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Annual report #2 on exploitation activities incl. plan for subsequent phase

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Abstract

In this document we report on the exploitation activities that were carried out by FED4SAE project partners during the second year of the project. Furthermore, the document provides updates of the project partners' individual exploitation plans that were devised after the first year of the project and described in the project deliverable D6.4.

The project's overall exploitation strategy remains stable and addresses three main tracks: the exploitation of the CPS technologies that are available in the project and offered to third parties in application experiments, the leverage on the communities and ecosystems that exist around FED4SAE DIHs and that will be extended and reinforced, and ensuring sustainability of the FED4SAE DIH network and the innovation services it can offer to European businesses.

This exploitation plan will be updated further as needed, and a final version will be issued at project end, which will include refinements based on progress made and lessons learned.

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1 Introduction

The overall ambition of FED4SAE is to boost and sustain the digitization of the European industry by strengthening competitiveness in Cyber Physical Systems (CPS) and embedded systems markets. To achieve the ambitious goals of FED4SAE and to maximize the industrial uptake, impact on targets, and outreach of the results, whilst ensuring the long-term sustainability and growth of major project outcomes, FED4SAE defines and continuously evolves a comprehensive set of strategic exploitation activities.

The exploitation activities are closely linked to the project's dissemination actions, which ensure that all relevant communities are broadly aware of FED4SAE offerings and results. A major objective for FED4SAE is to facilitate pan-European benefits from the project outputs and results. Overall, the exploitation strategy has the following dimensions:

- For FED4SAE partners that are providers of CPS and Embedded System platforms
  - It will enable new use cases and more platform sales,
  - Additional insights about end users which currently only the distributor captures,
- For FED4SAE partners that are advanced component providers (RTOs and Technology transfer-oriented university institutes),
  - Maturation of advanced enablers towards increased market readiness,
  - Industrial transfer opportunities through third parties.
- For FED4SAE DIHs,
  - New capabilities and increased competitiveness through partnerships in federated networks allow to provide more holistic services to local Start-ups, SMEs, Midcaps (better services for local businesses, better access to future funding and commercial contracts),
  - Easier market entry to other EU countries through federated hubs,
  - Funding to help local CPS and Embedded System sector grow,
  - Third party growth - new products, services and scale-up opportunities supported in the region.

Status of this document

The aim of the exploitation plan is to define the specific goals for exploiting both the innovative solutions created by FED4SAE application experiments and the further valuable assets available to the FED4SAE DIH network, and to devise strategic actions to achieve those goals to ensure high impact of the project outcomes.

This document constitutes an update of the refined FED4SAE exploitation plan made after the first year of the project and is to be read in conjunction with the strategies set out in deliverable D6.4. Notably, the present document focuses on the individual exploitation strategies of FED4SAE project partners. We report on actions carried out by the partners during the second project year and, where needed, describe updates to their exploitation plans based on experiences made so far, and taking into account specific needs and opportunities provided by the application experiments that have been selected in the Open Calls. The project exploitation plan will guide the actions during the last project year, and an ultimate update will be provided at project end, based on the progress made and lessons learned.

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2 Progress on overall exploitation

As described in the initial exploitation plan, deliverable D6.3, the FED4SAE exploitation strategy builds on three main pillars:

1. Exploitation of CPS technologies and application experiment results
2. Community and ecosystem building around FED4SAE DIHs
3. Ensuring sustainability of the FED4SAE DIH network and its services

During the second year of the project, FED4SAE has carried out various activities along each of these axes. In this document, however, we concentrate on action targeting the first two items, while the activities towards sustainability will be reported in deliverable D6.11.

Regarding the **CPS technologies and application experiments**, SMEs have been selected from the three rounds of Open Calls and their application experiments have been started. The dedicated activities to help exploit eventual experiment outcomes are reported by the owners of the individual industrial platforms and advanced CPS technologies in Section 3.

Community and ecosystem building activities have also further progressed. Besides local efforts of FED4SAE partners to establish new links to relevant stakeholders and communities in their respective regional ecosystems, cf. also Sect. 3, the FED4SAE consortium has made progress regarding establishing CPS Digital Innovation Hubs in FED4SAE. After the first year of the project, five of the eight RTO partners of the FED4SAE consortium were already hosting or closely connected to a DIH (CEA, Digital Catapult, fortiss, KTH, and the University of Cantabria). Now, after two years into the project, BME have established a fully-operational DIH in Budapest, and CSEM's newly launched Swiss Microtechnology & Micromanufacturing DIH is in preparatory stage. All FED4SAE DIHs are registered in the EC's DIH Catalogue:

- BME, Department of Electron Devices (https://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool/-/dih/13299/view)
- CEA are partner of the Minalogic DIH (http://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool/-/dih/1297/view)
- CSEM Swiss Micro Hub https://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool/-/dih/12554/view
- Digital Catapult (http://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool/-/dih/1317/view)
- fortiss are partner of and hosting the Munich Innovation Hub for Applied AI (http://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool/-/dih/12409/view)
- KTH are serving as the KTH Innovation Hub of Digital Industrialization (http://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool/-/dih/5792/view)
- University of Cantabria are hosting the IoT-SmartSantander DIH (http://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool/-/dih/1372/view)

Building on these DIHs will allow the FED4SAE network of DIHs to provide a comprehensive set of innovation support services to SMEs across Europe.

3 Exploitation activities in year 2 and refinements of exploitation plans

In deliverable D6.4, the FED4SAE project partners have devised detailed plans for their individual exploitation activities, which build on both their particular expertise in a wide range of CPS technologies and application domains as well as their strong involvement in local and regional ecosystems.

This section reports on the various exploitation activities carried out by the FED4SAE project partners during the second year of the project in relation to these plans. Furthermore, this section provides updates and refinements of the individual partners' exploitation strategies, taking into account both progress made so far and specific new needs of SMEs participating in the application experiments and related opportunities.

3.1 CEA

3.1.1 Exploitation activities carried out in Year 2

During the second year, CEA-Leti in collaboration with Minalogic and thanks to Smart4Europe support has participated at networking events in order to promote FED4SAE open calls beyond the French SME ecosystem. These events gave the opportunity to discuss with interested SMEs, to participate at matchmaking events and to have connection with some innovation management / business support associations for wider promotion of FED4SAE. It gave also the opportunity to promote the pan-European collaboration between SMEs, RTOs and industrial partners:

- Participation at the SMART AND DIGITAL FUTURE Vienna - Brno - Bratislava, 20/09/2018, Vienna where SAE initiative and associated open calls were presented. The 72 attendees included 43 companies (and 12 start-ups among them). FED4SAE discussed with 10 companies (one-on-one discussions) during the networking slot.
- The annual DIH event 2018 (Warsaw, Poland) highlighted Wegoto company (Wegoto is a French start-up, member of Minalogic network and awarded through FED4SAE 1st open call) and the granted project CADIX involving CEA-Leti and ST-I. The DIH event gave also the opportunity to participate at networking/matchmaking round-table setup by Smart4Europe, and gathering around 60 participants.
- At DATE 2019 (Florence, Italy), FED4SAE organized a speaking session to promote SAE initiative through FED4SAE results, e.g. the cooperation with both the industrial and the competency partners STMicroelectronics and Digital Catapult) and their foreseen impacts, and the experience and feedbacks for the SMEs (Alitec and Energetica Motor). Digital Catapult showcased a prototype resulting from its collaboration with ST-I within FED4SAE to provide easy access to LPWAN networks via DIH for evaluation, demonstration and education purposes even after FED4SAE project has ended.
- Thanks to Minalogic connection, FED4SAE 3rd open call was promoted in French language through the H2020 National Contact Points for ICT and SMEs. Promotion included posts in their newsletter, posts on social media with their specific accounts. FED4SAE was also promoted as a CEA-provided service by the newly created Auvergne-Rhône-Alpes Digital Innovation Hub, MinaSmart (https://www.minasmart-auvergnerhonealpes.com/en/).

3.1.2 Update of individual exploitation plan

To strengthen or create new collaborations with Third Parties, to extend its ecosystem to reach more Third Parties is the mission of CEA Tech, part of the DNA of CEA, based on its excellence and also on its capacity to handle innovation transfer to its industrial partners.

CEA works closely with Minalogic (Global Innovation cluster for digital technologies serving France's Auvergne-Rhône-Alpes region) to boost the ecosystem, promote SAE initiative. Whereas CEA brings its advanced technologies and expertise, Minalogic brings in-depth knowledge of the regional ecosystem, in-depth knowledge of the local SMEs and ability to connect actors together to promote adequately the SAE initiative and FED4SAE call opportunities.

The opening of the Open Innovation Centre (http://www.cea-tech.fr/cea-tech/english/Pages/resources-and-skills/x1x-Support-for-product-innovation.aspx) by end of 2019 will foster and reinforce the synergies of these two classes of services. (The first foundation stone was laid on September 25, 2018.) The OIC will offer a unique infrastructure providing networking, expertise equipment, creative methodologies, innovative space and a full range of services offering to ramp-up innovation and propose immersion in the world of innovation to technical component. The premises should be ready in 2019.

Through FED4SAE three open calls, CEA together with Minalogic and the OIC have fostered activities/services to be offered to interested innovative companies among other parties: technical expertise, collaborative support with industrial platforms, design-to-cost methodology, to benefit from CEA multi-disciplinary activities and industrial connections. These services illustrate the role-to-be of MinaSmart, the Auvergne-Rhône-Alpes Digital Innovation Hub (DIH) created by end of 2018 at the regional scale and therefore offering a large variety of skills from Grenoble to Lyon via Clermont-Ferrand, St-Etienne, reinforcing the hardware-software continuum on 6 key digitization technologies: i) high-performance computing and simulation, ii) artificial intelligence, iii) cyber-security and privacy, iv) connectivity (5G and Internet of Things), v) integrated and smart microelectronic components, and vi) cyber-physical systems.

