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ADEPTNESS – Design-Operation Continuum Methods for Testing and Deployment under Unforeseen Conditions for Cyber-Physical Systems of Systems



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microservices

Publications

<https://adeptness.eu/>

<https://www.linkedin.com/company/h2020-adeptness/>

https://twitter.com/adeptness_eu

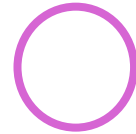


EDITORIAL

Welcome to the first issue of this Newsletter. We started the project in January 2020. We have dedicated this year to set the common architecture for ADEPTNESS platform. We have created the managing boards and designed procedures for communication between partners.

One of the main actions of this year has been the elicitation of the requirements from the stakeholders, ORONA and BOMBARDIER and from the research partners of the project SIMULA, TU WIEN, IKERLAN, MAdarlaren and University of Mondragon. Then, service and product providers Ulma Embedded Solutions and Eglobalmarket have provided system level requirements for ADEPTNESS.

This newsletter intends to summarize these efforts and keep partners, associates and interested readers informed about the different activities carried out in connection with ADEPTNESS. We hope that you enjoy this issue and we prompt you to provide us feedback and stay in touch through the webpage,



AITOR ARRIETA

UNIVERSITY OF MONDRAGON



GOIURIA SAGARDUI

UNIVERSITY OF MONDRAGON



Research and develop a workflow to speed-up the software release of CPSoS in operation while guaranteeing its reliability

PROJECT SUMMARY

Cyber-Physical Systems of Systems (CPSoS) are inherently complex. The lifecycle of these systems could last up to 30 years in sectors like aerospace, railway and elevation. In these systems, an increasing trend is to implement most of the functionalities through software. During the lifecycle of these systems, the software continuously evolves. The software of CPSoS evolves to

- (1) fix bugs,
- (2) add new functionalities,
- (3) perform refactoring activities to improve its quality,
- (4) include some extensions to face unforeseen situations that are detected during operation,
- (5) cope with hardware obsolescence, etc.

