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1. EXECUTIVE SUMMARY

1.1 Publishable summary

This document summarizes the IoT large-scale pilots' events with national and regional initiatives organised to promote the results of the projects, identify the synergies with similar national and regional initiatives in order to drive knowledge and technology transfer, through deployment, scalability, replication and training in the European IoT innovation ecosystem and facilitating the uptake of innovative ideas flowing among different IoT initiatives.

IoT is a disruptive innovation as it radically changes business processes within and across sectors and in this context the exchange of ideas and results among IoT initiatives operating on regional, national or EU level has a key role in advancing, exploiting and disseminating knowledge and IoT technology.

Research and innovation results generated by IoT European Large-Scale Pilots programme projects are used as catalyst for increasing cooperation in investment across regions, while leveraging research and innovation in different regions and countries.

As the IoT ecosystem is characterized by complex interactions between technology providers and users, with an important role to the infrastructure where the different solutions are deployed, a key feature of the ecosystem is the dynamic interaction with other national and regional initiatives that address specific environments. This interaction and interaction are constantly evolving in order to ensure scalability, replicability and the use of open standards and widespread interoperability.

The IoT large-scale pilots' events with national and regional initiatives are aiming as well on increasing the level of acceptance and adoption of the technology being developed in the LSPs projects, and motivate end-users to use IoT technology and to contribute with their insights and experiences of using IoT in the LSPs.

These events have demonstrated that these interactions are a good opportunity to further understand the process of end-user adoption of IoT technologies and applications, while the IoT developers use the interactions to present their IoT solutions and to attract potential future adopters.

Several future activities and upcoming events related to the different IoT European Large-Scale Pilots programme projects are presented. The future activities aim for disseminating and promoting the research and innovation results generated by the IoT LSP projects for scaling up the key IoT technology components and further facilitate pooling resources and linking national and regional IoT programmes, projects and initiatives, such as testbeds, experimentation facilities and pilots.

1.2 Non-publishable information

The document is public.

2. INTRODUCTION

2.1 Purpose and target group

The EC has actively supported the pilots financed under the IoT European Large-Scale Pilots programme to interact with national and regional initiatives and disseminate the solutions and concepts of developing and demonstrating IoT solutions for key societal challenges such as smart cities, smart agriculture, wearables, healthcare, and automated driving in Europe. These interactions are key for putting these solutions to the market and ensure that the future IoT solutions can interoperate and share data openly at regional, national and European level, IoT security and privacy is included by design across Europe and Europe can supply open platforms and standards based solutions for the IoT.

The IoT large-scale pilots' events with national and regional initiatives are used to promote the results from the LSPs projects and demonstrate that there is a need for deployment of interoperable, scalable, trusted, accessible and usable solutions at the national and regional level addressing the regulatory challenges that are necessary to replicate, scale and expand the IoT applications in a safe and secure manner and increase the adoption of these applications across the industrial sectors. The IoT training targets professionals working with technology, digital transformation, information systems, research and innovation, production and business.

The purpose of this work is to give an overview of the LSPs activities at national and regional levels, as well as an insight into the relevant activities and events in the relatively near future. The target group is both the LSP partners and other stakeholders, as an arena for coordination and support through alignment, synchronisation and exchanges of IoT practice.

2.2 Contributions of partners

The contributions of involved partners to various sections of the document is explained below.

SINTEF: Contributed on events and initiatives in Europe, future activities for the LSPs, and report processing.

ATOS: Contributed on events and initiatives in Europe with focus on activities in Spain.

ISMB/LINKS: Contributed on events and initiatives in Europe and activities in Italy promoting AUTOPILOT and MONICA.

MI: Elaborated on the IoT training organised with the support of several LSPs projects to disseminate best practices and challenges.

AS: Contributed on events and initiatives in Switzerland (IoT training).

2.3 Relations to other activities in the project

This work is primarily related to the tasks T01.01: IoT Focus Area coordination and road and T01.03: European IoT community building in the digital single market context. But is also related to selected tasks within most of the work packages, for instance parts of the work carried out within WP07: Communication and Collaboration Strategy, Dissemination and Events Management.

3. EVENTS AND INITIATIVES ACROSS EUROPE INVOLVING NATIONAL INITIATIVES TO PROMOTE IOT ACTIVITIES

In order to achieve its goals, the IoT European Large-Scale Pilots programme projects have been involved in events with national and regional initiatives to support and enhance the IoT innovation opportunities, deployment, scalability and replicability.

Coordination and orchestration of IoT large-scale pilot projects deployments, common IoT platform development and use are needed to reduce fragmentation and in this context, it is very important that national programmes become more closely linked to each other and to EU funded IoT programmes.

