# ICE IoT Conference Abstracts

Abstract number: **ABCC|DD-EE**

**A**- Day [1=11/3, 2=11/4]

**B**- Room [A=I&III, B=II&IV, C=VI, D=V]

**CC**-Time slot

**DD** – Track [ MB – Model Based Systems Engineering, RM – Requirement Management, CE-Intro to Continuous Engineering, BP- Best practice in CE, IO- Designing for the IoT/Industrial Internet Consortium, ER- Engineering research, D - demo]

**EE** - Session number

Tracks

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|---|---|
| Designing IoT/IIC | ▪ **Designing for the Internet of Things** – How to design to connect and thrive on the IoT. **Industrial Internet Consortium (IIC)** – Consortium members on the direction of technologies for the IoT |
| Best Practice CE | ▪ **Best Practices for Continuous Engineering** - Success stories, Challenges and Solutions which helped transform your business |
| MBSE | ▪ **Model Based Systems Engineering (MBSE)** - Best practices, new implementations and advances in MBSE |
| Requirements | ▪ **Requirements Management (RM)** - Best practices, new implementations and advances in RM |
| IoT CE solution | ▪ **The IBM IoT Continuous Engineering Solution** - What's new in IBM Continuous Engineering Solution, including IBM Rational Rhapsody, Design Manager, DOORS, DOORS Next Generation, Rational Engineering Lifecycle Manager , Rational Publishing Engine, Rational Quality Manager and Rational Team Concert. |
| Research | ▪ **Continuous Engineering Research** - What's new in research for the IoT and systems engineering |

# Systems Engineering Research track

2B08|ER-01 **Watson: the new era of Cognitive Computing – Christopher Guerin, IBM Watson**

Expertise matters more today than ever before. Increasingly the dynamic, complex environments within which we operate require timely decisions that factor in an ever-growing amount of information. Today we address this challenge by using computers and software. Computers, though, are limited to carrying out specific functions and rules that they were programmed to do, which does not create a true synergy between the human and machine.

Watson represents the new era of cognitive computing that overcomes the limitations of programmable computers by providing a new tool that enhances, scales, and accelerates our expertise. No longer will we be limited by our experience, unable to make sense of vast amounts of information, or throttled by our cognitive capacity. Rather, Watson acts as an advisor and works alongside us processing vast amounts of structured and unstructured information and putting it into the appropriate context for us to consider.

For the engineer, Watson provides situational awareness around the threats, opportunities, and compliance considerations related to a given design decision. This enables the engineer to make better, more informed, and timelier decisions, while also being freed to focus on the work that he or she does best – i.e. being an engineer.

This talk will cover Watson and cognitive computing at a broad level. It will also cover how the Watson cognitive computing platform can dramatically enhance the engineers' results by putting the knowledge of the world within his or her reach.

2B09|ER-02 **The realization of complex, cyber-physical "systems of systems" – Pierluigig Nuzzo , University of California at Berkeley**

The realization of complex, cyber-physical "systems of systems" (such as "smart" transportation, energy, security, health-care systems, and the "Internet of Things") can substantially benefit from model-based hierarchical and compositional methodologies to make their design possible let alone optimal. In this talk, we present the methodology being developed within the industrial Cyber-Physical (iCyPhy) research consortium, which addresses the complexity and heterogeneity of cyber-physical systems by formalizing the design process in a hierarchical and compositional way, and provides a unifying framework where different modeling, analysis and synthesis tools can seamlessly interconnect. We use assume-guarantee contracts and their algebra (e.g., composition, conjunction, refinement) to provide formal support to the entire design flow. The design is carried out as a sequence of refinement steps from a high-level specification to an implementation built out of a library of components at the lower level. At each step, the design is refined by combining synthesis from requirements, optimization, and simulation-based design space exploration methods. Observation and measurement data are then used to validate and further refine both the component and requirement models. We illustrate our approach on design examples of embedded controllers for aircraft power distribution and air management systems.

# Systems Engineering Research track

2B10|ER-03 **A Rigorous Framework for MBSE and Applications to IoT, WSN and MEMS – University of Maryland, John S. Baras**

Advances in Information Technology have enabled the design of complex engineered systems, with large number of heterogeneous components and capable of multiple complex functions, leading to the ubiquitous cyber-physical systems (CPS). These advances have at the same time increased the capabilities of such systems and have increased their complexity to such an extent that systematic design towards predictable performance is extremely challenging, if not infeasible with current methodologies and tools. We first describe a rigorous framework we are developing for model-based systems engineering (MBSE), a system level design methodology that addresses these challenges, which also incorporates manufacturing, operation and life cycle considerations. We describe the three fundamental components for MBSE within our framework: (a) An integrated systems modeling hub built around SysML, employing meta-modeling methods and environments and easy interfaces with a variety of domain specific design methods and tools; (b) Linking this modeling hub with tradeoff analysis tools for design space exploration, employing linkage with the parametric and requirements diagrams of SysML, and integrated methods and tools from multi-criteria mixed (integer and numerical variables and metrics) optimization and constrained based reasoning; (c) Representation and management of requirements, employing initial efforts towards an integration of methods and tools from model checking, contract based design and automatic theorem proving, and including finite time temporal logic specifications for system behavior. We provide a short description of the new fundamental challenges faced when incorporating humans as elements of such complex systems, a subject of rapidly increasing importance in view of the “networked society” and the “interconnected coevolving sociotechnical networks” paradigms. We next describe selected applications of the framework to several important current technological problems: smart grids, smart energy efficient buildings, heterogeneous wireless sensor networks (WSN), cyber security for the Internet of Things (IoT), design and manufacturing of MEMS. We close with a description of what is still lacking, research challenges and future promising research directions.

2B12|ER-04 **Model-Based Software Engineering – University of Waterloo, Joanne Atlee**

This talk will present results from three projects of the NECSIS strategic research network on model-based software engineering. (1) In one project, researchers from the University of British Columbia have been developing tools that visualize the results of queries to a change-request repository. The goal is to show at a glance the interactions between people and tasks, in order to help engineers to understand the collaborations that take place around a particular task or to see how the development of a feature progresses. (2) Designers of product lines face the challenge of understanding an enormous space of valid product configurations and their quality attributes (e.g., cost, energy consumption). Researchers at the University of Waterloo have extended traditional variability models (feature models) with expressions of features’ quality attributes, their corresponding design components, and rich constraints on valid configurations. They have developed an accompanying tool suite that generates and analyzes product instances (including partial configurations); identifies optimal products; and visualizes the metrics and differences among products. (3) A third group of researchers, also from the University of Waterloo, have devised guidelines for specifying requirements models, including a pattern for structuring requirements models that eases their creation and review.

2B13|ER-05 **The Continuous Engineering tools to create Smarter Operations -Henry Broodney, IBM**

The Continuous Engineering tools are helping us build better things, making sure we comply with requirements and regulations. The knowledge that the engineers input into the tools summarily defines all our expectations from the system being built. And we do try to make sure that these expectations are met. On the other hand, once the system is in operation, we mostly forget about this wealth of expectations. The observations we collect from sensors are either presented to us in an aggregated way, or used to monitor the running system based on learned understandings. This talk will bring several examples and ideas on synergetically bridging the two worlds, allowing smarter operations due to our knowledge of the design, and better designs due to our real world observations.

