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Final Public Activity Report

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Publishable summary

Unlike more traditional embedded systems, a full-fledged Cyber-Physical-Systems (CPS) is typically a network of interacting elements with physical input and output as opposed to standalone devices. The notion is closely tied to concepts of robotics and sensor networks with intelligence mechanisms based on computational intelligence, but is applicable to a much broader range of applications.

SMEs play a key role in European economies. They generate most of the innovative ideas for CPS products. However, due to limited resources, SMEs are very often not able to own all the necessary skills and technologies required to successfully develop CPS product and bring them to the market. Also, the fragmentation of the market hampers SMEs to grow outside their local market.

In the frame of H2020 and the Smart-Anything-Everywhere Initiative (www.smartanythingeverywhere.eu), EU is exploring the establishment of European pilot networks of embedded systems design centers, which help SMEs in any sector to embedded new electronic components in their products or services. The goal of these networks is to lower barriers for SMEs to enable them to build innovative CPS solutions and products, making use of high quality technology and knowledge available throughout Europe.

EuroCPS (www.eurocps.org) is targeting “Innovation Actions” of the H2020 objective ICT-2014 “Smart Cyber-Physical Systems”. The project aims to arm Europe with a network of design centers in order to initiate and boost synergies between SMEs, major CPS-platforms, and CPS-competency providers. The expected outcome is to capture the emerging CPS markets and create sustained demand for European manufacturing. To that end, the EuroCPS design centers act as one-stop-shop, providing technical expertise, coaching and access to advanced industrial CPS platforms in order to get SMEs up to speed on the innovation ecosystem of CPS products by facilitating access to the leading edge technologies and their implementation. In the process, design centers tap existing regional ecosystems in several countries to bring the full value chain from hardware/software platforms to high value-added CPS products and services.

To demonstrate this new cooperation model (leveraging software, system and nano-electronic industries), EuroCPS supported and funded industrial experiments (IE) considering their excellence, their impact on the ecosystem and their industrialization implementation possibility and prospects through three open calls. At least 30 granted IEs were expected for developing innovative CPS products. The IE duration should be between 6 and 18 months. The IE targeted products were to be designed, constructed and built on the seven EuroCPS Platforms:

- Avionics platform provided by Thales,
- INEMO platform provided by STMicroelectronics,
- Integrated and open platform provided by AVL,
- Power management platform provided by Infineon,
- Quark platform provided by Intel,
- Silicon processes and package technology platform provided by STMicroelectronics,
- STM32F platform provided by STMicroelectronics.

The 14 EuroCPS partners are major European system suppliers, world-class research centers and technology providers, all rooted in the top European regional ecosystems. They act as networking, competence or platform partners in order to provide all the necessary expertise and competencies to innovators from any sector. The networking partners of the project help in attracting experiments from local ecosystem. The competence partners support the third parties with services to help using one of the technology platforms of the EuroCPS network. The platform partners provide access to their technology platforms (hardware and/or software products) with technical support (knowledge transfer, engineering support).

EuroCPS started in February 2015. EuroCPS first defined all the materials necessary to manage the open call procedure, to monitor and report the granted industrial experiments, to enhance the networking and the communication through all the dedicated partners. Besides all these fundamental tasks, three

open calls were successfully launched and managed resulting in the submission of 118 applications and the selection of 34 IEs. 82**%** of the IEs are cross-border involving at least 2 partners from different countries. 2 IEs involve SMEs from countries not represented by EuroCPS consortium partners. After the open calls were closed, EuroCPS was devoted to the monitoring of the all the granted experiments, the promotion of the granted projects outputs and the EuroCPS results at major events such Digital Innovation Forum (DIF) in the Nederlands, Hannover Messe in Germany, Embedded Conference Scandinavia in Sweden, IoT planet international tradeshow in France, etc. Altogether a Business Coaching Event for the SMEs was set-up in January 2018 to deliver a tailored coaching event to assist in developing skills to help participating SMEs to scale their businesses and take their products/services to market.

