EUROPEAN COMMISSION – HORIZON 2020

Accelerating European CPS Solutions to Market

Deliverable D6.14

WP6

Annual report #3 on dissemination activities including plan for subsequent phases

Contract Number:	761708
Project Acronym:	FED4SAE
Project Title:	"Federated CPS Digital Innovation Hubs for the Smart Anything Everywhere Initiative"

Document Identifier:	D6.14
Status:	Final

Title of Document:	Annual report #3 on dissemination activities
Dissemination Level:	Public

Author(s):	Digital Catapult
Reviewed by:	CEA-Leti, BME

Created on:	1st December 2020
Last update:	30th January 2021

Abstract

This public report summarises the FED4SAE dissemination activities during the third year of the project, including all the actions taken to generate awareness within business communities, other EU projects, conferences and workshops, initiatives and clusters, as well as the creation specific tools for the awareness of the work done during the project and the many success stories that the granted start-ups, SMEs and Midcaps achieved like flyers, success stories and updating the website.

Table of Contents

List of Figures

List of Tables

1. Introduction

The FED4SAE dissemination and exploitation activities are designed 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. In relation to that, FED4SAE aims to engage and build a growing community of active players, from industry, SMEs, start-ups, Midcaps and the researcher community, to facilitate the creation of an integrated sustainable ecosystem of stakeholders active in the cyber-physical domain. To achieve this objective, the FED4SAE consortium will gradually and systematically build up and mobilize a large industrial community committed to adopt and exploit the results in a sustainable way, during and beyond FED4SAE.

The placement of dissemination activities in a dedicated work package (WP6 “Creating cross-border CPS and Embedded System DIH, Dissemination and Exploitation”) with participation of all project partners will ensure that the dissemination activities are carried out with the same level of commitment as technical work. A major objective for FED4SAE is to facilitate pan-European benefits from the project outputs and results. Thus, the activities will be closely monitored to ensure that application value chains as well as vertically integrated technology providers will benefit from the dissemination.

Dissemination will ensure that the next generation core CPS and Embedded System technologies and demonstrators from FED4SAE will be made available to the European Community. The goal is to increase the awareness on how innovative CPS and Embedded System technologies can be used to uplift quality and performance of products and services, i.e. making them smarter. The dissemination activities will also ensure the establishment of local partnerships and necessary co-investments in the regions, in order to strengthen the basis for the sustainability of federated DIHs that FED4SAE has established well beyond the lifetime of the project.

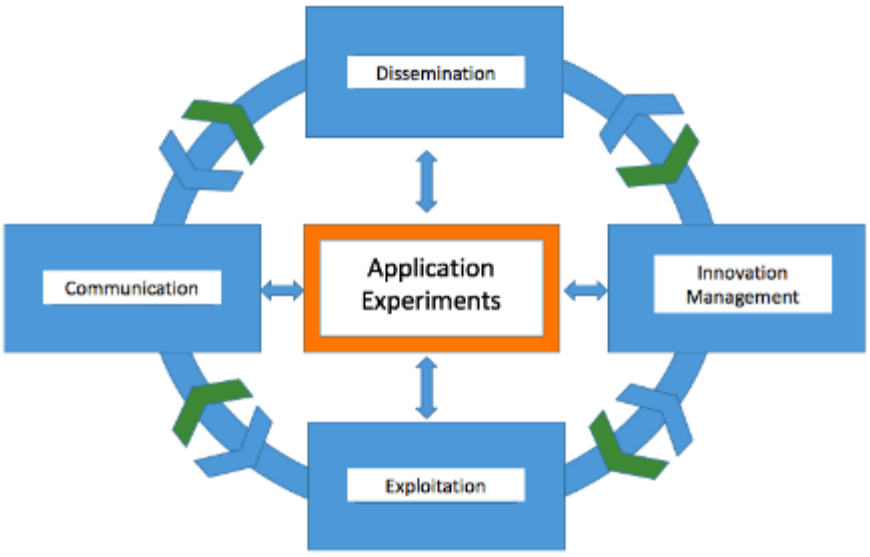


Figure 1: Relationship between Application Experiments and dissemination.

A comprehensive dissemination methodology with a wide spectrum of measures has been planned, in order to reach out to all necessary European stakeholders. We first identify clearly our targets (who) for dissemination and identify the goals for our engagement activities with the identified stakeholders (why). We then present a set of well-tailored dissemination actions and

channels (what/how), in order to support our dissemination objectives with the respective stakeholder groups. Here we differentiate between general dissemination instruments that target a variety of stakeholders more broadly and specific actions tailored to specific stakeholder. We finally provide an overview of the timing of the different dissemination actions. These are well aligned with the overall project plan and key project milestones to amplify the impact potential of the stakeholder engagement activities.

1.1 General image and outreach-building approach

FED4SAE's image and outreach-building approach has several objectives:

1. To disseminate generally understandable information about the project idea, approach, open calls, DIHs and results;
2. To interact with stakeholders, other researchers, local innovation hubs in the field, investors and the general public;
3. To push scientific and technological innovations for uptake by market actors, increase the accessibility.

An original visual identity, consistent across the website, print material, the slide deck and other online presence, has been created in order to create a memorable presence in relevant communities.

Additionally, all dissemination of results, including electronic, will acknowledge European Commission funding through the display the EC emblem, in addition to the project logo.

1.2 Target audiences, goals and actions

The FED4SAE consortium has identified seven groups of target audiences that would potentially benefit from the knowledge acquired during the project. The consortium has identified specific dissemination goals for each target audience group, outlined in the table below:

Table 1: Dissemination goals and actions by target audience.

Audience	Dissemination Goal	Actions
Tech and non-tech companies	Encourage companies to embed new innovative electronic components in their products and services Enable companies to engage with the right stakeholders to identify opportunities for CPS and Embedded System innovations	Presentation at events and mailing shots to seed general interest of CPS and Embedded System stakeholders in the project and open calls Communication of open calls through different online advertisement channels and regular webinars ahead of an open call Drop in clinic events for interested partners at DIHs to engage interested stakeholders into open calls and shape proposals Presentations of the project at relevant meet up groups and network events of DIHs partners in different regions Dissemination on the AE results
Newcomers	To inspire newcomers to embed new innovative electronic components in their products and services.	Idem as for tech companies Channels may vary as they are not embedded in CPS and Embedded System eco-system (European Arts and science network, European

Audience	Dissemination Goal	Actions
	To enable companies to engage with the right stakeholders to identify opportunities for CPS and Embedded System innovations Joint thematic workshops preferably during large events organized by the cluster organization gathering their members	Society for Maths and Arts, European Apparel and Textile Confederation, Wearable Europe, Wearable Conference Barcelona)
Regional innovation networks and accelerators	To promote Open Calls and inform about FED4SAE offerings To attract and engage start-ups, SMEs and midcaps in AEs Complement consortium expertise with additional skills and opportunities to support companies To help secure follow on funding for companies beyond To help regional authorities in their global strategy To ensure sustainability of created FED4SAE DIHs	Communication on the open calls Dissemination on the AEs results and gains for innovative companies Dissemination on the regional best practices to support innovative companies Use regional and national organisations communication vehicles to reach the regional SMEs
Investors	To help secure follow on funding for innovative companies for market launch and scale-up To ensure sustainability of created FED4SAE DIHs	Communication on the open calls Dissemination on the AE results and gains for innovative companies Private meeting with innovative companies for further investment beyond FED4SAE AEs Dissemination on the DIHs organization and impact on CPS and Embedded System development acceleration
Policy-makers	To remove barriers for innovation To identify and analyse market failures To influence new funding opportunities / programmes for CPS and Embedded Systems	Dissemination on the AEs results and gains for innovative companies Dissemination on the DIHs organization and impact on CPS and Embedded System development acceleration
Smart Anything Everywhere community	To foster synergies by creating awareness and share emerging best practices across different SAE projects To avoid duplication of work and identify possibly joined activities in terms of communication and exploitation to better exploit available project resources	Cluster meetings Joint thematic workshops
Broader CPS and Embedded System innovation community	To share of best practices for the advance of the EU CPS and Embedded System sector To encourage participation of stakeholders to engage in the federated DIHs and grow the outreach of them into different local CPS and Embedded System community networks	Dissemination on the AE results and gains for innovative companies

1.3 Purpose of this document

The aim of this document to provide an update on dissemination activities from Year 3 of the FED4SAE project.

2. Third Year Dissemination Activities

This section provides an overview of dissemination activaties carried out in the third year of the project and observed impacts of these. For each category of activities, we briefly present the initial dissemination targets and summarise the actual activities performed. We conclude with a brief assessment or learning about the effectiveness of these.

2.1 Project website

During the third year of the project, we continued to regularly provide updated project information and to showcase the selected pilot projects, webinars, and experiment results. The website continued to function as a central hub linking to and integrating all major social media activities and provides support through a dedicated FAQs section, videos and animations.

Moreover, during 2020 and beginning of 2021, the FED4SAE website has been updated as a showcase of the work done so far and the many successes that the granted companies have achieved. The new website structure and pages design was coordinated by Digital Catapult in collaboration with CEA, BLUMORPHO, Intel and fortiss, while the implementation was done by BME.

The structure of the website has changed, the content of several existing pages, like Homepage, News, Innovative Projects and Innovation Management, has been updated, while other new pages have been created to include information on the FED4SAE teams, access to finance, and the success stories of several Application Experiments and the companies.

The new Homepage contains information on the overall objectives of the FED4SAE project and the application experiments with some statistics associated, a list of all 32 granted applications with links to their own description page, information on funding and on DIHs. From this page, the end-user can quickly navigate to Success Stories, Innovative Projects, Technology Platform, Innovative Management, News and Insights, and FED4SAE Team pages, as shown in Figure 3. For comparison, we add a snapshot of the old Homepage in Figure 2.

The Innovative Projects page has been updated as well. While the old version contained generic information on how companies can participate to the FED4SAE project, the new version contains a generic description of the application experiments and a classification of them based on the different domains to which they applied, Environmental, Energy, Education, Entertainment, Healthcare, Transportation, Industry 4.0, to Smart Cities, together with the logo of the AEs and its name and a link to individual pages describing the AEs in more details.

The old pages of Industrial Platforms and Advanced Platforms have been unified into the new Technology Platforms page, which lists all advanced technologies, industrial platforms and testbeds offering partners of the project, together with their specific expertise and links to individual pages.

Moreover, the old Innovation Management page was updated with information on the process through which the AEs went in terms of coaching, strategic elements, the support received from private investment, and innovation readiness after the project.

The News and Insights page has been updated, with Press releases, articles, newsletters, meetings and events, webinars, photo gallery. Each of these has a link to their individual pages. Also, the SAE Initiative page has been updated with generic info and now includes direct links to the SAE initiative website and a video of a brief introduction to the initiative.

The new version of the website contains two new important pages on the FED4SAE team and the Success Stories. The former has info on the consortium, links to DIH centres and contact person and their e-mail addresses for each DIH, together with the list of public deliverables and associated links. The latter contains 16 FED4SAE Application Experiments describing the addressed challenge, the solution and FED4SAE support and opportunity, along with a short description of the company, a quote from a member of the company, and the impact. All DIHs and industrial partners, together with the participating companies, contributed to the content of the success stories. More information can be found in Section 2.3.1 Success stories.

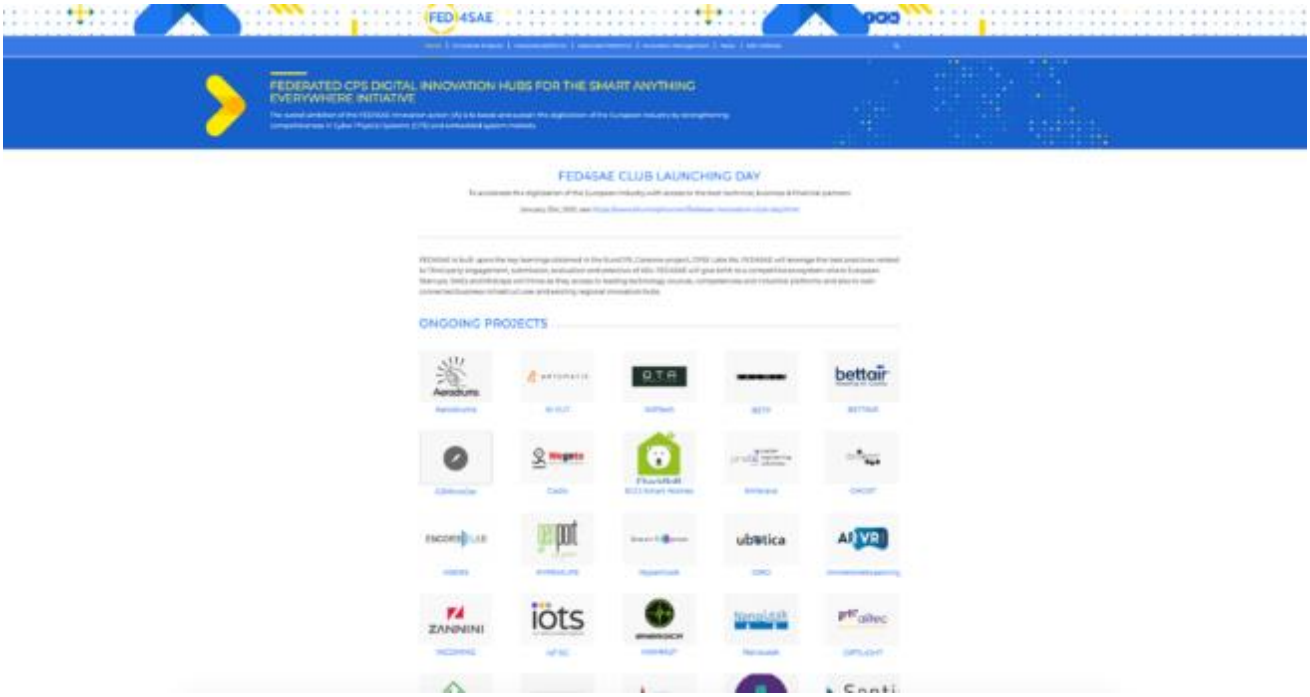


Figure 2: Snapshot of FED4SAE old Homepage.

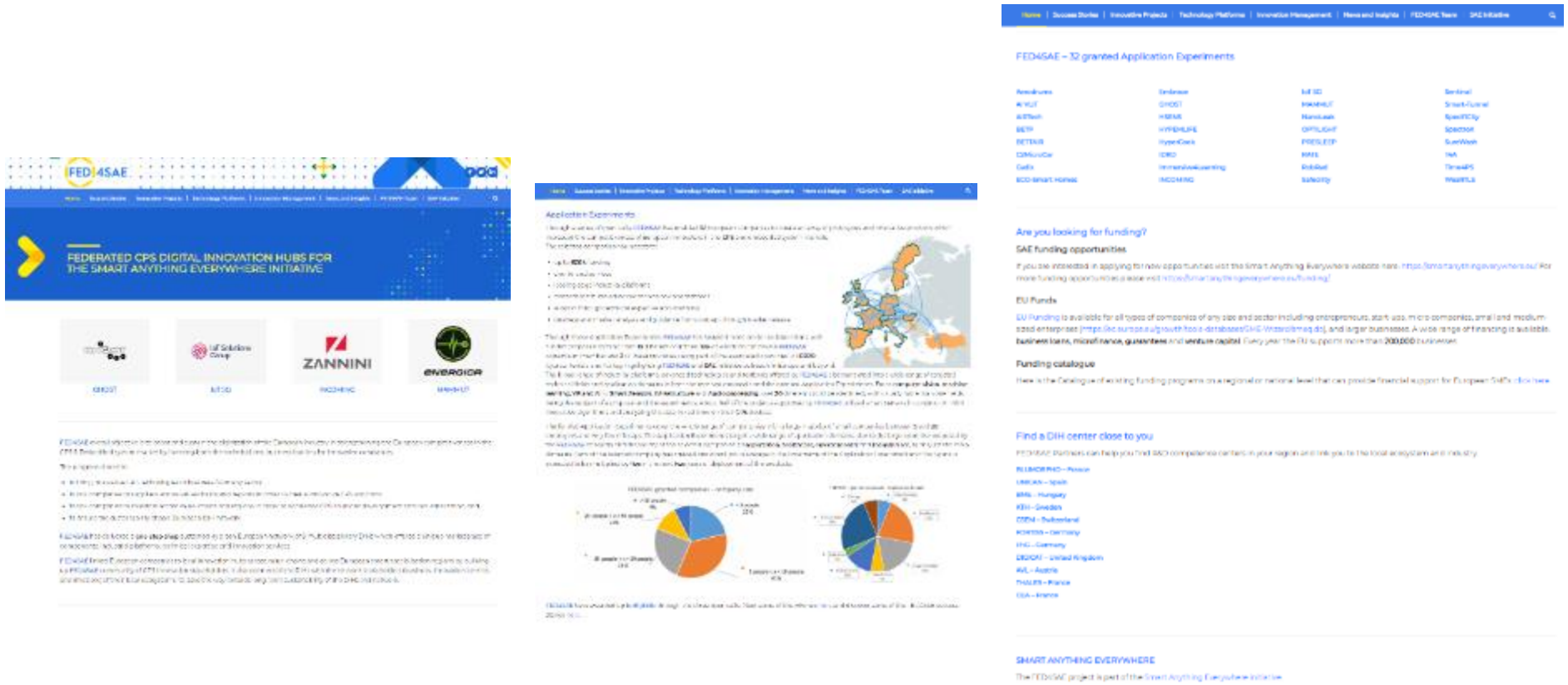
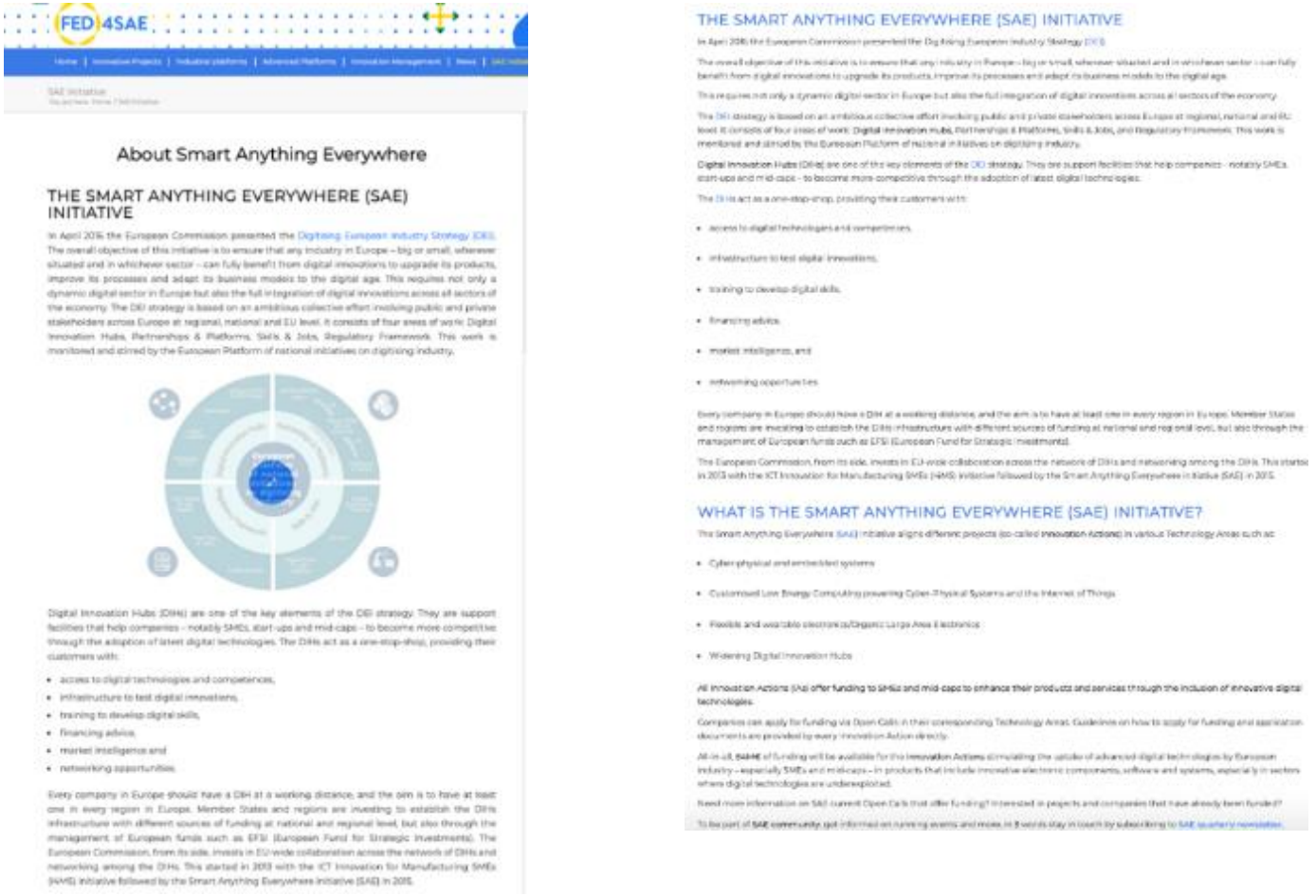


Figure 3: FED4SAE new Homepage (https://fed4sae.eu/).

Figure 4: FED4SAE Innovative Projects old (left) and new (right, https://fed4sae.eu/innovative-projects/) page.



About Smart Anything Everywhere

THE SMART ANYTHING EVERYWHERE (SAE) INITIATIVE

THE SMART ANYTHING EVERYWHERE (SAE) INITIATIVE

WHAT IS THE SMART ANYTHING EVERYWHERE (SAE) INITIATIVE?

Figure 5: FED4SAE SAE Initiative old (left) and new (right, https://fed4sae.eu/sae-initiative/) page.

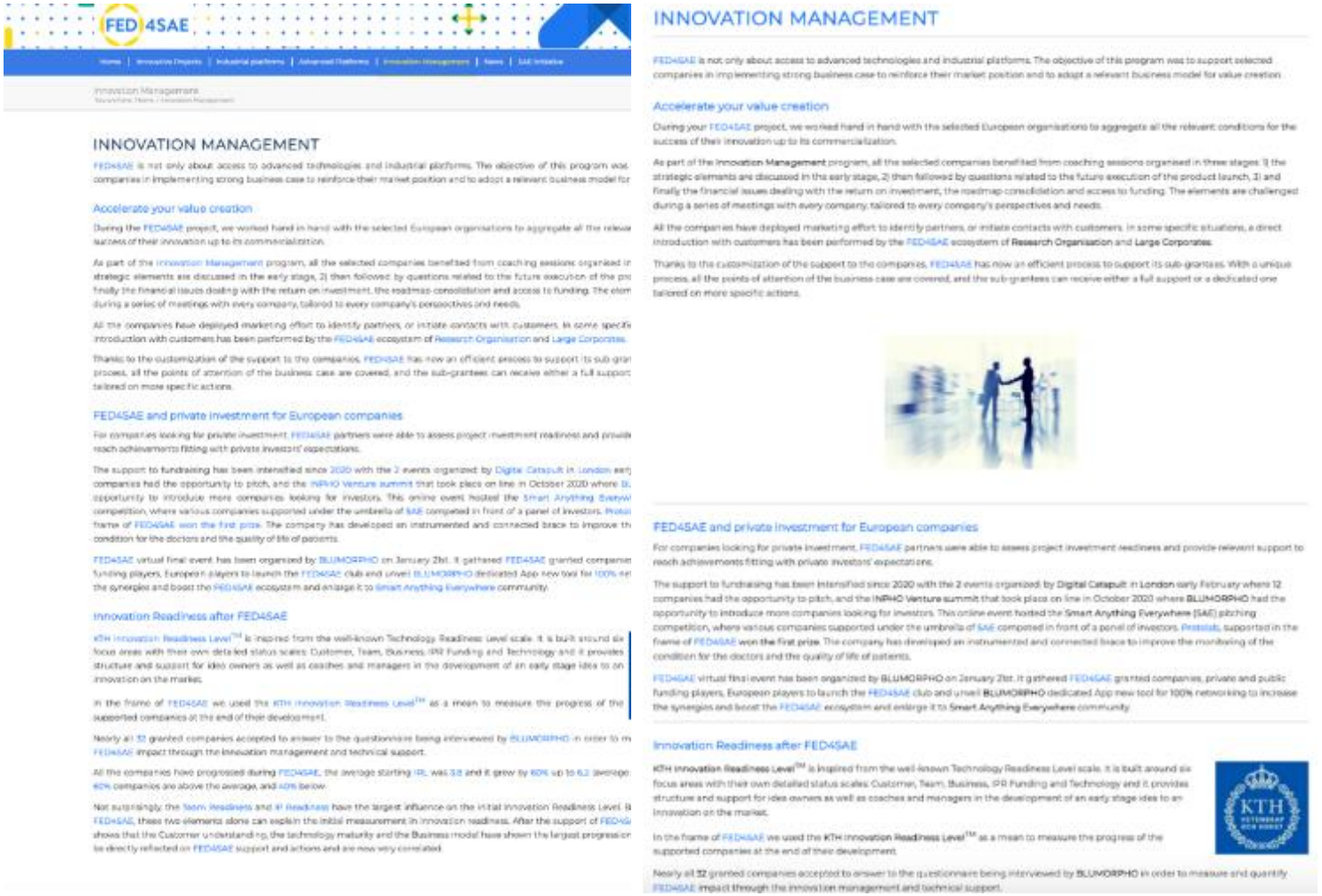


Figure 6: FED4SAE Innovation Management old (left) and new (right, https://fed4sae.eu/innovation-management/) page.