# Designing for the Internet of Things (IoT) track

1A06|IO-01 **The convergence of networking and information technology with engineered physical systems - Sokwoo Rhee, NIST**

The convergence of networking and information technology with engineered physical systems is creating a new generation of systems that integrate distributed networks of sensors, controls, and processors. These systems, referred to as "Internet-of-Things (IoT)" or “Cyber-Physical Systems (CPS),” are on the cusp of unleashing an extraordinary cycle of innovation through smart systems in areas such as manufacturing, transportation, utility infrastructures, and buildings, including home appliances and remote sensors. Industrial and public sector applications, including manufacturing and smart cities, are expected to benefit significantly from this new trend. Conventional manufacturing companies are striving to leverage this new enabler and rapidly transforming their business models. The SmartAmerica Challenge was a White House Presidential Innovation Fellow project with the goal to bring together research in CPS and IoT to combine test-beds, projects and activities from different sectors to show tangible and measurable benefits to the US economy and the daily lives of American citizens. Building on the success of SmartAmerica Challenge, National Institute of Standards and Technology (NIST), in partnership with other agencies and private sector stakeholders, has launched Global City Teams Challenge (GCTC), which enables cities and communities worldwide to share ideas, develop comprehensive requirements and solutions to their common issues, and leverage their respective investments. The Challenge brought the cities and innovators together to create solutions to common issues in cities/communities, establish replicable and scalable models of IoT deployments in smart cities and to encourage the adoption of CPS to improve the quality of life. More than 65 actions clusters comprising over 200 corporations, academic institutions, municipal governments and non-profits participated in GCTC 2015.

1C10|IO-02 **Continuous Engineering and Connected Devices: Becoming more agile using analytics and data from the field – Greg Knowles & Bill Jones, IBM**

Connected devices will change how you design, manufacture and maintain devices. In this session, we'll explore scenarios where connected device data and analytics will help you understand how devices behave in the field, when assumptions are violated, and when the devices are out of tolerance and why. Learn how this information can be turned into actionable insight to help you adjust engineering, manufacturing and maintenance of the devices.

1C11|IO-03 **Leveraging the Functional Mockup Interface (FMI) technology for physical system development in Rational Rhapsody - Hubertus Tummescheit, Jesse Gohl, Anh Nguyen, Modelon Inc.**

Incorporating system models into the software development process allows developers to receive continuous feedback on system performance throughout the design process. Included in this feedback is information about errors, both design limitations (validation) and implementation errors (verification). The benefit of this continuous feedback is more rapid convergence to the final design and less incidence of errors since errors are identified as soon as they are introduced. Frequently SysML and UML are used to describe these models through visual diagrams when concerning system software.

In cases where the system includes physical components, sometimes referred to as cyber-physical systems, these models can also represent the true physics of the system. The description of these systems is often in the form of Differential Algebraic Equations (DAEs). Rational Rhapsody can be used for this Model Based Systems Engineering (MBSE) design process not only for logical systems but also for cyber-physical systems. One way that Rhapsody can be coupled with physical models in their native simulation environments is through the open standards based Function Mockup Interface (FMI) which has already been adopted by more than 70 tools. The Functional Mockup Interface allows physical system models, written in for example the open standard modeling language Modelica, to connect to system controller logic developed in Rhapsody.

# Designing for the Internet of Things (IoT) track

1A13|IO-04 *Product Line Engineering and Operations (PLE&O) -- the Convergence of ALM, PLM and PLE for Enterprise Operations, including IoT Systems – Charlie Krueger, BigLever*

One of the industry's most highly acclaimed Product Line Engineering (PLE) success stories is also an insightful but less well known success story into IoT systems. This presentation describes how BigLever's PLE Ecosystem has enabled the convergence of ALM, PLM and PLE across the full systems and software engineering lifecycle, as well as enterprise operations, in order to manage a large IoT system family. The family has hundreds of deployments around the world, in dozens of substantially different configurations, each configuration comprising many thousands of different networked devices plus advanced operations capabilities interacting with these devices and assimilating data for safety critical analytics.

The BigLever converged ALM, PLM and PLE solution is applied across the full systems and software engineering 'V' lifecycle for designing and implementing the devices, device software, operations software, networks, and computing infrastructure. PLE also extends into enterprise Operations (PLE&O) upstream and downstream of the 'V', to manage deployments, procurement bill-of-materials (BoMs), maintenance BoMs, software and physical technology refresh loops, logistics and maintenance data, and more.

1A14|IO-05 **Building Secure Software for the IoT – Mark Sherman, SEI**

This presentation will discuss the tools, technologies and processes for building secure IoT software from requirements to operational deployment, including architecture, design, coding and testing. After providing the context for building secure software for the IoT, the discussion will step through each element of the development process, what one would like to achieve and some available technology. The role of the software supply chain in building secure software will also be discussed.

2A01|IO-06 **Rapid design and construction of Internet of Things Solutions on top of IBM Bluemix IoT Platform – Eran Gery & Eldad Palachi, IBM**

We will present Internet of Things (IoT) Workbench: a Bluemix service for rapid application development by specifying IoT Solutions and deploying them on top of the IoT Platform in Bluemix. We show how to diagrammatically describing the architecture of the solution (the entity types being connected their properties and the messages they exchange) and the interactions between the various entities (a sequence of messages describing scenarios in a form similar to UML sequence diagrams). The service automatically generates code (currently Node.js or Node-RED) to support the MQTT and HTTP messages and automatically deploys the application code on Bluemix via Bluemix DevOps services. We will show how to simulate multiple instances of the different devices so they can interact with the application as virtual devices. We will also show how one can easily use services offered by the IoT Platform and how to use libraries of elements and design patters with recipes, for rapidly integrating existing building blocks into a solution tailored for a specific customer.

2A02|IO-07 **IoT and the Public Sector – Everything Will Change – Dan Hoffman, Montgomery County Executive Offices**

From smart trash cans to smart street lamps, integrating city infrastructure and public services into the Internet of Things has the potential address problems such as crime, traffic, and pollution. Smart roads can help reduce congestion, sensor-equipped bridges can help improve public safety, and smart buildings can help reduce the city's environmental impact. This talk will explore the future of smart cities, how they will benefit citizens, and what opportunities exist to leverage smart infrastructure to build more resilient communities

# Designing for the Internet of Things (IoT) track

2A03|IO-08 **Making the transition to the IoT: Using strategic reuse to tame IoT product development complexity –Daniel Moul, IBM**

The smart, connected products that make up the Internet of Things are often distributed to global markets or otherwise targeted to market segments... to customers who want a product that's just right for them. That means lots of product variants—and that's a headache for product engineers. In this session we will look at how you can strategically reuse proven designs—to reduce development complexity and improve product quality.

We will start with a fictitious story of a company that is struggling with their transition to the IoT, and we'll look at some of the root causes of this struggle. After that we'll briefly look at PLE as a discipline, and I'll finish with a quick overview of how the practices and tools that IBM offer can help. I'll sprinkle in some examples from real companies as we go.

2A05|IO-09 **IQP Code free Developemnt Solution – Guy Kaplinsky, IQP Corp.**

IQP Code Free Development Solution is running on Bluemix, connect with IoT Foundation and Workbench. We are working with IBM Japan on some customers that we would like to make join presentation with Amit Finish CTO IoT on IBM/IQP solution and customer case study.

