technology watch
17,42	117	14	6.11 A common success stories repository
18,33	120	15	6.17 User communities for pilots and experiments
18,13	128	15	6.8 Technical skills
17,42	117	14	6.13 Best practices Sharing
14,08	130	11	6.3 Building relations with Member States
12,91	209	11	6.18 Mentoring
11,08	192	9	6.12 Certification of solutions
10,56	156	8	6.5 News
7,72	232	6	6.15 IPR Management

6.8 eDIH Services implementation&operation

The 18 services identified are more or less difficult and costly to put in place. Considering this aspect, the table below brings some assumptions that will also be taken into account in the prioritization of the implementation of each service

	Difficulty (1-10)	Cost (+, ++, +++)
6.1 Collaborative tools	3	+++
6.2 Liaison with the European Commission (EC)	5	+
6.3 Building Relations with member States	5	+
6.4 Workshop, meeting organisation, event planning, Hubs visit (for eDIH and SMEs)	5	+++
6.5 News	3	+
6.6 Technology watch	3	+
6.7 Training catalog & session	5	++
6.8 Technical skills	5	++
6.9 Identification of European projects and funds	5	+
6.10 A common market place where each companies solutions could be highlighted	6	+++
6.11 A common success stories repository where real successful operations for industry users can be highlighted	4	++
6.12 Certification of solutions	4	+

6.13 Best practices Sharing	2	+
6.14 Technical IoT open platform catalog	5	++
6.15 IPR Management	6	+
6.16 Access to technology and design services (support in)	7	++
6.17 User communities for pilots and experiments	5	++
6.18 Mentoring	5	+

7 Design of the platform catalogue

7.1 Objective

One of the aims of the shared platform/infrastructure could focus on offering a service catalogue within the IoT eDIH network (defined in a previous chapter of the white paper). The categorization of the value-added services would need to be standardized, and also the profiling of each eDIH network node would be required. Thus, the user would be able to filter the results on the basis of different criteria (name, category/type, country, value-added services...) and view only the eDIHs that provide a certain service or/and have experience in a certain aspect related to IoT

7.2 Mapping

It would be interesting not only to register eDIHs in the database but also the companies and organizations supporting the eDIH's customer providing solutions, f.e. classified by sector. This would create a sort of an integrated Marketplace, in which each actor of the network could benefit, either finding solution providers easily or offering their services to a wide ecosystem.

This catalogue could be accessible through an interactive online map where users would find detailed information of each actor, such as services offered.

The IoT shared platform could also be conceived as a strategic asset available for the network, providing options for Testing different IoT concepts and/or innovative projects linked to different fields (industry, agri-food sector, etc.). Maybe a pay per use/rent approach could be suitable for this purpose.

It's important to have from the eDIHs: field of application, service offered and condition of use in order to fit end-users expectations.

7.3 Platform Catalog

In order to have a clear and a brief overview of the platform in domain of IoT we propose as a first step the following information to be highlighted and displayed for the platform catalog:

- Platform brand
- Description
- Field of Applications
- Location
- Partner in charge
- Services & key Features
- Access rules
- Contact
- Link to the platform

AIOTI should propose an IPR draft template to support members. Certainly, the specific document has to be tailored to specific needs and local regulations, however an example document could be helpful.

7.4 Platforms overview, technical aspects

Concerning technical aspects, a detailed description of the different IoT platforms used by the different eDIHs should be done (similar to the list provided in the previous version of the white paper). In this regard, due to its potential for this network, an approach similar to the one applied by the Activage project, with the AIOTES (ACTIVAGE IoT Ecosystem Suite), could be considered. This would allow to develop an open framework particularly conducive to make heterogeneous IoT platforms used from different eDIHs interoperable, so existing resources may be better used within the network and more accessible for all actors.

