



# EuroCPS

Cyber-Physical Systems



**EuroCPS: European Network of Competencies and Platforms for Enabling SMEs from any Sector Building Innovative **CPS** Products to Sustain Demand for European Manufacturing**

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**BME-EET**

**ICT információs nap - 2015. december 3.**



NEMZETI KUTATÁSI, FEJLESZTÉSI ÉS INNOVÁCIÓS HIVATAL



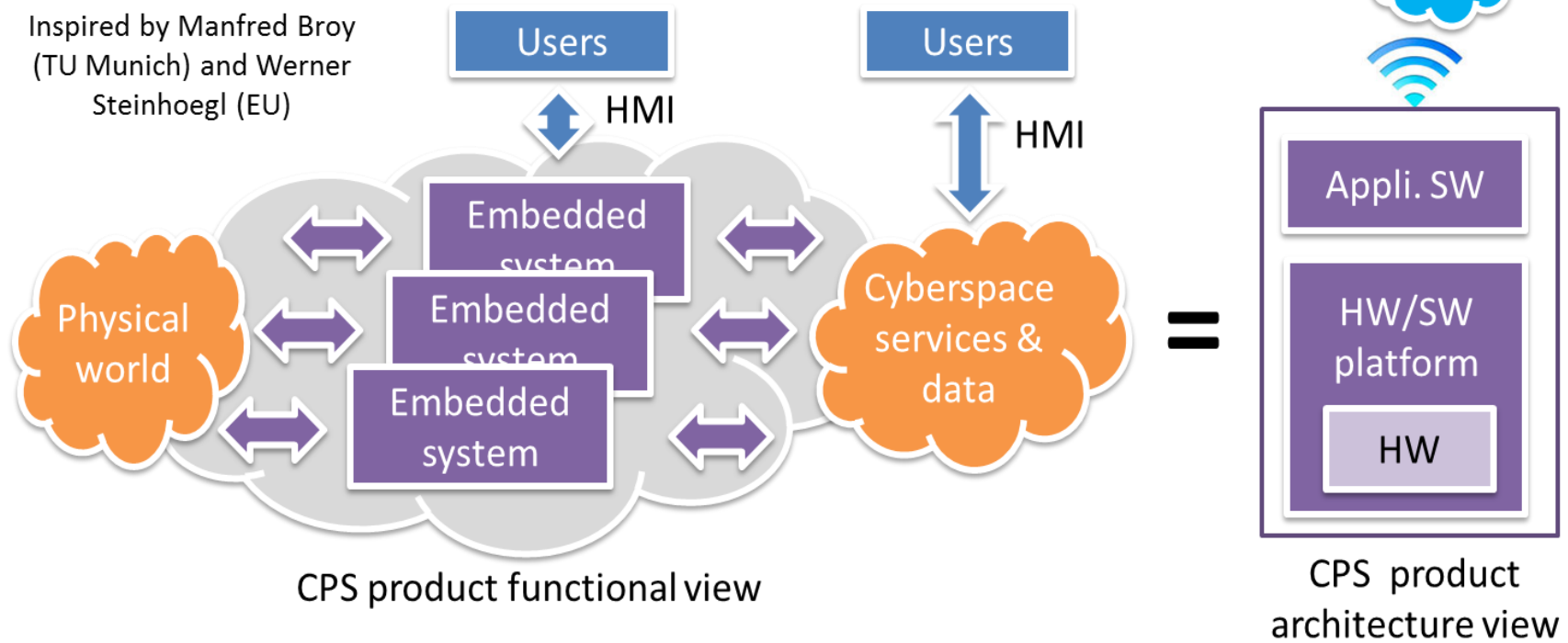


# What is CPS in EuroCPS?



# CPS=Cyber Physical Systems

Inspired by Manfred Broy  
(TU Munich) and Werner  
Steinhoegl (EU)





# The idea behind EuroCPS

# The EuroCPS Project

- Network of regional ecosystems along the full value chain to *service SMEs for innovative CPS* (Cyber Physical Systems) *products*
  - Leading European companies as CPS platform providers for design
  - Top European R&D institutes and universities acting as design/competence centers



- One of the contributions to the “Airbus of chips” Common European Interest Project launched by Neelie Kroes.

# The EuroCPS Project

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## Main objectives:

- Take innovative **embedded ICT** from any sector to **SMEs**.
- Facilitate user-supplier partnerships across value-chains and regions.