2A06|IO-10 **Automating Quality Management to build and test the Internet of Things – Paul Urban, IBM**

Embedded control software is growing exponentially in the cyber physical systems that comprise the Internet of Things. Testing methods need to evolve to meet the scale and complexity of today's smarter products. Learn how the IBM and National Instruments solution provides traceability from requirements to test, automates management of test results and optimizes usage of test resources. Learn how to reuse test components at virtually every point along the development path: from simulation and prototyping, through deployment onto hardware, and at integration into the end system to improve operational efficiency and test accuracy, even on different projects.

# IBM Continuous Engineering Solution

1D05|CE-01 **What! You can do that now!? - A survey of what's new in 2015 in the IBM IoT Continuous Engineering Solution - Daniel Moul, IBM**

Fasten your seat belts! In this single session you can get caught up on the significant new capabilities in the IBM solution this year, both those delivered in V6.0.0 in June and in the interim milestones since then (and planned for general availability this year). We will look at what's new for requirements management, systems engineering, design management, program and project management (including new support for Kanban, Lean and Agile methods), quality management, and software development.

We will survey updates to Rational DOORS, Rational DOORS Next Generation (RDNG), Rational Rhapsody with Design Manager, Rational Team Concert (RTC), Rational Quality Manager (RQM), Rational Engineering Lifecycle Manager (RELM), shared and add-on capabilities such as Report Builder and Rational Publishing Engine, and new delivery and purchase options including managed virtual cloud and BlueMix.

1D06|CE-02 **Product Line Engineering and Operations (PLE&O) -- How to Beat the Odds– Charlie Krueger, BigLever**

One of the keys to success in complex deployment models such as IoT systems is enabling the enterprise-wide transformation to a common Product Line Engineering and Operations (PLE&O) approach that supports product line diversity across all of the devices as well as the services and infrastructure that engage them. This presentation describes how to beat the challenging odds in achieving successful enterprise transformations to PLE&O.

Product Line Engineering (PLE) emerged over 2 decades ago with a software-only focus. The power of the approach increased exponentially, offering the largest competitive benefits in the engineering industry, as PLE expanded its scope across the full systems and software engineering lifecycle. However, we also saw an increase in the organizational adoption challenges as the different disciplines -- requirements, MBSE, software, mechanical, documentation, testing, and much more -- needed to align around a common PLE approach.

Most recently, PLE has expanded its scope into enterprise Operations (PLE&O), both upstream and downstream of the systems engineering 'V' lifecycle, into areas such as manufacturing, sales, portfolio planning, and deployment models such as IoT. PLE&O introduces another discontinuous jump in competitive benefits, but also another layer organizational adoption challenges as different enterprise disciplines that traditionally don't interact need to align around a common PLE&O approach. The odds of successful organizational transformations at the enterprise level are shown to be less than 50%. We describe how to beat these odds with organizational transformation strategies that are specifically tuned to PLE, and why these strategies are an essential ingredient in complex deployment models such as IoT systems

1D07|CE-03 **Future direction of tool integration, IoT and OSLC- Gavin Arthurs, IBM**

Abstract: Open-Services for Life-cycle Collaboration (OSLC) provides standards and technologies that enable tool integration. This session explores the upcoming OASIS OSLC 3.0 standards: what is OSLC v3, how is it different than OSLC v2, and why is it important to you. We will then explore possible future directions for OSLC based on the unique integration needs of Continuous Engineering for IoT application development and integration, and how OSLC can begin to shift from enabling to supporting such integrations.

2A01|CE-04 **Continuous Engineering for the IoT – Ben Chodroff, CloudOne**

The internet of things is impacting nearly every industry. In order to take advantage of complex systems of systems, understanding how to build an engineering lifecycle that captures requirements, builds and delivers new functionality, and ultimately provides analytic data is fundamental. In this session, CloudOne will show how clients from around the world are using the IBM IOT Continuous Engineering Solution to solve complex Internet of Things challenges. In addition, we'll do a live demo of the solution along with an example automotive IoT device that utilizes IBM Bluemix to transmit telemetry data for statistical analysis

# IBM Continuous Engineering Solution

2A09|CE-05 **Designing, Monitoring and Improving Connected Devices with the IBM IoT Continuous Engineering Solution –Justin Dyer, IBM**

In this presentation, learn how the IBM Continuous Engineering (CE) solution can be combined with the IoT Foundation services on Bluemix to create powerful, connected devices. The IBM CE solution enables systems and software engineers to develop, simulate and test devices while ensuring traceability to requirements. Now, through the use of modeling and code generation, these devices can easily communicate to cloud apps developed with Node-RED on Bluemix using light-weight communication protocols such as MQTT. Analytic services on Bluemix such as Real Time Insights can monitor data from connected devices in real time and respond to emerging conditions through automated actions. Actions can include the ability to automatically create incidents in IBM Asset Management solutions or feed information back into engineering in order to refine and improve future versions of connected devices.

**2A10|CE-06 Securing the IoT? - Jay Thomas, LDRA**

How in the world do we secure the IoT? Incredibly, the Internet of Things drives and even controls our daily lives. Mobile connections are everywhere and with those connections and the corresponding global access to both data and physical devices comes a tremendous security risk. Medical devices, industrial control systems, unmanned systems, even automobiles can be remotely controlled and monitored through the net. We can only hope that everyone has the best of intentions but the reality we know is quite different. In today's world it is absolutely critical that we start building security into today's IoT devices. In this presentation we will describe software tools and techniques for mitigating a core security risk with the IoT.

2A12|CE-07 **Applying IBM Continuous Engineering for world's first complete AUTOSAR R4.0.3 by KPIT Technologies Ltd. - Sachin Londhe, Datamato Technologies**

IBM CE helps KPIT AUTOSAR R4.0.3 to address distributed development , management complexities for variants at different maturity status. The IBM CE solution improves end-to-end traceability and baseline comparison throughout product life cycle. We have defined appropriate stream strategy in RTC which addresses best practice of SCM of more than 50 modules and different platform stacks in development. The source code migration of SVN to RTC 5.0.2 and later RTC 6.0 and integrating with DNG and RQM6.0 along with Rhapsody Developer and RTRT. Migration of RM content from DOORs 9.3 to DNG 6.0 to take benefit of GC and other web based features in RM. Project able to achieve and follow ISO 26262 and ASPICE standards using State of Art and Practices of System Engineering using IBM CE and results overall quality development

The use of Global Configuration(GC) achieved deterministic variants management and software configuration management across Product Life-cycle. Solution Components : DNG , RTC , RQM (CLM 6.0), Rhapsody Developer, RTRT and RPE

**2A13|CE-08 Rational Lifecycle Integration Adapter for Windchill PLM – Lonnie VanZandt, Soduius**

Announced and demonstrated at the June 2014 IBM Innovate Conference and now generally available through IBM Sales as an R1.0.1 Rational Lifecycle Integration Adapter for Windchill PLM, the Sodius OSLC RLIA Windchill adapter enables Product Engineers, ALM Systems Engineers, and field, test, and software engineers to access lifecycle information that relates to their particular discipline without having to leave their focus zone. This presentation will demonstrate actual use of this production-grade OSLC integration and will demonstrate how cross-domain OSLC information can be analyzed and visualized with RELM and the Jazz Reporting Service. These OSLC capabilities are valuable for IoT due to the intrinsic combination of physical components and embedded software.