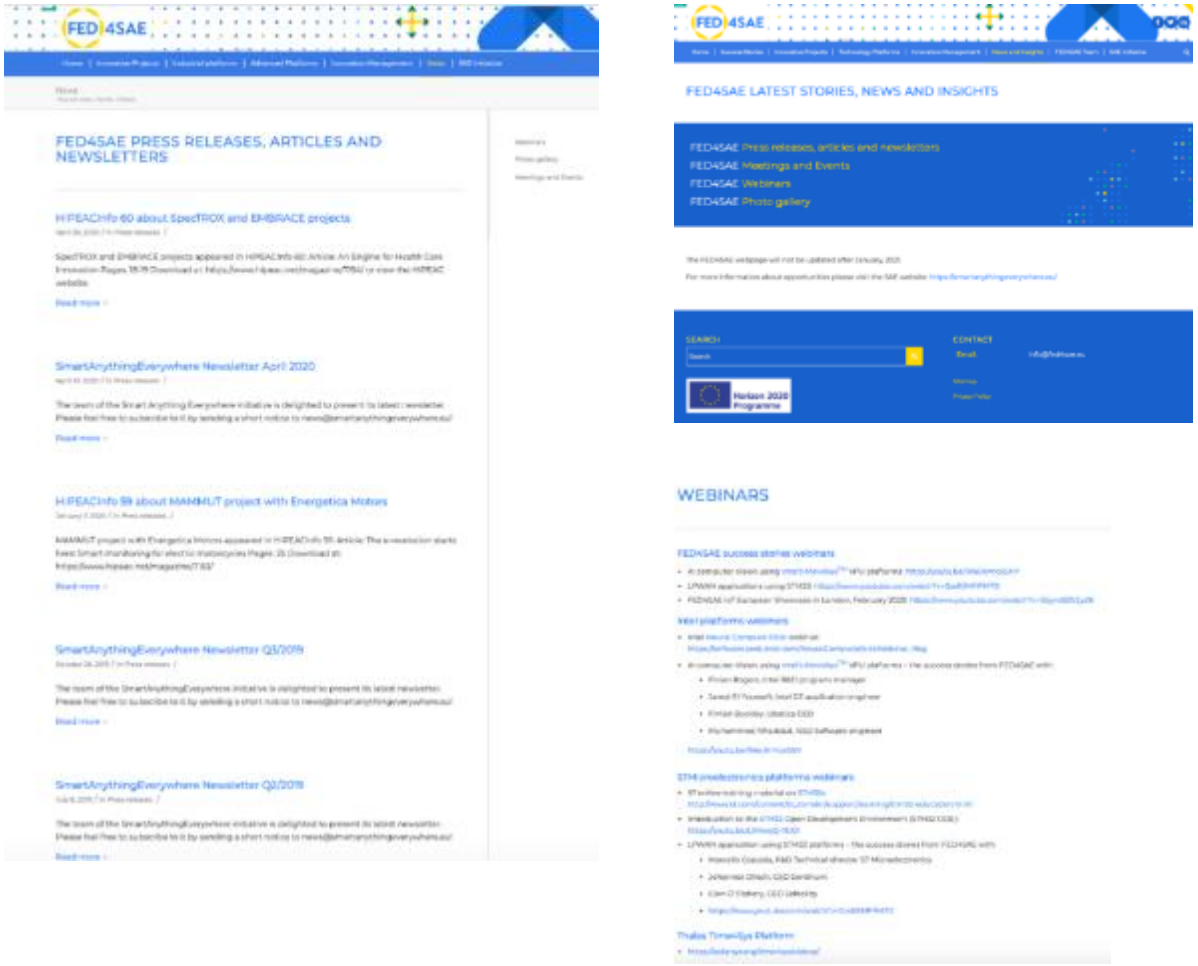


Figure 7: FED4SAE News old (left) and new and snapshot of Webinars new (right) webpages.

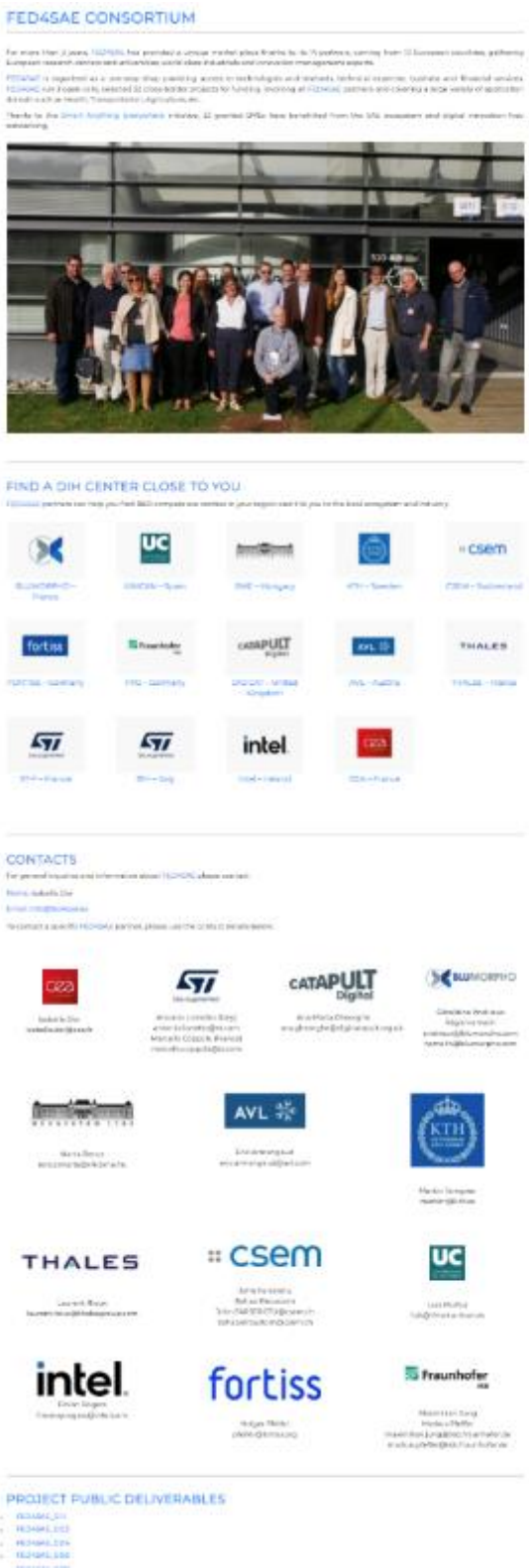


Figure 8: FED4SAE Team new webpage (https://fed4sae.eu/fed4sae-team/)

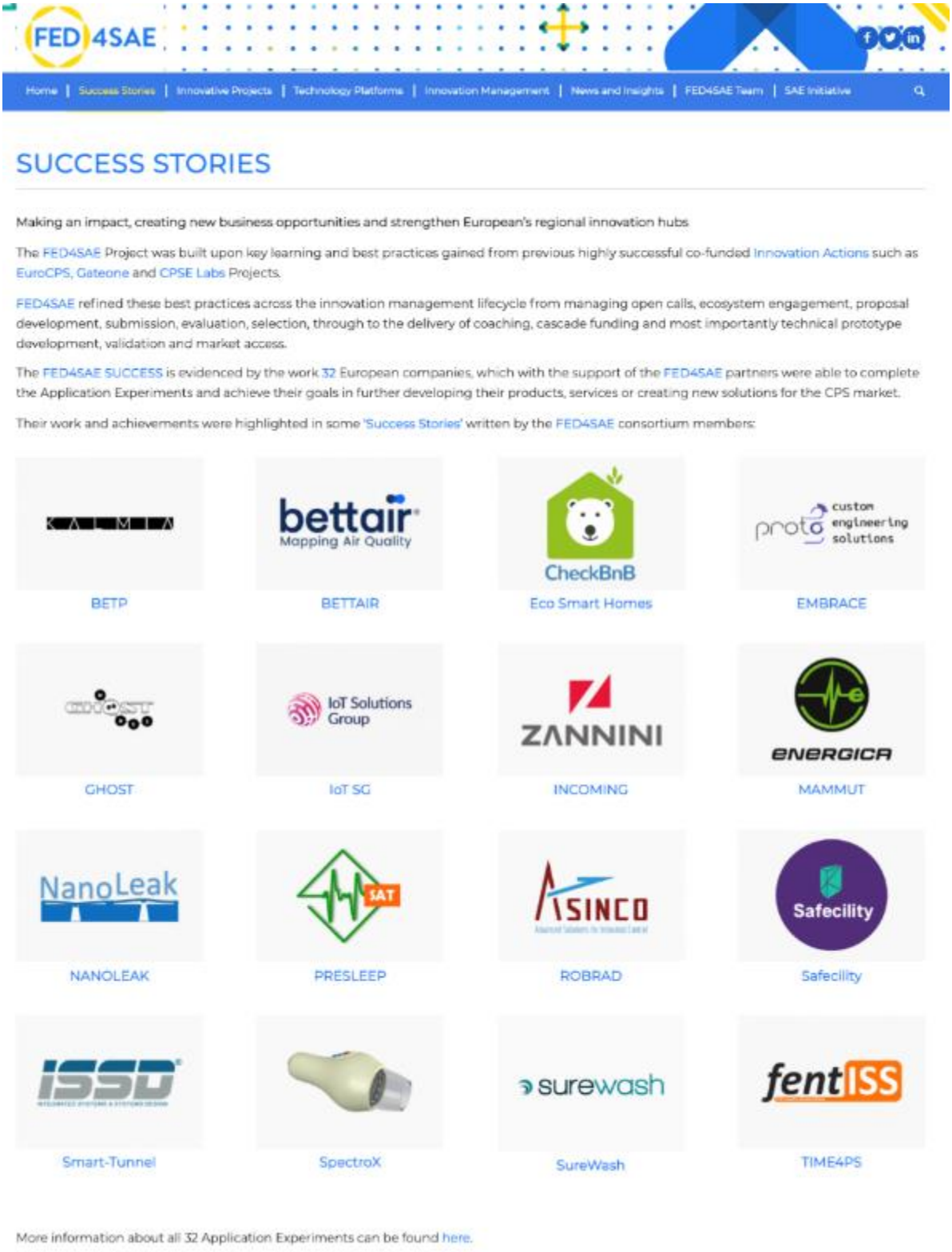


Figure 9: FED4SAE Success Stories new webpage (https://fed4sae.eu/success-stories/).

The website engagement rates have decreased with 17% during the third year with respect to the second year but there were visitors from much more different countries than in the second and first years.

There has been a strong interest from USA, France and Germany, as can be seen in Figure 10. The number of visits from UK, Germany and Switzerland increased during the third year of FED4SAE, while the interest from USA almost halved. Moreover, there was interest from new countries like India, China, and Turkey. The number of visitors from Greece and Ireland was almost the same as during the second year while the number of visitors from Italy has halved during the third year.

During the third year of FED4SAE there were no open calls, the number of visits per month being always over 400 till June 2020 after which it started decreasing, see Figure 11.

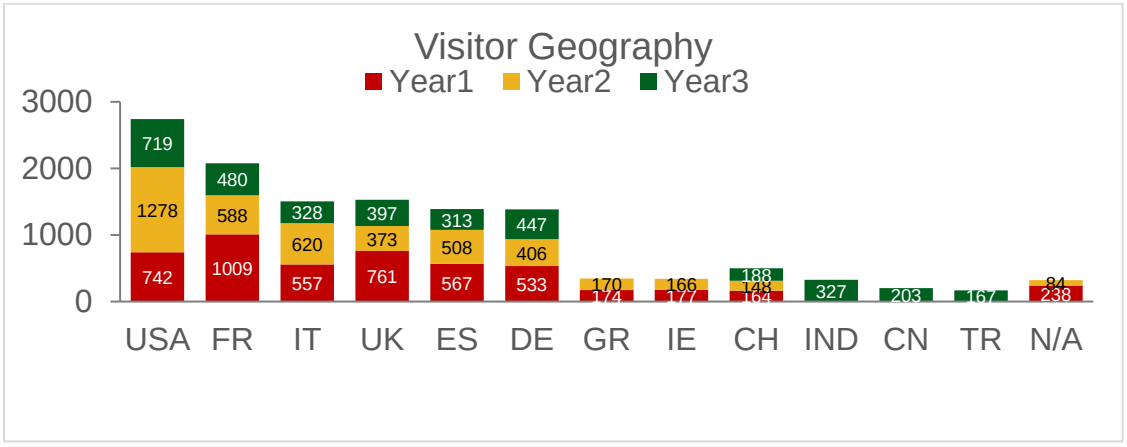


Figure 10: Visitor Geography and visitor numbers for first, second, and third year.

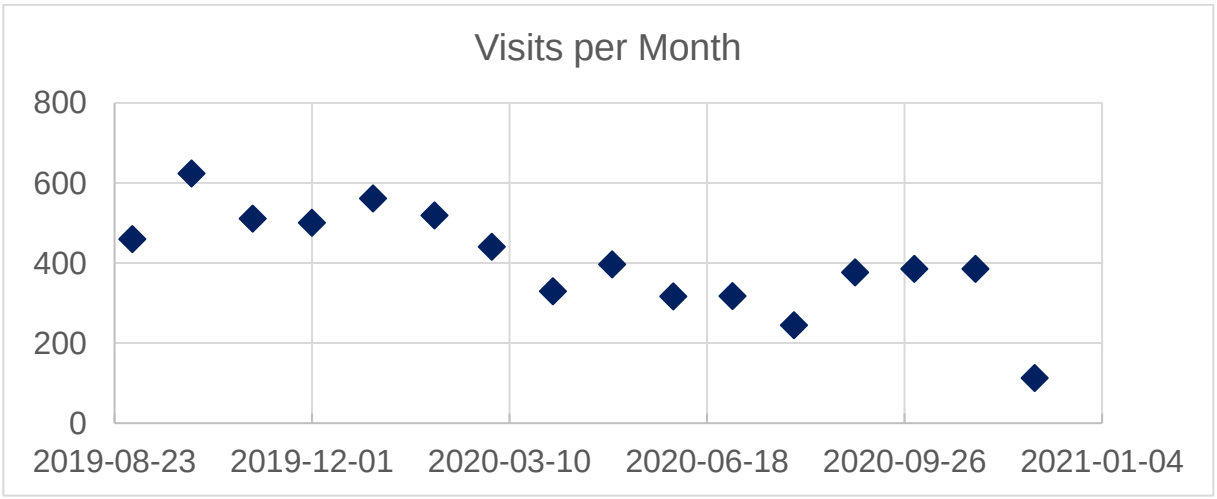


Figure 11: Visitors per month during the third year.

2.2 Social media

FED4SAE has continued to use different social media channels as an effective means to promote its CPS and Embedded System technologies and open calls and establish and attract local user communities and new users from across Europe. FED4SAE continued to be present on Facebook, LinkedIn, and Twitter to maximize stakeholders outreach across different European regions.

Next, we show how FED4SAE maintained and improved its social media presence and what other online activities were included to complement the ones already used during the first year of the project.

2.2.1 Facebook

The consortium committed to post at least 200 posts throughout the duration of the project to disseminate generally understandable information about the project idea, approach, open calls, DIHs and results.

During the third year, the consortium has produced 49 Facebook posts to disseminate the introduce the SMEs and raise interest around the use-cases, and highlight the companies present at the Smart Anything Everywhere showcase on 11 February. The posts have reached 640 people.

Although Facebook declined as a communication platform, for FED4SAE the numbers look more encouraging than during the second year, the posts related to the showcase event from February 2020 bringing half of the audience.

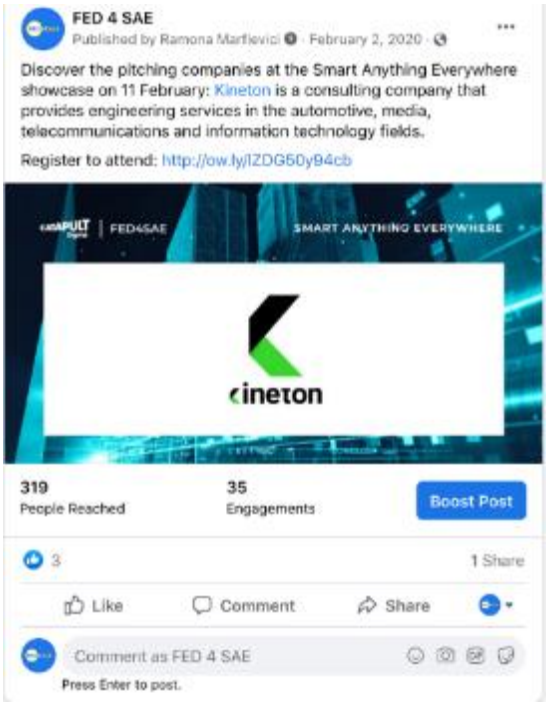


Figure 12: Snapshot of FED4SAE Facebook page and a post example.

2.2.2 LinkedIn

FED4SAE committed to create at least one LinkedIn post per month, focussing initially on project introduction, and establishing online credibility for FED4SAE, followed by dissemination of the Open Call in the first and second year, and promoting the application experiments during the third year. This is particularly relevant, as an IEEE survey has shown that engineers prefer LinkedIn (Don).

In the third year of the programme, FED4SAE has produced 69 posts on LinkedIn, this being one of the most effective social media channel for the project as during the second year. Moreover, the number of followers increased with 43 during the third year.

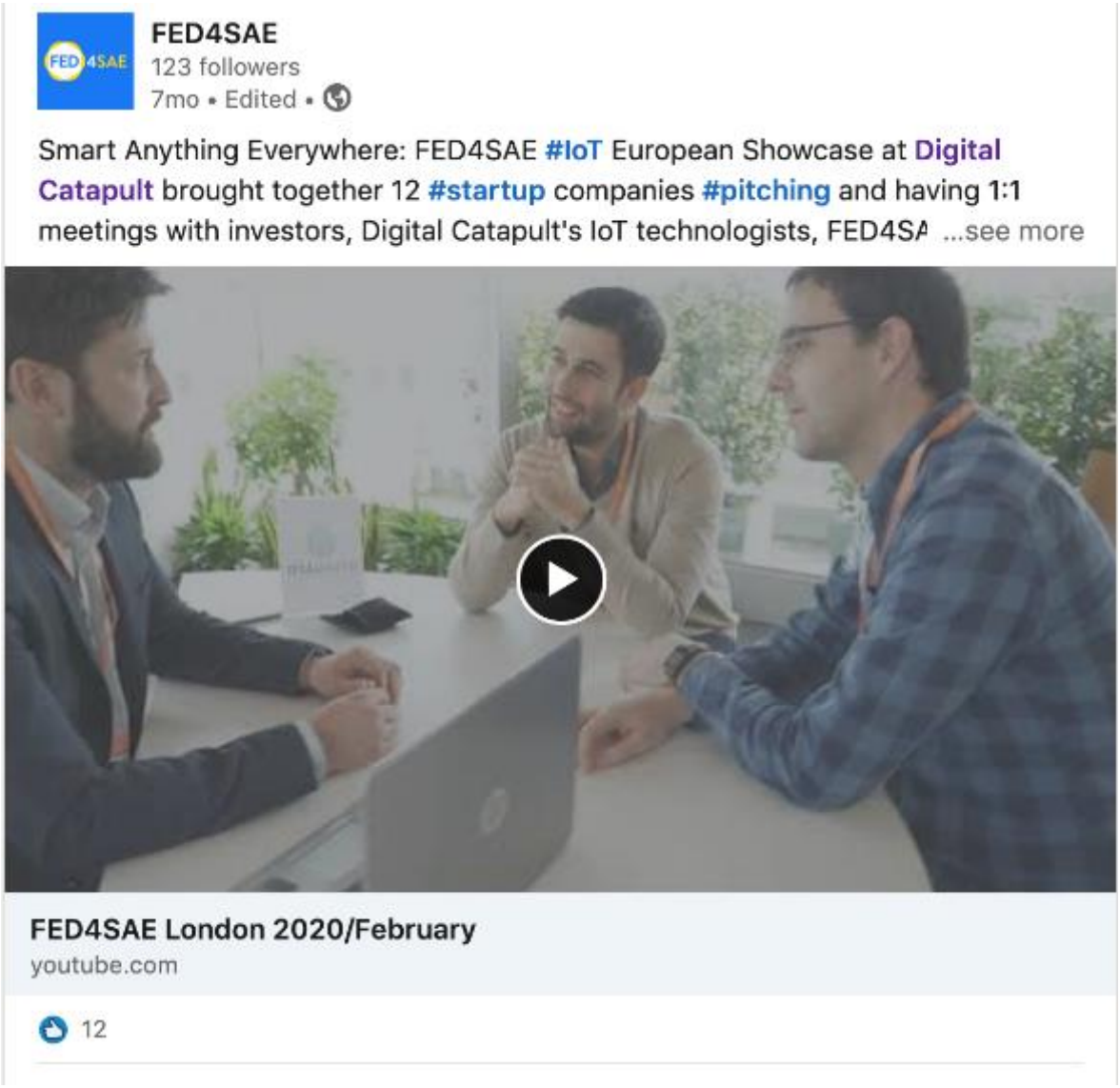


Figure 13: FED4SAE post on LinkedIn Page during the third year.

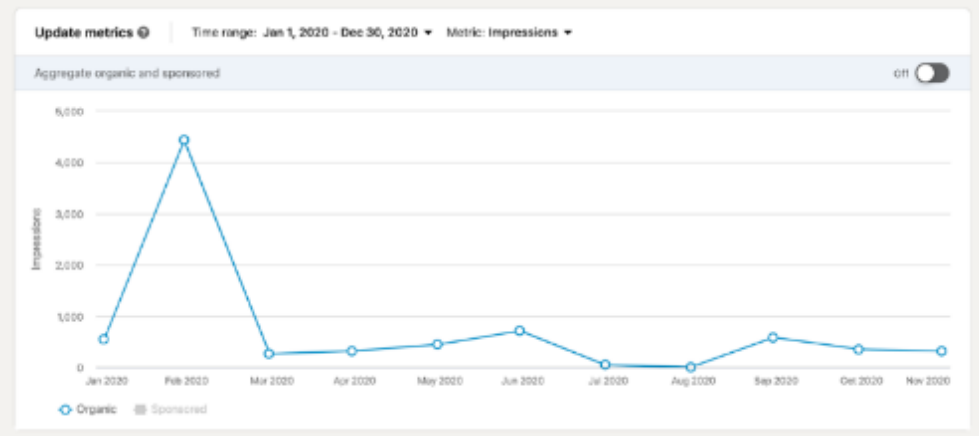


Figure 14: LinkedIn impressions for FED4SAE.

The social media channel reached a high audience, reflected in the total number of impressions gathered on its posts during the third year, with a peak during the month of February when 28 posts were produced introducing each of the application experiments of the FED4SAE project.

The social media channel also reached the intended audience with a more diverse audience than during the first and second year, most of the visitors having as a job function engineering (29.7%) and business development (20.56%), others representing domain like information technology, operations, education and program and project management.

Moreover, visitors having either senior (29.24%) or entry (43.98%) positions in companies were predominant among our visitors, and they are coming from either companies of 11 to 50 employees companies, 51.07% of the visitors, 2 to 10 employees, 20.05% of the visitors and 11.5% from companies with more than 10000 employees. There is a swap in terms Seniority of visitors with respect to the second year, there were more entry level visitors during the third year, and a swap in terms of Company Size, companies with 11 to 50 employees being predominant this year.

Most of the LinkedIn visitors are from companies from Ankara (TR) followed by companies from Lyon (FR), London (UK), Barcelona Area (ES), Munich and Freiburg (DE), and Naples Area (IT).