The aim of the events with national and regional initiatives is to create an environment to support promising initiatives to achieve critical mass and obtain at technical level interoperability and integration of legacy systems and evolving IoT platforms.

The IoT European Large-Scale Pilots programme projects offer the experience on validation, demonstration and experimentation in realistic settings of the different pilots that could support and enhanced the deployments and adoption at national and regional level.

Furthermore, these events effectively support the dissemination activities and ensure a wide take-up of best practices and recommendations and commitment to standardisation.

3.1 IoT Training

Fruitful discussions took place at the 2019 IoT Week in Aarhus, Denmark, the IoT conference that brought together more than 360 speakers from the worlds of research, industry, business, technology and science.

Various program activities, including a central booth featuring all the LSPs projects, enabled participants to explore IoT deeply, with the UN sustainability goals as a starting point. Many discussions emphasised the need of disseminating the information created and experimented inside the LSPs projects. This greatly facilitated the organisation of a short IoT training with cutting edge experts from the European research and industry ecosystem.

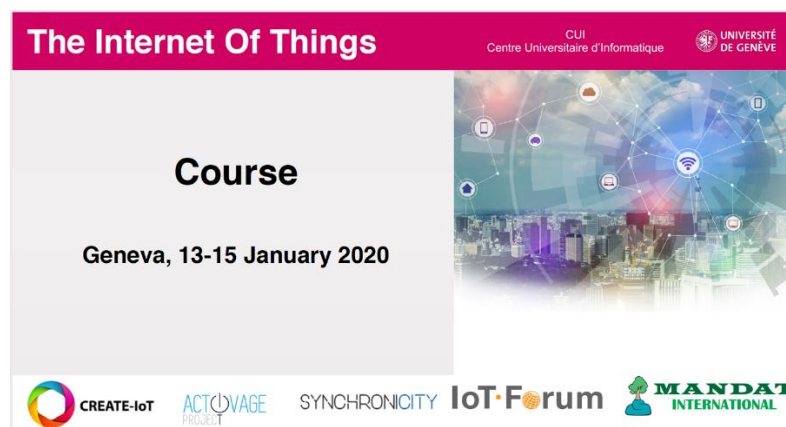


Figure 1: IoT training (first session)

The first session of the IoT training was scheduled on 13-15 JANUARY 2020 in Geneva, Switzerland, home of international organisations and easily reachable from all European countries. Among the project partners both MI and AS were supposed to contribute and participate.

The IoT training aims at raising the interest about IoT in the private sector by showing potential opportunities in various verticals and by sharing challenges and best practices drawn from the

LSPs findings. A special emphasis is put on data privacy because this hot topic is a concern for decision makers in the private sector and in certain cases it is the blocking factor that slows down the economic growth of IoT products and services in the marketplace.

By providing solutions to launch “safe” IoT projects, it is envisaged that this will boost the number of IoT products and services in the private sector and foster the take up of IoT in Europe.

3.1.1 Partnerships

The IoT training is hosted by the Centre Universitaire Informatique of the University of Geneva as part of its continuous education schema. The training description can be found at the university web page [24]. The IoT Forum and Mandat International support the initiative.

The IoT training share the challenges and best practices of the IoT Large Scale Pilot projects, with a strong focus on the ACTIVAGE and SYNCHRONICITY projects. ACTIVAGE makes an extensive usage of IoT-enabled biosensors, conveying personal and sensitive health data. SYNCHRONICITY launched pilots in several cities, one of them being Carouge, in the suburbs of Geneva.

Even though GDPR is not applied in Switzerland, citizen’s security, privacy and trust are key concerns for mayors in the country. SYNCHRONICITY has developed a reference architecture for the smart city market including privacy by design, which has been implemented and tested in Carouge.

Both projects provide great use cases to demonstrate how IoT can be applied across various sectors. They can share lessons learned with decision makers and provide hints to overcome the challenges generated by the introduction of IoT in the marketplace.

CREATE-IoT makes this easy by streamlining the technological solutions that are of common interest and applicable across the various application domains and use cases.

3.1.2 Related SDGs

The IoT training contributes to the promotion of several Sustainable Development Goals (SDG), namely:

- GOAL 3: Good Health and Well-being [9].
- GOAL 4: Quality Education [10].
- GOAL 11: Sustainable Cities and Communities [11].

3.1.3 Objectives

This training is the first one of a hybrid curriculum mixing up classroom training, on-line learning and attendance to the IoT week, the leading European conference. Professional credential validates knowledge acquired during the course and can serve as a standalone credential or grant credits to the curriculum.