Access to Technologies

- CEA has created new collaborations. The four companies (Wegoto, Artomatix, Surewash and Protolab) have never worked with the CEA-Leti before. Wegoto is a French start-up located in the local ecosystem, they are member of Minalogic network and their FED4SAE project "CADIX" was promoted on Minalogic website. Artomatix and Surewash are both based in Ireland and took contact with the CEA thanks to FED4SAE open calls and the support of FED4SAE Irish partner, Intel. Protolab is an Italian company and was attracted by the opportunities offered by the Products and Technologies Living Lab platform (PTL). CEA-Leti is supporting the granted projects up to demonstrator/proof-of-concept phase in order to serve as attractive showcases and assets for that purpose, and that could benefit for both the innovative companies and the CEA-Leti awareness.
- Set-up of collaborative research on three different CEA advanced technologies has been defined thanks to the three selected projects dealing with technology transfer, concept validation and prototyping, testing and validation.
    - Optimized compression technics
    - SigmaFusion© technology
    - Evaluation of prototype in the IRT-Nanoelec testbed facility. Functional test will include privacy and cybersecurity compliancy assessment as well as usage analysis and user acceptance with potential customers.
- These collaborative research is a way for CEA-Leti to promote its advanced technologies and testbed, to extend their functionality or adapt it to further use cases and increase their data base and thus strengthen their usage.

- Opportunity to benefit from CEA multi-disciplinary activities for SMEs granted by FED4SAE as for Energetica Motor who is involved in the project MAMMUT with CSEM and ST and was put in contact with CEA-Liten (Renewable Energy institute) as they are interested by studies that were conducted to reduce energy consumption in electrical vehicles.

KPI: Number of SMEs selected from Open Calls building innovative use cases exploiting the DIH-supported Advanced CPS Technologies. **Target:** 3. **Results**: 4 SMEs

Access to knowledge

- Whenever it is possible, the collaborative research will be accompanied by skill development support when the Third Party has the available resources and perspective in line, when CEA can involve a student, trainee or apprentice to work on the granted projects.

Access to funding

- Support to better define product usage and market needs can be provided, example with the project "Surewash" (Glanta company) thanks to IRT Nanoelec: a potential user "Korian Group" (private nursing homes and rehabilitation clinic, https://www.korian.com/en) was contacted, a demonstration of the actual Surewash product was organized at Korian Les Granges (rehabilitation clinic close to Grenoble) which yielded very rich feedback and a follow-up meeting in Paris was organized. Korian and Glanta had business discussion to deploy the solution in a training mode around Lyon in multiples sites.
- Because of its financing strategy (for instance EasyTech programme), the Incubator/Accelerator support is devoted to French Companies.
- CEA Open Innovation Centre (OIC) team is taking the opportunity of FED4SAE to roll out its activity in a European and cross-border context, dealing with SMEs outside Grenoble ecosystem and FED4SAE partners. In particular, in collaborations with FED4SAE consortium, CEA OIC team has define a design-to-cost methodology that is now tested on FED4SAE granted projects. This will result in defining common notions and wording, and providing a unique testing opportunity / feedbacks / improvements thanks to the large variety of application / technology / projects characteristics, to be capitalized in best practises guidelines and methodology applicable at European level.

KPI: Number of companies successfully receiving new funding/successfully connected to new customers through DIH activities. **Target:** 1-3.

Ecosystem building

- End of 2018, MinaSmart, Auvergne-Rhône-Alpes Digital Innovation Hub (DIH), was created gathering the major regional actors capable to provide the most complete bunch of services to support tech companies in their development and more traditional ones in their digital transition. FED4SAE has been selected as one of this service provided by CEA. Like this, the project is well identified and further promoted by all other regional partners mainly: Clusters, Regional Innovation Agency. Thanks to joint regional efforts FED4SAE is also now well referenced at the Regional Council. This is a major step towards a sustainable synergy of funds offering regional SME complementary regional/national and EU funding for their projects. SAE initiative and FED4SAE project constitute a solid base of discussion providing concrete examples of collaboration and foreseen impacts, especially when relying on SMEs known by both parties. The ecosystem relationship with the Smart Anything Everywhere initiatives are reinforced with the two newly granted IAs coordinated by the CEA, DigiFed and SmartEEs2.

KPI: Number of individuals actively engaged in the community. **Target:** 30-50 new per year.

To summarize, CEA-Leti together with Minalogic and OIC is actively proposing a set of services that could be referred as TECHNOLOGY services (fundamental for a RTO and part of CEA Tech DNA) and is developing new services in connection with the ECOSYSTEM development (benefitting from MinaSmart deployment):

- TECHNOLOGY services: collaborative research, concept-validation & prototyping, testing& validation, education and skills development.
- ECOSYSTEM development: deployment of MinaSmart DIH, ecosystem building, brokerage and networking, mentoring, incubator/accelerator support, open innovation support, Access to Funding and Investor Readiness Services.

3.2 Intel

3.2.1 Exploitation activities carried out in Year 2

So some of the quantifiable exploitation goals of the programme are as follows:

		Target		Exceeds	Outstanding	Actual Results (Year 2)
No	**Key Performance Indicator**	**Neural Compute**	**Compute Card**			
1	Leverage the FED4SAE Network to help raise awareness of AI and the NCS. Reach communities that Intel ecosystem of partners may not reach.	Identify innovation clusters or communities, centres of excellence in Europe.		Reach Research Community and enable a relationship with a World Class European Centre of Excellence in AI research & development.	Seed the Intel Architecture to form the basis of AI Research or a really novel application	**SUCESSFULLY ACHIEVED.** • The FED4SAE Partner Network was effective in its outreach and awareness raising activities through various physical and virtual channels (social media). Intel also directly communicated with thousands of start-ups, hardware Accelerators and SME to make them aware of the programme. Now only a tiny subset of these responded and applied to the FED4SAE program but many others may purchase the Intel NCS devices so as to prototype and accelerate their own AI program. This helps Intel build brand awareness as a technological leader and while it may be an intangible, it is a highly valuable impact of the program. • The program has deepened relationship between Intel and other partners in the consortium and the partners to develop and submit Horizon 2020 research proposals together. This would not have occurred without FED4SAE enabling that partnership.

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2	Applicants: Successful Ensure that there are minimum number (N^1) of applications and that at least (N^2) Application Experiments are funded on the platform.	20 proposals submitted based on the NCS of which 6 were successful.	7 proposals submitted based on the Compute Card of which 2 were successful.	Collectively 30 proposal applications for Intel's platforms in the programme.	40 proposal applications for Intel's platforms in the programme.	**SUCESSFULLY ACHIEVED.** • There were 38 Application based on the Neural Compute Stick while 24 Proposals referenced the Compute Card. • Nine (9) AE were funded using Intel CPS Platforms which was exactly the target we stated in the DoA.
3	Novelty: Identify SMEs targeting disruptive use cases that exploit and showcase the platform is some novel way – this could be targeting a new market or a different approach to an existing market. Ideally they should have some patents to protect their IP Innovation in the platform.	2 successful proposals that target novel Use case – new markets	1 successful proposal that target novel use cases.	4 Novel Use Cases that are good exemplars that exploit the Myriad VPU are targeting new markets	6 Novel Use Cases that are good exemplars that exploit the Myriad VPU are targeting new markets	**EXCEEDED GOAL.** Looking across the 9 Intel based Application Experiments, some are both highly novel and on solid path to commercialisation. While it is early days and one cannot foretell the future with any accuracy, Intel believes that the follow AE will lead to the creation of new commercial solutions based on Intel platforms. • Smart Tunnel – disrupting their own existing Computer Vision Business by applying low cost VPUs for object classification vehicular/ pedestrian/cyclist. Their AI approach will improve KPI, lower their costs enabling them to grow market share. • AeroDrums: Unfortunately for Intel, AeroDrums chose to move away from the Intel MyriadX VPU as it is significantly more expensive than the earlier Myriad2 (which was EOL) rather than technical feature or performance but they see the market demand as 20K units PA for their product and already have an existing product and channel to market. • SPECTROX – Hyperspectral imaging in melanoma detection. They have a novel approach, applying good science, have a huge global market but they need to identify patentable opportunities, accelerate their development and they also partners to penetrate this market and scale beyond Cyprus. • UBOTICA –Applying AI approaches to Diabetic retinopathy detection to assist the ophthalmologist and reduce human error. They are partnering with a Camera manufacturer so plan to embed their solution into that company next generation cameras.

