

Smart 4 Europe
Catalysing Digitisation throughout Europe



Deliverable

D5.5 Recommendations on implementation and sustainability of Digital Innovation Hubs

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Short description of the content of the deliverable

The CSA Smart4Europe is a support measure in implementing the European Commission’s Digitising European Industry Strategy and facilitates the further development and establishment of Digital Innovation Hubs (DIHs). This deliverable is exploring the key success factors that have been identified in the Smart Anything Everywhere Innovation actions and how these key success factors can be valorised to build business models that will allow the Innovation Actions to become sustainable beyond the Horizon 2020 initial funding.

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Statement

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If parts of this document will be published before the submission and acceptance of the document as deliverable of the Smart4Europe project, they must be indicated as “preliminary results”.



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Executive Summary

Smart4Europe is the Coordination and Support Action (CSA) set up in 2017 to address, among other challenges, the needs of the Smart Anything Everywhere (SAE) Initiative for a coordinated implementation and sustainability plan. The SAE initiative's main objective is to enhance the digitization of the European industry by accelerating the design, development and uptake of advanced digital technologies. To do so, in the framework of H2020, the SAE initiative had brought together several Innovation Actions (IAs) with the required technical and business expertise in Cyber-Physical Systems (CPS), Flexible & printed electronics, Low-energy computing, Internet of Things (IoT) and Smart Systems Integration (SSI).

Some IAs have already ended while 4 are still running and new ones are expected to start in the coming months. All in all, till now, the IAs have been gathering 83 technical DIHs and various industrial partners. The challenge for the sustainability of their actions is to be able to maintain and strengthen this strong network of DIHs and to find some solutions and business models so that the network keeps on developing pan-European collaboration to support the digitalization of European companies beyond the initial H2020 funding.

From the analysis of the key success factors of past and current SAE IAs, some recommendations can already be drawn in order to reach, if not full sustainability (which takes time), but at least a certain level of autonomy in their future actions.

- **Developing strong cooperation with the regional DIHs that are now developing in all Europe**

By combining a strong technical expertise and a wide geographical coverage, the SAE IAs will improve their ability to reach the most European companies possible and their ability to provide the best technical and business support to build some innovative application experiments and bring them successfully to market so that such success stories have a knock-on effect on European SME's digitization.

IAs will not only generate success stories with the companies benefiting from their application experiment but will also provide valuable inputs for European companies' digitization maturity assessment thus demonstrating their complementarity with regional DIH.

- **Joining forces in SAE initiative**

By joining forces within the SAE initiative and by maintaining a demanding and neutral selection process to identify the most promising uses cases, they will reach two objectives:

- demonstrate their ability to bring strong technical differentiation on the market;
- create a critical mass of success stories enabling them to draw the attention of private investors as well as newcomers;
- speak with one voice towards other innovation stakeholders.

- **Explore membership, fee for training services and replication models as complementary revenue sources**

SAE IAs and DIHs are multiple and it seems obvious that there cannot be only one type of business model and one type of sustainability plan. Different activities can rely on different revenue sources. Several solutions are already contemplated by the SAE IAs that should be further explored. However due to the specificity of IAs and DIHs, the 3 major revenues sources towards sustainability have been identified as:



- Membership fee for IAs/DIHs actions benefiting to many different stakeholders
- Provide specific training services to reach large number of companies all over Europe in strong collaboration with local DIHs
- Generate snowball effects in generating replication model so results from an Application Experiment could be duplicated in various fields and to various players.

- **Explore public/private partnership model**

A public/private partnership model dedicated to SMEs' challenges could be an effective solution to involve new investors in the sustainability of DIHs and to design the most appropriate solutions to answer SMEs' needs and expectations.

IAs / DIHs are supporting digitization of European SMEs in reducing their risk in getting access to new technologies and testing new businesses. The sustainability of IAs / DIHs will require engaging financing partners. Discussions have been engaged with EIB, EIF and private investors. Public/ private partnership to financially support the sustainability of IAs / DIHs will have to be considered.

In addition, it is interesting to notice that due to the diversity of companies supported by IAs/ DIHs – SMEs, early stage start-up, scale up companies – different financial tools to further support those companies will be required, from loan, convertible loans, equity investment etc.

Private investors are expecting specific return on investment. So, the collaboration will have to fit their expectations, investment strategy and own rules to reach such public/private partnership.

- **Remain agile to be able to adapt to a very fast-moving and complex environment**

IAs have to deal with very complex tasks and environment. The issue at stake in the digitalisation of European companies are all very complex and changing fast. The requirement to proceed to technologies transfer, pedagogy on highly disruptive technologies, access to private investment and corporate venture are all challenging and require a very agile organisation that will be able to anticipate and quickly adapt its *modus operandi* to new trends and developments.

By combining a mix of all those different options, SAE IAs should be able to reach progressively an increasing degree of autonomy from European funding while continuing to keep their ecosystem active and contributing to the digitisation of European Companies and to the improvement of the European Digital Single Market. Their challenge is to engage regional, national as well as private funding not only to support the sustainability of the network but also to be able to further invest in Application Experiments to support European SMEs in their digitization.



1 Introduction

The SAE initiative, founded in 2015, is one of the tools set up by the European Commission (EC) to enhance the digitization of the European Industry by accelerating the design, development and uptake of advanced digital technologies.

