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The Convergence of AI and Model-Based Systems Engineering

FEATURE ARTICLE

**The Journey to AI-Enabled Systems Engineering
at SPEC Innovations**



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WELCOME

Dear Readers,

Welcome to the March edition of the PPI Systems Engineering News Journal (PPI SyEN), themed "**The Convergence of AI and Model-Based Systems Engineering.**" This fusion is transforming how engineers design, validate, and optimize complex systems. AI and MBSE together enhance decision-making, streamline workflows, and improve traceability.

Our featured article, "The Journey to AI-Enabled Systems Engineering at SPEC Innovations" by Dr. Steven H. Dam, highlights the role of AI in Model-Based Systems Engineering (MBSE) through tools such as natural language processing for requirements validation, AI-powered traceability detection, and AI-assisted test case generation. Dr. Dam emphasizes the importance of human oversight, ensuring that AI enhances rather than replaces engineering expertise. He also discusses challenges like risk assessment, explainability, and incremental implementation.

Additionally, we cover AI-driven engineering tools, industry conference insights, and Model-Based Systems Engineering (MBSE) trends.

Syenna reflects on the risks of automation, agreeing with Dr. Dam, and concludes that AI should support, rather than replace, human expertise. She questions AI's readiness for critical decision-making and highlights the importance of human judgment in AI-assisted workflows.

Please note that PPI SyEN will transition from a monthly to a quarterly publication as part of our ongoing evolution, enabling more profound analysis and expanded coverage in each issue.

Thank you for being part of this journey. We hope this edition inspires you to explore new possibilities and embrace the future of AI in MBSE with curiosity and critical thinking.

Enjoy the issue!

Francois

Managing Editor (on behalf of the PPI SyEN Team)

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Views expressed in externally authored articles are not necessarily the views of PPI nor its professional staff.

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Plans are only good intentions unless they immediately transition into hard work.

Peter Drucker

<p>PPI Systems Engineering Newsjournal (PPI SyEN) seeks:</p> <ul style="list-style-type: none"> ➤ To advance the practice and perceived value of systems engineering across a broad range of activities, responsibilities, and job-descriptions ➤ To influence the field of systems engineering from an independent perspective ➤ To provide information, tools, techniques, and other value to a wide spectrum of practitioners, from the experienced, to the newcomer, to the curious ➤ To emphasize that systems engineering exists within the context of (and should be contributory toward) larger social/enterprise systems, not just an end within itself ➤ To give back to the Systems Engineering community 	<p>PPI defines systems engineering as: <i>an approach to the engineering of systems, based on systems thinking, that aims to transform a need for a solution into an actual solution that meets imperatives and maximizes effectiveness on a whole-of-life basis, in accordance with the values of the stakeholders whom the solution is to serve. Systems engineering embraces both technical and management dimensions of problem definition and problem solving.</i></p>
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SYSTEMS ENGINEERING NEWS

Recent events and updates in the field of systems engineering

Systems Engineering Research Center (SERC) Updates



The [February 2025 update](#) from the Systems Engineering Research Center (SERC) highlights this organization's research-driven contributions to systems engineering practices. Though focused on U.S. defense stakeholders, much of this research has broader application across global and non-defense domains.

[Generative AI Webinar](#)

On 6 January 2025 Dr. Laura Freeman of the SERC Research Council moderated a webinar for the Acquisition Innovation Research Center (AIRC) to discuss [Generative Artificial Intelligence in the DoD Acquisition Lifecycle](#). Software development experts explored the potential for generative AI to influence the DoD acquisition process while considering the risks that using AI might pose.

View the [webinar video](#).

[2025 AI4SE & SE4AI Research and Application Workshop](#)

Preparations are underway for the 2025 edition of the SERC's annual AI4SE & SE4AI event that will take place in September. Join the [mailing list](#) to receive the Call for Papers when it is issued.

Visit the [2024 workshop event page](#).

[Implementing the DoD's Digital Data Strategy for Acquisition and Sustainment: Strategic Implementation Approaches and Options](#)

This research report, publicly released in January 2025, summarizes the DoD's pursuit of increased use of data management and analytics to improve decision-making and acquisition and sustainment outcomes.

Download the [Executive Summary](#) (9 pages) and [full report](#) (54 pages).

[Systemic Factors Influencing Risk Aversion: Diagnosing Behaviors and Tailoring Interventions for Lasting Transformation](#)

This February 2025 research report focused on validating and elaborating on the model of systemic pressures facing the acquisition workforce that impede innovative behaviors, the ability to identify and assess the scalability of innovations, and how to grow a culture of innovation.

Download the [Executive Summary](#) (4 pages) and [full report](#) (31 pages).

[Bot Automation Using Large Language Models \(LLMs\) and Plugins](#)

This study sought to create tools that automate information extraction pipelines to support business processes in contract and procurement management. Opportunities were explored to use Large Language Models (LLMs) for this task. Recommendations are offered to mitigate concerns with data privacy and security, accuracy and reliability, legal and compliance issues, and integration with

existing systems.

Download the [Executive Summary](#) (3 pages) and [full report](#) (15 pages).

[Test and Evaluation Methods for Middle-Tier Acquisition – Option Year 1](#)

This research report, published in January 2025, summarizes methods developed to improve test and evaluation (T&E) effectiveness in the face of emerging technologies and threats.

Download the [Executive Summary](#) (5 pages) and [full report](#) (71 pages).

[Digital Transformation in Test and Evaluation for AI/ML, Autonomous, and Evolving Systems – Option Year 1](#)

Efforts to advance T&E tools and processes through digital transformation are the focus of this January 2025 report.

Download the [Executive Summary](#) (5 pages) and [full report](#) (71 pages).

[Development of an Artificial Intelligence Test Harness for the Department of Defense](#)

This January 2025 research report addresses pioneering T&E methods that leverage machine learning (ML) and AI to manage weapons systems changes.

Download the [Executive Summary](#) (4 pages) and [full report](#) (55 pages).

Access the latest SERC news [here](#).

Follow [SERC on LinkedIn](#).

Call for Abstracts: OMG Journal of Innovation – Harnessing Generative AI



The Object Management Group (OMG) has issued a [Call for Abstracts](#) for the upcoming Summer edition of the [Journal of Innovation](#). The theme of this edition is “*Harnessing Generative AI for Innovation, Resilience, and Efficiency in Industries*”. This issue will explore the evolving role of Generative AI in the industrial landscape and highlight the real-world impact of Generative AI on operational strategies, workforce adaptation, and industry-specific challenges.

Topics of interest for this edition include:

- Generative AI in Industrial Operations & Automation (Next-Generation Product Design and Prototyping, Manufacturing, Cybersecurity, Sustainable Practices, Supply Chain Resilience, Customization)
- Agentic AI and Autonomous Systems in Industry (Autonomous Industrial Decision-Making, Process Optimization, Digital Twins, Forecasting/Logistics, Human-AI Collaboration)
- AI-Driven Industrial Intelligence & Predictive Analytics (Predictive Maintenance, Anomaly Detection, Materials Science R&D, Data Pipeline Automation)
- Ethical, Legal, and Governance Considerations (Regulations, Governance, Trust, Bias/Fairness)

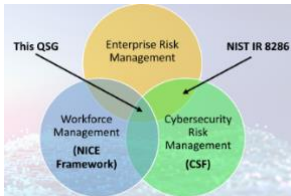
Desired content includes interdisciplinary perspectives in the form of empirical studies, innovative

frameworks, and thought leadership on the impact of Generative AI across various industries.

Abstracts are due by 5 May 2025 and should be submitted to Karen Quatromoni, OMG Director of Public Relations at Karen@omg.org. Full articles, for those abstracts that have been accepted, are due by 6 June 2025.

Learn more and download submission guidelines and templates [here](#).

NIST Cybersecurity Framework 2.0 - Draft Quick Start Guide Released



The U.S. National Institute for Standards and Technology (NIST) continues to build out resources that support tailoring and use of the [NIST Cybersecurity Framework \(CSF\) 2.0](#). Most recently, NIST has released the initial public draft of NIST Special Publication 1308, *NIST Cybersecurity Framework 2.0: Cybersecurity, Enterprise Risk Management, and Workforce Management Quick Start Guide*.

The Quick Start Guide draws on three key NIST resources to enable users to align their cybersecurity, Enterprise Risk Management (ERM), and workforce management practices in a streamlined process:

- The [Cybersecurity Framework \(CSF\) 2.0](#)
- The [Workforce Framework for Cybersecurity \(NICE Framework\)](#)
- The [NIST IR 8286 series, Integrating Cybersecurity and Enterprise Risk Management \(ERM\)](#)

The Guide recommends a phased/staged implementation process for the CSF:

- Stage 1: Identify Organizational Context
- Stage 2: Analyze and Prioritize Risks
- Stage 3: Conduct Workforce Assessment
- Stage 4: Identify and Plan Workforce Responses
- Stage 5: Implement, Evaluate, and Adjust Responses

Read the [Quick Start Guide](#).

Comments on the Guide may be submitted through 25 April 2025.

View the full [NIST announcement](#).