# Model Based Systems Engineering (MBSE)

**1A07|MB-01 Beyond MBSE: Looking towards the Next Evolution in Systems Engineering – David Long, INCOSE**

For almost ten years, the systems engineering community has been focused on the transformation from document-centric to model-based techniques. While most systems engineering organizations have completed pilot efforts, established appropriate communities of practice, and are plotting their path forward, this transformation is far from complete. In terms of the Roger's innovation adoption lifecycle, we are beyond the early adopters, in the early majority, and moving towards the tipping point where model-based systems engineering becomes the expected framework and approach for systems engineering.
Systems engineering remains a young discipline – one that must continue to learn and evolve, one where transitions should be viewed as waypoints along a journey rather than destinations themselves. While work remains to ensure the transformation to model-based techniques is both efficient and effective, it is time for the systems engineering community to begin looking beyond MBSE. When model-based is simply the way organizations practice systems engineering, what is the next evolution required to address next generation problems and deliver the organizational value required? How must the systems engineering practice evolve? What can we begin doing today – even in the continued implementation and adoption of MBSE – to prepare ourselves and our organizations to make that transition? Looking at the journey to date and the opportunities in the future, how can we characterize the next leg of the journey and plot a path forward for ourselves, our organizations, and the greater systems engineering practice?

1A10|MB-02 **Developing for the next Generation of Flight Management Systems - Ronald Houde, Esterline/CMC**

Esterline/CMC Electronics embarked in 2012 upon the development of its next generation of Flight Management Systems (FMS). Building upon its extensive experience developing and fielding successive generations of Flight Management Systems for air transport, rotorcraft and trainer applications, in both civil and military environments, CMC Electronics saw an opportunity to take advantage of new emerging regulations and technologies to increase the productivity of its Systems and Software Engineering staff and achieve the utmost in quality-driven embedded safety-critical software capability. After surveying the state of the industry, it decided to exploit advancements in Integrated Modular Avionics, Object-Oriented Technology, Model-Based Development, Product Line Engineering and Collaborative Lifecycle Management practices and tools, which it fused with its traditional requirements engineering environment to yield what promises to be a cornerstone of its future growth and success. Ronald will present the environment which has resulted from this effort, the achievements and challenges faced by CMC Electronics in the integration of IBM Rational Team Concert, a Product Line Engineering tool in its final selection stage, DOORS, Rhapsody, Test Conductor, Mathworks Simulink, C++, the Harmony SE and SXF frameworks and the UML/SysML language into its development community.

1A11|MB-03 **Implementation of MBSE at the Boeing Company - Michael Crow, Boeing**

The Boeing Company has established an enterprise wide initiative, Integrated Product Architecture (IPA), to implement MBSE across the company. IPA offers programs a choice of two different MBSE implementations: SysML using IBM Rhapsody and Structured Methods using Siemens Teamcenter Systems Engineering. This presentation will present the rational for creating the initiative, and why we are offering two different implementations, the challenges we face and what we need from industry.

# Model Based Systems Engineering (MBSE)

1A13|MB-04 **The Challenges of Model Lifecycle Management for Continuous Engineering – Stepanie Sharo Chiesi, Raytheon**

Continuous Engineering is the term for how businesses adapt and evolve engineering practices to match the velocity needed to maintain competitive edge in an environment of accelerating change. There are several challenges that businesses face when evolving engineering processes and practices within their organizations to the constantly adapting approach of Continuous Engineering. One of these challenges involves Model Lifecycle Management (MLM). This multi-faceted issue needs to be addressed as teams begin implementing Continuous Engineering practices so that they do not incur risks or create gaps that earlier engineering processes were developed to mitigate or eliminate.

As is widely observed, the best practices of Continuous Engineering revolve around knowledge access, connectivity, approaches to reuse, and the continuous evaluation and repetition of these steps to mature a design. A very critical aspect of executing in this environment, however, is the knowledge of how the various model elements are interrelated and at what point in development those elements are valid. Determining how data is linked between different domain tools and synchronization of those links presents further challenges. While open source methods enable the creation of this linked data environment, they do not solve the difficult problem of managing this type of complexity. Another open challenge is the linking of data, not only between the different models and tools across the system, but also across companies and enterprises while maintaining data rights and intellectual property. Furthermore, the different participants working on these complex systems may not be using the same tool suites for the equivalent domain of work. This adds an additional layer of complexity when defining a given view of the system at a particular point of time and managing the models that create that snapshot. Fully identifying these real challenges that companies face is invaluable in identifying the best practices for model management in continuous engineering. This presentation discusses defining and outlining these challenges and how to consider and approach MLM in Continuous Engineering.

1A14|MB-05 **Executable DoDAF 2 Architectures using Continuous Engineering – Graham Bleakley, IBM**

An important part of developing a DoDAF architecture is to capture the traceability between the different levels of abstraction. Traceability provides the means to understand how behaviour defined at the highest levels as capabilities is realised through operational aspects, specified and ultimately implemented in systems. The final part of the presentation will show how the Rational Engineering Lifecycle Manager (RELM) can be used to extract complex traceability graphs that go across several model layers. Showing how high-level requirements can be allocated to pieces of equipment. These can architectures can then be linked to SysML or UML models that capture the actual implementation.

The main benefits of this approach are that the developed architecture is of a much higher quality as you find errors much earlier in the specification process. It is also possible to gain a deeper understanding of the requirements as the model is executable, running what-if scenarios. Stakeholders can also do reviews of the architecture based upon the simulation, getting a chance to really understand the behaviour.

As a result this approach can be used to specify high quality, detailed system requirements, expected behaviour and the interfaces of platforms and provides a means of verification that the original intent of the requirements are met.

2B01|MB-06 **Advanced Behavioral Modeling – Bruce Douglass, IBM**

The 1ML and SysML provide very good tools for specifying behavior application systems. Behavior may be specified for individual classes, subsystems, components and use cases with statecharts and activity diagrams. Behavior may also be specified for elements acting in collaboration using interactions diagrams using sequence and collaboration diagrams. Statecharts, an enhanced form of state machines developed by Dr. David Harel \, form the basis for state behavior in the UML. Statecharts provide the ability to specify both hierarchical and concurrent behavior. Activity diagrams, while intimately related to statecharts, are used effectively to model algorithmic behavior and have been significantly extended in the SysML to include behavior that is both continuous in time and value. Sequence diagrams are used to show how collections of individual elements work together in collaboration to produce system-wide behavior. This workshop discusses all these approaches, introduces both their abstract and concrete syntax, and provides practical examples of their use

# Model Based Systems Engineering (MBSE)

2B02|MB-07 **Introducing MBSE by applying Systems Engineering principles when changing process - Jonas Hallqvist, Saab**

This presentation will demonstrate one possible way how to introduce MBSE into an organization. It is based on a real example from a development organization in aerospace industry. In this example the start of the introduction of MBSE had an innovative enthusiasm, thereafter followed by stagnation of progress. A change in point-of-view on why MBSE should be used was made and as a consequence the entire work methodology was considered a Development Enabling system. At this point Systems Engineering principles were applied in order to determine the need and to find a solution.

A description of pitfalls and other lessons are included but it will not cover application of SysML or any architectural frameworks.

One main point in this presentation is that introducing MBSE is not a technical task, it is a change process affecting a very complex system where the most important system elements are humans.