This first short IoT training aims at:

- Provide a multidisciplinary education on the Internet of Things with cutting edge experts from the European research and industry ecosystem
- Empower the professionals to lead the evolution of the IoT in their organisations
- Develop skills and expertise articulating academic knowledge and business expertise
- Encourage the pooling of experience and knowledge between peers and with stakeholders to develop innovative approaches
- Build a professional network

The training takeaways are transferable across a multitude of industries, helping participants to increase their influence in their organization and promote the adoption of IoT solutions.

3.1.4 Audience

The IoT training targets professionals holding roles such as Chief Technology Officer, Digital Transformation Manager, Director and Manager of Information Systems, C-level Executive in charge of/interested by Innovation, Project Manager, Research and Innovation Manager, Civil Servant in charge of Smart Cities, Business and Production Manager, Experienced Engineer.

For managers and entrepreneurs, this training demystifies the IoT jargon and shows them how IoT can impact their organization. It fosters brainstorming about how to capitalize on the opportunities IoT can provide.

For Data Protection Officers and Security experts highly concerned by data security issues, this training gives insights on data protection challenges brought by the inevitable proliferation of IoT devices in organisations and clues on how to mitigate the risks proactively and efficiently.

3.1.5 Programme

The three days training provides an overview of the necessary technologies, components, enablers and constraints for using IoT in the business world. It provides useful insights on Data Protection challenges, best practices and fundamentals. It walks the participants thru real-world case studies from the LSPs, demonstrating IoT is already transforming customer experience, operations and business models. The training is structured as follows:

- Day 1 DEMYSTIFYING IoT - *Demystify the IoT jargon, present the IoT landscape, share industry views and insights.*
- Day 2 PROTECTING IoT DATA, featuring ACTIVAGE use cases - *Highlight the relevance of data privacy in the IoT world, share guidelines and challenges from the ACTIVAGE project.*
- Day 3 NAVIGATING in SMART CITIES, featuring SYNCHRONICITY use cases - *Highlight the relevance of data privacy in the IoT world, share guidelines and challenges from the SYNCHRONICITY project.*

Post-training, the participants get additional on-line resources to deeper the knowledge acquired during the class-room training.

3.1.6 Next steps

The three days training scheduled in January 2020 have to be postponed to a later date due to insufficient number of registrations. The current lack of interest in the French part of Switzerland is very unfortunate but representative of the status of the field: high interest in the research community, increasing interest in the business world, mainly within the large corporations that have the necessary funds to invest in private R&D, European research projects, labs and marketing events, but slow take up of the industry at the individual level.

Another dissemination idea came up. A new proposal consists of co-locating an IoT training with the IoT Week 2020. This annual conference gathers leaders from the worlds of business, tech and science to shed light on the future of technology and its impact on business and life. It attracts many managers and experts who are eager to listen to the leaders and who are seeking to develop their skills and knowledge in IoT to be ahead of their peers in this fast-developing field. Therefore, a new curriculum will be designed to offer training prior to the conference, as well as an exam post-conference to validate the knowledge acquired by attending both the training and the conference tracks.

A professional certificate will demonstrate the candidates have acquired specific IoT knowledge and will validate their skills. Achieving an industry-recognized certification is valuable in every profession. It gives employers confidence in the candidates' abilities and knowledge and increase their value on the market. It also allows to expand the network of experts who can then further develop the field and promote new business opportunities.

3.2 First MEC Hackathon and Edge Cloud Italy 2018

The first MEC Hackathon had been organized by Intel, LINKS Foundation, VIAVI, MobileEdgeX, KNect365, Huawei, Saguna, with the patronage of ETSI and took place the 18th of September 2018.



Figure 2: First MEC Hackathon

The hackathon's goal was to develop automotive MEC applications on Intel and Saguna MEC servers.

During the Hackathon, a workshop about MEC computing had been held in the same location with several stakeholders presenting their products or experience with automotive MEC apps.

Among the others, LINKS presented its view about IoT for Automated driving, and in detail, the implementation tested in the Italian Pilot site (Port of Livorno) of the AUTOPILOT project.

The participants were 40 people coming from different companies mainly from Piedmont and Lombardy regions.

The impact of the workshop was to disseminate the paradigm of edge computing (that wasn't widely known at that time) and its application in the automotive scenario.

3.3 "Smart roads for AD cars": the AUTOPILOT project in Livorno

The 18th and 19th of October 2018, CNIT (National, Inter-University Consortium for Telecommunications, [12]) as Pilot Site Leader, organized this event to present the results of the Italian experimentations. The Italian permanent Pilot Site is a testing infrastructure encompassing the Florence – Livorno highway together with road access to the Livorno seaport settlement.