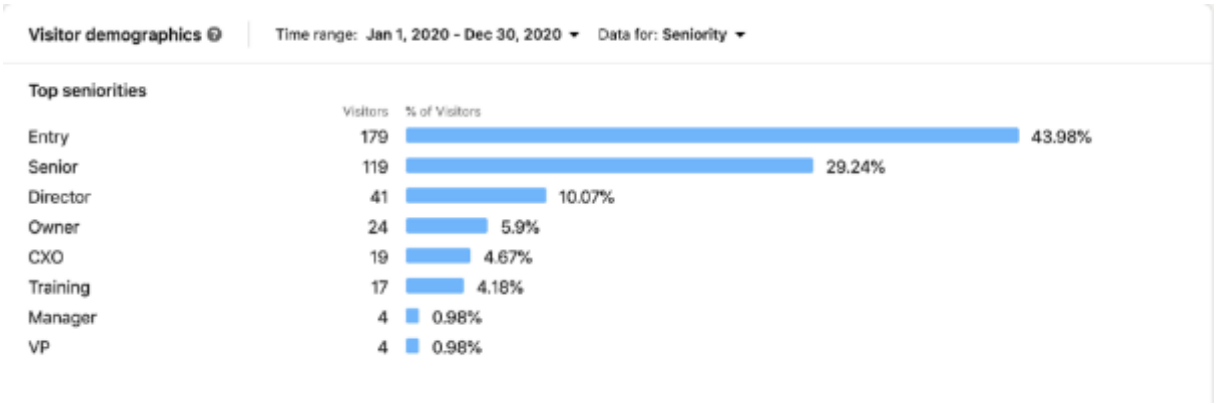


Figure 15: LinkedIn Visitor Seniority.

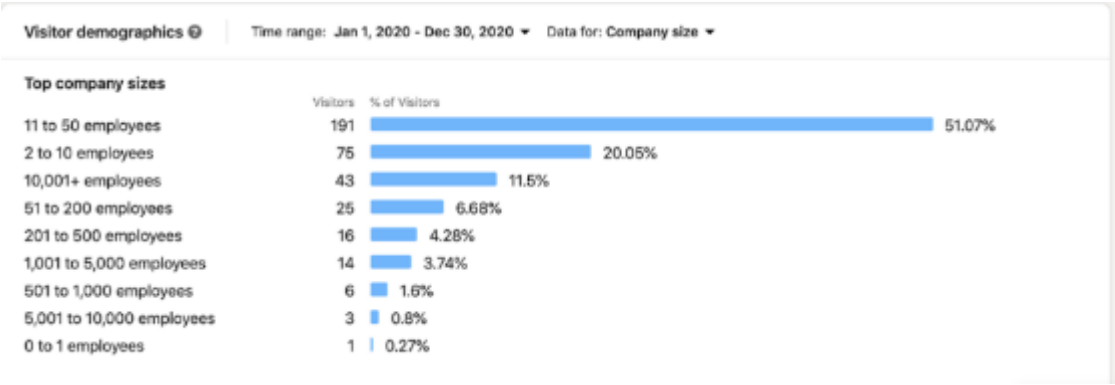


Figure 16: LinkedIn Visitor Company Size.

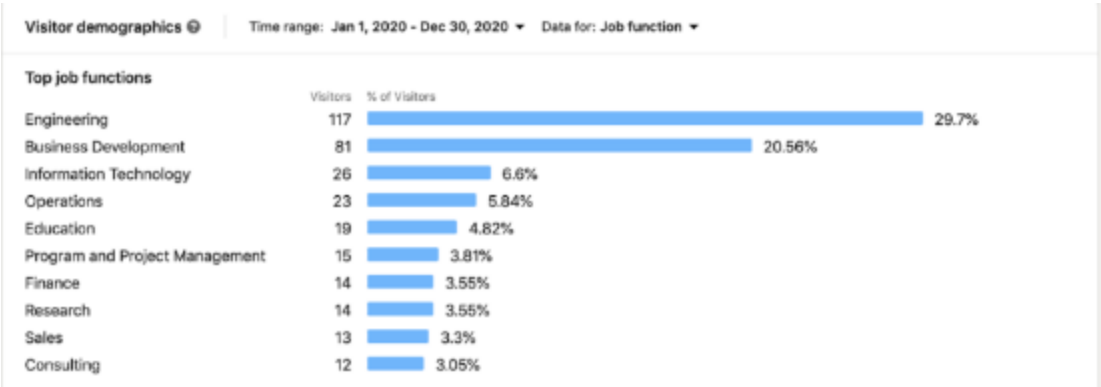


Figure 17: LinkedIn Visitor Roles.

2.2.3 Twitter

FED4SAE aims to disseminate on Twitter through the dissemination of generally understandable information about the project, its approach, open call funding opportunities, open call results and the network of Digital Innovation Hubs. The project committed to generate at least 300 followers.

Several relevant hashtags including #CPS, #cyberphysical, #SAE, #DIH, #IoT, and #IIoT have already been used, and the FED4SAE has identified and follows 70 European CPS influencers.

Twitter has been the most effective social media channel for FED4SAE reaching 387 followers at the end of the December 2020 and with 100 new followers during the third year, and with over 52000 impression. The engagement with Twitter is summarised in Table 2.

Table 2: FED4SAE Twitter Statistics.

Month	Impressions
Oct-19	6871
Nov-19	7001
Dec-19	0
Jan-20	4301
Feb-20	15800
Mar-20	3682
Apr-20	2569
May-20	4985
Jun-20	2538
Jul-20	984
Aug-20	910
Sept-20	611
Oct-20	1063
Nov-20	1076
Dec-20	513
Grand Total	**52904**

Figure 18: FED4SAE Twitter Profile.

2.3 Online promotion

2.3.1 Success stories

During the third year, 17 Application Experiments were selected as success stories based on the analysis done by BLUMORPHO. They represent six application domains: Energy, Entertainment, Environmental, Healthcare, Industry 4.0, Smart Cities, and Transportation. Below is the list of application experiments and their domains along with the motivation for being considered for the success stories:

Energy:

- ECO Smart Home: the project was affected due to Covid-19 and successfully pivoted

Environmental:

- NANOLEAK: the project was affected due to Covid-19 and successfully pivoted
- BETTAIR: great progress of the company during the project, the evolution of the team from beginning to the end of the project is impressive

Healthcare:

- Embrace: raised the highest interest from a panel of business angels and the winner of SAE contest Award, the company obtained the reimbursement of the product by the Italian social security
- PRESLEEP: patented solution, evaluation on industrial driver monitoring testbed
- SpectroX: the developed system is already sold to doctors and under assessment, a partnership is in place with CSEM for the first cameras

- SureWash: product already on the market with customers from healthcare, pharmaceutical, sport and education domain

Industry 4.0:

- BETP: company signed contracts
- GHOST: even though the company is still in early stage, they have developed their customer network
- INCOMING: significant progress during the project
- RobRad: system qualified and sold to customers

Smart Cities:

- IoTSG: products sold to customers, projects with several local authorities
- SafecilitySAE: four customers adopted the product
- Sentinal: strong traction from the market
- Smart Tunnel: three operational tunnels are using the solution developed

Transportation:

- MAMMUT: system in use in the MotoE World Cup
- TIME4PS: excellent structure of the company, clarification on the product offer and a consolidated business model

For the success stories, Digital Catapult designed a template to capture information on the company of the application experiment, a quote from a member of the company on their journey and the support received from FED4SAE, the addressed challenge, the proposed solution and results from trials and pilots, along with information on how FED4SAE partners supported the application experiment, and the impact generated. Together with the companies, all FED4SAE partners were authors or contributors to the success stories. The following success stories are now published on the updated website of the project as well.

Blockchain enabled traceability platform

Trusted traceability to improve efficiency for multi-stakeholders development and production of complex systems

Tracing partner contributions in distributed developments

According to Deloitte report from 2018 for the automotive industry there is significant interest in blockchain at the C-suite level, with global investment exceeding $1.7 billion in the last three years. The same report also cites Gartner report on Blockchain Business Value estimating blockchain's business value-add will grow to $176 billion by 2025. The report outlined a number of use cases in the automotive sector that are classified inside three groups. One of them is also a Verification and process improvements group with a purpose to improve vehicle information and usage data across the industry.

Most of current blockchain based solutions request extensive knowledge of distributed ledger technologies by the developers and integrators to deploy applications on the top of them. BETP provided a platform, that will hide all the blockchain complexity and will be blockchain agnostic. BETP goal was to offer a solution on the top of the state-of-the-art technology and bring it closer to the industry.

Blockchain for trusted traceability

Traceability is the ability to trace all processes from development, to production, consumption and final disposal. It is highly important for any manufacturer, as it provides the ability to quickly recall products, track production and match replacement parts.

It is very important to establish an environment where all the development activities are tracked in time order and where every dataset is uniquely represented and transparently shared via the network (some latest scandals inside automotive industry only confirm this). That kind of environment will bring trust to all the participants so that everybody is certain that data once written could not be changed anytime in the future.

BETP proposed the development of a blockchain-based traceability platform that would be loosely coupled to AVL's IODP and would provide:

- Trust into the system (a faster, safer way to verify key information and establish trust),
- Traceability of transactions (track the execution of various operations within the process),
- Transparency to B2B ecosystem by offering a solution that could be trusted by everyone involved.

BETP (commercial name AuthTrail) provides users with an immutable and verifiable history of all their application data changes.

authtrail **INDUSTRY 4.0**

***Kalmia d.o.o.** offer turn-key solutions in Web&Mobile, Communications and Blockchain - from consulting and architecture to infrastructure and development and also deployment, maintenance and support.*

' We are very satisfied by the support of FED4SAE ecosystem and we have benefited a lot from it. It helped us to evaluate the true value of our solution and will help us with further development.' (**Klemen Peternel, CEO of Kalmia d.o.o.**)

Impact

- Providing full transparency – and thus trust – for large scale cooperative development
- The application experiment has led to the development of a stand-alone product: authrail
- Already trusted by industry leaders
- Company growth

BETP is Blockchain driven but also highly scalable and costly effective. The platform will be deployed as a cloud service (SaaS) and will provide a secure layer between customer applications and blockchain. Additional service dashboard will be delivered in order to get instant access to data drilling tools and data verification statistics.

Authtrail as transparent partner communication platform

BETP have exposed three main security considerations:

- How to protect platform's interfaces (data access security).
- How to protect integrity of the application data (data integrity).
- How to protect application data stored inside of the platform (data privacy).

On data access level all the Service and User APIs must be protected via appropriate encryption. All endpoints must have installed valid TLS certificate issued by the renowned authority. Additionally, we must support an option for establishing a secure private connection with the service. On-premise installation should also be considered.

Data integrity stands for the property of the platform that assures complete data immutability. In other words, once data is written to the platform it cannot be changed anytime in the future. We need to provide measures to provide complete data integrity.

Data privacy is about securing raw data for being exposed to another people. The platform must provide a way of encrypting all the raw data before storing it to the journal.

FED4SAE support and opportunity

Through FED4SAE, BETP was able not only to access the leading edge industrial platforms but also the technical expertise provided by the partners.

By working with **AVL** and **fortiss** during this project, BETP had access to expertise on system architectures for blockchain across various industries and European ecosystem.

Supported by

AVL

fortiss

BLUMORPHO
Create value with all forms of innovation

Authors and Contributors: AVL, fortiss, Digital Catapult, Kalmia d.o.o

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu

FED4SAE

Figure 19: FED4SAE BETP Success Story.

BETTAIR becomes one of the main actors in IoT environmental monitoring in Europe with the support of FED4SAE

With the introduction of LoRaWAN communication support and the new hardware platform, the portfolio of environmental monitoring nodes of BETTAIR meets the needs of environmentally-aware cities in Europe

As LoRaWAN communication technology is getting adopted by more and more cities during the last years, BETTAIR aimed at supporting this technology in their nodes.

There are three main advantages with the adoption of LoRaWAN. Firstly, the power consumption is reduced, reducing battery requirements. Secondly, as a result of removing the 3G module, all the costs related to data transmission will be almost negligible, reducing the overall costs of the nodes. Last, but not least, supporting LoRaWAN will enable BETTAIR to deploy in LoRaWAN-enabled cities, where the infrastructure of LoRaWAN is already in place.

On the other hand, updating the hardware platform has enabled new features in the BETTAIR node. With the migration to a new platform based on the STM32 microcontroller family, there is a new range of possibilities, including a minimum longevity commitment and support of 10 years, Unique Security features and support of Over the Air update, enabling future remote updates of deployed infrastructure without the need physical access to the nodes.

Considering both goals, FED4SAE is a perfect match, as STM is one of the platform providers, while DigitalCatapult and the University of Cantabria have large testbeds that support LoRaWAN testing in different Smart City scenarios.

On the other hand, FED4SAE STMicroelectronics industrial platform provider, delivered support for the implementation for the STM32 platform.

It is worth mentioning that FED4SAE has supported BETTAIR with intensive pitch training and innovation management and facilitating introduction to investors at FED4SAE London event in February 2020.

bettair Mapping Air Quality — **ENVIRONMENTAL**

BETTAIR is a hard-tech company located in Barcelona that has developed a novel IoT platform that permits, for the first time, the mapping of air and noise pollution in cities on a previously unimaginable scale based on a large deployment of outstandingly accurate gas sensors by using an advanced post-processing algorithm, thus permitting to take effective mitigation actions.

'Thanks to the support of FED4SAE and the University of Cantabria we have integrated two important technical features that were present in our tech roadmap (platform migration and LoRaWAN connectivity). Both featured were competently tested by the University of Cantabria and Digital Catapult.' (**Josep Perelló, Co-founder and CEO of Bettair Cities.**)

Product development and FED4SAE support

FED4SAE provided the access to LoRaWAN- enabled testbeds to test the implementation of this communication technology in the nodes. This is important as BETTAIR nodes address harsh environments, such as cities, where communication can be unstable depending on the circumstances. Therefore, the possibility of testing it in a real environment provides useful insights to fine-tune the implementation.

Impact

- **ship2b label** award as a company with social and environmental impact
- Gold member of FIWARE FOUNDATION
- Technology partner of Green City Solutions

BETTAIR results and future plans

The results from the work carried out have enabled the company to improve their environmental monitoring solution, which enables any city worldwide to monitor pollutants and other environmental parameters with high accuracy.

Thanks to these results and the support of FED4SAE, along with the rest of new developments carried out, BETTAIR aims at increasing its presence in new cities worldwide during the forthcoming years, supporting them to improve their citizens' quality of life.

- One of the 8 finalists within the European Data Incubator acceleration program
- Further funding secured
- Company growth

Supported by

UC UNIVERSIDAD DE CANTABRIA

CATAPULT Digital

life.augmented

BLUMORPHO

Authors and Contributors: UNICAN, STMicroelectronics, Digital Catapult, BETTAIR

All images © BETTAIR

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu

FED4SAE

Figure 20: FED4SAE BETTAIR Success Story.

CheckBnB and EnergyCcM shows resilience against COVID19: from BnB to everywhere

COVID19 impact on tourism sector pushed FED4SAE supported APP CheckBnB energy efficiency project to pivot towards new sectors, applying the same technology onto bigger markets

Creating the ideal energy metering gateway device

Energy saving on the rental apartment sector not only represents a considerable cost reduction to apartment landlords, but follows the trend of several environmentally responsible solutions, helping to achieve a greener and more sustainable world.

Following this trend, CheckBnB and EnergyCcM wanted to create a new solution to measure and display holiday rental apartment's real-time power consumption, aiming at educating both guests and owners to control and reduce the energy waste during holidays. In order to do so, diverse warnings and alarms showing deviations from historical averages have been used.

From a hardware perspective, the challenge was to create a small sized and flexible device able to acquire power consumption data and send it to the cloud using NB-IoT technology. Besides, from a software perspective, the objective was to develop a multi-platform mobile application not only acting as energy budget display, but also supporting check-in procedures and value-added services for both visitors and owners.

ENERGY

CheckBnB and EnergyCcM are commercial brands of Monsol Electronic, a company which belongs to the "International Monsol Group" consisting of different entities with offices in Spain, United Kingdom, Czech Republic and United Arab Emirates.

Monsol was founded in 2005 in Spain and since its creation it has been connected to alternative energy, energy efficiency and current metering with respect to both its activities and services as well as its electronic products.

They are proud to be a reference company in Europe in the field of metering and monitoring of photovoltaic parks and in metering of energy counters; being actively present in five continents with more than 2 GW of monitored power worldwide.

EnergyCcM specializes in the development of measuring devices for energy efficiency policies, while CheckBnB develops its own solution to collect real-time data of electric consumption from the house through Energy CcM devices, aiming at reducing superfluous consumption and mitigating the environmental impact.

'Thanks to FED4SAE we were able to obtain funding support together with marketing, financial, and technical assistance which has helped us to better fund and develop our early stage solution in an effort to bring it to the market.' (**José Luis Vilches, CEO of Monsol Electronic**)

Product development and FED4SAE support

Even though the concepts were there they were still in an early stage, with the need to find commercial and financial support to be able to take those ideas to the next level.

Therefore, Monsol and EnergyCcM, through its CheckBnB subsidiary, answered the Horizon 2020 FED4SAE open application for midcap by submitting a proposal not only looking for that support, but also seeking international impact to bring their software and hardware developments to a global market.

APP CheckBnB project was one of the companies selected to receive up to Euro 60,000 in funding from the Horizon 2020 FED4SAE project, and they were able to benefit from all the support and skills coming from the project partners in terms of technical, commercial, financial and marketing expertise to bring their ideas to reality.

By using STMicroelectronics technology and support, EnergyCcM has been able to create a functional device, known as CcMaster, fulfilling all the requirements. This prototype has been certified by Telefonica, one of their partners, and is currently being commercialized in a different context as a monitoring system for energy systems.

On the other hand, CheckBnB has developed an integrated mobile application to deliver their green "energy budget" vision to the holiday rental market, including additional functionality to help P2P accommodation and deliver real-time location-based context information to guests, taking advantage of the Smart City and IoT domain know-how from University of Cantabria.

Last but not least, the commercial and marketing skills acquired through the close collaboration with Blumorpho have helped them to bring their solution to the market and increase the odds to attract new investors.

Fighting COVID19 massive impact on tourism industry

During 2020's 2nd quarter, when the product was going to start its piloting stage in the city of Santander using IoT data obtained through their smart city platform, COVID19 pandemic impact on tourism sector prevented CheckBnB to fully complete the project and APP CheckBnB mobile application development needed to be postponed.

Still, the CcMaster hardware created in the context of FED4SAE supported application experiment has been reused by EnergyCcM on a completely different domain. In this sense, they have pivoted its original use on rental apartments towards solar energy and public lightning sectors, becoming partners of big companies such as Riello, Steca and Iberdrola.

Impact

- CheckBnB awarded 2nd place as Spanish national best energy efficiency start-up company in 2019
- APP CheckBnB obtained 14001:2015 certification for environmental management systems
- CcMaster NB-IoT device certified by Telefonica
- Technology partner of Telefonica
- Monitoring system being used by big players on the energy sector, such as Riello, Steca and Iberdrola

Supported by

Authors and Contributors: UNICAN, STMicroelectronics, Digital Catapult, CheckBnB and EnergyCcM

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu

Figure 21: FED4SAE ECO Smart Home Success Story.

IoT brace

Smart sensor for monitoring of scoliosis treatment braces

The challenge

Each year about 2% of worldwide teenagers suffer of scoliosis: from moderate to severe scoliosis must be treated with braces (spinal orthosis) to counteract the evolution of scoliotic curve by applying a mechanical stress against the body and favouring the correct posture of rachis.

Despite the need of recording the exerted pressure expressed by orthopaedic specialists, there is currently no device available, in the market, able to quantitatively measure acting forces inside the braces and to monitor the wearing time.

Market analysis outlines big potential in the scoliosis management market, stressing increasing year to year demand still not satisfied by products on the market. It also identifies among main drivers the advancement of technology with tracking devices that can monitor the patient health evolution.

Protolab aims at:

- developing an innovative plug & play wearable sensor kit for monitoring the pressure inside scoliosis braces,
- improving the compliance with medical prescriptions,
- boosting the patient's active participation to reach satisfying results from the care treatment.

Digitization can boost the development of automated analysis to frequently check treatment progress, while the availability of gathered data can be used by predictive algorithms to favour rapid intervention in case of wrong trends, thus favouring the active participation of the patient to the care treatment.

Product development and FED4SAE support

Leveraging the collaboration with **CEA-Leti, STMicroelectronics**, and IRT Nanoelec, Protolab developed a prototype system based on STM32WB microcontroller integrating all the hardware means to support BLE 5.0 and IEEE802.15.4 wireless standards (e.g., ZigBee 3.0, Openthread). The STM32WB is used to collect data from sensors, to process, and then to transfer them via BLE to a dedicated smartphone App.

Tests of the new prototype data communication under realistic conditions were performed in collaboration with Products & Technologies Living-Lab (PTL) of IRT Nanoelec at CEA-Leti in Grenoble. The cybersecurity and privacy risk analysis and the evaluation of regulatory constraints related to patient's data management were assessed as well with the support of CEA-Leti.

Blumorpho's innovation management services helped Protolab identify the strategy and the statutory constraints to secure the go-to-market strategy as well as to seek investors.

proto custom engineering solutions

HEALTHCARE

High tech SME developing innovative complete solutions tailored to customer needs and providing integrated systems & services.

Engaging young patients

'Patient's motivation plays a key role for therapy success. Our scope is to engage young patients and improve their awareness to maximise achievable results and give them back satisfaction because they feel to be protagonists in their own therapy.' (**R. Pierobon, Project Coordinator at Protolab SRL**)

Impact

- Protolab started the process to obtain the support from the Italian Health System to refund IoT braces
- Protolab raised the most interest from a panel of Business Angels during the INPHO venture Event, October 2020
- Protolab was awarded the 1st prize in the Smart Anything Everywhere contest for the innovation approach to address scoliosis treatment with digital and sensors approach

The results

Protolab developed a miniaturized and integrated solution tested in a realistic environment.
Product qualification and certifications were launched in July 2020. Protolab planned to enter the market in early 2021 (customer acquisition).

Embrace enters a Global Scoliosis management Market estimated in 2B$. A rough estimate of investments needs, viability and sustainability of business has been carried out with an analysis of incremental costs and revenues that Protolab will tackle to enter the new market.

The estimated financial requirement is about 1.4 Mn EUR, while the Break-Even Point will be reached within five years at about 3000 kits/year.

Supported by

leti

life.augmented

BLUMORPHO

Authors and Contributors: CEA, STMicroelectronics, Digital Catapult

All images © Protolab SRL

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu

FED4SAE

Figure 22: FED4SAE EMBRACE Success Story.

Ghost nodes – a robust platform for enabling Industry 4.0 solutions

Smart integration of everything

How to scale at the edge

A fundamental core capability for realizing Industry 4.0 applications based on iIoT is a robust and scalable framework for system integration. Enterprises cannot create scalable and secure end to end solutions without it. Secondly, the frameworks also need to have good standardized interfaces towards other software platforms. Further, data security and central device management of distributed systems landscapes are fundamental.

Sandvik Coromant has been a pioneer in the industrial digital journey and "industry 4.0" era looking for a reliable integration platform along with other integration technology solutions during their development of a novel digital service platform. Key requirements were ability for different IT/OT/IoT systems to collaborate and integrate regardless of location, and ability to distribute software components for edge intelligence. Security, encryption, footprint were also demands since Sandvik Coromant focus on analytics services and corrective action functions that can predict & protect from anomalies on machines and operations processes before they happen.

Intel with its hardware expertise and KTH being one of the partners behind the OSLC standard made the FED4SAE project a strategic initiative to join.

INDUSTRY 4.0

***Ghost Labs AB** is a software company with the ambition to change the IT services industry by its hybrid integration platform Gateway Host Nodes - GHOST.*

Ghost Labs AB was founded 2016 as a research spin-off through a 5 year R&D initiative facilitated by an applied research think-tank in collaboration with Stockholm University, Royal Institute of Technology and some 30 Swedish industry collaborators.

Ghost Labs AB became commercial 2019 and has run pilots and obtained customers together with service partners in several industry verticals such as Transportation, Logistics, Construction and Manufacturing, Healthcare and Services.

'**Sandvik Coromant** is the world leader in precision metal-cutting tools for CNC machines and has invested heavily in order to predict and protect against anomalies in our customers shop floor operations. GHOST complements our Azure services and is fundamental in allowing us to collect enormous amounts of data from systems, machines and devices in a secure manner, and also enables us to distribute advanced analytics services (AI) to the edge. This truly transforms our business.' (**Nevzat Ertan, Chief Architect, Sandvik Coromant AB**)

Time to deliver more productivity

Sandvik Coromant is the world leader in precision metal-cutting tools for CNC machines and delivers customer value based on productivity promises. Amid the fierce competition and continuously raised bar to deliver more productivity, Sandvik Coromant has developed a digital service platform using GHOST unique, hybrid integration capabilities combined with Microsoft Azure strength in analytics services.

GHOST was selected by Sandvik Coromant since it was the only hybrid integration platform solution on the market that met their combined requirements of capabilities such as footprint, graphical user interface, integration flexibility, edge intelligence computing, remote device management, scalability, security, and central management/control. Sandvik Coromant now implement advanced digital services, such as real-time monitoring of tool performance and prediction/protection against anomalies in customers shop floor and IT/OT operations, in less than 10 minutes at their customers production premises based on the GHOST distributed infrastructure. Sandvik Coromant has also reduced infrastructure complexity and operations cost in their digital service platform since GHOST is a truly hybrid integration platform that spans over several integration technologies and can manage all types of integrations.

