Presentation of the Programme of the 6th GI/ACM Standardization Workshop on Industrial Automation and Control Systems

The 6th IACS WS'21 September 28, 2021 Virtual

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Abstract: One of the important basic objectives of the 6th IACS WS'21 is to contribute to Sustainability achieved by standardization that is based on new I4.0 technologies such as Smart Manufacturing, Digital Twin, AI-based Robotics, Industrial Internet of Things and more.

Keywords: Industrial Automation and Control Systems, I4.0, Standardization, Smart Manufacturing, Production Life Cycle, Security Levels, Functional Safety.

1 The 6th IACS WS'21 Specification

The 6th IACS Standardization WS'21 in series is again aligned with the yearly assembly of the ‚GI Jahrestagung 2021'. Hence the Workshop schedule is planned in accordance with the conference schedule

of the 51st GI Jahrestagung from September 27 to October 01, 2021

organized by GI-Berlin-Virtual:

All the communications to prepare the workshop including submissions uploads and reviewing, communicating with participants, organizers, PC members and last not least,

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authors has been achieved via the *easychair tool* by registering and logging-in to the **6th IACS WS'21**! —> https://easychair.org/account/signup

The use and deployment of *EasyChair* enabled the organizers to track all the constraints and conditions on the numerous submissions of this event. On the *easychair* platform the members of the co-chair board (CB) and the programme committee (PC) have performed diverging communications EU-wide and quite heterogeneously comprising industrial, scientific, governmental start-up SMEs and many other interested parties and organizations integrated to a 'virtual round table'.

The workshop's joint CB/PC Board appreciates the continuous support from Fraunhofer FOKUS in providing logistics and scientific experiences for preparing the workshop but also for printing posters, organizing reviewing decision-making meetings etc!

One of the **general objective of the 6th IACS WS'21** and of the conférence *'GI Jahrestagung 2021'* is on how to achieve sustainability by standardization of I4.0 Automation and Control Systems (IACS) according to the current industrial system and component requirements of one of the most important industrial standards series IEC 62443!

Work of Standards Developing Organizations (SDOs) and international Technical Standardization Committees compared to the concepts and approach of IACS is also part (but not limited to) of IEC TC65 ‚Smart Manufacturing' WG23 (system) and WG24 (AAS), ISO/JTC1 SC27 on Security Technologies, SC38 on Cloud Computing, SC41 on Industrial Internets of Things, SC42 on Artificial Intelligence Technology in Smart Factories, Smart Cities, Smart Grids etc.

The 6th GI/ACM IACS WS'21 nominated Board of Co-Chairs:

Jan B. de Meer(General),

Karl Waedt(Co),

Axel Rennoch(Co),

Hans-Joachim Hof(Co)

The 6th GI/ACM IACS WS'21 Programme Committee Members:

Axel Rennoch	Fraunhofer Institute FOKUS Berlin
Hans-Joachim Hof	Technische Hochschule Ingolstadt INSI
Jan-Bernhard De Meer	German Chapter ACM

Karl Waedt	Framatome GmbH Erlangen
Olga Meyer	Fraunhofer Institute IPA Stuttgart
Peer Reymann	ITQS GmbH Germany
Rainer Falk	Siemens AG München
Sabine Kruspig	Kanzlei Schwarz & Kollegen München
Scott Cadzow	C3L UK
Steffen Fries	Siemens AG München
Ulrich Seldeslachts	Leuven Belgium

The 6th IACS WS’21 Time Plan anticipated

1. Early Registration of Abstracts of Intentional Submissions: April 11;
2. LNI-ready papers for the 6th IACS WS’21 LNI Proceedings: June 30; (End of Reviewing)
3. Final LNI Proceedings Preparation: July 31
4. The 6th IACS WS’21, GI Berlin-virtual: September 28 (accepted presentations due).

2 The 6th IACS WS’21 Supporters

Starting with the GI Conference *Informatik2016* held in Klagenfurt the IACS Workshop Series appreciates cooperation with national and EU industrial and research standardization supporting organizations:

3 The 6th IACS WS'21 Targets

One of the important basic objectives of the 6th IACS WS'21 is to contribute to ‚Sustainability achieved by standardization that is based on new I4.0 technologies such as Smart Manufacturing, Digital Twin, AI-based Robotics, Industrial Internet of Things and more.

According to the multistandard IEC 62443 prescribing requirements on security, safety, privacy, quality of work, asset management etc. the 6th IACS WS'21 adopts the following objectives derived from IEC 62443:

- IACS Modeling, Vocabularies and Concepts
- System Security Conformance Metrics
- Production Lifecycle and Use Cases of New Technologies
- IACS Risk Assessment and Security Levels
- Administration Shell of Repositories for I4.0 Objects and IoT Devices
- Knowledge Derivation from Big Data Lakes
- Ontology Language and Unique Object Identification
- Security Algebra and Verification Techniques
- Human-Machine Interoperability
- Semantic Interoperability in SM/IIoTs
- New Artificial Intelligence Techniques and Approaches
- Functional Safety and Trustworthiness
- ICT Application Regulations and Ethics.

4 The 6th IACS WS'21 Narrative

The industrial multipart standard IEC 62443 IACS addressed by the GI/ACM I4.0 standardization workshop series has been and still is developed in accordance with other standardization organizations aiming at requirements, methods and techniques of CRITIS, ETSI TC Cyber, IEC TC65 Smart Factoring, ISO JTC1 SC27/WG4 IT Security, Artificial Intelligence (SC42) and Industrial IoT (SC41) and more.