## Main outcome:

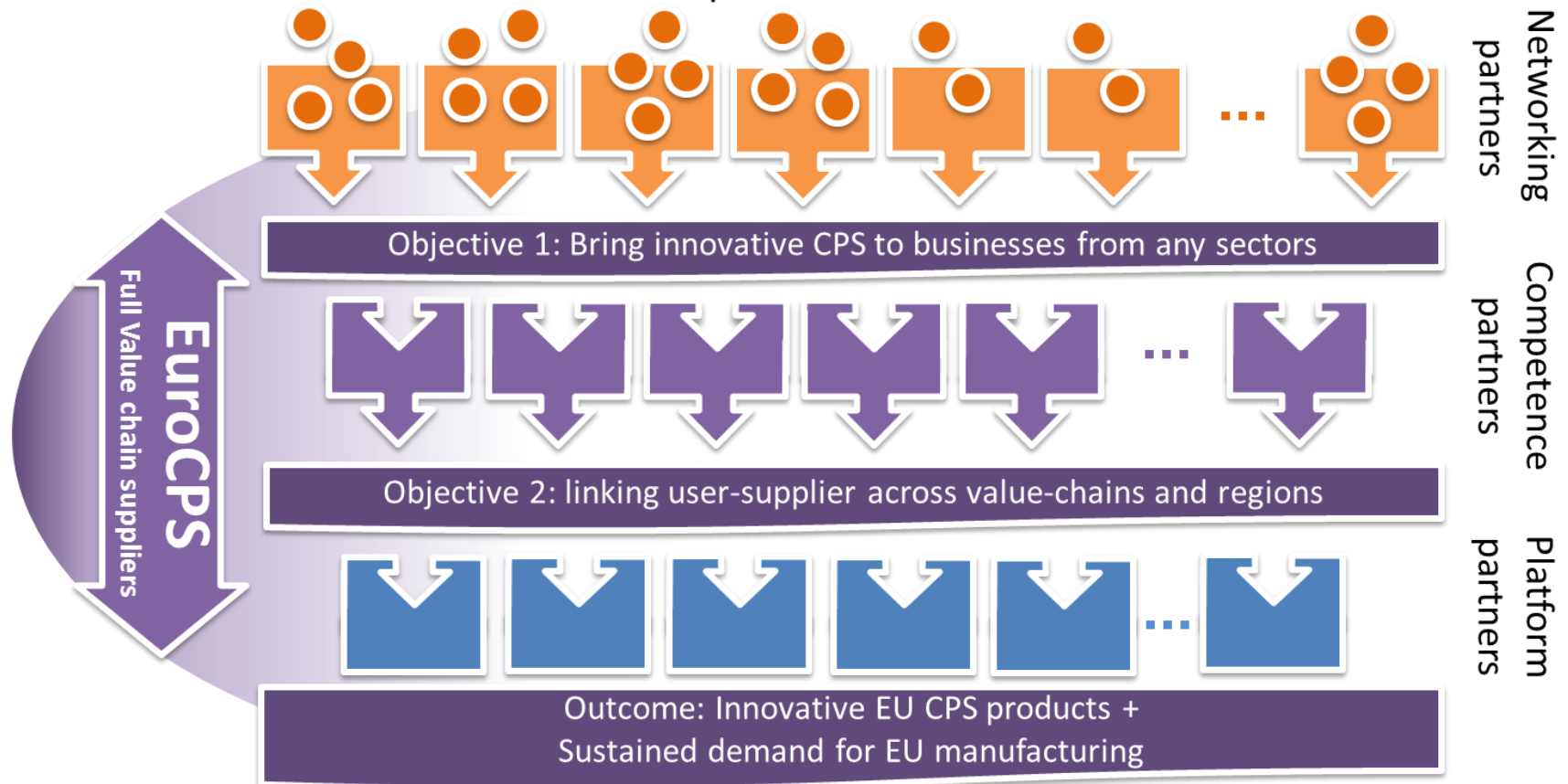
- **Enable the creation of innovative European CPS products** that will generate **sustained demand for European manufacturing**.

## Goal:

- Strengthen the position of European industry along the value chain :
  - Promote innovative CPS products using existing chips made in EU
  - Promote the optimization of CPS products with new EU chips at SMEs