SysML v2 2024-12 Released



The Object Management Group (OMG) has announced the publicly available 2024-12 release of the Systems Modeling Language™ Version 2. The specification and a summary of the context for this release is available [here](#). This release includes a major change in the syntax and semantics of SysML connection definitions and usages (KerML associations and connectors).

This release includes the Beta 2.4 specification documents along with training material on the textual and graphical notations, which can be found [here](#).

Learn more information about SysML releases [here](#).

SysON Open Source SysML v2 Software Releases



As the SysML v2 standard continues to be refined, vendors are building out SysML v2 functionality within their MBSE tool suites. [OBEO](#), a primary contributor the Eclipse SysON project, has announced two releases of [SysON](#), an open-source web-based tool set to edit SysML v2 models. SysON includes a set of editors (graphical, textual, form-based, etc.) enabling users to build the various parts of system models.

The 2025.1.0 release is focused on productivity improvements and includes features such as:

- Drag and reposition the menu palette
- Search and find elements and tools
- Frequently used command access
- One-click access to your most recently used tool
- Hierarchical organization of tools
- Dedicated Libraries section in the Explorer view

The 2025.2.0 release offers enhancement that include:

- Model conformance to SysMLv2 Beta 2.3 version specification
- Validation rules
- Right-click display of contextual menu
- Drag and drop in Explorer view
- Undo/redo of semantic changes

View the full set of [SysON release notes](#).

Access a [SysON overview video](#).

Get started with SysON [here](#).

TraceCloud Darwin SysML v2 Software Released

TraceCloud has announced the release of [Darwin](#), a SysML V2 compatible MBSE product, available for production use on the TraceCloud platform. Users can build a model of their system physical architecture in TraceCloud and associate sub-parts and ports, interconnection requirements, validation requirements, and additional attributes with each system component.

View an 18-minute Darwin TraceCloud [overview video](#).

Learn more [here](#).

Updates to the Systems Engineering Tools Database (SETDB)



The Systems Engineering Tools Database (SETDB), developed by PPI in partnership with INCOSE, provides a virtual platform for engineering tool vendors to communicate their latest offerings.

Recent SETDB updates, including both new tools and updates to existing tools, include:

Vendor: [DNV](#)

- [Battery AI](#): An artificial intelligence driven battery analytics platform that acts as a repository for Battery Scorecard testing data and forecasts lifetime of batteries under custom duty cycles. Battery AI offers a platform to compare different technologies, and evaluate the expected lifetimes.

Vendor: [Maplesoft™](#) a subsidiary of Cybernet Systems Corporation

- [Maple](#): Math software that combines a powerful math engine with an interface that makes it extremely easy to analyze, explore, visualize, and solve mathematical problems with over 5000 functions including calculus, algebra, differential equations, statistics, linear algebra, and geometry.
- [MapleMBSE](#): An MS-Excel based, two-way connection to your systems model that enables all stakeholders to collaborate through/with system model developed in Rhapsody®, Cameo Systems Modeler™, and Capella to execute rapid impact analysis and trade studies and other tasks.
- [MapleSim™](#): An advanced system-level modeling tool for complex system modeling. It produces high fidelity, computationally efficient models, and digital twins suitable for HIL simulations, design, and tasks such as optimization, sensitivity analysis, and parameter sweeps with multiple simulations.
- [MapleSim Insight](#): Gives machine designers and builders powerful, simulation-based debugging and 3-D visualization capabilities that directly connect to your automation tools to perform simulation-based testing of controllers easily and efficiently.
- [MapleSim for Digital Twins](#): Simulations and digital twins both utilize digital models to represent the various processes of a system, but a digital twin provides a virtual environment that stays up-to-date, making it more flexible for applications across a product lifecycle.

Vendor: [Sodius Willert](#)

- [Publisher for SPARX Enterprise Architect](#): A powerful systems models exchange between best-in-class modeling tools SPARX Enterprise Architect and Cameo Systems Modeler (MagicDraw).

Vendor: [Sparx Systems](#)

- [Enterprise Architect](#): Sparx Systems specializes in high-performance and scalable visual modeling tools for the planning, design, simulation, and construction of software, embedded, and real-time systems.

In addition to software tools, the SETDB also includes other resources such as standards and frameworks. This month's updates have yielded a host of these items:

Source: [Aerospace Industries Association \(AIA\)](#)

- [AIA NAS9300-007](#): Long term archiving and retrieval of digital technical product documentation such as 3D, CAD and PDM data

Source: INCOSE

- [INCOSE Systems Engineering Competency Framework](#): Provides a set of competencies for Systems Engineering within a framework that provides guidance for both beneficiaries and

practitioners to identify knowledge, skills, abilities and behaviors important to Systems Engineering effectiveness in the domain for which the competency model is applied.

Source: [ISO Standards](#)

- [ISO/IEC/IEEE 12207](#): Provides processes that can be employed for defining, controlling, and improving software life cycle processes within an organization or a project and is typically applied during the acquisition phase of a system containing software.
- [ISO/IEC/IEEE 15288](#): Systems and software engineering system lifecycle processes. This standard establishes a common framework of process descriptions for describing the life cycle of systems created by humans, defining a set of processes and associated terminology from an engineering viewpoint.
- [ISO/IEC 19513](#): This International Standard provides a specification language, UPDM, that is readily understandable not only by the community of architects of information technology systems but also by a wide range of end users including executives, enterprise management, program managers and system developers.
- IEEE/ISO/IEC 24641: Systems and Software engineering — Methods and tools for model-based systems and software engineering standard specifies a reference model for the overall structure and processes of model-based systems and software engineering and describes how the components of the reference model fit together.
- [ISO/IEC/IEEE TR 24748-1](#): Provides guidance for the life cycle management of systems and software, complementing the processes described in ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207.
- [ISO/IEC/IEEE 24748-2](#): A guideline for the application of ISO/IEC/IEEE 15288. It addresses system, life cycle, organizational, project, and process, concept application, principally through reference to ISO/IEC/IEEE 24748-1 and ISO/IEC/IEEE 15288.
- [ISO 31000](#): An international standard that provides principles and guidelines for risk management. It outlines a comprehensive approach to identifying, analyzing, evaluating, treating, monitoring and communicating risks across an organization.
- [ISO 31022](#): Provides a common approach and guidelines for managing the specific challenges of legal risk faced by organizations, as a complementary document to ISO 31000. The application of these guidelines can be customized to any organization and its context.
- [ISO/TS 31050](#): Gives guidance on managing emerging risks that an organization can face. This document complements ISO 31000. and is applicable to any organization, at any stage and to any activity of the organization and Its application can be customized to suit different organizations.
- [ISO/IEC/IEEE 42010](#): Specifies requirements for the structure and expression of an architecture description (AD) for various entities, including software, systems, enterprises, systems of systems, families of systems, products (goods or services), product lines, service lines, technologies and business domains.
- [ISO 9001](#): A globally recognized standard for quality management. It helps organizations of all sizes and sectors to improve their performance, meet customer expectations and demonstrate their commitment to quality.
- [ISO/IEC/IEEE 90003](#): Provides guidance for organizations in the application of ISO 9001:2015 to the acquisition, supply, development, operation and maintenance of computer software and related support services. It does not add to or otherwise change the requirements of ISO 9001:2015.

Source: [OMG® Standards Development Organization](#)

SYSTEMS ENGINEERING NEWS

- [OMG System Modeling Language](#): The OMG Systems Modeling Language™ (OMG SysML®) is a general-purpose graphical modeling language for specifying, analyzing, designing, and verifying complex systems that may include hardware, software, information, personnel, procedures, and facilities.
- [Unified Architecture Framework \(UAF\)](#): An OMG standard that assists in development of architectural descriptions in commercial industry firms, federal government agencies and defense organizations.
- [Unified Profile for DoDAF and MODAF \(UPDM\)](#): Provides the modeling of operational capabilities, services, system activities, nodes, system functions, ports, protocols, interfaces, performance, and physical properties and units of measure for the modeling of architectural concepts from the DoDAF and MoDAF viewpoints (Published by ISO)

PPI SyEN readers are encouraged to check out these new and updated systems engineering tool offerings.

Access the [SETDB website](#).

Upcoming PPI Live-Online™ and In-Person Systems Engineering Five-Day Courses

Click [here](#) to view the full schedule or register for upcoming courses.

