



# COSMOS

DevOps for Complex Cyber-physical Systems

## Advanced DevOps Tools and Methods for Cyber-Physical Systems

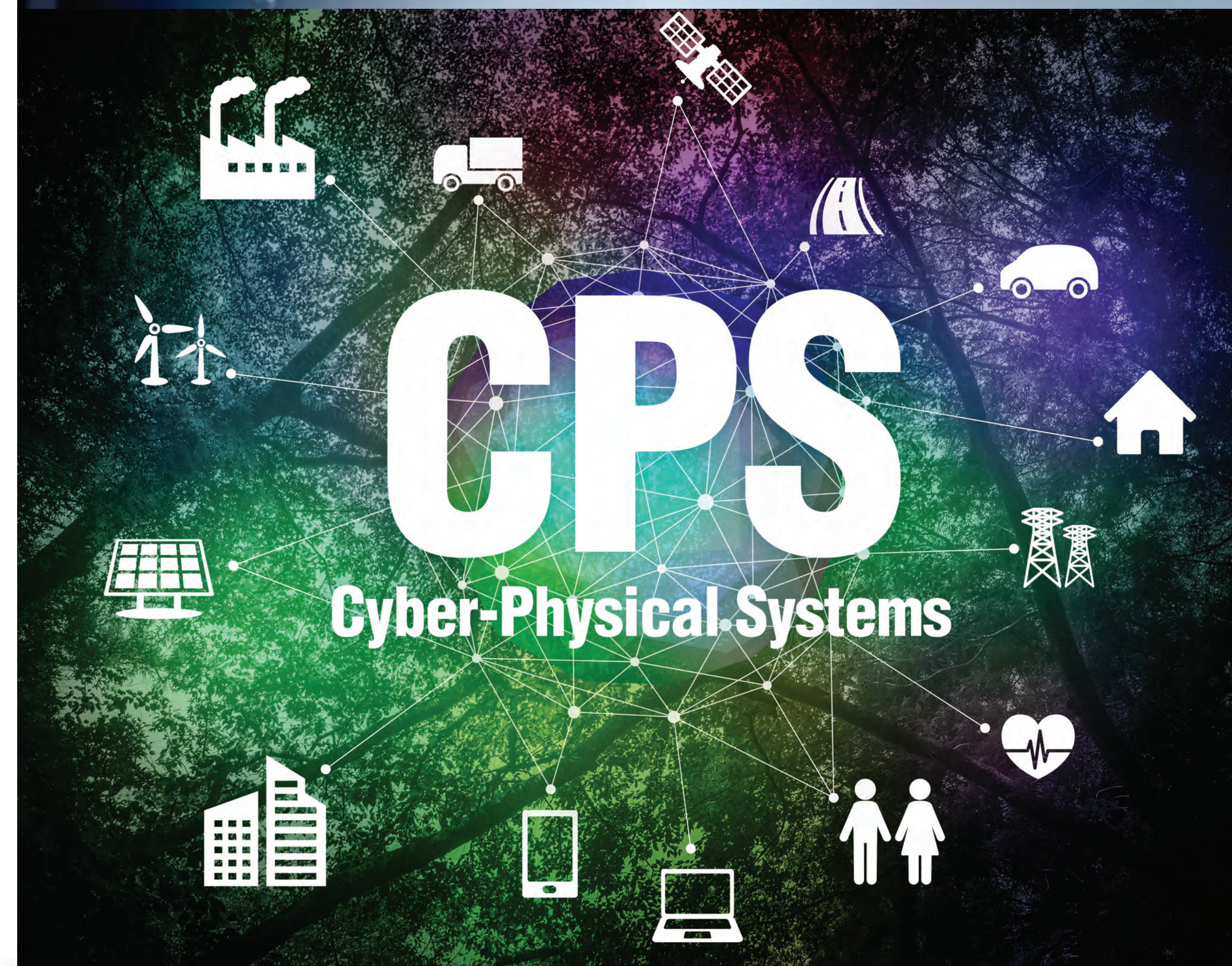
### EXECUTIVE Summary

COSMOS is designing and developing novel DevOps methodologies, techniques, and tools that enable effective, continuous development and evolution of cyber-physical systems (CPS), while providing substantial increases in the reliability, trustworthiness, and adaptability of complex software and hardware systems on which European industry, citizens and society heavily rely.

