

# PPI SyEN

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## *Expanding Horizons: Systems Engineering Beyond Boundaries*

**Applying Systems Engineering to Process Design**



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EMAIL: [PPISyEN@PPI-Int.com](mailto:PPISyEN@PPI-Int.com)



**EDITORIAL STAFF**

*Editor*  
John Fitch

*Editor-in-Chief*  
Robert Halligan

*Managing Editor*  
René King

**PRODUCTION STAFF**

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Benjamin Bryant

*Graphic Designer*  
Matthew Wong

*Marketing Coordinator*  
Rebeca Carneiro

*Publishing Assistants*  
Trudy King  
Shalani De Silva

**PUBLISHER**



Project Performance International  
2 Parkgate Drive  
Ringwood, Vic 3134 Australia  
Tel: +61 3 9876 7345

Tel UK: +44 20 3608 6754  
Tel USA: +1 888 772 5174  
Tel China: +86 188 5117 2867

[www.ppi-int.com](http://www.ppi-int.com)

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**WELCOME**

Dear Readers,

In this month's edition of PPI SyEN, we focus on the theme "*Expanding Horizons: Systems Engineering Beyond Boundaries.*" Systems engineering is no longer confined to traditional product development but is increasingly being applied across various domains, industries, and processes. This growing flexibility and adaptability of SE expands its relevance in addressing the complexity of modern challenges.

Rick Hefner's feature article, *Applying Systems Engineering to Process Design*, illustrates how SE tools and methodologies are transforming business process design. This broadening of SE's applicability reflects the versatility of systems thinking, enabling us to tackle everything from technical projects to organizational workflows. As Rick reminds us, the boundaries of any system are porous, extending into the wider world that must be considered in our engineering efforts.

This edition highlights contributions from diverse sectors and organizations, from the Society of Women Engineers (SWE) to the INCOSE Systems Engineering Laboratory, reflecting the fact that there isn't "ONE SE to rule them all." Instead, systems engineering is continuously evolving, informed by interdisciplinary perspectives, from healthcare to AI, from simulation governance to human-centered smart cities.

We also explore the integration of systems thinking with practical applications. For example, the upcoming NAFEMS webinars and workshops demonstrate how SE principles are being used to address the growing complexity in the simulation and electronics industries. Additionally, our resource spotlight on System Dynamics continues to offer tools for understanding complex behaviors and decision-making.

As always, we aim to provide a wealth of insights and practical knowledge to support your journey in systems engineering. Whether you are expanding your expertise into new domains or exploring fresh applications of SE, we hope this edition leaves you feeling inspired and ready to embrace the future.

Warm regards,

*René*

Managing Editor (on behalf of the PPI SyEN team)

**SYSTEMS ENGINEERING NEWS .....4**  
*Recent events and updates in the field of systems engineering*

**CONFERENCES, MEETINGS & WEBINARS ..... 13**  
*Upcoming events of relevance to systems engineering*

**FEATURE ARTICLE.....24**

**Applying Systems Engineering to Process Design .....24**  
*By Rick Hefner*

**PPI SyEN SPOTLIGHT: Key Takeaways from SETE 2024 - Shaping the Future of Systems Engineering through Innovation, Leadership and Ethical Practice .....31**  
*By Rene King*

**SYSTEMS ENGINEERING RESOURCES .....34**  
*Useful artifacts to improve your SE effectiveness*

**FINAL THOUGHTS FROM SYENNA .....46**

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

<p><b>PPI Systems Engineering Newsjournal (PPI SyEN) seeks:</b></p> <ul style="list-style-type: none"> <li>➤ To advance the practice and perceived value of systems engineering across a broad range of activities, responsibilities, and job-descriptions</li> <li>➤ To influence the field of systems engineering from an independent perspective</li> <li>➤ To provide information, tools, techniques, and other value to a wide spectrum of practitioners, from the experienced, to the newcomer, to the curious</li> <li>➤ 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</li> <li>➤ To give back to the Systems Engineering community</li> </ul>	<p><b>PPI defines systems engineering as:</b>  <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*

## 2024 Society of Women Engineers (SWE) Award Winners



The [Society of Women Engineers \(SWE\)](#) has announced the recipients of its annual awards program, recognizing those who are making significant contributions to the STEM community and the advancement of women in engineering. SWE award recipients include professionals and collegiates from influential businesses, corporations, and universities across the globe. This year's award recipients will be recognized at [WE24](#), the world's largest conference and career fair for women engineers and technologists that will take place on 24-26 October 2024 in Chicago, Illinois, USA.

A sampling of this year's awards include:

### Achievement Award

The highest award given by the Society of Women Engineers. It is presented annually to an individual who has made significant and progressive technical contributions over 20+ years.

- Lori Zipes, Naval Sea Systems Command

### Distinguished Engineering Educator Award

Honors an individual who has made significant contributions in the fields of engineering, engineering technology, or science related to engineering. They must have 10+ years of instructional experience in an engineering, engineering technology, or science related to engineering educational institute.

- Gretchen Hein, Ph.D., Michigan Technological University
- Katy Kao, Ph.D., San José State University
- Diane Peters, P.E., Ph.D., F.SWE, Kettering University

### Advocating Women in Engineering Award

Awarded to an individual who has demonstrated professional excellence for at least 20 years in engineering, engineering management, engineering education, engineering technology, or science related to engineering and has proven to be an advocate of women in engineering.

- Uma Bruegman, The Aerospace Corporation
- Kenyatta Dial, Dow
- Shawn Emerson Simmons, Ph.D., Exxon Mobil Corporation
- Sara Rosner, Intel
- Kristan Soto, Dow

### Fellow Grade

Honor conferred on SWE members in recognition of significant and long-term service to the advancement of women in the engineering profession through the mission, objectives, and goals of the Society.

- Heather Doty, BAE Systems Inc.
- Allison Goodman, Intel
- Kerrie Greenfelder, P.E., Burns & McDonnell
- Dayna Johnson, P.E., Ecolab
- Sandra Mandawe Paglieroni, LGC Wireless (Retired)
- Susan Schlett, Sikorsky Aircraft
- Tuyet-Hanh Schnell, Lockheed Martin
- Patricia Walker, Medtronic

The SWE recognizes numerous additional award categories. View the full set of SWE award announcements [here](#).

Scan SWE [member news](#).

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### INCOSE Q3 2024 Highlights



In September, INCOSE published its Q3 2024 Members Newsletter. This edition introduced a new graphics design format with a fresh look aimed at complementing INCOSE's new vision, mission and strategic plan. A

sample of various highlights is provided below.

#### Leadership Notes

Rolf Hartmann, INCOSE President, reflected on the global growth of the INCOSE community in terms of membership, national chapters and services such as the Systems Engineering Laboratory.

Steve Records, INCOSE Executive Director, focused on INCOSE efforts to create a sustainable infrastructure for the organization, including reducing the environmental footprint of travel and event production.

David Long, INCOSE Director of Strategy, emphasized the importance of member engagement in realizing the four objectives of the new strategic plan as INCOSE sets targets and prioritizes initiatives for 2025.

