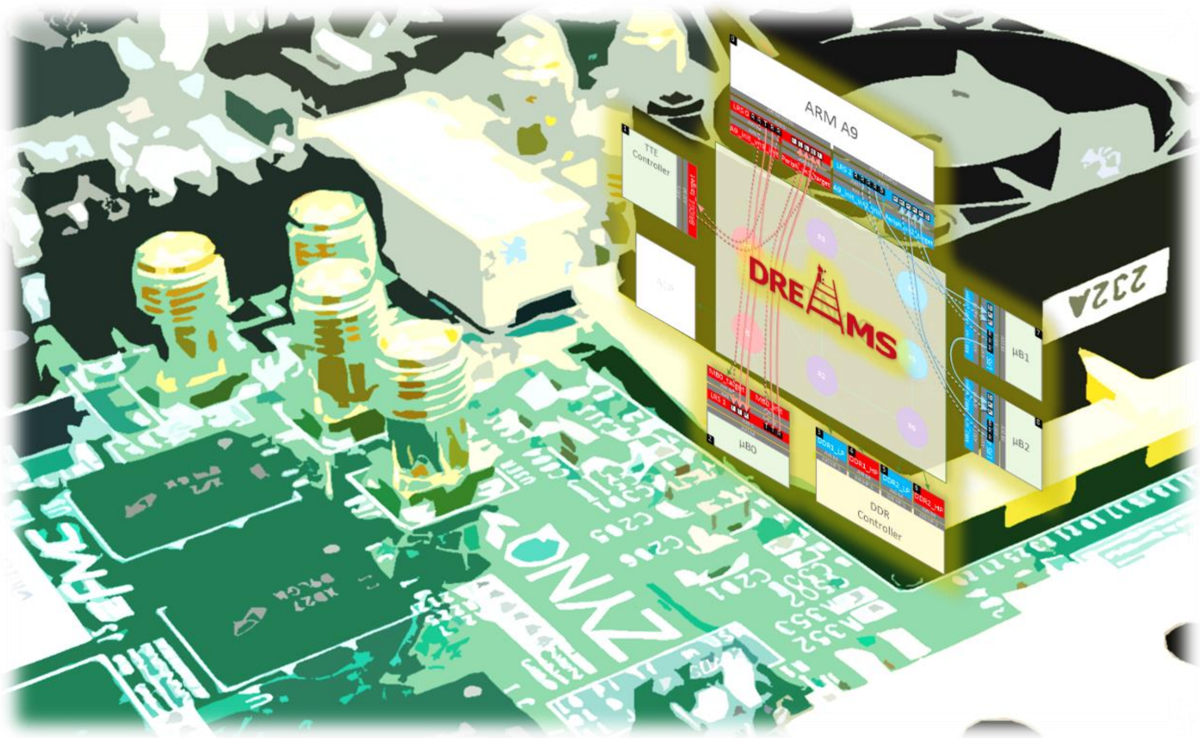

DREAMS Final Integration

DREAMS partners recently integrated the DREAMS technologies into different physical platforms with different processor architectures, e.g., ZYNQ evaluation board (ARMv7), Freescale T4240 (PowerPC), Galileo platform (x86) and Juno platform (ARMv8). The outcomes of this integration are three domain-specific platforms that are used by avionic, wind power and healthcare demonstrators.

For more details, keep reading this newsletter …

The objective of DREAMS is to develop a cross-domain architecture and design tools for networked complex systems, where application subsystems of different criticality execute and interact on networked multi-core chips. DREAMS delivers architectural concepts, meta-models, virtualization technologies, model-driven development methods, tools, adaptation strategies and validation, verification and certification methods for the seamless integration of mixed-criticality to establish security, safety, real-time performance as well as data, energy and system integrity.

At the end of the third year of the four-year European project, DREAMS partners integrated novel features for temporal and spatial partitioning of communication and computational resources, resource management and resource efficiency as well as security.

The DREAMS final platform in conjunction with the completion of major dissemination and training and the availability of the DREAMS community infrastructure addresses the seventh milestone of the project that is known as “Final DREAMS platform deployed and exploitation plan”.