Figure 3: Italian Pilot Site (AUTOPILOT)

During the event, a workshop on the future of smart roads and autonomous driving impact has been held. The presenters were from the Tuscany region, from different cities in Italy (Turin, Rome

and Verona), from the Italian transportation ministry and from ANAS (the company that manages more than 20000 Km of Italian motorways), etc.

Finally, a real demonstration of the Autopilot use cases had been presented.

The event had a big regional impact with news from local newspapers and televisions. At the event were present several stakeholders from government, big industries and SME.

The technical impact was on the demonstration of real use cases, interesting not only for the “standard” stakeholders (municipality, OEM, etc.) but also from the logistic point of view in particular for the impact of IoT in Vulnerable Road User protection and Autonomous driving.

The agenda of the event can be found at the link in the following reference [13].

3.4 “Smart Roads” National initiative

On 28th February 2018, the Italian Ministry for Infrastructures and Transportation (MIT) issued a Decree (a.k.a. “Smart Road Decree” - DM 70/2018), about road connectivity and autonomous driving. It led also to the creation of a National Observatory on Smart Roads (art. 20) by and within the Department of Information and Statistics Systems of the same Ministry.

The Observatory on Smart Roads mainly deals with (a) the collection of data from the experimentation and with the management of the (b) authorizations for testing autonomous vehicles on public roads. This foreground is important to highlight the following results which will position the Turin ecosystem with TCL:

- Turin has been selected (with Parma) as **the first city in Italy to experiment autonomous driving in an urban context**. In fact, the City today meets all the 12 technical parameters indicated in the "Smart Road" decree, among which, very important, the presence of optical fiber and traffic detection systems, sensors at traffic lights, spire under the asphalt that ensure the detection of cars passages, and then to have a real-time picture of traffic, smart cameras at intersections.
- Turin has signed a **MOU (Memorandum of Understanding) with the MIT** for the cooperation on Smart Roads and, consequently, MIT participate in the National Observatory on Smart Roads
- Due to the obligations of Smart Road Decree, TCL will have to supervise the collection of all the **data from the smart road experiments**. Most importantly, this context will facilitate the growth of AI applications to several filed (autonomous driving, management of road infrastructure, safety of pedestrians and other vulnerable road users).
- The city of Turin, in the framework of the two contexts TCL and Smart Roads National initiative, has promoted the creation of a **local partnership (“Torino Smart Road”)**, collecting all the main local and non-local stakeholders (industrial, governmental and research partners) interested in the experimentation of Connected and Autonomous Mobility (CAM); among them: FCA, GM, FEV Italia, Magneti Marelli, TIM, UNipol, LINKS Foundation, Politecnico di Torino, Università degli Studi di Torino - hence a strong partnership involving a rich network spanning from the industrial automotive sector, to the telecommunications and research. Torino Smart Road is promoting cutting-edge experiments, putting together smart roads, CAM and 5G and has been awarded the Global Road Achievement Award (GRAA) 2019 at the IRF Global R2T (Roads to Tomorrow) Conference & Exhibition in Las Vegas
- Turin is the first Italian **5G city** (together with Rome and Naples) and, specifically in the sector of CAM, Turin Municipality has joined the **5GAA (5G Automotive Association)**, the international Body promoting the experiments, the standardization, the adoption and the deployment of 5G for CAM. Turin has hosted also one 5GAA meeting, with a large set of demonstrations of 5G for CAM [14].

- More in general, not only for CAM, the Turin municipality and TIM (the Italian incumbent telecom provider) have signed a MOU about the promotion of **5G for the Smart City evolution**. Importantly, also this will have impact (albeit indirectly) on autonomous driving: according to the IoT paradigm and leveraging the new architectures (such as SDN, MEC,...) a large amount of additional and contextual data will be made available to enforce safety and increase comfort in driving.

3.5 Hackathon on Urban Spaces

The final MONICA Hackathon on Urban Spaces [15] took place in Torino from 8th to 11th November 2018, challenging 46 participants to build a user-centred solution for an improved nightlife experience, based on open data provided by MONICA.

The aim of the Urban Spaces Hackathon is to foster innovative, digital solutions that can enhance the engagement and experience of event goers, minimising the negative effects of crowds gathering and maximising the joys of nightlife.

The starting point was the nightlife in Torino, known as Movida, which is centred around the San Salvario District where MONICA is deploying its sound and security solutions.

3.5.1 The challenge

The challenge is to build an application, utility or service, starting from the data provided by the MONICA open data platform.

The solution should be able to offer to the Movida goers a 360° experience of the nightlife of the district as if they entered into a theme park: presentation and reviews of local businesses, cultural programmes, special offers, interaction with IoT and wearables, rewarding or loyalty programmes, payments and access to information provided by the city administration.