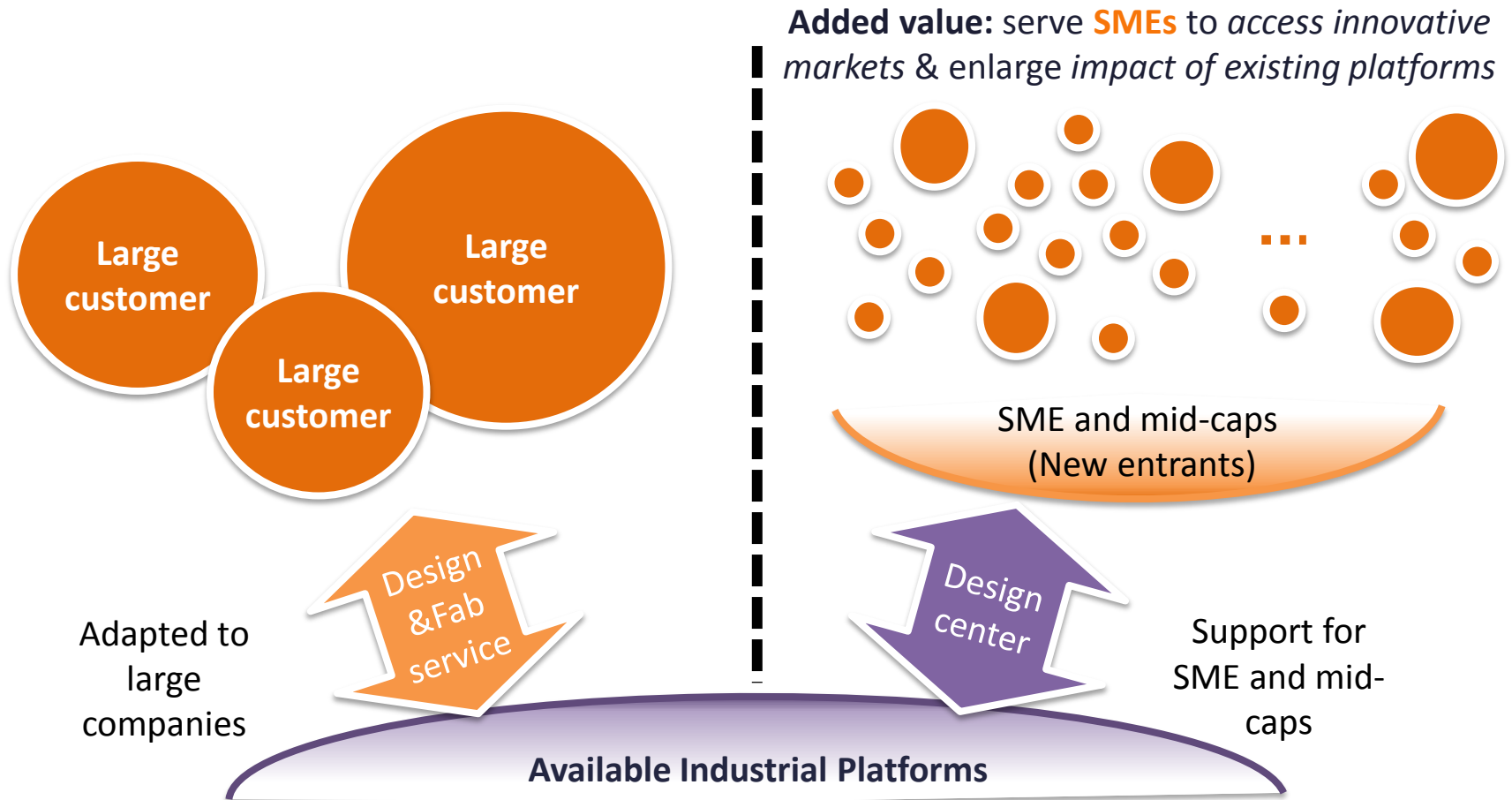
# The EuroCPS Project

Innovative embedded ICT users across regions: Industrial experiments



# Design center concept

- Access to advanced industrial platforms for SMEs



- **Do not forget:** *Today's innovators are tomorrow's potential major players*





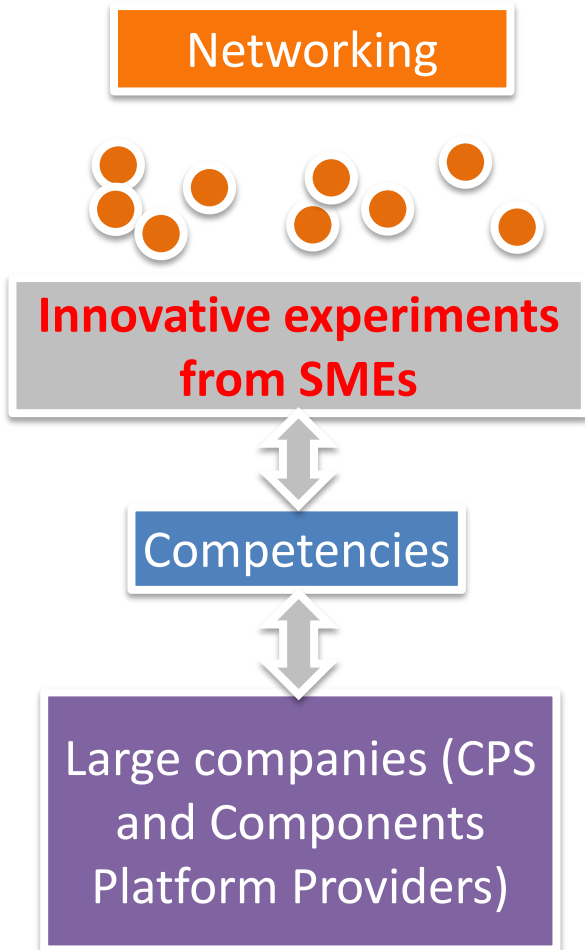


# The operation



# SME experiments, building on EU strengths

Provide competencies for innovators to enable them using state of the art European CPS platforms