There had been some strategic shifts within the European Commission policies in favor of the digitization of the European companies during the recent years. It is important to have in mind this conceptual and operational evolution and the diversity encompassed by the concept of Digital Innovation Hubs resulting in our current European innovation ecosystem. In 2015, the European Commission first launched a series of actions focusing on the so called “competences centers” that were deemed the most appropriate innovation stakeholders to drive Innovations Actions. Further on, after the first SAE projects were launched, the willingness of the EC to set up and promote a network of regional and technical Digital Innovation Hubs (DIHs) went stronger. The objective is to reinforce each DIH key digital capabilities through a European DIHs network relying on each other’s expertise, made available through Pan-European collaborations. The goal is to enable the digitization of European SMEs through a better access to cutting-edge technologies and business development resources everywhere in Europe and at SMEs working distance. The consortia of the SAE Innovation Actions can today be considered either as DIH or as DIHs networks. This is a major evolution in the various support to innovation solutions. The Innovation Actions can be defined as **European DIHs with a strong technical differentiation whose mission is to develop the ecosystem enabling the dissemination of highly disruptive and added-value technologies**. This is at least the vision that was proposed within the D2.6 “Blueprint for a Sustainability Plan” and that will be explained later on again in this deliverable. Those Innovations Actions with a strong technical focus shall be considered as referees for the others local DIHs and shall developed pan-European collaboration with them to build strong ecosystems.

This deliverable on “Recommendations on implementation and sustainability of DIHs” is one of the last steps resulting from the inputs gathered throughout the **WP5 Communication, Dissemination and Exploitation** and, especially from the task 5.4. However, it is also referring to the works done in other work packages within the Smart4Europe CSA. Above all, it is taking further ahead the reflection process initiated with the deliverable D2.6 “Blueprint for a Sustainability Plan” and is benefitting from the very valuable inputs of the deliverable D2.5 “SAE community database” which had gathered the lessons learned from all the Innovation Actions of the SAE initiative. Furthermore, this deliverable D5.5 takes into account the work done on the Technology Radar (D4.4) to identify the domains of excellence in which Innovation Actions and DIHs have to invest.

The overall objectives of the WP5 are:

- to communicate and disseminate SAE related information to stimulate replication potential of early technology adoption.
- to facilitate implementation and sustainability of Digital Innovation Hubs across European regions.

The objective of the task 5.4 is to work on a possible convergence of the existing funding and support models for Innovations Actions which are considered as DIHs network with a strong technical focus. The aim of the actions undertaken within this task has been to identify new business models that



could foster knowledge sharing and technologies transfer between SAE IAs and other local DIHs while enabling the sustainable development of new business opportunities for them all.

At this stage of the process, it is important to explain what the concept of sustainability is which will be considered throughout this deliverable as it is also a very complex and evolving concept. Sustainability does not only consider the return on investment of the money invest through DIH services delivery or the success rate of the companies benefiting from the technical and business support or the Innovations Actions. Sustainability of a DIH implies it has the required means to further provide European companies with the technical & business support they need to achieve their digital transformation beyond the initial H2020 framework project that was at the start of its operations. Sustainability also implies that DIHs have the required means to reach even more European companies than done previously during the first part of their development. Besides, those first phases in IAs development could be considered as an “experimental” phase, an “application experiment” to validate the concept and its capacity to find its way to the market needs and to scale-up.

This deliverable addresses the challenges at stake concerning the digitalization of European Industry and how Digital Innovation Hubs can play a critical role in facing those challenges. First of all, the deliverable considers the challenges for the European Commission who is the first funding source of the Smart Anything Everywhere initiative and its Innovation Actions but also the challenges for others European innovation stakeholders. The deliverable highlights the specificity of the SAE Innovations Actions in the more general DIHs landscape and drafts some recommendations on sustainable business models to support their actions in favor of digital innovation in Europe.



2 Context and challenge of DIHs sustainability

2.1 The European challenge of Digitalization

2.1.1 European Commission policies & expectation

The “Europe 2020 strategy” underlying the European Union and Member States policies since 2010 aims at creating a smart, sustainable and inclusive growth in Europe. The potential of digitisation and of the Information & Communication technologies (ICT) to reach this aim has been strongly acknowledged and fostered by the European Commission. For the last decade, the EC has taken the full measure of the challenges ahead and allocated a highly significant amount of money to enable European societies and industries to embrace this digital revolution. The outgoing European Commission made the Digital Agenda for Europe one of its 7 flagship initiatives and a connected Digital Single Market one of its 10 priorities.

However, as highlighted every year since 2016 by the [Digital Economy and Society Index, DESI](#), there are many discrepancies in Europe in the uptake of the digital revolution, from a country to another and from a region to another but also from a company to another and from one sector of activity to another.

In the framework of the Digital Single Market Strategy, the European Commission has set up ambitious plans to address this increasing heterogeneity between European countries and European industries in the adoption of digitisation technologies. In 2016, the Digitising European Industry (DEI) strategy has been launched in order to facilitate the digital transformation of European companies and to “unlock the full potential of the 4th industrial revolution”³. One of the 5 pillars of this initiative is dedicated to build a strong network of Digital Innovation Hubs conceived as “one-stop-shop where companies - especially SMEs, start-ups and mid-caps – can get help to improve their business, production processes, products and services by means of digital technology”⁴.

Investments in digitisation are expected to enable growth as well as creating jobs and new business opportunities. Investments in ICT research and innovation are considered as key to a more competitive and inclusive Europe. The DEI strategy is mobilising €5 billion of EU investment from Horizon 2020 between 2016 and 2020 and the upcoming Digital Europe and Horizon Europe programs are expected to pursue and strengthen this huge effort.

However, building on this tremendous investment, the European Commission has two important objectives to reach in order to address internal and external constraints: **measuring and consolidating the impact** of the incurred expenditures and **assuring the leading position** the European ecosystem keeps in research and innovation. To address those two objectives, the sustainability of the European projects initially funded by the European Commission became more and more pressing. The European Commission is expecting other innovation stakeholders to join the dynamic created by its massive investment in digital innovation in order to give this European investment a new dimension by catalysing national, local and private investment. It is also important for the European Commission and for the actors involved in the European actions that those projects can create some strong enough assets for some activities to continue to develop further after the initiating phase during which public money is often critical. With the competitive international environment Europe is evolving in, it is of utmost importance that all public and private actors

³ <https://ec.europa.eu/digital-single-market/en/pillars-digitising-european-industry-initiative>

⁴ idem



commit themselves in order to build strong innovative ecosystems and that's what the European Commission is now calling for when advocating for sustainability of the Digital Innovation Hubs.