From early beginning of the IEC 62443 series development in 2013 and since the multipart standard IEC 62443 is continuously growing. Almost every 2 to 3 years a new standard

part is published and comprises to-day 13 parts ranging from system to component specifications. The roadmap towards a complete view on I4.0 Systems comprises a system view of four groups of standard parts, i.e. General Concepts (1), Policies and Procedures (2), System Aspects (3), Component Aspects (4).

In 2018 a 5th group of ‚Industry Profiles' has been defined and became started and is now nearly to be finished. Industry Profiles are based on available normative parts of IEC 62443-2.4 for solutions suppliers and IEC 62443-4.1 for product developers.

This is now the 6th IACS Workshop in series joined with ‚GI Jahrestagung‘ 2021 in Berlin-Virtual. All former I4.0 standardization workshops organized under tha auspices of ‘GI Jahrestagung’ happened in Karlsruhe (the first WS organized virtually), Kassel (4th), Berlin(3rd), Chemnitz (2nd) and Klagenfurt (1st).

The members of the PC and its Chairing Board (CB) appreciated and acknowledging the manyfold support from the associations of 'German Chapter ACM' and 'Gesellschaft für Informatik (GI)' of the D-A-CH countries, the EU ‚ECSO‘ and, the national ‚SCI4.0‘ and ‚Plattform I4.0 organizations and finally the support of Fraunhofer FOKUS Berlin.

The ‚European Cyber Organization (ECSO)‘ supports the workshop’s main issue of addressing industrial development and harmonization by and with standards as it is key to the IEC 62443 IACS series. ECSO is structured into 6 working groups comprising but not limited to Standardization of Supply Chain Management (1), International Collaborations (2), Sectorial Demanding I4.0 (3), Coordination with Regions (4) and Awareness of Cyber Ranges (5).

July 31, 2021, Berlin, for the joint board of Co-Chairs and PC members:

Jan-Bernhard deMeer (General Chair)

Axel Rennoch, Hans-Joachim Hof, Karl Waedt (Co-Chairs).

5 The 6th IACS WS'21 Programme

On the following poster you'll find the list of accepted authors and their speeches:

6 The 6th IACS WS'21 Speakers

Anja Simon (f) received her diploma degree in engineering for technical cybernetics and automation at the HTWK Leipzig in 1989 and a degree in economics of engineering from an association of the European Union and German IHK in 1996. In addition, she graduated as master of consulting excellence at Siemens Munich in 2006. She joined Siemens AG in 1992 and has worked in multiple different positions since then. Her professional career has led Anja Simon from software developer, product and sales engineer as well senior business consultant for major operational projects for industrial customers to central management tasks for global multifunctional shared service centers and the responsibility of international IT service outsourcing deals. Recently, as a program manager for cross-

company digitization projects, she was responsible for the R&D functions and the operational roll-out of joint solutions. Anja Simon will take over the CTO role for LNI 4.0 (Lab Networks for Industrie 4.0) on July 1st, 2021.

Axel Rennoch is computer scientists at the Fraunhofer Institute for Open Communication Systems in Berlin. As a member of the System Quality Competence Center, he is involved / responsible for validation and testing projects on next generation networks and software technologies. Axel Rennoch has been working in the field of Formal Methods, Testing Methodologies and Quality of Service considerations in various scientific and industrial projects since 1985. His experiences address the application of Formal Description Techniques, the development and execution of protocol tests, and software testing. During this work he contributed to several national and international standardization groups (e.g. DIN, ISO, ATM-Forum, OMG, ETSI) and published research papers continuously.

Joseph Schindler is currently a member of the Graduate Program at Framatome GmbH Erlangen. After finishing his Bachelor of Mechanical Engineering, Josef Schindler decided to reorientate and to study Electrical Power Engineering at Friedrich-Alexander-University Erlangen-Nuremberg. His key motivation for this change for the master studies was the “Energy Transition/Energiewende”. Luckily, he found an ideal master thesis for this concern: “Modelling of a Hybrid Energy Storage (Vanadium Redox Flow Battery & Flywheel Storage) with a Neural Network-based Control”. In 2018, he started a PhD graduate program at Framatome, where he researches the impact of cross-commodity sharing at neighbourhood-level. Aims are the reduction of peak loads and better integration of Renewable Energy Sources. There is a high potential for cybersecurity attacks in the network interconnection of the neighbours. Hence, the research focuses increasingly on cybersecurity-related topics.

Markus Rentschler completed his studies in 1993 and holds degrees in Communications Engineering from the University of Applied Sciences in Konstanz/Germany and Digital Systems Engineering from the Heriot-Watt University in Edinburgh/Scotland. Since then, he could gain over 25 years of experience in development and quality assurance of embedded communication systems and is holder of several patents. In his current position he is with his team responsible for the standardization of system interfaces for the *Balluff* product families and an active member or lead in several external standardization activities. Besides that, he is a part-time lecturer for "Software Engineering" at the Cooperative State University in Stuttgart and is regularly publishing on national and international technical conferences.

Olga Meyer works as a research associate at the Fraunhofer Institute for Manufacturing Engineering and Automation IPA. She leads several public and contract research projects in the field of manufacturing IT and develops innovative solutions for cloud manufacturing as well as IT architectures for cyber-physical production systems and communication technologies. Olga Meyer is an active member of several standardization working groups at national and international level working on the development of standards in the areas of Smart Manufacturing, Digital Twin, Industrial Internet of Things and other related technologies. Within the Horizon 2020 project QU4LITY, she contributed to the "German Standardization Roadmap for Industry 4.0", which is one of the central communication media for Industry 4.0 in Germany.