P006-959	Eindhoven, the Netherlands CEST 8:30 (UTC +2:00) In-Person	12 May – 16 May 2025
P006-960	Las Vegas, USA PDT 8:00 (UTC -7:00) In-Person	19 May – 23 May 2025
P006-961-1	Asia SGT 6:00 (UTC +8:00) PPI Live-Online™	23 Jun – 27 Jun 2025
P006-961-2	Oceania AEST 8:00 (UTC +10:00) PPI Live-Online™	23 Jun – 27 Jun 2025
P006-962	Eindhoven, the Netherlands CEST 8:30 (UTC +2:00) In-Person	14 Jul – 18 Jul 2025
P006-963	Las Vegas, USA PDT 8:00 (UTC -7:00) In-Person	21 Jul – 25 Jul 2025
P006-964-1	Asia SGT 6:00 (UTC +8:00) PPI Live-Online™	25 Aug – 29 Aug 2025
P006-964-2	Oceania AEST 8:00 (UTC +10:00) PPI Live-Online™	25 Aug – 29 Aug 2025
P006-965-1	Europe CEST 9:00 (UTC +2:00) PPI Live-Online™	15 Sep – 19 Sep 2025
P006-965-2	United Kingdom BST 8:00 (UTC +1:00) PPI Live-Online™	15 Sep – 19 Sep 2025
P006-965-3	South Africa SAST 9:00 (UTC +2:00) PPI Live-Online™ (Exclusive to South Africa)	15 Sep – 19 Sep 2025
P006-965-4	Türkiye TRT 10:00 (UTC +3:00) PPI Live-Online™	15 Sep – 19 Sep 2025
P006-965-5	Saudi Arabia AST 10:00 (UTC +3:00) PPI Live-Online™	15 Sep – 19 Sep 2025

CONFERENCES, MEETINGS & WEBINARS

Events of relevance to systems engineering

MBSE Cyber Systems Symposium 2025

MBSE CYBER SYSTEMS SYMPOSIUM 2025

Registration is open for the [Dassault Systèmes](#) MBSE Cyber Systems Symposium 2025 to be held in Reno, Nevada, USA on 7-10 April. This four-day user conference brings together the CATIA systems engineering community and provides participants with the opportunity to stay current with technologies and innovations by hearing from 100+ [featured speakers](#) on topics such as:

- MBSE
- SysML
- Product Lifecycle Management (PLM)
- Product Line Engineering (PLE)
- Systems Engineering
- Enterprise/Business Architecture
- Business Process Modeling Notation (BPMN)
- Concept Modeling
- Ontology

A sample of presentations from the detailed [conference agenda](#) includes:

- Architecting Your System in SysML with Dynamic and System Simulation and Analysis
- Empowering MBSE with Simulation
- Enterprise Architecture & Systems Engineering: Same Coin, Different Sides
- Enterprise Model of the Dynamic Targeting Process Using UAF
- Exploring the Next Frontier: SysML v2
- From Chaos to Clarity: Breaking Down MBSE Development One Piece at a Time
- MBSE-Driven Embedded Software Development for Early Validation and Fast Prototyping
- Mission Engineering with UAF
- Model-Based System Failure Mode Assessment using FMEA and FTA
- System Outputs, Emergent Properties, Biomimicry, and Systems of Systems - Working Together to Achieve Better Outcomes

Learn more [here](#). Register [here](#).

PDMA Webinar: Empathy-First Innovation - Integrating Patient Advocacy into Product Design



As part of its Innovation in Focus webcast series, the [Product Development Management Association \(PDMA\)](#) will host a free webinar on 24 April titled "*Empathy-First Innovation: Integrating Patient Advocacy into Product Design*", presented by Ty Hagler, of Trig, LLC.

[Overview](#)

CONFERENCES, MEETINGS & WEBINARS

Incorporating patient advocacy into the product design process is essential for creating solutions that truly address patient needs. This 60-minute webinar offers an introduction to empathy-first innovation, demonstrating how to seamlessly integrate patient advocates into your development journey. Through a real-world case study of a medical device that revolutionized postpartum care, you'll gain insights into practical techniques for problem scoping, crafting empathy statements, and defining user needs.

Key Takeaways

- Foundations of Empathy-First Innovation: Embedding patient voices into design and development processes
- Practical Tools and Techniques: Methods for effective journey mapping and ideation to identify and address patient challenges
- Case Study Insights: Development of a groundbreaking postpartum care device; how empathy-driven approaches contributed to success

[Learn more](#) and register for this event.

Enterprise Architect (EA) Global Summit 2025



Sparx Systems is hosting the [Enterprise Architect \(EA\) Global Summit 2025](#) in Munich, Germany on 29-30 April. This inaugural on-site event for the Enterprise Architect user community and MBSE enthusiasts aims to create connections and increase knowledge sharing among participants and industry experts.

Day 1 will focus on standards, trends, and the future of Enterprise Architect. Day 2 will showcase best practices from Sparx Systems customers and partners.

[Highlighted keynotes and presentations](#) include:

- [Enterprise Design with EDGY](#) (Rudi Claes, Senior Architect, INNOCOM)
- [Enterprise-Level Adoption of AI: Opportunities for Architecture](#) (Stephen Aier, Professor, Senior Lecturer, Director, University of St. Gallen)
- [From Architecture to Impact: How EAM, MBSE, and Data Architecture Shape the Future](#) (Peter Lieber CEO, Sparx Systems Europe)
- [Next Generation Modeling Language SysML v2 – Future of Engineering](#) (Tim Weilkiens, Executive Board Member oose)
- [Sparx Systems Innovations – Transforming Enterprise Architecture & Systems Engineering](#) (Tom O'Reilly, COO, Sparx Systems PTY Ltd.)
- [To do better MBSE with Enterprise Architect, what do we need?](#) (Takeshi Kouno, CEO, Sparx Systems Japan)
- [Transform Your Architecture Practice with Trerado: The Advanced Unified Platform from Sparx Systems](#) (Nizam Mohamed, Director, Enterprise Solutions, Sparx Systems)

Register [here](#).

CONFERENCES, MEETINGS & WEBINARS

Registration Open for INCOSE 10th Annual Systems Engineering in Healthcare Conference



The [INCOSE Healthcare Working Group \(HWG\)](#) is sponsoring the 10th Annual Systems Engineering in Healthcare Conference on 29 April through 1 May 2025 in Minneapolis/St. Paul, Minnesota, USA. Registration is now open for this in-person conference with the theme of *Advancing the Practice of Systems Engineering in Healthcare*.

The keynote speaker of the conference will be Jim Peichel, VP Cardiac Implantables Technology Development Center, Medtronic, who will present on the topic "*Why Systems Engineering is Critical to the Future of Healthcare*."

The program for 2025 includes pre-conference tutorials on 29 April and multiple learning tracks on 30 April and 1 May. A new Fundamentals Track is being offered for those attendees who are new to systems engineering and also for experienced practitioners looking for a fundamentals refresher.

Learn more and register [here](#).

Smart Cities Summit North America



The [Smart Cities Council \(SCC\)](#) will host its Smart Cities Summit North America on 6-8 May 2025 in San Francisco, California, USA. In collaboration with [Charter Cities Institute](#), [Deep Tech Week](#), [Leading Cities](#), and [Smart Cities Americas](#) this event will apply a human-centric approach to connect needs and opportunities with global experts, capital, technology, policies and best practice frameworks.

Keynote speakers for the Summit include:

- [Nick Naamou](#), Founder & Chair, Miami-Dubai Chamber of Commerce
- [Karima-Catherine Goundiam](#), Founder & CEO, B2BeeMatch; Red Dot Digital
- [Christina Yan Zhang](#), Co-chair, UN ITU Cityverse Group
- [Michael Lake](#), President & CEO, Leading Cities
- [Alan Boehme](#), Global 500 CTO, Angel Investor
- [Oscar Huerta Melchor](#), Policy Analyst on Urban Development and Governance, OECD
- [Khaled Daher](#), SCC - Global Thought Leader - Transport & Mobility, ZIGURAT Institute of Technology

A sample of the wide range of presentation topics includes:

- AcceliCITY: Fostering Innovation for Smart Cities
- Building Future-Ready Communities
- Digital Infrastructure
- Earthquake Resilience: Monitoring, Early Detection & Response, Damage Mitigation: Recovery & Reconstruction
- Empathy in Design: How do we ensure human-centric design in our communities?
- Healthspan: Contemplating a New Wellbeing Metric for Smart Cities Success
- Human-centric Cities: An overview of the UN-Habitat People-Centric Smart Cities Playbook
- Interoperability: The critical step for at scale Smart Cities & Buildings Adoption

CONFERENCES, MEETINGS & WEBINARS

- Scaling Up: From Idea to Innovation: Good ideas and big markets aren't enough to guarantee success
- Smart AI: Responsible AI – Workshop
- Smart Airports & Intelligent Transportation Hubs
- The Philosophy of Smart Cities

See the full [conference program](#).

Register [here](#).

PLM Road Map & PDT North America 2025



CIMData is hosting the [Product Lifecycle Management \(PLM\) Road Map & PDT North America 2025](#) event on 7-8 May 2025 in Washington DC, USA. This conference focuses on PLM's integral role in Digital Transformation from strategy to execution. The theme of this conference is *Elevating PLM to an Enterprise Business Solution, the PLM Professional's Road Map to Success*.

The conference keynote will be delivered by PLM pioneer Professor Martin Eigner on the topic *"Reflecting on 40 Years of PDM/PLM: Are We Where We Wanted to Be?"*. Eigner will address a pivotal question:

Can the next generation of PLM solutions meet the challenges of digital transformation with the advanced, modern software technologies available?

The conference will explore the numerous ways that Digital Transformation depends upon PLM with topics such as:

- Digital Threads and Digital Twins - How to Work with Partners When Your Worlds Don't Look the Same
- How do we Drive Through-Life Product Performance: It's not AI, Digital Twins or Toolsets
- PLM's Integral Role in Digital Transformation
- Requirements Traceability to Enable Mission Readiness
- The Current Reality and Future Trends in Model-Based Systems Engineering – Insights from Industry Research
- Transforming from a Data Driven to a Knowledge Driven Organization with PLM Focused Processes
- Transforming Product Development with AI
- Unlocking Business Growth Through Digital PLM & Digital Thread Transformation

See the full [conference agenda](#).