Impact

- The Ghost Nodes software platform is now available on the Microsoft Azure Marketplace
- New business relationships: SANDVIK Coromant, SODEXI, TransDev
- Increased outreach to European ecosystem

Proven on the shop floor

The Ghost Application Experiment have managed to proof that their integration platform performs well in an industry 4.0 context:

- A proven service that works on the edge (30+ machines connected at the Sandvik Shop floor in Gimo, Sweden).
- A pluggable, scalable architecture that is efficient and easy to manage.
- Secure deployment on a component level.
- Tested in complex industry networks capable of traversing any number of firewalls in a secure manner.
- Security audits of the solution have been carried out together with Microsoft.

FED4SAE support and opportunity

Based on technical hardware specifications provided by Sandvik Coromant, the Application Experiment evaluated different hardware setups based on feedback from Intel.

A number of training sessions have been conducted together with KTH to introduce the Ghost team to the OSLC standard. In-dept sessions have also been performed to support the Application Experiment in developing software components that could be used in future cases.

Blumorpho have had a number of sessions and workshops with the Ghost team to help and support them in defining a new Business Plan.

Supported by

intel

KTH

BLUMORPHO

References

https://www.sandvik.coromant.com/en-gb/products/coroplus-machininginsights/Pages/default.aspx

https://www.youtube.com/watch?v=OvmIBDINSCU

https://www.youtube.com/watch?v=Q6O-pLEZF6c

Authors and Contributors: KTH, Intel, Digital Catapult, Ghost Labs AB

All images © Ghost Labs AB

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu

FED4SAE

Figure 23: FED4SAE GHOST Success Story.

FED4SAE funding and private investment of over Euro 500,000

FED4SAE and Digital Catapult helps IoT Solutions Group to obtain the financing to grow and scale

Harnessing IoT technology to provide insight that transforms service effectiveness and efficiency

IoT Solutions Group, a FED4SAE participant, has developed a range of solutions that helps clients make smart decisions and improve the efficiency of their operations.

One of its solutions helps organisations make waste management more efficient, reduce environmental impact and reduce potential damage to assets.

Working with components from STMicroelectronics, its low power STM32 based LPWAN microcontrollers to check the status of bins while providing real-time reporting and actionable insight so that waste disposal can be managed more effectively.

Building a diverse portfolio

IoT Solutions Group has also developed a range of solutions to help public and private sector organisations respond to Covid-19 and other operational challenges that affect customers and residents.

One such example is an aid to vulnerable social care users that discreetly monitors activity levels and raises alerts if expected activity falls below pre-determined thresholds – indicating a potential accident or illness. This early warning system helps care providers prioritise service users in most need and optimise resource allocation.

The device is simply posted out to the recipient, sits on a kitchen shelf and needs no user interaction, internet or mains power.

Without the FED4SAE funding and Digital Catapult support, the research and development needed to diversify would not have been possible.

IoT Solutions Group **SMART CITIES**

IoT Solutions Group delivers scalable solutions across the whole value chain, including hardware, software, network connectivity and insight for organisations of all sizes.

'Whilst we are experts in the field of IoT, having worked in the industry for a number of years, starting our own organisation presented a variety of fresh challenges, so the support of Digital Catapult and FED4SAE gave us a huge boost in confidence, as well as providing access to specialist expertise and independent perspectives. Along with access to funding, they helped us build a corporate CV and enhance our approach to the market. Having their backing has also provided us with valuable credibility, which greatly assisted our investment efforts.' (**Neal Forse, IoT Solutions Group Co-founder**)

Impact

- Winner of the Digital Catapult Platinum Award in the IoT Category
- Meeting with investors after pitching during FED4SAE Investor Day in February 2020 helped the company raise over Euro 500,000 for its seed round funding in April 2020
- Competed in and won three local authority challenges
- Signed contracts with large organisations in the industry
- Talk for 17 local authorities during the workshop "How local authorities can use IoT and digital technologies to tackle COVID-19 and spur recovery", Digital Catapult, October

FED4SAE support and opportunity

IoT Solutions Group responded to a FED4SAE open call. This funding would give the team greater capacity and enable it to scale up and market products and services in Europe. Along with technical support from Digital Catapult and STMicroelectronics, IoT Solutions Group also received €58,000 funding from the Horizon 2020 FED4SAE project.

The team is proud to have closed an investment funding round after the COVID-19 lockdown began, which is a testament to the value proposition offered.

The close relationship with Digital Catapult hugely impacted IoT Solutions Group, helping it to gain traction within a target market early on. The relationship has opened fresh opportunities to launch products in Europe, recently obtaining new major business leads.

FED4SAE has provided IoT Solutions Group with:

- Support for integration of the STM32 microcontroller
- Intensive pitch training
- Facilitating introductions to investors at a FED4SAE event in London in February 2020
- Innovation management and access to market.

This grant funding through the FED4SAE Horizon 2020 programme and additional connections with industry partners has been a significant help in developing the sensors themselves and enhancing the effectiveness of the end to end solutions that IoT Solutions Group provides.

By working with experienced technology partners and other support teams, the speed to market and impact made has been greatly increased and has been an important aspect of IoTSG's success with several private and public sector organisations in 2020.

Supported by

CATAPULT Digital

life.augmented

BLUMORPHO

Authors and Contributors: Digital Catapult, STMicroelectronics, IoT Solutions Group

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu

FED4SAE

Figure 24: FED4SAE IoT SG Success Story.

The factory where everything is under control

Industry 4.0 innovation is INCOMING!

ZANNINI INDUSTRY 4.0

Better data, less machine downtime

Advanced tool machines are valuable assets that must be kept in production with as little downtime as possible in order for a factory like Zannini's to work efficiently.

Digital solutions can contribute significantly to keeping expensive equipment running well. They can provide remote notifications to operators to help them recognize and fix unexpected machine stops earlier. They can link islands of automation in order to make support processes more efficient, for example by dispatching a material transport automatically when a container is full. And not least, they can make better information about the machine utilization and performance available faster, helping to improve work scheduling and condition monitoring.

Zannini is specialized in high technology products covering several industry sectors such as automotive and household appliances and produces high precision mechanical components for hydraulic and prenumatic systems.

'The STMicroelectronics platform was even more value for money than expected, and fortiss has provided top-notch support.' (**Lorenzo Zampetti, R&D Engineer at Zannini**)

However, processes and equipment are diverse, so integration must be highly individualized. Conventional programming approaches are often time consuming. Legacy equipment is not able to provide information through a computer network. Commercial solutions did not fit Zannini's need for a system that could scale dynamically under their own control as their requirements and experience developed.

A truly open system

The INCOMING system is a new solution to integrate industrial manufacturing equipment of all kinds and generations for data acquisition and high-level control. It is designed to be easily set-up, scaled and modified, thanks to its open architecture.

It provides remote equipment status notifications to any web browser, such as an operator's smartphone; it collects information about equipment usage and performance, such as a machine's actual in-production time and average cycle time per day, and makes it available to explore for managers through the spreadsheets that they are familar with; and it links sensors, controllers and manufacturing IT together with custom automatic sequences.

Impact

The INCOMING system:

- Improves the efficiency of manufacturing processes and helps gather valuable data faster
- Decreases equipment downtime thanks to supervisory automatic control, performance data collection and web-based realt-time dashboards
- It is designed to accommodate equipment of all generations

Increased machine overall equipment efficiency (OEE) from 70% to 74% at Zannini's factory

Zannini will keep using and expanding the system in-house and offer the system on the market through their spin-off Z4tec

The system consists of machine add-on units (INCOMING DACB – Data Acquisition and Control Box) and a central server, which communicate over MQTT, a widely used open protocol standard for the Internet of Things. The DACBs connect to the machines using wide-spread industrial communication standards: 24 V discrete digital signals and OPC UA.

Zannini's DACB proof-of-concept is based on the STMicroelectronics STM32MP1 series fast prototype board and X-Nucleo expansion, an industrial platform featured by FED4SAE. The DACB software uses the open-source Eclipse 4diac platform for distributed automation and control, another advanced technology promoted by FED4SAE, which follows the IEC 61499 standards.

The central server is based on an off-the-shelf solution package using popular open-source software components such as Node-RED and Freeboard.

Measurable results

The Zannini team designed a custom rail-mount enclosure for the STM32MP157A-DK1 Discovery Kit and the X-NUCLEO-PLC01A1 extension board for 24 V industrial digital I/O, which was then 3D printed. Together with a DC-DC converter to connect to the machine's existing 24 V DC power supply, the DACB forms a DIN-rail assembly of devices that an electrician can install easily inside a machine's electrical panel with only a short machine downtime.

After a series of lab tests and software iterations, Zannini has put the solution to the test on the shop floor. In its first deployment at the Zannini Castelfidardo plant, INCOMING connects to three CNC lathes of different generations and with different control and communication interfaces. Their current status is shown in real time on web-based dashboards, while the central server keeps track of how much time was spent in each state and logs the cycle times. Whenever an ultrasound sensor detects that the container for metal chips is full and needs to be exchanged, the factory IT system is triggered to deploy an AGV (automatic guided vehicle) to the machine. For all three machines, a significant increase in OEE (overall equipment efficiency) up to 4.3% over a 70% baseline was achieved thanks to the automatic interventions taken by the INCOMING system alone; additional decreases in machine downtime were enabled by operators and managers being alerted to degraded performance faster. Having proven its real-world potential and reliable operation, the system now is a permanent part of Zannini's manufacturing operations, and several future use cases have already been identified.

The rollout of the INCOMING system will be continued at Zannini's domestic and international sites. In addition, it forms the basis for a future product to be offered to external customers and supported through Zannini's spin-off Z4tec, enabling them to monitor and optimize their own manufacturing processes.

FED4SAE support and opportunity

FED4SAE has enabled Zannini to find better solutions for data acquisition, control, presentation, and analysis. New technologies now make part of Zannini's knowledge portfolio that embodies different and innovative approaches. Discussions with the partners and other FED4SAE Open Call winners offered valuable technical and business insights.

Both the STM32 platform and 4diac were applied in the application experiment with concrete benefit. Together, they enable an open and low-cost prototype for the machine add-on unit (DACB) of the INCOMING system.

For INCOMING, fortiss has integrated 4diac with the OpenSTLinux distribution provided by STMicroelectronics for the STM32MP1 and has added support for the X-Nucleo-PLC01A1 to the Eclipse 4diac public codebase. STMicroelectronics contributed technical support specific to their platform, and Blumorpho provided focused business innovation coaching and networking opportunities.

Supported by

life.augmented

fortiss

BLUMORPHO

References

STM32 discovery kits: https://www.st.com/en/evaluation-tools/stm32-discovery-kits.html

STM32 Nucleo Expansion Boards: https://www.st.com/en/ecosystems/stm32-nucleo-expansion-boards.html

Eclipse 4diac for distributed industrial automation and control following the IEC 61499 standard: http://www.eclipse.org/4diac/

4diac support for the ST platform: https://download.fortiss.org/public/fed4sae/4diac-on-STM_overview.pdf

Authors and Contributors: STMicroelectronics, CEA, Digital Catapult, Zannini

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu

FED4SAE

Figure 25: FED4SAE INCOMING Success Story.

Digital Catapult, CSEM and STMicroelectronics support Energica in making MotoE smarter and safer

Supporting the development of a LoRa-based connectivity solution for remote battery status monitoring and reporting

Making FIM Enel MotoE™ smarter and safer

The FIM Enel MotoE™ World Cup made its debut in the 2019 MotoGP World Championship, an all-electric series powered by Energica, which has experienced up close the breath-taking battles on the most iconic motorcycle racing tracks.

By addressing one of the key concerns of Dorna Sports (the exclusive commercial and television rights holder of MotoGP and MotoE), Energica has designed and implemented a novel smart LoRa based connectivity architecture using the STM32 module to insure a safer battery charging operations and better managing battery cycles during the races while providing vital compliance data in both a reliable and timely manner.

Developing the proof of concept

FED4SAE support meant not only access to technical expertise and resources for development and testing, it also meant that Energica could develop its proof of concept for a market-ready product and commercial plan.

The Energica team found the FED4SAE's expert technical advice to be extremely helpful and benefited from it in meeting Dorna's requirements.

Energica built its novel platform with a SMT32L5552 MCU from STMicroelectronics, and validated it on the Digital Catapult LoRaWAN testbed infrastructure in London as well as during the test sessions of MotoE.

Moreover, Energica explored the feasibility of providing geolocation services for motorcycles and charging station localisation leveraging the LoRaWAN geolocation testbed of Digital Catapult and a time difference of arrival (TDOA)-based solver for computing final positions provided by the Swiss Centre of Electronics and Microtechnology (CSEM).

Furthermore, due to further introductions by Digital Catapult and Blumorpho, Energica has had conversations with many more potential investors and partners.

FED4SAE support and opportunity

The Energica team answered the Horizon 2020 FED4SAE open application for start-ups & midcaps looking to gain support from the programme, a network of innovation hubs across Europe that boosts and sustains industrial digitisation.

The FED4SAE programme focused on strengthening competitiveness in cyber physical systems (CPS) and the internet of things (IoT). It was designed for companies with products and services that integrate physical and computer-based processes, and embedded system markets.

Energica was one of the 32 European companies selected to receive up to Euro 60,000 in funding from the Horizon 2020 FED4SAE project.

TRANSPORTATION

Energica Motor Company S.p.A. *is the first Italian manufacturer of supersport electric motorcycles. Energica electric motorcycles are the ultimate expression of Italian luxury, masterfully manufactured in the Italian Motor Valley in Modena, Italy. Each Energica electric motorcycle is unique in its class for the technical solutions and innovations used that make it a jewel of technology.*

Energica *has been chosen by DORNA as the sole supplier for this new era and will maintain this role at least until 2022 featuring the EGO CORSA, highly appreciated by motorcyclists for its incredible performance.*

'Thanks to the FED4SAE project, and STMicroelectronics' support, Energica has fuelled its innovation path. Working with the FED4SAE partners while sharing skills and experiences, keep Energica at the forefront of technology which is confirming us among the leaders of a new eco-sustainable industrial scenario.' (**Livia Cevolini, CEO of Energica Motor Company S.p.A.**)

Impact

- Developed and validated the LoRa connectivity board usintgSTM32
- Solved charging station challenges faced during the FIM MotoE™ World Cup Application Environment
- Completed all the MotoE races without problems and sold connectivity boards to racing teams
- Objective to integrate the LoRa connectivity board onto the commercial line of motorbikes to offer a wide range of applications and services to Energica's customers

Supported by

Authors and Contributors: STMicroelectronics, CEA, Digital Catapult, Energica Motor Company S.p.A.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu

Figure 26: FED4SAE MAMMUT Success Story.

Mass spectrometer nano sampler

Development of a smart sampling device based on NANOhole LEAKs for analytical instrumentation

Gas sampling based on molecular flow in nano holes

Airborne pollution is one of the major causes of death, especially in metropolitan areas. A first step in the control of air pollution is the monitoring of air quality, in which the detection of Volatile Organic Compounds (VOCs) is one of the key parameters.

A mass spectrometer is a good instrument for the analysis of air quality, but this instrument operates under a high vacuum. The difficulty of the use of this instrument is the sampling of a very small volume of air while guaranteeing that the proportions of VOCs in the sample are equal to the proportions in the air.

NanoTech Analysis has developed an advanced sampling method. The gas sampling uses openings in the order of 100- 300nm in a membrane to sample the air. The openings are controlled by a miniature valve that controls the sampling. The extremely small size of the openings guarantees a very small air flow into the vacuum of the mass spectrometer, while assuring that the air flow is independent of the molecular mass or diameter of the components of the air.

While the principle of the sampling is very elegant, the technological implementation of this sampling method is very challenging. The two main technological issues are:

- Create membranes with openings in the range of 100-300nm.
- Control the airflow through the openings with valves.

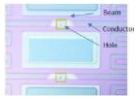
NanoTech Analysis **ENVIRONMENTAL**

NanoTech is a startup company active in the detection of Volatile Organic Compounds (VOC) in the air and other gases.

'As a result of the project, at least two customers have confirmed that they are now capable of carrying out in a simple, efficient, and cost-effective manner measurements at high sensitivity and at an optimum sampling rate.' (**R. Correale, NanoTech Analysis**)

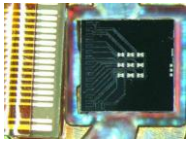
Product development

The advanced fabrication technology for this air sampler uses e-beam or stepper patterning to create openings in the membrane and then reduces the size of the openings in a controlled fashion. Scanning Electron Beam and Focussed Ion Beam inspections have shown that openings in the range of 100-300nm could be reproducibly created.



The air flow through the opening can be closed off by a current-carrying beam, placed in a strong magnetic field, which moves driven by the Lorentz force. Two beams through which current can flow and the openings below the beams that appear as small dots.

The entire die is having a 3 X 3 pattern of two beams each. The die measures 3 x 3 mm^2, of which the beams only occupy 1 mm^2.



Impact

- Two analysis systems are available and in almost continuous operation to demonstrate the abilities of the equipment to interested parties

The die shown above is mounted on a vacuum flange as shown in the left-hand side, and is connected to electronics boards, shown on the right-hand side, for the actuation of the valves. The gas analysis systems thus realised has shown the feasibility of the sampling methods using small openings. The valves have, however, not demonstrated their ability to control the gas flow.

FED4SAE support and opportunity

Based on the results of the FED4ASE program, NanoTech Analysis has been able to build strong partnerships with two important Italian medical research institutions for the launch of two different programs aimed at detecting markers and signatures of specific diseases.

The final scope is to realize an innovative scientific instrument able to join the compactness, mobility and high sensitivity resulting from the combination of nano and micro devices defined in the context of this program with more standard analytical techniques.

Supported by

life.augmented

BLUMORPHO

csem

Authors and Contributors: CSEM, CEA, Digital Catapult, NanoTech Analysis

All images © NanoTech Analysis

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu

FED4SAE

Figure 27: FED4SAE NANOLEAK Success Story.

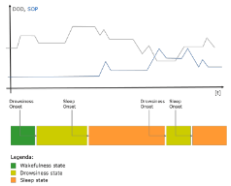
Human fatigue monitoring for critical operation

PRESLEEP: a smart wearable for the automatic detection and prediction of the awake, drowsiness and sleeping staged

Human fatigue monitoring in industrial environments

Currently, the gold standard of the tests used by sleep medicine for the study of human sleep disorders and for the identification of the wakefulness, drowsiness, and sleeping stages is Polysomnography (PSG).

The PSG is an extremely complex instrumental examination that involves deploying on patients a set of sensors (from a minimum of 10 to over 30) that are in direct contact with various parts of the body, both external and internal, e.g., skin, scalp, nasal cavities. Using this set of sensors, the polysomnograph can record for hours, usually for one night, the main physiological functions of the patient such as brain electrical activity, body movements, cardiorespiratory activity, eyes movements, muscle tone, etc.



The PSG is therefore a useful but demanding exam for the patient and it requires highly specialized technical staff deploying the sensors on the subject to be studied and doctors with specific skills in sleep medicine for the analysis and interpretation of the recorded data. Moreover, PSGs are expensive and are limited by the number of beds available in the study centre and the number of specialists available to read and assess the data.

Therefore, there is a need to increase the quality of simplified and automatic tools for studying sleep disorders and for identifying the awake, drowsiness and sleep stages.

Smart wearable for physiological parameter monitoring

The PRESLEEP project was aimed at the fine assessment and validation of the proposed proprietary methodology/technology, for the automatic detection and prediction of wakefulness, drowsiness, and sleeping stages through a smart wearable, in a realistic operating environment.

The following objectives were set up at the start of the PRESLEEP project:

- complete development of the methodology for the automatic detection and prediction of the stages using real-time signal measurements and Artificial Intelligence techniques
- complete development of the smart wearable prototype and of the software components including the proprietary algorithm for the automatic detection and prediction of stages
- verification and validation tests of the smart wearable under realistic environmental conditions at AVL
- detailed definition of the smart wearable, hardware and software components, for the further industrialization process with a selected supplier.

HEALTHCARE

Sleep Advice Technologies S.r.l. *is a start-up based in Italy combining sleep medicine know-how with electronic engineering skills*

Impact

- Drowsiness detection: automatic detection and prediction of the transition between wakefulness, drowsiness, and sleeping stages through a smart wearable
- Prediction of the time horizon when the subject will fall asleep (at least 5 minutes before the sleep onset) and detect the drowsiness onset (1 minute resolution)
- Patented solution

A unique and patented IP, to detect the transition between the three behavioural states of a subject and to predict the sleep onset well before a person could lose the control of his/her activities was developed during the project.

Sleep and drowsiness onset detection

The IP fundamentally aims at the precise identification of the changes in cardiocirculatory activity typical of the phase preceding the entry into the sleep state.

The IP is based on a combined multi-factors and multi-domains real-time analysis and the required physiological parameters are extracted through photoplethysmography technology.

The IP detects precisely the drowsiness onset at a 1 minute resolution and predicts the sleep onset at least 5 minutes before the event.

FED4SAE support and opportunity

The following support was provided during the course of the project:

- Discussions about automotive business and especially oncoming regulation for drowsiness detection
- Technical support to interface with AVL IODP solution, and access to the driver monitoring testbed to generate relevant datasets to evaluate the proposed IP
- Funding through the open call for project
- Evaluation on industrial driver monitoring testbed

Supported by

Authors and Contributors: AVL, KTH, Digital Catapult, Sleep Advice Technology S.r.l.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu

Figure 28: FED4SAE PRESLEEP Success Story.

FED4SAE and ROBRAD

Robustification of radar sensors for application in harsh industrial environments

Radar technology for harsh environments

Due to the adverse environmental conditions in metal production, essential measurement technologies, e.g. optical and laser-based, reach their physical limits in various fields of application and many common sensors (optical, laser-based) are hindered from reaching their specified functionality. Thus, observation of relevant process parameters stays fragmented over the whole process-chain.

Radar-based measurements however are insensitive to the adverse conditions (e.g. high temperature, dust, air humidity, and mist from rolling emulsion or oil).

For improving the technological readiness level of such sensors, a well-structured and competently performed experiments and functionality tests are of core importance.

INDUSTRY 4.0

ASINCO designs, develops and delivers modern and efficient solutions for plant and process automation including product-related applications. Focus is on the process industry: iron and steel industry, metallurgy, process engineering, power plants and others.

ASINCO is a pioneer of radar-based measurement technology in the process area. ASINCO has many years of experience in the development, construction and testing of differing radar measurement technology.

'Everyone is talking about "Industry 4.0", and if futurologists are to be believed, this technology is set to revolutionize production. To achieve this goal, new intelligent sensors and actuators as well as innovative automation solutions must be developed in addition to new safety concepts. Therefore, ASINCO offers suitable radar-based solutions from basic electronic development up to tailored measurement solutions.' (**Joaquim Denker, ASINCO**)

Robustification of Asinco's radar-based measurement technology

In a comparison of today's optically- or laser-based measuring systems, a previously unattained field of application, much closer to the process, has been opened.

The radar-based system technology, further developed and especially robustified for the industrial application, has the potential to be used in almost every process stage of metal processing, from continuous casting (slabs) and hot rolling (hot strip, heavy plate) to cold rolling and finishing, as well as in long product plants and potentially in the production of other materials such as plastics, glass, wood and paper.

By transferring main raw data processing onto a decentralised embedded system included in the sensor, core requirements are provided for effectively implementing the sensing units as self-aware CPS in industrial environments. Due to advancement in innovative signal processing algorithms, this was achieved without any discernible disadvantages compared to existing measurement technologies.

With the introduction of this new measuring technology, possibilities for process improvement with associated energy savings are attained at many points in the metal production process.

Cost-effective, modular and reproducible solution

The project yielded an overall concept based on STM32-componetns and a test plan for a self-sufficient test-hardware.

This resulted in a first prototypical test batch of sensors which have been tested under various conditions:

- Testing and improving sensor performance in terms of real-time capabilities for digital signal processing (sampling time: up to 1 kHz)
- Testing and improving sensor protection (housing) against harsh environment conditions with long-term continuous load tests against corrosive gases
- Testing and improving sensor protection (electronic) against harsh environment conditions with long-term continuous load tests with temperatures up to 100°C and variable humidity.

Based on these tests, further adaptions of the sensors have been carried out and the final iteration showed that the design of the sensor housing can withstand the industrial conditions in the steel industry.

A test set-up will be placed in a real environment in a steel mill to carry out tests under real conditions in order to validate the sensors. Nevertheless, the prospects for a functional radar system that can prove itself under harsh industrial conditions are good.

FED4SAE support and opportunity

The increasing use of sensor intelligence and data pre-processing capabilities has been successfully facilitated in the project by using the reliable and high-performance industrialized STM hardware.

The initiation and further pursuit of the robustification and market readiness development of radar-based sensors is the main interest for ASINCO as systems currently available on the market obviously do not meet industrial requirements.