2.1.2 Smart Anything Everywhere: enhancing the digital transformation of the European industry through Digital Innovation hubs

A first group of four Innovation Actions: CPSE Labs, EuroCPS, gateone-project and Smarter-SI have been first implemented, starting in 2015, combining efforts under the SAE initiative, to support experiments with the aim of involving SMEs and midcaps in the field of Cyber-Physical Systems (CPS), Internet of Things (IoT) and Smart Systems Integration (SSI). For this first generation of Digital Innovation Hubs, sustainability was mainly assessed from the point of view of the return on investment that their beneficiaries were able to generate after having benefitted from the technical and business support of each DIH. It appears very unlikely that any of those projects would find a sustainable business models beyond public funding as it was not clearly identified at first in their strategy and they were addressing very specific market failures (cooperation between RTOs addressing small lot sizes not available from commercial foundries at reasonable & affordable costs, early stage technologies, etc.) that precisely required public support to be overcome.

Since September 2017, this first group has been enlarged with the launch of 4 new Innovation Actions: DIATOMIC, FED4SAE, SmartEEs and TETRAMAX. For those DIHs, sustainability clearly implies to lay the foundation of a longer term cooperation between members of the DIHs so that they can continue to support companies in their digital transformation beyond the H2020 funding. Sustainability for them requires to find the good equilibrium between in kind involvement of partners and additional funding to allow:

- the respect of the same neutrality and requirements in the evaluation process of the companies applying for their support;
- the development of application experiments: test the feasibility of a new product and define the related new business model;
- the validation of the appropriate technical solution and its commercialization.

Furthermore, sustainability of the SAE IAs also means to define a collaborative approach to join forces beyond the CSA Smart4Europe. Even if a new CSA will take on the coordination task, as stated in the D2.6 "Blueprint for a sustainability plan", the IAs would benefit to join forces on some specific actions to create a mass effect and reach a real pan-European coverage that would be more attractive for private investors and more visible for regional DIHs looking for expert-DIHs to help their companies.

The first step towards this aspect of the sustainability is to be really aware of the benefit of a joint action and willing to implement it in order to make the best of the upcoming CSA. Considering that 2 years is quite a short period of time to build a team, the CSA Smart4Europe has been very proactive in fostering collaboration between IAs, working on common interests, goals and challenges. The first achievements reached through this cooperation constitute a very valuable input for the upcoming CSA as the more convinced IAs are of the need to work together, the more useful and effective a CSA can be. The remaining challenges that all SAE IAs have to face concerning sustainability and that are still to be addressed are the question of the replication models and how to reach the non-digital natives companies to reach a new scale in the digitisation of European companies.



2.2 Smart4Europe methodology to address DIHs challenges

Sustainability of DIHs should be conceived as a way to address at the same time the challenges of the European Commission itself and the ones from European companies. To enable an exhaustive view of those challenges, Smart4Europe has worked on collecting data on needs and expectations of all the innovation stakeholders taking an active part in digitalisation at the European level.

- DIHs have to address the European Commission's expectations concerning the impact of their research and innovation policies, their deployment for all European Industry and their scale-up capabilities;
- DIHs have been designed to address the needs of European companies for a better access to digital technologies and the need of innovative companies for a better access to finance to reinforce their digitisation process. Besides, the deliverable D2.6 "Blueprint for a sustainability plan" showed a first review of the current state of play on how the existing SAE European DIHs were addressing those various needs. It was also the opportunity to highlight to which conditions IAs could improve their actions to help European companies access to finance, whatever their level of maturity and whatever their growth strategy. It gave also some recommendations and how those actions could be set in a long-term perspective that will be further explored in this document

In order to provide this analysis of possible sustainability plans, information have been gathered through interviews and relevant expertise⁵:

- Interviews and workshops with the SAE Innovation Actions' coordinators and key players.
- Interviews of major European innovation stakeholders:
 - Members of the European Parliament;
 - Representatives of the European financial institutions (EIF, EIB, InnovFin);
 - Local and national innovation actors: agencies or public administration in charge of the Industry4.0 initiative, Regional agencies, clusters organisation;
 - Private Investors selected among BLUMORPHO's contacts for their interest in investing in European DeepTech;
 - SMEs benefiting or having benefited from the SAE IAs or from BLUMORPHO support to innovation and access to market strategy.
 - European Entrepreneurs CEA-PME.

The information thus collected highlighted some convergent diagnostics on the needs of the ecosystem but also some challenges that are more specific to some key players and which requires to fine tune the coordination of innovation stakeholders.

⁵ For more details on the interviewed experts see annex 1. For more detailed information on the results of the interviews, please refer to D2.6 Blueprint for a Sustainability plan.



The elements of the diagnostic that is commonly shared by all the innovation stakeholders are the following:

- The too low level of digitization of European companies and the need for an improved coordination of European, national and regional action to solve this.
- The need for a less fragmented market and a greater visibility of the huge diversity of technical and business supports made available for European companies through public funding.
- The huge amount of money required to reach a high level of digitization and the need to facilitate access to finance to SMEs willing to innovate in cutting-edge technologies.
- The remaining difficulty faced by European companies, even by the most innovative ones, to scale-up.
- The need for special financial tools to help disruptive companies to go ahead, be it grants, loans or others.
- The specific challenge faced by all actors to reach traditional SMEs that are quite far from digitisation, not even speaking from cutting-edge technologies but just considering first ICT basic technologies.
- The interest of all the companies for a rapid decision cycle and therefore for accessible technical and business acceleration services that can reduce their products time to market.
- Beyond the technical needs the interest of SMEs for feedback on their road map and business strategy.

However, other challenges could be seen as more complexed to address as they required the developed ecosystems to conciliate regional development strategies with pan-European development strategies. According to the European Commission's plan, the main objectives of a European DIHs network are indeed at the same time to:

- provide access to technical and business supports to European companies in a day travel distance in order to strengthen the local ecosystem and allow regional development;
- foster European cooperation in order to allow access to cutting-edge technologies wherever the company is situated in Europe.