#### INCOSE International Symposium 2024 (IS2024)

Several articles commented on the success of 2024 International Symposium that took place in Dublin, Ireland, with over 1000 participants and 100 technical papers. Keynote speakers Professor Brian Collins, Mark Kelly, and Dave Snowden were recognized for setting a high bar for this event. Numerous awards were given for contributions to the conference and the organization. A small sample of these awards includes:

- Best Paper: *Systems Engineering roles to handle emergent properties and behaviors in complex technical systems* (Jan Pfeifer, Iris Graessler, Florian Hintz, and Nicolas Meyrl)
- Best Paper: *Towards a Systems Engineering Ontology Stack* (Joe Gregory and Alejandro Salado)
- Brian Mar Best Student Paper: *Integrating SPA Extended for Coordination into SysML Using RAAML Methodology* (Elizabeth Pennington)
- INCOSE Fellows: G. Maarten Bonnema, Anja Maier, and Ramakrishna "Ramki" Raman
- INCOSE Founders: Terry Bahil and Kerry Lunney

Victoria Patterson, INCOSE-LA 2024 Secretary, provided a personal retrospective on the learning opportunity presented by her first time participation as a conference presenter.

### Sector and Chapter Updates

A sample of the third quarter highlights from INCOSE sectors and chapters include:

- The [Systems Engineering Society of Australia \(SESA\)](#) is celebrating its thirtieth-year anniversary, recalling a fast start that resulted in enrolling 206 members during its first official year.
- [JCOSE](#), the INCOSE Japan chapter, has established the JCOSE Automotive Working Group to promote systems engineering within the automotive industry and to enhance the industry's development capabilities.
- The [New England chapter](#) held a hands-on MBSE workshop in which participants gained familiarity with [Mathworks System Composer](#).
- The [Los Angeles chapter](#) co-sponsored the [11<sup>th</sup> Annual MARS Exposition](#) in September.
- The [Canada](#) chapter was recognized with its second successive INCOSE Silver Chapter Award and also rolled out the inaugural SE Student Competition across Canada to attract both established experts and emerging talents in the SE domain.
- [GfSE](#), the German chapter, has extended its reach to other German-speaking countries and changed its internet domain from .de to .org to reflect this broader focus. GfSE is heavily engaged in preparing for its [TdSE](#) event in November.

### Working Group and Initiative Updates

Various working groups and initiatives reported their progress, such as:

- The [Human Systems Integration \(HSI\) Working Group \(WG\)](#) held the 3<sup>rd</sup> INCOSE Conference on Human Systems Integration (HSI2024) in Jeju, Korea. This event was conducted in collaboration with the triennial conference of the International Ergonomics Association (IEA 2024). HSI2024 featured keynotes from Dr. Guy A. Boy, Dr. Cynthia Null, and Dr. Ayse P. Gurses that highlighted the growth and evolution of the HSI discipline.
- The [Systems Security Engineering Working Group](#) has issued a Call for Articles aimed at contributions to the August 2025 edition of the INCOSE INSIGHT practitioners magazine with the theme, "*Staying Alive is Essential – Security is a System Engineer's Problem*".
- The [Smart Cities Initiative](#) is conducting a pilot program with the City of San Diego, California, to apply systems thinking to improve support systems for the city's unhoused population.
- David Schrunk, co-chair of [Systems Engineering and Lawmaking Working Group \(SELAW\)](#), visited Mongolia and Japan in support of SELAW's mission to develop science-directed lawmaking processes for democratic governments.
- INCOSE's [SySTEAM Initiative](#), in the person of Dr. Federica Robinson-Bryant, participated in a panel discussion at the American Society for Engineering Education (ASEE) Annual Conference. The panel focused on Diversity, Equity, and Inclusion (DEI) challenges in STEAM education. Dr. Robinson-Bryant called for industry to partner with academia throughout the entire talent lifecycle and highlighted the impact of storytelling in supporting DEI initiatives.
- The [Requirements Working Group](#) has been very busy with efforts to publish the Getting the Needs and Requirements Manual (NRM), updates to the public-facing RWG website and YouTube channels, and support for the development of a [Guide to Security Needs and Requirements \(GTSNR\)](#).

- The [Information Communications Technology \(ICT\) Working Group](#) has developed a 10-item list of network-related concerns that systems engineers may wish to consider on their projects. The list includes aspects such as network infrastructure, security, protocols/standards, data validation, bandwidth, scalability, and Quality of Service (QoS).
- The INCOSE [SE Lab](#) now provides member access to full-version software for non-commercial use. Recently added tools include the simulation-focused suite from Ansys (SAM, ModelCenter, Scade One, Medini Analyze, Twin Builder, Systems Toolkit).

The Q3 2024 Member Newsletter also included two special-topic articles:

- Beyond the Machines: The People Powering Future of Robotics (Agile Robots team)
- Surfing the Digital Wave (Deepaa Ganesh)

[Download](#) the full (85-page) INCOSE Q3 2024 Member Newsletter for details on these and other topics.

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### Highlights from PDMA Conference Events



The [Product Development Management Association \(PDMA\)](#) conducted a series of successful events in August and September in support of its focus on innovation, product development and product management. PDMA's founding principle is that successful commercialization of products and innovation, from concept through end-of-life, requires efficient and integrated cross-organizational effort.

#### [2024 PDMA Doctoral Consortium](#)

PDMA held its 2024 Doctoral Consortium on 30 July – 2 August at Syracuse University in Syracuse, New York, USA. The goal of this annual event is to facilitate formal and informal networking that grows an international "community of learning" among innovation scholars. Over 50 participants, faculty and doctoral student fellows, from Europe, India, and the U.S., attended the consortium during which recognized innovation scholars shared their time and insights with doctoral students. The Consortium featured faculty sessions on cutting-edge research and small-group meetings that provided feedback to doctoral students on their dissertation proposals.

#### [2024 PDMA Inspire Innovation Conference and JPIM Research Forum](#)

PDMA's flagship annual event took place on 14-17 September in St. Louis, Missouri, USA, bringing together thought leaders in the field of product innovation and management. Keynote speakers provided attendees with insights into the future of their discipline, including:

- [Tony Ulwick](#) who shared a unified innovation process that addresses the organizational challenges that impede innovation success.
- [Atif Raiq](#) who explored real-world applications in his talk titled "*The Human-AI Collaboration Revolution*".
- [Dr. Gina O'Connor](#) who presented proven approaches by which industry practitioners, service providers, and academic researchers can build bridges and meaningfully partner with one another to achieve their goals.
- [Jason Case](#) who spoke about how healthcare can be improved through the design, development, and seamless integration of connected technologies and turning data into

actionable insight.

- [Chris Elmore](#) who related how to develop and implement a successful innovation strategy that integrates various new product development (NPD) capabilities.

The conference also celebrated the 2024 winners of the [Outstanding Corporate Innovators \(OCI\)](#) awards, [Dallas Fort Worth International Airport \(DFW\)](#) and [MSA Safety](#).

### [PDMA 2024 Global Student Innovation Challenge \(GSIC2024\)](#)

During the Inspire Innovation Conference, the winning teams in the PDMA's 5th Annual Global Student Innovation Challenge presented their innovation ideas. The 2024 competition included 125 students in 34 teams from 15 universities across 9 countries. The winning teams were:

- 1st place: *Bloom Speculum* team from Technical University South Carolina USA
- 2nd place: *E-Walk* team from Clemson University, South Carolina USA
- 3rd place: *PowerHouse* team from Technical University Berlin Germany

PDMA uses this university-level competition to leverage students' passions to learn product development methodologies, promote best practices in product innovation, and partner with professors and industry professionals in the development of the next generation of highly skilled innovators and product leaders.