						• SUREWASH (Hand Hygiene) – A compelling story but the European market may not be quite ready the solution just yet. It may take a little time but the market pull will come - possibly from the US Hospitals initially, and once it does the potential scale is huge. • Artomatix: Highly Novel but low sickness to Intel Platforms. So Intel needs to ensure that their platform is available and their application will exploit it. • AR VR Learning: Headset manufacturers are likely to design in the AI capability into future headsets and Intel is partnering with headset manufacturers to enable this capability; however the opportunity for the company is as a significant AR Training content creator. • Hypercook (Industrial Baking) is applying Hyperspectral imaging to make the industrial baking process more deterministic. They have existing market and strong partners but right now it is unclear how scalable their solution will be. I.e., oven manufacturers could copy their innovation and embed these capabilities into their next generation ovens. • GhostLabs (Industrial CNC Machine monitoring and control), This is a huge market that Microsoft, Amazon and all the large cloud players are attempting to reach and exploit. Ghost have a novel lightweight edge solution that could be a component of a full cloud edge solution.
4	Complete pilot deployments with real world customers within one year of completing their FED4SAE Project.	4 Pilots	2 Pilots	7 Pilots	9 Pilots	**EXCEEDED GOAL** Within FED4SAE the follow AE are currently doing real-world pilots with customers engagement. We believe that is a strong leading health indicator as to the likely longer term success of an Application Experiment. • SmartTunnel is deploying their solution into a customer's vehicular Tunnels to validate and benchmark the performance of their solution's current CV approaches and also secure customer engagement and feedback. • SpectroX will deploy their Hyperspectral Cameras to dermatologist so that they can

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						generate real-world patient images which will then be labelled and used to train a Neural Network. • Surewash have done deployments at Korian Nursing Homes in France which again has enabled customer feedback and address concerns around IT Security and GDPR – a roadblocking concern in solution commercial adoption, • GhostLabs will be deploying their industrial solution to monitor and control 5-10 CNC Machines at SANDVIK large tool manufacturing plant in Stockholm. Further real-world pilots will follow once the application experiments reach a sufficiently level of stability / maturity etc., (Ubotica, Artomatix, Hypercook) which could be either within the AE or after the AE completion date.
5	Get to market within 18 months of Completing their FED4SAE Project – ideally these will be based upon partners' standard boards to get to market – custom board development will of course delay market entry but may be an essential differentiator for some applications.	2 Myriad based Product Launched into the Market	1 Compute Card/NUC based Product/Service Launched into the Market.	3 new Products / Services Launched based on the Myriad VPU.	4 new Products / Services Launched based on the Myriad VPU.	**STATUS: ON TRACK – TOO EARLY.** It's too early to be certain but currently the following AE appears very positive subject to performance verification during the and commercial terms • SmartTunnel plan to go to market with an Aibooster – 8 MyriadX VPUs on a single board. • UBOTICA will embed the MyriadX into smart cameras. • SPECTROX could exploit a MyriadX or other compute capability say on the dermatologist's existing PC so the precise implementation detail of a commercial deployment are a little early to say for certain.
6	Sustaining Digital Innovation Hubs While there is significant exploitation ecosystem in Asia that have brought products to market, this KPI goal is to help enable a dynamic European Ecosystem to identify innovation clusters,	Identify a Digital Innovation Hubs that has developed a competency in AI and act as a centre of excellence to support their ecosystem based on Intel's Product line.	There is an established network of System Integrators for the Compute Card.	Identify two partners Digital Innovation Hubs that have develop a competency in AI and act as a centre of excellence to support their ecosystem based on Intel's Product line.	Identify three partners Digital Innovation Hubs that have develop a competency in AI and act as a centre of excellence to support their ecosystem based on Intel's Product line.	**STATUS: TOO EARLY.** It is currently too early to understand the opportunity and potential impact of the DIH model but Intel will continue to monitor the opportunities to assist, support and accelerate the Digitization of European Industry through the adoption of its technologies into the market and DIH could be a game changer.

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	hardware accelerators or communities/ DIH centres of excellence in AI can exploit NCS/Myriad VPU, that supports start-ups or spinouts, and potentially identify compelling features that can help influence the product roadmap.					

3.2.2 Update of individual exploitation plan

No	Key Performance Indicator	Targets	Outstanding	Y2 Status (see detail above)
1	Continue to support the Application Experiments based on Intel's CPS Platforms.	Monitor and support all inflight AE to ensure that all Intel based Application Experiments successfully complete their deliverables within the Program.	That there is some significant upside that they achieve their goals earlier, that they get customer traction earlier than planned, that they secure additional funding to fund additional resource and thus accelerate their progress up the TRL scale.	Certainly on track – probably a little ahead of schedule and the AE appear promising.
2	Identify an Application Experiments that is Market Ready and work with them to develop a white paper / promotional video that showcases their use of the Intel MyriadX platform which Intel will publish on their Corporate website to showcase European leadership in the exploitation of this relatively new AI technology.	It would be awesome to achieve just one as it can be very difficult to convince decision makers within Intel as to the business value of showcasing a specific Company.	It may be unrealistic, but it would be outstanding to have two AE that would be sufficiently compelling for Intel Corp would showcase.	On track to achieve one.
3	Ecosystem Development – We need to show to our ecosystem partners that there is a sufficient demand for myriad based solution that they will develop general purpose board around the platform. This in itself will also reduce the barriers for adoption for SME in that they will not need to develop custom boards	To have a 3-5 range of commercially available boards that are available from and supported by Intel partners such that a customer could purchase and utilise one of their market ready platforms in their go-to-market solution. This would also mean that should the end customer needs a customised board with additional interfaces that it can be easily customised for the purpose.	5-10 boards from up to 5 different vendors. Ideally some may be in the European time zone that can engage and provide local support.	On track to achieve this
6	Get to market within 18 months of Completing their FED4SAE Project – ideally these will be based upon partner's standard boards to	2 Myriad based Product Launched into the Market	4 new Products / Services Launched based on the Myriad VPU.	As noted above – this is on track.

	get to market – custom board development will of course delay market entry but may be an essential differentiator for some applications.			
4	Sustaining Digital Innovation Hubs While there is significant exploitation ecosystem in Asia that have brought products to market, this KPI goal is to help enable a dynamic European Ecosystem to identify innovation clusters, hardware accelerators or communities/ DIH centres of excellence in AI can exploit NCS/Myriad VPU, that supports start-ups or spinouts, and potentially identify compelling features that can help influence the product roadmap.	Identify a Digital Innovation Hubs that has developed a competency in AI and act as a centre of excellence to support their ecosystem based on Intel's Product line.	Identify three partners Digital Innovation Hubs that have develop a competency in AI and act as a centre of excellence to support their ecosystem based on Intel's Product line.	Example - Intel Movidius team are monitoring the ICT48 the **"Horizon 2020 Call on European Network of Artificial Intelligence Excellence Centres"** and they see this as a highly complementary initiative to accelerate the DIH initiative. Intel Movidius are current exploring if there is likely to be a proposal submitted from Ireland in which they could participate and contribute to.

3.3 ST-I and ST-F

3.3.1 Exploitation activities carried out in Year 2

As in the previous year, in the second year of the project, FED4SAE, ST (ST-I &ST-F) activities have been focused to promote the opportunity and the benefits made available by the FED4SAE Open Calls to SME and RTO with involvements on start-ups.

Several European meetings, in addition of presentation and promotion events planned for our products, were an excellent vehicle for direct promotion and to get in touch with SMEs and start-ups interested in being able to develop their ideas with possible and useful support of the SAE initiatives.

This has also allowed us to establish direct contacts and increase our networking of highly innovative small companies, on which to verify and to evaluate our proposition of marketing packages as complete (hardware and software) support for our key devices.

ST is a provider of advanced devices (Integrated Circuits-IC, Application Specific Standard Parts-ASSP, System on Chip -SoC, System on Package –SoP, Application Specific Integrated Circuit –ASIC) and technological enabler based on its own semiconductor manufacturing capability and experience, addressing three different market customer models:

- Top customers: characterized by very high orders of parts that justify to provide custom products on base of their requests and requirements;
- Global managed customers: supported in unified manner (Automotive, Industrial, Communication, IoT) providing appropriate global coverage of devices and services;

- Distribution and mass market: characterized by very large number of low value orders on a large spread of different products. This market sector is supported providing a technical support differentiated by type of customers, such as providing marketing package for key product on specific applications

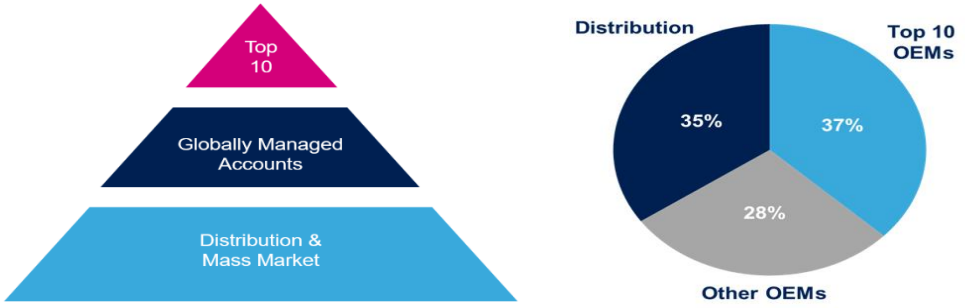

Figure 1: ST Served customers representation (left) and 2018 full year sales: %by customer type (right)

It is possible to give a pyramidal representation, Figure 1, of the customers served (more than 100,000) in which the bases are correlated to the number while the heights to the value of the orders for each of these three customer type.

It is to note that mass market covers around 35% of overall ST sales (2018 data) and this kind of customers embrace SMEs and the Start-ups as those that are in the aims of FED4SAE project.

As in similar project, ST-I, supporting FED4SAE activities on SMEs' Application Experiments, intends to foster the SMEs' innovative ideas and recognize the possible constrains, obstacles and limitations on adoption of our devices in the development of new system/product.

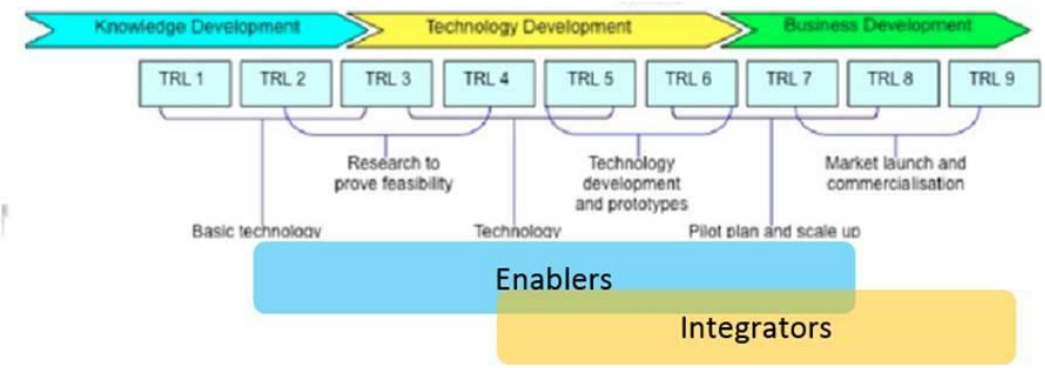

Figure 2 ST and integrators positioning in innovative product development chain

ST positions itself as technology enabler, supporting any kind of integrators on development of marketable products

SMEs and Start-ups, in general, cannot have investment capital and reduction of scale on production costs typical of large enterprise, therefore they have to be truly innovative on product proposition to be competitive in the market, providing advanced solutions on enhancing of goods and services.

