Sabine Hafner-Zimmermann, Michael J. de C. Henshaw

The future of trans-Atlantic collaboration in modelling and simulation of Cyber-Physical Systems

A Strategic Research Agenda for Collaboration

Steinbeis-Edition

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Authors:
Sabine Hafner-Zimmermann (Steinbeis-Europa-Zentrum, Germany)
Michael J. de C. Henshaw (Loughborough University, UK)

Contributors:
Peter Brook, Sofia Ahlberg-Pilfold, Luminita Ciocoiu, Lipika Deka, Murray Sinclair, and Carys Siemieniuch (Loughborough University, UK)
John Fitzgerald and Zoe Andrews (Newcastle University, UK)
Meike Reimann (Steinbeis-Europa-Zentrum, Germany)

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1 Executive Summary

The need for EU-US collaboration in modelling and simulation for CPS – Scope of TAMS4CPS

Smart systems, in which sophisticated software / hardware is embedded in physical systems, are part of everyday life. From simple products with embedded decision-making software, to massive systems in which hundreds of systems, each with hundreds or thousands of embedded processors, interoperate the use of Cyber-Physical Systems (CPS) will continue to expand.

Through highly developed analysis of sensor data, CPS respond appropriately to changes in their environment to undertake complex activities of benefit to society. CPS may operate as individual systems, but are more usually networked as Systems of Systems (SoS) displaying complex behaviours that cannot be adequately predicted with current modelling capabilities. When CPS are networked by the internet, the resulting complex system is sometimes referred to as an Internet-of-Things (IoT), which is considered to be the basis for a new industrial revolution through which societal, commercial, and technological benefits are expected to accrue across diverse sectors (healthcare, transport, manufacturing, defence and security, energy, etc.).

There has been substantial investment in CPS research in Europe and the United States (US). Through a series of workshops and other events, the TAMS4CPS Support Action has established that there is mutual benefit in the European Union (EU) and US collaborating on CPS research. An agenda for collaborative research into modelling and simulation (M&S) for CPS is set forth. The agenda includes models for many different purposes, including fundamental concepts, design models (e. g. architectures), predictive techniques, real-time control, human-CPS interaction, and CPS governance.