Register [here](#).

Business Analysis (BA) & Beyond EU - Events in May-June



As part of the International Institute of Business Analysis™ (IIBA®) global events series, various European chapters of the IIBA are hosting the 2025 BA & Beyond conference at multiple sites in Denmark, the Netherlands, Belgium and Luxembourg between 6-15 May. The theme of this in-person conference is “*Connect – Interact - Act*” to highlight how engagement among business analysis practitioners can lead to tangible actions and results.

Conference sites and their dates include:

- 6 May – Denmark
- 8 May – The Netherlands
- 12-13 May – Belgium
- 15 May - Luxembourg

Talks will cover classic BA techniques and skills and their use in meeting today's challenges, plus presentations on new and related tools, techniques, skills and approaches. A sample of the topics addressed across all sites in the [detailed program](#) include:

- AI Meets Design Thinking: Accelerating Innovative Customer Experiences
- Building resilient, future-ready products
- Designing Beyond the Template: How to Build Digital Experiences that Reflect Society's Complexity
- Driving Product Success: The Key Role of Data-Driven Decisions
- Enhancing Cybersecurity / The Strategic Role of Business Analysts
- Lean into the Flow of Embodied Innovation: Integrating Head, Heart, and Hand
- Mastering Fact-Oriented Modeling with Natural Language: The Future of Business Analysis
- Resilience Through Voice: Tools for Navigating Change
- Roots of Innovation: A case study of agile requirements
- The BA's modelling toolkit
- When Data Falls Short: The Missing Pieces in Decision-Making

View [session videos](#) from prior BA & Beyond events.

[Learn more](#) and [register](#).

Learn more about [IIBA](#).

Keynotes and Program Details: NAFEMS World Congress 2025



NAFEMS, the International Association for the Engineering Modelling, Analysis and Simulation Community, has announced the keynote speakers and published the program details for the [NAFEMS World Congress 2023 \(NWC25\)](#). NWC25 is scheduled for 19-22 May 2025 in Salzburg, Austria.

[Keynote talks](#) for NWC25 include:

CONFERENCES, MEETINGS & WEBINARS

- Accelerating the Green Energy Revolution through Nano-to-Mega Scale Models (Harri Koivisto, Head of Modelling and Digitalisation, Ceres Power)
- Are we Ready for Foundational Models? (Astrid Walle, Data Science and Simulation Expert, Siemens Energy)
- How Simulation is Driving Innovation, Sustainability and Consumer-centric Design in the Consumer Goods and Healthcare Industries (Tyler London, Senior Product Manager: Modelling, Simulation & Visualisation, Reckitt)
- Make Healthcare Better with Computational Modeling and Simulation (Cheryl Liu, Director, Computer Modeling & Simulation, Stryker)
- Simulation as a Design Guiding Tool: Re-examining the Role of the Simulation Engineer (Karlo Seleš, Senior Mechanical Integrity Engineer, Rimac Technology)
- Sustainable Skies: How Simulation Brings Flight to the X-66 Demonstrator (Jack Castro, Technical Fellow, The Boeing Company)

The conference includes a dozen elective [training “short courses”](#) and fourteen [interactive workshops](#) on simulation strategy and techniques.

View the detailed [conference agenda](#).

[Learn more](#) about NWC25. Register [here](#).

MESCONF 2025 Modeling Conference



MESCONF
THE MODELING CONFERENCE

Since 2015, the MESCONF Modeling Conference has focused on discussing how model-driven approaches can be used to develop faster, safer, and better solutions to meet the functional and non-functional requirements of embedded systems. For background, see the [manifesto](#) that launched the MESCONF series and the [biographies of its organizers](#).

[MESCONF 2025](#) will be held in Munich, Germany on 22-23 May. MESCONF focuses on the practical applications and experiences that users have gained in the use of modeling for architectural design and software development. The impact of AI and SysML v2 will be topics of particular interest during MESCONF 2025.

Program details are still in flux. Check back [here](#) for updates.

View prior year agendas for [MESCONF 2024](#) and [2023](#) for a sample of the expected content.

Register [here](#).

MBSE Summit 2025



Registration is open for the MBSE Summit 2025 to be held in Traunkirchen, Austria on 2-3 June 2025. Organized by [LieberLieber](#) and [Johannes Kepler University \(JKU\) Linz](#), this conference offers attendees the opportunity to hear from experts in MBSE research, development and practice.

CONFERENCES, MEETINGS & WEBINARS

Five keynotes are featured:

- *Advancing an MBSE Method with SysML v2 (Sandy Friedenthal, SAF Consulting)*
- *Complex development of military aircraft – Experiences and the value of MBSE (Dr. Annika Meijer-Henriksson, Saab)*
- *Integrated Systems Design for the Industrial Space Age (Robert Karban, Planetary Utilities Corporation)*
- *Untying the Gordian Knot: How to implement MBSE successfully (Dr. Chantal Sinnwell, Siemens Digital Industries Software)*
- *Advancing Multidisciplinary Space System Design: From Tool-Centric to Data-Driven Approaches (Tobias Franz, DLR - German Aerospace Centre)*

Planned breakout sessions will provide participants an opportunity to interact with MBSE experts:

- *Is MBSE stuck in a niche? How AI could drive adoption! (Dr. Michael Jastram)*
- *MBSE & Digital Twin: From Model to Reality End-to-End (René Honcak)*

Download the 2024 Summit report: [The Future of Systems Engineering](#).

Learn more [here](#). Register [here](#).

Siemens Realize LIVE Americas 2025



The Digital Industries Software division of Siemens is hosting the [Realize LIVE Americas 2025](#) Digital Transformation Conference in Detroit, Michigan, USA on

2-5 June. With 450+ sessions and 2000+ participants, this event connects the Siemens software user community with experts to explore AI, digitization, sustainability and optimization across the product lifecycle.

Featured speakers include:

- Jeff Mowry, Chief Information Officer, Workhorse
- Adam Shepherd, Fellow for Digital Transformation, Northrop Grumman
- Frank Helmke, Head of Product Lifecycle Management, BSH Home Appliances Group
- Joe Bohman, Executive Vice President, PLM Products, Siemens Digital Industries Software
- Tony Hemmelgarn, President and CEO, Siemens Digital Industries Software

Multiple sessions types are available for participants including:

- [Thought leadership](#)
- [Industry talks](#)
- [Case studies](#)
- [Product keynotes](#)
- [Tips and tricks](#)
- [Product demos](#)
- [Hands-on training and certification](#)

CONFERENCES, MEETINGS & WEBINARS

Multiple methods are available to [connect with experts and experience software](#) firsthand. An [Innovation Hub](#) provides attendees to shape the future of products. Participants gain access to the full [conference content library](#) (2024 examples provided).

[Register](#) for Realize LIVE Americas 2025.

INCOSE IS2025 Keynote Speakers



The INCOSE [International Symposium 2025 \(IS2025\)](#) will take place on 26-31 July 2025, with the in-person portion of this hybrid event to be held at the [Rogers Centre](#) Ottawa, Canada.

[Keynote speakers](#) for IS2025 have been announced and include:

- [Langdon Morris](#), World Renowned Futurist, Speaker, Author, Consultant Executive Advisor, and Educator
- [Jon Reijneveld](#), Co-Founder and Chief Engineer at The Exploration Company (TEC)
- [Robert Thirsk](#), Astronaut (retired) - Canadian Space Agency, Advisor
- [William \(Willy\) Donaldson](#), Associate Professor of Management at Christopher Newport University, Director of the CNU Luter Business Institute, and Director of the Biotechnology and Management Program

[Learn more](#) about IS2025 and check back for program updates and registration links. Book group rate accommodations for IS2025 [here](#).

Call for Papers: Automated Technology for Verification and Analysis (ATVA 2025)



The 23rd International Symposium on Automated Technology for Verification and Analysis (ATVA 2025) will take place in Bangalore, India on 27-30 October 2025. ATVA 2025 promotes research on the theoretical and practical aspects of automated analysis, verification and synthesis of hardware and software systems by providing a forum for interaction between international research communities and industry practitioners.

The [Call for Papers](#) for ATVA 2025 seeks both regular research papers (18 pages, excluding references) and tool papers (10 pages, excluding references). Suggested topics include:

- Formalisms for modeling hardware, software and embedded systems
- Specification and verification of finite-state, infinite-state and parameterized systems
- Program analysis and software verification
- Analysis and verification of hardware circuits, systems-on-chip and embedded systems
- Analysis of real-time, hybrid, priced, weighted and probabilistic systems
- Deductive, algorithmic, compositional, and abstraction/refinement techniques for analysis and verification
- Analytical techniques for safety, security, and dependability
- Testing and runtime analysis based on verification technology
- Analysis and verification of parallel and concurrent systems
- Verification in industrial practice

CONFERENCES, MEETINGS & WEBINARS

- Synthesis for hardware and software systems
- Applications and case studies of verification
- Automated tool support for verification
- Testing and verification of neural networks
- Testing and verification of autonomous systems

The conference proceedings will be published in the [Springer Lecture Notes in Computer Science \(LNCS\)](#) series, therefore all submissions must be in LNCS format.