It should also consider engagement of the user in a way that changes his or her behaviour. Thus, solutions could include:

- Information about noise level, motivating the individual to lower the volume of conversation.
- Notifications to move to less crowded locations due to security reasons.
- Reward system for behavioural change e.g. discounts and special offers.
- Nudging and behavioural design.

The specific objective of the hackathon is to conceive an innovative, participatory and locally based answer to the Movida management in San Salvario with solutions focused on user involvement and enhancing user experience in urban spaces.

The city will also use the results to develop a local business model for the overall management of a city's open space affected by the phenomena known as Movida or other "spontaneous" crowd gathering for leisure purposes.

The winning idea should be easily transferable to other areas of the city and to other EU cities with similar challenges.

The Urban Spaces hackathon is one out of three hackathons organised by MONICA to foster new innovative applications from entrepreneurs in terms of user engagement and enhanced user experience at events in the city.

3.5.2 Programme

The three days hackathon provided:

- Introduction and team presentations, CAP presentation and San Salvario tour, the MOVIDA district.

- Core day of the hackathon.
- Presentation of results and awards.

3.5.3 The winning solution – next steps

By displaying sound levels on tablets in clubs and bars as well as on media totems in the street, the project aims to increase awareness of the noise issues and engage bar owners and nightclubbers in different ways to change their behaviour.

Different actions are started by the application when noise levels are too high but also when the crowd manages to reduce the sound levels. Additionally, different economic incentives to reduce noise are introduced.



Figure 4: The winning solution representatives

As an option, a “Shhh” app for mobile phones can also be downloaded, so that it is possible to send messages asking for less noise in certain areas. Thereby, a sense of respect for the community is reinforced through engagement and connection with the residents.

The hackathon was organised by Santer Reply SpA in collaboration with MONICA project partners City of Torino and LINKS Foundation.

To further develop the idea, the winning team will now enter a follow-up support Growth Programme [16] provided by MONICA project partners and the hackathon organisers.

3.6 5G and IoT connectivity

Apart from the previous initiatives pointed in the D01.05, new initiatives have raised in Spain at national level. One of the most highlighted (and new) is framed under the 5G National Plan [17][18][19], with the 5G as a core enabler for IoT connectivity, scalability and real time services. The National Plan includes different activities about "fostering 5G technology with pilots and I+D+I activities", and changes and configuration in the national frequencies to allow the implementation of pilots.

The first round of pilots was approved in 23rd February 2018 through the public company Red.es, opening the call. That call finalised in May 2019 with two pilots to be developed in the Autonomous Communities of Andalusia and Galicia. Both pilots had the objectives of:

- To support the deployment of the first 5G networks.
- To experiment with 5G network management technology.
- To develop use cases with all the stakeholders to validate the three big enhancements provided by 5G: high speed communications and capacity, reliability and low latency and massive communications machine to machine. All these enhancements as key needs to develop new IoT Services.

Andalucia pilot: it is composed by 32 use cases with a duration of 30 months and 25M€ (6M€ by Red.es and FEDER funds). The pilots are focused on agriculture, health, smart cities, security and defence, society, economy, digital cultures, digital transformation and tourism. A 5G network will be available through the cities of Malaga, Cadiz, Sevilla, Huelva y Jaen.

Galicia pilot: it is composed by 8 use cases with a duration of 24 months and 11M€ (4M€ by Red.es and FEDER funds). The pilots are focused on event's streaming, connected vehicle, train's infrastructure maintaining and industry 4.0. The 5G network deployed will cover different cities in Ferrol, Coruña, Vigo, Orense and other infrastructure related points.

More recently, a second round of funding for 5G pilots has been opened. At 4th of October 2019, a new call of funding was approved, opening a new call for new pilots. That time the budget managed by Red.es was distributed by (11) Autonomous Communities, each one with a concrete budget estimation until reaching the total of 45M€. The call is now under the evaluation process. This second round demonstrate the Spanish awareness (and commitment) about the importance of 5G networks and deployments to enable new business opportunities, developments, digital transformation, etc, including IoT as a horizontal technology applied multisectoral.

3.7 Connected Industry 4.0

Spanish Government has been aware about the importance of digital transformation for the industry, in the road to Connected Industry 4.0. The General Secretary of Industry, in a jointly effort with public and private sector, develops in 2015 the Connected Industry 4.0 strategy. This strategy responds to 3 objectives: increase the added value for industry and qualified employees, to foster the Industrial Spanish sector about the new technological related areas and enhance the competitiveness of Spanish industry to increase exports.

Once the strategy is ready, different actuation lines are opened, together with strategical areas, including the support for development of digital transformation with funding calls. The last one opened during 2019 with a budget of 20M€ distributed between 17 approved projects.