Submissions will be open for next year's challenge, GSIC2025, from early November 2024 through 1 June 2025.

Investigate the [PDMA Connections](#) monthly e-newsletter to view updates on the latest PDMA activities and resources.

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### Practice-oriented Submissions for the System Dynamics Review



The System Dynamics Review (SDR) is published quarterly by Wiley on behalf of the [System Dynamics Society \(SDS\)](#). The Review has opened a new category of submissions, *Practice*, aimed at those consultants, educators and professionals who are actively engaged in applying system dynamics to real-world challenges.

Interested system dynamics practitioners should describe their experiences in consulting, teaching, or any form of engagement that enhances understanding, advances curriculum development, supports decision-making, or informs policy design. The submitted paper should range in length from 3000-500 words and outline:

- the problem
- the opportunity
- the approach taken
- what worked and what didn't
- the insights gained.

Applications need to use the tools and technique of system dynamics but need not represent complete model development and analysis.



Learn more [here](#).

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### INCOSE Announces Three New Academic Equivalency Agreements



INCOSE has announced the approval of three new Academic Equivalency Agreements for courses at [John Hopkins University](#), the [University of Utah](#) and the [University of New South Wales \(UNSW\) Canberra](#). Students who do well in university courses assessed to have Academic Equivalence (AcEq) can bypass the certification knowledge exam when applying for ASEP and CSEP Certification. The assessments they complete through their coursework at each university have been recognized by the INCOSE Certification Program's volunteer reviewers as an equivalent alternative to the standardized test developed by INCOSE.

UNSW Canberra is one of two universities outside of the United States to be recognized with Academic Equivalence.

Learn more about the Academic Equivalency process [here](#) and in the [Certification Blog](#).

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### FDA Issues Draft Guidance On Use-Related Risk Analysis (URRA)



In July 2024, the U.S. Food & Drug Administration (FDA) released a new draft guidance, *Purpose and Content of Use-Related Risk Analyses for Drugs, Biological Products, and Combination Products*. It provides guidance to industry and FDA staff on the purpose and content of a risk management tool for usability, a use-related risk analysis (URRA), for both pre-market submission and post-market updates. Although this guidance overtly applies to drug- and biologics-led combination products that include a device constituent part, its concepts can be applied to medical devices, in vitro devices, and potentially to stand-alone drug and biological products.

Key elements in this guidance include:

- The URRA is a risk management tool used to identify use-related hazards associated with product use and the measures implemented to reduce those risks.
- URRA is the tool to identify use-related hazards associated with the user interface design of the combination product
- URRA characterizes risks so they can be mitigated (such as through risk controls) or eliminated through improved product user interface design.
- URRA is started early during product development process, in contrast with a use failure mode and effects analysis (uFMEA) that was traditionally started later in the design process on the system level,.
- Use of URRA is expected to generate new user, design and user interface (UI) requirements.

According to the FDA, the URRA should include the following:

- A comprehensive list of all tasks required for the use of the product
- The potential use errors and harms that may occur with those tasks
- A determination of whether each task is a critical task

- Risk controls employed in the user interface design to mitigate the use errors
- Evaluation methods that have been used or will be used to evaluate the effectiveness of the risk controls.

When developing the URRA, manufacturers should consider all the intended uses of the product, the potential product users, and the likely use environments.

Learn more in the [Med Device Online article](#) summarizing the URRA.

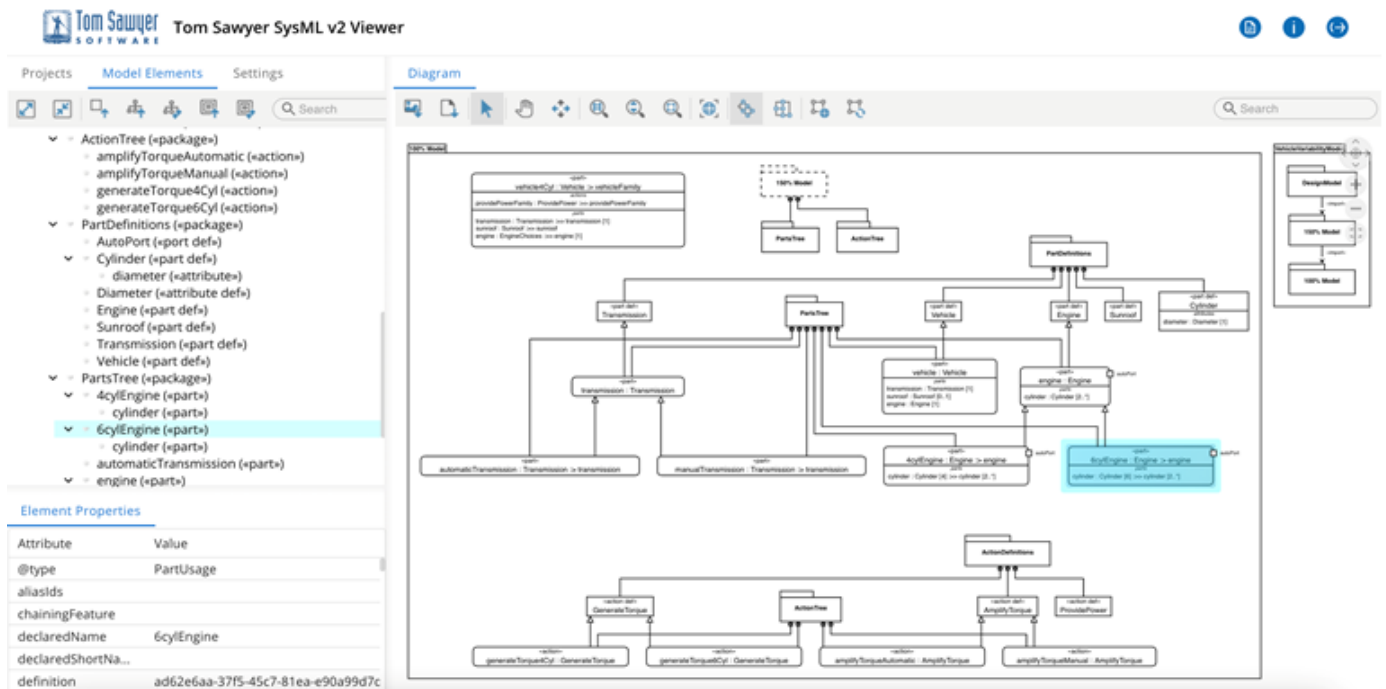
Download the [FDA URRA Guide](#).

## Tom Sawyer SysML v2 Viewer Released



[Tom Sawyer Software](#) has announced the release of its SysML v2 Viewer. This new product provides automatic layout, interactive model element loading, and interactive visualization and navigation for models in any SysML v2 API-compliant repository.

Model users can save time by visualizing system models as interactive graphs while enforcing standard drawing conventions and leveraging a variety of built-in graph layout algorithms. Tree diagrams present model elements in vertical or horizontal layers making it easier to understand complex structures.