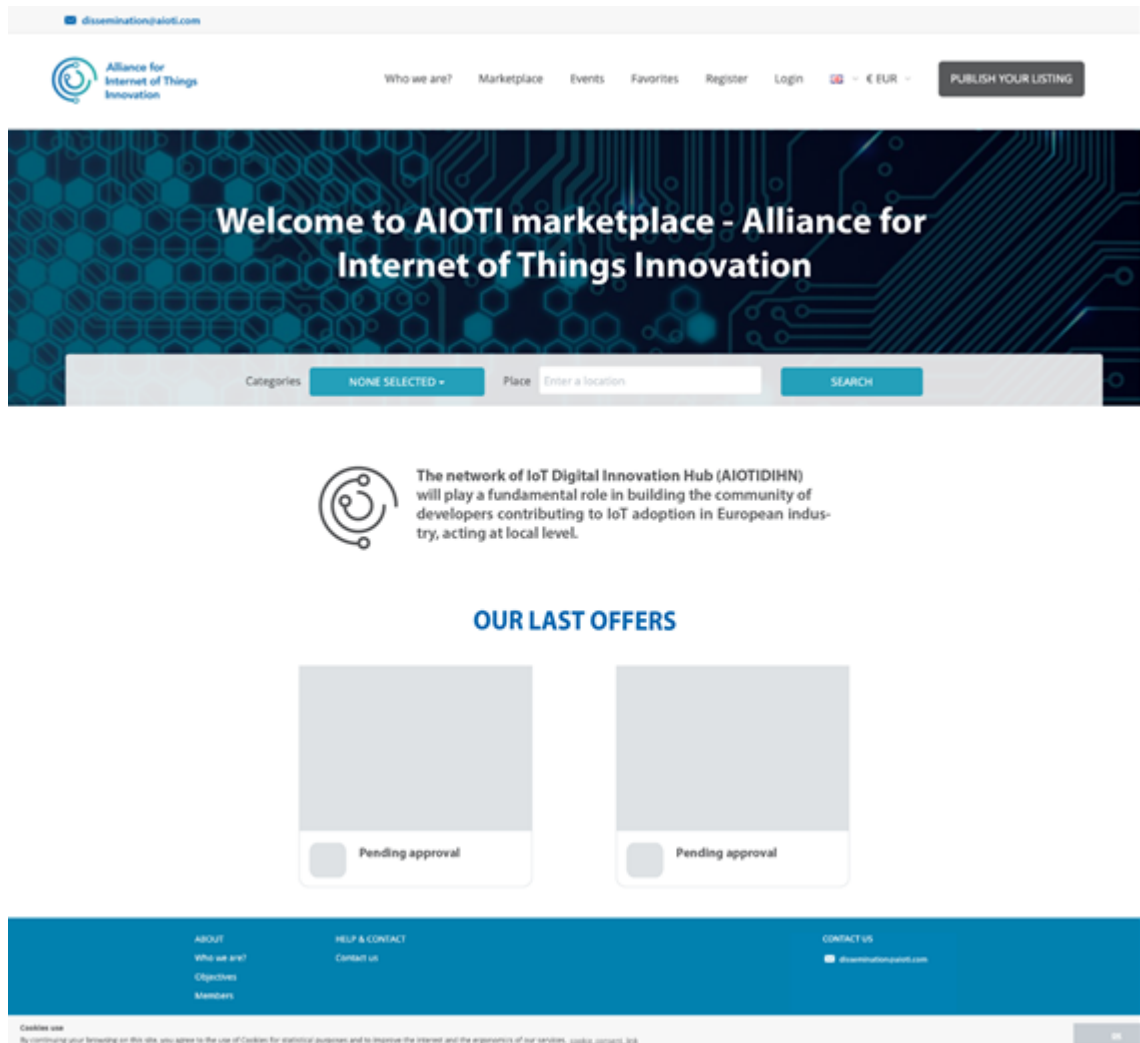
Unify-IoT project has recently produced a report on existing IoT platform, the 23 leading IoT platforms could be classified as follow:

Leading IoT platforms					
Commercial					Open Source
Multination corporations				SME platforms	
Cloud centric	Industry centric	Comms centric	Device centric		
Microsoft Azure IoT IBM Watson IoT Amazon AWS IoT	PTC ThingWorx Bosch SW Inno Suite GE Predix	PTC Axeda CISCO/Jasper Ayala Networks Aeris IoT	Intel IoT ARM mbed	ThingSpeak Xively Carriots EvryThng SensorCloud	Kaa Nimbits Eclipse IoT Open Remote FIWARE* OpenIoT*

The list of the platform and associated services will be updated on the web page on a regular basis. Existing platform is available in Annex A.2 of this paper.