Planetic [20] is a non-profit Spanish platform, focusing about offering a global integrated view of Spanish TIC sector. Helping to different sectors to foster their digitisation process and positioning them into the international market. It is also a collaborative space for Innovation, Research and development, where companies and stakeholders can be informed about different initiatives, task forces and strategies to support their progresses. In the case of the task forces, there exists different fields of participation, some of them very related to IoT technologies or the sectors covered by the different LSP projects: AAL, DIH, Robotics, AI or Industry 4.0. Each task force contains its own activities and objectives, but always, with the focus on helping and promoting the national TIC sector.

3.8 Smart Cities scale-up initiate

One of the last (and new) initiatives very related to smart-cities, it is the Scale-Up Initiate, as an outcome from Synchronicity and OASC. It aims to create a network of cities that shares a common vision about how to develop efficient, cost-effective and citizen-centric services. To be part of this Network/Community, an official representative of a public administration at local, regional, national or European level, needs to sign the initiative[21]. The members of Scale-Up agrees about:

- A citizen-centric approach.
- A city-led approach at EU level.
- The city as a citizen-driven and open innovation ecosystem.
- Ethical and socially responsible access, use, sharing and management of data
- Technologies as key enablers.

- Interoperable digital platforms based on open standards and technical specifications, Application Programming Interfaces (APIs) and shared data models.

The last point is one of the most relevant, from a technological and platform development point of view. Taking attention to Synchronicity, it proposes a common Framework based on the OASC MIMs (Minimum Interoperability Mechanisms): vendor neutral and technology-agnostic blocks that combined provides the technological base for IoT deployments and services implementation for cities and communities. There exists five MIM: Personal Data, Context Information, Marketplace, Fair AI and Data Models.

Different events have been organized to promote the signing, and increasing the number of members composing the Scale-Up Initiative [22][23]. In the case of Spain, there are already 13 signed cities: “Diputacion Provincial” of Alicante, and the cities of: Bilbao, Madrid, Santander, Malaga, Zaragoza, Alcoy, Granada, Gijon, Valencia, Barcelona, Murcia y Algeciras.

3.9 IoT and pan-European initiatives for digitizing industry

As part of the workshop series "CREATE-IoT the Next Generation IoT experience for the Future", the "IoT and pan-European initiatives for digitizing industry" event was organised in Lisbon, Portugal, 28th February 2019 [25]. This session focused on IoT and pan-European digital transitions and covered the following topics:

- IoT Large-Scale Pilots Programme as part of digitising European industry strategy.
- IoT Market Trends - Presentation of the e-Book on IoT Market Trends.
- Digital transformation experiences beyond large-scale pilots.
- The role of public authorities, local, regional and MSs initiatives in digital transformation and IoT future developments - "Build Ecosystems, Not Labs! "
- The role of public authorities, local, regional and MSs initiatives in digital transformation and IoT future developments.
- Synergies among different initiatives and future developments.
- Horizon Europe perspective – what next.

Representatives from CREATE-IoT, U4IoT, and all the LSPs where present, in addition to stakeholders from the public authorities and private sectors.



Figure 5: Introduction to the "IoT and pan-European initiatives for digitizing industry" event

Developing and enlarging the European IoT ecosystems requires strong links between communities of IoT users and providers, Member States' initiatives, government representatives and policy makers to discuss, align and plan research, innovation, development and deployment of IoT technologies and applications across various industrial sectors as part of the digitising European industry initiative.

The Workshops series organised by CREATE-IoT aimed to foster links between communities of IoT users and providers, as well as with Member States' initiatives, and to connect with other initiatives including contractual Public-Private-Partnerships, exploit the combination of IoT and Art for stimulating innovation and acceptance and support the preparation for the next generation of IoT deployment and future funding programmes.

The event organised in Lisbon was an ideal platform for different IoT value chain stakeholders, government representatives and policy makers to meet and discuss the current state of play of IoT large-scale deployments involving existing and local communities and addressing a combination of sustainability areas and future policy developments.

The "European Industry Partnerships Collaborative Event" event was organised in Amsterdam, The Netherlands, 17th April 2019 [26]. The workshop report is available at the IOT European Large-Scale Pilots programme website [27]. The discussions addressed three areas that were very relevant to Member States' initiatives, and links with present and future European partnerships:

- European perspective in a global market (issues related to sovereignty, autonomy, value chains, role of new partnerships)
- Innovation, deployment and emerging technologies
- A research and innovation perspective on converging technologies (5G, IoT/IIoT, AI, edge computing, DLTs, big data, etc.)