Submit content through [EasyChair](#).

Important dates include:

- Abstract submission: 11 April
- Paper submission: 18 April
- Author notification: 25 June

Check for program updates and learn more about ATVA 2025 [here](#).

“

Engineering is the science of economy, of conserving the energy, kinetic and potential, provided and stored up by nature for the use of man. It is the business of engineering to utilize this energy to the best advantage, so that there may be the least possible waste.

William A. Smith

FEATURE ARTICLE

The Journey to AI-Enabled Systems Engineering at SPEC Innovations

by Dr. Steven H. Dam, Ph.D., ESEP

SPEC Innovations

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Authored for PPI SyEN

The Journey to AI-Enabled Systems Engineering at SPEC Innovations

As artificial intelligence (AI) continues to transform industries, SPEC Innovations has embraced its potential to enhance Model-Based Systems Engineering (MBSE) through our flagship software, Innoslate. Our journey toward AI-enabled systems engineering has been one of exploration, iteration, and discovery—balancing the promise of AI with the complexities of applying it to the systems engineering lifecycle. Through this journey, we have identified key AI use cases that provide real value, as well as challenges and lessons learned along the way.

Early AI Innovations: A Foundation for the Future

Long before the recent influx of AI advancements, we recognized the potential of AI-driven tools in systems engineering. Nearly a decade ago, we introduced a natural language processing (NLP) quality checker in Innoslate (see Figure 1), providing early AI-driven assistance in evaluating requirements and documentation. This foundation helped pave the way for more advanced AI capabilities in MBSE.

Building on this, nearly five years ago, we developed an AI-powered traceability detection system, which significantly improved the ability to identify and establish connections between system elements. This innovation enhanced requirements management by ensuring consistency and completeness in traceability analysis.

More recently, we introduced Sopatra, a software solution that leverages AI to convert textual descriptions into structured models. By automating the transformation of unstructured text into MBSE-compliant models, Sopatra streamlines the system modeling process, reducing manual effort and enhancing consistency in system representation.

As AI capabilities evolved, we expanded its application within MBSE, addressing a growing range of use cases in a deliberate order based on feasibility, impact, and user needs. Our approach has always been to ensure AI enhances, rather than replaces, human expertise, with a strong emphasis on transparency and usability.

VR Verification Requirements	Rationale	Quality Score
VR.1 Space Vehicle First-mode Natural Frequency The space vehicle first-mode natural frequency shall be verified by analysis and test.	T V Analysis and test shall be considered successful if the estimate and measured first mode is greater than 25 Hz.	88%
VR.1.1 Natural Frequency Analysis The analysis shall develop a multi-node finite element model to estimate natural modes.	S T V	100%
VR.1.2 Natural Frequency Test The test shall conduct a modal survey (sine sweep) of the vehicle using a vibration table.	S V	100%

Figure 1. Innoslate’s Quality Checker utilizes Natural Language Processing AI to assist users in refining their requirements.

Selecting AI Use Cases: Opportunities and Constraints

From the outset, our goal has been to integrate AI where it can significantly enhance efficiency, decision-making, and automation within systems engineering. However, we quickly realized that not all AI applications are equally beneficial or mature enough to deliver meaningful impact. We focused on areas where AI could support engineers rather than replace critical human judgment and decision-making.

One of our primary use cases was **risk identification**. Systems engineering inherently involves complex interdependencies, and managing risk effectively is crucial to success. By leveraging AI to analyze system elements and predict potential risks early, we could proactively support engineers in identifying and mitigating issues before they escalate. The key challenge was to ensure that AI-generated risks were relevant and useful, rather than generic or overly cautious. We refined our approach by incorporating traceability features, allowing engineers to validate and adjust risk assessments within the broader project context.

We also worked to enhance **risk classification**, recognizing that risks to a function or action are fundamentally different from those affecting an asset, input/output, or interface/connection. By distinguishing risks based on data type (class), we provided users with a more precise and context-aware analysis of system vulnerabilities.

Another area of focus was **the development of AI-assisted test cases**. Generating test cases from requirements can be time-consuming, and inconsistencies can lead to costly gaps in verification. AI’s ability to automate this process while maintaining traceability between requirements and test cases proved to be a valuable efficiency boost. However, we learned that fully automated test generation was not always ideal—engineers needed flexibility to refine AI-generated test cases, ensuring alignment with real-world constraints.

A third key use case was **AI-powered translation** to facilitate collaboration across global teams (see Figure 2). While AI-driven translation is well-developed in many industries, applying it to technical and domain-specific content presents unique challenges. We had to balance accuracy with readability, ensuring that translated content-maintained engineering precision without losing meaning.

Additionally, we expanded our AI toolkit with features like Summarize AI, Text Prompts AI, and Image Generation AI to further enhance MBSE workflows:

- **Summarize AI** enables users to quickly extract key insights from lengthy system descriptions, requirements, and reports, improving efficiency in document analysis.
- **Text Prompts AI** assists in generating structured content for requirements, reports, and test cases, reducing manual effort and ensuring consistency across documentation.

- **Image Generation AI** provides users with AI-generated diagrams and visualizations to complement textual data, enhancing the clarity and communication of complex system designs.

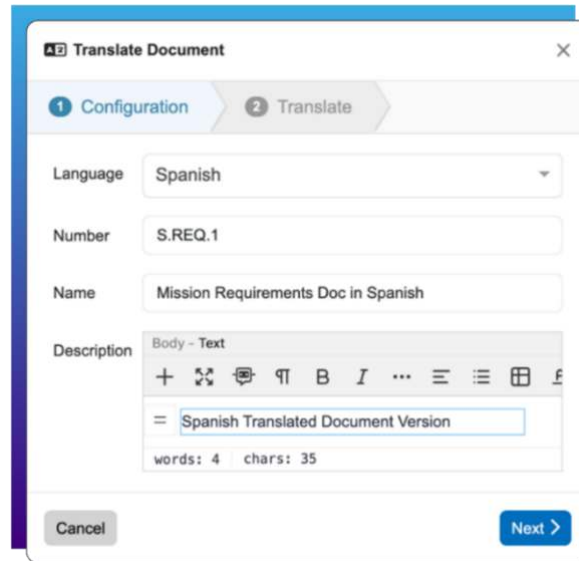


Figure 2. AI Translation empowers globally dispersed teams to work together

Lessons Learned: The Reality of AI in Systems Engineering

Throughout our journey, we encountered several lessons that shaped our approach to AI in MBSE:

1. **AI as an Assistant, Not a Replacement:** While AI can automate repetitive tasks, it cannot replace the expertise of systems engineers. We found that AI works best when it augments human decision-making rather than attempting to take over the process entirely.
2. **The Importance of Explainability:** Engineers need to trust AI-generated insights. Black-box AI models that provide recommendations without clear reasoning can be met with skepticism. We prioritized transparency, allowing users to see why AI suggested certain risks, test cases, or translations.
3. **Balancing Automation With Customization:** No AI model fits all projects perfectly. Providing users with the ability to modify AI-generated content ensures that automation remains a helpful tool rather than a rigid constraint.
4. **User-Driven Training and Feedback Loops:** Our AI models allow users to customize and validate risk identification based on their domain-specific knowledge. This feedback loop helps refine AI suggestions over time, making the system more intelligent and aligned with industry-specific risk identification and assessment practices.
5. **Challenges in Risk Mitigation Identification:** While our AI is effective at identifying risks, one challenge that remains is the automatic generation of risk mitigation actions. Currently, users must manually determine mitigation strategies, but we are actively exploring ways to expand AI capabilities in this area. Future iterations may incorporate AI-suggested mitigation strategies, informed by historical risk data and best practices.
6. **The Value of Incremental Implementation:** Rather than overhauling entire workflows, we integrated AI features gradually, allowing users to adapt and provide feedback. This iterative approach helped refine AI capabilities based on real-world usage.

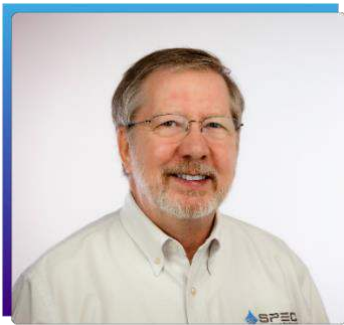
The Road Ahead

Our experience integrating AI into systems engineering has reinforced the idea that AI's true value lies in enhancing—not replacing—human expertise. While we have successfully deployed AI-driven features in areas like risk management, test case automation, and translation, we continue to explore other potential applications. Some areas, such as fully autonomous requirements generation or predictive modeling beyond current datasets, remain challenges that require further research before they can be implemented practically.

As AI technology evolves, we remain committed to responsible innovation, ensuring that AI in MBSE is not just a trend but a meaningful enhancement to the way engineers design and manage complex systems. By sharing our journey, challenges, and successes, we hope to contribute to the broader discussion on how AI can best support the future of systems engineering.