8 Design of the Market place

8.1 Design of the MARKETPLACE



8.2 Using the MARKETPLACE

In the upper menu there are a series of tabs where we can find the following information:

Tab - About us

This page contains information about AIOTI

Tab - Events

It lists the events that have taken place and those that are planned by the organization, and the user can click on each one for more information.

Tab - Favourites

It indicates the searches made by the user and the corresponding search criteria.

Tab - Registration

Access to register at our Marketplace.

To register, it is necessary to fill in some basic information, or register by logging in to a Facebook account.

Tab - Login

Gives access to the private user area. The user must simply log in by entering their email and password or log in using a Facebook account.

Home page

This page will allow the registered user to request or offer a service.

It has a search engine that makes it possible to filter a search:

- by the predefined categories
- by the location where the service is offered

The application also displays the latest service offers made by Marketplace members.

In the lower part of the web page the user can access the main menu, the contact information and assistance.

Private Area

Once logged in, the user can access the private area.

The user has:

- A section for viewing and modifying personal data.
- A section that enables the search for services.
- A section that displays the advertisements offered by the user.

Publish your Ad

It is located on the top right of the website and enables users to publish their offers.

To publish an offer, the user will have to do the following:

- Select the category of the advertisement. This category is predefined by the application administrator.
- Select the language of the announcement.
- Add the title that will appear in the publication and its corresponding description.
- A series of images may be added easily, by dragging them to a predefined area. Up to a maximum of 24 images may be added to define a service.
- Define the price of the service, it can be set a fixed price or hourly rate.
- Select the currency in which the user will make the transaction.
- The address at which each of those services is offered can be entered to facilitate service searches. It will be done by defining:
 - o Country
 - o City
 - o Postal code

- o Phone number
- The Marketplace uses the Google API for the visual location of each of the services and the companies offering and requesting them.
- To complete the publication simply accept the terms of use and click on Publish.

The ad will be included on the homepage. The new advertisement can be found by doing a search and it will appear in the new publications section of the home page for a certain period of time.

9 Conclusion

This paper is describing a number of actions that AIOTI needs to put in place in order to set up a sustainable IoT eDIH network able to support IoT eDIHs. In the next Digital Europe program, €1.3 billion for ensuring the wide use of digital technologies across the economy and society to Build up and strengthen the network of European Digital Innovation Hubs, aiming to have a Hub in every region, to help companies benefit from digital opportunities.

With regards to this program, AIOTI is willing to be part of this initiative, taking advantage of the Digital Europe program to put in place such a network following the activities described in this paper.

To do so, there is a number of steps to climb but there is also a need to coordinate these steps with DIHNET.EU in order to secure the sustainability and the consistency of the action plan.

In order to be stronger and consistent with the future Smart Network and Services partnership, this initiative will be shared with the 5G IA organisation in order to share these views. This extension of the IoT eDIH network to a "SNS" eDIH network encompassing eDIH will cover both domains and will obviously include cybersecurity and AI technologies as required by the Digital Europe program.

ANNEXES

A.1 Labeling questionnaire

The questionnaire presented in the table below intends to be a recommendation to kick off the qualification/certification application process of IoT eDIH. Since it is a completely new process to access recent complex entities as eDIH, it will require further updates based on the experience and the increasing maturity of eDIH.

