9:00 am – 9:10pm **Welcome and Overview**
Claude Baudoin, Owner and Principal Consultant for cébé IT and Knowledge Management

9:10 am – 9:30 pm **Moving Smart Manufacturing Forward: IIC Testbeds and OMG Standards**
Dr. Richard Soley, Chairman & CEO, Object Management Group (OMG), Executive Director of the Industrial Internet Consortium (IIC)

The ideas behind the Internet of Things (or Cyber-Physical Systems, or Machine-to-Machine Interoperability, Industrie 4.0, or several other names) are not particularly new; indeed, what has happened is really a convergence of existing technologies and corporate strategies. As the number of sensors in the world rapidly outpaces the world population and concepts of Big Data for real-time, predictive analytics comes to the fore, new market opportunities appear. In fact, the world will see major disruptions in transportation, financial management, medical devices and other markets as "Internet thinking" moves into the industrial domain.

9:30 am – 9:50 am **Industrie 4.0 Overview**
Erich Clauer, Vice President, Head of Industry Standards & Open Source, SAP

Plattform Industrie 4.0 is the central network to advance digital transformation in production in Germany. The Plattform Industrie 4.0 was formed in 2015 under the patronage of the German Federal Ministry for Economic Affairs and German Federal Ministry of Education and Research to promote collaboration between politics, industry, science, associations and trade unions. The Platform is one of the largest international and national networks and supports companies, especially SMEs, in implementing Industry 4.0, particularly by providing practical examples and deploying them on site. The main goal is to come up with recommendations for the industries and the legislative. A further deliverable is to initiate standards specific to Industrie 4.0, with the focus on manufacturing. Equally important, the network is also open to international companies and has on a global level tight relationships with countries like China, France, Italy, Japan, to mention a few, and their IIoT initiatives as well as with government independent organizations like the IIC.

The working groups at The Plattform Industrie 4.0 are focused on (A) Reference architectures, standards and norms, (B) Research and Innovation, (C) Security of networked systems, (D) Legal Framework and (E) Work, education and training. The Labs Network Industrie 4.0 is a network of labs where Industrie 4.0, in collaboration with the participating companies, can be tested for practical use. For more information, visit www.plattform-i40.de.

9:50 am –10:10 am **IIC Smart Factory Task Group Overview**

Calvin Smith, Director & Head of IoT Partner Engineering, Wipro Digital

The Smart Factory Task Group was formed in 2016 to promote collaboration, education and standards specific to IIoT in manufacturing. The Smart Factory group highlights the progress of IIC testbeds, task groups, allied industry organizations such as Industry 4.0, to help business and technology leaders in the discrete manufacturing and process industries understand and adopt evolving IIoT best practices.

10:10 am – 10:30 am Refreshment Break

10:30 am – 11:10 am **Modernizing your Industrial Manufacturing Network -- The IIC Time Sensitive Network Testbed**

Paul Didier, Internet of Things Solution Architect at Cisco

As the number of devices connected via the Internet of Things grows at exponential rates, the communications infrastructure has to grow with it. Time Sensitive Networking (TSN) is the evolution of standard Ethernet that will make critical data available when and where it's needed. TSN is suitable for automation applications in industrial environments like manufacturing, distributed control and measurement, and electrical power grids. This paves the way for the Industry 4.0 in modern heterogeneous industrial networks and shifts us into the fast lane toward realizing an Industrial Internet of Things.

11:10 am – 11:30 am **Asset Model Engineering and Plug & Work in the Smart Factory Web using the IEC standards AutomationML and OPC UA**

Dr. Kym Watson, Deputy Head of Information Management and Production Control Department, Fraunhofer Institute of Optronics, System Technologies and Image Exploitation IOSB

The Smart Factory Web is an approved testbed project of the Industrial Internet Consortium (IIC) managed and executed by Fraunhofer IOSB and the Korea Electronics Institute (KETI). The Smart Factory Web aims to achieve flexible adaptation of production capabilities and sharing of assets in a web of Smart Factories to improve order fulfillment. This requires a modelling language for assets and standards to exchange plant engineering information that are accepted in the industrial manufacturing community. The presentation explains how the standard IEC 62714 AutomationML applied in combination with the communication standard IEC 62541 OPC-UA fulfills these requirements. These standards also contribute to solve the needs for plug-and-work in industrial plants. Plug-and-work is designed to adapt or even replace plant assets efficiently with a minimum of engineering effort. The relationship of these standards to the Reference Architecture Model Industrie 4.0 (RAMI4.0; recently published as IEC PAS 63088 Ed1: Smart Manufacturing) and the I4.0 component as well as to the IIC Connectivity Framework is explained.