The "European Industry Partnerships for New Digital Age" event was organised in Brussels, The Belgium, 12th September 2019 [28]. The discussions highlighted that a coordinated action at EU level is needed to avoid fragmentation of public digital services across the EU and within MSs, prevent inefficient use of resources and only partial cross-border exchange of expertise, with negative societal and economic impacts. It was pointed out that to this end, under the next framework programme Horizon Europe, the European Commission (EC) could consider an "Alliance" with Member States (MSs) and/or new partnerships with stakeholders in relevant areas to facilitate closer cooperation among industrial data controllers, accelerate coordinated investments (possibly in the form of an IPCEI - Important Projects of Common European Interest), and promote fast deployment of next generation mobile networks as well as data exchange models that allow third party businesses (non-data-owners) to access data sets resulting from data owners' cooperation.

The workshop aimed to identify potential synergies with national and regional programmes, address means to bring together a broad range of innovation actors to work towards a common goal and turns research into socio-economic results.

The "European Industry Partnerships Lighthouses to Thrive in the New Digital Age" event was organised in Brussels, Belgium, 05th November 2019 [29]. The discussion on "Enhancing Europe's technological sovereignty has been prominently presented under the new mandate of the EC. The EC's industrial strategy has to focus on key value chains to support Europe's autonomy. In this context, the Strategic Value Chain (SVC) on IIoT must be built on European assets in AI, data economy, cloud, 5G, cybersecurity and strong verticals, mobilising public and private investments and EU programmes (notably Horizon Europe and Digital Europe).

The dynamic interaction with the various national and regional initiatives in the area of IoT/IIOT, AI, 5G was identified as a priority with the need to act now to create value for European society, economy and citizens as important strategic issues related to digitisation, autonomy and sovereignty in an interconnected global environment.

4. FUTURE ACTIVITIES

4.1 CREATE-IoT and future activities

The future activities aim for disseminating and promoting the research and innovation results generated by IoT European Large-Scale Pilots programme projects for scaling up the key IoT technology components and further facilitate pooling resources and linking national and regional IoT programmes, projects and initiatives, such as testbeds, experimentation facilities and pilots.

In this context, the most immediate actions call for further and more intense joint action of the EU and the national IoT projects to address the challenges of digitising industry and encourage the collaboration, joint programming, co-investment and federation.

4.2 Future activities per LSP

4.2.1 ACTIVAGE

The original start and end date of the ACTIVAGE project is 1st January 2017 and 30th June 2020. but among others, an objective is to specify the governance model for the ACTIVAGE ecosystem in order to achieve sustainability after the end of the project [1].

One important future event to mentioned is the ACTIVAGE Experience Day that will take place in Madrid (Spain) at the Circulo de Bellas Artes on 7th May 2020 [1].

This will be an interactive session where the ACTIVAGE community outcomes will be shown, not only in terms of results of this outstanding project, but also sharing the ACTIVAGE experience first-hand from all the actors involved in the Active and Healthy Ageing (AHA) domain that will join the event.



Figure 6: The Experience Day event (ACTIVAGE) [1]

4.2.2 AUTOPILOT

The original start and end date of the AUTOPILOT project is 1st January 2017 and 31st December 2019. However, the end date is extended to 29th February 2020, and a final event where successfully arranged in Versailles (France) 6th February 2020 with a glimpse into the future regarding IoT for Autonomous Driving [2].

Live demos, Q&A sessions and exhibition area attracted over 200 attendees from Europe and Asia. Partners and stakeholders from the IoT value chain celebrated the impressive results achieved throughout the project's implementation.

New innovation directions have been identified in the project and necessary actions are taken to ensure that the innovations are effectively being exploited after the end of the project.

Both a business exploitation plan and a standardisation plan are prepared. So, AUTOPILOT's impact will continue in the future, bringing smart mobility through IoT to a higher level.



Figure 7: Final event with glimpse into the future (AUTOPILOT) [2]

4.2.3 IoF2020

The original start and end date of the IoF2020 project is 1st January 2017 and 31st December 2020. The IoF2020 project has several upcoming use case demonstrations this year [3]:

- Happy cow - The goal is to show the results and advancements of the use case and attract customers and potential partners. Rossem, Belgium, 1st March 2020.
- Farm machine interoperability - Communication standards for programmers. The goal is to demonstrate the applicability of existing standards. Webinar, 15th April 2020.
- Farm machine interoperability - Lessons learned for Standard Developing Organisations (SDOs). The goal is to disseminate lessons learned from proof of concepts with existing and experimental standards, for further development of standards. Webinar, 15th April 2020.
- Decision-making optimisation in beef supply chain. The main goal is to attract new partners and stakeholders, plus to explore market opportunities, inform the general public about the main topics of the project including an improved traceability of beef products, generate awareness of the use of technology in the livestock sector. Girona, Spain, 22nd June 2020.
- Farm machine interoperability - Harvest logistics optimisation. The goal is to increase the willingness to adopt harvest logistics solution with real-life demonstration of benefits and user-friendliness. 20th October 2020.