The simulation of real process environments by exploiting the functionalities of the advanced platforms of the Fraunhofer corrosive gases testbed accelerated the improvement of the technological readiness level of the radar sensors.

Impact

- Radar sensor (90-120 GHz) with highest robustness, precision and real-time capability **developed**
- Metal industry identified as the **target industry**
- Forecasted **growth** in the target industry of about **8-10%** in the next **two** years
- **Sales** of **4-5M Euro/year** expected for the next **two** years
- Access to **iron** and **steel industry** market with a budget of **15M Euro/year** in Europe and over **150M Euro/year** worldwide
- Personnel growth planned for the next year to complete the product commercialisation

Supported by

Fraunhofer IISB

ASINCO is already closely interconnected within the pan-European community of radar sensors and within the steel producing community. The cross-border collaborations in FED4SAE further enhanced this and helped ASINCO to expand its leading position in the target market of providing robust measurement solutions for the metal producing industry.

life.augmented

BLUMORPHO

Authors and Contributors: Fraunhofer, UNICAN, Digital Catapult, ASINCO

All images © ASINCO

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu

FED4SAE

Figure 29: FED4SAE ROBRAD Success Story.

Digital Catapult and STMicroelectronics support Safecility in their product development

Supporting the development of an IoT solution for testing emergency lightning

Making building smarter and safer

In the UK, fire emergency lighting is legally required to be tested four times a year; normally as an on-site manual process, this can be extremely laborious and failures can still occur undetected between tests.

Safecility automates testing, freeing up resources, and providing vital compliance data in real time.

SMART CITIES

***Safecility** automates the testing of emergency lighting to provide real-time compliance information. It replaces human input with wireless sensors that stream data to a software platform which shows dashboard information and records a complete audit trail.*

' The money meant that we could focus and achieve milestones. It also gave us more confidence to approach larger companies - H2020 is a huge mark of approval.' (**Cian O'Flaherty, Founder and CEO of Safecility**)

Developing the proof of concept

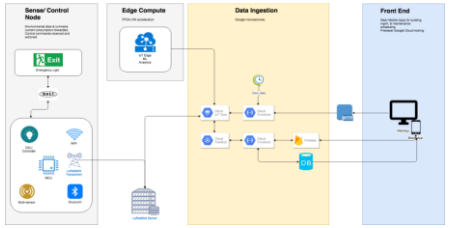
FED4SAE support meant not only access to technical expertise and resources for development and testing, it also meant that Safecility could develop its proof of concept for a market-ready product and commercial plan.

The Safecility team found FED4SAE's expert advice to be extremely helpful, and benefited from attending workshops and receiving constructive feedback on business planning, including market positioning and pricing.

Safecility was able to connect and build relationships with microcontroller specialists from STMicroelectronics resulting in the solution's successful implementation using ST's B-L072Z-LRWAN1 and STM32F4 microcontroller boards. These boards used to build the prototype, allowed Safecility to perform the initial tests and to define the final miniaturized production unit.

Furthermore, this has been validated on the Digital Catapult LoRaWAN testbed infrastructure. Below you can find the implemented Safecility infrastructure in London.

Since then, thanks to further introductions by Digital Catapult and Blumorpho, Safecility has had conversations with many more potential investors and partners.



Impact

- Future potential to expand the current offering and build on the current technology
- Safecility's work will contribute to reducing human error or failures, resulting in safer buildings and protecting their occupants
- A competitive Start Fund grant from Enterprise Ireland in 2019
- Featured in Housing Tech in January 2020 as part of Next Generation for Housing Applications
- Several successful trials, including those with Vivid Homes and Limerick Council
- Shortlisted by LUX for the Lux Awards 2020 Emergency Lightning Product of the Year, October 2020
- Shortlisted for the Product & Manufacturing startup in the National Startup Awards 2020, December 2020

FED4SAE support and opportunity

The Safecility team answered the Horizon 2020 FED4SAE open application for start-ups looking to gain support from the programme, a network of innovation hubs across Europe that boosts and sustains industrial digitisation.

The FED4SAE programme focuses on strengthening competitiveness in cyber physical systems (CPS) and the internet of things (IoT). It is designed for companies with products and services that integrate physical and computer-based processes, and embedded system markets.

Safecility was one of the 32 European companies selected to receive up to Euro 60,000 in funding from the Horizon 2020 FED4SAE project.

Supported by

Authors and Contributors: Digital Catapult, STMicroelectronics, Safecility

All images © Safecility

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu

Figure 30: FED4SAE Safecility Success Story.

SENTINAL – Transparency in ducts

An energy self-sufficient drainage monitoring system for critical event detection

Heavy rain alarm systems

SMART CITIES

Solution

Impact

Smart manhole monitoring

FED4SAE support and opportunity

Supported by

Fraunhofer

BLUMORPHO

References

Authors and Contributors: Fraunhofer, Digital Catapult, Sentinum

FED4SAE

Figure 31: FED4SAE Sentinal Success Story.

Safer traffic flow in Europe's road tunnels

Cost-efficient and robust AI helps operators detect and prevent dangerous situations in road tunnels

Real-time automated traffic safety monitoring

In many road tunnels worldwide, human operators monitor the flow of traffic through closed-circuit television cameras from a central control room. As they recognise safety risks, such as pedestrians walking in the tunnel or cars stopping, the operators will take measures to reduce the danger, for example, changing traffic signs to a lower speed limit and dispatching safety crew. However, scrutinizing tens or even hundreds of camera feeds over extended periods of time is a cognitive challenge that quickly exhausts humans, who may miss or respond late to a safety incident.

Therefore, Automatic Incident Detection (AID) systems have been developed that help by analysing multiple video streams in real time and highlighting relevant situations. An AID system by ISSD is already in production use in several tunnels in Turkey. Like others on the market, it utilizes traditional computer vision image processing algorithms.

However, these are subject to inherent performance limitations that computer vision approaches based on artificial neural networks can overcome. After encouraging first tests, ISSD were looking to integrate deep-learning technology into their product – but wondered how it would hold up in a full-scale live production environment, and whether the increased computational requirements would still allow them to offer a product at a competitive price point.

Cost-efficient and robust deep learning

In this experiment, ISSD has created a deep-learning based detection engine for their AID product that generates real-time alerts when pedestrians or a stationary vehicle appear in a video stream. Together with FED4SAE partners, they closely examined the relevant neural network technology, looking into what too often remains a black box, to better understand its performance and reliability.

Intel's Movidius™ platform, one of the industrial platforms featured by FED4SAE, proved itself as a capable tool to meet ISSD's cost target for the server running the detection engine – even at the higher processing load that comes with the neural network based approach.

A key feature of ISSD's AID system is that it works with a variety of cameras as long as they are network-enabled, allowing it to integrate with a larger range of greenfield and brownfield infrastructure. The FED4SAE platform and advanced technology also fully supported this requirement.

ISSD SMART CITIES

ISSD is working on system design and integration, digital signal processing, software development and electronic design. The company provides solutions for Intelligent Transportation Systems, Traffic Management and Enforcement Systems.

"FED4SAE has given us access to cutting-edge technology and know-how. Working with a world-class company as partners on an equal footing was a great experience." (**Enes Yüncü, R&D Team Lead at ISSD**)

Impact

- New deep-learning detection engine as integral part of ISSD's tunnel safety product
- 50% lower false alarm rate and faster incident detection in first live test
- Higher performance, lower hardware cost per camera stream
- Works with many camera brands and models
- New technology also to be applied to other ISSD traffic monitoring products
- Intel to partner with ISSD for scaling to the global market

Ahead of the state of the art

ISSD performed detailed measurements of the new detection engine's performance. To develop a baseline, video footage containing a known number of pedestrians or stationary vehicles was collected from live sites and the current AID system was independently benchmarked again st this set. The AI solution was then tested against this baseline, and was found to outperform the current AID solution.

After this, the new detection engine was integrated into a live installation for evaluation at one of ISSD's customers in Turkey, running in parallel to the proven infrastructure for safety reasons. In this test, the false alarm rate was reduced about half from the legacy solution, with the new engine still detecting all the events that the legacy engine detected, and doing so faster.

The deployment environment for the detection engine employs Intel Movidius Myriad X visual processing units (VPU) in a highly scaled high-density deep learning (HDDL) configuration. ISSD's configuration pushes the number of Myriad X VPUs in a single server to 56, hosted on 7 HDDL PCIe boards. The specialized VPU hardware performs neural network inference much more efficiently than a CPU, which enables ISSD to process camera video at an even lower hardware cost per stream than with their previous detection engine – even as the processing has grown more complex.

For a look inside the "mechanics" of deep learning that goes much deeper than usual, ISSD applied the open-source Neural Network Dependability Kit (NNDK), another advanced technology promoted by FED4SAE, allowing a better understanding of how the neural network reaches its decisions and how robustly it does so. Among other things, ISSD tested and improved the robustness of the neural network model against image noise that could be introduced by exceptional weather conditions near the tunnel entrance, less-than-perfectly maintained camera lenses or camera electronics.

The new event detection engine significantly strengthens ISSD's product offering in tunnel safety solutions, with ISSD also planning to apply the new technology to other traffic monitoring products in their portfolio.

FED4SAE support and opportunity

All FED4SAE partners contributed their specific expertise related to technology and product development. Together, the requirements were analysed carefully in order to be able to provide targeted support.

Intel benchmarked the solution across multiple hardware platforms (CPU, FPGA, VPU) to confirm ISSD's selection, supported with knowledge on how to best use the platform, performance tuning of the neural network and assistance on the server configuration using the HDDL boards.

Leading the technical coaching on neural networks, their architecture and optimization, fortiss supported ISSD in applying the NNDK and interpreting its analysis results to evaluate the object detection network model, and improve its robustness against various kinds of image noise. Based on the analysis results, fortiss also highlighted possible modifications to the model that could significantly reduce its size and speed up inference further.

Supported by

intel

fortiss

Blumorpho provided ISSD with focused coaching regarding the business innovation and go-to-market strategy and pitch training. At the Smart Anything Everywhere IoT European Showcase at Digital Catapult London, ISSD had the opportunity to pitch their offering to investors, customers, the academic community and broader industry.

Intel will partner with ISSD (see links below) to assist them in scaling their portfolio of intelligent traffic management solutions to the global market, improving traffic safety worldwide.

BLUMORPHO

References

Intel Solution Brief: ISSD SPECTO enhances road safety with fast incident detection and response powered by AI.
https://www.intel.com/content/www/us/en/internet-of-things/ai-in-production/success-stories.html#gs.promotions-4

Sahu et al.: Application of the Neural Network Dependability Kit in real-world environments.
http://arxiv.org/abs/2002.09602

Authors and Contributors: fortiss, Intel, Digital Catapult, ISSD

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu

FED4SAE

Figure 32: FED4SAE Smart-Tunnel Success Story.

SpectroX™ AI powered hyperspectral imagining enabling early stage skin cancer detection

FED4SAE partnered with Althexis Solutions Ltd™ to develop SpectroX – a digital Dermoscopy solution which enables early stage detection of melanoma

Dermoscopy refers to the examination of the skin using surface microscopy. Althexis Solutions Ltd™ has developed the Next Generation Hyperspectral Dermoscopy System which enables dermatologists to gain insights into the presence of cancerous cell tissue (melanoma) in a patient's skin and boost their productivity through an user-friendly, touch enabled software.

The handheld camera solution has been achieved as a result of exploiting advances in Artificial intelligence with hyperspectral imaging which when tuned to specific wavelengths enables early-stage detection of signals as to the presence of cancerous cell tissue.

As with most, if not all cancers, early detection enables early intervention and treatment resulting in a significant increase in recovery and survival rates [1]. Hyperspectral imaging provides these early signals of melanoma to be detected in advance of them becoming visible to the human eye and this innovation provides a significant competitive advantage over existing RGB image solutions on the global market.

Product Development

The Althexis™ team has developed a full end to end system solution targeting dermatologists clinics providing them with an integrated system that allows them to capture all aspects of patient engagement capturing patient details, electronic patient GDPR consent form through to imaging data capture, classification, diagnosis, treatment if appropriate and any follow up visits thus enabling additional images to be captured and the morphology of the mole traced over time.

Through the application of smart filtering algorithms, hair on the patients' skin can be detected and removed from the image enabling an unobstructed high resolution view of the skin mole.

The SpectroX camera device illuminating a patient's arm and the high resolution hyperspectral image (specific hyperspectral bands and RGB) of the mole is captured and presented in the system, see below pictures.. The data is stored in a secure encrypted Cloud platform enabling easy access to the data.

ALTHEXIS HEALTHCARE

Althexis™ consists of a team of highly skilled experts in Electronics and Computer Science, Artificial Intelligence, Hyperspectral Imaging and also a qualified Dermatologist, and collectively have the perfect mix of interdisciplinary skills to address complex challenges.

Althexis have developed and deployed a number of their SpectroX Systems to private medical clinics in Greece and a surgical oncology clinic at General University Hospital in Heraklion-Crete and from these trials have received very positive feedback.

Currently (Q4 2020) Althexis is seeking Venture Capital funding in order to scale its business by approaching new clients and developing new features for SpectroX.

Overcoming the many challenged

Training Artificial intelligence systems generally require large quantities of labelled data and in this case Althexis needed hyperspectral images of melanoma data which just did not exist and so the team prioritized the creation of the hyperspectral camera and getting out to dermatologists to enable them to assist in generating this valuable labelled dataset which Althexis integrated into their existing RGB based Neural Network inference models.

The Althexis team worked with CSEM who provided their deep expertise in hyperspectral imaging and developed a customized hyperspectral Camera Dermoscope which was very successful both in terms of actual performance and durability. The camera worked continuously for large periods of time without any operational issue. The quality of the image was highly appreciated by the Doctors and they also provided feedback that camera housing materials give a feel of a premium medical device.

Collaborating with dermatologists to evaluate and gain their feedback on early prototypes enabled the team to gain valuable insights which were used to fine tune both the handheld camera and the system's graphical user interface thus improving the overall usability of the solution. Other insights as to decontaminate the camera between patients, feedback on image resolution and field of view, consistent lighting to ensure image quality were raised and addressed enabling a more compelling market ready solution to be created.

FED4SAE support and opportunity

FED4SAE provided an excellent opportunity for Althexis to work with CSEM who provided both coaching support, expertise in Hyperspectral imaging and developed the custom Hyperspectral Camera which met the specific needs of Althexis's digital dermoscopy use case.

Althexis evaluated the use of Movidius VPU as an accelerator to offload image classification however they concluded that the performance of an Intel iCore 10 CPU Tablet PC, including AVX-512 DLBoost instructions to accelerate AI inference, provided sufficient compute power without the need for an additional accelerators to do the image classification.

Intel offered to help scale the solution as part of its portfolio of healthcare market solutions and to showcase the solution at its global partner marketing events.

Blumorpho provided business innovation coaching and monitoring.

Impact

- Business growth and scale up
- Commercial funding secured
- Development of a hybrid hyperspectral + RGB convolutional neural network able to benefit from any kind of available dataset RGB or hyperspectral

Supported by

csem

intel

BLUMORPHO

References

[1] https://www.skincancer.org/skin-cancer-information/skin-cancer-facts/
[2] https://fed4sae.eu/sae-initiative/archived/hyper-vision-csem/
[3] Intel Movidius VPU (Visual Processing Units)

Authors and Contributors: Intel, CSEM, Digital Catapult, Althexis Solutions Ltd

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu

FED4SAE

Figure 33: FED4SAE SpectroX Success Story.

FED4SAE™ applying Artificial Intelligence in infection prevention

FED4SAE™ partners with SureWash™ to develop hand hygiene solutions and reduce infections in hospitals, food preparation, sports or education

A breakthrough in hand hygiene quality improvement

SureWash™, a Dublin based hand hygiene training technology company has supported more than 200 hospitals over the last 10 years to achieve validated competence in the World Health Organisation (WHO)[1] hand hygiene technique, reducing the risk of infections and improving patient outcomes. SureWash™ units use cutting edge computer vision technology to build hand hygiene muscle memory by giving real-time feedback to learners.

SureWash's™ new device provides real-time feedback using automatic video auditing (AVA) of the users' hand hygiene technique. These AVA devices may be placed over sinks to measure the quantity and quality of hand hygiene and if there are problems, the system provides real-time training to the user on the spot. The video images never leave the device making them fully GDPR compliant.

The Surewash™ devices were used in a clinical trial within the NHS and it increased the quality of hand hygiene by 197% and the number of hand wash events by 147%. The results were published in the American Journal of Infection Control in February 2020.

SureWash™ partnered with Intel and CEA-Leti to develop this low-cost technology platform based on Intel's Myriad™ technology. The opportunities for this SureWash product is extensive as it can be placed above all hospital or kitchen sinks combining both hand hygiene training and monitoring in a new, innovative way. This SureWash™ device is the first system that is capable of monitoring both quality and instances of hand hygiene in real time.

surewash HEALTHCARE

SureWash was founded on a simple set of principles: a quarter of a million deaths worldwide per annum are estimated to be a result of hospital acquired infections and estimated 50% of these deaths as result of poor hand hygiene practices.

SureWash uses its patented gesture recognition applications to teach staff, patients and visitors the WHO hand hygiene technique to globally approved standards.

SureWash is part of GLANTA that was founded in 2011, GLANTA has been pioneering new techniques in gesture recognition and augmented reality since inception. Above all, GLANTA's mission is to deliver working applications for camera based algorithms.

'FED4SAE has been an excellent opportunity for SUREWASH to broaden the portfolio of solutions we offer to industry. Through the collaboration with CEA, we have validated the SUREWASH-CITS™ platform and received valuable usability feedback from Korian Nursing Homes, we highly valued the "design to cost" exercise provided by KTH and BLUMORPHO and continue to deepen our ongoing relationship with Intel as a key technology partner.' **(Gerry Lacey, CTO & Co-Founder of SureWash)**

The importance of infection prevention

COVID-19 has raised everyone's awareness of the importance of hand hygiene, however, well before it arrived, 9 million infections occurred each year in European hospitals and care facilities [2], and in the US, hospital acquired infections kill 100,000 patients each year and cost $45 Billion. In fact, 7% of all hospital patients in developed countries acquire infections (HAI).

The World Health Organisation (WHO)[1] estimate that 50% of infections could be prevented with better hand hygiene and to help reduce hand acquired infections, the WHO have developed a seven step handwashing protocol that mitigates the risk of bacteria remaining on washed hands.

The Surewash™ AVA system has embedded this WHO handwashing protocol into the video auditing system. For example, in the hospital environment, the goal is to increase staff compliance to the protocol, thus reduce hospital acquired infections such as Clostridium difficile, methicillin-resistant Staphylococcus aureus (MRSA), Acinetobacter baumannii and thus avoid the need for antibiotics to treat infections. This improves patient outcomes, reduces hospital stay and overall results in lives saved and significant cost avoidance.

The **SUREWASH™ ELITE** mobile unit is a compact, turnkey system that can be easily transferred through a facility. It offers training and follow-up for all healthcare staff.

Weighing just 4.5 kg the **SUREWASH™ GO** device is fully portable. In addition, it comes with its own moulded case with custom foam for ease of transport.

SureWash training product outcomes

These individual AVA devices can be connected over a standard network, enabling them to report anonymised compliance data which enables hospital infection control to visualise utilisation, track compliance, compare sites and enables early invention thus preventing the outbreak of infections.

Impact

- **Building a Hand Hygiene Portfolio**
- The AVA solution joins SureWash's™ extensive portfolio of Hand Hygiene solutions for both fixed and mobile environments.
- SureWash™ are now seeking a partner to commercialise this product at scale. If you are interested in helping to roll out SureWash AVA into the marketplace, please get in touch through the website: https://surewash.com/contact-us/

FED4SAE support and opportunity

FED4SAE provided the perfect opportunity for SureWash™ work with Intel Movidius engineers who provided assistance on the Intel's Myriad™ VPU (Visual Processing Units), OpenVino (Open Visual Inference and Neural network Optimization) and Realsense™ depth sensing camera technologies.

This enables prototypes to be created which were deployed, tested and evaluated in the CEA's IRT-Nanoelec testbed facility where both functional testing including (GDPR) privacy,

Supported by

intel.

cybersecurity compliance as well as usability analysis and user acceptance testing with potential customers was completed. SureWash™ also received support in business modelling, market insights and design to cost from Blumorpho and CEA-Open Innovation team.

CEA connected Surewash™ to a large Organisation of Nursing Homes in France who also evaluated and provided valuable feedback on the prototype devices. Intel has introduced SureWash™ to a number of potential partners to accelerate its path to market.

References

[1] World Health Organisation (WHO). Hand Hygiene protocol
https://www.who.int/gpsc/clean_hands_protection/en/

[2] European centre for disease control
https://www.ecdc.europa.eu/en/publications-data/infographic-healthcare-associated-infections-threat-patient-safety-europe

[3] American Journal for Infection Control
https://www.ajicjournal.org/article/S0196-6553(19)30646-7/fulltext

[4] Intel Movidius VPU (Visual Processing Units)

https://www.intel.com/content/www/us/en/products/docs/processors/movidius-vpu/myriad-x-product-brief.html

Authors and Contributors: Intel, CEA, Digital Catapult, SureWash

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu/

Figure 34: FED4SAE SureWash Success Story.

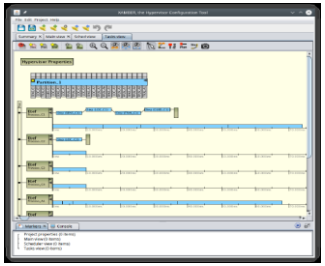
TIME4PS – Fully integrated development tools for partitioned systems

Integrated time modelling for mixed criticality partitioned systems

Making the configuration and the deployment optimal

The main goal of the TIME4PS project was to provide a complete set of tools that covers all the phases of the life cycle of a product, from the system design to the final configuration file of the partitioned system:

- Connect the customers' modelling tool with Time4Sys
- Give Time4Sys the ability to define partitioned systems
- Connect Time4Sys and Xamber so the timing performance verification is automatically done in Xamber
- Demonstrate the capabilities of the partitioned framework developed by means of an application experiment in the space domain.



Product development and FED4SAE support

Partnering with Thales Research and Technology, Time4PS consists of an architecture where three tools are connected to define the complete system: a modelling design tool (XPM) that is used to model the system and generate the deployment and the configuration code of the applications, Time4sys to define temporal information, and a configuration tool to obtain the planning and schedule for XtratuM according to the application real-time constraints (Xamber).

fentISS **TRANSPORTATION**

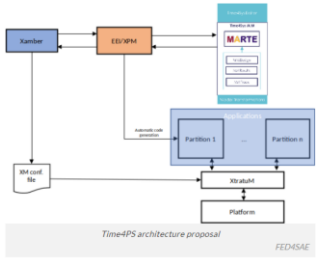
FentISS, S.L. is on the cutting-edge of the software technology for critical embedded systems making a continuous effort to offer customers safe and secure solutions for their critical applications in aerospace and other critical markets.

The software developed by the company is currently flying in more than 100 satellites as a key element of the spacecraft avionics system. Flight heritage is expected to grow beyond 1000 orbiting satellites over the next five years with challenging milestones for deep space missions to Mars and Jupiter

'This collaborative project promoted by FED4SAE has been a great opportunity for us to show fentISS' great potential in software development and to empower our company to gain global competitiveness and innovation capacity. We fully trust in the great prospective of our solutions and we appreciate FED4SAE for doing so as well.' (**Paco Gómez Molinero, CTO of FentISS**)

Impact

- Team evolution: 14 people with a new CEO with entrepreneurial experience, 4 new people dedicated to non-technical activities and focused on business growth
- Enhanced innovation capacity of fentiSS: Time4PS developed technology used as a starting point to improve the software development environment of fentiS5's products



FED4SAE support and opportunity

This project contributed to scientific progress of software engineering for mixed criticality embedded real-time systems and it highlighted the increase in quality and effort savings obtained by using an integrated software development lifecycle supported by the appropriate tools.

Thanks to this solution, fentISS customers will be able to use more sophisticated tools for modelling, analysis, and integration of their system.

- fentISS competitiveness: substantial increase in customer contact due to more than 15 conferences and follow-ups with leads
- Scientific progress of software engineering for mixed criticality embedded real-time systems
- Quality increase and effort savings obtained by using an integrated development lifecycle support by the appropriate tools

Supported by

THALES

leti

BLUMORPHO

Authors and Contributors: Thales, CEA, Digital Catapult, fentISS

All images © fentISS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 761708
https://fed4sae.eu

FED4SAE

Figure 35: FED4SAE TIME4PS Success Story.

2.3.2 Webinars

This will be further reported in the last deliverable on FED4SAE sustainability but various webinars have been organised in cooperation with BLUMORPHO and FED4SAE industrial partners in order to highlight the solutions developed within the project and to establish the first actions of what was designed as the FED4SAE sustainability plan. The aim of those webinars were at the same time to provide information on the opportunities of collaboration offered by FED4SAE industrial partners and to give some visibility to FED4SAE supported companies.