Ready to apply Innoslate's AI capabilities to your project? [Sign up for your free sandbox account.](#)

About the Author



Dr. Steven H. Dam, Ph.D., ESEP, is the President and Founder of the Systems and Proposal Engineering Company, operating as SPEC Innovations, based in Manassas, VA. With over 40 years of experience in structured analysis, software development, and systems engineering, he participated in the development of the C4ISR Architecture Framework (now known as DoDAF), the Business Enterprise Architecture (BEA), and Net-Centric Enterprise Services (NCES) architecture. He is currently applying systems engineering techniques to various projects for the DoD and Department of Energy (DOE).

Dr. Dam is the author of four books focused on systems engineering, including his most recent publication, "Real MBSE: Model-Based Systems Engineering Using LML and Innoslate." He holds a Bachelor of Science degree in Physics from George Mason University and a PhD in Physics from the University of South Carolina.

Dr. Dam is also an INCOSE-certified Expert Systems Engineering Professional (ESEP), an Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA), and a member of both the Systems Engineering Technical Committee and the Digital Engineering Integration Committee. He currently serves as the Secretary of the Lifecycle Modeling Organization and has been a long-time member of the LML Steering Committee.

SYSTEMS ENGINEERING RESOURCES

Useful artifacts to improve your SE effectiveness

INCOSE Systems Engineering Journal: March 2025 Edition



INCOSE has published, through the Wiley online library, the

[March 2025 edition of the Systems Engineering Journal](#). Volume 28, Issue 2 includes both open access articles, plus full access papers that require an institutional login, e.g., via INCOSE membership. There is no published overriding theme for this edition, though MBSE-related content is widespread. PPI SyEN has included abstracts to guide our readers to which of these diverse topics best fit their interests.

[Open Access Articles](#)

Open Access articles are available to view and download in PDF format without any restrictions.

[Model-based systems engineering and safety assessment: A workflow for mechatronic systems design](#)

Authors: Imane Bouhali, Agnese Pasquariello, Faida Mhenni, Ferdinando Vitolo, Peter Hehenberger, Stanislao Patalano and Jean-Yves Choley

Abstract: Mechatronic systems become ever more complex because of their increasing number of interconnected safety critical components and sophistication. MBSE (Model-based Systems Engineering) and MBSA (Model-Based Safety Assessment) are the most commonly adopted approaches to deal with the design and safety analysis of mechatronic systems. Unfortunately, both approaches are normally adopted separately, especially in the earlier phases of system design, thus leading to a lack of communication between system engineers and the safety team. This work aims to fill that gap at a high level, that is, through process interaction. This paper proposes an enhanced V-model for the design of safety-critical mechatronic systems. It relates a system development process with specific safety assessment methods. Specifically, the proposed workflow details exchange flows between the RFLP (Requirements, Functional, Logical, Physical) method, the FHA (Functional Hazard Analysis), the FMEA (Failure Mode and Effects Analysis), the MBSA and simulation, and the FTA (Fault Tree Analysis). These analyses are complemented with multiphysics modeling and simulation to observe system behavior in functional and failure scenarios, with the aim of requirements verification. The design workflow has been applied to a winged Unmanned Aerial Vehicle to apply the parallel process and the necessary interaction of MBSE and MBSA approaches. The information flows between the individual activities proved effective for designing a safe system before the verification phase. The main benefit of the proposed workflow is providing both the design and safety team with some interaction points, thus avoiding a lack of safety-critical analysis in the early phases of system design.

[Models2Code: Autonomous model-based generation to expedite the engineering process](#)

Authors: Cristina Paniagua and Fernando Labra Caso

Abstract: Insufficient resources and high costs are hindering industrial development, potentially impeding adaptation to market demands. Overcoming this challenge necessitates advancements in software engineering techniques to streamline processes and meet industrial requirements. Crucially, automating manual tasks and enhancing interoperability between engineering stages can yield efficiency gains. This paper presents a model-based system engineering approach aimed at automating the transition from design to implementation, incorporating autonomous generation and validation features. Implemented as plugins and utilizing model transformation techniques, this solution targets reducing engineering time and facilitating the adoption of new technologies. Developed, implemented, and tested within the Arrowhead framework, the approach is followed by a discussion on its benefits and limitations.

[Systems engineering barriers to legacy system evolution: Legacy system assessment](#)

Authors: Sian Terry and V. Chandrasekar

Abstract: This study evaluates the effectiveness of common engineering processes in conducting system assessments, with a focus on legacy system assessments, which are currently a barrier to legacy system evolution. These processes include reverse systems engineering (RSE), which remains in its infancy, and more established processes such as software and hardware reverse engineering. The study assesses these methods to better understand their ability to define systems of interest and meet the criteria set by the four horsemen of traditional systems engineering, as defined by Rebovich and White, and the International Council of Systems Engineering. Additionally, RE techniques are reviewed to ensure that a formal, systems-level process - with detailed steps and diagrams - is documented and accessible to systems or reverse engineers. Lastly, this investigation elucidates the ability of each reverse engineering process to discover, recover, or reproduce information pertaining to the systems of interest that is missing, incomplete, or outdated in documentation relevant to the development or operations of that system. This information can be used to better understand the areas of RSE that still need to be developed and aid in the maturation of a repeatable process that is applicable to legacy systems. The results of this study are expected to contribute to the further development of the Enterprise Lifecycle Model proposed by Terry and Chandrasekar.

[Using visual requirements modeling to design human-centric manufacturing systems for novel products - A comprehensive predictive case study](#)

Authors: Malin Hane Hagström and Dag Bergsjö

Abstract: Efficient production systems are necessary for the realization of products that fulfil customer needs and delivery requirements. However, the process of designing the production system has received little academic attention and today's manufacturing system design processes and architecture are still based on traditional engineering methods. This study covers a case study using visual requirements modeling for the design of a production system for a new product. A comprehensive prescriptive study was designed combined with attempts to verify the methods used. A total of six workshops, development of models to define requirements to select concepts, and two validation studies are documented. A total of 166 persons participated, and up to 15 persons participated in the validation workshops. The analysis shows that the method addressed several of the gaps identified in literature: (1) the lack of systematic and effective systems engineering design methods in production system design, and (2) the lack of inclusion of human aspects in the production system design. The gaps in the effectiveness of the methods remain to be fully evaluated, as the project is still running and will not be concluded until 2025. Recommendations for future work include exploring further the management mechanisms of systems engineering, which type of

competences does the future engineer need and how production system design engineers can learn more from other disciplines.

Full Access Articles

Full Access articles are available through an institutional login such as INCOSE membership. This edition of the Journal includes the following titles:

- [Building credibility for human systems integration in model-based systems engineering](#)
- [How to steer evolution of a system-of-systems](#)
- [Petri net modeling and analysis of an IoT-enabled system for real-time monitoring of eggplants](#)
- [The impact of counterfeit components and LRUs in the navy surface warfare supply chain: A systems dynamics approach](#)
- [Value deployment in set-based design: Design space propagation to integrate manufacturing in the narrowing-down process](#)

INCOSE members in good standing may access all Systems Engineering Journal content through their [INCOSE Connect](#) login (using the [Wiley Online Proceedings Library link](#) after login). Non-members may [subscribe to the journal](#), use institutional logins from their university or place of employment, or purchase access to individual articles at the URLs associated with the article titles, above.

Open University: Systems Thinking Hub



The Open University hosts a wide range of free educational content on its [OpenLearn](#) platform. PPI SyEN readers may be interested in the [Systems Thinking Hub](#) - a collection of free

resources - articles, videos, audios, and courses - that explore Systems Thinking in Practice (STiP). The hub has drawn on content already on OpenLearn, but also includes new content created specifically for the hub. These resources fall into five categories:

- Key ideas and concepts used in systems thinking in practice
- Application of systems thinking to complex environmental situations
- Application of systems thinking to other complex situations
- Guidance on how to draw and use systems diagrams to support your system practice
- Showcase for the thoughts of key systems thinkers

Systems thinking applications are further organized into subcategories:

- Digital & Computing
- Money & Business
- Nature & Environment
- Science, Maths & Technology
- Society, Politics & Law

Video and course resources range in length from 5 minutes to 1 day. A sample of the 38 topics currently offered includes:

- [Managing complexity: A systems approach - introduction](#) (course)

SYSTEMS ENGINEERING RESOURCES

- [Mastering systems thinking in practice](#) (course)
- [Systems engineering: Challenging complexity](#) (course)
- [Systems explained: What do we mean by feedback?](#) (article)
- [Systems modelling](#) (course)
- [Systems Practice case study - The CEO](#) (article)
- [Strategic planning: systems thinking in practice](#) (course)
- [Systems thinking: a select glossary](#) (article)
- [Systems Thinking: Diagramming Tutorials](#) (video series)

The wide range of leading systems thinkers who share their insights in brief videos include:

- [Jake Chapman](#) (author, environmental energy innovator, Open University Systems Department)
- [Peter Checkland](#) (Lancaster University, creator of Soft Systems Methodology)
- [Humberto Maturana](#) (Chilean Biologist)
- [John Naughton](#) (Professor, Open University)
- [Peter Tuddenham](#) (former president, International Society for the Systems Sciences)
- [Sir Geoffrey Vickers](#) (Author, systems thinking pioneer)

[Learn more](#) about the Systems Thinking Hub.