The aim of IoF2020 events is to encourage Synergy and Peer-to-Peer learning amongst similar European initiatives.

4.2.4 MONICA

The original start and end date of the MONICA project is 1st January 2017 and 31st March 2020, but roadmaps, business models and new markets analysis will be developed for the sustainability of the platform beyond the project lifetime [4].

Among others, results from the MONICA project will be presented at the upcoming AI Everything event at Dubai World Trade Centre from 10th to 11th March 2020 [4]. AI Everything is one of the largest dedicated AI events in the world, attracting both private and public stakeholders to showcase their advanced AI solutions to more than 10,000 international expected visitors [6].



Figure 8: The AI Everything event [6]

4.2.5 SYNCHRONICITY

The original start and end date of the SYNCHRONICITY project is 1st January 2017 and 31st December 2019, but as they wrote in their project guide "SYNCHRONICITY is just the beginning of a movement to empower those who govern our cities and communities to make the places where we spend our lives work well" [5][7].

An introduction to the project framework and a guide for implementation is provided, including how we all can take the SYNCHRONICITY movement forward through the concept of Minimal Interoperability Mechanisms (MIMs).

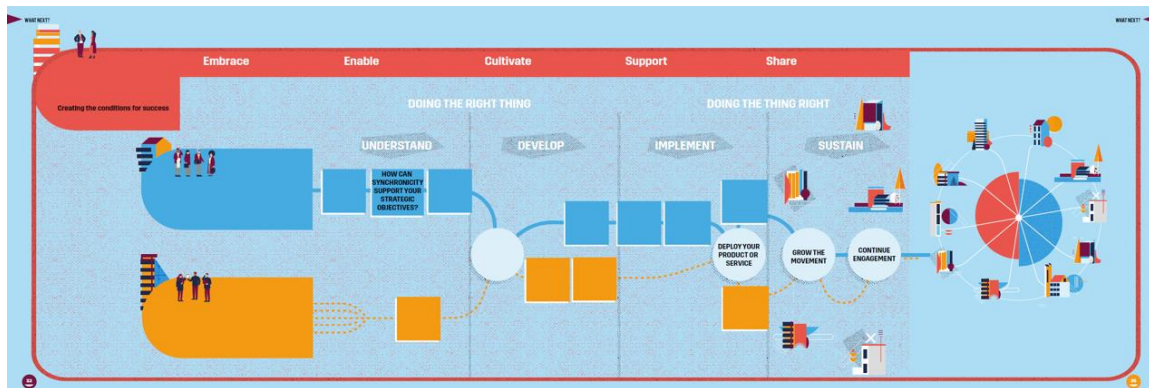


Figure 9: The collective story (SYNCHRONICITY) [7]

5. CONCLUSIONS

Promoting, disseminating, applying and replicating the research and innovation results generated by IoT European Large-Scale Pilots programme projects requires ambitious collective effort involving public and private IoT stakeholders across Europe at regional, national and EU level.

Therefore, the implementation of the IoT large-scale pilots' events with national and regional initiatives with the participation of representatives of the LSPs, national and regional projects, education and training centres, and end-users have an important effect on the continuous EU-wide dialogue for developing and adopting IoT technologies and applications across different industrial sectors.

The events demonstrated the important role of the end-user community in using the IoT applications and marketplaces and the evaluating the perceived create value of IoT solutions.

The long-term value creation, sustainability and scalability of IoT applications requires addressing the infrastructure at the regional and national level and allow users and partners to build applications and create value on top of this infrastructure.

The events provided the arena for debating the issues such as openness to and reliance on third-party complementary applications, which determine the value of IoT platforms where the developers working on the IoT platforms create more applications that make the IoT platform's offering more valuable, resulting into more customers using the platform and sharing the data.

The IoT developments presented during the events showed that the IoT platform makes data accessible and the data need to be shared in a way or another in order to extend the IoT applications capabilities and value.

The IoT European Large-Scale Pilots programme projects demonstrated that the of IoT applications lie both in the data that is made available from connected applications, sensors and devices and the data that is exchanged and process at the edge and in the Cloud.

the IoT large-scale pilots' events with national and regional initiatives emphasised the need to pursue a consistent European data strategy for IoT technologies and applications, by connecting users and providers, and support unlocking data for use across IoT applications across industrial sectors.

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