On the other hand, SMEs and start-ups, for their nature, have a more niche focus and specific expertise, generally, more advanced and flexible that in large enterprise

FED4SAE project is giving us the opportunity to gather the SMEs' innovation skills and the incoming trend on requirements and expected characteristics for electronic devices, sensing the „weak signals on innovation" directly from their dynamic and high innovative application field so as to be able to take in account of these signals in our support/marketing plans.

As in the first year of the project, the FED4SAE activities allow ST-F and ST-I to:

- Foster the SMEs' innovative ideas;
- Recognize possible constraints, obstacles, and limitations on adoption of our solutions on mass market;
- Reinforce our propositions on mass market, better addressing the needs of (customer) third party;
- Nurture continuous and trusting affiliation relationship with them.

As in the previous year, the measurement of success of our approach to the mass marketing is the shipments of our X-Nucleo, that despite the increased presence of similar propositions by our competitors, it is maintained at the levels of past years with a constant increment in the X-Nucleo proposed by SRA (forecasted about 35,000 shipments in 2019).

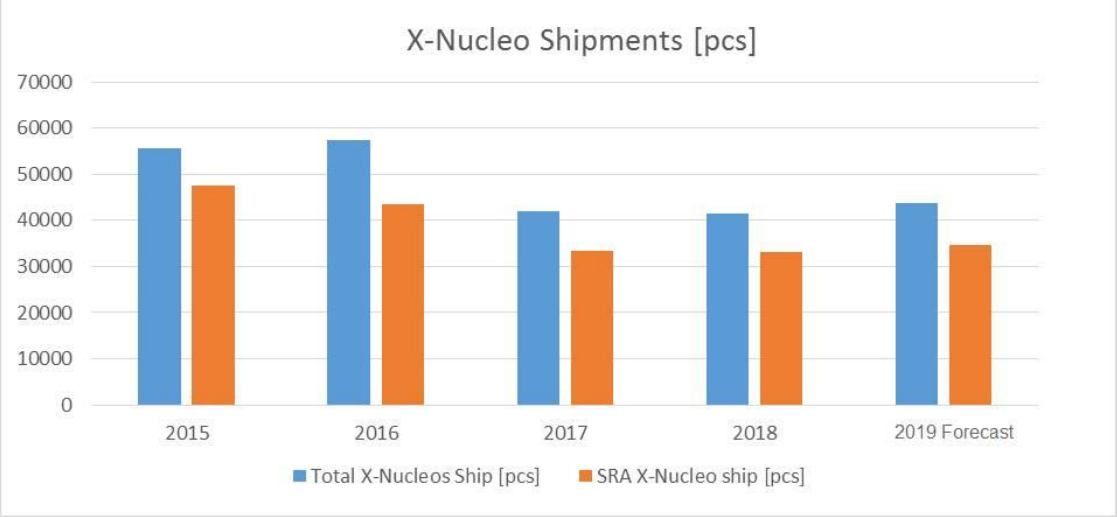

Figure 3 X Nucleo shipments

At same time, this confirms the good trend for the STM32 Nucleo, its trend being superior to those of the X-Nucleo (generally an X-Nucleo is complemented and managed by a STM32 Nucleo board), confirming the interest in the STM32 microcontroller family as core device for very different kinds of applications.

3.3.2 Update of individual exploitation plan

The initial exploitation plan remains unchanged, and on the positive results of the first two years, the planned activities will be reinforced.

The project FED4SAE offers a landscape on SME trends and linked innovation capability, giving us an immediate feedback on our devices promotion and Technology interest on areas.

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In particular, in most of the selected application experiments the USB communication is used for the debugging and monitoring of the boards, while, where possible, Bluetooth communication tends to replace USB and it is largely adopted as wireless communication.

LoRA is becoming ever more adopted in distance communication, networking and localization.

Another trend is to move smartness on physical edge devices providing fast response (low latency to respond) and reducing data load to the upper layers of the overall CPS solution. This moves to reinforce the development on software and tools available for LoRA and Low Energy Bluetooth and to reinforce the support on low consumption Microcontrollers and to facilitate the adoption of Linus environment for high performance STM32 microcontrollers

Last but not least, dedicated pages inside ST website and STM32 web community have been made available to promote Application Experiment results and third parties' competencies

The KPI defined in the first year is updated with data on third open call.

The expected number of submitted proposals (more than 30 for ST, more than 12 for ST-I and more than 18 for ST-F) has been fully satisfied, and the target defined for each call has been exceeded in each call.

The table below reassumes these KPI

Submitted proposals	Each Open Call (OC)				In all call in total	
	Target	I OC.	II OC	III OC	**Target**	Actual value
ST	**> 10**	14*	13	15*	**>30**	44
ST-I	**>= 4**	7	5	5	**>12**	17
ST-F	**>= 6**	11	8	14-	**>18**	33

(*) common ST-I and ST-F submissions

Another significant element to have a feedback on the exploitation activities, has been related to the area coverage of the promotion, as expression of pervasiveness of the messages transmitted by FED4SAE promotion.

The expected target for each call, submissions from at least 5 different countries, and at least 3 for both ST-I and ST-F are fully satisfied also.

Submitted proposals	Each Open Call (OC)			
	Target	I OC.	II OC	III OC
ST	**> 5 different nations**	**8 Nations** France 2, Spain 2 Italy 4, Ireland 1 Poland 1, UK 3 Hungary 1	**7 Nations** Spain 3 Italy 3 UK 1, Hungary 2 Germany 2, Serbia 1 Norway 1	**7 Nations** Spain 4, Italy 4 UK 2, Hungary 1 Germany 2, France 1, Denmark 1, Ireland 1,
ST-I	**>= 3 different nations**	**5 Nations** France 2, Spain 2 Italy 1, Ireland 1 Poland 1	**5 Nations** Hungary 1, Germany 1 Spain 2, Serbia 1 Norway 1	**3 Nations** Italy 3, Spain 1, France 1

ST-F	**>= 3 different nations**	**5 Nations** France 1 ,Spain 2 Italy 4 , UK 3 Hungary 1	**5 Nations** Spain 2, Italy 3 UK 1, Hungary 1 Germany 1	**7 Nations** Spain 3, Italy 4 UK 2, Hungary 1 Germany 2, France 1, Denmark 1, Ireland 1,

In the three calls we received feedback from, in total, 11 different nations: France, Spain, Italy, Ireland, Poland, UK, Hungary, Germany, Serbia, Norway, and Denmark, as reported with green circles in the **Fehler! Verweisquelle konnte nicht gefunden werden.** , highlighting a very strong coverage on main European countries.

Note that this is related to the proposals submitted without considering the AE proposals from other countries that were not finalized in a submission.

3.4 Thales

3.4.1 Exploitation activities carried out in Year 2

During the second year of FED4SAE we have continued our efforts to leverage the FED4SAE network to get more applicants and to promote the Time4Sys platform for new communities. We have also contacted directly various potential applicants to increase the number of applicants and reach out objective in FED4SAE. Typically, we have visited and assisted 2 SMEs to submit proposals which finally got funded in the 3rd call.

And not the least, we have contributed to standardisation activities by submitting a response to the MARTE RFI launched at OMG in September 2018, which makes Time4Sys more visible to the whole OMG community.

Exploitation goal stated in D6.4	Performed actions addressing this goal	Achievements / results / success
Leverage the FED4SAE Network to help raise awareness of Time4Sys. Reach communities that Thales may not reach.	Work for AE participants to disseminate Time4Sys in their community	Demonstration of Time4Sys with ARTAL accepted at Eclipse Conference at Munich in September 2019 (Germany). Around 15 contacts have been established about Time4Sys/Tideal.
Applicants : Successful Ensure that there are minimum number (N^1) of applications and that at least (N^2) Application Experiments are funded on the platform.	Contact directly some SME to organise meeting in their place to present FED4SAE initiative.	In November 2018, we visited the LinkSoftware SME located in Tunis (Tunisia). Finally LinkSoftware wins an AE during the 3rd call. Visit of fentiss SME in February 2019 located in Valencia (Spain). fentiss did a proposal and win an AE in the 3rd call. Results: 2 new more AE funded by FEDSAE
Innovative: Identify SMEs targeting using Time4Sys as a	Promoting the Time4Sys platform	RTSS 2018 (Real-Time Systems Symposium) in Nashville 11-14

brick of the innovative product, which means the SME distributes the Time4Sys platform in some novel way – this could be targeting a new market or a different approach to an existing market. Ideally they should have some patents to protect their IP Innovation in the Time4Sys platform.	around various conferences and communities to demonstrate the benefits of the platform and to encourage SME to develop innovative product based on the Time4Sys platform	Dec 2018, where we presented to all conference participants (more than 250) the Time4Sys poster and done a demonstration of the platform. HiPEAC 2018 (European Network on High Performance and Embedded Architecture and Compilation) in Valencia 21-23 Jan 2019 Presentation of the integration of a timing verification tool in the design process through the use of Time4Sys with around 20 participants.
Standardisation impact: While there is adoption of Time4Sys in various domains, there is an objective to make Time4Sys shared by the community and become a world class standard based technology. This will give long term guarantee of the investment efforts from SME.	Contribution to the RFI (Request For Information) launch by OMG in September 2018 to propose to standardise the Time4Sys concepts in real-time and Embedded Engineering Domain	THALES responses have been accepted and presented during the March 2019 meeting at Washington DC (USA). THALES is now invited to contribute to the definition of the RFP (Request For Proposal).