Build on existing regional Ecosystems  
Build on KET's pilot lines



# The EuroCPS Platforms



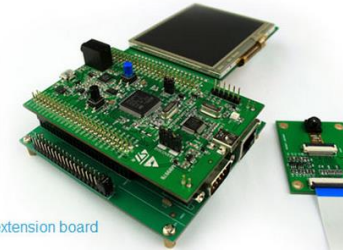
NEWS

HOW WE OPERATE

DESIGN CENTERS

EUROCPS PLATFORMS

INNOVATOR'S PROJECT



STM32F4DISCOVERY extension board

- Avionics Platform
- Connectivity Platform
- INEMO Inertial Platform
- Integrated and Open Development Platform
- Power Management Platform
- Quark System on Chip Platform
- Silicon Processes and Package Technology
- STM32 Microcontroller Platform

Platforms	Typical industrial experiments
STM32 (ST)	<ul style="list-style-type: none"> <li>- SW applications for low-power embedded systems</li> <li>- System using STM32 as a subsystem</li> </ul>
Quark (Intel)	<ul style="list-style-type: none"> <li>- IoT applications</li> <li>- System using Quark as a subsystem</li> </ul>
CPSDA (Schneider)	<ul style="list-style-type: none"> <li>- SW application (home energy management...)</li> <li>- Fog/cloud applications and energy services</li> </ul>
Power conversion for CPS (Infineon-AT)	<ul style="list-style-type: none"> <li>- Highly efficient networked systems for industrial applications (eg. lighting, machinery..)</li> </ul>
Large drive simulation (AVL)	<ul style="list-style-type: none"> <li>- Automated Test and Verification Systems for Tractors</li> </ul>
Silicon (ST)	<ul style="list-style-type: none"> <li>- Cyberphysical systems applications with new technologies and devices</li> </ul>
Avionics (Thales)	<ul style="list-style-type: none"> <li>- SW Applications and SW IP</li> </ul>

# The EuroCPS Platforms

<https://www.eurocps.org/wp-content/uploads/2015/10/poster-platforms-v2.pdf>

## Software



### Avionics Platform

Processing board & real time SW solutions provided by Thales



### Integrated and Open Development Platform

Simulation methods and tools for development provided by AVL

## Integration systems



### Connectivity Platform

Solution for digitalization application provided by Schneider



### STM32 Microcontroller Platform

32-bit product range provided by STMicroelectronics



### iNEMO Inertial Platform

A sensor platform provided by STMicroelectronics



### Quark System on Chip Platform

Low-power platform provided by Intel

## Hardware



### Industrial microcontrollers Platform

Component platform provided by Infineon



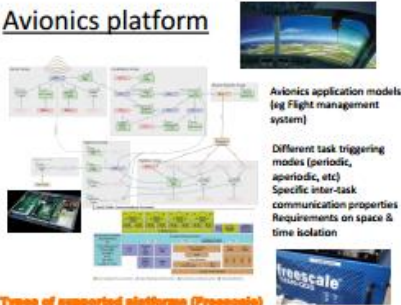
### Silicon Process and Package Technology

Leading-edge silicon processes and package technologies provided by STMicroelectronics



# The EuroCPS Platforms

## Avionics platform



### Types of supported platforms (Processors)

#### QorIQ Processing Platforms 64-bit Multicores

- QorIQ Communications Processors High/Mid-Performance Tier
  - T4240, P4080, P5020, P5040, T2080

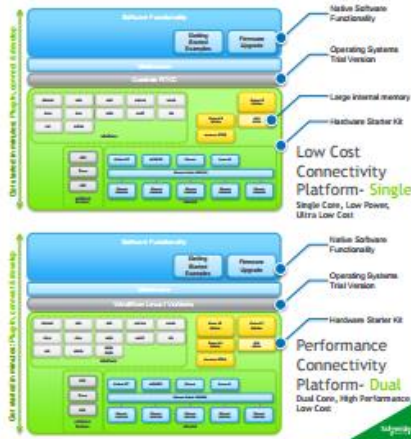
#### LMX Applications Processors based on ARM Cortex

- LMX 5SoloX Processors - Heterogeneous Processing

Potential Industrial Experiments on RTOS with new features, architecture models, timing analysis tools, etc



## Connectivity Platform



## iNEMO inertial Platform



## Power management Platform

### XMC - 32-Bit Industrial Microcontrollers

One Microcontroller Platform. Countless Solutions.

www.infineon.com/xmc

## Integrated and Open Dvt Platform



→ Opportunities for Industrial Experiences

Integration into AV's seamless development and validation platform

Get access to comprehensive development data along the entire development cycle for creation of smart solutions



## STM32 Microcontroller Platform

### STM32 Nucleo Development Board

www.st.com/stm32nucleo

- Based on ST's 32-bit ARM Cortex-M based STM32 microprocessors
  - A board with 1 MCU and hardware to programming
- Two connectors to connect to companion expansion boards
- For all STM32 families
- >60K Boards sold
- comparable product range from ultra-low power to high-performance
- STM32Cube™, a 100% free solution to ease your life, that combines:
  - A PC software configurator tool
  - STM32 embedded software bricks

STWearKit

Configure and test on PC

Use code

STM32Cube Embedded software

Middleware

RTOS, USB, CAN, SPI, I2C, etc.