Identification of the eDIH <i>This section intends to characterise your organization.</i>
Name:
Official website:
Address:
Partners:
Briefly describe cooperation mechanisms of your organisation (2000 characters):
Provide a short description of the specialization of your organization (2000 characters):
Specify addressed sectors (e.g. Industry 4.0, Agriculture...) and in case you do not specify in a concrete sector please mention "transversal to all economy sectors":
Specify addressed technologies:
Specify geographical coverage in which your organization is focused:
eDIH governance and financing <i>This section intends to understand the governance and implementation mechanisms that sustain your organization together with financial sustainability strategies and current financial sources.</i>
Describe your organization governance model (2000 characters):

Specify the structure of your organization (2000 characters):	
Describe management mechanisms (2000 characters):	
Describe implementation mechanisms supporting the services execution (2000 characters):	
Provide a short description of your organisation's alignment with the smart specialization (2000 characters):	
Describe government support initiatives for your organisation (2000 characters):	
Provide a brief overview of the financial sustainability plan of your organisation (2000 characters):	
Provide a short description of internal evaluation processes about your organisation performance:	
Identify repartition shares among different financial sources:	Revenues from services:
	European projects:
	National projects:
	Regional projects:
	National support initiatives:
	Regional support initiatives:
	Others (specify and indicate share):
<p>Services provided by the eDIH</p> <p><i>This section intends to collect information about the services provided by your organisation. It follows the eDIH services structure defined by the IoT eDIH Network focusing only on services that can be offered either to industry or public sector.</i></p>	
1.	<p>Strategy Development</p> <p><i>This sub-section focus on strategy development services. For each service type, please identify:</i></p>

	<ul style="list-style-type: none"> - number of businesses and public sector entities that benefitted from a service; - sector; - location; - type of support received.
1.1	Priorities for company development
1.2	Diagnosis and Transference Plan for Digital Development
1.3	Ecosystem learning
2.	<p>Community Building</p> <p><i>This sub-section focus on community building services. For each service type, please identify:</i></p> <ul style="list-style-type: none"> - number of initiatives your organisation as been part of; - concrete focus of each initiative; - number of initiatives coordinated by your organization; - short description; - approximate number of stakeholders engaged in each initiative (if relevant).
2.1	Events
2.2	Ecosystem building – open innovation process
2.3	Representation promotion
3.	<p>RDI development</p> <p><i>This sub-section focus on RDI development services. For each service type, please <u>identify each activity</u> in which your organization has been involved providing the following:</i></p> <ul style="list-style-type: none"> - number of business and public sector that benefitted from a service; - technologies involved and/or tested; - digital and/or physical infrastructure involved; - partners and/or stakeholders involved; - sectors addressed; - cooperation mechanisms established.

3.1	Strategy RDI
3.2	R&D Project/Techno Transfer (contract research)
3.3	Technical support on scale up
3.4	Provision of technology infrastructure
3.5	Testing & Validation
4.	<p>Business Development</p> <p><i>This sub-section focus on business development services. For each service type, please <u>identify each activity</u> in which your organization has been involved providing the following:</i></p> <ul style="list-style-type: none"> - <i>number of business and public sector that benefitted from a service;</i> - <i>technologies involved;</i> - <i>sectors addressed;</i> - <i>cooperation mechanisms established;</i> - <i>partners and/or stakeholders involved.</i>
4.1	Growth for SMEs
4.2	Incubator/Accelerator support
4.3	Marketplace dynamisation
4.4	Helpdesk management
5.	<p>Access to Finance</p> <p><i>This sub-section focus on access to finance services. For each service type, please <u>identify each activity</u> in which your organization has been involved providing the following:</i></p> <ul style="list-style-type: none"> - <i>number of business and public sector that benefitted from a service;</i> - <i>technologies involved;</i> - <i>sectors involved;</i> - <i>partners and/or stakeholders involved;</i> - <i>cooperation mechanisms established;</i> - <i>amount of investment successfully triggered.</i>
5.1	Innovation vouchers

