Newsletter N° 4

January 2017

Editorial

It is our pleasure to present the fourth and last issue of our Road2CPS Newsletter. This issue includes information about the activities that have been implemented during the last six months in relation with the aim of carrying out strategic action for future CPS through roadmaps, impact multiplications and constituency building.

All of our Newsletters as well as other interesting information can be viewed on our website www.road2cps.eu. Please visit our website and also follow us on our social networks (twitter and Facebook).

Our fourth newsletter includes information on activities and events that have been implemented during the Road2CPS project lifespan.

This issue is dedicated to our successful workshops that were organised in Mallorca "Digitizing European Business and Society", and in Newcastle " Identifying Catalysts for Innovation in Smart Systems", Brussels "Strategy Workshop" and also on our final event "SmartCPS Concertation Event" held in Brussels.

We hope you find this information interesting.

Yours sincerely,

Strategic action for future CPS through roadmaps, impact multiplication and constituency building

HORIZON 2020

Coordinator:

**Dr. Meike Reimann
Steinbeis-Europa-Zentrum**

**reimann@steinbeis-europa.de
+49 721 93 51 9119**

ROAD CPS 2

The Road2CPS consortium

What do we understand by CPS?

The term Cyber-Physical System (CPS) describes hardware-software systems which tightly couple the physical world and the virtual world, under the control of humans. They are established from networked embedded systems that are connected with the outside world through sensors and actuators, acquiring data streams from the physical world, establishing and continuously updating a virtual twin of the physical world and with the capability of interacting with the physical world, following instructions from the virtual sphere. Furthermore, CPSs are not merely networked embedded systems but software-intensive, intelligent systems with the capability to collaborate, adapt, and evolve. CPS can be considered to be the technological foundation for the Internet of Things in which every physical object has a virtual representation and in which the physical and virtual reality form a continuum.

What are you going to find in this Newsletter?

Digitizing European Business and Society: Paving the Way towards Smart Destinations and Sustainable Tourism
Mallorca, 11th October 2016

Strategy Workshop

Brussels, 15th November 2016

SmartCPS Concertation Event

Brussels, 30th January 2017

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Road2CPS- Digitizing European Business and Society: Paving the Way towards Smart Destinations and Sustainable Tourism in Mallorca

The Road2CPS Workshop on Smart Destinations was held on October 11, 2016 in Palma de Mallorca, Spain. The workshop originated from the Road2CPS consortium's willingness to review a new emerging domain, Smart Tourism, which appeared to be both very dynamic and CPS-relevant, albeit not as visible as more established domains such as smart factory, smart mobility or smart cities. The workshop preparatory actions confirmed this initial intuition: the development of this sector is nowadays characterized by an increasing adoption of new technologies among which CPS is a key enabler, and by a deliberate impulse of a whole ecosystem (private and public actors). The latter is in strong resonance with current EC initiatives to foster digitizing industry via networks of regional Digital Innovation Hubs (DIH) and Competence Centres (CC). Thus, collecting the views of some of the important actors involved in digitizing tourism was a very interesting and topical opportunity for Road2CPS.

The workshop provided an overview of how such a digitization process is taking place in a particularly active region such as the Balearic Islands, which has invested its long experience of tourism challenge management into a pioneering approach called "Smart Islands". Its aim is to sustain a digital growth of this sector while enhancing the well-being of its residents. This feature's cross-cutting issues such as questioning the role of innovative technologies, planning the development of sustainable infrastructures, reflecting on resilience strategies for cities which see large seasonal population flows, aiming to pave the way towards circular economy. A key point which was acknowledged throughout the day was the importance of new technologies to provide valuable data by which more informed decision-making processes can be set up and assessed, in contrast to the past decades. More generally the phenomenon of digitization and the deployment of Cyber-Physical Systems (CPS) technologies and the Internet of Things (IoT) are expected to increase substantially over the next decades, holding great potential for novel applications, innovative products and services as well as new business models. CPS and IoT technologies increase the ability to predict behaviour and can thus be used to reengineer business

processes, e.g. designing them to be more sustainable, using available resources more efficiently and effectively – in line with the concept of circular economy.

