

Project Communication (Publication: June 2018)

Impact of PICASSO in the field of IoT/CPS

The IoT/CPS Expert Group has developed comprehensive analyses and comparisons of EU and US cross-domain and application-specific drivers and needs, of enabling technologies, research and innovation priorities, current funding and collaboration landscapes, and potential barriers for collaboration in the IoT and CPS sectors. These are the results of a concerted effort that involved a significant number of international experts from industry, academia, research organizations and funding agencies. Based on these results, promising fields for transatlantic collaboration and possible mechanisms were identified.

The work of the IoT/CPS Expert Group has connected EU and US IoT/CPS experts and contributed to unifying their views on priorities and opportunities for research collaboration. The results are valuable for many stakeholders also after the end of PICASSO, e.g. in follow-up initiatives that might be established in response to our recommendations.

What is the PICASSO project about?

The PICASSO project “ICT Policy, Research and Innovation for Smart Society: towards new avenues in EU-US ICT collaboration” is a 2-years project, from January 2016 to June 2018, funded under the European Union Horizon 2020 programme. The project brought together EU and US prominent specialists. Their aim was to reinforce EU-US ICT collaboration in **pre-competitive research about the key enabling technologies related to societal challenges of common interest** – 5G Networks, Big Data, Internet of Things and Cyber Physical Systems – and to support the **EU-US ICT policy dialogue**.

What were the goals of the PICASSO IoT/CPS Expert Group?

The main objectives of the PICASSO Expert Group on the Internet of Things and Cyber-physical Systems (IoT/CPS) were the following:

1. To identify the key societal challenges where the intersection of IoT and CPS offers a large potential for progress,
2. To analyse and compare technology strengths, technology gaps, the collaboration landscape, and barriers for collaboration in the EU and in the US,
3. To disseminate information on EU-US collaboration to a wide variety of industry, academia, and policy stakeholders
4. To develop concrete proposals for future EU-US collaborations that will help to solve key societal challenges for *IoT-enabled cyber-physical systems*

Who are the IoT/CPS Experts?

The following members were involved in the Expert Group:

- Dr. Sebastian Engell, Professor, TU Dortmund, Germany (Expert Group chair)
- Dr. Tariq Samad, Senior Fellow, Technological Leadership Institute, University of Minnesota, US (co-chair)
- Dr. Massoud Amin, Director, Technological Leadership Institute, University of Minnesota, US
- Dr. Chris Greer, Director of the Smart Grid and CPS Program Office and National Coordinator for Smart Grid Interoperability, NIST, US
- Dr. Amit B. Kulkarni, Global R&D Leader for Wireless and IoT, Honeywell ACS, US
- Dr. Paul D. Nielsen, Director and CEO, Software Engineering Institute, Carnegie Mellon University, US
- Dr. Martin Serrano, Principal Investigator & Data Scientist, Insight Centre for Data Analytics, Ireland

- Dr. Haydn Thompson, CEO, THHINK, UK
- Dr. O. Sinan Tumer, Senior Director, SAP Co-Innovation Labs, SAP Labs LLC, US
- Dr. Hubertus Tummescheit, Chief Executive Officer, Modelon Inc., US, and Co-founder, Modelon AB, Sweden
- Dr. Ovidiu Vermesan, Chief Scientist, SINTEF, Norway, and chair of WG01 of the Alliance for Internet of Things Innovation (AIOTI)

Expert Group manager: Christian Sonntag, Senior Scientist, TU Dortmund, Germany

What are the outcomes?

The Expert Group developed the *PICASSO IoT/CPS Opportunity Report* that provides a comprehensive analysis of EU and US cross-domain and application-specific drivers and needs, enabling technologies, research and innovation priorities, current funding and collaboration landscapes, and potential barriers. The report is based on extensive analytical work as well as in-depth discussions and validations with a large network of EG members and external stakeholders, including US funding agencies, the relevant EC units, industry-led associations, international technology companies, other EU-US collaboration initiatives, international expert networks, R&I projects, and roadmapping initiatives. Based on this analysis, the Expert Group identified six technology themes that are most promising for EU-US collaboration:

- Closing the Loop in IoT-enabled Cyber-physical Systems
- Model-based Systems Engineering
- Trust, (Cyber-)security, Robustness, Resilience, and Safety
- Integration, Interoperability, Flexibility, and Reconfiguration
- Autonomy and Humans in the Loop
- Situational Awareness, Diagnostics, and Prognostics.