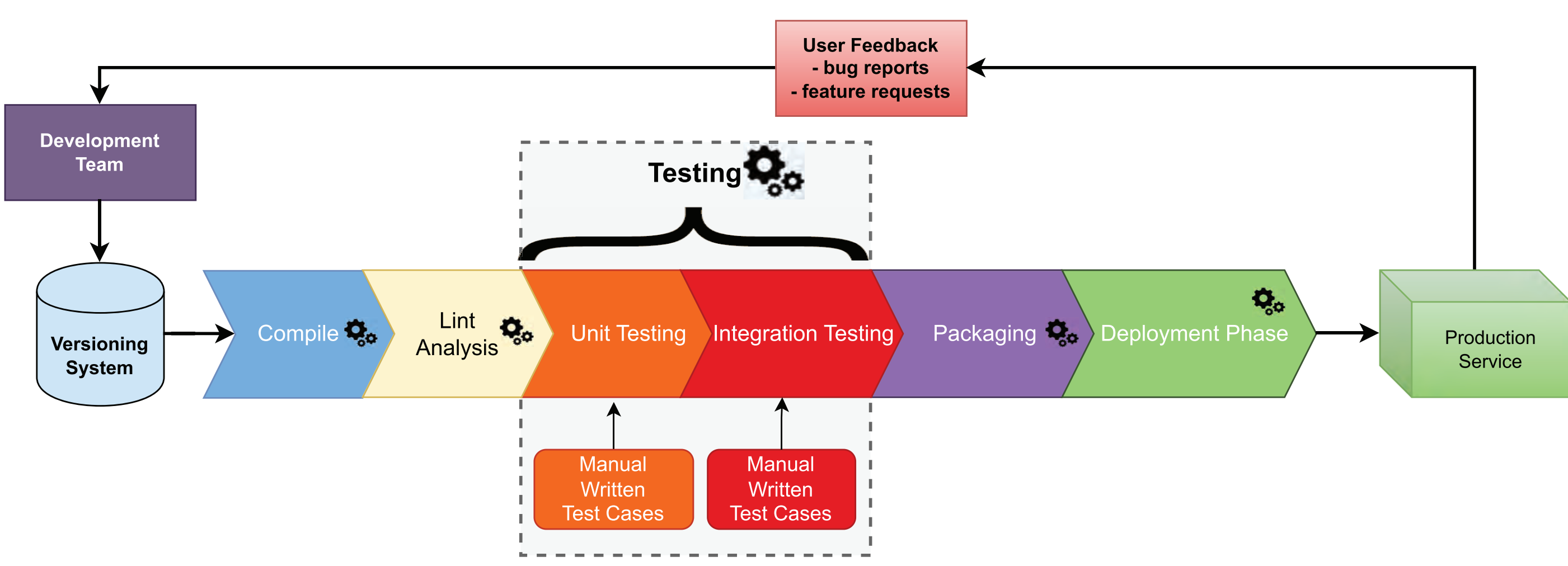


### PROJECT Challenge

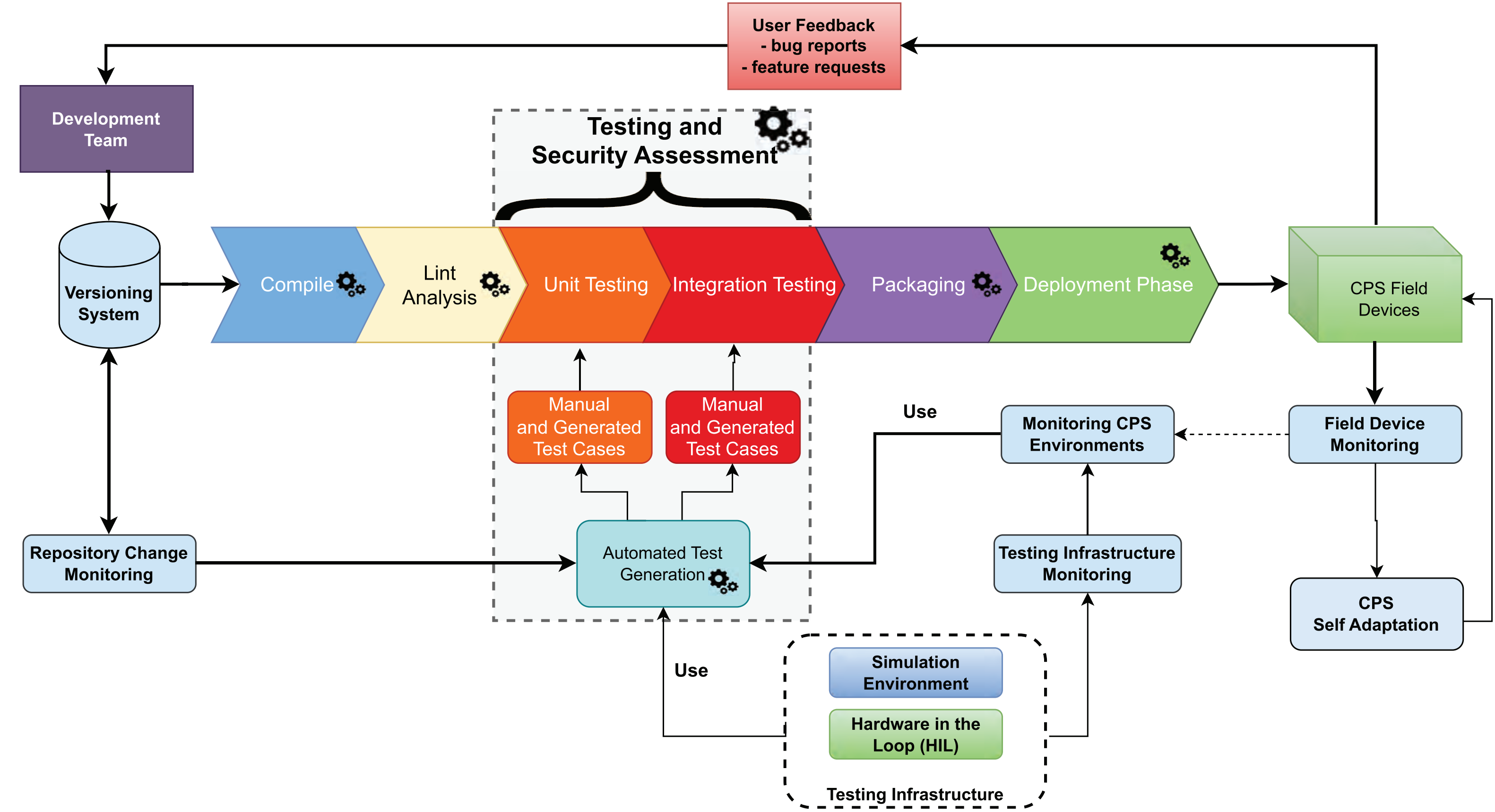
Applying DevOps practices to CPS domains requires specific development and verification strategies able to include Hardware-in-the-Loop (HiL) capabilities. Embedded systems design, manufacturing, and testing also have different, longer lead times and cycle times than enterprise software, leading to longer V&V procedures and higher testing costs (typically over 25% of total development costs). CPS are far more difficult to integrate, and testing the hardware is not always practically possible as the final version of the hardware is often available late and testing on the hardware directly can be expensive.