1. LPWAN applications using SMT32: Some of the success stories from FED4SAE

- Online webinar on May 19, 2020
- Link: https://www.youtube.com/watch?v=0zsR3MFPM70
- Description: FED4SAE partner ST Microelectronics introduced its STM32 microcontroller. Companies who successfully applied it in the frame of FED4SAE also presented their application experiment.

2. AI Computer Vision using INTEL's Movidius™ VPU Platforms – the success stories from FED4SAE

- Online webinar on April 30, 2020
- Link: https://youtu.be/WeUIrmcxSNY
- Description: INTEL™ provided an overview of developing AI solutions using the Movidius VPU platforms which enables low power edge inferencing. After Intel's introduction, some the companies that participated to FED4SAE and developed solutions based on the Myriad were highlighted. The two examples were from various applicative sectors:
    - Healthcare: Ubotica™ have developed an AI solution that detects diabetic retinopathy (DR) in fundus images.
    - Industry: ISSD™ have developed an AI solution that addresses the challenge of automated traffic monitoring in road tunnels.

Furthermore, on 21st January 2021, in the framework of the 1st FED4SAE Innovation Club event, two webinars were organized:

- One to highlight two FED4SAE success stories developed with THALES. Link Software and FentISS shared their feedback on how they have integrated TIME4SYS in their own solutions to enable timing verification in the design process of complex system.
- The other one to share information on the IGNITE programme developed by INTEL to accelerate promising companies.

2.3.3 Online press releases

FED4SAE consortium prepared a final press release for the end of the project. This press release will be published during the first half of February on the Smart Anything Everywhere (SAE) website, in CEA-Leti Newsletter, and on FED4SAE and Digital Catapult's website. The last two will link to SAE's website. Following is the content of the press release.

FED4SAE brings success to start-ups across Europe

After three years, the FED4SAE programme has concluded. Since its launch, the programme has directly supported 32 companies from across Europe to create an array of prototypes and innovative products which increased the competitiveness of European innovators in the CPS and embedded system markets, as well as working to expand Digital Innovation Hubs across the continent.

FED4SAE has helped to create a competitive ecosystem where European start-ups and scale-ups can thrive with access to leading technology sources, competencies and industrial platforms, as well as well-connected business infrastructure and existing regional innovation hubs. To celebrate the results from the programme, the FED4SAE website has been updated as a showcase of the work done so far and the many successes that the stratus have achieved.

The open calls for this programme, through brokerage events, booths, FED4SAE information workshops, webinars and website communication, raised awareness of the FED4SAE initiative with over 3,000 companies, with proposals sent from 34 countries across Europe; 97% of all the submitted proposals included partners at least from two different countries. The broad range of industrial platforms, advanced technologies and testbeds offered by FED4SAE also translated into a wide range of targeted technical fields and application domains in both the received proposals and those that were granted: from computer vision, machine learning, virtual reality and artificial intelligence to smart sensors, and audio processing. In total over 30 different technology uses could be identified, with usually more than one field being featured in a proposal.

The companies that were selected had access to:

- up to €58k funding
- end-to-end services
- leading edge industrial platforms
- research institutes advanced technology and testbeds
- support through technical expertise and coaching
- business and market analysis and guidance from concept through market release.

The management of innovation within the programme formed a coaching process that was implemented in three steps:

- The strategic elements are discussed in the early stages of the project
- The future execution of the product launch is then looked into
- The financial issues dealing with the ROI and access to funding.

These elements were investigated during a series of meetings with each company, tailored to that company's perspectives and needs.

The success stories from the programme are numerous including:

- **Safecility** - the development of an IoT solution for testing emergency lighting, it has already gained four customers that adopted the company's product and it has begun to structure its sales. Additionally, in October 2020, Safecility was shortlisted by LUX for the Lux Awards 2020 Emergency Lighting Product of the Year
- **CheckBnB and EnergyCcM** - Eco Smart Homeproject, initially aiming at reducing energy wastage in holiday homes, though the team was able to successfully pivot after COVID-19 impacted its business
- **BETTAIR** - met the needs of environmentally-aware cities in Europe, becoming one of the major players in its field through support from FED4SAE

- **Surewash** - developed hand hygiene solutions to reduce infections in hospitals, food preparation, sports or education, a topic that became even more pertinent after the outbreak of COVID-19
- **ASINCO** - produces radar-based measurement technology that is now being sold to customers with expected sales of up to €5 million in the next two years
- **Energica Motor Company** - worked with FED4SAE to support the development of a smart battery monitoring system for electrical motorcycles to insure safe battery changing operation and better managing battery cycles during MotoE competition races for which Energica has been chosen as the single manufacturer of the series

FED4SAE relied on its consortium of 14 partners spread across 10 different countries, to provide a unique marketplace providing access to technologies, technical expertise, business and financial services. With these partners' help, this programme has helped provide new opportunities for European startups. Even though FED4SAE has come to an end, there are still ample opportunities for European startups to continue to improve and develop. In particular, DigiFED, that aims to support companies in their digitization routes and enhance the DIH offer and increase DIH collaboration across the continent, and Smart Anything Everywhere, which offers startups access to funding and expertise through other DIHs, are able to provide more of the support and value that FED4SAE has previously.

Despite the impact of COVID-19, FED4SAE has continued to help startups across the continent, by using funding and virtual assistance. The startups that took part were able to adapt and largely able to work during the pandemic. For example the Eco Smart Home project was able to pivot its plan to take into account COVID-19 and still complete the project. It is the spirit of cooperation and perseverance that will continue through the programmes that succeed it; the same spirit that will help the European startup infrastructure thrive in the face of the pandemic and its effects.

For more information on FED4SAE, to check the results of the programme, success stories and other funding opportunities, please visit the FED4SAE website.

2.3.4 Flyers

All FED4SAE Application experiments flyers were updated during the third year. The flyers contain information on the company involved in the Application Experiment and the FED4SAE partners that supported the project, a description of the challenge, the solution and the special achievements, how FED4SAE supported the company and what is the impact of the solution and of the company. Next, we provide all the flyers, also available at https://fed4sae.eu/innovative-projects/.


ACCELERATING CPS SOLUTIONS TO MARKET
Making a self-contained air drumming instrument
Aerodrums
intel
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
ARTIFICIAL INTELLIGENCE BASED ALGORITHM FOR IMAGE QUALITY ENHANCEMENT
ARTOMATIX
intel
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
Artificially Intelligent Rainwater Management Technology
OTA ANALYTICS
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
BETP: Blockchain Enabled Traceability Platform
KALMIA
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
BETP: Blockchain Enabled Traceability Platform
KALMIA
fortiss
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
Mapping Urban Air Quality In High Resolution
bettair
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
Real-Time 3D scanning system for Accessibility diagnosis in urban environments
Wegoto
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
Saving Energy and reducing Energy waste for Eco Smart Short rental Holidays Home
CheckBnB
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
Development of a smart sensor kit for monitoring of scoliosis treatment braces
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
Edge Computing made Simple
intel
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
New low consumption and autonomous soil humidity sensor with fast deployment
ENCORE LAB
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
PREDICTIVE CONTROL SYSTEM TO MAXIMIZE LIFETIME OF HYBRID FUEL CELLS
Fraunhofer
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
HYPERCOOK: AI MULTISPECTRAL IMAGING FOR SMART ONLINE MONITORING OF BAKING PROCESS
GreenTropism
csem
intel
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
In-Line Diabetic Retinopathy Detection
ubotica
intel
fortiss
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
VR Based learning for the future
intel
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
INCOMING: smart Interface for COnnected MachinING operation
ZANNINI
fortiss
FED4SAE

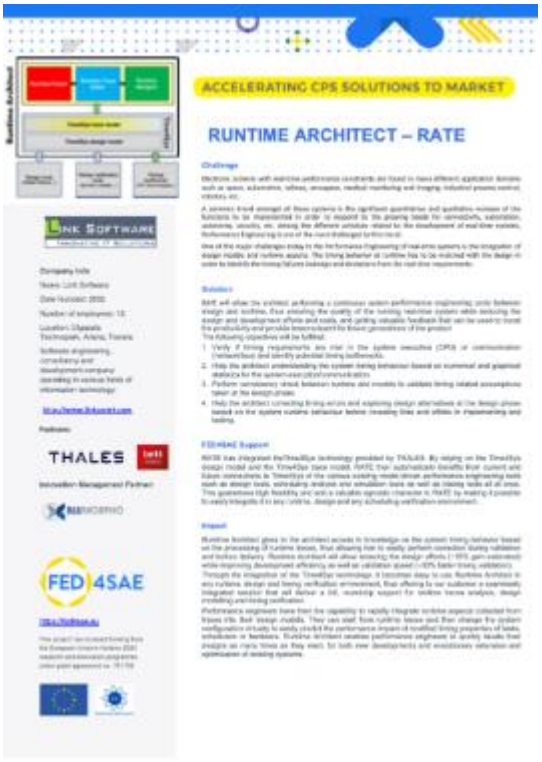

ACCELERATING CPS SOLUTIONS TO MARKET
Driving efficiency and impact through real-time insight
Sensing Solutions for 2020 and Beyond
IoT Solutions Group
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
MAMMUT
Supporting the development of a LoRa based connectivity solution for remote battery status monitoring and reporting
ENERGICA
csem
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
Development of a smart sampling device based on NANOhole LEAKs for analytical instrumentation
NanoTech Analysis
csem
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
Real-time, automated light type monitoring and optimal control in horticulture
alitec
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
PRESLEEP "A WEARABLE CPS FOR THE AUTOMATIC DETECTION AND PREDICTION OF THE AWAKE, DROWSINESS AND SLEEPING STAGES"
AVL
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
RUNTIME ARCHITECT – RATE
THALES
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
ROBUSTIFICATION OF RADAR SENSORS FOR APPLICATION IN HARSH INDUSTRIAL ENVIRONMENTS
ASINCO
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
Safecility: automated sensor solutions for statutory building compliance testing
Safecility
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
AN ENERGY-SELF-SUFFICIENT DRAINAGE MONITORING SYSTEM FOR CRITICAL EVENT DETECTION
Sentinum
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
Smart-Tunnel: Improved automatic incident detection in road tunnels
intel
fortiss
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
Enhancing Calibration Process in Gas Sensors for Air Quality Smart Application in Smart Cities
Fraunhofer
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
LEVERAGING AI & HYPERSPECTRAL IMAGING TO PROVIDE EARLY INSIGHTS INTO SKIN CANCER
LTHEXIS
SpectroX
csem
intel
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
SureWash Over the Sink
Hand Hygiene Automatic Video Auditing
surewash
intel
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
TIME4SYS FOR SYSTEM
ARCHITECTS CHALLENGE
Capella
artal
THALES
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
Time4PS: Fully integrated
development tools for partitioned
systems
fentISS
THALES
FED4SAE


ACCELERATING CPS SOLUTIONS TO MARKET
Integration of wearable sensors
and a real-time localization system
for industry 4.0 applications
sunstone RTLS
FED4SAE

2.4 Presentations, events and workshops

Digital Catapult together with Blumorpho, CSEM, CEA Leti, ST Microelectronics and UNICAN, presented a poster “Application Experiments from Federated Cyber Physical Systems Digital Innovation Hubs for the Smart Anything Everywhere Initiative”, at the International Conference on Embedded Wireless Systems and Networks, February 17-19, 2020, Lyon (France).

Figure 36: Poster presented @EWSN 2020.

CSEM together with Althexis Solutions presented the paper “A fast simple-to-use and inexpensive multispectral camera to detect skin conditions” on SpectroX application experiment, at the Conference SPIE 11287, Photonic Instrumentation Engineering VII, 1128716, 26 March 2020. Abstract and conference presentation are available online.

Figure 37: Paper presented @SPIE 2020.

Digital Catapult in partnership with BLUMORPHO organised a two-day event for 12 FED4SAE start-ups and scaleups (Energica, Protolab, Bettair, SureWash, OTA Analytics, ISSD Electronics, Kalmia, OMTLAB Ltd, App CheckBnB SL, IoT Solutions Group Ltd, Genport srl, HOPU, The Convex Lens): Smart Anything Everywhere: FED4SAE IoT European Show, on 10-11 February 2020.

On the first day, the companies participated in a workshop, and on the following day they pitched in a showcase to investors and industry leaders in the UK. The goal of the two-day event was to provide the startups and scaleups a valuable engagement experience with the UK innovation ecosystem in general, and with stakeholders of IoT technology in particular.

On the first day, Digital Catapult hosted a workshop for the FED4SAE application experiments companies with Full Tilt Communications. During the workshop, guidelines about public speaking and speaking in front of the camera were provided to the companies. Then, 12 companies were split into two groups where Full Tilt Communications team prepared the first group to record their pitch on camera while teams from Digital Catapult and BLUMORPHO met with the second and held drop-in sessions with them. In these drop-in sessions, each business received a ten-minute meeting to discuss the various aspects of their preparation to pitch. Digital Catapult's Investor Engagement Manager discussed with the companies about their investment-readiness level, Blumorpho's CTO provided the training throughout the project met with them to discuss their pitch-readiness. Moreover, Digital Catapult's technologists met with the companies to discuss their technology.

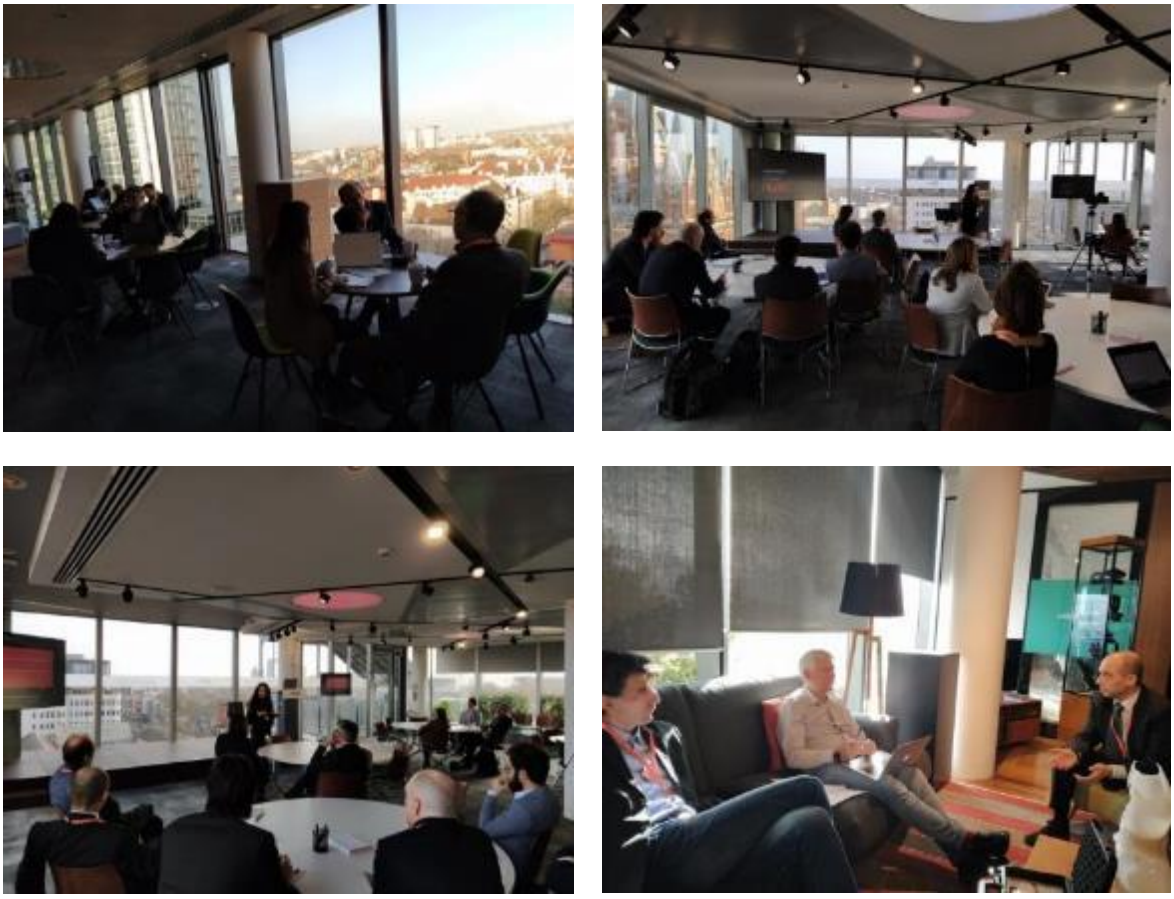


Figure 38: First day of the FED4SAE IoT European Show.

During the second day, the showcase, more than 70 attendees participated in various activities with experts, speakers, a panel and a pitch session of the 12 FED4SAE companies. These were followed by 1-to-1 meetings with investors, FED4SAE partners, Digital Catapult team of technologist and industry leaders.

The organized panel focused on bringing IoT products to the market. Panel members: Steve Hodges, Senior Principal Researcher, Microsoft; Pilgrim Beart, CEO, DevicePilot; Carrie Babcock, Investment Manager, Beringea and Christine Chen, Senior Manager Solutions Consulting, Ciena.

The pitch session had the 12 companies presented their solutions in front of the audience, followed by 56 1-to-1 meetings for the 12 pitching companies with investors from the UK innovation ecosystem.

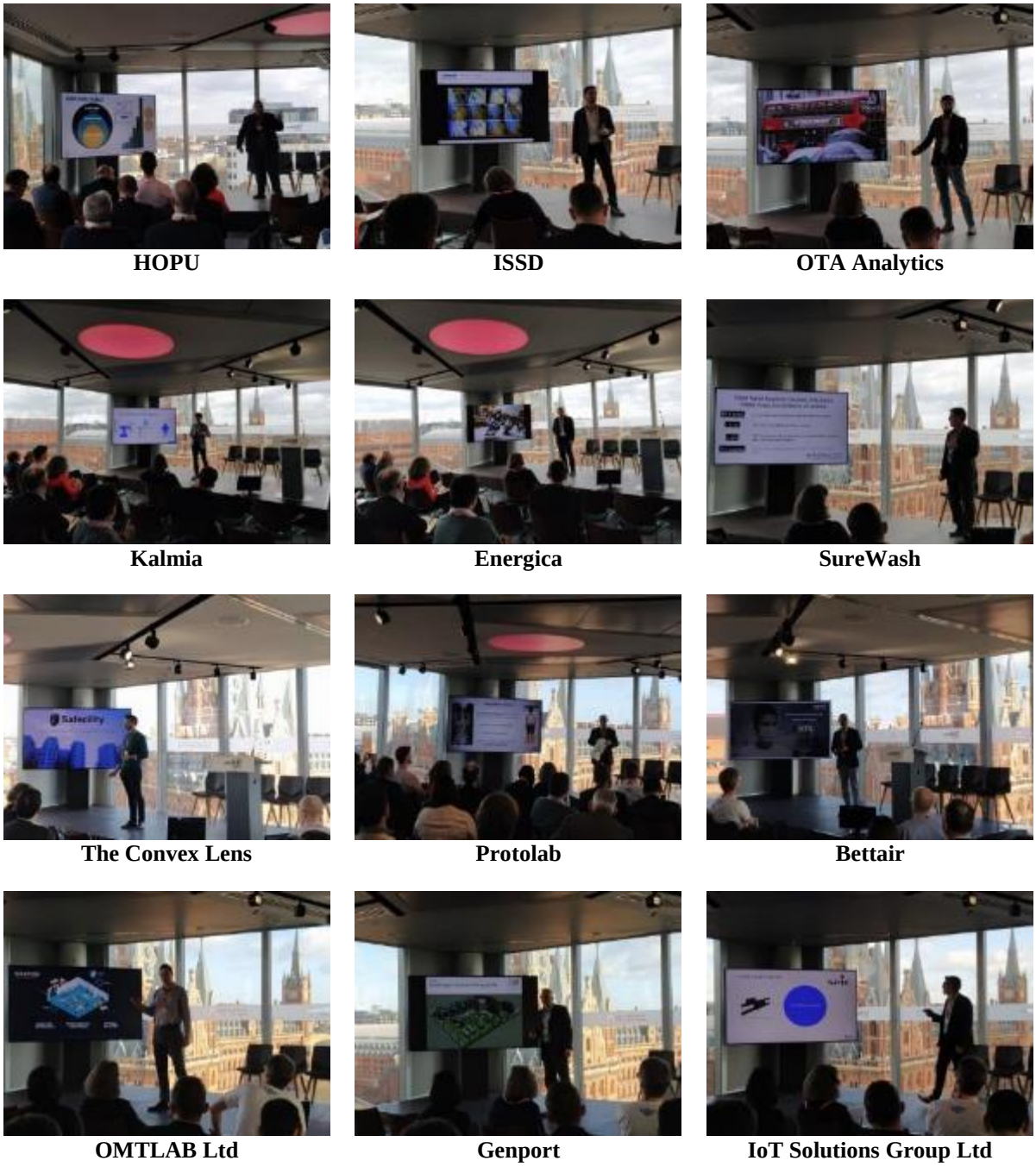


Figure 39: Pitch session at the FED4SAE IoT European Show.

2.5 Print promotion

Digital Catapult together with CSEM, CEA Leti and ST Microelectronics, published two articles highlighting FED4SAE results in HIPEAC news magazine number 59 and 60, illustrating digitisation process in Transportation and Health. Articles are available on FED4SAE website, press release page (https://fed4sae.eu/category/press-releases/).

Industry focus

Electric vehicles are riding a wave, and supersports motorcycles are no exception. Here, Isabelle Dor (CEA), Ana Gheorghe and Ramona Marfievici (both Digital Catapult) explain how Italian motorcycle manufacturer Energica is enhancing its machines with help from the innovation action FED4SAE.

The e-revolution starts here: Smart monitoring for electric motorcycles

With 2019 considered the 'base year' for the electric revolution in the global high-performance motorcycle market, it is no surprise that this year marks the inaugural season of the FIM Enel MotoE™ World Cup. Energica Motor Company SpA, the first Italian manufacturer of supersport electric motorcycles, which combines innovation with the long tradition of the Italian Motor Valley, has been chosen as single manufacturer for the competition.

One recent major challenge – and opportunity – for Energica was to find a smart connectivity solution for electric two-wheelers which would enable a whole range of services. The company turned to the European Union-funded innovation action FED4SAE to support its application experiment MAMMUT, or 'Monitoring Applications exploiting on-board Motorbike's Multiple Transceivers', to design, implement and test a novel, smart connectivity architecture.

With this architecture, the company aimed to achieve the following goals:

- enable remote battery and vehicle monitoring
- support component and vehicle tracking during key-off periods
- provide geolocation services for motorbike and charging station localization
- allow real-time communication on the status of the vehicle and over-the-air updates during active riding periods

These led to four key requirements for the connectivity architecture. First, power consumption must be minimized when in key-off mode. Second, monitoring range must be maximized. Third, status and parameter updates during active and racing periods must be delivered in both a reliable and timely manner. Fourth, connectivity must be supported in multiple types of environments: dense urban, rural and indoor (i.e. basements and underground where vehicles are parked).

Energica approached these requirements by using both LoRa (long range) and 3G/4G communication technologies, as depicted in figure 1. This gives MAMMUT the low-power consumption, long-range and deep indoor penetration of LoRa, while building on the GPS-free geolocation functionality of LoRaWAN (LoRa wide-area network). In addition, it supports high throughput connectivity for high end services and vehicle firmware over-the-air (FOTA) updates through the cellular modem.

The core of MAMMUT is a novel platform with a STM32L552 MCU from STMicroelectronics, which leverages a LoRaWAN geolocation testbed and a time difference of arrival (TDOA)-based solver. The testbed with ten Kerlink iBTS gateways is deployed and managed by Digital Catapult in London. The localization solver for computing the final position is provided by the Swiss Center for Electronics and Microtechnology (CSEM) and uses probabilistic techniques to improve final precision.

Applications and services have already been implemented on a STM32 evaluation board, Nucleo-l7 with a LoRa-Discovery module, and will be easily ported to the final board.

In November 2019, a prototype was completed and tested during the preliminary trials of the MotoE World Cup in Valencia, Spain. In addition, power consumption and communication performance assessment 'in vivo' along with geolocation experimental campaigns in London are already on the 2020 agenda for MAMMUT.

FED4SAE is a three-year innovation action with a budget of €7.6 million, which started in 2017. Its partners are the French Alternative Energies and Atomic Energy Commission (CEA), Intel, STMicroelectronics, Thales, AVL, Digital Catapult, Fraunhofer, fortiss, the Swiss Center for Electronics and Microtechnology (CSEM), Stockholm Royal Institute of Technology (KTH), Budapest University of Technology and Economics (BME), University of Cantabria and Bluetrum.

fed4sae.eu

Figure 40: Article published in HIPEAC news 59 (https://www.hipeac.net/magazine/7153/).