80%

Reduction in time to recovery

60%

Reduction in bugs

80%

Reduction in deployment effort

PROJECT SUMMARY

WP1. REQUIREMENTS AND FRAMEWORK FOR DESIGN-OPERATION CONTINUUM OF CPSOS AND ETHIC CHECKING

WP2. RESEARCH AND DEVELOPMENT OF RELIABLE RE-COMMISSIONING METHODS FOR CPSOS

WP3. RESEARCH AND DEVELOPMENT OF RESILIENCE METHODS IN OPERATION FOR CPSOS

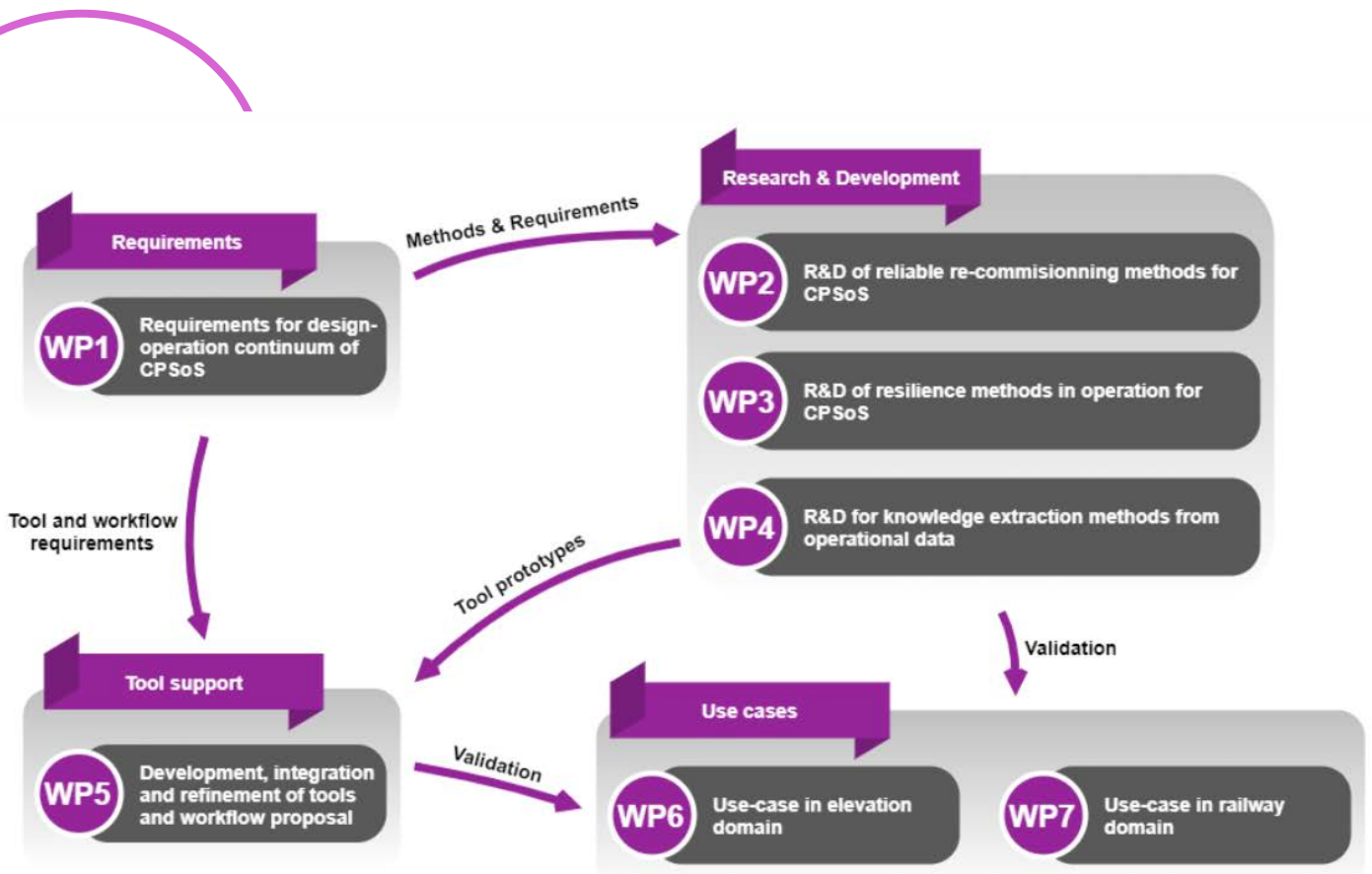
WP4. RESEARCH AND DEVELOPMENT FOR KNOWLEDGE EXTRACTION FROM OPERATIONAL DATA

WP5. DEVELOPMENT, INTEGRATION AND REFINEMENT OF TOOLS AND WORKFLOW PROPOSAL

WP6. USE-CASE A – DESIGN-OPERATION CONTINUUM OF ELEVATORS CONTROL ALGORITHMS

WP7. USE-CASE B – TRAIN CONTROL MANAGEMENT SYSTEM CYCLE VIRTUALIZATION

WP8. MANAGEMENT, DISSEMINATION, EXPLOITATION AND STANDARDIZATION





KICK-OFF MEETING

The kick-off meeting venue was held in Orona Ideo, an innovation city where the Orona headquarters are located. Besides Orona's headquarters, Orona Ideo hosts an atmosphere where researchers from Ikerlan and Mondragon University collaborate, each of them having buildings for their activities. The meeting was held in the Orona foundation building. This building is a campus from Mondragon Unibertsitatea, and it hosts both researchers as well as students.

The venue offered several advantages, such as, a visit to Orona's headquarters, where the showroom as well as the laboratories were visited. This visit offered a clearer picture of Orona's use-case's details to the partners of the project.