Application development layer

C code generation for instantiation, depending on user choices

## Quark System on Chip Platform

### Intel Gateway Solutions for IoT Development Kit DK50

Intel Studio SDK (Software Development Kit)

Based on Intel Galileo Hardware

Open Platform for Developing IoT Applications and Services

These may be Integrated with McAfee® and Wind River® Software to provide edge security and device manageability.

## Silicon Process & Package Techno.

- Access to application-specific standard and custom devices and to their leading-edge silicon processes and package technologies for customer-designed products to give added performance and value to the end product.
- Several technologies including advanced 65nm and 28nm CMOS available for SME.
- Only architecture exploration and device definition are funded.





# Design centers / networking

- **All over Europe**

- **Austria:** AVL Austria
- **France:** Thales, CEA
- **Germany:** FhG, FinePower
- **Hungary:** BME
- **Italy:** UNIBO
- **Netherlands:** High Tech NL
- **Sweden:** Luleå University of Technology
- **UK:** Digital Catapult

- **Design centers support multiple platforms**

- Networking with SMEs
- Design coaching

SMEs are free to work with any design center



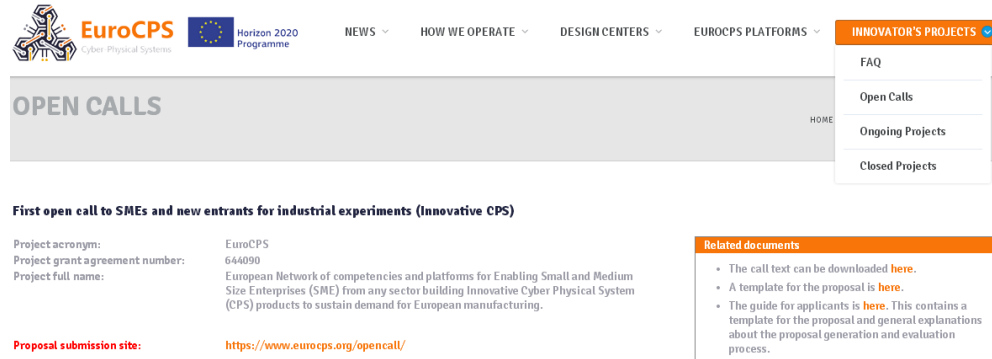
# Each experiment services an SME

- Each experiment services an SME **using competences and platforms from the project**
- 2 kinds of **platforms**: *CPS and Silicon components*
- 5 kinds of **competencies**:
  - CPS design: solution exploration and product specification
  - Embedded SW design
  - HW architecture design & components reuse
  - HW/SW system integration
  - Access to HW component and CPS platforms
- 3 types of **experiments**:
  - **System integration project**: System solution using existing SW and HW components.
  - **SW intensive system project**: Solution using existing programmable platforms.
  - **CPS with Innovative components project**: Integrated HW-SW prototype requiring specific HW-SW platform.



# EuroCPS Operations

- **€10m cost, €8m EC funding, 15 partners, 36 months**
    - **2/3 of funding devoted to Industrial Experiments of SMEs**
    - **Up to €150k for an SME**
  - **Coaching and Enablement to use platforms executed by partners**
  - **Plan to service 30 Industrial Experiments from SMEs selected through 3 open calls**
    - **T0+6 (June 2015) 10 projects / contractual phase**
    - **T0+10 (Oct 2015) 38 proposals submitted**
    - **T0+14 (Feb 2016)**
- The concept is similar to that of I4MS
- **Cascade funding scheme, easy process for SMEs**
    - **Design centers are also cascade funding partners**



The screenshot shows the EuroCPS website interface. At the top, there is a navigation bar with the EuroCPS logo, the Horizon 2020 Programme logo, and menu items for NEWS, HOW WE OPERATE, DESIGN CENTERS, EUROCPs PLATFORMS, and INNOVATOR'S PROJECTS. Below the navigation bar, there is a section titled "OPEN CALLS" with a "HOME" link. The main content area features a heading "First open call to SMEs and new entrants for industrial experiments (Innovative CPS)". Below this heading, there is a table with project details:

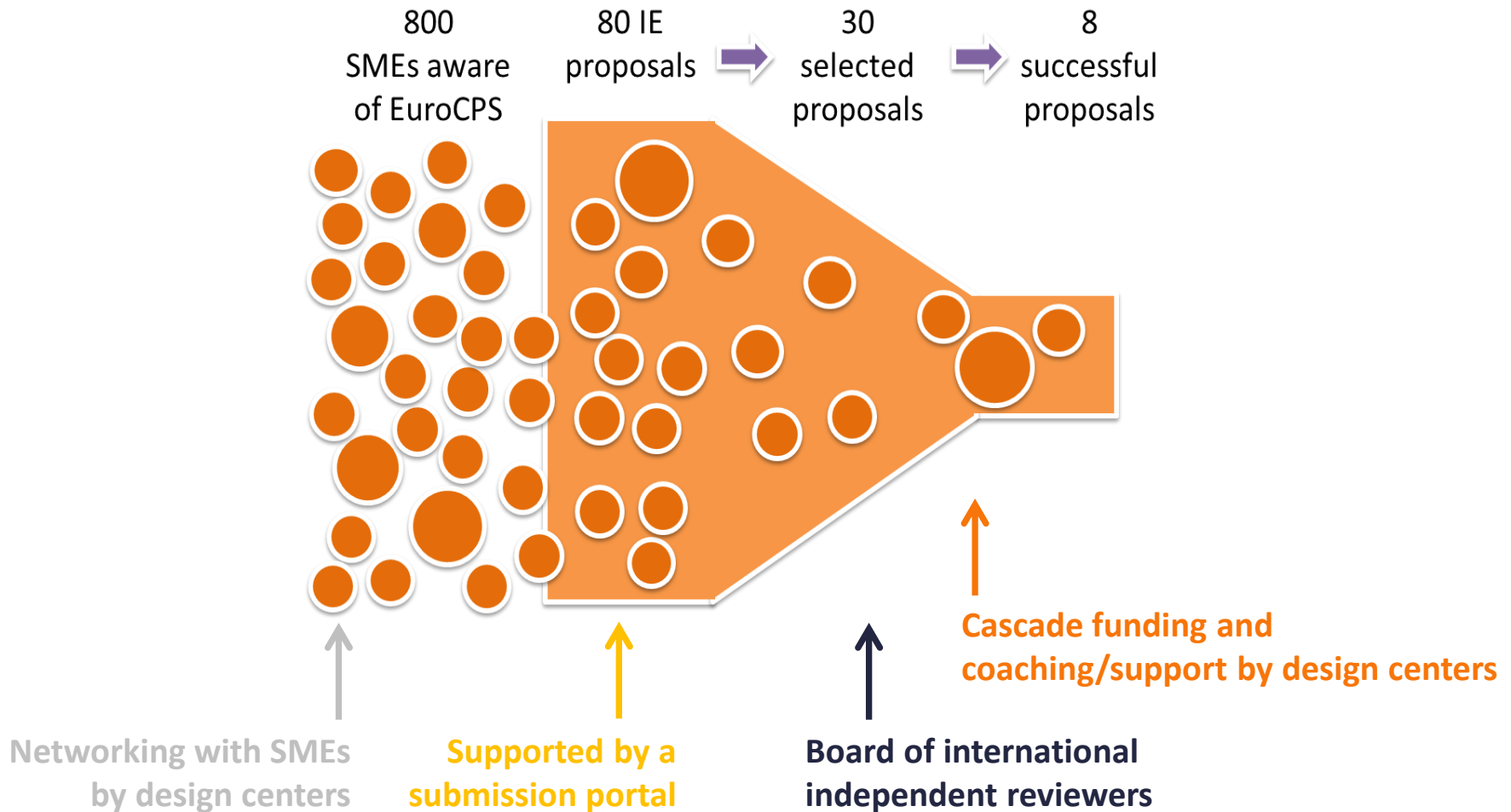
Project acronym:	EuroCPS
Project grant agreement number:	644090
Project full name:	European Network of competencies and platforms for Enabling Small and Medium Size Enterprises (SME) from any sector building Innovative Cyber Physical System (CPS) products to sustain demand for European manufacturing.

Below the table, there is a "Proposal submission site:" label and the URL <https://www.eurocps.org/opencall/>. To the right of the table, there is a "Related documents" section with a list of links:

- The call text can be downloaded [here](#).
- A template for the proposal is [here](#).
- The guide for applicants is [here](#). This contains a template for the proposal and general explanations about the proposal generation and evaluation process.