11:30 pm – 12:00 pm **Spinning a Standards-Based Digital Thread for Smart Manufacturing**

Allison Barnard Feeney, Smart Manufacturing Operations Planning and Control Program Manager at NIST

A recent economic analysis released by NIST found that smart manufacturing advancements would save manufacturers $57.4 billion per year. Three of the advancements identified in the NIST analysis are managing digital data through increased exchange of models, seamless transition of digital information throughout the enterprise, and efficient communication of information to decision makers. Together, these advancements describe the digital thread, which links product lifecycle systems so that shared, trusted, and traceable data may be used to generate actionable intelligence to improve design and manufacturing processes. This presentation discusses how semantically rich, open standards are needed to realize the digital thread, especially for small-to-medium enterprises. Such standards democratize innovation and level the playing field for all manufacturers by promoting technology-agnostic solutions able to integrate heterogeneous systems. Three standards are highlighted as key enablers of the digital thread: STEP (ISO 10303), MTConnect, and ANSI Quality Information Framework.

12:00 pm – 1:30 pm Attendee Networking Luncheon

1:30 pm – 1:50 pm **OMG Standards at Work**

Larry Johnson, Vice President and Technical Director, OMG

Products implementing OMG standards are at the heart of many Industrial Internet of Things (IIoT) systems, from controlling hydro-electric power generation to integrated logistics fleet management systems. Relevant OMG standards include: Data-Distribution Service for Real-Time Systems™ (DDS™), the premier open middleware standard directly addressing publish-subscribe communications for real-time and embedded systems Interaction Flow Modeling Language™ (IFML™), a relatively new standard, used to design viable user interfaces with the IIoT System Assurance (SysA) and Software Quality specifications which are critical to building secure and dependable multi-platform systems.

Systems Modeling Language™ (SysML™), which provides the tools and notations for designing complex interdisciplinary systems and systems-of-systems that incorporate multiple components at large scale. Information modelling and interoperability standards like the Ontology Definition MetaModel™ (ODM™) and Model Driven Message Interoperability™ (MDMI™) specifications, which designers can use to ensure that they are ascribing consistent semantics to the information flowing across IIoT applications. This overview puts DDS, IFML, SysA, SysML, ODM, MDMI and OMG's other IIoT work in context, describing the areas where OMG standards provide a foundation for IIoT deployments around the globe.

1:50 pm – 2:10 pm **Future Directions of SysML v2**

Sanford Friedenthal, MBSE Consultant

SysML v1 was adopted in 2006, and has been a key enabler of model-based systems engineering (MBSE). Since that time, much has been learned about applying MBSE with SysML. This presentation describes the directions and approach for the next generation of SysML (v2) to provide capabilities that address the limitations of SysML v1, and enable the evolving practice of MBSE.

2:10 pm – 2:30 pm – Data-Distribution Service (DDS) – the IIoT Connectivity Standard

Dr. Gerardo Pardo-Castellote, CTO of Real Time Innovations (RTI) and co-chair of the DDS PSIG

The DDS (Data-Distribution Service for Real-Time Systems) version 1 was adopted in 2004. DDS defined a Data-Centric Publish-Subscribe (Databus) API and information model suitable for integrating IIOT applications. Since then, DDS has been extended into a complete connectivity framework including standards for the wire protocol (RTPS), extensible types (DDS-XTYPES), remote service invocation (DDS-RPC), and security (DDS-Security). There are also standard gateway specifications to other IIOT connectivity technologies including HTTP/REST (DDS-WEB) and OPCUA (on-going). DDS is broadly adopted in Industrial IoT applications and was identified as a key Core-Connectivity Standard in the "Industrial Internet of Things Connectivity Reference Architecture" recently published by the IIC. This presentation introduces DDS and the kinds of manufacturing applications that benefit from this technology.

2:30 pm – 2:50 pm Past and future of OMG's Manufacturing Technology and Industrial Systems (ManTIS) Task Force

Uwe Kaufmann, CEO ModelAlchemy Consulting , Co-Chair of the OMG ManTIS Domain Task Force

This presentation will review briefly the history of OMG's Manufacturing Domain Task Force (DTF), today known as the Manufacturing Technology and Industrial Systems (ManTIS) DTF. Chartered in 1996 as OMG's first DTF, its mission is to foster the emergence of cost effective, timely, commercially available and interoperable manufacturing domain software components. While this broad scope has been retained, the DTF's current work is more focused on interoperability solutions in product development of the discrete manufacturing industry. We will highlight the specifications developed in the past and draw relationships to other standardization activities. Today, Product Lifecycle Management (PLM) can be considered the backbone of product development in discrete manufacturing. But this rather document-centric approach is challenged by the complexity and interdisciplinarity of current and future development processes of software-intensive products. ManTIS' current work is therefore focusing on the integration of Model-Based Systems Engineering (MBSE) and Product Lifecycle Management (PLM).