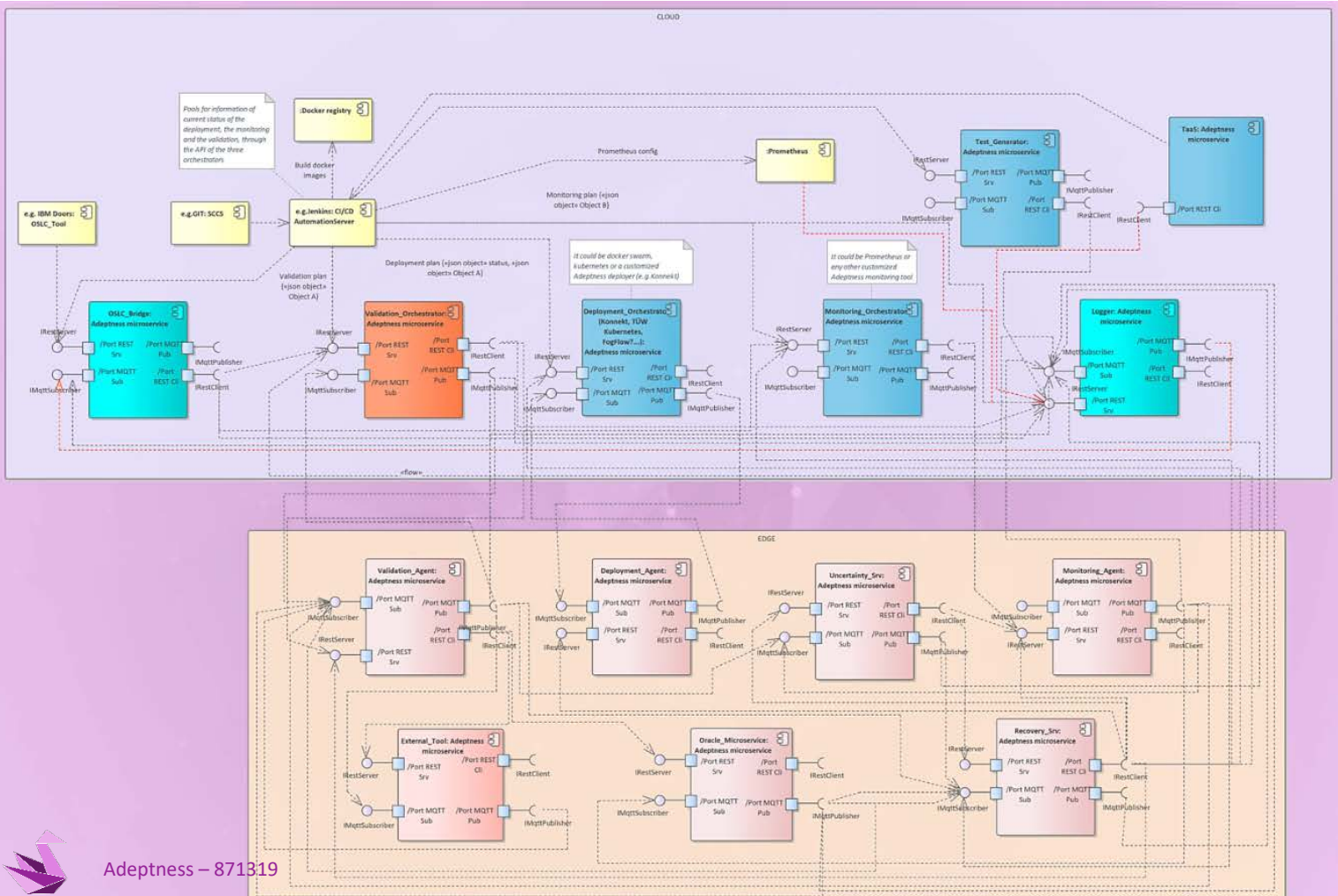


MICROSERVICES BASED ARCHITECTURE

- ✓ Microservices provided for each stage of a new software release: deployment, validation, monitoring, uncertainty detection, traceability and test regeneration.
- ✓ Synchronous communication REST API over http
- ✓ Asynchronous communication Publication and subscription over MQTT
- ✓ Microservice templates available in Python and C

Video available at

<https://youtu.be/cVA-9PYqhPc>



6 publications

2 workshops

Demo available at

<https://youtu.be/uoq9n9k4kgc>

PUBLICATIONS

J. Ayerdi, A. Garciandia, A. Arrieta, W. Afzal, E. P. Enoiu, A. Agirre, G. Sagardui, M. Arratibel and O. Sellin, "Towards a Taxonomy for Eliciting Design-Operation Continuum Requirements of Cyber-Physical Systems", International Conference on Requirements Engineering, 2020 (RE'20)

J. Ayerdi, S. Segura, A. Arrieta, G. Sagardui, M. Arratibel "QoS-aware Metamorphic Testing: an Elevation Case Study", International Symposium on Software Reliability Engineering, 2020 (ISSRE2020)

B. Ahmed, E. P. Enoiu, W. Afzal, K. Zamli. "An Evaluation of Monte Carlo-Based Hyper Heuristic for Interaction Testing of Industrial Embedded Software Applications", Soft Computing 24, 13929-13954, 2020.

P. E. Strandberg, T. Ostrand, E. Weyuker, W. Afzal, D. Sundmark. "Intermittently Failing Tests in the Embedded Systems Domain", International Symposium on Software Testing and Analysis, 2020 (ISSTA2020).

S. Ali and T. Yue, Handling Uncertainties in Cyber-Physical Systems during Their Operations with Digital Twins, Fifth Workshop on Monitoring and Testing of Cyber-Physical Systems (MT-CPS) co-located with CPS-IoT Week, 2020.

T. Yue, P. Arcaini, S. Ali, Understanding Digital Twins for Cyber-Physical Systems: A Conceptual Model, Track on Engineering of Digital Twins for Cyber-Physical Systems at the 9th International Symposium On Leveraging Applications of Formal Methods, Verification and Validation, 2020.

WORKSHOPS

DepDevOps

Workshop on DevOps Testing for Cyber-Physical Systems (DevOps4CPS-Testing)





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ikerlan



simula



Adeptness



BOMBARDIER