3.4.2 Update of individual exploitation plan

In the following year, THALES will participate at industrial forums, workshops and conferences (Concur 2019, Embedded Systems Week 2019, European Eclipse Conference, ETFA conference, RTSS'19, DATE 2020, RTAS 2020, among others) to promote the work done in FED4SAE and also highlight the work achieved by all SMEs using the Time4Sys Platform in their AE. In parallel, we will continue to contribute to standardisation activities (e.g., towards OMG) to make Time4Sys a standard and by this way to increase its adoption in industry in various domains. We will also engage a dissemination strategy in THALES to promote the products developed by AE applicants using the Time4Sys Platform.

3.5 AVL

3.5.1 Exploitation activities carried out in Year 2

Exploitation goal stated in D6.4	Performed actions addressing this goal	Achievements / results / success
Goal 1: Through execution of the AEs, create new assets and follow-up business	Identification of clear assets for co-exploitation with the involved SMEs	1. PRESLEEP: AVL exploitation through integration of SAT's smart watch into AVL's driver simulator (through IODP services) for human monitoring (validation of autonomous systems)

		2. BETP: integration of Kalmia's blockchain solutions into the IODP platform for traceability and quality insurance (supplier management) during cross-institution development in the automotive domain 3. C2MICROCAR: providing integrated toolchains for the holistic simulation and evaluation of complex autonomous driving functions (SAE L4) As of the time of writing this report, the assets have been defined and aligned with the respective AVL's assets owners and business responsible. Regular meetings ensure proper alignment between the institutions, therefore increasing the chance of a technical, and then of a commercial success.
Goal 2: Increase the visibility of AVL and its portfolio for innovative SMEs	Strengthening of AVL ecosystem of SMEs through the AVL start-up initiative	https://www.creators-expedition.com/
Goal 2: Increase the visibility of AVL and its portfolio for innovative SMEs	Creation of dedicated webinars and white papers related to IODP and its usage to address customer needs	AVL is creating webinar in a regular manner to communicate on his portfolio, see https://www.avl.com/en/webinars Especially, two groups of webinars can be identified: (a) webinars on IODP as a core technology for integrated and open development, and (b) webinars on AVL expertise for powertrain engineering and test systems, taking advantage of IODP to increase development and validation efficiency. While the first group mainly address technology partners interested to "plug" to the AVL technology community, the second group will be more relevant in terms of illustrating the capabilities of the technology solutions to the possible customers. Especially these second group represent interesting success stories for application of a given technology to a specific customer need. IODP Success Stories - https://www.avl.com/de/web/guest/iodp-success-stories e.g., "Driveability of virtual vehicles - Can transient vehicle models written in software be used to measure driveability on an engine testbed?" IODP Publications - https://www.avl.com/web/guest/iodp-publications e.g., "Validation of X-in-the-Loop Approaches for Virtual Homologation of Automated Driving

		Functions", "Fault-Tolerant Coupling of Real-Time Systems: A Case Study"
Goal 2: Increase the visibility of AVL and its portfolio for innovative SMEs	Distribution of FED4SAE call for project to regional networks)	Distributed to BMVIT (Austrian ministry for research www.bmvit.at), FFG (Austrian funding authority www.ffg.at), *Plattform Industrie 4.0* (Austrian association for Industry 4.0 www.plattformindustrie40.at), tech2b (Austrian start-up incubator, www.tech2b.at), Austrian economics services (AWS www.aws.at)

The exploitation targets set in D6.4 are still in line to AVL targets and are in good progress.

Goal 1 - Through execution of the AEs, create new assets and follow-up business
Minimum KPI: each AE lead to a new asset (including marketing material) which can be used for customer discussion.

Optimistic KPI: half of the AE is leading to new customer project no longer than two years after finalization of the AE.

Status at end of Year 2: each AE has a clear asset identified, respective AVL business responsible are supporting the activity.

Goal 2 - Increase the visibility of AVL and its portfolio for innovative SMEs
KPI: 20 new SMEs with CPS competences are aware of AVL, 5 SMEs are interested in direct cooperation and have entered detailed discussion to set-up a proposal.

Status at the end of Year 2: >5 proposals received from >=5 different SMEs.

3.5.2 Update of individual exploitation plan

For the third year, the overall exploitation strategy stays the same, still following the same two targets:

- Goal 1 - Through execution of the AEs, create new assets and follow-up business
- Goal 2 - Increase the visibility of AVL and its portfolio for innovative SMEs

Regarding the implementation of the plan, the focus will be set now to Goal 1. Hence, there is no further open calls planned in Year 3, therefore less incentive is available to follow Goal 2. Parallel to that, with the 3 AEs set-up and aligned with AVL skills and business management, Goal 1 can be followed on a more focused way. The planning phase (Year 2) is now entering the operation phase (Year 3) with the development of concrete assets and respective marketing materials to be promoted conjointly between the respective SMEs and AVL.

3.6 Digital Catapult

3.6.1 Exploitation activities carried out in Year 2

Exploitation goal stated in D6.4	**Performed actions addressing this goal**	**Achievements / results / success**
Accelerate UK CPS/IoT solutions to market in particular for SMEs	Run acceleration programmes.	Success. Provided technical training and design support along with access to business mentors and skills as well as investor exposure.

Grow UK companies and the market share of their products	Partner with other UK organisations and create Digital Readiness Level Tool.	In progress.
Increase competitiveness of CPS businesses by leveraging best in class technologies from our European partners	Create Future Networks Lab at Digital Catapult.	Success, offering access to IoT platforms, devices and components of our partners.
Drive adoption of CPS technologies by UK businesses including midcaps to enable more rapid digital transformation of their organisations	Run the Connected Factory Demonstrator program.	Success. Asset tracking solution deployed at Dyer Engineering and Special Metal Wiggin in UK.
Primary focus around LPWAN as critical national IoT connectivity infrastructure for UK	Merged Things Connected - Digital Catapult LPWAN testbed - with the Things Network, providing 600 base stations across UK.	Success. Some of the network assets are used by FED4SAE AEs.

3.6.2 Update of individual exploitation plan

Digital Catapult offers a range of different digital innovation services that are also useful to organisations working in the CPS and IoT domain, which it established over the past few years. These services are offered to start ups, scale-ups and midcaps engaging with the Digital Catapult through a variety of its programmes, including the one of FED4SAE.

In the following we will briefly explain how DIH services relevant to FED4SAE have been evolved over the 2nd year of the project, how FED4SAE has contributed to these or FED4SAE partners are benefiting from their exploitation. We will also outline further exploitation goals of these services for the remaining year of the project.

LPWAN testbed (Testing and validation)

One key offering of the Digital Catapult is access to Things Connected – an IoT testbed focused on Low Power Wide Area Networks. (LPWAN). It allows companies to experiment with LPWAN technologies in order to gain experience and validate initial product ideas or pilot these with potential customers.

Things Connected represents UK's largest LoRaWAN test network with over 150 base stations across London and different regions of the UK. We have recently merged these network assets with the Things Network, providing a total now of over 600 base stations across the UK.

Some of the network assets have been used by FED4SAE AE, including OTA, Energica, Bettair.

One LPWAN capability that has been identified as necessary for the MAMMUT is not only to provide LoRaWAN connectivity but also LoRAWA geo-location features for the testbed. In order to support experimentation with the latter, hardware upgrades to the testbed were necessary. 10 new LoRaWAN gateways were procured and configured over summer 2019 and are now being installed in central London, in order to prepare for experiments of MAMMUT to be carried out later this year.

A further capability has been the addition of a NB-IoT and LTE-M base station, which was integrated with our software-defined 5G mobile core network. Corresponding radio licenses for testing have been obtained by OFCOM.

Our LPWAN testbed now offers experimentation capabilities with all LPWAN technologies including Sigfox, LoRaWAN, NB-IoT and LTE-M.

Future Networks Lab
A bigger investment of the Digital Catapult has been the creation of our Future Networks Lab, a facility for start-ups and scale-ups, who want to innovate using IoT and 5G technologies and organisations who act as early adopters for these.

Leveraging some of the partnerships and profiles of larger industrial partners of FED4SAE and RTOs, we were able to attract increasing interest from key commercial players on the market.

By bringing on board industry partner organisation such as BT, Siemens, PTC, IBM, ServiceNow, Semtech, Texas Instrument and Arrow Electronic, we were able to create a more holistic CPS/IoT innovation ecosystem.

Through our lab we are now able to offer innovators and potential adopters access to the technologies of our partners such as IoT platforms, devices and components. The lab contains different IoT/CPS show cases from our partners and collaborators as well as lab space to carry out technology testing and evaluation.

In the next year, we will aim to exploit the lab as a showcase opportunity for the FED4SAE application experiments that we have supported. Our goal is to have (product) showcases of the outcomes from all 5 application experiments that we closely supported.

This will provide our partners with increased exposure opportunities to potential technology adopters / future customers.

Digital maturity assessment
Digital Catapult has partnered with other UK organisations to create a *Digital Readiness Level (DRL) Tool* (https://drl-tool.org/) to enable the assessment of digital maturity of businesses.

The goal of these tools is to help companies to measure and therefore improve their digital maturity. It is designed to work in a similar way as the now well established models for Technology Readiness Level (TRL) and Manufacturing Readiness Level (MRL): they have an open standard approach to allow and promote direct comparison and benchmarking with other companies of comparable size, sector and region.