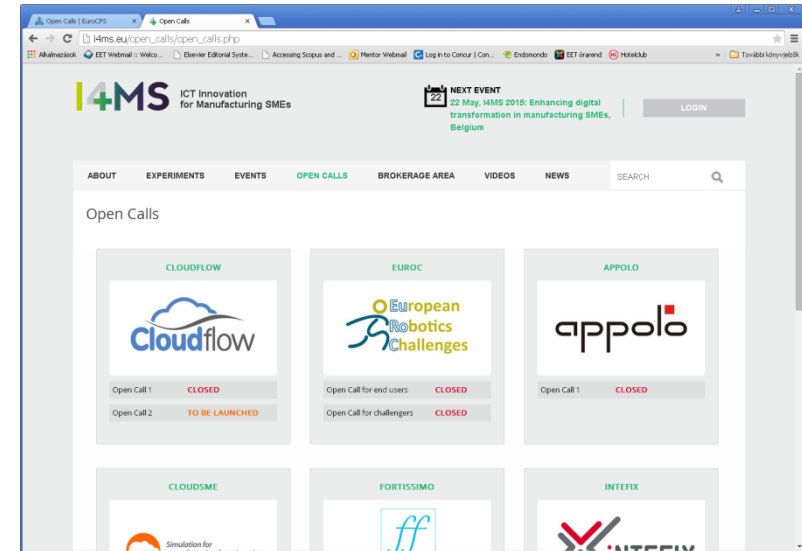
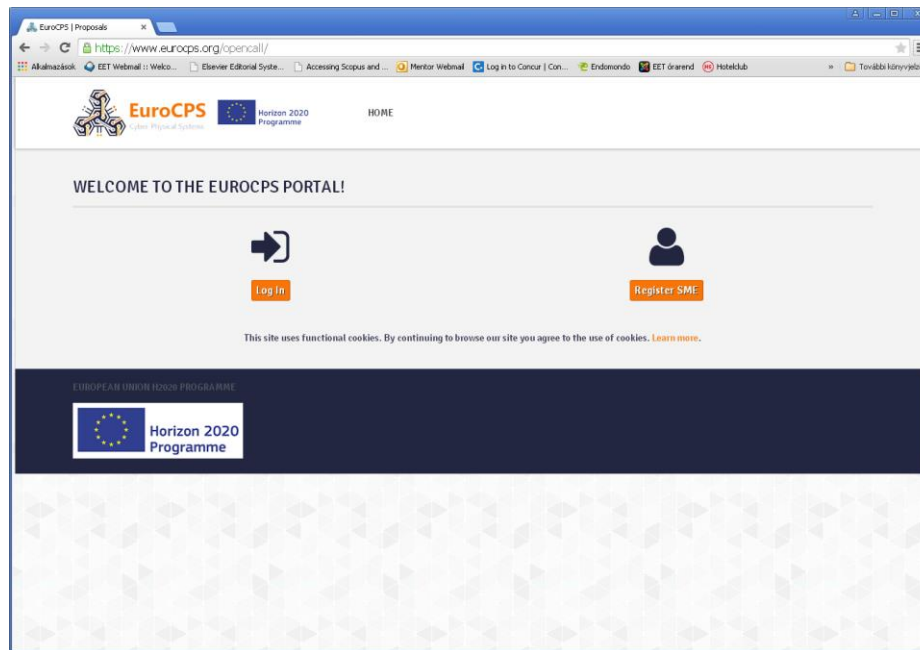


# Industrial Experiments' target numbers



# EuroCPS Open Calls for Experiments

- In its concept similar to calls for experiments by I4MS
- **2<sup>nd</sup> EuroCPS call for industrial experiments closing now**
- **3<sup>rd</sup> call foreseen for February 2016**



**BME is happy to discuss your project ideas and help you prepare your proposal.**

**Contacts:**

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Ferenc Ender [ender@eet.bme.hu](mailto:ender@eet.bme.hu)

# EuroCPS Open Calls for Experiments

- Submission portal: <https://www.eurocps.org/opencall/>
- Registration with a few data
- Login
- Define a proposal

- Enter/check/select

The screenshot displays the EuroCPS submission portal interface. At the top, there is a navigation bar with the EuroCPS logo, the text 'EuroCPS Cyber-Physical Systems', the European Union flag, 'Horizon 2020 Programme', and a 'HOME' link. Below this, the user is logged in as 'TEST\_TEST SME'. The main content area is divided into several sections:

- Create Proposal:** A form with fields for 'Company' (Test\_Test SME), 'Proposal name' (Trial), 'Requested funding (k€)' (70), 'Total budget (k€)' (100), and 'Duration (months)' (12). There is a note: 'Please specify both in kEUR'. Below this is a 'Platforms' section with a list of options, including 'Avionics Platform', 'Connectivity Platform', 'iNEMO Inertial Platform', and 'Integrated and Open Platform'. A dropdown menu is open, showing a list of countries: 'AVL - Austria', 'BME - Hungary' (highlighted), 'CDEC - United Kingdom', 'CEA - France', 'FlG - Germany', 'FPG - Germany', 'HTNL - Netherlands', 'LTU - Sweden', 'Thales - France', 'UNIBO - Italy', and 'BME - Hungary'. At the bottom of this section are 'Cancel' and 'OK' buttons.
- Welcome to EuroCPS!** A message: 'Please use the menu on the left to navigate the site.'
- Table of Proposals:** A table with columns: 'Proposal name', 'Platforms', 'Design center', 'Uploaded', 'Finalized', and 'Tasks'. The first row shows 'Trial', 'Power Mgmt STM32', 'BME', a green checkmark, a red warning triangle, and a wrench icon. Below the table is a '+ Create new proposal' button.
- Help Text:** A text box explaining the workflow: 'After registering a proposal, a warning sign will appear in the state column as a reminder to upload the documentation PDF as well. You can upload one file only. If you upload a new version, it will replace the old one. After uploading, the icon will change to a green checkmark. To modify the proposal datasheet, use the icons on the right hand side. If you are ready and want to submit the proposal for an evaluation, click the finalize proposal icon. That is the last step of submitting your proposal.'