Industry focus

From the automotive to the avionic to the healthcare sector, Cyber-Physical Systems (CPS) are revolutionizing the ways in which we interact with our environment. For a more detailed look at how two of these technologies are changing healthcare for the better, read more:

An Engine for Health Care Innovation

Industry focus

Figure 41: Article published in HIPEAC news 60 (https://www.hipeac.net/magazine/7154/).

For the remaining time of year 3, in 2021 there are two joint scientific articles in preparation:

- by fortiss and the FED4SAE application experiments companies Ubotica and ISSD on the benefits of using fortiss' Advanced Technology "NNDK" for the development and assurance of neural networks;
- by Digital Catapult and UNICAN on the lessons learnt during the various phases from developing of the product from the initial idea to the market, design and implementation, to trials and pilot deployments, by the companies participating in FED4SAE.

2.6 Private meetings

Fortiss promoted the FED4SAE-style Open Call AEs in meetings with representatives of regional policy makers, in particular with the Wirtschaftsbeirat, October 7th, 2020, and with Bavarian Ministry for Digital Affairs on December 4th, 2020. In both meetings fortiss promoted the outcomes of the "IDRD" application experiment with Ubotica.

A number of ongoing private meeting between Intel and ISSD on SmartTunnel to assist with marketing and product go to market took place. An “Intel Solution Brief” was created to showcase how ISSD’s SPECTO enhances road safety with fast incident detection and response powered by AI. Link: https://www.intel.com/content/www/us/en/internet-of-things/ai-in-production/success-stories.html#promotions-4

Intel Sales team have made introductions and identified commercial opportunities for SureWash both for their current Intel based portfolio of hand hygiene solutions and for their new “Over the Sink” Solution.
Link: https://surewash.com/news/surewash-over-the-sink-combining-hand-hygiene-training-monitoring/

2.7 Promotion and showcasing of AEs

BME’s annual Summer School of Smart Systems integration is a frequent meeting point of master students, academic researchers and industry experts. CEO of FED4SAE partner OMT Labs (Sunstone-RTLS) is a returning invited speaker of this event. Such presentation is a good opportunity for the SMEs to showcase their achievements as well as to engage students to get involved in their R&D work.

Following the closure of every call, the selected companies were asked to produce a brief introductory video of their company and application experiment to be used for showcasing purposes on our website, at events, SAE innovation portal and as a relatable resource for other companies considering applying to FED4SAE program and more widely to Smart Anything Everywhere running open calls (mainly phase III new Innovation Actions: DigiFed, SmartEES2, Smart4ALL, HUBCAP, DIH4CPS and BOWI).

AE leaflets were created to attract attention and to generate interests for an optimal exploitation of the project’s results. Every AE leaflet is being updated to reflect the current status of the project after being technically completed, to give a hint on the exploitation plan and the business perspectives.

A portfolio promoting FED4SAE results/prototypes is now available on ourFED4SAE main page.

AEs combining high quality in technical completion and business opportunities despite the Covid-19 pandemic impact, granted for public release, are promoted as success stories and can be found on the website.

Fortiss supported AE Third Party Ubotica in presenting their experiment in the webinar “AI computer Vision using Intel’s MovidiusTM VPU platforms – the success stories from FED4SAE” organised by Intel (https://youtu.be/WeUIrmcxSNY) on April 30, 2020.

Fortiss contributed to the production of a success story about the AE “Incoming” by Third Party company Zannini, in cooperation with ST, published on the FED4SAE website.

From 23rd to 26th June 2020, BLUMORPHO organised Impact Week 2020, its digital event aiming at gathering impact investors, corporates, key thought leaders and innovative companies to exchange on “How to build a positive impact and a more sustainable economy through deep tech and digital technologies”. This event has been organised in the context of the Covid-19 crisis and one of the aim of the event was to allow innovative companies to listen to investors explaining how they were expecting to work in this challenging environment. The second objective was to allow innovative companies to ask their questions to investors in order to prepare their own growth

strategy. B-to-B meeting were also organised. All the SAE companies had been invited to join this meeting. Some companies from FED4SAE did join the event and a few brokerage meetings have been organised for Althexis and Specificity.

Intel organized a virtual IOTG IPTS Demo Showcase, showcasing ISSD Smart Tunnel Application Experiment. This event was broadcasted in Asia on November 10-12, 2020, and EMEA on November 17-19. A total of 3000 OERM/ODM, distributors, ISV, and customers from both geos were present. It is worth noting that Intel also invited SpectroX to showcase their solution at this event, however, as they were engaged in commercial discussions about the future of their platform, they declined to participate at the virtual event which was understandable.

2.8 Collaboration with other projects, organisations and clusters

Through its involvement in the CSA Smart4Europe and Smart4Europe2, FED4SAE has actively collaborated within the Smart Anything Everywhere (SAE) initiative, in particular fostering the SAE community building and strengthening and enlarging SAE ecosystem. Consequently, FED4SAE community is presented on the SAE innovation portal.

FED4SAE advertised every open call and their results through the SAE innovation portal and the quarterly newsletter.

Thanks to Smart4Europe and Smart4Europe2 coordination activities, FED4SAE granted projects, success stories and highlights are widely promoted under the umbrella of Smart Anything Everywhere initiative but also I4MS through the active collaboration developed between the two initiatives. SAE innovation portal relayed FED4SAE results through the SAE community and beyond. Next to kind is to put into relief highlights and success stories and update the information provided by FED4SAE consortium and communication team.

Smart4Europe2 gives the opportunity to attend brokerage events by SAE or SAE/I4MS booths, participating or organizing speaking sessions promoting SAE and I4MS and cascade funding opportunities (EFECS 2019 and EFECS 2020, DIH annual day, etc.), setting up networking / matchmaking working during major events.

Being an active member of the CSA and in close contact with the other innovation actions SmartEES/SmartEES2 and DigiFed, FED4SAE is taking part in the organization and attending the SAE collaboration workshops, exchanging feedbacks and lessons learnt, discussing on issues such as Sustainability that are of concerns among the SAE Innovation Actions. FED4SAE was invited to DigiFed 1st networking event; to discuss *FED4SAE Lessons and Experiences*.

Via Minalogic (CEA Linked Third Party) good collaboration and large promotion of FED4SAE Open calls and activities were insured with the Silicon Europe Alliance, an alliance of 10 EU clusters for innovative electronics & software technologies, photonics and artificial intelligence. This “cluster of clusters” represents over 2 000 members (over 75% SMEs) and more than 250,000 jobs. This makes the Silicon Europe Alliance one of the biggest technology clusters in the world.

In the scope of the Covid-19 pandemic, in March 2020, FED4SAE joined the UnitedAgainstCovid19 action dedicated to accelerate the adoption of promising technologies that can contribute to support Health Authorities and Health Practitioners. FED4SAE contributed to this action in inviting their beneficiaries to join to offer their solutions and in promoting the activity. More than 105 companies entered into the process covering the application focus showed in the figure below:

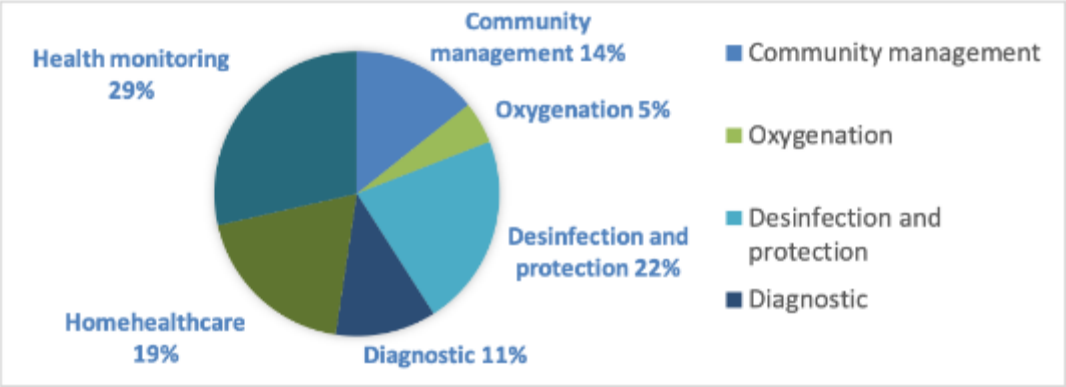


Figure 42: UnitedAgainstCovid19 application categories.

In the scope of this action, SureWash and Kalmia have been identified as very promising companies and introduced to Health Authorities to assess the interest of accelerating their access to market with regulation compliance. Individual meetings have been organized with Health Technology Assessment experts, feedback have been given to SureWash and Kalmia on how to accelerate their go to market strategy.

The **Smart Anything Everywhere (SAE) Contest** has been organised from April to October 2020 and FED4SAE beneficiaries have been invited to take part to it. This contest aimed to award the most promising company among the Smart Anything Everywhere start-ups community and to develop the link between the SAE community and private investors specialised in deep tech.

The concept:

- All applicants would get visibility towards a jury panel composed exclusively of ***private investors active in hardware deep tech***
- The Top 5 companies would benefit from press and communication visibility
- All applications would benefit from special discount to join the **INPHO® Venture Summit** Showroom to present their products and solutions.

The award: the winner and finalists of the contest gained a free pass to INPHO® Venture Summit and were selected to pitch during the **INPHO® Venture Summit** which took place digitally from 8th to 30th October 2020.

The organisation**:** a dedicated webpage has been designed on BLUMORPHO website and advertised through the first two SAE cluster meetings, emailing toFED4SAE and SAE innovative companies, on SAE and BLUMORPHO's websites and social networks (LinkedIn & Twitter).

Out of the 4 FED4SAE applicants and after having received a dedicated pitching coaching from BLUMORPHO 2 decided to go further in the process and to pitch in front of investors. To take into account their maturity without hindering their credibility, a pitching sessions dedicated to early stage companies has been organised during the last week of the event taking into account their investors readiness level and giving them more time to get ready and have the opportunity to listen to more mature & experienced companies pitching.

BLUMORPHO and CEA made sure that all FED4SAE companies are aware of this opportunity by sending them the information through personal emails.

Among the 9 companies that applied to the SAE contest, 4 were coming from FED4SAE.

SAE Innovation Action	Innovative companies
Diatomic	d-cube
DigiFed	Datenberg
FED4SAE	The Convexlens HOPU Kalmia Protolab
SmartFES	Tagenea Ab.acus
Tetramax	Cipacto

Figure 43: Companies having applied to the SAE contest award.

To be able to highlight the presence of the FED4SAE innovative companies on social media, BLUMORPHO had asked them for their twitter and/or LinkedIn contacts. The objective was to create a dynamic between the companies' networks and the ones of BLUMORPHO, SAE, FED4SAE and INPHO Venture Summit.

With the material provided by the companies, BLUMORPHO have created visuals to advertise their presence at the INPHO Venture summit.

Figure 44: BLUMORPHO's visual advertising FED4SAE presence at INPHO Venture summit.

The award ceremony has taken place during the global INPHO Venture summit closing ceremy. In the presence of Georges Ugras, president of INPHO editorial committee and jury panel as well as Hervé Floch, director of Alpha RLH (organiser of the event).
The SAE contest award has been delivered by Andreas Lymberis, Head of Sector "Wearables & Bioelectronics" at the European Commission.

The 1st Price was awarded to the FED4SAE company Protolab for their innovative approach to address scoliosis treatment with digital and sensor approach. Beyond the technical challenge, the jury members highlighted that smart technology can contribute to improve people life and improve a rather standard treatment procedure.

The post announcing this award received by a FED4SAE innovative company was one of the most successful LinkedIn post made by BLUMORPHO for the FED4SAE project.

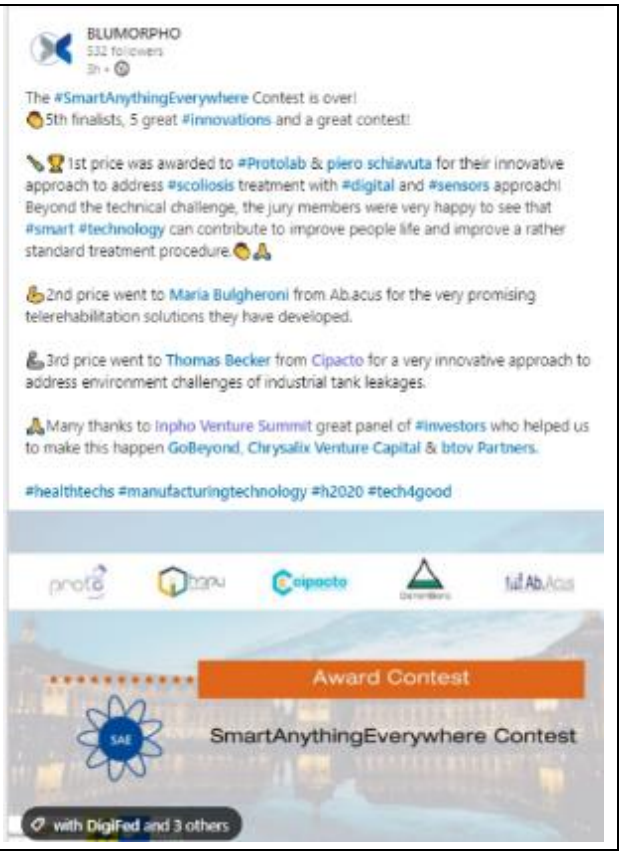


Figure 45: BLUMORPHO's visual advertising FED4SAE presence at INPHO Venture summit.

Intel has ongoing collaboration with UBOTICA and the Irish Health Service to enable a "Confidential Computing" Approach to enable secure, GDPR Complaint access to the Health Agency large database of labelled Diabetic retinopathy images. This will enable Ubotica to train a more comprehensive neural network and also enable the HSE to gain new insights to enable early detection and intervention preventing blindness in patients with diabetes. This will project move ahead once resources become available post COVID-19 Vaccine rollout later in 2021. Ubotica recently launched Intel Movidius VPU on the ESA Satelite for image processing in space. An article about this was published in Silicon Republic: https://www.siliconrepublic.com/start-ups/ubotica-cvai-esa-earth-observation-satellite

2.9 Year 3 dissemination activities of individual DIH

2.9.1 BLUMORPHO

BLUMORPHO has been active on Twitter and LinkedIn promoting FED4SAE's application experiments as being part of the SAE team of digital enablers.

Table 3. BLUMORPHO's Twitter activity related to FED4SAE.

Tweet	Date	Impressions	Engagement
Looking forward to working further with great teams of digital enablers @fed4sae @DiatomicEU @TetramaxEU @SmartEEsEU and all the new innovation actions partners of the @SAE_Initiative dedicated to the #digitaltransformation of European #SMEs! https://t.co/lOebRR0jVt	2020-01-16	498	13
Join our first webinar on the success stories of the @Fed4SAE project: #AI Computer Vision using Intel™s Movidius VPU Platforms - 30th of April at 10 am. #DigitalTransformation #ComputerVision #CPS #H2020 @SAE @DIHNET @SmartEEs @Diatomic @tetramax @DigIndEU @Digifed https://t.co/eVJOd91QGP	2020-04-15	2851	43
Want to find out how the STM32 microcontroller enables LPWAN applications? Join the discussion with @STMicroelectronics, @Safecility, and @SentinumGmbH, 2 success stories from @Fed4SAE. https://t.co/MF3Jtk1ljR #DigitalTransformation #H2020 #IoT #smartcities #smartbuildings #CPS https://t.co/K048Jl6DAC	2020-05-18	1658	28
We are also fully committed to help #innovative companies in the #energy sector to bridge the #investment gap and thus contribute to a more #sustainabledevelopment. @C_Voucher @fed4sae @LedgerEu @SmartEEsEU https://t.co/zEOQti8iZt https://t.co/VibNgc6sIy	2020-10-02	138	7
The #SAEcontestaward is taking place during @inpho_ventures. Join the @SAE_Initiative #Digital #ecosystem and meet with #innovative companies from @FED4SAE, @DiatomicEU @SmartEEs_EU and @TETRAMAX running for the award. https://t.co/NnHKejJivt #H2020 @DigIndEU #Inpho2020 https://t.co/9evJ9tKQnI	2020-10-16	135	3
Protolab, one of @fed4sae #innovative success stories is pitching now at @inpho_ventures. So proud of the @SAE_Initiative innovators community! @DigiCatapult #h2020 #inpho2020 #SmartAnythingEverywhere https://t.co/8v10yGzfxZ	2020-10-30	1588	17

Tweet	Date	Impressions	Engagement
Piero Schiavuta #Protolab Co-founder supported by #fed4sae #EUCommission #SAE In medicine psychological element plays a great role. EMBRACE allows a successful engagement of the patient in the scoliosis therapy. #MedTech #Electronics #Europe https://t.co/AXw8GrzBBU https://t.co/ed43VB8iwL	2020-12-30	222	2
Register to FED4SAE Innovation Club Day organised by BLUMORPHO on January 21st 2021 and get access to exclusive funding & business opportunities FED4SAE Innovation Club Day - #FED4SAE - #SAE #Europe #Innovation https://t.co/TTOPilw8Mb https://t.co/efdDFVMvtc	2020-12-29	360	3
Register to FED4SAE Innovation Club Day organised by BLUMORPHO on January 21st 2021 and get access to exclusive funding & business opportunities FED4SAE Innovation Club Day - #FED4SAE - #SAE #Europe #Innovation https://t.co/TTOPilw8Mb https://t.co/rmQxxZ4fzc	2020-12-25	201	2
Register to FED4SAE Innovation Club Day organised by BLUMORPHO on January 21st 2021 and get access to exclusive funding & business opportunities FED4SAE Innovation Club Day - #FED4SAE - #SAE #Europe #Innovation https://t.co/TTOPilw8Mb https://t.co/NICxZm0kl0	2020-12-24	119	0
Register to @SAE_Initiative @fed4sae Innovation Club Day organised by BLUMORPHO on January 21st 2021 and assist to reverse pitching sessions from Public & Private funding partners. Full agenda & Registration are here: https://t.co/qLtJiVXIa5 https://t.co/dwDdODfCrv	2020-12-23	94	7
Register to @SAE_Initiative @fed4sae Innovation Club Day organised by BLUMORPHO on January 21st 2021 and get access to exclusive funding & business opportunities. Full agenda & Registration are here: https://t.co/qLtJiVXIa5 https://t.co/TeRf9T47x5	2020-12-19	264	19
The @inpho_ventures @SAE_Initiative @fed4sae award winner: Piero Schiavuta - #Protolab Co-founder CONGRATS to the team! https://t.co/9qrw5x1N5W	2020-12-18	51	1

Tweet	Date	Impressions	Engagement
Piero Schiavuta #Protolab Co-founder supported by @fed4sae @EU_Commission @SAE_Initiative In medicine psychological element plays a great role. EMBRACE allows a successful engagement of the patient in the scoliosis therapy. #MedTech #Electronics #FED4SAE https://t.co/9qrw5x1N5W	2020-12-16	57	5

Table 4. BLUMORPHO's LinkedIn activity related to FED4SAE.

LinkedIn	Date	Impressions	Engagement
Register to #FED4SAE Innovation Club Day organised on January 21st 2021 and assist to reverse pitching sessions from Public & Private funding partners. Full agenda & Registration are here:	30 Dec	21	3
The #SmartAnythingEverywhere Contest is over! 1st prize to #Protolab #scoliosis treatment with #digital and #sensors approach 2nd prize to #Abacus telerehabilitation solutions 3rd prize to #Cipacto address environment challenges of industrial tank leakages CONGRATS to All	24 Dec	44	1
Register to FED4SAE Innovation Club Day organised on January 21st 2021 and assist to reverse pitching sessions from Public & Private funding partners. Full agenda & Registration are here: https://lnkd.in/epJvRsW	23 Dec	213	8
Register to FED4SAE Innovation Club Day organised on January 21st 2021 and get access to exclusive funding & business opportunities. Full agenda & Registration are here: https://lnkd.in/epJvRsW #Europe #Innovation #ReversePitching	19 Dec	208	5
Piero Schiavuta #Protolab Co-founder supported by FED4SAE #fed4sae #EUCommission #SAE In medicine the psychological element plays an important role. EMBRACE allows a successful engagement of the patient in the scoliosis therapy. #MedTech #Electronics #Health #Europe	17 Dec	64	3
The #SmartAnythingEverywhere Contest is over! 1st prize to #Protolab #scoliosis treatment with #digital and #sensors approach 2nd prize to #Abacus telerehabilitation solutions 3rd prize to #Cipacto address environment	2 Dec	33	3

LinkedIn	Date	Impressions	Engagement
challenges of industrial tank leakages CONGRATS to All			
The #SmartAnythingEverywhere Contest is over! □1st prize to #Protolab #scoliosis treatment with #digital and #sensors approach □2nd prize to #Abacus telerehabilitation solutions □3rd prize to #Cipacto address environment challenges of industrial tank leakages CONGRATS to All	30 Nov	24	1
The #SmartAnythingEverywhere Contest is over! □1st prize to #Protolab #scoliosis treatment with #digital and #sensors approach □2nd prize to #Abacus telerehabilitation solutions □3rd prize to #Cipacto address environment challenges of industrial tank leakages CONGRATS to All	27 Nov	81	3
The #SmartAnythingEverywhere Contest is over! □5th finalists, 5 great #innovations and a great contest! □□1st prize was awarded to #Protolab & piero schiavuta for their innovative approach to address #scoliosis treatment with #digital and #sensors approach! Beyond the technical challenge, the jury members were very happy to see that #smart #technology can contribute to improve people life and improve a rather standard treatment procedure.□□ □2nd prize went to Maria Bulgheroni from Ab.acus for the very promising telerehabilitation solutions they have developed. □3rd prize went to Thomas Becker from Cipacto for a very innovative approach to address environment challenges of industrial tank leakages. □Many thanks to Inpho Venture Summit great panel of #investors who helped us to make this happen GoBeyond, Chrysalix Venture Capital & btov Partners. #healthtechs #manufacturingtechnology #h2020 #tech4good	31 Oct	830	24
The #SmartAnythingEverywhere initiative #innovative company DatenBerg GmbH will join Inpho Venture Summit and pitch on how to make the best of #data to make #manufacturing40 happen! Don't miss it: https://lnkd.in/d3CWZCZ	28 Oct	129	7

LinkedIn	Date	Impressions	Engagement
#dataanalytics #Inpho2020 DigiFed I4MS - ICT Innovation for Manufacturing SMEs #InternationalDataSpacesAssociation Matthias Kuom			
During #Inpho2020, Inpho Venture Summit and the #SAE_Initiative are showcasing #innovative companies running for the #SAEContestAward.	22 Oct	303	8
From today INPHO "chat, showroom & private sessions features" will remain accessible during the 2 remaining weeks to facilitate the networking between the delegates. Thanks Inpho Venture Summit! This gives you even more #opportunities to meet with #innovative companies from FED4SAE, Diatomic, SmartEEs_EU and TETRAMAX running for the #SAEcontestaward. Join us to meet the #SAEinitiative #ecosystem. Matthias Kuom, Julia Koch, Steinbeis 2i GmbH | Steinbeis-Europa-Zentrum	16 Oct	102	6
During #Inpho2020, Inpho Venture Summit and the #SAE_Initiative are showcasing #innovative companies running for the #SAEContestAward. Join us and meet the #SAEContestAward finalist, #Cipacto, a #Tetramax success story, pitching tomorrow during Inpho Venture Summit!	15 Oct	178	8
Inpho Venture Summit and the #SmartAnythingEverywhere initiative at the spearhead of innovation! Through #H2020 #Innovation support, the #SmartAnythingEverywhere initiative has supported great innovative companies which are taking part to #INPHO2020. Join this week sessions of Inpho Venture Summit to: -meet the #startups who are taking part to the #SAEContestAward -listen to our great panelists of Corporate leaders -meet investors and get ready for a #sustainable #digitaltransformation!	15 Oct	106	4
#SmartAnythingEverywhere initiative is happy to welcome you on its booth during the Inpho Venture	11 Oct	332	12

LinkedIn	Date	Impressions	Engagement
Summit. #Startups from #H2020 projects: Diatomic, FED4SAE SmartEEs_EU & TETRAMAX are also taking part to meet #investors and participate to the #SAEcontest award. Stay tuned to find out more on each of those #innovative companies committed to the #digitaltransformation of European Industry or register to join us for this year #digital edition of Inpho Venture Summit https://lnkd.in/d3CWZCZ			
#inpho2020 SAE has its own booth among all the start-up and we are glad to promote the award program to them. A EU Commission initiative.	9 Oct	133	2
The Smart Anything Everywhere Initiative will award the most promising #innovative companies of its ecosystem during the upcoming Inpho Venture Summit. Apply to the #SAE Contest Award 2020: https://lnkd.in/dZ2MGZm And join #investors & #corporates gathering during Inpho Venture Summit 2020 to tackle our world's most pressing challenges through #disruptivetechnologies: https://lnkd.in/erSqD7z SmartEEs_EU FED4SAE SMART4ALL H2020 Babis Ipektsidis TETRAMAX Nemanja Nićin Bernard STREE Sarah Mortimer Holger Pfeifer	3 Sept	306	15
Join our free webinar to know more on how the STM32 microcontroller enables LPWAN applications on 19 May at 10am, and open the discussion with STMicroelectronics, Safecility, and Sentinum GmbH. Register: https://lnkd.in/d2iPcy7 In this webinar, STMicroelectronics will provide an overview of STM32 product range with a presentation of the tools available for developers. We will then showcase two success stories of its application highlighting two companies supported by the FED4SAE project : • Remote testing solution of emergency lighting by Safecility • Drainage monitoring system for flood prevention by Sentinum GmbH	13 May	427	13

LinkedIn	Date	Impressions	Engagement
#DigitalTransformation #SAE #CPS #H2020 #IoT #smartcities #smartbuildings			
It is not too late to register and join the first free webinar of our series on the success stories of the FED4SAE project : AI Computer Vision using Intel's Movidius™ VPU Platforms, tomorrow the 30th of April at 10 am. Register : https://lnkd.in/gpYsr7F In this first webinar, IntelLabsEurope ™ will provide an overview of developing AI solutions using the Movidius VPU platforms which enables low power edge inferencing. After Intel's introduction, we will take some examples from the FED4SAE project and highlight companies that participated and developed solutions based on the Myriad. The two examples are from the: - Healthcare domain where you will learn how Ubotica™ developed an AI solution that detects diabetic retinopathy (DR) in fundus images. - Industrial domain, where you will learn how ISSD Bilişim Elektronik A.Ş.™ have developed an AI solution that addresses the challenge of automated traffic monitoring in road tunnels. You will have the opportunity to interact with the speakers during the webinar and ask your questions to experts. #DigitalTransformation #SAE #CPS #AI #H2020	29 Apr	203	4
Join the first free webinar of our series on the success stories of the FED4SAE project : AI Computer Vision using Intel's Movidius™ VPU Platforms, on the 30th of April at 10 am. Register : https://lnkd.in/gpYsr7F In this first webinar, IntelLabsEurope ™ will provide an overview of developing AI solutions using the Movidius VPU platforms which enables low power edge inferencing. After Intel's introduction, we will take some examples from the FED4SAE project and highlight companies that participated and developed solutions based on the Myriad. The two examples are from the: - Healthcare domain where you will learn how Ubotica™ developed an AI solution that detects	15 Apr	480	23

LinkedIn	Date	Impressions	Engagement
diabetic retinopathy (DR) in fundus images. - Industrial domain, you will then learn how ISSD Bilişim Elektronik A.Ş.™ have developed an AI solution that addresses the challenge of automated traffic monitoring in road tunnels. You will have the opportunity to interact with the speakers during the webinar and ask your questions to experts. #DigitalTransformation #SAE #CPS #AI #H2020			

2.9.2 BME

BME's annual Summer School of Smart Systems Integration (SSI) is a frequent meeting point of master students, academic researchers and industry experts. In this event BME always makes sure to provide an opportunity for their SME partners in FED4SAE to showcase their AEs. CEO of FED4SAE partner OMT Labs (Sunstone-RTLS) was an invited speaker in the 2020 edition of this programme. A novelty of this Summer School was that the Master students had to create start-ups in groups of 3, and had to pitch it to a group of "investors", who were industry representative entrepreneurs.