The DRL Tool is designed to provide a company with an opportunity to take a detailed look at where they are in respect to the digital journey and to assess and prioritise their future actions to identify and reach an appropriate position.

IoT/CPS benchmarking services
IoT/CPS represents a rapidly emerging market with many new products and solutions that have so far not been extensively utilised in the field. Technology adopters are often not certain whether the promised solutions are of adequate quality, deliver on promised performance characteristics or are suitable for the target deployment use case. Likewise new entrants to the market are interested in understanding performance advantages or limitations of their products compared to the ones of their competitors. This allows them to improve their product or better adapt their pricing strategy/product market fit.

Digital Catapult has established a CPS/IoT benchmark service offering based on suitable evaluation environments, methodologies and tools to carry out performance assessments and benchmarks for specific IoT/CPS devices and solutions.

As part of the third year of FED4SAE, Digital Catapult will carry out one such benchmarking activity focused on LoRaWAN geo-location solution. This will help inform MAMMUT AE and other partners of the experiment.

Acceleration Programmes and Mentoring
Accelerator programmes represent another offering of our DIH, which provide support to CPS/IoT start-ups and scale-ups to accelerate their product and service offerings.

Our accelerator programmes are challenge led, which means they typically involve a challenge sponsor with real world problems that acts as a potential customer for the developed solutions. This ensures that the accelerated products and services of participating start-ups/scale-ups address a real market need and quickly find suitable customers.

In the past our programmes involved public authorities (Things Connected for Local Authorities (TC4LA) and manufacturing businesses (Connected Factory Demonstrator) as challenge owners. They provide technical training and design support, but also access to business mentors and skills as well as investor exposure.

We will try to encourage suitable SMEs engaged in FED4SAE to respond to suitable challenges that are part of our accelerator programmes.

Our experience and excellent partnerships established within FED4SAE has allowed us to be successful in DigiFed another H2020 project bid, which is expected to start in January 2020. This project will allow us to further strengthen our Digital Innovation Hub network with fellow European DIH and provide further opportunities to innovation and adoption of IoT/CPS technologies.

Through this programme will aim to reach out to many of the companies who have applied as part of FED4SAE with good proposal ideas but have unfortunately not been successful. This will provide them with additional opportunities to benefit from new innovation funding and support activities.

3.7 Fraunhofer IISB

3.7.1 Exploitation activities carried out in Year 2

In line with the initially set out goals for the exploitation, during the second year of the project, Fraunhofer IISB continued to promote the project and its remaining open call among its network, among Bavarian and German SMEs, for example through the regional initiative “Bayern Innovativ” – an initiative of the state of Bavaria to support SMEs and midcaps to accelerate innovation and to help them turn their innovation into success. This action enabled us to establish several contacts to SMEs, generating four proposals in the third open call and ultimately the successful selection of two Application Experiments in the third call making use of the technology bricks Fraunhofer IISB is offering.

Fraunhofer IISB has strengthened its collaboration with the companies supported in the second call and started the collaboration with the ones supported through call three.

ASINCO GmbH, a German SME devoted to designing, developing and providing efficient automation and measurement solutions for plant and process automation, including product-specific applications with a focus on the metallurgical industry, iron and steel industry, process engineering, power plants and others.

Sentinum UG, a young tech-company, with a deep knowledge and practical experience in electronic circuit design, embedded-systems programming, dynamic web-applications and machine learning, implementing a platform for scalable ultra-low power sensor networks in Smart-City applications.

The support of third parties through Application Experiments (AEs) has given valuable feedback in particular about the offered testbeds enabling Fraunhofer IISB to further improve them.

During the experiments, the reliability of the testbed was validated using an external calibrated reference analyzer. The testbed was able to generate the required conditions for the calibration of the smart city system very accurately, proving its usability of for Smart City applications.

The collaboration in one of the Application Experiments can be leveraged through a likely bilateral cooperation with the company to monitor the gas concentration in the test chamber using gas sensors inside the chamber and not only relying on the concentration of the test gases. This can further improve the test bed by broadening its abilities.

The reference analyzer rented for the tests yielded very precise results and will likely be used permanently in the future further ensure the accuracy of the testbed.

3.7.2 Update of individual exploitation plan

In the same fashion as for the second call, the results and outcomes of the executed Application Experiments of the third call can serve as examples and showcases to support the promotion in the relevant networks. Fraunhofer IISB will continue to promote FED4SAE instruments (technological, financial, innovation and business support) to regional stakeholders and funding authorities for local implementation of such activities.

We will continue to offer the testbeds either through applicable future programmes or through bilateral collaboration with SMEs interested in the provided services and industrial partners to leverage the possibilities created through FED4SAE. The added awareness of the services created through the several dissemination activities in FED4SAE will further help Fraunhofer IISB to initiate bilateral collaboration with industry and SMEs.

3.8 fortiss

3.8.1 Exploitation activities carried out in Year 2

The exploitation activities carried out by fortiss in the second year of the project were focused on two targets: first, raising awareness about the advanced technologies fortiss is supporting in FED4SAE in its Open Calls, and second, building on the DIH for Applied AI hosted by fortiss to create support services for SMEs.

Exploitation goals	Actions	Achievements
Access to Knowledge: awareness raising and training on fortiss technologies	Training programmes on fortiss advanced technologies have been setup. Tutorials on 4diac are given regularly to practitioners from industry, while a course on NNDK has been developed from scratch.	A first pilot implementation of the NNDK has been given to the SMEs involved in two of the new Application Experiments selected in the 3rd Open Call as part of the on-boarding training.
Access to Technologies: Ensure SME Application Experiments using fortiss' advanced technologies 4diac and NNDK are launched in the 3rd Open Call	Inform SMEs in local networks and via FED4SAE industry partners about fortiss technologies and their potential use cases	3 Application Experiments have been selected from the 3rd Open Call, one using 4diac ("Incoming", together with ST), and two using NNDK ("IDRD" and "SmartTunnel", both with Intel).

Ecosystem Building: reaching out to stakeholders via community events and match-making opportunities. Increase range of applications and use case for fortiss technologies.	fortiss has organised several information events targeted at industry to inform about potentials of Artificial Intelligence for their businesses.	For instance, the "KI für den Mittelstand" ("AI for SMEs") event (May 9, 2019) brought together some 60 participants to share insights from research, practical AI use cases, start-up pitches and discuss in interactive workshops. Furthermore, a joint AI research centre has been founded by IBM and fortiss, with an opening event taking place on April 29, 2019. This will further increase opportunities to outreach to industry partners to transfer of AI research results into practice. Moreover, the new Application Experiment "IDRD" has already provided an opportunity to introduce NNDK into a project proposal submitted jointly with the SME involved in the experiment.
Access to Finance: offer services to companies who seek appropriate funding opportunities for their development projects	Via the DIH, and as part of our "Mittelstand" (SME) package, fortiss is offering various types of services towards SMEs. FED4SAE-type of Open Call projects have been integrated as a particular offering into this package. More specific services to SMEs involved in the experiments will be offered at a later stage, when the experiments have made more progress.	Access to funding via FED4SAE-type of Open Call projects (in SAE and I4MS) is regularly being promoted in information events hosted by fortiss and the Applied AI DIH. Specifically, as part of the fortiss "Fachtagung" event on Oct. 9, 2018, FED4SAE Open Calls have been presented to interested SMEs.

3.8.2 Update of individual exploitation plan

fortiss' exploitation strategy will remain unchanged for the final period of the project. Particular emphasis will of course be placed on promoting the expected outcomes of the three new Application Experiments in suitable events and forums. A key platform to involve further stakeholders in the ecosystems will be the Munich DIH on Applied AI.

3.9 CSEM

CSEM is at the heart of the digital innovation in Europe through the EPoSS membership, the HTA alliance, EARTO and the partnership in related projects (Gateone project, SMARTER-SI, etc.). Our goals are:

1. to support start-ups and SMEs in their digitalization processes based on our FED4SAE focus areas: microsystems and advanced Manufacturing, surface engineering and ultra-low power integrated systems technology platforms.
2. to help Swiss and European companies in their innovation roadmap and consolidating our internal development by opening new possibilities of industrial collaboration; allowing CSEM to get closer to the industrial sector and reaching new potential partners. In-line with our mission and the goals above, the focus of CSEM's exploitation plans is on helping Swiss and European companies in their innovation roadmap and consolidating our internal development by opening new possibilities of industrial collaboration.

Towards these goals, CSEM seeks to build a network of stakeholders around the platforms and technologies supported by the different FED4SAE centres for their focused smart domains, to support establishing user-supplier relationships and to enable the exchange of learning assets (e.g. best practices). A central element in building such innovation eco-systems to achieve synergy will be to establish links between the FED4SAE centres and other existing regional and national innovation hubs.

3.9.1 Exploitation activities carried out in Year 2

Swiss Micro DIH

In this period, CSEM established itself as a Swiss DIH (The Swiss Micro DIH: available technologies, Application Experiments, Engaging SMEs, Innovation Management, Access to Funding). As a Swiss DIH, and in accordance with our mission, we seek to support start-ups and SMEs in their digitalization processes based on our FED4SAE focus areas: Microsystems, surface engineering and ultra-low power integrated systems technology platforms.

Publicity

In-line with our mission, the focus of CSEM's exploitation plans is on helping Swiss and European companies in their innovation roadmap and consolidating our internal development by opening new possibilities for industrial collaboration. Additionally, CSEM has, and will continue, to make publicity about the FED4SAE via our website, our Twitter account and conferences and events such as MEMS MNE 2019, IMCS 2019. Additionally, CSEM has also endeavoured to broaden and extend our research collaborations in the domain of Digital Technologies, participating in several recent European and Swiss research initiatives.