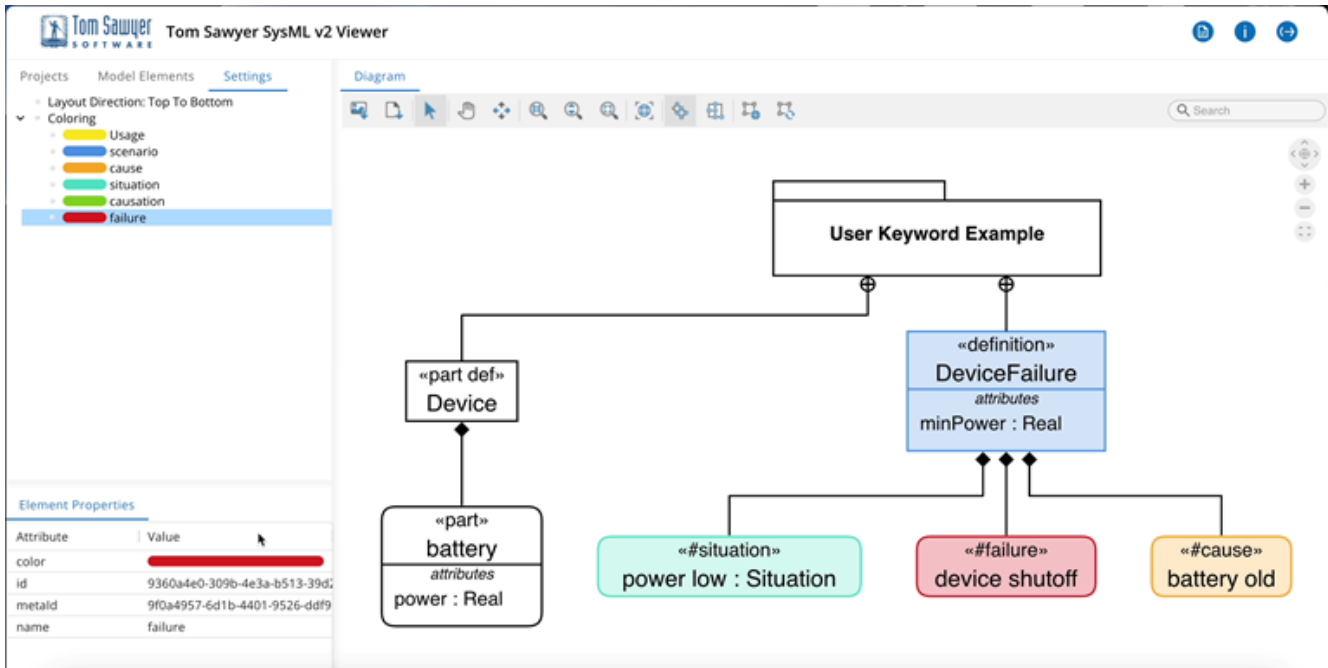
*A system model visualized as a tree diagram*

Also supported is the visualization of nested structures that groups related model elements, helping engineers and stakeholders understand relationships across different levels – particularly valuable for very large models.

System models can be customized with color-coding to visually distinguish different components or

system behaviors. Color-coding enables users to:

- Quickly identify key elements, spot patterns, and highlight areas of interest or concern, making it easier to interpret complex models
- Improve communication with stakeholders by simplifying the representation of intricate systems



*Customized, color-coded system model*

The SysML v2 Viewer can visualize models from any repository that supports the SysML v2 API and services specification.

Learn more about the differences between SysML v2 and v1 in a feature article in [PPI SyEN Edition 123 \(April 2023\)](#) and in the [Tom Sawyer Software blog](#).

[Learn more](#) about the SysML v2 Viewer software.

Watch the [Viewer Overview video](#).

[Demo](#) the Viewer software.

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### Exciting Update: Prepare for the New INCOSE SEP Exam Changes

In September 2024, INCOSE announced a significant update regarding the Systems Engineering Professional (SEP) knowledge exam, which is a requirement for both ASEP and CSEP certifications. Currently, the exam is a hybrid test based on overlapping content from both the Fourth and Fifth Editions of the INCOSE Systems Engineering Handbook (SEH). However, starting from 15 March 2025, the exam will be **exclusively based on the Fifth Edition of the INCOSE Systems Engineering Handbook (SEH5E)**.

This change means that the updated exam will reflect new content, terminology, and methodologies outlined in SEH5E, which are not present in the Fourth Edition (SEH4E). The Fifth Edition introduces the latest advancements in systems engineering practices and includes expanded sections on model-based systems engineering (MBSE), agile systems engineering, and other emerging topics relevant to October 2024

today's engineering challenges.

### What This Means for You

For those currently preparing for the SEP knowledge exam, your timeline will impact the resources you use for study:

- **If you are studying based on SEH4E**, we recommend taking the exam **before 15 March 2025**, as this will be your last opportunity to test based on content from both SEH4E and SEH5E.
- **If you are studying based on SEH5E**, you have the option to take the exam either before or after 15 March 2025. SEH5E contains all the material relevant to both the current version of the exam and the future post-March 2025 version.

For those preparing with SEH5E, rest assured that this edition is an excellent resource, providing in-depth coverage of key topics that will be included in the updated exam.

At CTI, we understand that changes to certification requirements can feel overwhelming. We are here to help you navigate the transition smoothly. Our **INCOSE SEP Exam Prep course** is fully aligned with the Fifth Edition of the Handbook. The course has been recently updated to its best-ever version, offering comprehensive resources and ongoing support to ensure you are well-prepared for the exam.

Whether you are just beginning your journey with ASEP or working toward CSEP certification, our goal at CTI is to help you excel in your professional development. The shift to SEH5E in the SEP exam is an opportunity to align your systems engineering knowledge with the most up-to-date industry practices, preparing you for success in your SEP certification journey.

For more information on the SEP certification visit the [INCOSE certification website](#) or to learn how CTI can support your preparation for the exam, [book a call](#) with CTI's René King or [email](#) CTI's training support team today.

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*Each problem that I solved became a rule which served afterwards to solve other problems.*

**Rene Descartes**

# CONFERENCES, MEETINGS & WEBINARS

*Events of relevance to systems engineering*

## ASEC 2024: Registration and Program Details



ASEC 2024

Registration is open for the INCOSE UK [Annual Systems Engineering Conference \(ASEC 2024\)](#) to be held on 5-6 November in Edinburgh, Scotland. The theme of ASEC 2024 is *'New Beginnings'*, further focusing on:

- Building on the Past
- Systems Engineering enabling a Sustainable Future
- Embracing Inclusivity
- Ensuring Systems Engineering Quality

Topics addressed in the ASEC 2024 plenary (main) sessions include:

- Applying the IPA Systems Integration guidance to a large infrastructure programme
- Architecture, architecting and the development of the discipline – what work is there still to do?
- Embracing New Beginnings: Lessons Learned from Transforming Traditional Organisations to Adopt Systems Engineering
- Enhancing team collaboration - Real-time SysMLv2 combined with engineering analysis
- Extending Industrial MBSE with Semantic Integration
- Deploying MBSE in Fusion
- Managing the longest system lifecycle – design and safety case integration for geological disposal of radioactive waste
- Safety and Reliability with RAAML in SysML based MBSE architectures
- Systems Engineering an effective Quantum Technology Ecosystem
- Unlocking the Power of System Integrators: Dispelling Myths and Misconceptions for Organisational Success

Tutorial topics include:

- Democratising Systems Approaches
- Simple ways to think about systems
- Synergising Design Optimisation and Model-Based Systems Engineering: A Practical Demonstration
- Understanding and Mitigating Failure Modes in Innovative Systems Engineering (InSE) or InSyE

See program [details](#). Register [here](#).