Against this background, this all-day workshop brought together about 40 experts from academia, industry, municipalities and policy-making to learn about and discuss new concepts, frameworks, challenges and opportunities for smart destinations and sustainable tourism facilitated by digitization efforts. It was further set to align specific challenges faced by cities and regions whose economic and labour market profiles are marked by tourism and the corresponding opportunities offered by CPS and IoT technologies.

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CPS experts as well as end-users and businesses ranging from start-ups to large enterprises were invited to participate and contribute to discussions on visionary scenarios, disruptive innovations and their impact on the business ecosystem.

The objectives of the workshop were to stimulate:

- Visionary scenarios on the role and priorities for CPS and IoT technologies to support the evolution towards more sustainable tourism in smart destinations.
- Foster exchange on CPS innovation perspectives and generating future business strategies.
- Aligning priorities and reflection on European initiatives and circular economy aspects to ensure the coherence of results.
- Assessing the impact on the business models of long established sectors such as the tourism economy.

Information on the agenda and speakers can be found by clicking on the following link: **Road2CPS – Workshop on "Digitizing European Business and Society: Paving the Way towards Smart Destinations and Sustainable Tourism"**

Presentations given during the workshop were:

- SMART DESTINATIONS AND SMART TOURISM, Dolores Ordóñez (AnySolution)
- MAKING SPAIN A SMART DESTINATION, Antonio Lopez de Avila (Segittur)
- DIGITISING EUROPEAN BUSINESS, Luis del Olmo (Balears.t)
- TURISTEC PRESENTATION, Jaume Monserrat (Turistec)
- SMART MALLORCA, Cosme Bonet (Mallorca Island Council)
  CALVIÀ SMART MUNICIPALITY, Antonio Tirado (Calvià Town Council)
- CPS & TOURISM, Elena Petrova (Asidees)

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- [CLOUT PROJECT, Juan Ramon Santana (Clout & Festival)](#)
- [TOWARDS CIRCULAR ECONOMY, Rafael Guinea (Tirme)](#)
- [SMART MURCIA, Antonio Skarmeta, (Murcia University)](#)
- [CONCEPTS FOR AGRICULTURE AND TOURISM CYBER-PHYSICAL EXOSYSTEM, Joao Sarraipa (UNINOVA)](#)
- [SMART MANUFACTURING, Marton Borbely (Xetics)](#)

For more details you can find the workshop report on our webpage on the following [link](#).

Road2CPS Identifying Catalysts for Innovation in Smart Systems in Newcastle

The Road2CPS Workshop on Innovation in Smart Systems was held October 21st 2016 in Newcastle upon Tyne (UK), with 15 participants from a range of large and small business. Participants were industrial practitioners, drawn from a wide range of sectors but all interested in application of "smart" digital technologies (including Cyber-Physical Systems (CPS) and/or Internet of Things (IoT)).

The workshop was designed to validate initial findings from the previous 18 months of the Road2CPS project. Initial findings were presented to the participants, and interactive sessions then allowed the participants to discuss the suggestions, consider how they relate to their own sector, and make comments or raise additional recommendations. The overall focus of the day was on barriers to adoption of digitisation technologies and possible solutions to help overcome those barriers.

The workshop aimed to:

- Identify future needs for cyber-physical system (CPS), digitization and smart systems.
- Identify opportunities and barriers in adopting digitisation.
- Generate some recommendations for initiatives and work that could help organisations overcome these barriers.

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Road2CPS Strategy Roadmap Workshop in Brussels

The Road2CPS Strategy Roadmap Workshop, held on November 15, 2016 in Brussels, was set to discuss visions, perspectives and priorities in the area of Cyber-Physical Systems (CPS) and related fields and to draw recommendations for future research and innovation activities.

The workshop gathered 30 experts from the industry, academia and policy-making, and started with presentations providing a broad overview on activities, challenges, priorities and recommendations in the area of 'Digitizing the European Industry' and related fields like Advanced Computing, Cyber-Physical Systems, System-of-Systems (SoS), Internet-of-Things (IoT), and Factories of the Future (FoF). Presenters were asked to specifically focus on recommendations for future research priorities and implementation strategies, which are discussed this workshop report (full presentations are available on the Road2CPS website). During interactive sessions in the afternoon, the participants evaluated and prioritised technological and non-technological themes proposed by Road2CPS, and elaborated on barriers for implementation and topic specific recommendations.