### Traditional DevOps



### COSMOS DevOps for CPS



### TECHNICAL Innovations

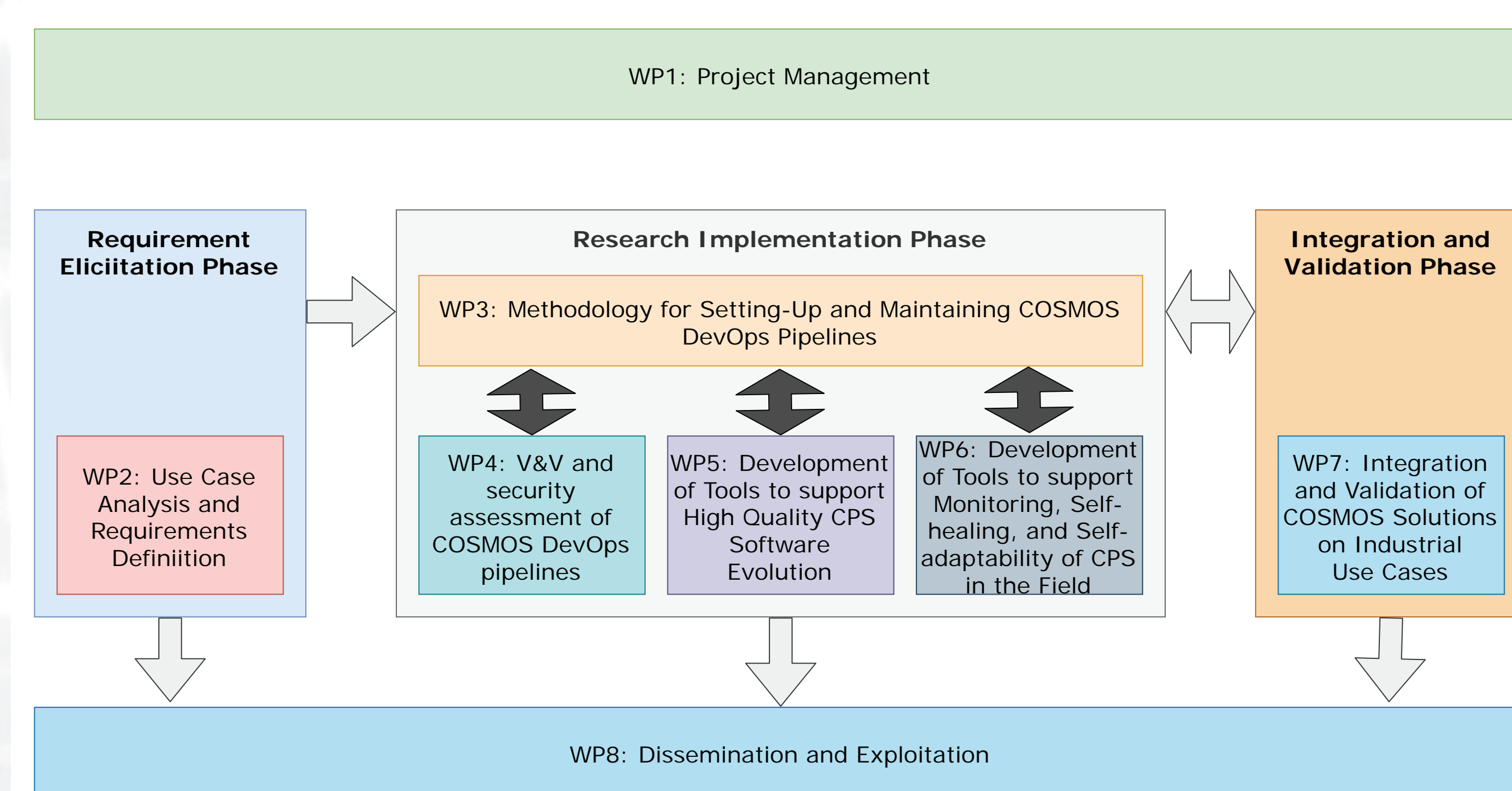
COSMOS overcomes the challenges of developing and evolving high-quality, dependable CPS by employing DevOps and AI as key technologies to:

- > Design, develop, and validate solutions that continuously improve overall efficiency/quality of CPS, reducing the number of post-release defects and security vulnerabilities
- > Develop solutions that enable CPS to autonomously adapt to unexpected run-time behaviours due to dynamic or unexpected operating contexts

Addresses key technical challenges for Agile CPS:

- > Simulation and Hardware in-the-Loop (HiL)
- > Signals processing from heterogeneous sensors
- > Run-time verification from logs, data and events
- > Security assessment of CPS vulnerabilities
- > Monitoring, self-adaptability and evolving of CPS

### PROJECT Approach



### PROJECT Consortium



COSMOS innovations are driven by requirements from industrial partners providing CPS solutions to the Healthcare, Avionics, Automotive, Utilities and Railways sectors.

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**WEBSITE**  
www.COSMOS-DevOps.org

**DURATION**  
36 Months

**COMPLETION**  
December 2023

**TOTAL COST**  
5M€

**CONSORTIUM**  
12 Organisations