European Initiative  
**Smart Anything Everywhere**



# Cooperation within the Smart Anything Everywhere (SAE) Initiative

# Cooperation within the SAE initiative

The screenshot shows a web browser window with the URL <https://smartanythingeverywhere.eu>. The page features the SAE logo (a stylized flower) and the European Union flag with the text "Horizon 200 Programme". A navigation menu includes "Cluster Projects", "About SAE", "FAQ", "Downloads", and "SAE News". The main content area has a background illustration of a desk with a laptop, keyboard, mouse, coffee cup, and smartphone. A dark grey box contains the text "SMART ANYTHING EVERYWHERE" and "Digital Innovation Initiatives based on European Networks of Competence Centres in EU H2020." Below this is a button that says "READ MORE ABOUT SAE". A large orange box contains the text "Cluster of 4 European Projects". To the left of the text is an image of a blue Intel Galileo microcontroller board. The text to the right of the board describes the initiative's focus on smart products and digital components.

Smart phones, smart watches or smart TVs are just a few of the new products that are entering our daily lives. The functionalities of more and more objects are increased by digital components hidden inside. For instance, smart offices can turn off the lights when nobody is in the office, or a car can break automatically when it notices an obstacle. As an answer to these new changes, the European Commission proposed the creation of a 'Smart Anything Everywhere' (SAE) initiative.

The core of the initiative is the networks of competence centres, usually research technology organisations (RTOs) or technology transfer-oriented university institutes who cluster a wide spectrum of technical and application knowledge to support innovation.

# Cooperation within the SAE initiative

The screenshot shows a web browser window with the URL <https://smartanythingeverywhere.eu>. The page features a navigation bar with links for Cluster Projects, About SAE, FAQ, Downloads, and SAE News. Below the navigation bar, there are four main project sections, each with a logo and a brief description:

- EUROPCS**: A network of design centres boosting and initiating synergies between SMEs, major CPS-platforms and competency providers to capture the emerging markets of IoT products. **30 experiments** initiated and led by SMEs.
- CPSELABS**: CPS engineering infrastructure, knowledge and tools for realising novel CPS-based products and services. The CPSELABS marketplace provides an open forum for sharing platforms, architectures and SW tools for the engineering of dependable and trustworthy CPS. **Focussed experiments** (3-6 partners) and **fast-track** (12-18 months) with...
- GATEONE PROJECT**: Innovation service for European smartization by SMEs. 20% of bioelectronics technologies. **50 small scale experiments** to deliver innovation concept as demonstrators with SMEs engaged in testing phase.
- SMARTER - SI**: Smart access to manufacturing for systems integration. To develop a RTO Community Foundry Model (CFM) that will accelerate a wider deployment of SSI with greater access to design, manufacturing capabilities for prototyping, early validation and first production for SMEs to exploit in niche markets (low volume high value). A test bed to...

Below these descriptions are four colored boxes with key messages:

- Use of CPS design platforms by SMEs**
- Help businesses develop trustworthy CPS**
- Adoption of smart technologies and smart systems by SMEs**
- Smarter access to manufacturing for systems integration**

Each box is followed by a list of recent publications or events:

- Use of CPS design platforms by SMEs**
  - First open call to SMEs and new entrants for industrial experiments (Innovative CPS) Published on 2015-04-30
  - Sensing Environments: An Internet of Things Pit Stop Published on 2015-04-01
  - First EuroCPS-Italy Workshop Published on 2015-03-31
- Help businesses develop trustworthy CPS**
  - Engineering Labs: First open call for innovation projects Published on 2015-04-29
  - Launch of the European Initiative "Smart Anything Everywhere" Published on 2015-03-26
- Smarter access to manufacturing for systems integration**
  - open Published on 2015-04-29
  - EuroTraining – Access to training in the areas of smart integrated systems, embedded systems and micro-/nanoelectronics Published on 2015-04-15
  - Current cohort of SSI Erasmus Mundus MSc students looking for organisations hosting their master thesis



# Cooperation within the SAE initiative

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- The **EuroCPS** project is *part of the cluster* **SmartAnythingEverywhere**
- **Open meetings** are planned with all the 4 projects
  - Organised by EU and/or projects
- **Exchange experiment and best practice**
  - Working with SME and Monitoring industrial experiment
- **Cross advertisement of offered services**
  - **Competencies:** Enablement to use advanced Technologies, IP, Platforms
  - **Technologies:** Advanced methods and tools
  - **IP:** specific Reusable Advanced components and subsystems
  - **Platforms:** Infrastructure required for specific design/fabrication process
- **Cross advertisement for open calls**
- Promote the use of **off the shelf IP and technologies from other projects** in the EuroCPS experiments





# The role of BME in the EuroCPS Project



# The role of BME in the Project

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- BME acts as a **networking partner**, contacting innovative SMEs in the region
- BME serves as a **design center**, supporting design activities with the following EuroCPS platforms
  - Power Management (IFAT)
  - Quark System on Chip (Intel)
  - Silicon Processes and Package (STMicroelectronics)
  - STM32 Microcontrollers (STMicroelectronics)
- BME serves as a **cascade funding partner** for the SMEs selected in the open calls
- BME is responsible for the **web site of EuroCPS** and of the **Smart Anything Everywhere** cluster

# Web pages

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- The web pages of EuroCPS and of the Smart Anything Everywhere cluster projects

– <https://www.eurocps.org>



– <http://www.SmartAnythingEverywhere.eu>





# Thank you for your attention