A major insight that resulted from the activities of the Expert Group is that the current political climate has made it challenging to establish concrete opportunities for EU-US collaboration especially in domains with strong economic competition. The first strategic recommendation of the Expert Group is to establish a **joint EU-US knowledge exchange initiative** in the short term. This will ensure regular exchanges on important technology topics over the next years between EU and US experts. The exchanges will foster a common understanding of EU and US experts of the existing challenges and opportunities and outline the benefits and synergies that EU-US collaboration actions can provide. In addition, the exchange of researchers, practitioners, and students between the EU and the US will widen horizons and will be an important part of a **comprehensive education of the future workforce in the IoT and CPS domains**.

The second recommendation is that in the longer term, a **joint collaboration programme on autonomous IoT-enabled cyber-physical systems** should be set up that is co-funded by the EC and the NSF and provides coordinated calls for low Technology Readiness Level (TRL) research and innovation projects to advance the state of the art in autonomy and autonomous IoT-enabled cyber-physical systems. The specific call topics should be based on the results of the activities of the EU-US knowledge exchange initiative.

Several of the actors that were part of the IoT/CPS Expert Group are involved in other initiatives in the area of international collaboration and will continue to pursue the PICASSO objectives and to promote the PICASSO results.

PICASSO Project Website: www.picasso-project.eu

Twitter: @picasso_ict - **Linkedin:** PICASSO – EU/US ICT research

About the PICASSO Project:

PICASSO is co-funded by the European Commission under the Horizon 2020 programme.

Start Date: 1st January 2016 - **Duration:** 30 months

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PICASSO Consortium Members:

	<p>inno TSD, France – one of Europe’s leading innovation management consultancy firms, specialised in helping major private and public stakeholders design and implement R&D and innovation projects. https://www.inno-tsd.fr/en</p>
	<p>TECHNISCHE UNIVERSITÄT DORTMUND, Germany – a leading German technically oriented research university with strong research groups in big data, communications, smart grids, e-mobility and cyber-physical systems... http://www.tu-dortmund.de</p>
	<p>THINK WIRELESS TECHNOLOGIES LIMITED, United Kingdom - an ICT company founded in 2009 after more than a decade of research and development in wireless and energy harvesting technologies. http://www.think.com/</p>
	<p>ATC SA, Greece - an SME and Technology Centre in the field of ICT participating in 3 ICT European Technology Platforms: NESSI (Steering Committee member), NEM (member) and NETWORLD2020 (member), and founding member of European Big Data Value Association. http://www.atc.gr</p>
	<p>AGENZIA PER LA PROMOZIONE DELLA RICERCA EUROPEA, Italy – a non-profit research organisation, grouping together more than 100 members, including public and private research centres, industries, industrial associations, chambers of commerce, science parks and more than 50 universities, with the main objective to promote the participation in national and European RTD programmes. http://www.apre.it/</p>
	<p>HONEYWELL INTERNATIONAL INC, United States – a multinational company and global leader that invents and manufactures technologies to address some of the world’s toughest challenges initiated by revolutionary macro-trends in science, technology and society. The company’s products and solutions are focused on energy and the environment, safety and security, and efficiency and productivity. http://honeywell.com/</p>
	<p>GNKS CONSULT BV, Netherlands - conducting strategic and policy research and evaluation, building on excellence in understanding of the impact of the emerging Global Networked Knowledge Society http://www.gnksconsult.com/</p>
	<p>TECHNISCHE UNIVERSITÄT DRESDEN, Germany - a full-scale university with 14 faculties, covering a wide range of fields in science and engineering, humanities, social sciences and medicine. https://tu-dresden.de/</p>
	<p>FLORIDA INTERNATIONAL UNIVERSITY, United States - The Miami-Florida Jean Monnet Center of Excellence, (MFJMCE), a member of the global network of EU-sponsored Jean Monnet centers, has the mission to promote teaching, research and outreach activities relating to the EU. http://www.fiu.edu/; https://miamieuc.fiu.edu/</p>
	<p>UNIVERSITY OF MINNESOTA, United States – The Technological Leadership Institute bridges the gap between business and engineering. TLI’s mission is to develop local and global leaders for technology enterprises. https://tli.umn.edu/</p>