### Business Analysis Summits in South Africa and Poland

The [International Institute of Business Analysis \(IIBA\)](#) is sponsoring two regionally-focused conferences in November.

#### [BA Summit South Africa](#)



This in-person event will take place in Umhlanga, KwaZulu-Natal, South Africa on 4-6 November with the theme “*Unleashing the Power of Business Analysis*”. Conference presentations will be organized into four tracks:

- Ignite Innovation - This track is about challenging the status quo, bringing in fresh new ways of thinking, innovating concepts such as Technology, Digitization and Value creation through innovation.
- Ignite Collaboration - Topics in this track will focus on expanding the BA space; by promoting cross-functional cooperation and communication, dismantling organizational silos, and utilizing a variety of skill sets.
- Ignite Talent - This track offers a melting pot of industry megastars, eager minds, workshops and keynote speeches, empowering attendees to become beacons of ingenuity and skill.
- Ignite Transformation – This track explores how business analysts can effectively lead and manage change within their organizations, diving deep into the core of transformation.

Keynotes for the Summit include:

- [The Future of Business Analysis with Artificial Intelligence](#) (Fabrício Laguna)
- [You Don't Know Me: Reimagining Product Innovation](#) (Bola Adesope)
- [Resilience: Mentworking, Optimism and G.R.I.T](#) (Ntsiki Mkhize)

Pre-conference workshops on 4 November include:

- The Mindset of Getting MORE
- Successful Stakeholder Engagement
- Mastering Process Mapping: An Interactive Workshop Experience
- Navigating the Transition: Key Skills and Strategies for a Business Analyst
- Foundation in Business Analysis

View program details [here](#).

[Register](#) for the BA Summit South Africa.

#### [IIBA Poland Summit 2024](#)



This in-person event will take place in Warsaw, Poland on 7-8 November with the theme “*Fundamentals Rediscovered*”. This year's theme emphasizes the importance of foundational business analysis skills while exploring the latest trends and emerging opportunities on the horizon.

Keynotes for the Summit include:

- From skepticism to advocacy (Adrian Reed)
- Developing the nimble characteristics – Adapt or Die (Fabrício Laguna)

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## CONFERENCES, MEETINGS & WEBINARS

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- 3 Impacts of AI on Business Analysis (Angela Wick)

View the [detailed agenda](#).

[Register](#) for the IIBA Poland Summit 2024.

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### PDMA November Webinars



The [Product Development Management Association \(PDMA\)](#) will be hosting three webinars in November that may be of interest to systems engineering practitioners.

#### [Becoming a Data-Driven Strategy Star: The Power of VOC](#)

In this 7 November virtual workshop, presented by Ulrike Laubner-Kelleher of Red String Methods, you'll dive into the art of customer interviews and discover how to turn raw data into actionable insights that drive product success. With hands-on exercises, expert guidance, and real-time feedback, you'll not only learn the best practices for interviewing but also how to leverage the Voice of the Customer (VOC) to elevate your product strategy, prioritization, and marketing efforts. Key takeaways include:

- Master the art of customer interviews with proven best practices.
- Experience hands-on practice and live coaching to refine your interviewing skills.
- Transform interview data into powerful insights for product creation, development, and marketing.
- Walk away with a ready-to-use interview template for future success.
- Gain access to The Strategic Product Management Workbook, your essential guide for day-to-day product management excellence.
- Leave with actionable steps to supercharge your product strategy and make an immediate impact.

#### [Understanding and Anticipating Your Competitor's Moves](#)

In this free 14 November webcast, Jay Nakagawa of Dell Technologies will share how to anticipate competitors' next moves with practical techniques and real-world examples. Discover how to apply effective frameworks, recognize biases, and pressure-test your strategies to stay ahead in the market. Equip yourself with the insights and skills needed to gain a competitive edge and lead with confidence. Key takeaways include:

- Learn practical techniques that enable you to anticipate your competitors next moves.
- Recognize which framework to use given a particular situation and competitor.
- Apply the techniques reviewed to your own situation.
- Understand and recognize biases that affect every situation.
- Learn how to pressure-test your plan before presenting to executives.

#### [Harnessing the Power of AI in Product Management](#)

This free 20 November webinar will feature John Haggerty, product management executive and AI thought leader. Haggerty will use this interactive workshop to help product managers gain a deep understanding of how to leverage AI to drive innovation, improve customer experiences, and achieve business growth. Through real-world case studies and group activities, participants will explore AI's applications in key areas such as product feedback analysis, churn prediction, and ethical

considerations. Key takeaways include:

- Understand the multidisciplinary nature of AI and its impact on product management across various industries.
- Learn how to leverage AI to analyze customer feedback, identify pain points, and inform product improvements.
- Discover AI's role in predicting and mitigating customer churn, enabling proactive retention strategies.
- Gain insights into responsible AI development, addressing potential biases and ethical concerns.
- Acquire practical skills and strategies to effectively integrate AI into product management practices, driving innovation and business growth.

View other upcoming PDMA events [here](#).

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### AI4SE & SE4AI International Virtual Workshop



The Systems Engineering Research Center (SERC) and INCOSE will host a virtual AI4SE & SE4AI Workshop for the international community on 6-7 November. This workshop builds on the U.S.-only [2024 AI4SE & SE4AI Workshop](#) sponsored by SERC and the U.S. Army and held in September at George Washington University in Washington, DC.

The theme of this virtual workshop is *Safer AI-Enabled Complex Systems: Responsible Deployment of AI through Systems Engineering*. AI4SE research topics include:

- *Evolving role of AI-driven digital engineering and its impact on the systems engineering workforce*
- *Large Language Models (LLMs) co-pilots for systems modelers and engineers*
- *Cognitive assistants: conversational systems automating many mundane tasks*
- *AI and visualization to assist in complex project management activities*
- *AI for system design and design space exploration*
- *Other AI, data analytic, and visualization approaches to improve SE and PM*

SE4AI research topics include:

- AI embedded in complex systems of systems (SoS) and/or teams
- Measures of trust
- Test and Evaluation (T&E) across the lifecycle
- System design processes that support AI across the lifecycle
- Bidirectionality in human-AI collaborative systems
- Socio-technical System Testbeds to support system characterization and/or training
- Critical aspects of AI systems safety, reliability, and ethical considerations

Learn more [here](#).

Register for the [6 November evening session](#) and [7 November morning session](#).

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### Registration and Keynotes for INCOSE Los Angeles-San Diego Joint Technical Conference



The INCOSE [Los Angeles](#) and [San Diego](#) chapters will be jointly hosting a [Joint Technical Conference](#) on 9-10 November in Irvine, California, USA. The theme of this event is *"Industry Applications of Systems Engineering & Systems Approaches."* A virtual attendance option is available.

Keynotes for this event include:

- Why Mars, Why Now? (Mr. James Melton, PhD)
- Pros and Cons of Implementing MBSE at a Start-Up (Mr. Mike Wallace, Director Systems Engineering, Virgin Galactic)

Topic areas include:

- Applications of Systems Thinking
- Complexity Modeling & Assessment
- Design Uncertainty & Risk Modeling
- Evolution of SE & Systems Applications & Future Directions
- Exemplars of SE & Implications of New Technology for Systems Applications
- Expanding Excellence of SE & Systems Methods to New Horizons
- Industry Adoption of SE
- Modern Applications of SE & Systems Methods
- Resilience & System Trust
- SE for Autonomous Systems

Register [here](#).

