EFES 2021 – Day 2 – Session 1
Impact of ECS value chain on a competitive Europe

Pre-Integrated Architectures for sustainable complex Cyber-Physical Systems
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Videoconference – November 24th, 2021
INTRODUCTIONS

CPS4EU Project

- Managed by ECSEL JU
- 36 Partners from 5 European Countries
- 53 M. Euro budget
- 16 use cases in Automotive, Industry, Energy and for SMEs
- 7/2019 to 6/2022

- Web site: www.cps4eu.eu
- LinkedIn group: www.linkedin.com/groups/12372370/
EVOLUTIONS OF THE CPS* LANDSCAPE

The automotive industry is confronting a widening and unsustainable gap between software complexity and productivity levels.

- Increasing complexity of projects
- New powerful aggressive industrial players
- Long term goals, long term business models

(*) CPS: Cyber Physical Systems

[VDA, China strategy, July 2020]

[McKinsey, The case for an end-to-end automotive software platform, January 2020]
EVOLUTIONS OF THE CPS* LANDSCAPE

How to balance end user + societal expectations and sustainability?

- Functional safety
- Cybersecurity
- Privacy and Ethics
- IP rights
- Export rules
- Liability
- Traceability
- CO2 neutrality, Life cycle analysis
- Minimal usage of natural resources

(*) CPS: Cyber Physical Systems

PRE-INTEGRATED ARCHITECTURES

Design Pattern concept extended to complex Cyber-Physical Systems

- Reduction of the R&D effort
- Trustworthy-oriented Architectures
- For three CPS layers: Physical, Cyber and Internet of CPS
- Manageable size: not too large, not too small
- Scalability for networked eco-systems
- Compatibility with legacy components, processes and tools
- Inter-operability with other components or tools
- Pre-validated concepts to ensure homologation
- Flexibility to be configurable for the developer needs
- Possibility to be extended with new additional features

[D. Coffer et al., Rockwell-Collins, Complexity-reducing design patterns for cyber-physical systems, 2011]
PRACTICAL IMPLEMENTATIONS

CPS4EU Eco-system

Vertical Applications

Pre-integrated Architectures

Basic Modules

Heterogenous Computing

Industrial Edge Computing and Connectivity

Secure CPS-to-X Connectivity

Sensing Perception

Sensing Localization

Cooperative System of Systems

HP Embedded computing

AI computing

Vision computing

Connectivity V2X / M2M

Cyber-security

Ultra precise localisation system

Perception and interpretation of environment

Cooperative algorithms

Tools

CPS4EU – Philippe Gougeon

This project has received funding from the ECSEL Joint Undertaking (JU) under grant agreement No 826276. The JU receives support from the European Union’s Horizon 2020 research and innovation programme and France, Spain, Hungary, Italy, Germany.
6 PIARCHs from CPS4EU

- Secure CPS-to-X connectivity
- Heterogenous computing for AI
- Cooperative system of systems
- Industrial edge computing gateway
- Sensing perception
- Sensing localization
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PRE-INTEGRATED ARCHITECTURES

Heterogenous AI computing PIARCH

Cooperative system of systems PIARCH

Industrial Edge computing gateway PIARCH

Sensing perception and localization PIARCHs
PRACTICAL IMPLEMENTATIONS

16 Use cases using at least 1 PIARCH (TRL 6-7)

Automotive use case (Valeo) – Urban automated driving

Industry automation use case (Leonardo) – Improved trimming quality

Energy use case (RTE) – Distributed controls for energy transmission network
CONCLUSIONS

Pre-Integrated Architectures for sustainable complex Cyber-Physical Systems

- Solution to reduce R&D Efforts for complex CPS developments
- Practical approach for current and upcoming challenges
- Fits well to networked eco-systems
- Meets expectations of large companies, SMEs and tool providers

- Visit our virtual booth at EFECS 2021 (Go to the Marketplace, then select CPS4EU)

- Contact our project partners for more information: https://cps4eu.eu/wp-content/uploads/2020/11/CPS4EU-presentation-Summary.pdf

- Or contact by email philippe.gougeon@valeo.com
THANK YOU FOR YOUR ATTENTION