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Amongst the technological topics, and related future research priorities 'integration, interoperability and standards' ranged highest. The topic is connected to digital platforms and reference architectures, which have already become a key priority theme for the European Commission and their Digitisation Strategy, as well as the work on standards to help successful implementation of CPSs. Other themes of very high technological/research relevance revealed to be 'security and privacy' and 'emergence, complexity, adaptability and flexibility'. Thereafter, 'big data and real-time analysis' 'CPS engineering (requirements, design)' were ranked as important fields followed by 'modelling and simulation', 'safety and dependability', 'ubiquitous autonomy and forecasting' as well as 'cognitive CPS and learning' and 'HMI/ human machine awareness'.

Non-technological priority themes, needed for successful implementation were particularly confirmed to be CPS education, training and skills and business models accompanied by recommendations to address the 'human in the loop', community building and networks and collaboration on a regional, national and global level as well as across domains and value chains. Demonstrators and living lab are seen as essential to alleviate concerns and regulatory and legal issues (incl. Single Digital Market) to ensure a reliable framework. Societal dialogue and awareness raising as well as ethics are seen as crucial elements of future CPS development, because of the pervasiveness of CPS into every-day life. Further recommendations included to focus EC incentives on open

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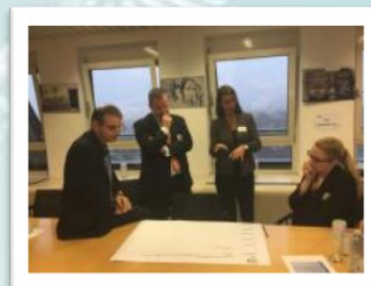
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approaches such as open data, open platform building, supporting open innovations as well as open source solutions.

In short, progress in key technological and non-tech fields identified will help to fuel the development of trustworthy CPS, broaden their applications and enable new business. A cross-disciplinary, multi-domain and inclusive approach should be followed, to best benefit economy and society as a whole.

Information on the agenda and speakers can be found on this link

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Presentations given during the workshop were:

- STRATEGY WORKSHOP, Meike Reimann (Steinbeis-Europa-Zentrum)
- DIGITISING EUROPEAN INDUSTRY, Werner Steinhögl (European Commission)
- STRATEGIC RESEARCH AGENDA 2016, Ad ten Berg (ARTEMIS-IA)
- TOWARDS VALUE CREATION FROM CPS, Stamatis Karnouskos (SAP)
- SME PERSPECTIVE ON INNOVATION MECHANISMS, Haydn Thompsom (THINK GROUP)
- KEY RESEARCH AND INNOVATION CHALLENGES AND MEDIUM-TERM PRIORITIES IN CPS, Christian Sonntag (TU Dortmund)
- HIPEAC VISION 2017 FOR COMPUTING IN 2025, Marc Duranton (Ghent University)
- MANUFACTURING EUROPE'S FOURTH INDUSTRIAL REVOLUTION, Zeljko Pazin (EFFRA)
- INDUSTRY 4.0, Daniel Stock (Fraunhofer IPA)
- RECOMMENDATIONS & RESEARCH PRIORITIES FOR CPS IN MANUFACTURING, Anna DE Carolis, (ScORpIUs)
- IoT STRATEGY ROADMAP, Ovidiu Vermesan (SINTEF)
- CPS: OPPORTINITIES AND CHALLENGES FOR SOFTWARE, SERVICES, CLOUD AND DATA, Andreas Metzger (UDE)

For more details please take a look at our workshop report by clicking on the following link