2.9.3. CEA

In the continuation of Years 1 and 2, CEA Leti has maintained its active participation in the promotion of SAE initiative, FED4SAE success stories by attending European brokerage events, taking part to round tables, networking events and workshop presenting FED4SAE and the running open calls. CEA Leti benefitted of its collaboration with Smart4Europe and Smart4Europe2 to mutualize efforts and promotion means.

Digitising European Industry Stakeholder Forum
- Madrid, Spain
- 13-15 November, 2019
- 633 attendees - EC actors, policy makers, SMEs, RTOS, DIHs

IDRD application experiment granted by FED4SAE (company Ubotica) was selected for a pitch during the "Artificial Intelligence in Digital Innovation Hubs" session. The CEO of Ubotica joined the panel and presented the case.

EFECS 2019 (https://efecs.eu/efecs2019.html)
- Helsinki, Finland
- 19-21 November, 2019
- 668 attendees

Participation to 5E Workshop on Setting up the Vision for European Electronics Ecosystems Convergence, 30-40 participants.

HIPEAC CSW week 2020
- Spring session was cancelled, shifted to the Fall one.
- Fall session organized virtually.

- 14-16 October, 2020

Organization and participation to the SAE session "*Smart Anything Everywhere - Vision, Opportunities and Success Stories (Innovation Actions)"* gathering presentation by EC actors, SAE innovation actions and I4MS project. EuroCPS and FED4SAE success stories (HungaroLux Light and Surewash Hand Hygiene) were presented to illustrate SAE opportunities and impacts. 38 people participated to the session.

Participation to the *CPS and sustainability* session, moderated by the coordinator of Platforms4CPS, with KTH Royal Institute of Technology, BOWI coordinator from Aarhus University and ACT Operations IT. By providing short talks from several CPS research perspectives aimed at encouraging reflection of CPS in relation to sustainability challenge, bringing thoughts to the table of how the CPS technology-pull landscape is likely to evolve for sustainability.

DigiFed 1st networking expansion event

- Digital event
- 17 November 2020
- About 35-40 attendees attending both the presentation and participating to the three workshops run in parallel - DIHs, RTOs, SMEs

Presentation of "*Lessons and experiences - FED4SAE*", sharing open call and AE implementation feedbacks and lessons learnt, illustrating the impacts through a couple of FED4SAE success stories.

EFECS 2020 (https://efecs.eu/)

- Virtual event
- 25-26 November, 2020

Participation to SAE booth promoting FED4SAE success stories, through SAE communication and DigiFed open call promotion.

DATE 2021 (https://www.date-conference.com/)

- Virtual event
- 01-05 February, 2021

FED4SAE will participate to CEA-Leti virtual booth and ST virtual booth to promote FED4SAE success stories related to the partners' technologies.

CSA SAE Collaboration workshops

- Digital event organized every 3 months. Three workshops organized since January 2020 gathering SAE Innovation actions, inviting EC members and sister projects (such as I4MS): 02/04/2020, 02/07/2020, 26/10/2020
- To extend and strengthen SAE community
- To share lessons learnt, best practices and guidelines.
- To build and consolidate DIH network ecosystem across Europe.
- 20-30 participants in average.

The collaboration initiated with Minalogic during Years 1and 2 remained pro-active for Year 3, including the connection with the French NCP networks (ICT NCP and SME NCP), cluster connection with Silicon Europe Alliance. The third open call was largely promoted in the French community through the French NCPs for ICT and SME.

Minalogic brought at several occasions visibility to the FED4SAE project and its funding. Upon Minalogic's invitation, the French local company WEGOTO presented its project CADIX during

the Minalogic annual conference. His testimonial was meant to promote FED4SAE to the regional SMEs and to encourage them to apply to open calls in cascade funding.

Partnership was initiated with MinaSmart, Auvergne-Rhône-Alpes (AURA) digital innovation Hub, reinforcing SAE connection to AURA local ecosystem.

It should be underlined that this activity followed its normal course up to March 2020 where Covid-19 pandemic changed the rules of the games (so to say) with all physical events being cancelled, some of them postponed and finally organized virtually. Dissemination activity was then very much slowed down and started to be differently organized through online conference/workshops/discussion and virtual booths.

CEA-Leti has largely benefitting of its collaboration with the CSA (Smart4Europe2) to adapt to the new situation, mutualize efforts and promotion means.

2.9.4 CSEM

In the final FED4SAE project period, CSEM continued to make publicity about the FED4SAE via its website, Twitter account and other events. CSEM have also endeavoured to broaden and extend its research collaborations in the domain of Digital Technologies, participating in several recent European and Swiss research initiatives. Dissemination materials (e.g. ,flyers, video) have also been prepared for the AE's (MAMMUT, SpectroX, HyperCook and NanoLeak). However, due to Covid19 restrictions, CSEM was notable to perform several events to marketing its technologies and projects like FED4SAE. Nevertheless, CSEM continued the promotion during restricted meetings and through our network of contacts. Thanks to FED4SAE, CSEM was able in 2020 to establish 2 additional DIHs (raisehub.swiss and lifehub.swiss) that together with microhub.swiss will form the heart of the swiss network of EDIH.

Together with Althexis Solutions, CSEM published the paper "A fast simple-to-use and inexpensive multispectral camera to detect skin conditions" on SpectroX application experiment, at the Conference SPIE 11287. Also, a short version of the paper was published in the Scientific Reports of CSEM.

2.9.5 Digital Catapult

During the third year, Digital Catapult continued to focus on disseminating info on the FED4SAE application experiments to its partners and published two success stories on its website

Digital Catapult presented a poster "Application Experiments from Federated Cyber Physical System Digital Innovation Hubs for the Smart Anything Everywhere Initiative" during the poster session of the International Conference on Embedded Wireless Systems and Network (EWSN), February 17-19, 2020, Lyon (France) on the MAMMUT, Bettair, Safecility, IoTSG and AirTech application experiments. This conference had 140 attendees from academia and industry.

An abstract on use of LoRaWAN technology by the supported AEs was submitted to the LoRaWAN World Expo, June 9-10, Paris (France), but the event was cancelled due to COVID-19.

Moreover, two success stories were published on Digital Catapult's website on how IoTSG and Safecility were supported to obtain the funding needed to grow and scale, and to develop an IoT solution for testing emerging lightning respectively.

On 10-11 February 2020, Digital Catapult in partnership with BLUMORPHO, organized the event Smart Anything Everywhere: FED4SAE IoT European Show, for 12 FED4SAE start-ups and scaleups.

2.9.6 Fraunhofer

During the third year, Fraunhofer IISB has demonstrated its technological capabilities by participating in various events and workshops, e.g., EFECS (European Forum for Electronic Components and Systems), ECS Brokerage Event, and others.

As a result of this dissemination strategy, Fraunhofer IISB offers a similar test environment together with other technical possibilities within a European project for transnational access to research and prototype infrastructure and discussion with interested parties have just begun.

The dissemination of the concept, the idea and the results of the technical experiments with the support of Fraunhofer IISB is carried out by the third-party providers themselves, since they know the market and the potential customers better and can coordinate these activities with their own public relations and dissemination activities.

2.9.7 fortiss

fortiss promoted the Munich DIH for Applied AI at the DEI Stakeholder Forum in Madrid, on November 13th, 2019 highlighting the collaboration with FED4SAE Third Party Ubotica in the AE "IDRD".

2.9.8 KTH

The KTH Digital Innovation Hub on Industrial Digitalization, DIHID, have been active at different events as well as by spreading information regarding the three FED4SAE Application Experiments that KTH are involved in. Due to the Covid-19 situation many events and activities have been affected or canceled.

Here is a summary of activities that have been taking place during year 3:

- The KTH DIH on Industrial Digitalization, DIHID have continued to develop its presence in the local ecosystem. www.dihid.eu
- By regular corporation with the Industry Network ICES, that reaches almost 2000 people with its monthly newsletters. http://Ices.kth.se
- Co-Hosting a number of Webinars on AI and Industrial IOT together with the ICES Network.
- The DIHID have been involved in initiating a new concept in Sweden for professional learning called PECA. PECA is a strategic initiative aiming to make advanced academic

and professional training content, delivered by professional Training Partners, available to employees within Swedish Industry and Tech Companies. One of the core pillars for the initiative is to look for new and improved way for educating people at work. The FED4SAE experiment Immersive4Learning is a potential partner to the project.

- Co-Hosting a seminar in Q4 2020 with the ICES R&D Manager network on Edge Computing and System Integration. Ghost Labs presented how their software platform, proven from a FED4SAE experiment, had supported Sodexo in creating a Circular Economy setup within healthcare.
- Co-Hosted a seminar with IOT Hub THINGS, that interacts with a large number of member SME's, on the theme IPR and Digital R&D.
- By informing and inviting the members in the Nordic IOT Initiative Hi2OT to events.
- Interaction with KTH Innovation, the Business Incubator at KTH.

Figure 46: KTH participation in events.

2.9.9 UNICAN

During the last year of the project, the University of Cantabria and the Municipality of Santander have disseminated the project within the following events, meetings and scientific reports:

- The Scientific Paper "A privacy-aware crowd management system for smart cities and smart buildings" [1].
- Dissemination action in F2F meetings with representatives of more than 30 different entities in the Greencities 2020 congress (Málaga. Spain, September 30th / October 1st), as part of the innovation actions in which the municipality of Santander is collaborating.

[1] Santana, J. R., Sánchez, L., Sotres, P., Lanza, J., Llorente, T., & Muñoz, L. (2020). A privacy-aware crowd management system for smart cities and smart buildings. *IEEE Access*, *8*, 135394-135405.

- Introduction of FED4SAE, amongst other initiatives carried out by the University of Cantabria, within the frame of the RESOE project (Strategic Governance Plan for Rural Depopulation in Asturias, Cantabria, Castilla y León and Galicia) and its kick-off event.
- Integration of the FED4SAE deployed sensors from BETTAIR AE into the SmartSantander Maps, which includes the information of real-time sensor data from deployed devices in Santander.

As part of the future plans and initiatives, FED4SAE along with the AEs (i.e. BETTAIR, Eco-SmartHomes, AIRtech and WeaRTLS) will be showcased as success stories of the IoT-SmartSantander DIH in the future projects that have been submitted and are pending for acceptance.

It is also worth mentioning that the IoT-SmartSantander DIH is aiming at being integrated into a wider and bigger DIH at regional level, for which the letter of interest has been already submitted, and will include additional stakeholders in Cantabria, enlarging the services that will be provided by the DIH. In this sense, the FED4SAE project and AEs will be also showcased as success stories within this DIH.

2.10 Year 3 dissemination activities of industrial partners

2.10.1 ST Microelectronics

ST Microelectronics disseminated many of the AEs using ST Technologies Intranet. In addition Specific articles have been written to provide an in deep description of some AEs. These articles have been published to the internal corporate web site. The target audience is about 50000 people world-wide.

In addition, ST is organizing an event online during the Design, Automation and Test in Europe Conference (DATE2021, www.date-conference.com), February 1-5, 2021, where selected AEs have the opportunity to present the final achievements of AE using STM32.

Moreover, ST advertised on their social media channels key results of the AE using STM technologies.

2.10.2 Intel

Intel delivered a webinar on Exploiting AI (on Intel's VPU) for Computer Vision, featuring IDRD and Smart Tunnel Application Experiments, on April 30, 2020. The webinar was attended by a mixed audience of 70 attendees from across EU.

2.10.3 AVL

Focus of the 3rd year for AVL was to support industrialization and setup of go-to-market strategies, especially with the selected AEs.

- Consolidation of AVL's offering related IODP (https://www.avl.com/-/integrated-open-development-platform-iodp-): as a core asset for AVL, the IODP platform is continuously updated and enriched with new content. This activity is independent from FED4SAE, however could be accelerated through the direct interactions with the selected SMEs. The interaction ranged from bilateral discussion and feedback, up to creation of white papers and proof of concepts (e.g., BETP) to showcase the feasibility of the proposed solutions
- Participation to a webinar managed by BLUMORPHO (around June last year) to present the IODP platform and the automotive domain
- Bilateral exchange with the SMEs and discussion on how to approach new customers. Through the monitoring activities several private meetings have been organized in order to align both on technology and on common business development topics. Especially, during the PRESLEEP experiment (1 week workshop at AVL Graz premises) alignment on common business development were performed and has led to follow-up discussion with a large potential customer in the domain of automotive electronics. With BETP, the outcomes of the experiment have been presented during different customer meetings from AVL, emphasizing the technology developed and the collaboration with Kalmia.

2.10.4 Thales

In 2020, the impact of the COVID-19 was very important on the dissemination activities of THALES. Nevertheless, THALES did 3 major external disseminations and 2 internal disseminations:

External dissemination of the results of FED4SAE:

- MODELWARDS'20: International Conference on Model-Driven-Engineering and Software Development, La Valetta, Malta, 25 - 27 Feb 2020. "Seamless Integration of Performance Verification in the Model-based Design of Safety Critical Avionics Applications", R. Henia, L. Rioux.
- ADA-Europe 2020: even the event was cancelled, all accepted papers were published. THALES got a chance to promote the results of the tree application experiments of FED4SAE related to the THALES Platform: Time4ys:
  - "Time4PS: Fully integrated development toolset for partitioned systems", Yolanda Valiente, Patricia Balbastre, Francisco Gómez, Laurent Rioux and Rafik Henia.
  - "Integration of timing verification techniques in the early stages of design with Capella/Tideal", Benoit Viaud, Laurent Rioux and Aurélien Didier .
  - "Runtime Architect: Link Performance Design to Runtime Aspects", Adel Gasri, Rafik Henia, Laurent Rioux and Nicolas Sordon.
- A webinar organised by Blumorpho on 21th January 2021 with the participation of LinkSoftware and Fentiss. During this webinar, THALES promoted the Time4sys platforms and results achieved by the Application experiment of LinkSoftware and Fentiss.

Internal dissemination of the results of FED4SAE in meeting with THALES divisions:

- Presentation of the three application experiments related to the THALES platform to THALES Optronics, 1st October 2020.
- Presentation of the RuntimeArchitect solution developed by LinkSoftware in its application experiment to THALES Avionics, 13th November 2020.
- Distributed all application experiments flyers and promote the FED4SAE website to THALES divisions.
- Event with the Impact of the COVID-19, Thales succeeded to promote the results of FED4SAE externally and internally.

3. Evaluation and Reporting

The partners summarized the relevant information in an Excel spreadsheet, published on a yearly basis in Dissemination report deliverables. The format has been agreed and events thus far are visible in ANNEX 1: Activity Reporting Spreadsheet.

KPIs were and reported to the EC and the public on a yearly basis in the Dissemination report deliverables. Targets are outlined in Table 5: FED4SAE Dissemination KPIs, and include:

- Community engagement
- Open call documents downloads
- Attendance of webinars and post event video views
- Website page views
- Number of publications and conference communication
- Number and reach of international events attended by partners
- Social networking reach (followers, number of posts) for Twitter, Facebook and LinkedIn.

This document reports the overall KPIs at the end of year 3 of the project.

4. Conclusions

In its three years, the FED4SAE project intended to facilitate the development and commercial exploitation of CPS for productivity improvements and digital transformation in a wide variety of tech and non-tech sectors. Our dissemination strategy for the three years has proven successful in engaging a broad audience around the topic of CPS applications and funding available. During the third year of the project, we focused more on dissemination via local partner networks and clusters, redesigned parts of the project website, generated success stories and flyers, in addition to social media, online communication, conferences and publications, to further expose the Application Experiments and their results.

Table 5: FED4SAE Dissemination KPIs.

Target groups	KPIs	Min. target- end of project	Current
Tech companies	# of startups, SMEs and midcaps engaged through open call dissemination activities and events	500	3000
	# of startups, SMEs and midcaps submitting proposals to open calls	150	116
	# of startups, SMEs and midcaps supported through open calls	30	32
	# of participation at exhibitions/trade fairs with selected Third Parties to promote experiment results	5	4 (DATE 2021)
Newcomers	# of participation at exhibitions/trade fairs with selected Third parties to promote experiment results	2	0
Regional innovation networks and accelerators	# of participation in workshops with policymakers and SAE community	3	3
Investors	# of participation in private meetings with innovators	10	56
Policy makers	# of policy recommendations and implementation thereof by regional/EU bodies	2	0
SAE community (other projects in the call and CSAs)	# of participation in workshops with policymakers and regional innovation networks and innovators	3	3
Broader CPS and Embedded System innovation community	# of followers on social media (Twitter, LinkedIn, Facebook) # of website visits, click rate	At least 300 followers (Twitter); 200 posts (Facebook); 1 monthly update (LinkedIn); 20,000 website visits	387 followers at the end of year 3 244 Facebook posts at the year 3 252 LinkedIn posts; 22,306 website visits

References

Brown, Jim. *Going Social with Product Development*. 2018 Nov 2009.
Accessed: 31 Oct 2017.
http://tech-clarity.com/going social-with-product-development/1375

DFA Media. *60% of manufacturers are testing Industrial Internet of Things programmes but only 1 in 20 have a clear business case*.
Accessed: 29 Sep 2017.
http://pwemag.co.uk/news/fullstory.php/aid/2723/60_25_of_manufacturers_are_testing_Industrial_Internet_of_hings_programmes_but_only_1_in_20_have_a_clear_business_case.html

Don, Joel. *How Industrial Engineers Use Social Media*. n.d. 30 OCt 2017
https://automation.isa.org/2016/08/how-industrial-engineers-use-social-media/

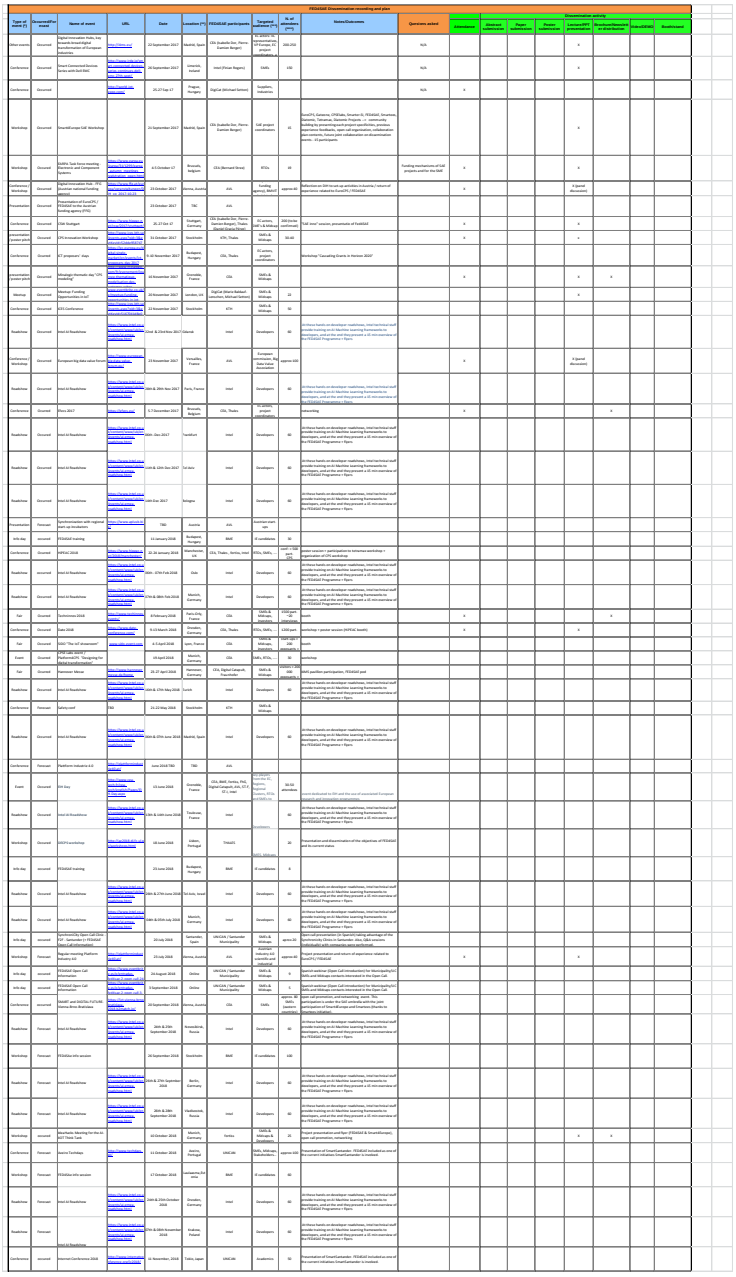
Giannatelli, Ada. *Social Media Strategy for Communication and Dissemination*. 26 June 2014. Politecnico di Milano. 30 Oct 2017.
https://www.slideshare.net/giannatelli/app4-inno-socialmediastrategywebinarslideshare

Government of the United Kingdom. *Building our Industrial Strategy*. Green Paper. London: HM Government.2017
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/611705/building-our industrialstrategy-green-paper.pdf

Nati, Dr. Michele. *F-Interop Open Call: Lessons learnt*. 6 Sep 2017. Digital Catapult Center. 15 Nov 2017
https://www.digitalcatapultcentre.org.uk/f-interop-open-call-lessons-learnt/

ANNEX 1: Activity Reporting Spreadsheet

The activity reporting spreadsheet lists all the conferences, events and workshops attended by the consortium, as well as the planned ones. It gives an overview of all the events, their date/location/topics, it details the partner(s) that will attend the event, what kind of activity (networking, workshop/round-table, poster, etc.), the targeted audience, the dissemination activities and comments/feedbacks. This is illustrated by the reporting spreadsheet except focusing on presenting the events attended during all three years.



ANNEX 2: FED4SAE Application Experiment Flyer template

ANNEX 3: FED4SAE Application Experiment Success Story template