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### 2024 International Boehm COCOMO Forum on Systems and Software Cost Modeling



**BOEHM CSSE**  
Center for Systems and Software Engineering

The Boehm Center for Systems and Software Engineering (Boehm CSSE) carries on the Barry Boehm legacy of research in the areas of system and software development practices and the evolution of these practices as well as the estimation of cost/schedule for all things related to software, systems, and system of systems (SoS) engineering and development.

In support of this mission, the Center will host the 2024 International Boehm COCOMO Forum on Systems and Software Cost Modeling on 12-14 November 2024. The in-person portion of this hybrid event will take place in El Segundo, California, USA.

Learn more and register [here](#).

[Become a member](#) of the Boehm CSSE.

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## CONFERENCES, MEETINGS & WEBINARS

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### SERC Research Review 2024



The 16<sup>th</sup> annual Research Review of the Systems Engineering Research Center (SERC) that will take place from 12-13 November 2024 in Washington DC. This in-person event will begin with the [SERC Research Review \(SRR\)](#) on 12 November followed by the [SERC Doctoral Student Forum \(SDSF\)](#) on 13 November.

The Research Review showcases SERC research sponsored by the Department of Defense. The Doctor Student Forum features the next generation of systems thinkers competing for the [Boehm Award](#).

[Learn more here](#) and [register](#) for these events.

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### TdSE 2024 Conference - Program Details



INCOSE's German chapter, GfSE (Gesellschaft für Systems Engineering e.V) is hosting its annual conference, [Day of Systems Engineering \(TdSE®\)](#), in

Leipzig, Germany from 13-15 November 2024 with its motto as "*Courageously shaping new paths for the future*"

The [keynote address](#) for TdSE 2024 will be:

*Model Based Systems Engineering as enabler of change (Dr. Elena Cortona – Chief Technology Officer at Belimo Automation AG)*

Model Based Systems Engineering offers a perfect approach to accompany organizations in this change. First, it helps to reduce problems, products, organizations, etc. to what is important and what needs to be monitored, changed, or improved. It is also a perfect communication tool for senior management. It helps engineers remove all the beautiful, but often overly complex, details and forces them to get to the heart of the question: how can we be more efficient and effective in developing, improving, or maintaining good products?

TdSE 2024 will offer a wide range of tutorials and tool vendor sessions on 13 November:

- CASCaDE Project
- Configuration Management – The Key to Successful Product Line Engineering
- Consistency from requirements to test cases
- Elements for a Paradigm Shift in Systems Engineering
- Excursion SysMLv2
- Handling Variance in Your Tool
- Systems Engineering in the Industrial Metaverse
- UAF in the product development of systems
- Using model-based systems engineering profitably even in small companies and projects

The lecture program on 14-15 November will offer with a total of sixty presentations in five concurrent tracks. Topical areas include:

- INCOSE Vision 2035

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## CONFERENCES, MEETINGS & WEBINARS

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- Industry contribution
- Innovations in Systems Engineering
- Scientific contribution
- SE for the Company
- Sustainability & Adaptability

See [program details](#).  
[Register](#) for TdSE 2024.

View highlights of TdSE 2023 [here](#).

Learn more about GfSE [here](#).

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### IIBA Webinar: The Art of Persuasion - Transforming Stakeholder Engagement with Storytelling



The International Institute of Business Analysis (IIBA) is hosting a free open-access business analysis webinar on 14 November titled *The Art of Persuasion: Transforming Stakeholder Engagement with Storytelling*. Grant Wright, Co-founder of Visual Jam Ltd, and Paddy Dhanda, Head of Agile

Practices at QA Ltd, will share how to explain complex ideas in a way that resonates with stakeholders using communication methods that embrace empathy, storytelling, and visual thinking. Expected learning outcomes include:

- Why conventional communication methods like PowerPoints and lengthy documents often fall flat
- How to deeply understand your audience and craft clear, persuasive messages that inspire action
- The power of emotional connection and storytelling in influencing stakeholders and driving successful business change

Learn more and register [here](#). Non-members of IIBA can create a free account on the IIBA site in order to register.

View prior IIBA public webinars [here](#).

The IIBA hosts frequent members-only webinars. Upcoming events include:

- [How to Start Your Data Quality Management Program](#) (13 November)
- [Process Analysis and Improvement](#) (4 December)

Learn more about the [IIBA](#) and its [membership options](#).

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### Capella Days 2024: Featured Talks



#### CAPELLA DAYS 2024

Where the Capella Community Meets

The annual free online gathering of the Capella (MBSE tool) and Arcadia (MBSE method) community, [Capella Days 2024](#), is scheduled for 19-21 November. Capella Days bring together the creators of Capella/Arcadia, providers of Capella add-on and services, and MBSE experts and industrial users. Capella Days 2024 will deliver 12 talks from 26 speakers, distributed across 4 sessions (3 in the Americas/Europe time zones and 1 in the Europe/Asia Pacific time zones).

Conference organizers, [Obeo](#) and [Thales](#), have announced an initial set of featured talks for Capella Days 2024.

#### [Adoption of ARCADIA and Capella to Develop an Elimination Process of Radioactive Waste by Melting \(19 November\)](#)

By Luca Bruno (CERN)

The European Organization for Nuclear Research (CERN) has operated high-energy accelerators for 70 years of research in fundamental physics, producing up to 640 tons of radioactive waste (RW) per year.

This talk provides an overview of how the ARCADIA methodology guided the development of a complex RW industrial process by means of graphical elements alone. The Capella software was instrumental, providing a rich set of diagrams that covered all the design needs; it generated automatically a textual specification of the process that was required by the auditing French Authorities but that was never used throughout the development, implementation, and audit: the diagrams conveyed all information needed and served as a clear basis for its understanding when discussing with the development and auditing teams. Differences in the educational backgrounds of technicians, engineers or physicists played little or no role at all.

#### [Enabling MBSE with Simulation to perform System Analysis for SOLARIS \(21 November – Asia Pacific + Europe\)](#)

By Serena Brizio and Lorenzo Guarino (Thales Alenia Space) and Stephan van Beek and Marco Bimbi (MathWorks)

In this presentation we will explore the joint use of Model-Based System Engineering (Capella) and the use of Simulation (System Composer, Simulink) to perform architecture optimization and system analysis in the context of the project SBSP (Space-Based Solar Power, part of the ESA SOLARIS program).

#### [Accelerating Railway Digitization: Scaling Up MBSE in a High-Paced Organization \(21 November\)](#)

By Viktor Kravchenko, Moritz Weber, and Julius Berges (DB InfraGo AG)

At Digital Rail for Germany, a railway sector initiative, we work on digitalization and application of latest technologies to bring more capacity to the existing network, increase quality and punctuality. To manage the complexity of the challenge at hand we adopted a Model-Based Systems Engineering (MBSE) approach and created our own engineering environment around Capella.

However, scaling MBSE up across a large organization presents unique challenges. This talk will

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## CONFERENCES, MEETINGS & WEBINARS

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provide valuable insights into how we address these challenges, ensuring that MBSE can be scaled effectively to support the digital transformation of Germany's railway system.