Road2CPS SmartCPS Concertation Event in Brussels

The jointly organised Road2CPS, TAMS4CPS and ScorPiuS SmartCPS-Concertation-Event brought together over 90 experts from the fields of Cyber-Physical Systems (CPS). In total 20 projects that had been funded under Horizon2020 were presented. This included a number of CSA projects that had been performing CPS roadmapping work considering a variety of viewpoints. In all the results from 6 different roadmaps/research agenda's were presented highlighting a growing consensus on the vision for the future and the research priorities in the domain. This importantly brings together the constituency and provides a single voice which can be used to inform strategic decisions for the future to maximise the impact of the research budget available for CPS

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activities. The work on roadmapping and constituency building will continue with the Platforms4CPS project which additionally will address the ECs desire to support European platform building. Notably there was good synergy between the roadmaps with similar recommendations with respect to technological research priorities and actions required. This was also endorsed by industry presentations from the ARTEMIS-IA and Siemens, matching well with the ARTEMIS-IA Strategic Research Agenda, Siemen's Core Technology Initiatives and also the goals being pursued by the EC's Digitising European Industry initiative.

In addition to the roadmapping work, project presentations were given on the portfolio of CPS H2020 projects. This highlighted a good coverage of research, development and innovation needs across the domain which matched many of the needs identified. Foundational work is being performed addressing new approaches for verification and validation to meet the challenges of guaranteeing safety in an increasingly connected and uncertain world. Security is also being addressed in several projects and the rising importance of this is reflected in the establishment of a Cybersecurity Joint Undertaking. The EC emphasis on addressing the complete value chain of the future considering sensing, networking, multi-core hardware and Big Data analytics is also demonstrated by a number of projects. There are still challenges, however, in the area of development and adoption of platforms within Europe and also exploitation of new data-based business models. Here the EC has a role to play

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in addressing barriers by harmonising legislation on privacy, data ownership and liability.

Within the EC there is a shift from supporting technology development to promoting digitalisation. This is being driven top down by the EC via the Digitising European Industry Initiative. European industry is driven by SMEs and Innovation Hubs that engage with SMEs are seen as vital for raising awareness, transferring skills and providing access to the latest technologies. The existing CPS driven actions EuroCPS and CPS Labs have successfully supported 57 projects to date. These activities should be continued and expanded to also provide commercialisation support for SMEs.

The CPS market is global with major initiatives underway around the world. The opportunities for transatlantic collaboration have been investigated by CPS Summit and TAMS4CPS identifying where it is possible to collaborate and bring together critical mass. Here there are opportunities for exchange of researchers, larger scale joint initiatives to share experimental test beds and data, and also to work on specific topics of mutual interest.

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And here is part of the great team that has made this project such as success:

From left to right: Steve Bageritz (Steinbeis-Germany), Dolores Ordóñez (AnySolution-Spain), Juan Alonso (Atos-Spain), Meike Reimann (Steinbeis-Germany), Juan Rico (Atos-Spain), Murray Sinclair (Univ. Loughborough-UK), Nuria de Lama (Atos-Spain), Juan Cadavid (CEA-France), Benjamin Goetz (Fraunhofer-Germany), Ken Pierce (Univ. Newcastle-UK)

Information on the agenda and speakers can be found on this link.

Presentations given during the concertation event:

- SMART CPS CONCERTATION EVENT, Meike Reimann (Steinbeis)
- DIGITISING EUROPEAN INDUSTRY, Werner Steinhögl (European Commission)
- STRATEGIC ACTION FOR FUTURE CPS THROUGH ROADMAPS, IMPACT MULTIPLICATION AND CONSTITUENCY BUILDING, Meike Reimann (Steinbeis and Nuria Lama (Atos)
- TAMS CPS, Michael Henshaw (Loughborough University)
- sCorPiuS Roadmap Recommendations & Research Priorities for CPS in Manufacturing, Giacomo Tavola (Politecnico di Milano)
- THE HIPEAC VISION, Marc Duranton CEA)