5.2	Consulting
5.3	Support/expertise
6	<p>Skills/Talents</p> <p><i>This sub-section focus on skills/talents services. For each service type, please <u>identify each activity</u> in which your organization has been involved providing the following:</i></p> <ul style="list-style-type: none"> - <i>number of business and public sector that benefitted from a service;</i> - <i>technologies involved;</i> - <i>sectors involved;</i> - <i>partners and/or stakeholders involved;</i> - <i>cooperation mechanisms established;</i>
6.1	Digital campuses
6.2	Digitalisation and I4.0 training
6.3	Workshops “train the trainer”
6.4	Job Offering
<p>Achievements, communication and recognition of the eDIH</p> <p><i>This section intends to collect information about the concrete achievements and recognitions that your organisation has received (European projects, awards, prizes, nominations, etc.) and media activity of your organisation (local and international articles about your organisation).</i></p>	

A.2 Existing IoT Platforms

This section gives a short description of the technical IoT platforms used by IoT eDIH

This section gives a short description of the technical IoT platforms used by IoT eDIH

Platform Azure IoT

- Description:

The Azure Internet of Things (IoT) is a collection of Microsoft-managed cloud services that connect, monitor, and control billions of IoT assets. In simpler terms, an IoT solution is made up of one or more IoT devices and one or more back-end services running in the cloud that communicate with each other.

- Remote access: <https://azure.microsoft.com/en-us/services/iot-hub/>
- Access condition: Commercial
- Location: Worldwide

Platform AWS IoT

- Description:

AWS IoT makes it easy to use AWS services like Amazon Kinesis, Amazon S3, Amazon DynamoDB, Amazon CloudWatch, and AWS CloudTrail, to build IoT applications that gather, process, analyze and act on data generated by connected devices, without having to manage any infrastructure.

- Remote access: <https://aws.amazon.com/iot-core/getting-started/>
- Access condition: Commercial
- Location: Worldwide

Platform FIWARE

- Description:

FIWARE Lab is the non-commercial sandbox environment of the FIWARE Community. It offers, for free, the capability to innovate and experiment with the FIWARE Technologies. Entrepreneurs and individuals can test FIWARE technologies as well as their applications within the FIWARE Lab, with the possibility to exploit Open Data published by cities and other organizations.

- Remote access: <https://cloud.lab.fiware.org/auth/login/?next=/>
- Access condition: FREE
- Location: France, India, Spain, Italy, Greece, Senegal

Platform SPOT

- Description:

SPOT is a commercial IoT Platform developed for Objenious Network (LoRaWAN). Objenious is a subsidiary of Bouygues Telecom.

- Remote access: <https://objenious.com/starter/>
<https://spot.objenious.com/login>
- Access condition: Commercial
- Location: France

Platform Sigfox

- Description:

Sigfox is a LPWAN commercial network with a dedicated IoT Platform. Sigfox delivers the network and the protocols required to allow an object to share its data from anywhere in the world.

- Remote access: <https://build.sigfox.com>
- Access condition: Commercial
- Location: France, Sigfox presence in 60 countries in 2018

NB-IoT Vodafone Network - Vodafone IoT Platform

- Description:

NarrowBand-Internet of Things (NB-IoT) is a standards-based low power wide area (LPWA) technology developed to enable a wide range of new IoT devices and services. NB-IoT is an 'industrial grade' LPWA solution – it runs on licenced spectrum which guarantees quality of service and a future-proofed capability

- Remote access: <https://www.vodafone.com/business/iot/managed-iot-connectivity/nb-iot#narrowbandiot-applications-and-solutions>

<https://www.vodafone.com/business/iot#iot-platform>

- Access condition: Commercial. Based on open standards – service is not vendor or operator dependent
- Location: Worldwide

Platform The Things Network

- Description:

The Things Network provides a set of open tools and a global, open network (LoRaWAN) to build IoT application at low cost, featuring maximum security and ready to scale. Through robust end-to-end encryption, a secure and collaborative Internet of Things network is built that spans across many countries around the globe. Now operating thousands of gateways providing coverage to millions of people.