Additional topics in the detailed agenda include:

- [Implementing Systems Engineering in Brazilian Synchrotron: A Workflow for Enhanced Beamline Design \(19 November\)](#)
- [MBSE-Based IVV Approach \(19 November\)](#)
- [Enhancing Industrial Equipment Reengineering with Model-Based Systems Engineering \(20 November\)](#)
- [Leveraging System Architecture Models for Diagnosis of High-Tech Systems \(20 November\)](#)
- [Realizing the Full Value of MBSE Models through Digital Thread Implementation at Applied Materials \(20 November\)](#)
- [Example of How Capella Can Be Used for CubeSat Development \(21 November – Asia Pacific + Europe\)](#)
- [Leveraging Capella and ARCADIA for Satellite System Design and Integration \(21 November – Asia Pacific + Europe\)](#)
- [Application of the Arcadia Method on a Bulk Carrier with Siemens Teamcenter PLM Integration \(21 November\)](#)
- [MBSE Confidentiality Management and Security Analysis of Capella Designs \(21 November\)](#)

Learn more and register for Capella Days 2024 [here](#).

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### Registration Open: Business Analyst World Chicago



The International Institute of Business Analysis™ (IIBA®) is a professional association with over 30,000 members that helps the global business analysis community to achieve better outcomes through better analysis. IIBA® has endorsed the Business Analyst World conference that will take place in Chicago, Illinois, USA on 2-4 December 2024.

[Keynotes](#) for this conference include:

- [Fry Your Chickens](#) (Phil Barth, PMP, Author, Great Things Happen, LLC)
- [Get READY for Rapid Change!](#) (April Callis-Birchmeier, CEO/President, Springboard Consulting)
- [Navigating Toxic Waters: The Keys to Understanding Organizational Politics](#) (Vincent Mirabelli, Principal Research Director, Info-Tech Research Group)
- ["What If I Don't": Challenge Your Mindset and Prioritize What You Value Most](#) (AJ Hawley, Principal Consultant, Trendsparency)

A sample of the presentation topics includes:

- [Elicitation by Example](#)
- [Power of Data Visualizations](#)
- [Strategic Business Model Innovation for Enhanced Value Creation](#)
- [The T-Shaped Business Analyst](#)

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## CONFERENCES, MEETINGS & WEBINARS

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View the detailed conference program [here](#).

Five optional conference workshops will be held on 4 December to address the following topics:

- [BAZINGA! Big Bang Techniques \(No Joke!\)](#)
- [Communication is easy. Why is it so hard?](#)
- [Good C.O.P / Bad C.O.P: Build a Community of Practice That Your Organization Will Use](#)
- [Strategic Tools for Business Analysts](#)
- [The Agile Business Analyst Boot Camp](#)

Download the [conference brochure](#).

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

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### NAFEMS November - December Webinars



NAFEMS, the international modeling and simulation association, is offering two free webinars in November and December 2024.

#### [Simulation Governance: Challenges in the Age of Data and Digitalization](#) (6 November)

As innovations in product development and the digitalization of everything continue, the challenge to ensure and improve simulation capability is key to product design quality assurance. Trends such as digitalization, democratization and the data deluge of IoT are placing increased stress on simulation confidence and credibility. Simulations are to be embedded in other tools (e.g., generative design in CAD) and used by many non-experts. Artificial Intelligence and Machine Learning propose data-based “simulations” that challenge usual approaches to V&V and UQ. Simulation is a critical and essential strategic capability across the company, and not the exclusive province of specialist simulation groups in product engineering and manufacturing. Our panel of experts will discuss these and other governance challenges to ensure simulation quality and accuracy.

#### [From Data to Innovation: The Power of Simulation and PLM Integration](#) (5 December)

In today's marketplace, where speed is crucial, companies face ever-faster innovation cycles, increased product complexity, and workforce challenges. To remain competitive, it is essential to adopt advanced technologies that streamline operations and drive innovation. Join our webinar and discover how integrating simulation data with a digital thread can accelerate product development, improve predictive capability, reduce risk, and enable powerful AI models. This integration ensures a continuous flow of information, enhances decision-making, improves traceability, and helps address skills shortages, empowering the workforce.

This event will be conducted in Portuguese.

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### NAFEMS Engineering Simulation in Electronics Conference: Program Details



Program details have been released for the NAFEMS online [Engineering Simulation in Electronics Conference 2024](#) that will take place on 9-10 December.

Keynotes for this virtual event include:

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## CONFERENCES, MEETINGS & WEBINARS

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- Predictive Simulation of Radiated Emissions from an Automotive PCB with Integrated LED Driver (Aitor Muñoz Lao, Jaguar Land Rover)
- AI in PCB design?! (Michael Kühn, Robert Bosch)
- Several Ways to Simulate the Electromagnetic Compatibility of the Electric Powertrain (Jan Carsten Hansen, Technical University Graz)

Over 20 conference presentations will take place in four simulation-focused tracks:

- Power Integrity
- Electromagnetic Compatibility (EMC)
- Signal Integrity
- Radio Frequency (RF)

View the detailed [conference agenda](#).

Register [here](#).

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### INCOSE IS2025 Call for Submissions



INCOSE has issued its [Call for Submissions](#) for the [International Symposium 2025 \(IS2025\)](#). IS2025 will be a hybrid event that will take place on 26-31 July 2025, with the in-person conference to be held in Ottawa, Canada. For this premier global forum, INCOSE seeks a blend of research papers, application papers, presentations, panels, and tutorials that will further the practice of systems engineering through shared insights, experiences and innovations.

Submissions are sought across diverse application domains in the following areas of emphasis:

- Agile, Iterative, and Lean
- AI
- Autonomous Systems
- Critical Infrastructure
- Digital Engineering
- Emerging Technologies
- Engineering Management
- Global Environmental Sustainability
- Industry 4.0 and Society 5.0
- Innovative Approaches
- Systems of Systems (SoS)
- Systems Modernization
- Systems Resilience, Reliability, Safety
- Systems Security Engineering
- Socioeconomic Sustainability
- Sociotechnical Systems

Key dates, common to all types of submissions, include:

- All Submissions Due: 30 November 2024
- Notification of Acceptance: 21 February 2025
- Authors Acceptance to Present: 31 March 2025
- Final Submission Due: 30 April 2025

Submitters are cautioned to carefully follow the unique guidelines and use the templates provided for each type of submittal. Download the relevant guidelines and templates [here](#).

Download the IS2025 [Call for Submissions brochure](#).

Learn more about IS2025 [here](#).

# FEATURE ARTICLE

## Applying Systems Engineering to Process Design

*by Rick Hefner, Ph.D.*

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Authored for PPI SyEN

### Abstract

This article explores the application of systems engineering tools in business process design, drawing a direct analogy to their use in product development. By comparing the two domains, it highlights shared artifacts and methodologies, demonstrating how systems engineering principles can effectively be applied to business processes. Adopting a systems approach enables organizations to gain a comprehensive understanding of their operations, allowing for the identification of inefficiencies, bottlenecks, and opportunities for improvement.

### Introduction

Systems engineering (SE) is a well-established discipline used to manage the complexity of developing products and systems. [1] This methodology, which emphasizes a structured approach to solving large-scale engineering problems, has been increasingly applied to process design in industries ranging from manufacturing to service sectors. Applying SE tools to process design enables organizations to systematically capture stakeholder needs, establish clear requirements, and optimize workflows.

