SafeCOP

Start date	1 April 2016
Duration	36 months
Total investment	€3.8M
Number of participants	29

Next generation embedded systems are interconnected through wireless communication. They provide businesses and individuals with a wide range of highly innovative applications and services in everyday life. Because of the complex nature of these systems, it is necessary to make sure they comply with essential requirements of safety and security.

SafeCOP is an ECSEL project targeting cyber-physical systems whose safe cooperation relies on wireless communication. The Cooperative Open Cyber-Physical System (CO-CPS) is a "system-of-systems", which is characterised by multiple stakeholders, dynamic system definitions, and unpredictable operating environments. In this scenario, no single party holds the overall responsibility over the system, which means the safety-relevant functions are performed jointly while relying on the wireless communication. This means that security might easily be compromised.

Such CO-CPS can successfully address several societal challenges, and can lead to new applications and new markets. For instance, cooperative vehicles, or "V2V", have been shown to reduce fuel consumption, decrease the number of traffic accidents, and result in efficiency gains and con-gestion savings. CO-CPS can also be successfully applied in healthcare, which is characterized by dramatically increasing costs. For example, cooperative robots could be used to reduce the amount of physical labour in hospitals.

Development of CO-CPS, however, poses challenges that are not adequately addressed by existing practices, typically requiring design decisions to be made that trade-off safety concerns, functionality, cost, and other considerations. SafeCOP will develop a safety-assurance framework for such systems, which will facilitate their certification and market release. The project will also define a reference "Runtime Manager" architecture that detects abnormal behaviour, and triggers a safety degraded mode in case of emergency. SafeCOP will also contribute to developing new standards and regulations by providing certification authorities with scientifically legitimate solutions. The project will also equip current wireless technologies with a safety protocol to ensure secure cooperation of already existing systems.

SafeCOP brings clear benefits in implementation and certification practice of cooperating systems in four addressed areas: healthcare, maritime, vehicle-to-vehicle and vehicle-to-infrastructure. The project will lower certification costs, increase trustworthiness of wireless communication, ensure better management of increasing complexity, reduce effort for verification and validation, lower total system costs, and shorten time to market leading to increased market share. These results will be demonstrated in five use-cases: cooperative moving of empty hospital beds, cooperative bathymetry with boat platoons, vehicle control loss warning, vehicle and roadside units' interaction and vehicle-to-infrastructure cooperation for traffic management.