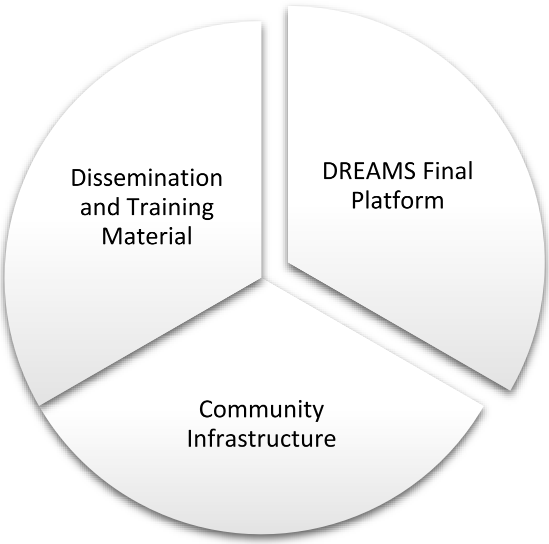

Figure 1 Dimensions of the Final DREAMS Platform Deployed and Exploitation Plan

The DREAMS final platform encompasses meta-models, chip-level technologies, cluster-level technologies, development methods, and certification and validation methods, which are integrated through the final integration. In this newsletter we learn how technologies such as, hardware platforms, software layers and tools enabling the development of safe applications with the advantages offered by the technologies are integrated through the final integration.

DREAMS Integration Targets

Due to different demonstration requirements as well as different types of targets, the following integration targets were identified:

The **final physical platform** is composed of both domain independent and domain specific platforms. The DREAMS Harmonized Platform (DHP), a "Xilinx All Programmable System-on-Chip" development board (ZC706 ZYNQ-7000 evaluation board[1]) has been identified as the domain-independent physical platform, which presents different technologies provided by the DREAMS technological partners.

In addition, based on the requirements of different use cases, different hardware platforms have been identified to be used in conjunction with the DHP for domain-specific applications.

In the Avionic use case, two instances of the Freescale T4240 PowerPC platform[2] in conjunction with the DHP are used to demonstrate the functionality of the flight management system.

The system in the wind power demonstrator is demonstrated in the GALILEO[3] platform, which is based on an x86 dual core processor. This platform requires several inputs and outputs that are connected through an EtherCAT fieldbus. GALILEO is a real-time platform used for the supervision and control system, though it may support other real-time applications such as wind farm control.

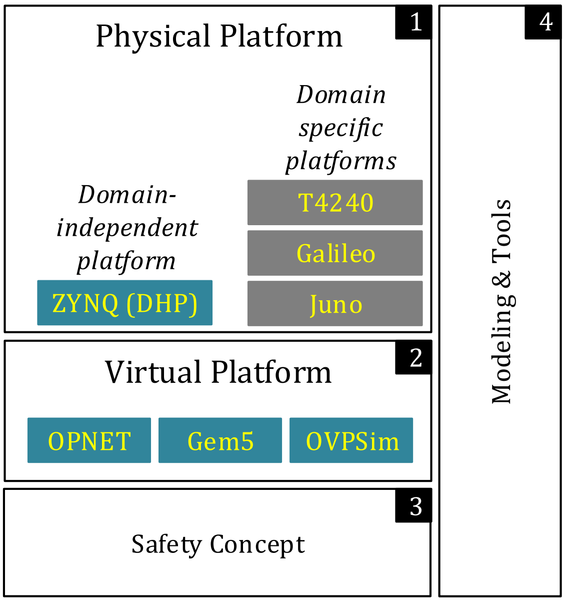

Figure 2 DREAMS Integration Targets

In healthcare use case, the ARM JUNO platform[4] which uses the latest generation of ARM processors, is used. The use of JUNO shall allow the integration of several DREAMS contributions (the DHP) while using the last generation of processors in a realistic demonstrator as shown hereafter.

The **virtual platform** addresses a simulation framework that allows to gain insights into design alternatives and design faults at early development stages, thus decreasing development time and cost. This framework includes the cluster level, the chip level and the hypervisor level, which are implemented based on the descriptions provided in D5.2.1.The virtual platform is composed of two configurable simulation environments, OPNET-Gem5 and OVPSim-Gem5 simulation environments.