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- [THE UNCOVERCPS APPROACH TOWARDS CERTIFIABLE HUMAN-ROBOT CO-EXISTENCE, Matthias Althoff (Univ. Munich)](#)
- [CPS ENGINEERING LABS, Holger Pfeifer (Fortiss)](#)
- [EURO CPS, Isabelle Dor (CEA)](#)
- [EYES OF THINGS, Oscar Deniz (Univ. Castilla-La Mancha)](#)
- CUSTOMER BENEFITS BY CPS, Roland Rosen (Siemens AG)
- AXIOM SmartCPS, Paolo Gai (Evidence S.R.L.)
- [COSSIM, Andreas Brokalakis (Synelixis Solutions Ltd)](#)
- [INTO-CPS, Ken Pierce (Univ. Newcastle)](#)
- [SECURITY AND SAFETY BY DESIGN FOR EMBEDDED SYSTEMS, Dominique Ragot, (Thales)](#)
- [TRUSTED APPS FOR OPEN CPSS, Holger Pfeifer (Fortiss GmbH)](#)
- [THE PATHWAY TO THE DIGITAL TRANSFORMATION, Ad ten Berg (Artemis Industry Association)](#)
- [BONSEYES ARTIFICIAL INTELLIGENCE MARKETPLACE, Oscar Deniz Suarez (UCLM)](#)
- [CERBERO CROS-LAYER MODEL-BASED FRAMEWORK FOR MULTI-OBJECTIVE DESIGN OF RECONFIGURABLE SYSTEMS IN UNCERTAIN HYBRID ENVIRONMENTS, Francesca Palumbo (Uni Sassari)](#)
- [CPS WARM, Riccardo Tomasi (ISMB)](#)
- [CREATING THE CPS VISION, STRATEGY, TECHNOLOGY BUILDING BLOCKS AND SUPPORTING ECOSYSTEM FOR FUTURE CPS PLATFORMS, Charles Robinson (Thales R&T)](#)
- [CPS SUMMIT, Herald Ruess (Fortiss)](#)
- [SHORT RAPPORT & SYNERGY SESSION, Haydn Thompson (Thhink)](#)

For more details please find the workshop report on our webpage, on the following [link](#).

RESOURCES

On the Road2CPS webpage (http://www.road2cps.eu) you can find a number of interesting documents that have been published by our Consortium. To download them please go to **Resources**.

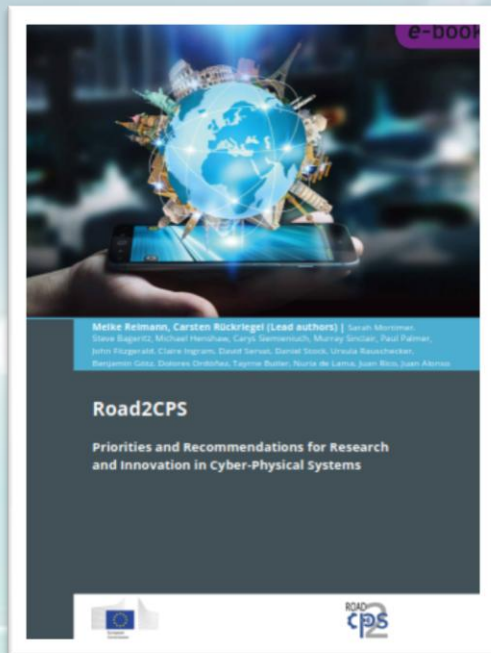**Strategic action for future CPS through roadmaps, impact multiplication and constituency building**

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Apart from all of the Deliverables generated during the project's lifespan, other useful and interesting documents can also be found such as our **Road2CPS EBook**:

This section also includes other interesting papers, EC documents and information on all the events organised during the project lifespan with the presentations of the speakers.

A video summarising the project's activities has also been put together and can be seen on the following link:

To see the pictures taken at the events, please go the **Gallery** on our website.

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Upcoming events

IoT International Conference

March 7, 2017 Brussels (Belgium)

Embedded World 2017

March 14, 2017, Nuremberg (Germany)

CeBIT

March 20-24, 2017, Hannover (Germany)

DATE 2017

March 27, 2017 Lausanne (Switzerland)

Digital Information Forum

May 10-11, 2017, Amsterdam (Netherlands)

HANNOVER MESSE

April 24-28, 2017, Hannover (Germany)

Digital Assembly 2017

June 15-16, Valletta (Malta)

Net futures Conference

June 28-29, 2017, Brussels (Belgium)

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