FED4SAE Call 3

In the period of Call 3, CSEM contacted multiple SME's that had submitted proposals in previous calls, which although not retained for funding we deemed to have potential, and encouraged them to resubmit their proposal, with improvements, guiding them in the process. Several projects calling for the use of CSEM technology were highly ranked by the evaluators. NanoLeak, which was ranked no.1, was retained for funding, becoming CSEM's fourth AE (exceeding our target for the project of 3 AE's). Two other AE's involving CSEM (ICOEPIC and sRECORD) were also ranked highly; however, they were not funded due to the limited availability of funds remaining in the FED4SAE Call 3 and partner balance, In the case of ICOEPIC, which involved a Swiss SME, CSEM is looking for alternative funding opportunities within Switzerland.

3.9.2 Update of individual exploitation plan

Digital technology services

Going forward, our target is to continue build on the momentum generated and to search for ways to exploit the results generated by the AE's retained in Call 2 and Call 3 as the results become available. For example, to offer our services as a technology provider to SME's requiring CSEM FED4SAE focus are technologies, such as GPS free localization, hyperspectral imaging and nanotechnology for chemical sensing.

CSEM offers digital technology services in three areas: 1) Ultra-Low Power Integrated Systems, 2) Microsystems and 3) Surface Engineering.

1. **ULTRA-LOW-POWER INTEGRATED SYSTEMS**: The Ultra-Low Power (ULP) Integrated Systems program at CSEM addresses the challenges and technologies required to build very low power, typically wireless, embedded smart systems or remote sensing nodes. Such components are key to the realization of solutions for Internet of Things (IoT), wearable technologies for health and medical applications, as well as, machine-to-machine (M2M) communications required by Industry 4.0. CSEM activities span Vision Systems, Wireless Systems, RF IC design and System-on-Chip (SoC) design.

   ***FED4SAE focus**: vision systems (Vision in a Package / Intelligent Camera, Intelligent Camera System for Hyperspectral Imaging), and wireless systems (WiseNET Ultra Low Power Wireless Sensor Network and WiseMAC protocol, GPS free localization solver for any LoRa® / LTE-M / NB-IoT / WiFi / BT Network and WiseDep Robust low power wireless for safety-critical applications).*

2. **MICROSYSTEMS:** The Microsystems programs at CSEM addresses the needs for connected sensors in applications such as building automation, healthcare & life science, consumer & home automation, transportation, industrial & environment monitoring security, and retail & logistics. The programs are centred around three activities: MEMS, functional Packaging, and Advanced Manufacturing.

   ***FED4SAE focus**: MEMS, including nano-features. The project requires E-beam lithography, advanced dry etching processes for pattern transfer, and Deep Reactive Ion Etching*

3. **SURFACE ENGINEERING**: The Surface Engineering program at CSEM targets the control of surface structure and composition (both topographical and chemical) and the development of manufacturing technologies for industrial applications. It addresses such topics as the fabrication of nano-structured surfaces, the design and realization of nano-optical components based on nano-engineered surfaces, biochemical functionalized surface, flexible and broad material and process technology and the printing of components for fast and low-cost employment of flexible devices.

   ***FED4SAE focus**: Nanotechnology for chemical sensing*

3.10 KTH

3.10.1 Exploitation activities carried out in Year 2

KTH carried out a number of exploitation-related activities during the second project year:

1. Information about the FED4SAE Calls was sent out twice per call via the ICES monthly newsletter that reaches 1500+ industrial and academic reader.

2. Involvement in the CPS Summer School for both Industry and Academia organized by KTH in June 2019
3. Presenting at the EIT Digital Summer School of Big Data
4. Information about FED4SAE Calls and the DIH Services spread via the THINGS newsletter to current members and alumni
5. Co-hosted 3 Coffee with an Expert seminars together with ICES
6. Part of the conference Smartare Industri together with ICES
7. Co-hosted one event together with THINGS on the theme Expanding Abroad
8. 10+ Companies, SMEs and Large Corps, introduced to the Prototype lab.
9. 2 Companies introduced to the RCV platform. 1 selected as Application Experiment.
10. Companies presented to the AIDE tool. 2 selected as Application Experiments.
11. Initiated partnership with the Innovation Program for Process Industry (PiiA) regarding professional education.
12. Early stage partnership with the KTH Platform on Industrial Transformation.

3.10.2 Update of individual exploitation plan

Role in the project: *Acting as competence centre and DIH*

Expected results:

- Support Third parties to integrate innovative technologies in their products and services.
- Support Third parties in understanding innovation processes, and put them in contact with investors and business knowledge.

Exploitation strategy:

- Strengthen or create new collaborations with Third parties.
- Extend local ecosystem around testbeds and technology.

Benefits:

- Learning about innovative products and services by Third parties.
- Learning about Start-ups, SMEs, and Midcaps business case constraints.
- Growing Start-ups, SMEs and Midcaps to strengthen existing competence and business networks, especially in transportation.

Timescale: short medium and long term

The KTH Digital Innovation HUB on Industrial Digitalization is having a number of activities in place for marketing its service offering towards Third Parties:

- The HUB is going to expand within KTH to cover larger parts of the organization.
- Close cooperation with the Industrial Network ICES, with its 30+ members ranging from SMEs to large corps.
- Close cooperation with the industrial IOT HUB THINGS located in Stockholm

- Close cooperation with KTH Innovation, the local incubator for Students and Academics at KTH.

Draft plan for Year 3

- Invite the three FED4SAE Application Experiments to present at different ICES events during the year.
- Publish updates from the three Application Experiments in the ICES newsletter
- Continue to develop the partnership with the IOT Hub THINGS.
- Make a first set of Professional Training Services for the DIH to be piloted together with the Innovation Program PiiA and ICES.
- Co-Host 3 mini-seminars with ICES on the theme AI, Edge Computing and Security.
- Co-Host 2 matchmaking event between Students and Companies together with ICES
- Enhance the collaboration with European Enterprise Network regarding access to finance.
- Joint event Q2 2020 with PiiA on Safety & Security in Industry scenarios
- Co-Host events together with THINGS and ICES on IPR in R&D Processes.

3.11 BME

3.11.1 Exploitation activities carried out in Year 2

Networking and coaching activities
During the FED4SAE project BME planned to become a Hungarian Digital Innovation Hub (DIH). We are not yet fully there but we think that we are on the right track in becoming one. We are working together with Innomine.com, a Hungarian SME from the Central Hungary Region, to become together the only DIH in the Central Hungary Region.

Awareness creation in the 2nd project year:
Different SME focussed events have been held in this reporting period, like ICT program info-days, specific SAE info days and a meeting organized together with the Hungarian Agency for Innovation (NKFIH) to support and build longer term relations with the respective SMEs. 2 info days were held together with the NKFIH at the premises of NKFIH, and 3 consulting event were held for innovative SMEs at our own premises. In addition to this about 10 face to face meetings were held at BME for SMEs to orient them in writing SME Industrial Experiment applications targeting Fed4Sae SME support.

2nd year coaching activity:
As a CPS coaching and design house BME has planned to exploit the results and experience gained during the EuroCPS and FED4SAE projects with local SMEs. It is expected that we will support innovative 10-12 SMEs with coaching in addition to the ones with IE support. This coaching is planned to be offered free of charge during the project and will then be offered for a consulting fee, or national support, depending on the availability of such. So far 7 SMEs were coached.

3 transnational Industry Experiments has been selected for funding in the first and 2nd Calls for IE applications with BME coaching. All the 3 will use also our reliability testbed.

We are part also *of a 4th Industrial experiment*, where our coaching will be focused on using the reliability testbed.

Teaching activities
Being an educational institute BME wishes to exploit the experiences in new university courses. The most important target of the new courses is the EU supported SSI+, our renewed Erasmus + Master course in Smart Systems Integration, which is teaching international master students. Additionally, a new Summer School program was planned to be developed for students to learn about how to design with European CPS platforms, based on experience of the SMEs and other case studies. A special direction of these courses is presenting the design methods and processes at innovative SMEs in the form of workshops lead by SME innovators. At least 5 new fee paying students are planned a year who want to be specialized in CPS design, in addition to the 25 EU grant holders.

2nd year activity:
A Summer School in Smart Systems Integration with 36 new participants was held in August 2019, where 3 half days were dedicated to smart systems design at SMEs. For these days 12 of our previous year's students have also returned and participated at their own expenses. 2 of our coached Industrial Experiments were presented by the SMEs themselves, discussing the special challenges of innovative European SMEs.

Collaborative research activities
New research projects were planned to be created based on the new ideas and expert knowledge. First year activity: an ECSEL project CPS4EU has been submitted for funding, that has been successful, and the project started in the summer of 2019.

3.11.2 Update of individual exploitation plan

Our exploitation plan for the 3rd year of the project is not very different from the initial plan, but it contains some shift in the focus of the activities. We will concentrate on developing all the missing expertise that is needed to become a national DIH, in addition to our successful transnational DIH activities.

Awareness creation
We continue our activities by organizing local info-days for innovative SMEs at BME, and plan to participate in all the Hungarian national events, organised by NKFIH. Participation at 3 such events is planned.

Ecosystem building, scouting, brokerage, networking
Despite of the fact that we have exploited our capacity in coaching within the FED4SAE project with 4 SMEs to coach, we continue our networking activity and help local and transnational SMEs to improve their Industrial Experiment applications. The SMEs with whom we get in contact will help not only in enlarging our ecosystem, but may serve as places to send our students to gain industrial experience as student interns.

Collaborative Research
Our major goal is to develop special relationship with all the innovative SMEs with which we are in contact in order to initiate new research directions and new research projects with them. This activity was successful already in the past, and we expect that the SMEs we coach in the next years will become our research partners in the near future.