Those two main objectives may, in a way, be considered as potentially contradictory or, at least, difficult to conciliate. European cooperation between DIHs relies in a way on the idea that according to the theory of comparative advantages, regional DIHs will exchange expertise and services with other DIH considering that it is less expensive and more effective for them to rely on others' expertise than to develop their own. This assumption can be discussed on several points of view. This kind of cooperation could indeed be interesting and logical to set-up with thematic DIHs like the SAE IAs which are very focused on some cutting-edge technologies and which offer a strong technical differentiation to their potential clients and partners. And this is indeed what has been proposed in the D2.6 "Blueprint for Sustainability":

"The thematic DIHs shall develop strong relationships with regional DIHs in order to make their technologies and expertise available everywhere in Europe. SAE can facilitate the link between thematic and regional DIHs. Companies that applied during an Open Call of one of the SAE aligned IAs, but were not selected to receive "Cascaded Funding" shall be oriented towards their regional DIH to identify the support they need, process to a digital maturity assessment and go on building their project. And the other way round: a regional DIH contacted by a company looking for technologies offered by the SAE IAs must have the opportunity to find and give the appropriate information to this company, either through the SAE website or through each IA's website or through a (common) helpdesk."



However, such a cooperation is not so obvious to be developed between two regional DIHs which both want to develop their local ecosystem, to develop their local expertise and local champions. Their differentiation will be less likely relying on technical expertise than on their geographical reach and their knowledge of the local ecosystem. **To our knowledge, the only pan-European cooperations that have been identified within DIHs till now were strictly related to reaching a technical expertise that was not available locally.** Even between two similar or comparable thematic DIHs, a pan-European collaboration is not so easy foreseen. At first glance, there is no small risk that they won't see the interest to cooperate. What the local innovation stakeholders acknowledge is that their mission is to strengthen the development of the companies based on their territories. They clearly have some reserves on welcoming foreigner companies that could potentially become new competitors for the already installed companies on their local market. And this is what BLU has experienced also when accompanying some European innovative companies to work on their "internationalisation" towards other European countries. There are of course some important counterexamples as the Chamber of Commerce in Bordeaux welcoming European companies for the INPHO Venture Forum every two years, but still, this is a challenge that all the innovation stakeholders are foreseeing and that will require time and very specific business models to be addressed. Furthermore, beyond the "economical" argument, there is still a strong "human" argument in the language and cultural barriers which remain a constant obstacle to pan-European – and sometimes even cross-border – cooperation.

This does not mean that building pan-European cooperation is not feasible and many great examples are here to demonstrate the benefit of such cooperation. But this means that there are still great challenges to overcome to make such cooperation the rule and no more the exception. This also means that SAE IAs have an opportunity here to build their sustainability strategy by highlighting their strong technical differentiation in order to be identified as the DIHs of reference for the cutting-edge technologies they are working on.



3 What are the challenges DIHs have to address to reach sustainability?

This analysis made through the cooperation between Smart4Europe and the SAE IAs and through the interviews and contacts with experts enable us to draw some tentative conclusions on what are the key success factors for SAE IAs and their integration in a more global European DIHs network, that is to say the main focus they must be careful at in order to reach sustainability.

3.1 Reach various companies in all Europe and with specific and challenging needs

The global objective of DIHs is to accompany the European companies in the development of their differentiation strategies and the creation of new added-value. To do so, their sectorial and technical expertise is key and must be widely spread in Europe.

3.1.1 Address the diversity of companies and digital challenges

The classification of enterprises targeted by the IAs' are following the traditional classification of the European Commission that distinguishes startups, SME and Mid-caps.

According to the Annual report on European SMEs 2017/2018⁶, micro SMEs are by far the most common type of SME in Europe, accounting for 93,1% of all enterprises however representing less than 30% of the global employment.

The goal of the SAE initiative being to help SMEs, startups and mid-caps in their digital transformation, the classification of SAE IAs beneficiaries does not come as a surprise:

- 67% are SMEs;
- 29% are spin-off and start-ups;
- 3% midcaps;
- 1% are not clearly identified in any of those categories⁷.

Furthermore, regarding the role of the IAs concerning business acceleration support, it is important to add to this classification a distinction between traditional SMEs, early stage start-ups and scale-up start-ups.

- Traditional SMEs are most of the time focusing on serving their already developed market - although it could be a niche market. They are focusing on **commercialization** and **not technology development**.
- On the opposite, early stage start-ups are rather exploiting a new technology to consider developing a new business. They do not have developed distribution channels. Most of the time they are technology push.
- Scale-up companies are quite often offering innovation solution with attractive business models in creating differentiation in the market place.

IAs and DIHs can address those different categories although companies' needs are different in terms of support and funding.

⁶ <https://publications.europa.eu/en/publication-detail/-/publication/a435b6ed-e888-11e8-b690-01aa75ed71a1/language-en/format-PDF/source-80656354>

⁷ D2.5 "SAE internal community data base"



And indeed, according to the data available from the current IAs, it appears that half of the selected companies count less than 10 employees and are quite young (less than 10 years old). The deliverable D2.5 points out that this young age and its associated vulnerability are advocating for the inclusion of a serious business evaluation during the evaluation process - as it is currently experienced in the FED4SAE project and as we will explain later on in this document. It is also advocating for the strong business support that is done in the application experiment itself. It also explains why the question of access to finance is also quite complexed and requires an individual approach.

This is indeed very important to keep in mind the diversity of needs of the European innovation ecosystem and the fact that there might be some **discrepancies between what the European Commission means by digital transformation and what the European companies identify as their needs for digital technologies**. For some companies the digital transformation will be an existential and pressing requirement to ensure the sustainability of their business, when for others, access to digital technologies is just a new mean for more growth.