Business Analysis Podcasts



The International Institute of Business Analysis (IIBA) maintains an open-access library of Business Analysis Live! podcasts that address a wide variety of topics relevant to business analysis professionals. New podcasts are added bi-weekly. A sample of 2024-2025 additions is provided below:

- [Decide Like a Skydiver](#) (4 Mar 2025)
- [Navigating a Strategy Change](#) (4 Feb 2025)
- [How a Framework Transforms Your Business Analysis Approach](#) (21 Jan 2025)
- [Why Business Process Models Matter](#) (26 Nov 2024)
- [What Is A Functional Consultant?](#) (16 Nov 2024)
- [How to Elicit Requirements](#) (17 Sep 2024)
- [The Power of Observation](#) (20 Aug 2024)
- [Becoming a Business Architect](#) (23 Jul 2024)
- [Crafting Effective AI Queries](#) (9 Jul 2024)
- [Visual Communication](#) (25 Jun 2024)
- [What is Requirements Management?](#) (16 Apr 2024)
- [Neuroscience and Business Analysis](#) (19 Mar 2024)
- [The Importance of Being Nimble](#) (5 Mar 2024)
- [Working With Developers](#) (6 Feb 2024)

Typical podcasts range in length from 40-50 minutes.

View the entire [Business Analysis Live! library](#).

IIBA Analyst Catalyst Blog



The [International Institute of Business Analysis \(IIBA\)](#) is a non-profit professional association that helps business analysts develop their skills and further their careers by providing access to relevant content. IIBA publishes an [Analyst Catalyst Blog](#) that is open to non-members. Recently published posts include:

[Giving Good Requirements](#): On October 15, 2024, the Northwest Arkansas Chapter hosted a virtual event, combining innovation, insight, and community leadership. The session spotlighted Colleen Cristarella, IIBA Northwest Arkansas' VP of Marketing, who shared her journey of transforming communication and processes between business and IT teams.

[MoSCoW or Bust! Myths About Prioritization](#): Prioritization is an important yet sometimes misunderstood activity performed by business analysis professionals, product management professionals, and agile teams. While many believe it's about arranging work in order, the reality is a bit more complicated. Speaker, author, and product management professional Kent McDonald challenges some of the most common myths about prioritization and rethinks how to prioritize.

[Prompt Engineering Through the Lens of Requirements Elicitation](#): Generative AI, specifically prompt engineering, is all about crafting the right input to get meaningful outputs from an AI model. Business analysis professionals are uniquely positioned to excel at prompt engineering in AI, and here's why.

[Shepherding Change: How to Lead Organizational Transformation with Empathy and Adaptability](#): Despite its critical role, change management is often overlooked in technology initiatives. This article discusses the importance of planning, designing, and sustaining change across an organization - and how you can take a proactive approach to successfully lead it.

[Top Technologies Business Analysis Professionals Should Know in 2025](#): Digital transformation is fundamentally reshaping how businesses operate, and technology continues to lead the charge. For business analysis professionals, keeping up with the latest developments is one of the best ways to stay relevant and indispensable. That's why we've compiled a focused list of technologies that are more than just buzzwords. These innovations are redefining industries and reshaping the role of business analysis professionals in the process.

The Analyst Catalyst blog has almost 500 posts, searchable by content categories, publication date ranges, and keywords.

INCOSE New Zealand Chapter Videos



The INCOSE New Zealand chapter continues to build an impressive library of its chapter videos - addressing a diverse set of systems engineering topics. The chapter [YouTube channel](#) captures the "meet-up" videos and in some case slide presentations. Recent additions include:

[One drop at a time – implementing an SE approach in the water industry](#)

Presenter: Jenny Lancaster, Aurecon

SYSTEMS ENGINEERING RESOURCES

An insightful look into South Australia (SA) Water's collaboration with Aurecon to enhance project delivery using Systems Engineering (SE). This session explores the evolution from addressing fragmented processes and limited information flow to implementing a tailored SE approach. Discover how the strategy developed from focussed activities into a comprehensive V-model, supporting informed decision-making and effective stakeholder engagement. Gain an understanding of how this practical approach aligned project objectives and improved project development at SA Water.

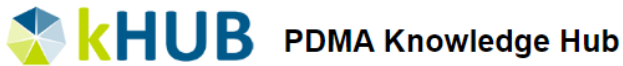
[An Introduction to Human Systems Integration \(HSI\) - the dual perspectives of Systems Engineering and Human Factors](#)

Presenter: Grace Kennedy, Chair of the INCOSE HSI Working Group, Acmena Group

Join our lunchtime session with guest speaker, Grace Kennedy, to explore all things Human Systems Integration/Human Factors Integration. In systems development, trying to fit the human to the technology is a risky, and some would say, futile situation in terms of achieving system performance and safety assurance. An HSI approach enables us to not only fit the technology to the human, but to develop human-centred designs that let the human be human, and enables us to think in terms of the design and behaviour of the total sociotechnical system. So how do we explicitly include the human voice within the systems engineering process? Through a series of examples, we'll cover what HSI is (and what it isn't), why's it needed and when, who does it and how both SEs and HFs can collaborate to ensure that the human is considered adequately throughout the systems lifecycle.

Learn more about the [INCOSE New Zealand chapter](#).

Recommended Product Development and Innovation Resources



The [Product Development Management Association \(PDMA\)](#) hosts a Knowledge Hub (kHUB) that offers a wide variety of product development and innovation

management resources in the form of blogs, podcasts, videos, conference presentations, feature articles and whitepapers. Also included are research articles from the Journal of Production Innovation Management (JPIM).

Recent recommendations include:

- [Adopting Artificial Intelligence for New Product Development: The RAPID Process](#) (article)
- [AI-PRISM: A New Lens for Predicting New Product Success](#) (article)
- [Aligning Product Portfolios with Strategic Plans](#) (article)
- [Breaking the Black Box: How Community-Driven Product Development Prevents Product Flops](#) (article)
- [Communication or the Lack Thereof: Why Your Product Team is Misunderstood](#) (chapter content)
- [Developing Obsession-Worthy Hardware](#) (webcast)
- [Find Pearls and Drive More Innovation in Your Portfolio](#) (article)
- [From Concept to Market: Inside Food Product Development](#) (article)
- [How to 10x Your Product Management with Generative AI](#) (webcast)
- [Ideation Techniques: Conceptualizing New Products and Services](#) (blog)
- [Serial Innovators: How Individuals Create and Deliver Breakthrough Innovations in Mature Firms](#) (article)
- [Steve Jobs: A Product Developer's Perspective](#) (article)

- [The Adoption and Performance Impact of AI in New Product Development: A Management Report](#) (article)
- [The Business Model Canvas](#) (chapter content)
- [The Power of Integrating Customers into Your Product Development Black Box](#) (chapter content)

Access to kHUB is free and open to the public.

System Dynamics Resource Recommendations



The [System Dynamics Society \(SDS\)](#) continues to curate (host or recommend) an impressive variety of system dynamics resources in the form of books, videos, blogs, webinars and papers. Here are some recent recommendations for your consideration.

[Accelerating Sustainability Education with System Dynamics: A Community-Based Strategy](#) (webinar recording)

The webinar examined the challenge of scaling sustainability education and the limitations of traditional dissemination strategies. Despite the availability of high-quality tools like C-ROADS and En-ROADS, adoption remains insufficient due to weak word-of-mouth diffusion in higher education. Presenters emphasized the need for a shift from conventional outreach efforts to a community-based propagation approach.

[Design Value Calculator: Enhancing Decision-Making with Game Data and System Dynamics](#) (webinar recording)

This webinar introduces an interactive board game developed by Tomas Bata University in Zlín (Czech Republic). The game, based on a System Dynamics model, simulates six years of economic development for a business and calculates the impact of product design changes on profitability. Participants will learn how this tool helps businesses identify weak points, assess design investments, and ultimately improve profitability.

[Electric truck adoption and charging development: Policy insights from a dynamic model](#) (Open access paper)

The adoption of electric heavy trucks holds great potential for decarbonising freight transportation, but the market remains nascent. Electrification of the road freight transportation system is complex, involving many interrelated variables, including vehicles, charging infrastructure, and various stakeholders. Effective policy interventions are crucial for accelerating the transition, and developing dynamic models is helpful for understanding the dynamics involved. This study develops a system dynamics model to explore the long-term adoption of electric trucks and charging infrastructure development, considering technology maturity, awareness, and cost.

[Exploring the relationships between soundscape quality and public health using a systems thinking approach](#) (Open access paper)

Urban soundscapes significantly influence public health, with sound quality affecting well-being and social value. While traditional noise control has emphasized harm reduction, soundscape studies propose that managing sound environments can promote health benefits. This study explores the complex relationships between soundscape quality and public health using a systems thinking approach. In a participatory workshop with 21 experts from fields such as urban planning,

environmental psychology, and acoustics, a causal loop diagram (CLD) was developed to illustrate the interactions between soundscape quality and public health variables. The CLD revealed key feedback loops and intervention points, organized around themes of socio-economic impact, environmental justice, biodiversity, and soundscape design.

[Process Modeling and Optimization with System Dynamics and the Theory of constraints](#) (webinar recording)

Kai Neumann, founder of Consideo and an expert in complexity management and systems thinking, shares his expertise on process modeling and optimization using iModeler, a System Dynamics modeling software, and the Theory of Constraints (TOC).

