

Service-oriented Architecture and Cloud Computing Technologies - Innovation Backbone to Implement Industrial Cyber-Physical Systems *(Lessons Learned from latest industrial prototype applications)*

Presenter:

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Brief description:

We are witnessing today several concepts and technology trends when designing and implementing solutions on Industry Cyber-Physical Infrastructures e.g., the SmartGrid, the Factory of the Future, the Industry 4.0, etc. Especially when key issues on cross-layer collaboration, (near) real-time interaction, complexity and emergency behaviour management, support of system of systems evolvability, heterogeneity, interoperability, scalability etc. are coming into play, we have to radically rethink approaches under the requirements and constraints of the Industrial Systems. Structural Integration and Behavioural Collaboration are major goals especially for a domain relative new to IT technologies and their rapid evolution pace. Service-oriented Architectures (SoA), Web and Cloud Computing Technologies have been proven to be a real and feasible innovation backbone at Internet scale, and are finding their way in the future Industrial Systems. Based on Lessons learned from latest prototype industrial applications, we need to further evaluate and assess their capability and applicability and ask key questions e.g., how deep can we go with web technologies in real-time monitoring and control; how can we realize the next generation large-scale distributed monitoring systems; how to support the lifecycle of industrial solutions viewed under the system of systems engineering viewpoint; how to architect the next generation SCADA/DCS systems; what is the tradeoff for security, trust and privacy; how can we migrate towards web-technology based systems; how to design today the best legacy system of tomorrow; etc.

The tutorial will serve as an introductory session to the developments made in several European industry-driven projects such as SOCRADES (www.socrades.eu), IMC-AESOP (www.imc-aesop.eu), SmartKYE (www.smartkye.eu) who have focused on cross-layer Cyber-Physical System interactions and SOA-based industrial system integration. The tutorial aims at providing an insight to aspects such as: web services on devices, integration with enterprise systems, collaborative automation, future cloud-based SCADA/DCS, directions for large scale systems, migration of legacy infrastructures, technologies and challenges for the future. We aim to strike the balance in providing lessons learned, hands-on experiences as well as future directions, aspects of interest and challenges.

This Tutorial is the consecutive action to the series of Tutorials and Keynotes presented by the authors during the latest IEEE IECON, IEEE ISIE, IEEE INDIN Conferences. It summarizes a set of scientific and technical results of application of the Cyber-Physical Systems Paradigm in different industrial domains, mainly in manufacturing and process industry. The presenters are experts on the tutorial subject matter proposed, and content presented can be also found in numerous IEEE papers and book chapters published by the presenters. As IECON 2013 has a very strong focus on Industrial Manufacturing, Applications and infrastructures as well as emerging domains such as the SmartGrid, we think this tutorial is an excellent fit as it covers from multiple angles the IECON 2013 focus.

Presenter Biographies:

Prof. Armando Walter Colombo joined the Department of Electrotechnic and Industrial Informatics at the University of Applied Sciences Emden-Leer, Germany, and became Full Professor in August 2010. He is also Edison Level 2 Group Senior Expert and Research Program Manager at Schneider Electric. He received the MSc. on Control System Engineering from the National University of San Juan, Argentina, in 1994, and the Doctor degree in Engineering from the University of Erlangen-Nuremberg, Germany, in 1998. He is a Senior Member of the IEEE, member of the IEEE IES Administrative Committee (AdCom) and of the Gesellschaft für Informatik e.V. The last 12 years Prof. Colombo coordinated efforts in several European Commission and industry funded projects related to emerging technologies in key areas such as service-oriented architectures, cyber-physical systems, collaborative agent-based industrial automation, etc. He has served/serves as Associated Editor of the IEEE Transactions on Industrial Informatics, IEEE Transactions on Automation Systems Engineering (IEEE T-ASE) and Associated Editor of the IFAC Associated Journal ATP-International. Prof. Colombo is the co-leader of the ARTEMIS (European Embedded Systems Platform) Strategic Research Agenda - Sub-Program ASP4. He has more than 200 per-review publications and 23 industrial patent applications (see <http://scholar.google.com/citations?user=csLRR18AAAAJ>). Prof. Colombo is listed in Who's Who in the World /Engineering 99-00/01 and in Outstanding People of the XX Century (Bibliographic Centre Cambridge, UK).

Stamatis Karnouskos is with SAP as a Research Expert on M2M / Internet of Things. He investigates the added-value of integrating networked embedded devices in enterprise systems. For more than 15 years Stamatis leads efforts in several European Commission and industry funded projects related to industrial automation, smart grids, Internet-based services and architectures, software agents, mobile commerce, security and mobility. Stamatis is actively involved in several consultations at European Commission and German level dealing with Cyber-Physical systems, System of Systems, Internet of Things, energy efficiency and SmartGrids. He has co-authored and edited several books, technical papers, acted as guest editor in IEEE/Elsevier journals, and participates as a program member committee and reviewer in several international journals, conferences and workshops. Stamatis serves in the technical advisory board of Internet Protocol for Smart Objects Alliance (IPSO), the Permanent Stakeholder Group of the European Network and Information Security Agency (ENISA).