The **model-based development process** for mixed-criticality systems based on the meta-models is defined as a chain of transformations from the input models to the final artefacts to be deployed at the target platform. It provides a methodology and prototypes of tools for mapping mixed-criticality applications to heterogeneous networked platforms including algorithms for scheduling and allocation, analysis of timing, energy and reliability.

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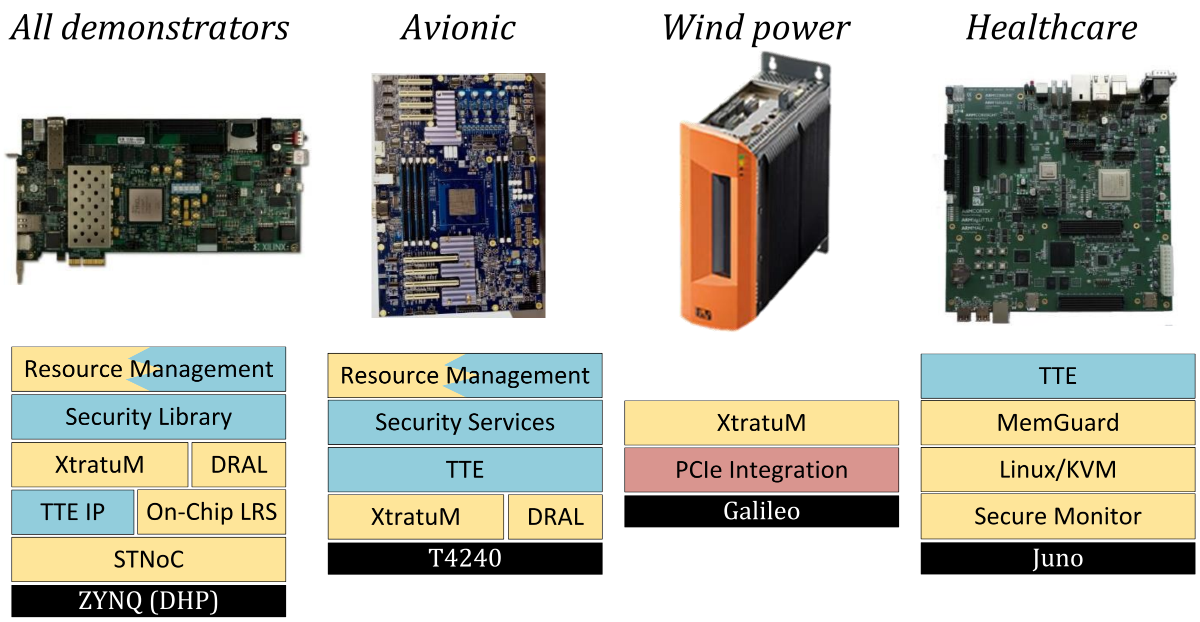
[1] https://www.xilinx.com/products/boards-and-kits/ek-z7-zc706-g.html

[2] http://www.nxp.com/products/microcontrollers-and-processors/power-architecture-processors/qoriq-processors-power-architecture-t-series/qoriq-t4240-development-system:T4240QDS

[3] http://www.ikerlan.es/en/rd-companies/projects/galileo-v4-supervision-and-control-system

[4] http://www.arm.com/products/tools/development-boards/versatile-express/juno-arm-development-platform.php

The DREAMS **certification methods** pave the way towards the competitive development and certification of mixed-criticality embedded computing platforms, providing solutions to manage complexity, increase re-usability and reduce the engineering and certification time and cost. For this purpose, this integration target defines modular safety cases (MSC), cross-domain mixed-criticality patterns to guide and support engineers towards solutions that solve commonly occurring problems in the development of mixed-criticality products. In addition, this target defines how each tool can be integrated in an industrial safety engineering process and defines the implications of certifying a variable product family.



Different physical platforms are chosen to address different requirements of the demonstrator partners, the ZYNQ Evaluation board (ARMv7) which is used for the DREAMS Harmonized Platform (DHP), the Freescale T4240 (PowerPC) for avionics, the Galileo platform (x86) for wind power and the Juno platform (ARMv8) for the health care demonstrator.

Stay tuned

DREAMS' webpage: http://dreams-project.eu