**2B03|MB-08 Model-based Unit, Integration and System Testing in a continuous engineering environment – Christian Wachtendorf, BTC Embedded Systems AG**

Innovative and high-quality software is a key driver for business success in most industries today. To remain competitive, quality must be built into all aspects of future products. In a continuous engineering environment Model Based Testing (MBT) greatly helps to improve quality of system and software components. MBT provides engineers the ability to seamlessly integrate unit, integration, and HW/SW system testing into their MBD process, helping to correct problems early already on the model, aka the “shift-left paradigm”. An increased level of test modeling and automation will lead to reduced testing time, easier-to-understand tests, and higher-quality releases. This presentation shows how this can be achieved by using Rational Rhapsody, and TestConductor Add-On, and Automatic Test Generation Add-On, and how the MBT approach and tools nicely fit into a continuous engineering environment

2B05|MB-09 **AUTOSAR for Rhapsody profile and model-to-code transformation capability - Lonnie VanZandt, Sodius**

Sodius is an IBM Business Partner and IBM's implementor for their AUTOSAR for Rhapsody profile and model-to-code transformation capability. Sodius' representative will present the current set of capabilities within the AUTOSAR Profile, will share observations from the North American AUTOSAR Users' Group meeting held in August in Detroit, and will engage the participants in a discussion about how the current Rhapsody capabilities could, should, or must evolve for their benefit. In the new era of the IoT, as the subsystems of an automobile become more capable of communication beyond their immediate boundaries and as communications media become more performant and available, the need for Model-based and at least quasi-formal Systems Engineering rises to assure security and operation. AUTOSAR empowers such MBSE.

2B06|MB-10 **WHY I Love Design Manager - Michael Crow, Boeing**

IBM Design Manager is a relatively new addition to the IBM Jazz Suite that OSLC enables several otherwise non-OSLC compliant applications (i.e. Rhapsody, RSA, System Architect, Simulink). But Design Manager also supports several other very important features: • Model Reviews • Configuration Management • Queries • Global Configuration Management

The value of each of these features will be described along with a Conceptual Model for the feature and some sample screenshots of the implementation.

**2C08|MB-11 Connected Engineering - Bill Chown, Mentor Graphics**

Platforms are a complex integration of systems that must be seen and assessed in the context of the whole (systems engineering). Connected Engineering links disparate disciplines and tools into an integrated system flow in order to deal with the explosion of electronics and the ensuing complexity in today’s system designs. Connected Engineering encourages concurrent development, enables earlier and better visibility into requirements and how these translate into design function, and moves a project from document-driven communication to data-driven implementation. Mentor Graphics provides Connected Engineering solutions that deal with the exponential growth in electronic system integration complexity. This presentation will show a unique content management system that integrates with the IBM Rational environment, using OSLC to link lifecycle and implementation across disciplines and throughout the electronic system design process

# Requirements Management (RM) track

1B05|RM-01 **Welcome to the Requirements Track, Richard Watson & Morgan Brown, IBM**

Requirements Management is a vital ingredient in delivering the connected products in the heart of the Internet of Things. It helps teams to deliver the right products and improve outcomes by better understanding and managing the impact of change. In this session you will learn about the latest developments in the DOORS Family. We will provide and overview of the upcoming sessions in the Requirement Management track, the labs, the demo sessions and introduce the key people for networking during the conference.

1B06|MB-02 **Effectively Managing Top-Tier Requirements in DOORS – Paul lusardi, NuScale**

Managing requirements can be a daunting task to for in-house requirements and effectively trace to business and contract requirements. Even more importantly, applicable safety-related, industrial codes and standards as well. By investing in a DOORS top-tier requirements library, compliance analysis can be performed; in addition, downstream design impacts are assessed for changing top-tier library artifacts.

The presenter will walk through the process of licensing, capturing, and maintaining top-tier requirements to gain the best efficiencies through automation and staffing while maximizing the value of individual requirement traceability, allocation, and coverage to downstream system requirements.

1B07|RM-03 DOORS Next generation – Tips and Tricks, Morgan Brown & Yianna Papadakis-Kantos , IBM

Tips and Tricks for improving the efficiency and effectiveness of your requirements management process using DOORS Next Generation. Learn about how to use drag and drop to create traceability in a web browser, understand how to add glossary terms into a requirements module. Create use cases and sketches to expand the details of your requirements documents. All this and more!

1B10|RM-04 **Qualification of DOORS Next Generation for Functional Safety Applications in the Internet of Things – Jeff Gray, CertTech**

Requirements management is a vital ingredient in delivering the connected products at the heart of the Internet of Things (IoT). Efficient use of requirements management tools helps teams to deliver the right products and improve outcomes by providing better definition of essential product functionality and better management of the impacts of change. DOORS NG users in functional safety applications are faced with the costly and time consuming requirement to qualify software tools for their intended use as part of the safety lifecycle. Participants in this session will gain a solid foundation for addressing these challenges, along with proven strategies and solutions from a experienced practitioner's perspective. This session also includes a guided tour of the commercially available Tool Qualification Kit (TQK) for DOORS NG from CertTech, with an in-depth look at the kit components including the Safety Manual, Tool Operational Requirements and fully automated Test Procedures necessary for compliance with rigorous industry guidelines including RTCA DO-178B/C, ISO 26262, IEC 61508 and IEC 62304. CertTech is a member of the IBM Business Partner Program, and offers similar TQK products for other leading software applications including National Instruments TestStand, Bullseye Testing BullseyeCoverage and Danlaw Mx-Suite.

# Requirements Management (RM) track

**1B11|RM-05 Moving from DOORS to DOORS Next Generation –Adam Hammett, HTii**

Since the introduction of DOORS Next Generation (DNG) there has been an overwhelming desire to find the best methods to import requirements and data into the tool. The primary methods of transferring data to DOORS NG are .CSV and ReqIF. HTii recently presented a webinar in the IBM Enlightenment Series detailing these two methods. A discussion about the uses and limitations of each method was conducted, as well as a detailed walkthrough for each method. The focus of this presentation was on migrating data from DOORS 9 to DOORS NG while still providing a broad understanding of how DOORS NG accepts ReqIF and .CSV files.

This talk was quite popular drawing over 250 registrations and 130 people live during the webinar. Since this talk, we have had several requests for additional information and have expanded on this topic to include more details about the data ingest methods for DOORS NG. This talk seems like a perfect fit for a live session and we are eager to present on these best practices. Thank you for your consideration!

1B06|RM-06 **One engineer's quest to share best practices across the entire Raytheon enterprise – Alex Ivanov, Raytheon**

Come learn the story of a shy software developer who wrote some DXL code, showed it to people and got feedback that this will truly save them some time. He went on to show more people in his building and they too said this is a tremendous benefit. He then put on his thinking cap and turned to IBM Connections to share his teams solutions with the rest of his company. In the short span of just a few years he developed 1 of the top 3 most visited & liked wiki pages at Raytheon, grew a DOORS community to over 2000 people, developed a blogging habit and most importantly transformed into a radiant product manager that was no longer unsure of himself when it came to communicating with people.