This need for a better segmentation of the companies benefiting from DIHs support towards their digitisation process has been also validated through discussion with EIB which makes a distinction between two kind of digital profiles for SMEs: digital natives and digital adopters

This distinction is important as digital natives and the digital adopters which different kind of digital needs:

- the business optimization that adds significant value without changing business models;
- the business transformation that leads to a net-new revenue and business models.

According to the EIB, European SMEs are still very cautious when investing in the technology with “high benefits” and strong take-up that they have identified as the top 10 technologies enabling digital transformation:

- Conversational systems;
- Intelligent apps and analytics;
- Biometrics for authentication;
- Wearable devices;
- Immersive experiences (AR, VR, MR);
- AI foundations;
- Security;
- Internet of Things;
- Cloud and cloud to the edge.

These findings from EIB advocate for a strong SAE IAs network to accompany SMEs in their adoption of cutting-edge technologies with “high benefit”. One of the major strengths of the SAE IAs is their ability to gather at the same time the technical know-how, the industrial capability and the business acceleration support that will be dimensioned depending of the development of the company, its challenges, its motivations and needs.

Furthermore, the adaptability and agility of the SAE IAs network must be backed by a neutral and effective selection process. The pertinence of the selection process is not only important for the success rate of each IA but for the quality and the interest of the success stories created. This is critical that SAE IAs engage their resources in interesting use cases that will have an impact on the replication process. This is critical to enable IAs to make the best of the work done with “digital



natives” in order to help further “digital adopters”. This is a challenge for the wider spread of digital technologies and a requirement to showcase the excellence of the IAs services’ offer.

This great diversity in digitisation needs and maturity is also very critical as far as the access to finance is concerned. Even if the barriers to digitisation are not only financial, EIB considers that DIHs have a critical role to play to provide companies with innovative and specific approaches to access finance for digitisation. For companies that are not looking for or not developed enough for private investors, the EIB is working on some recommendations to optimize the ecosystem enabling the loan process. Scale-up companies are supposed to be more in the scope of private investors and should be supported in getting in touch with Funds and Venture corporate. This is more for the early stage start-ups that gaps to access to finance are the more obvious and that dedicated solutions should be explored, in particular through private/public partnerships. This gradual approach had been applied with success in the framework of the first SAE IAs and in the framework of various thematic DIHs. A stronger cooperation between thematic and regional DIHs should strengthen this approach and make it available for much more companies.

3.1.2 Ensure a broader geographical coverage through a strong territorial grid

In order to embrace the huge diversity of European industry needs, it is of utmost importance that the offer of services provided by SAE IAs is clearly identified throughout Europe so that all European companies can have a chance to get access to their technical and business support.

In this regard, the D2.5 “SAE internal community data base” provide us with interesting information concerning SAE consortia and their ability to reach European companies in all the Members states.

- The geographical coverage of the SAE initiative’s partners is quite significant already. As of 2018, SAE Innovation Actions had gathered 83 organizations that are considered as DIHs coming from France, Germany Spain and UK for the most important countries but covering more than 2/3 of European Member states. The countries not yet represented at all in SAE consortia are mostly in Eastern Europe: Latvia, Lithuania, Poland and Slovakia – but also Austria.
- The D2.5 also gathered indicators concerning the geographical distribution of the entities/awarded companies benefitting from the IAs and their application experiments. The target of SAE initiative is to enhance digital transformation of SMEs, startups and midcaps in particular, the data collected in the deliverable concern exclusively those kind of companies coming from 34 different European Countries (24 European Members States and 10 associated countries), expanding towards the East of Europe thanks to the effort of current IAs: DIATOMIC, FED4SAE, SmartEEs and TETRAMAX.

It is here interesting to notice that the applying and granted companies are covering a bigger geographical reach than the one represented by the DIHs members of the consortia alone. This confirms that the impact of the SAE IAs is not restricted to the sphere of influence of their partners but goes beyond and, as highlighted by the D2.5, is continuously growing reaching new countries.

In this regard, it is critical to build a strong and active link between local/regional DIHs and the SAE IAs, at the same time for the IAs to reach a complete European dimension and for the local DIHs to make sure the companies they want to support and promote get access to the best digital solutions possible.

The adaptability of the SAE IAs network already mentioned enable IAs to provide European companies with the required support whatever the project is in their cutting-edge technologies. The



SAE IAs have the agility, the human resources and the technical infrastructures to address the great diversity of digital challenges that European companies have to face. They constitute new and complementary tools to strengthen the current European innovation ecosystem.

3.2 SAE Innovation Actions: new comers aiming at complementing and strengthening the European innovation ecosystems

As just mentioned, one of the challenges of the DIHs - and of the SAE IAs that are DIH themselves or network of DIHs - is to build a strong enough differentiation strategy to make them key players in their field of expertise, interesting or essential to cooperate with for other innovation stakeholders. They are new comers in an already very rich environment of innovation supports tools and regional and local structure so it is important that they make the best of this, that they are identified as referee for cutting edge technologies and bring their complementarity where needed.

3.2.1 Need to highlight the specificities and new added-value of DIHs.

The challenge of the European Commission's strong investment in favor of the DIHs network development is to avoid the dead-weight effect. It is thus critical to demonstrate that DIHs specific added-value will make the difference and will complement and strengthen the existing arsenal of helps and programs towards SMEs growth, modernisation and digitisation that are developed at all political levels – European, national, regional and local.

At the European level, the DIHs and the SAE IAs come as new vehicles in an already very rich environment of support programs, be they in favor of SMEs like COSME, MobiliseSME or SME instrument or be they in favor of some specific technologies like all the ICT or Future and Emerging Technologies (FET) calls in H2020 program or in favor of regional development like ERDF funds. At the National level, many European member states have set-up initiatives to help their industry to enter into the Industry 4.0 revolution. The EC is well aware of the need to create a convergence and has settled a Platform where all those initiatives can come together and start to build at least a coordination if not a cooperation. At the regional level, clusters and local development agencies also provide many supports to their ecosystems.