- Remote access: <https://account.thethingsnetwork.org/register>
- Access condition: Open Source
- Location: Worldwide

AIOTES Platform: ACTIVAGE IoT Ecosystem Suite (AIoTES)

- Description:

The ACTIVAGE IoT Ecosystem Suite (AIoTES) consists of a set of techniques, tools and methodologies for interoperability between heterogeneous IoT Platforms and an open framework for providing semantic interoperability of IoT Platforms for AHA, while addressing trustworthiness, privacy, data protection and security. It interconnects FIWARE, IoTivity, OpenIOT, SeniorSome, sensiNact, Sofia 2, and universAAL IoT platforms, new platforms can be added by creating a bridge for syntactic alignment and using the IPSM feature for semantic alignments with the AIOTES Data Model.

- Remote access: <http://www.activageproject.eu/>
- Access Condition: Open Source (release expected on sept 2019, and in 2020Q1)
- Location: Europe (Spain, Italy, Greece, France, Germany, Finland, UK)

Platform UniversAAL

- Description: universAAL IoT is the open source platform that enables seamless interoperability of devices, services and applications on an unprecedented scale. The community behind this not-for-profit software platform believes that by integrating every available technology, we can finally bring clarity to the Internet of Things (IoT).
- Remote access: <https://www.universaal.info/page/explore/>
- Access condition: not-for-profit software
- Location: Worldwide

CRYSTAL: CRITICAL SYSTEM ENGINEERING ACCELERATION Reference Technology Platform

- Description: The ARTEMIS Joint Undertaking project CRYSTAL (CRITICAL sYSTEM engineering AccELeration) takes up the challenge to establish and push forward an Interoperability Specification (IOS) and a Reference Technology Platform (RTP) as a European standard for safety-critical systems.
- Remote access: <http://www.crystal-artemis.eu>
- Access condition: not-for-profit software
- Location: Europe

Platform Microsystem

- Description: Micro and nano electromechanical systems (MEMS and NEMS) manufacturers are on a constant quest to lower chip energy consumption while keeping the cost of manufacturing key chip components down.

CEA Tech institute Leti brings 35 years of experience in MEMS R&D, and is one of the world's largest centers for MEMS research. The institute has successfully transferred many of its innovations to manufacturers.

Leti offers a broad range of services covering the entire MEMS and NEMS development cycle, addressing sensors, switches, RF components, 3D integration, characterization, and reliability testing to partners' specifications.

The institute's flagship M&NEMS technology makes it possible to integrate nano-objects (piezoresistive nanowires) and MEMS onto a single sensor. This innovation—smaller than traditional MEMS capacitive sensors—marks an advance toward reducing manufacturing costs.

- Remote access: <http://www.cea-tech.fr/cea-tech/english/Pages/resources-and-skills/x1x-micro-nano-systems.aspx>
- Access condition: CEA Tech conditions
- Location: Grenoble – France

Platform IoT and Network (including connectivity)

- Description: CEA Tech is helping drive widespread IoT (Internet of Things) deployment by addressing three major issues: how communicating objects capture and process information; overall system cost reduction; and data security.

CEA Tech institute Leti is developing sensors to pick up data and process it locally to extract relevant information and is making advances toward self-powering components by modifying integrated low-power electronics, developing enhanced low-level protocols, and systems capable of harvesting energy from the environment.

The institute is also developing smart miniaturized antennas and investigating ways to roll out reliable, secure connectivity. Finally, the institute is paving the way for tomorrow's telecommunications networks (5G) for IoT.

- Remote access: <http://www.cea-tech.fr/cea-tech/english/Pages/resources-and-skills/x1x-telecommunications-and-communicating-objects.aspx>
- Access condition: CEA Tech conditions
- Location: Grenoble - France

Platform Cybersecurity & Privacy

- Description: The integrated circuits found in smartphones, mobile embedded systems, smart cards, and other connected objects are all prime targets for cyber-attacks.

CEA Tech institute Leti has built up a unique set of resources to simulate physical attacks (fault injection) on these kinds of systems. Leti researchers have also developed characterization tests to evaluate these targets' vulnerability, detect any weaknesses, and come up with innovative solutions to close breaches, thereby mitigating attacks.

Leti helps its industrial partners make their products more secure and certifies products before release. In France, certification involves official evaluations carried out according to Common Criteria. Leti is one of two centers in France to conduct these official evaluations, right on the CEA Tech campus.