**1B14|RM-07 Requirements Authoring - An experience report from Airbus Group - Jean-Claude Roussel, Airbus & Juan Llorens, REUCE Co.**

This paper describes an improvement in the requirements writing activity using a DOORS plug-in named Requirements Authoring Tool (RAT) from The REUSE Company. Requirements Authoring pretends to write requirements quicker and easier, while ensuring in the meantime their quality, both at single requirement level (Correctness) and at the whole specification level (Consistency and Completeness of a set of requirements). Using Requirements Quality Analyzer (RQA) the overall quality of a specification is assessed. The application of ontologies using Knowledge Manager (KM) allows also formalizing and managing system's knowledge, enabling re-use. Pilot applications in Airbus Group have been deployed with very promising results.

# Requirements Management (RM) track

2D01|RM-08 **Migrating to IBM DOORS – Bonnie Mason, Philips HealthTech**
Moving requirements from a legacy tool to IBM Rational DOORS can offer significant benefits, but migration often brings its own challenges. Businesses may be reluctant to move to a new tool for fear that migration will be too difficult or costly. This presentation describes techniques used and lessons learned from a recent project to transfer existing product requirements to IBM Rational DOORS at one business unit of a large medical device manufacturer.

The migration project begins with a Migration Plan, which describes the target DOORS schema and shows how attributes will be mapped between the two systems. The plan should also identify the types of links that will be permitted between modules, and should include an access control plan. It is important to solicit stakeholder input and obtain stakeholder approval of the plan before beginning the effort.

Automating the migration to DOORS may be easy if the requirements management tool from which you are transitioning supports a standard interchange format such as the Object Management Group's ReqIF. If it doesn't, you may be able to export the data to popular file formats such as Word documents or spreadsheets, and then leverage built-in functions that come with DOORS to import the data. DXL scripts in the DOORS DXL Library can be used to help import traces. Unfortunately, while the goal should be to automate as much of the migration as possible, it may not be possible to avoid some manual editing.

After the data has been successfully moved to DOORS, a formal data verification may be required. You may be able to automate before-and-after comparisons of the requirements text, attributes and traces if the previous tool allows this data to be exported to Word or spreadsheet formats.

Another issue that may be a concern to users is how to capture the history of each requirement from the legacy tool for future reference. Keeping the old tool alive indefinitely is probably not an option. A possible approach for representing a previous tool's requirements history will be described.

Some of the key lessons learned during the project were to obtain stakeholder buy-in to the project ahead of time, automate as much of the migration and verification as possible using customized scripts, communicate frequently with stakeholders, and have a well-thought-out plan for training the users.

2D02|RM-09 Next Generation Migration of DOORS to DNG, Ian Zimmerman, ALS, Jo Alvarez Raytheon

IBM Rational DOORS Next Generation introduces the next evolution in requirements management tools. It takes the best parts of DOORS 9 to create a requirements management tool that is hosted on top of the IBM Rational Jazz technology platform. The lessons learned by the DOORS community helped to form the core of Rational DOORS Next Generation product. Rational DOORS Next Generation is a fully web-based requirements management tool that uses existing web technology. This web-based approach streamlines and reduces costs that are associated with the deployment of a true enterprise requirements management solution. In this session, you learn about the latest approach for migrating from Rational DOORS to Rational DOORS Next Generation, and look at a customer's experience.

2D03|RM-10 **Optimizing DOORS 9 – IBM, Paul Strachan**

Learn in this session some things you might not know about the DOORS Database Server, some of the pitfalls you can encounter when not taking advantage of DOORS 9 effectively, along with some best practices that will allow you to make the most of DOORS 9.

2D05|RM-11 **DOORS family ask the Experts:** Don't miss your chance to ask the leading lights of 'IBM's Requirements Management' Product Management, Enablement, Education, Support and Development teams your questions on Rational DOORS and Rational DOORS Next Generation (DNG). Whether you are working in aerospace and defense, automotive, financial services, healthcare or anywhere in between, if you are using IBM's Requirements Management solutions (DOORS or DNG) and have any questions, we're sure to have the right people to help you find the answer. This session will be an informal discussion in the form of questions and answers. It has traditionally been very energetic and we expect this at ICE IoT to be no exception.

# Best Practices for Continuous Engineering (CE) track

**2C05|BP-01 Transforming Aerospace Programs to PLE – Isreali Aircraft Industries & IBM Eran Gery IBM, Zvi Lando IAI**

In this talk we will describe several use cases at IAI where IBM & IAI jointly worked on transforming existing programs to adopt a PLE approach. We will describe 3 use cases with different lifecycle focus – one is software centric (around IMA), the 2nd is requirements and test centric, and the last one is architecture centric. We will discuss the challenges of each one of the projects, the solution approach, and what they expected to gain from the transformation. Overall all 3 scenarios followed some variation of a feature driven approach. Overall IAI utilizes DOORS, Rhapsody, RTC, as well as 3rd party tools in those projects. The feature-modeling tool IAI applied in those projects is pure::variants from pure-systems.

**2C06|BP-02 Model Based Engineering: The Future of Engineering - Guy Babineau Northrop Grumman & Barclay Brown, IBM**

Being an engineer in the age of the Internet of Things means dealing with constant, dizzying complexity and change. The tools of the past, even last decade's tools, may not be up to the challenge. What's needed is a new approach to engineering—Model Based Engineering. Live, interconnected, real-time engineering information replaces dead-end documents, reports and drawings. Changes propagate across all engineering disciplines and bits of engineering information are linked up to form new product variants. Systems are built out of virtual bytes before being built out of real steel and silicon, saving time, money and cutting through the complexity. In this session the world of Model Based Engineering is considered, including its history, origins and current state of the art.
As the National Defense Industry Association report on MBE puts it, "Model Based Engineering (MBE) is an emerging approach to engineering that holds great promise for addressing the increasing complexity of systems, and systems of systems, while reducing the time, cost, and risk to develop, deliver, and evolve these systems."
Engineers have used models of various kinds for many years. Model Based Engineering, however is an approach to engineering that uses models as an integral part of the technical baseline including requirements, analysis, design, implementation, and verification of a capability or system. No one type of model or modeling tool can accomplish this so MBE inevitably requires the integration of diverse models into a cohesive whole.
A number of interesting technologies will play a part in MBE and will be considered including SysML, XMI, FMI and OSLC, and the need for future technologies is considered.

**1C07|BP-03 Global Compliance - Managing and Implementing Engineering Modifications in existing products, projects and programs - Andreas Keis, Airbus Goup**

In a world where we have fewer new programs and projects much of our engineering effort is dominated by modifications. The European Community, and four leading Industries have created a research project known as Project Crystal, to investigate the challenges around implementing modifications by the development of an interoperability specification and platform to better support engineering disciplines in the assessment and management of the impact of changes and development of modifications. This lecture will provide an insight of how this interoperability platform helps engineers in their daily tasks, more efficiently manage change, assess the impact of change through better traceability and cross-discipline collaboration, conduct trade-studies, simulate and optimise designs, ensure verification and validation activities covering not only functional, but also non-functional capabilities. We will show how this interoperability platform helps to successful deliver modifications on time and meet certification criteria.

**2C01|BP-04 Improve Project Effectiveness through Better Reporting using the Jazz Reporting Service - Jared Pulham, IBM**

How can you leverage the wealth of development data you have in a variety of tools to enable your teams to "do more with less, faster"? In this session we'll explore how the transformation in IBM's Jazz reporting and analytics capabilities enables you to address the challenges of reporting across your development tools. The ability to efficiently create charts, graphs and documents from the collective data expressed by all these tools required enabling querying and reporting across linked artifacts, using OSLC as a common vocabulary. Join Rational's leaders in Analytics and Reporting to explore the best practice new capabilities and see how they are integrated into the product portfolio.