In such a prolific context, the challenge for DIHs in general and for SAE IAs in particular is to demonstrate their ability to complement the existing support policies by bringing their strong technical & business expertise. They are the good vehicle to help SMEs to build their own expertise and build a new business from. They have the ability to facilitate them access to finance to accelerate their digitisation, thus providing them with new growth perspectives and allowing regional development. This implies that SAE DIHs continue on creating strong links with all the pre-existing networks and programs so that those innovation stakeholders are aware and involved in the development of SAE DIHs and take an active part in their communication and actions towards European companies. It supposes also that DIHs are able to value the new services they are offering in order to address the innovation challenges mentioned before. Those services are a new way of accompanying companies and to create development that other innovation stakeholders will be ready to pay for, something new that will allow all the innovation actors to overcome their specific individual or sectorial logics.

3.2.2 Need for a strong local & regional anchoring

The specificity of DIHs and of SAE IAs is their positioning in the whole ecosystem, their work on transversality combined with a strong sectorial expertise. It is very important to highlight the role



they can play to generate scale effects for the adoption of innovative technologies in cooperation with regional DIHs.

One of the challenges of the SAE IAs is to facilitate the collaboration between regional actors at a pan-European level. It is important to emphasize at the same time the help they can bring to local/regional DIHs to do so and the support they can expect from them in return.

In this regard, it is here interesting to come back to the evaluation process experienced within the FED4SAE project already mentioned above. Within this project, they have decided to include in the evaluation and selection process a systemic evaluation of the development strategy and business plan of the company. All the applying companies went through this assessment made during a two hours interview. All the companies, selected or not, received a feedback from the project on their strategy. The interest of this experience of such an evaluation made during the selection process is twofold.

- The first one, as already mentioned, is to identify the challenges faced by the applying companies and to assess their ability to make the best of the application experiment. This is a way to identify, as much as possible, companies that are facing financial difficulties and that won't be able to last till the end of the experiment. And this is also a way to identify the more interesting uses cases.
- The second one is that all the applying companies, selected or not, will benefit from their application process by receiving a feedback on their business plan and roadmap. They will all have a first "digital assessment" that will be a starting point, or a new step, in their journey to digitisation.

This experience is especially valuable when considering the sustainability of the DIHs and the appreciation of the DIHs network. It is important to note at this stage that such a first evaluation and the feedback, recommendation or orientation to a regional DIH or another thematic DIH has a real positive impact for the applicants and represent a real service, with an important added-value. It means that even if the companies are not selected for further support through Application Experiment, this application process constitutes an important step in their digitisation process. According to the global mission of the SAE initiative, this is a way not to let a request for support from a company without an answer concerning the feasibility/scaling/maturity of their digitisation project.

This is just one example of the benefit that can be expected from pan-European cooperation. It is very important that IAs build strong links and working relationships with regional DIHs thus:

- enabling any companies in Europe to access to cutting-edge technology through the intermediation of their local/regional DIH that will direct the companies to the right thematic DIH they need;
- enabling IAs to send back non-selected companies to their local/regional DIH so that they can pursue the digital assessment started through the evaluation process of the IAs selection phase and give an appropriate answer to the need expressed by the companies;
- enabling the implementation of replication projects in new territory and new application fields.

As those pan-European cooperations will develop and prove their positive impact on the improvement of the digitisation process of European companies, new needs will appear and new models for cooperation will become obvious to the whole ecosystem.



4 New business models & Perspectives for sustainability

The objective of the SAE initiative is to accelerate the design, development and uptake of advanced digital technologies by European industry, in particular, SMEs and mid-caps. To do so, each SAE IA has been organised in order to be able to conciliate several objectives at the same time.

- The local coverage and regional anchoring versus the pan-European and the cross-border cooperation.
- The transversality offered by the cutting-edge digital technologies available versus the verticality of several applications domains and the need to work on the whole value chain when working on an application experiment.

The various current organisations and models set-up in the SAE IAs to manage those objectives have all given some interesting results and can be used as inspiring models for sustainability.

SAE IAs and DIHs are multiple and it seems obvious that there cannot be only one type of business model and one type of sustainability plan.

However, if the answers are different, the question remains the same and the challenge of the sustainability is the same for all of them. The issue at stake is to find a way for this ecosystem to remain operational beyond the H2020 initial funding. This means to find new sources of funding allowing experts to help European companies to develop and produce new very innovative products and bring them to the market. This also means to scale-up and reach a growing number of companies, including the “digital adopters” and to be able to help all of them access to the cutting-edge technologies the IAs are expert in.

SAE IAs have already started to think about it and some have already started to assess some business models.

4.1 DIH as an ecosystem builder based on membership fees

SAE Innovations Actions are pan-European DIHs with a strong technical differentiation intended to develop a complete ecosystem based on excellence and knowledge sharing. This positioning of SAE DIHs as ecosystem builder and the provision of specific expertise should enable the establishment of memberships. Besides, this is one of the business models contemplated by several IAs which are currently working on their sustainability. All the innovation stakeholders that are already members of the SAE IAs or beneficiaries of their services are interested in the reflexion process on the IAs' sustainability and can be potentially impacted.

It is indeed interesting to identify for each of them what is the added-value created by the IAs and how they could contribute to pay for it.

For example, RTOs – i.e. “technical” DIHs – are benefitting from the work done through the IAs as it brings them new clients and offers them some new markets for their technologies. They could decide/ or be asked to either pay a membership fee to enter into the IAs ecosystem or to become a shareholder of the structure that would be set-up to embody the IAs after the H2020 project.

4.2 Structures of excellence involved in knowledge sharing based on fee for services

There are already many structures of innovation support either encouraging the smart specialisation of regions or working on specific technologies. The IAs have to facilitate the cross-fertilisation of those two logics and find a way to combine thematic and technical focus.