- Remote access: <http://www.cea-tech.fr/cea-tech/english/Pages/resources-and-skills/x1x-secure-components.aspx>
- Access condition: CEA Tech conditions
- Location: Grenoble - France

Platform DIH AGRIFOOD COOPERATION PLATFORM

- Description: DIH AGRIFOOD COOPERATION PLATFORM is a networking platform and database of carefully selected type of data that allows IoT solution providers to present themselves, alongside their IoT products and services to interested parties and technology users from the agrifood industry, such as farmers and food producers. The platform is a place where technology supply and demand should meet. In addition, the platform is used as a communication channel to all identified organizations and is supporting DIH dissemination and promotion activities. The platform is based on Facilitators, trained representatives of DIH AGRIFOOD members who are able to understand and resolve needs connected to digital transformation and act as Technology transfer managers. The platform is hosting: Organizations, Projects, Thematic Networks, Products and services, Living labs, DIHs and Facilitators
- Remote access: <https://mapping.dih-agrifood.com/>
- Access condition: Open access
- Location: Worldwide

Nanophotonics Centre platform:

Ł-ITE offers:

- Infrared photonic devices development
- Mid-IR Quantum Cascade Lasers, design, fabrication, characterization
- Mid-IR, coupled cavity lasers for single mode emission
- New light sources for industrial, environmental and medical applications
- Optically pumped, external cavity devices: fabrication and characterization of VECSELs, MECSELs
- Assembling, packaging and wire-bonding of laser chips
- Optical characterization of mid-IR materials
- Electrical and spectral characterization of optoelectronic devices

Thermal characterization of semiconductor devices

Platform Google Firebase

- Description: Firebase is a mobile and web application development platform, which provide services as Cloud Firestore, ML Kit, Authentication, Hosting, Realtime database.
- Remote access: <https://firebase.google.com/>
- Access condition: Commercial
- Location: Worldwide

Platform OpenHAB

- Description: The open Home Automation Bus (openHAB) is an open source, technology agnostic home automation platform which runs as the center of a smart house. It allows to integrate a multitude of different devices and systems, provide a uniform user interface and a common approach to automation rules across the system.
- Remote access: <https://www.openhab.org>
- Access condition: Open Source
- Location: Worldwide

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[1] In some places eDIH are set up in a way that companies of the region can offer and seek services. This complements 3.4

[2] It would be interesting to join forces with existing networks as DIHNET, AI-DIH ...

[3] eDIHs can generate innovative ecosystems by promoting the participation of its members and companies of their region in programmes such as Horizon Europe.

[4] Some eDIHs cannot be fully operational because the coordinator does not dynamise it. Then, it might happen partners do not grasp the benefits of being part of it.

About AIOTI

AIOTI is the multi-stakeholder platform for stimulating IoT Innovation in Europe, bringing together small and large companies, start-ups and scale-ups, academia, policy makers and end-users and representatives of society in an end-to-end approach. We work with partners in a global context. We strive to leverage, share and promote best practices in the IoT ecosystems, be a one-stop point of information on all relevant aspects of IoT Innovation to its members while proactively addressing key issues and roadblocks for economic growth, acceptance and adoption of IoT Innovation in society.

AIOTI's contribution goes beyond technology and addresses horizontal elements across application domains, such as matchmaking and stimulating cooperation in IoT ecosystems, creating joint research roadmaps, driving convergence of standards and interoperability and defining policies. We also put them in practice in vertical application domains with societal and economic relevance.

AIOTI is a partner for the European Commission on IoT policies and stimulus programs, helping to identifying and removing obstacles and fast learning, deployment and replication of IoT Innovation in Real Scale Experimentation in Europe from a global perspective.

AIOTI is a member driven organisation with equal rights for all members, striving for a well-balanced representation from all stakeholders in IoT and recognizing the different needs and capabilities. Our members believe that we are the most relevant platform for connecting to the European IoT Innovation ecosystems in general and the best platform to find partners for Real Scale Experimentation.

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