

CPS20: CPS 20 years from now



## CPS20: CPS 20 years from now visions and challenges

## Preface

Today's software and especially control systems are increasingly connected with one another and also to the Internet. While the physical and the virtual worlds -the latter also called cyberspace- merge, interaction and collaboration give rise to emergent behaviour that provides services beyond the limits of single applications.

Cyber-Physical Systems (CPS) consist of computation, communication and control components tightly combined with physical processes of different nature, e.g., mechanical, electrical, and chemical. CPS decisively expand the functionality and, as a result, the practical value and competitiveness of, among others, vehicles, aircraft, medical equipment, production plants and household appliances. Their potential moreover includes solving a number of challenges of modern society as, e.g., care and support of individuals in an aging population, accident prevention, and intelligent use of limited resources among others by generation of renewable energy.

Typically a CPS is defined and understood (evaluated) in a social and organizational context. It is commonly foreseen that future CPS will be able to interactively adapt to their context, are capable of learning, dynamically and automatically reconfigure themselves and cooperate with other CPS, possess an adequate human-machine interface, and fulfil stringent safety, security and private data protection regulations.

CPS thus play a crucial role in stimulating economic growth. They permeate industry and academia pushing the development of world class products, services and inventions. They are also recognized as crucial in addressing grand societal challenges, i.e., are the result of a demand pull as well.

The CyPhERS project aims at a strategic research and innovation agenda for CPS, including recommendations for action, that consider the economic, technical, scientific, and societal impact of CPS. The multifaceted nature of CPS requires a multi- and transdisciplinary approach to their development. Indeed, ideally the associated issues are addressed in collaboration by experts from manifold domains. In October 2013, CyPhERS organized the first experts' workshop whose goal was the elicitation of the state of the art, the aggregation of visions, and the prediction of possible and desirable evolution in the short, medium and long run.

CPS20 is the second CyPhERS experts' workshop designed to, on the one hand, validate reached results and conclusions and, on the other, elicit further and deeper discernments. The most important motivation lies in the holistic interpretation of the challenges posed by CPS and the preparation of orchestrated stratagems to their mastering. Experts from multiple disciplines and industrial domains, from all corners of the continent, meet in Berlin and within the CPSweek to discuss vision, opportunities and challenges. The workshop provides a fruitful venue for networking and exchanging ideas. Participants are moreover given the opportunity to join the CyPhERS network of experts, that is, to supply feedback on the achieved insights and actively contribute to the roadmap and recommendations to be produced by the project.

We warmly welcome you to Berlin, a city at the heart of Europe that gathers a variety of cultures and tendencies, that is fashionable and scholastic, modern and historic, and thus helps setting the CPS20 event at the right crossroad. We hope you enjoy the workshop and your stay, and will be glad to count with you in the CyPhERS network of experts.

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