IAs are the appropriate structure to organise the transversality through the integration of strong technical DIHs:

- Thanks to the Technology Radar, IAs know where the R&D efforts are developed and where to find the right expertise in their field of excellence.
- Thematic DIHs should be integrated into IAs to be able to provide companies outside their traditional territorial reach with their expertise and to gain some expertise by collaborating with other technical DIHs.
- IAs could organise exchange of experts in residence between RTOs and between RTOs and companies and between RTOs and local/regional DIHs.
- IAs and regional DIHs should work together on:
 - reaching a broader part of European companies, with a special focus for the non-digital natives;
 - providing companies with sectorial and market analysis.
 - developing training program to improve the global knowledge of the ecosystem of the challenges addressed by the cutting-edge technologies available;
 - developing training program to improve the skills of the workers and their ability to work with those cutting-edge technologies.

The various services that can be declined from this positioning could be finance through specific fees covering very specific needs and dedicated answers (e.g. tuition fee, preferential tariff for specific sectorial analysis, etc.).

4.3 Use the replication models to build strong value chains in various application fields and generate new revenue from investment in innovative companies

The digitisation of the European industry supposes the organisation of the whole value chain and will not give its full potential if just seen from the point of view of the local territory or from the point of view of the company.

It is thus critical for the sustainability of IAs and for the digitisation of the European industry to design **replication models** that will not be detrimental to the companies benefitting from the IAs technical and business support but that will benefit the whole ecosystem and allow a wider spread of cutting-edge technologies.

Replication models should operate so that a technology validated in an application sector can be reused and transfer to another application field.

This can be done through the concept of joint investment.

- If the granted company does not invest in the technology developed through the experiment to keep an intellectual property, it will just take advantage of an earlier and quicker access to the market than its potential competitors. This will enable the IA to duplicate the digital solution in another application domain, with a new positioning on the market. This will provide an opportunity for new developments locally for regional DIHs and for news technical development for the IA.
- If the granted company wants to invest in the IP, the licence signed with the IA will generate some revenue / royalties that will contribute to give the IA a certain level of autonomy versus public funding.



This choice given to the company between “adoption” of the technology solution or letting it available to replication let the door open to the discussion held in some IAs already concerning a payback system.

The open question is – apart from a licensing and IP process – what could be the solution to allow a kind of post-experiment co-investment from the beneficiaries? The various payback models that have been foreseen by certain IAs have never been finalised as the European Commission made it very clear that such a solution was not an option at all in the H2020 framework. However, in the context of the definition of business models allowing IAs to generate their own revenue and gain in sustainability, a payback model remains interesting to consider even if its implementation seems complex and requires some fine-tuning and further discussions with the beneficiaries and with the EC.

4.4 Create a critical mass to interact with private and public investors

The organisation in technology clusters of the SAE IAs can bring complexity and inconsistency for financial partners. As suggested in D2.6 “Blueprint for a Sustainability Plan” it could make sense for SAE IAs to join forces to create a critical mass to interact with private and public investors at the same time as to be representative enough of the challenges faced by European companies in their digitisation process. In this regard the SAE initiative could be positioned and operate as the bridge between local and European activities and the support structure for all its related Innovation Actions in their relation towards public and private financial partners and in their actions towards the European industry.

The challenge is not only for each DIHs or Innovation Actions to provide new innovation services but for them to use the SAE initiative to create a critical mass to mutualise some costs and optimise the impact of their actions. All-together, the SAE IAs represent a huge gathering of experts who have proven very effective to support European companies in their digitisation process. Their aim should be to strengthen this group, to unify, speak with one voice and go on building the required structures that would allow them to provide the same quality of services to European companies beyond the H2020 initial funding.

The model below has been discussed during one of the workshops (Warsaw 2018) organised by the CSA Smart4Europe and involving the SAE Innovation Actions and is still under discussion.



transition period from a model exclusively funded through European money and a model financially self-sufficient.

There are already several examples in European Member states as well as outside Europe of Innovation support structures that are expected to become financially autonomous after having been launched and thanks to public funding. The transition periods are usually not shorter than 7 to 8 years and can sometimes be longer – like 10 years for the Sociétés d'Accélération du Transfert de Technologies (SATT) in France ([LINK](#)) or like Digital catapult in UK ([LINK](#)).

This is a very important point to keep in mind when working on DIHs sustainability. Sustainability of innovation support structures is a very long process and sustainability of DIHs should be reached progressively:

- first build a strong consortium and keep the network active;
- then plan ahead the financial transition from EU funding to autonomy;
- organise the coexistence of public and private funding following a public/Private partnership, model as the ECSEL model but adapted to the issues at stake for SMEs in order to advocate for the support actions to be developed;
- encourage agile structures and networks relationship between thematic and local DIHs to be in line with the European Commission's expectation and to make the best of its political & financial initial inputs;
- use the DIHs network to strengthen and deepen the Single European Market through knowledge and human resources sharing to support European companies' digitalisation.

5 Conclusion

The name of the next European Research and innovation program, Horizon Europe, gives a very interesting perspective to all the work that is ahead of all the innovation stakeholders involved in the DIHs development in general and in the SAE initiative and its Innovation Actions in particular. This is of upmost importance to avoid national or regional inward-turning. In this sense a very proactive DIHs' development policy could be a very effective tool in strengthening the Digital Single Market through pan-European collaborations.

To design and develop a good pan-European cooperation between researchers has been a long-term project but it is now a real success and the European community of researchers is now a reality. Many transversal and sectorial European associations embody this community like EARTO (European Association of Research and Technology Organizations), ECTRI (European Conference of Transport Research Institutes) and many others. The bridge between these researchers' communities and the European industry has also been implemented very successfully through Marie SKLODOWSKA-CURIE actions.

However, there is still much to do in order to facilitate the access of European companies to digital cutting-edge technologies developed by European researchers. And there is still much to do so that clusters, development agencies and other innovation acceleration structures work together and build strong concrete pan-European collaboration on digitisation projects, wherever the supported companies or the technical solutions providers are coming from. The strong investment of the European Commission in the development of Digital Innovation Hubs is a way to bridge the gap between the promotion of research actions that will rely in the future on the European Innovation



Council and the new financial tools develop through the EIB and InnovFin to support very innovative companies with disruptive technologies to scale-up.