[SDG Conference Bergen 2025 - How do we move from knowledge to action?](#) (conference recording)

This session explores the transition from knowledge to action for sustainable health. Prompted by provocations from speakers with diverse perspectives, conference attendees will explore the tensions and ambiguities that arise between ethics, the need for decision-making, and the imperative to transform our understanding and practice of health and care.

[System Dynamics in Policy Design: A Case Study from India's Renewable Energy Sector](#) (webinar recording)

Dr. Devendra Gupta, a professor at the National Institute of Advanced Studies in Bengaluru (India) presents his research on integrating System Dynamics into renewable energy policy design. His study, part of his PhD work at the Indian Institute of Technology, focused on using System Dynamics modeling to address key policy challenges in India's biomass-based renewable energy sector.

[The influence of causal loop diagrams on systems thinking and information utilization in complex problem-solving](#) (Open access paper)

Effective communication tools are essential for computer-aided approaches to policy analysis and design. The System Dynamics approach relies on model diagrams, such as Causal Loop Diagrams (CLDs), to communicate findings to clients. Despite their importance, there has been limited examination of the effectiveness of such diagrams in supporting professionals' reasoning about complex problems. Findings suggest that presenting a CLD following textual information enhances systems thinking and information utilization.

SEI Blog - DevSecOps Capability Maturity Model



The Software Engineering Institute (SEI) at Carnegie Mellon University (CMU) publishes informative blog posts on numerous topics relevant to systems and software engineering. A recent post titled "[The DevSecOps Capability Maturity Model](#)" proposed a Capability Maturity Model (CMM) for assessing the implementation maturity of the U.S. Department of Defense's (DoD) [DevSecOps](#) activities. The intent of DevSecOps is to speed software delivery, tighten security, and improve collaboration across the software development lifecycle.

The article addresses the following topics:

- What Is a Maturity Model?
- Understanding Value within a DevSecOps Perspective
- How Value Drives Scope

SYSTEMS ENGINEERING RESOURCES

- [How Capability Evolves](#)
- [DevSecOps Platform Independent Model](#)
- [Benchmarking Your DevSecOps Capabilities](#)

Learn more about the [Continuous Deployment of Capability](#) within the SEI blog through additional articles:

- [5 Challenges to Implementing DevSecOps and How to Overcome Them](#)
- [Acquisition Archetypes Seen in the Wild, DevSecOps Edition: Cross-Program Dependencies](#)
- [Actionable Data from the DevSecOps Pipeline](#)
- [Cultivating Kubernetes on the Edge](#)
- [Example Case: Using DevSecOps to Redefine Minimum Viable Product](#)
- [Extending Agile and DevSecOps to Improve Efforts Tangential to Software Product Development](#)
- [Polar: Improving DevSecOps Observability](#)

PPI RESOURCES

PPI offers a multitude of resources available to all our clients, associates and friends! Click on any of the links below to access these resources today.

Systems Engineering FAQ: <https://www.ppi-int.com/resources/systems-engineering-faq>
Industry-related questions answered by PPI Founder and Managing Director Robert Halligan.

Key downloads: <https://www.ppi-int.com/keydownloads/>
Free downloadable presentations, short papers, specifications and other helpful downloads related to requirements and the field of Systems Engineering.

Conferences: <https://www.ppi-int.com/resources/conferences-and-meetings/>
Keep track of systems engineering-relevant conferences and meeting dates throughout the year.

Systems Engineering Goldmine: <https://www.ppi-int.com/se-goldmine/>
A free resource with over 4GB of downloadable information relevant to the Engineering of systems and a searchable database of 7,800+ defined terms. You can expect the content of the SE Goldmine to continue to increase over time.

Systems Engineering Tools Database (requires SEG account to log in from the Systems Engineering Goldmine): <https://www.systemsengineeringtools.com/>
A resource jointly developed and operated by Project Performance International (PPI) and the International Council on Systems Engineering (INCOSE). The SETDB helps you find appropriate software tools and cloud services that support your systems engineering-related activities. As a PPI SEG account holder, you have ongoing free access to the SETDB.

PPI SyEN Newsjournal (a substantial monthly SE publication): <https://www.ppi-int.com/systems-engineering-newsjournal/>
You're already reading our monthly newsjournal! However, click on the link to access the history of 100+ monthly newsjournals containing excellent articles, news and other interesting topics summarizing developments in the field of systems engineering.

FINAL THOUGHTS FROM SYENNA

AI: The New Boss, or Just Another Overeager Intern?

Syenna was recently at a friend's birthday barbecue. Very quickly, the conversation turned to Artificial Intelligence and the imagined impact it would have on the job market. Sienna is not sure if this is still a major discussion point in the social circle of the readers as well, and also could not help but think back to the 80s and '90s when Gen X kids were warned by scared teachers that computers would soon make their jobs obsolete. Fast forward a few decades, and 95% of those kids now work in IT, making sure those same computers don't get any funny ideas about world domination. Irony, thy name is automation.

Now, with AI marching into every industry—engineering, finance, healthcare, and even creative fields—we're being told again that we're on the brink of obsolescence. AI will design products, write reports, make diagnoses, and optimize workflows. In Syenna's experience, though, AI is still more of an "eager intern who means well but sometimes fabricates information" than a "flawless executive decision-maker." It's great at crunching data and automating routine tasks, and as one of the birthday guests put it "providing a really good looking answer that is about 80% there", but when it comes to actual judgment, creativity, and understanding nuance, AI still needs human oversight—unless, of course, you trust it to confidently decide you wanted bacon with your McDonald's ice cream.¹

One of Syenna's favourite podcasts is Cautionary Tales by Tim Harford. In one of his recent episodes, "Flying Too High: AI and Air France Flight 447,"² he highlighted a fascinating study on AI-assisted decision-making. Harvard Business School researcher Fabrizio Dell'Acqua (as cited in *Harvard Business Review*³) conducted an experiment where professional recruiters were asked to evaluate real resumes. Some were given highly accurate AI tools ("good AI"), others received a less reliable version ("bad AI"), and a third group had no AI at all. The assumption was that the better the AI, the better the hiring decisions would be. However, the results told a different story. While AI-assisted recruiters outperformed those relying solely on human judgment, those using *bad* AI actually made *better* hiring decisions than those with access to the more advanced system.

Why? The recruiters with "good AI" became over-reliant on the tool, trusting its recommendations without much scrutiny. Confident in the algorithm's accuracy, they spent less time analyzing each candidate. In contrast, those using "bad AI" knew the system was imperfect and remained actively engaged in the process, questioning its outputs and supplementing them with their own expertise. Their skepticism forced them to pay closer attention, ultimately leading to better decisions. This unexpected result echoes the dangers of automation complacency, a phenomenon also observed in aviation, where pilots who become too dependent on automated systems can be caught off guard in critical situations—like the tragic case of Air France Flight 447, where overreliance on automation contributed to the disaster.

¹ <https://www.denverpost.com/2024/06/29/260-mcnuggets-mcdonalds-ends-artificial-intelligence-drive-thru-tests-amid-errors-2/>

² <https://timharford.com/2024/07/8801/>

³ https://www.hbs.edu/ris/Publication%2520Files/24-013_d9b45b68-9e74-42d6-a1c6-c72fb70c7282.pdf

FINAL THOUGHTS

As Harford points out, the lesson here isn't just about hiring or aviation—it applies to any field where AI and humans collaborate. The real question isn't whether AI or human decision-making is better; it's how we can integrate AI in a way that enhances rather than replaces human judgment. The most effective approach isn't blind trust in AI or outright rejection of it, but a balanced partnership where AI augments human expertise without undermining critical thinking. So, whether you're hiring an engineer, designing a new system, or piloting a plane, one thing is clear: AI works best when we stay engaged, questioning, and in control—because the moment we switch off, even the smartest AI can lead us astray.

This was, interestingly enough, exactly the same conclusion the partygoers at the birthday barbecue came to. None of the geeks in the conversation using AI were concerned that AI would replace them. In their experience, AI did a really good job of crunching numbers and doing the 'hard lifting', you still needed a competent human being to evaluate the result and sign off on it.

Looking across multiple AI fields such as Large Language Models, Computer Vision AI, Robotic Process Automation, Autonomous Systems and Robotics, and Decision-Making AI, it looks like AI will reshape the workforce rather than outright replacing jobs in general. Roles that rely on repetitive tasks are at higher risk of automation, while those that require emotional intelligence, critical thinking, and human interaction remain in demand. New job categories will emerge, including AI maintenance, ethics oversight, and data analysis. The increased adoption of AI technologies has already created new jobs, such as prompt engineers and AI trainers.

So, what's the real convergence between MBSE and AI? In Syenna's humble opinion, it's not about automation replacing us—it's about augmentation. AI takes care of the grunt work, we provide the wisdom, and together, we make systems engineering more efficient. At the end of the day, even the most sophisticated AI still needs a seasoned engineer to keep it from confidently suggesting that a submarine be "optimized for aerodynamics instead of hydrodynamics."

Syenna's question for this month is this:

To what extent are you enhancing your efficiency through the use of AI, and more importantly, how close are you to the ideal balance point between not trusting it, versus trusting it too much?

Regards,

Syenna