2:50 pm – 3:10 pm – prostep ivip: Smart Engineering Meets Smart Production

Dr. Alain Pfouga, Managing Director, prostep ivip

To face the challenges of I4.0 and the digital transformation, industry must rely on workable standards like FMI, SysML and others. Furthermore, an improved communication between engineering and production is becoming a key factor in the successful implementation of Digital Manufacturing and the Digital Twin. The prostep ivip association has been supporting industry in these challenges for several years, in close collaboration with partners like OMG. Two representative projects from prostep ivip´s program will be presented, building the bridge between Engineering and Production: "Smart Systems Engineering" and "Synched Factory Twins".

3:10 pm – 3:40 pm Refreshment Break

3:40 pm – 4:00 pm **Digital Transformation and the Need for Model-Based Systems Engineering**

Sven-Olaf Schulze, GfSE Gesellschaft für Systems Engineering, German Chapter of INCOSE

The next industrial revolution has started – Industry 4.0. The paper will provide an overview about the history of the industrial evolution and will provide an insight into the Industry 4.0 aim taking into account the Internet of Things (IoT) and Internet of Data for product, systems and enterprises. Based on the challenges related to enabling systems the interfaces and impact to the development phase will be shown. Hence due to the complexity increase a need of Model-Based Systems Engineering over the life-cycle for the systems of interest, enabling systems, cooperating system will be shown to ensure the happiness and satisfaction of the market and customer.

4:00 pm – 4:20 pm **From Concept to Manufacturing: Transforming Product Creation in the Connected and Cognitive Era**

Graham Bleakley, IBM IoT Watson, OMG UAF Co-Chair

Product complexity is increasing, as are competition and quality standards. Industry 4.0 Initiatives around the world are tackling these challenges using advanced technologies such as the IoT, big data analytics and cognitive computing. This talk describes how the Watson IoT solution stack and ecosystem addresses these needs in areas from continuous product engineering to smart manufacturing. It describes the architecture and key capabilities that transform product creation: model based engineering, horizontal integration to manufacturing, connected manufacturing leveraging connected assets, predictive and cognitive processes, leading to an optimized shop floor. It will also discuss the manufacturing to engineering feedback loop

4:20 pm – 4:40 pm **Bridging the Digital & Physical Worlds: IoT & Model-Based Approaches in Manufacturing**

Matthew Hause, PTC, OMG UAF Co-Chair

Manufacturers will continuously improve operational performance and flexibility through digital manufacturing, real-time intelligence and predictive analytics. The PTC ThingWorx product line enables innovators to rapidly develop and deploy smart, connected solutions for the Internet of Things. ThingWorx Production Advisor optimizes production performance with real-time monitoring of production status and critical KPI's. Detect and react instantly to production schedule and quality issues. ThingWorx Asset Advisor reduces unplanned downtime with real-time monitoring of the status and health of critical production assets. Detect anomalies to identify potential issues that could result in unplanned downtime and AR with native Microsoft HoloLens Authoring to improve maintenance tasks. ThingWorx Controls Advisor ensures OT network data quality with unified real-time monitoring of all connected end points and related data elements on the OT system network. Rapidly and flexibly trend data to troubleshoot issues.

At the front end, a shift towards an integrated, digital engineering environment enables rapid transformation of concepts and designs to physical prototypes through the application of additive manufacturing technologies, such as 3D printers. This capability enables engineers to rapidly and continually assess and update their designs prior to committing costs to production hardware. This presentation will discuss the digital engineering journey from concept to design through manufacturing to enable smart connected factories to create smart connected devices and systems.

4:40 pm – 5:45 pm Panel Discussion - What Standards Specifications Do We Need?

Moderator:
Claude Baudoin, Owner and Principal Consultant for cébé IT and Knowledge Management
Panelists:
Allison Barnard Feeney, NIST
Matthew Hause, PTC
Calvin Smith, Wipro Digital
Alain Pfouga, prostep ivip
Kym Watson, Fraunhofer
Sven-Olaf Schulze, GfSE

5:45pm – 6:00pm **Wrap Up and Next Steps**

6:00pm – 8:00pm **Networking Cocktail Reception**

December 12, 2017. Agenda and speakers subject to change with or without notice.