Testing and validation
A special attractive force of BME as a coaching partner is the world class special knowledge that we have in testing and reliability assessment. In the first year of the FED4SAE project we have offered our novel Reliability testing facility for the Industrial Experiments, and this was so popular, that our capabilities are fully exploited already after the 2nd Call. The success of this service has encouraged us to enlarge further the services that we offer for SMEs in reliability testing of Smart Systems.

Education and skills development
We plan new courses in the renewed SSS+ Erasmus mundus Joint International Master Program that will has started in 2019. A special new element of the program is the strengthened industrial participation in the education, as we plan to send each student twice for internship during the 24 months Master Program. The innovative SMEs with whom we build special relationship within the FED4SAE project will benefit from the special fresh knowledge of the very high quality international students (about 25 are selected out of roughly 800 applicants yearly), while the internship will provide excellent opportunities for the students to gain experience in working at innovative SMEs.

At the Summer Courses the best SME projects will be presented again to the students.

3.12 University of Cantabria

3.12.1 Exploitation activities carried out in Year 2

During the second year UNICAN has carried out several activities related to the exploitation of the SmartSantander testbed within the FED4SAE framework. While these activities have followed the initial plan stated in D6.3, they built on top of the ones already mentioned on D6.4: actions to engage the community, support companies to carry out their developments on top of SmartSantander and the execution of Application Experiments.

We can highlight the following activities among them:

- **Ecosystem**
  During the second year, the SmartSantander testbed DIH ecosystem have enhanced its functionality providing support to LoRaWAN experiments.
- **Creation and participation on information events**
  During the second year, we have participated in different events related to the third open call. These events had a two-fold approach. First, to disseminate the open call offered through FED4SAE to promote and support CPS developments. Second, the promotion of the SmartSantander testbed DIH, including the possibilities the testbed offers to companies related to CPS. In this sense, in order to ease the involvement of non-local companies, we have made two online webinars to promote and discuss the opportunities offered by this Open Call. In addition, several bilateral meetings with national and international companies have been carried out as a result of these webinars. In this sense, we have also involved the local development agency (ADL) and other regional entities to increase the impact. The positive effects of these activities can clearly be seen on the amount of application experiment proposals involving UNICAN during the third open call.
- **Promotion**
  Thanks to the participation in FED4SAE we are increasing the awareness of the SmartSantander testbed among third parties in the European Union, which has led to an increment of queries to make use of the testbed within the project.
- **Participation in new AEs**
  In collaboration with the municipality of Santander, we have started discussions with new companies to carry out AEs within the FED4SAE framework. From such discussions, 3 Application Experiment that use the SmartSantander testbed have been started as a result of the second and thirds open calls (1+2). Additionally, we received a total of 14 proposals involving UNICAN in these open calls (3+11).

In D6.4 several KPIs were defined to be met by UNICAN within the framework of FED4SAE. All of them have already been fulfilled during the second year. The following table show the goals and achievements on each area:

Exploitation goal stated in D6.4	Target result	Achievements / results / success
Submission of new proposals for FED4SAE Open Calls in which UNICAN participates as Networking / Competence partner or Advanced platform	3-6	14
Collaboration with new companies in AEs within FED4SAE	1-2	3
Bilateral meetings with companies interested in FED4SAE and the IoT-SmartSantander DIH	5-10	>15
New online / physical events to promote FED4SAE and the IoT-SmartSantander DIH, as well as to initiate contacts with new companies	1-3	2
Initiate contacts with new regional, national or international entities to promote FED4SAE and the IoT-SmartSantander DIH	1 - 2	1
Attending events to promote the SmartSantander testbed and FED4SAE as one of the projects it is involved	1-3	1
UNICAN will participate in new scientific publications or initiate new collaborative research projects	1-3	2

3.12.2 Update of individual exploitation plan

During the third year of FED4SAE project, UNICAN aims at continuing with the work carried out previously in order to foster the usage and the promotion of the IoT-SmartSantander DIH. As mentioned in D6.4, UNICAN will continue to develop and work on the following areas, where UNICAN has already a great expertise, to support third parties within SmartSantander:

- Protocols and architecture design and implementation for mobile communication networks.
- Context management and context-aware solutions from network to application level, through the implementation of different schemes, based on the provided information, to manage the access to the network.
- Middleware platforms for sensor networks and other mobile technologies, in order to uniform and homogenize the access to subjacent sensor technologies from the upper layers.
- Internet of Things, including deployment and installation issues, as well as the management of the whole network, the execution of different researching experiments and the provision of several services to the citizens.
- Contactless communication technologies, such as RFID, NFC, MIFARE and its evolution DESFire, applied to smartcard solutions and NFC-based mobile environments.

In that sense, UNICAN, along with the Municipality of Santander, provides support with several services within the DIH activities. These services are not only offered under the framework of

FED4SAE, but also in the context of other projects in which UNICAN is involved. A detailed description of these services, along with the expected outcomes and KPIs for them, are described below:

- **Ecosystem building, scouting, brokerage, networking; Awareness creation**
  One of the most important activities within the IoT-SmartSantander DIH is the expansion of the existing ecosystem by leveraging the dissemination and exploitation activities carried out with the help of the municipality. In this sense, thanks to FED4SAE project, we will be able to access to a wider ecosystem of companies through the participation on the open calls and the collaboration within the chosen Application Experiments.

- **Education and skills development; Collaborative Research**
  As University, one of the main goals for UNICAN is the increment of the scientific production of the institution with novel scientific papers, posters and conferences. Additionally, finding new funding sources to participate in collaborative research projects is also part of the UNICAN strategic goals.

  These services are aligned with the goals from UNICAN. Therefore, FED4SAE will help UNICAN to find new interested companies to participate in future collaborative projects, as well as to find interested parties to perform collaborative scientific publications.

  On the other hand, UNICAN has a great experience in the educational field. Thanks to the participation in FED4SAE, UNICAN will keep updating his current educational offer in the different subjects by introducing latest trends in research. Furthermore, UNICAN expects to play a great role by coaching third companies attending to FED4SAE calls in the areas where UNICAN already has a great expertise.

- **Concept validation and prototyping; Testing and validation**
  As part of one of the specific characteristics of the SmartSantander testbed, UNICAN will seek to deploy new prototypes from companies within the testbed. Such prototypes will benefit of deploying in a real urban scenario to test its functionalities under real conditions. Additionally, thanks to the experience gathered while deploying infrastructure in the city, UNICAN will help companies on the development of prototypes for the deployment on these scenarios.

  FED4SAE will help UNICAN to reach new companies and initiate collaboration under the framework of the Open Calls.

3.13 BLUMORPHO

3.13.1 Exploitation activities carried out in Year 2 and planned further activities

The promotion of FED4SAE and CPS towards the investment and corporate venture community lead to the identification of this topic in the investment strategies of 2 large organizations Bosch Venture and Trumpf Venture. BLUMORPHO is partner of these companies in their identification of investment opportunities in start-ups. Consequently, 2 companies supported by FED4SAE have applied to the Bosch Venture Forum: HOP Ubiquitous and BETTAIR. After the review from the business units the company BETTAIR has been selected to participate to the Bosch Venture Forum, a private “one day” event. BETTAIR had the opportunity to meet with the investment partners but also the business units of Bosch to open the door towards potential partnerships.

Ecosystem building, scouting, brokerage, networking

Medical devices

Among the companies positioned on medical devices, the following companies will be promoted to the Health Technology Organisation.

- Glanta: Hand hygiene – not directly a medical device.
- Althexis Solutions Ltd: skin cancer diagnosis through hyperspectral imaging and AI
- Protolab – EMBRACE: Bracing system for scoliosis
- Ubotica Technologies

Industrie 4.0

During the past few month, we have identified a growing activity in corporates for the Industrie 4.0 area. Companies like Kion or Heidelberg in Germany have launched "proof of concept" in indoor location systems or remote and the semiconductor industry is craving to feed its AI models with the production data. For all these companies met we have been able to promote the FED4SAE and the following companies:

- OMTLAB Ltd : geolocation
- Kalmia: blockchain for value chain tracking
- Zannini: IoT for Industrie 4.0
- Ghost Labs

This activity brings the "voice of the customer" closer to the companies and gives also a clear trend in the market. In the coming months, at least 1 open call for collaboration will be open from one large corporation.

Access to Funding and Investor Readiness Services

The last edition of the INPHO Venture Summit in Bordeaux was held in Oct. 2018 and has been an opportunity for GLANTA to meet with a community of investors. The organisation committee is currently assessing the possibility to have the next edition of INPHO in June 2020. This will be the perfect opportunity to have more companies supported by FED4SAE applying to the pitching sessions.

Mentoring, Education and skills development

In the frame of the support delivered to the FED4SAE sub-grantees, we found out that many companies needed support in their business development. Especially, they need support in the identification of the right targets and the way to approach their potential customers. This skill needs to be further developed for early stage start-ups (Sentinum) and for some companies pivoting from a design service to a product business model (EMBRACE project). In this context, we have implemented a specific process were BLUMORPHO is producing a list of contacts in a given business target and we support the companies in their prospection campaign. This support can range from reviewing the e-mails text to providing guidance in the interview techniques.

4 Conclusions

The FED4SAE partners have carried out further exploitation activities during the second project year to build up, activate, and extent their local ecosystems around their CPS platforms and technology domains. The activities are based on the initially defined strategy to exploit the assets created by the project, viz. innovative prototypes for new CPS and embedded systems products and services resulting from application experiments with third parties, the communities and ecosystems around the FED4SAE DIHs, and the network of FED4SAE DIHs itself and the innovation services it can offer to European businesses. With further experience gained from the of application experiments selected in the Open Calls, the FED4SAE partners have updated and refined their exploitation plans to progress further towards achieving the vision of a one-stop shop for innovation in CPS.

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