# Best Practices for Continuous Engineering (CE) track

2C02|BP-05 New Approaches to ALM-PLM Cross-Discipline Systems Development for the IoT - Andreas Keis, Airbus & Pawel Chadzynski, Aras,

As design and development get more complicated with each new product, the growth in complexity is creating new product development challenges, especially in the IoT. Highly collaborative cross discipline engineering processes have never been more important to the successful development of next generation aircraft, vehicles, industrial equipment, defense technologies, healthcare, and consumer products. Learn how Airbus, IBM and Aras are working together towards a unified ALM-PLM approach for systems engineering in product development using OASIS Open Services for Lifecycle Collaboration (OSLC).

2C03|BP-06 **The Scaled Agile Framework® (SAFe®) - Harry Koehnemann, 321Gang**

Real enterprise projects are not IT -- at least not only IT. In practice, the adoption of lean and agile principles have largely ignored the non-development aspects of software delivery, which are very real in large, regulated IT environments. Futhermore, guidance and best practices have completely ignored the unique challenges outside of software delivery entirely. In both complex IT and product engineering organizations, the very same principles do apply -- we just don't talk about it all that much. In fact, it is even more critical in highly complex and regulated IT and engineering organizations to consider how to bridge the chasm that exists between IT development and the "others". The Scaled Agile Framework® (SAFe®) is a proven framework for scaling lean and agile principles across an enterprise to manage software delivery for agile teams-of-teams. But what do you do if you have hybrid teams using a combination of processes? Can you apply SAFe even in more traditional organizations? Does SAFe make sense when your organization doesn't do IT? And what about the “others”? Come learn how lean and agile principles can be applied in highly complex, regulated IT and engineering organizations and how the latest enhancements in SAFe can help you realize the benefits to manage those complexities for lean systems engineering.

2C05|BP-07 **IBM Managed Continuous engineering Sevices - Fariz Saracevic, IBM**

Enable Continuous Engineering customers to put their customized IBM development solutions to use on the IBM virtual-private cloud, with managed services to install, configure, maintain, and assist in quickly onboarding users. In this session, you will learn details about IBM Managed Continuous Engineering services which deliver IBM software development capabilities in a managed virtual private cloud environment. Customers buy or bring their own IBM product licenses (BYOL), and then IBM managed services install, customize, configure and monitor the solution 24x7. The service customizes each solution to the client's process, security and IT compliance needs, and provides it on a SoftLayer® infrastructure that integrates with the client's corporate intranet and meets their security standards.

2C06|BP-08 **Leveraging global configuration management to accelerate complex product engineering - Eran Gery, IBM**

One of the key enablers for continuous engineering is strategic reuse. This year the IBM CE platform introduce the new global configuration management (GCM) capability that pans all lifecycle tools. In this talk we discuss how to leverage GCM to optimize systems and software engineering projects, as part of the CE approach. We will briefly explain what global configuration management is about, and the most of the talk describes different scenarios and practices on how it can be leveraged to address common challenges in engineering processes. We will focus on both parallel development, feature based concurrent engineering, as well as reuse in the context of product families, or realization of a product line engineering approach. With respect to PLE, we will look at practices the combine GCM and other variant management techniques, such as parametric approaches and also feature driven approaches.

# Best Practices for Continuous Engineering (CE) track

**2C09|BP-09 Ensuring Code Quality using RTC for Continuous Development – IBM - Michael Valenta, IBM**

In today's world of tight delivery schedules and concurrent development of multiple product features, it is challenging to maintain code quality while meeting deadlines. In this talk, we will present how RTC can be used to help ensure the code quality of the products you ship. Topics will include:
- multi-stream development to ensure that features can be developed independently until they are ready to deliver,
- continuous builds and automated tests to ensure that regressions are not introduced by new changes,
- server enforced preconditions that can be used to ensure that all code changes are linked to the work item that motivated the change,
- the new code review capability to ensure that all code being delivered has been adequately reviewed.

**2C10|BP-10 Variant Management for Complex Systems and Software, Enabling PLE beyond Strategic Reuse: Challenges and Solutions - Holger Schmiedefeldt, Pure Systems**

Engineering teams are challenged by the growing complexity of many and diverging product variants. This growing complexity manifests itself in systems of systems, interdependencies between requirements and architecture, many diversified legacy assets with “hidden” variability, and inadequate variability mechanisms in existing tools. Product Line Engineering (PLE) and Variant Management are considered essential activities to manage complexity and enable Systematic Reuse. Plus there are additional benefits to Feature-driven Variant Management beyond Systematic Reuse. In this session we will look both at (1) Challenges, and (2) Solutions.

**Part 1 – Challenges:** How to achieve better Systematic Reuse and capitalize assets, How to deal with increasing complexity of product variants and dependencies between components, systems of systems and software, How to integrate engineering tools and adopt processes for continuous engineering change & lifecycle management, How to deal with functional safety, compliance and traceability, How to analyze and plan for feasible product variants and perform early design tradeoffs

**Part 2 – Solutions:** Managing Variant Complexity and Systematic Reuse across the V-model and Engineering Lifecycle, Using Variability Models to extract and externalize Variation Points from engineering assets, Extending Feature models to support dependencies, constraints, rules and parametric attributes, Scenarios for Variant Planning and Analysis, Continuous Configuration, Integration and Testing, DOORS Next Generation and DOORS 9: enabling Feature-driven PLE for Requirements, Rhapsody: Enabling Strategic Reuse and Feature driven PLE for Models utilizing SysML und UML, How open platforms and standards like OSLC can help drive adoption and integration of PLE

# Best Practices for Continuous Engineering (CE) track

2C12|BP-11 **Don't be a follower. Enact your process to lead in the IoT - Robert Baillargeon, Method Park**

No matter what products we create or services we provide, we all understand processes are necessary to ensure quality and consistency in delivery. However as we have seen recently, processes are more than just elements of quality but they are also the the culture and behavior of our organizations. Often we see two perspectives from companies on their processes; the processes they state they follow and the processes that the culture encourages them to execute. Our perspective is that these processes must be one in the same. As followers, we can get lost on our journey and lose our ability to lead. For this reason it is imperative that your process must be enacted, alive, in your tools and your daily execution.

Marching into the path of IoT only amplifies the needs of our organizations. Organizations that are successful in IoT have identified the need to integrate and interact across the traditional silos of the organization. This only can be done with effective and enacted processes of shared workflow and data. It is only thru the enactment of processes can we achieve the repeatability and scalability needed in this market. Join us to learn how to make this vision of IoT process enactment a reality and how this provides a core foundation to your IoT initiatives.

2C13|BP-12 I**NCOSE Tool Vendor Challdge - Frank Salvatore, Engility**

This talk will be about the Functionality and Interoperability of systems engineering tools. The talk will be based on data obtained from this year's INCOSE 2014 Tool Vendor Challenge. As the lead for this event I will provide a description of the goals and objectives that INCOSE has laid out for this challenge. I will explain how these goals and objectives are reflective of the INCOSE 2025 vision and will help to guide the industry toward improving systems engineering thru the application of integrated tool sets. I will explain the challenge problem that was to be solved by all tool vendor challenge participants. I will conclude my discussion with a summarization of the capabilities demonstrated by all the vendors who participated and provide. This talk will highlight standards employed by different classes of tools and will report on industry trends and challenges.

