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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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TAMS4CPS acknowledges the support from the five US universities involved in the project: Professor Alexander H. Levis (George Mason University); Professor Dimitris Mavris and Dr. Kelly Griendling (Georgia Institute of Technology); Prof. Daniel DeLaurentis and Dr. Inseok Hwang (Purdue University); Professor Gregg Versonder (Stevens Institute of Technology); and Professor Mo M. Jamshidi (University of Texas, San Antonio).

The TAMS4CPS project is co-funded by the European Community's Horizon 2020 Programme under grant agreement no 644821. This publication is the Final Strategic Research Agenda for Collaboration developed within the project.

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Imprint

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1st edition, 2017 | Steinbeis-Edition, Stuttgart
ISBN 978-3-95663-112-2

Layout: Steinbeis-Edition
Cover picture: ©jamesteohart/Fotolia.com
Production: Frick Kreativbüro & Onlinedruckerei e.K., Krumbach

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159928-2017-02 | www.steinbeis-edition.de

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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.