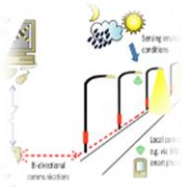
The granted IEs cover a large variety of application domains such as smart cities, smart health, smart agriculture, smart energy among others, showing the capacity of EuroCPS to bring innovative CPS to business from any sectors within the help of networking, competence and platform partners. For the granted companies, EuroCPs was not the only source of financing but in most of the cases it provided the seed money to take risk with a new project and also provided the adequate technical knowledge to the SME in a very easy way thanks to the one stop shop concept. For a large number of projects EuroCPS is enabling job creation and business increase thanks to the speed up in product development and more than 20 success stories were written and are available on EuroCPS website at https://www.eurocps.org/innovators-projects/success-stories/. They are illustrated in the following figures

Rapid verification of new functionality features for tractors and medical devices

Low-Cost, Land-Based IoT Geolocation: a Smart-Farm Solution

Bringing the Power of Multiple Virtual Machines to Embedded

Secure monitoring of medical samples throughout the lab



Smart street lighting increases safety, reduces energy use

Smartphone Functionality in Harsh Environments Aims at Walkie-Talkie Market

Applying the Brakes to Bicycle Theft with Asset Tracking and the IoT

Combining Edge Analytics and a Wearable Device for Patient-Centered Healthcare

Sustainable Farming – Fewer Pesticides Thanks to IoT Technology

An ASIC for Apix : Supporting a NEMS Startup with Accelerated Chip-Design Strategy

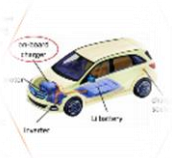
A High-Performance Multicore MixedCriticality Platform for Aerospace, Robotics and Automotive Systems

Plug & Play Smart Factory Primed to Support Industry 4.0 Services

Teaching Building Heating Systems to Respond to the Weather

Machine Learning in the Field for More Successful and Eco-Friendly Farming

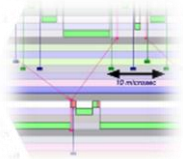
Smart, Portable Lab-on-a-Chip System to Detect and Report Water Pollution in Real Time



Low-voltage Battery Charger Powers Drive for Safer, More Efficient Electric Vehicles

Smart, Low-Cost Electronics Flushes Legionella Bacteria from Shower Facilities

A Clearer Look at Water Purification, With Cost-Cutting Potential



Partitioning space and time for safe and secure cyber physical systems

Nighttime Epileptic Seizure Detector Improves Care of Patients and Quality of Life for Caregivers

Nestwave Combines GPS & 4G for Accurate, Low-Power Indoor & Outdoor Geolocation

Overall EuroCPS, the attractiveness for SMEs of the proposed design center model combined with financial support is highlighted by more than 150 SMEs interested in proposing IE and the high-quality of the 118 submitted proposals. The three kinds of projects (SW intensive project, System integration project, CPS with innovative components project) supported by EuroCPS are covered by the 34 selected IEs. All the technology platforms support at least 3 IEs. All the EuroCPS competence partners support at least 2 IEs. The efficiency of the model to build on open tools, platforms and standards is demonstrated by the completion of the three calls thanks to a tight consortium, a simple proposal (5 weeks) procedure, a fast acceptance notification (7 weeks), and a short time to launch IEs. The capacity to initiate and boost synergies between SMEs, technology supplier and competences inside and outside their region or traditional market place is underlined by 2 selected IEs coming from European countries not represented by a EuroCPS partner.

EuroCPS is providing a more tailored access to European funding for SMEs, by providing lightweight and focused funding and services with a manageable project size and administrative overhead (proposal writing, reporting) and day-to-day support.

Analysis of the impacts shows that IE helped SMEs to progress in their technology development and enabled to develop demonstrators. The achieved demonstrators support the diffusion of the SME technology to prospects. The SME business plans are reinforced. Among the 34 selected proposals, 103 new jobs have been created in the granted SMEs with the help of EuroCPS up to 2018 and a further constant growth is expected for the next years (200 new job creation are forecast until 2020). In terms of revenues, EuroCPS projects have generated 10 M€ additional revenues up to 2018 and an exponential growth is planned for the next coming years mainly in the small SMEs granted (27 M€ up to 2019)