# Demonstration track

**D-A1 Aras ALM-PLM Integrated Change Management**

Highly collaborative cross-discipline engineering processes have never been more important to the successful development of next generation vehicles, aircraft, industrial equipment, defense technologies, healthcare, and consumer products. See a demo of the Aras and IBM Continuous Engineering ALM-PLM systems approach reference architecture using OASIS Open Services for Lifecycle Collaboration (OSLC)

**D-A2 Sodius PTC Windchill PLM integration with IBM Jazz CLM**

The Sodius team will demonstrate the operation of their IBM Rational Lifecycle Adapter (RLIA) for integration of Change Management between teams using PTC Windchill for their product lifecycle management and using IBM Jazz CLM for their application lifecycle management. The demonstration will include use of OSLC Selection and Creation dialogs to perform create, update, and delete operations between the two discipline-specific realms and will highlight the convenience of OSLC's Preview dialog to present information from one realm in the context of the other. Furthermore, the demonstration will include the use of OSLC's Tracked Resource Set capability to enable PLM information to be analyzed and presented in IBM Jazz Rational Lifecycle Engineering Management environment and in IBM Jazz Reporting Service. **D-B1 BigLever The New Frontier for Delivering Products into the IoT — An Integrated PLE/ALM/PLM Solution**

A company's ability to deliver sophisticated, high-quality products into the IoT extends beyond the product development lifecycle into the operations lifecycle for an entire product line portfolio. This demo will spotlight the core technologies from BigLever, Aras, and IBM that enable your company to deliver a product line in support of your company's IoT strategy. Using this innovative feature-based approach — which integrates Product Line Engineering (PLE) with ALM and PLM technologies — your company can now rapidly deploy new product line variations, refinements, and enhancements to address changes in technology and business opportunity with much greater efficiency

**D-B2 LDRA Managing traceability with DOORS and LDRA to ease regulatory compliance**

Process standards such as DO-178B/C, ISO 26262, IEC 61508, IEC 62304 and others, mandate that all requirements, design elements, source code, tests, and related artifacts be linked across the lifecycle. This ensures that the embedded software fulfils all system and functional safety requirements and meets compliance objectives. Many companies use manual methods with tools such as Microsoft Word and Excel to manage traceability. But as embedded software becomes more complex, the challenge of demonstrating traceability makes these tedious, error-prone manual methods increasingly **D-C1 Nov 3, 3:50-4:10 pure-systems PLE and Variant Management with pure::variants, Rhapsody and DOORS Next Generation:**
This demonstration provides an overview of pure::variants and integrations with IBM for PLE and variant management. It shows feature-driven reuse for Rhapsody SysML / UML models, and structural and parametric variability in DOORS NG. Also discussed are plans for an open PLE platform for tools integration utilizing OSLC..
*D-C2* **4:10-4:30 Mentor Graphics** Building on OSLC:

This demonstration shows how design, implementation and lifecycle tools enable a collaborative development environment across disciplines and stages of the design flow, through OSLC communication, tool augmentation and a focal point to organize information.

# Demonstration track

D-E1. **Improved usability in Rhapsody 8.1.4 –** This demo will highlight improved usability features in Rhapsody tool that is being released in the latest 8.1.4 version.

D-E2 **Hybrid (cyber-physical) simulation** - This demo will feature simulation and analysis of virtual prototypes of your products including physical features (electrical, mechanical, thermo-dynamics, etc.) using hybrid co-simulation built on industry standards (FMI/FMU) in integration with ITI SimX.

D-F1 **Requirements verification, Rhapsody with DOORS Next Generation** - This demo will show current techniques for creating and viewing coverage links from Rhapsody model elements to DNG requirements

D-F2 **Safety critical designs using Rhapsody** - In this demo you are going to find out how you can design products while adhering to various industry compliances and standards like Aerospace & Defense (DO178B/C), Automotive (ISO26262).

D-G1 **Verification with Model Based Testing by Applying Rhapsody TestConductor** - Accelerate quality. Automate Testing. See how with Rhapsody TestConductor you can capture tests graphically for better understanding and automate testing for early requirement validation, systems and software verification, and improved requirements, model and code coverage

D-G2 **Design Manager and Mathworks Simulink integration** - This demo will exhibit how Design Manager seamlessly integrates with Mathworks Simulink to achieve better traceability of Simulink artifacts to Requirements, test cases and other models as well as model sharing and design reviews.

D –H1. **Configuration Management of requirements provides flexibility in the development process.** This demo will showcase the configuration management capabilities of IBM Rational DOORS Next Generation. Learn how: Baselines preserve the state of your development for future reference or spin-off work, Requirements can be shared in multiple projects, Updates to requirements can be propagated to multiple projects

**D-H2. A picture is worth a thousand words!** This demo will showcase the powerful graphical capabilities of IBM Rational DOORS Next Generation. Capture thoughts and ideas pictorially with optional custom graphics, to support your requirements document, Link graphical shapes to requirements, Display your diagrams within requirements documents

**D-I1. Harvest requirements and further collaborate on your requirements data with IBM Rational DOORS Next Generation** This demo shows how you can collaborate with your team in the gathering, reviewing, and editing of requirements, even if they are not using IBM Rational DOORS Next Generation. See how you can import data from a variety of sources including word and Excel, and how Excel can be used to edit data off-line.

**D-I2. Migration from IBM Rational DOORS 9 to IBM Rational DOORS Next Generation** This demo shows how to migrate requirements data from IBM Rational DOORS to IBM Rational DOORS Next Generation

**Day 1 B- New to IBM Rational DOORS Next Generation? Come have a look**!
This is a short demo of IBM Rational DOORS Next Generation that focuses on the first user experience and becoming comfortable with the user interface. Learn how to navigate your project, find the information you need, and basic editing and linking of requirements.

**Day 2 B. Have you seen the planning capabilities of IBM Rational DOORS Next Generation?** IBM Rational DOORS Next Generation offers a robust set of planning capabilities; the trick is to install them, and then start using them. Learn how requirements management can benefit from planning and tracking in both agile and traditional projects

# Panel and Roundtable

**Engineering Association Panel**

Engineering associations have a big impact on the future of systems engineering and the Internet of Things. Come hear how they are addressing the needs of our changing world by supporting engineers and their organizations. Learn what they have to offer our changing world and how they will help get us where we need to be.

Moderator: **Jack Desjardins, IBM**

Panelists

**Dr. Mark Sherman (Software Engineering Institute)**

**David Long (President INCOSE)**

**Dr. Richard Mark Soley (OMG/IIC)**

**Anitha Raj ( Women In Technology)**

**Business Partner Roundtable**

"The IBM Continuous Engineering solution includes products developed by a number of strategic business partners. These solutions add significant value to the IBM CE offerings and are tightly integrated to provide a seamless user experience. In many cases partner solutions leverage the OSLC standard for integration. In this session you will hear from a number of IBM partners who will describe their offerings and how they work in conjunction with the IBM CE solution to provide value to customers. This is an opportunity to get a brief overview of what partner offerings are available and to network with the partners.“