In this context, the interest of the DIHs is that they are expected to create strong ecosystems all over Europe, gathering private and public investors that will rely on them to invest in the right technical providers and the right technologies' adopters. DIHs are indeed expected to bring some solutions to any European company - even the ones that can't invest in research themselves but have however an interesting use case to develop.

In order to reach those expectations, the recommendation that can be made to DIHs resulting from the first lessons learned throughout the SAE IAs' Application Experiments and the analysis of their environment are:

- to develop strong cooperation with the regional DIHs that are now developing throughout Europe to reach more companies and to make their technology and expertise more visible and accessible;
- to joining forces in the SAE initiative to create a critical mass, reduce fragmentation and speak with one voice;
- to explore membership, fee for training services and replication models as complementary revenue sources;
- to explore public/private partnership models to facilitate access to finance for any kind of companies;
- to remain agile to be able to adapt to a very fast-moving and complex environment and remain fit for purpose, always in line with the emerging needs of companies and the emerging answers provided by technology.

Thanks to those strong ecosystems build on complete value chains in various application fields, DIHs will accelerate the deployment of cutting-edge technologies on the European market thus allowing some improvement in the Digitisation of the European economy.



6 Annex

6.1 Lists of experts interviewed for the D2.6 “Blueprint for a Sustainability Plan”

- Members of the European Parliament from different political groups and mainly from the Committee on Industry, Research and Energy (ITRE):

Name	Gender	Country	Fraction
Pervanche BERÈS	f	France	S&D
Virginie ROZIÈRE	f	France	S&D
Soledad CABEZÓN RUIZ	f	Spain	S&D
Lambert VAN NISTELROOIJ	m	Netherlands	EPP
Christian EHLER	m	Germany	EPP
Arne GERICKE	m	Germany	ECR

- Local and national innovation actors:
 - Agencies or public administration in charge of the Industry4.0 initiative in Austria, Belgium, France, Germany, Italy, Netherlands, Spain, Lithuania.
 - Regional agencies: Basque development agency (Spain), Bulgarian Digital Innovation Hub, Aquitaine Chamber of Commerce and Industry (France); European Regional representation of Pays de la Loire (France).
 - 3 Clusters: Minalogic (France), Silicon Saxony (Germany), DSP Valley (Belgium).



- Private Investors selected among BLUMORPHO contacts for their interest in investing in European DeepTech⁸.

Jean-Gabriel	Boinot-Tramoni	Partner	Quantonation
George	UGRAS	Managing Director	AV8 Ventures
Dieter	KRAFT	General Manager	Trumpf Ventures
Christian	REITBERGER	Partner	BtoV
Aymerik	RENARD	General Partner	Hardware Club
Paul	THURK	Managing Director	Arch Venture Partners
Christophe	DESRUMAUX	Investment Director	Super Nova Invest
Cédric	FAVIER	Investment Director	Elaia Partners
Augustin	Sayer	Partner	NEWFUND
Clément	Vanden Driessche	Partner	Next47
Uhl	Heribert	Partner	Robert Bosch Venture
François	Tison	General Partner	360 Capital Partners
Cyril	GILBERT	Partner	Jolt Capital
Jean-Louis	Malinge	Partner	ARCH Venture Partners

- Representatives of the European Institutions:
 - Nithan Patak EIF,
 - Arnold Verbeek Senior Advisor Innovation Finance EIB
 - Bjorn-Soren Gigler, Senior Advisor Innovation Finance EIB
 - DG research & Innovation, David Malo's team for topics on the European Innovation Council and InnovFin
- SMEs within BLUMORPHO's network and SMEs benefiting from the SAE IAs

BLUMORPHO organized an open discussion with 24 SMEs with interest in innovation during the INPHO Venture Summit congress. During 45 minutes, we introduced the DIHs network and IAs concept. The following companies took part to the discussion.

⁸ Private investment sources are depending on companies' maturity in terms of revenues generation, resources and needs. Private equity fund is one of the investment source.

Private equity simply shares (equity or securities) in a company that is not listed on the stock market. A private equity fund is raised and managed by investment professionals, the General Partner and its Partners. They all act as investment advisors.

The main private equity players BLUMORPHO included in this study are venture capital (VCs) and corporate venture capital (CVCs).

Company name	First name	Last name	Country
3D-oxides	Giacomo	Benvenuti	France
Aether Biomachines	Pavle	Jeremic	France
Ariana Pharmaceuticals	Mohammad	Afshar	France
Astrum LT, UAB	Sergei	Tsarev	HK
CAILabs	Jean-François	Morizur	France
CryptaLabs	Justin	Roberts	United Kingdom
Crystalline Mirror Solutions	Jörg	Nowack	Austria
DESKI	Bertrand	Moal	France
Fastree3D	Claude	Florin	Switzerland
GlobalSensing Technology (GST) *	Michel	Paindavoine	France
Glwee*	Philippe	Rousseau	France
Gogo Mobility Robots*	Juan	Izeta	Spain
greenTEG*	Wulf	Glatz	Switzerland
Holoxica Limited	Javid	Khan	United Kingdom
InLable/Nanooptometrics	Raivis	Nikitins	Latvia
INOPTEC Ltd.	Ralf G.J.	Knoll	Germany
Insightness	Christian	Brändli	Suisse
IOST	Leeho	Lim	UK
ISORG	Emmanuel	Guerineau	France
Neta	Julien	Michelon	France
RIDDLE&CODE	Alvaro	Mier	Austria
Solayer GMBH	Kamel	Ferdi	Germany
Talapoin/Dibot	Jozef	Dubovec	Slovakia
Tenstorrent	Stan	Ossias	Canada

Among those 24 companies, 4 already took part to Innovation Actions as beneficiaries and are identified by an *.