The V-model [2] is a structured systems engineering approach to system development that emphasizes the relationships between different stages of development and their corresponding stages of testing and validation. The left side of the "V" represents the decomposition of requirements and design, starting with concept development and moving through system design phases such as high-level design and detailed design. The right side of the "V" represents the integration and validation of the system, ensuring that each component and system level is verified and validated against the requirements established on the left side. This model highlights the importance of early testing and continuous validation throughout the lifecycle, ensuring that the system meets stakeholder needs and functions as intended when deployed. It emphasizes a balanced focus on both system development and verification processes, with key activities such as testing, system integration, and validation against user needs aligning with each corresponding development phase.



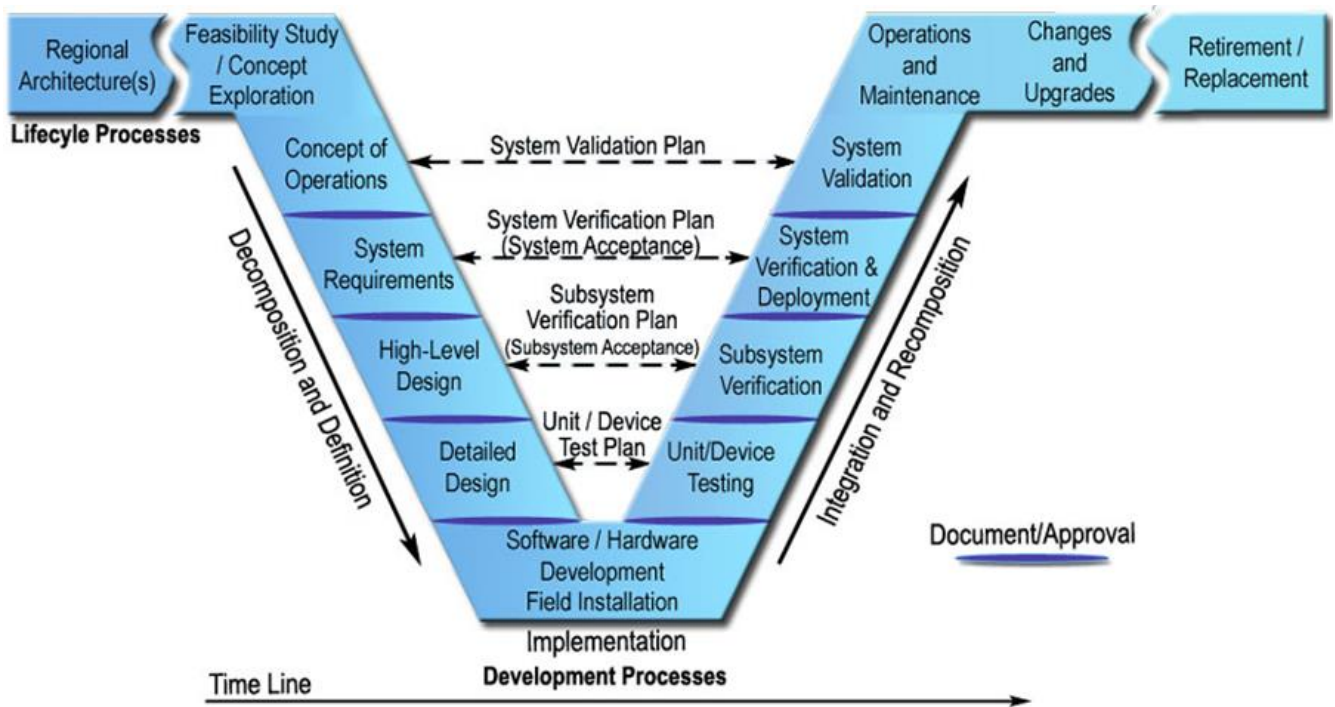


Figure 1. Systems Engineering "V" Diagram

### Systems Thinking

Systems thinking [3] is a holistic approach to understanding how components of a system interact with each other within the context of larger systems. It involves recognizing patterns and interrelationships rather than breaking down a system into individual parts, as in reductionist thinking. Systems thinking emphasizes the importance of viewing a system as a whole, understanding how its elements are interconnected and how they influence one another over time. This approach is particularly effective in addressing complex, "messy" problems, where traditional linear thinking fails to capture the dynamic nature of systems. It shifts the focus from individual components to understanding feedback loops, delays, and unintended consequences within systems.

Systems thinking is integral to systems engineering because it provides the conceptual framework needed to understand and address complex, interconnected systems. In systems engineering, the focus is often on the integration and optimization of components within a larger system, ensuring that all parts work together efficiently to achieve the desired outcome. Systems thinking complements this by encouraging engineers to consider how different elements of the system interact, how external factors influence the system, and how changes in one part of the system may affect the whole. By applying systems thinking, systems engineers can better anticipate potential issues, avoid unintended consequences, and design more resilient, adaptive systems that account for the system's environment, stakeholders, and long-term goals.

In process design, systems thinking helps identify the relationships between various steps in the process, uncovering inefficiencies and potential areas for improvement. Rather than focusing solely on optimizing individual parts of a process, systems thinking examines how different stages interact and influence each other, including how external factors affect the process. By viewing the entire process as a system, designers can better predict outcomes, avoid unintended consequences, and ensure that changes in one part of the process do not disrupt the whole. For example, when applying systems thinking to business processes, organizations can integrate tools like causal loop diagrams and feedback loops to model interactions and identify key leverage points for process improvements.

This holistic perspective allows for more effective decision-making, risk management, and continuous improvement in process design.

### Applying Systems Engineering to Process Design

The systems engineering framework is useful for applying systems thinking to process design. Systems engineering artifacts, such as context diagrams, flowcharts, and requirement matrices, are essential tools for communicating and enhancing understanding among stakeholders and engineering teams. These artifacts serve as visual representations or structured documentation of various aspects of a system, helping to clarify complex relationships, processes, and requirements. By transforming abstract concepts into tangible visual models, artifacts make it easier for diverse teams—including non-technical stakeholders—to grasp the overall system design, its purpose, and the connections between its parts. This fosters clearer communication, ensures alignment on system requirements, and helps prevent misunderstandings during the design and implementation phases. Additionally, artifacts provide a shared reference point for decision-making, allowing teams to collaboratively analyze, validate, and iterate on system designs in a structured, consistent manner.

### An Example: Serving a Cup of Coffee

This approach can be illustrated with an example process design problem. Let’s assume you wanted to open a coffee shop and were interested in designing an efficient and effective process for serving a cup of coffee. Let’s walk through the systems engineering process.

**Concept Definition** is the activity where the fundamental idea or purpose of a system is defined, capturing the system’s mission, goals, and high-level operational concepts. It involves identifying stakeholders and their needs, and it sets the foundation for the system’s scope and objectives. During this phase, artifacts like a *mission statement* or *concept of operations (ConOps)* are created. These documents outline how the system will operate within its environment, describe its intended use, and clarify its boundaries.

To apply the systems engineering paradigm, let us consider the provide coffee process as the system-of-interest. We could ask what the mission of purpose of this process is, i.e., to provide coffee to satisfy a customer order. But to clarify the scope, we would need to specify where the process stops and starts. A *system context diagram* (Figure 2) is useful in clarifying scope, by identifying external entities and their interface with the system-of-interest.

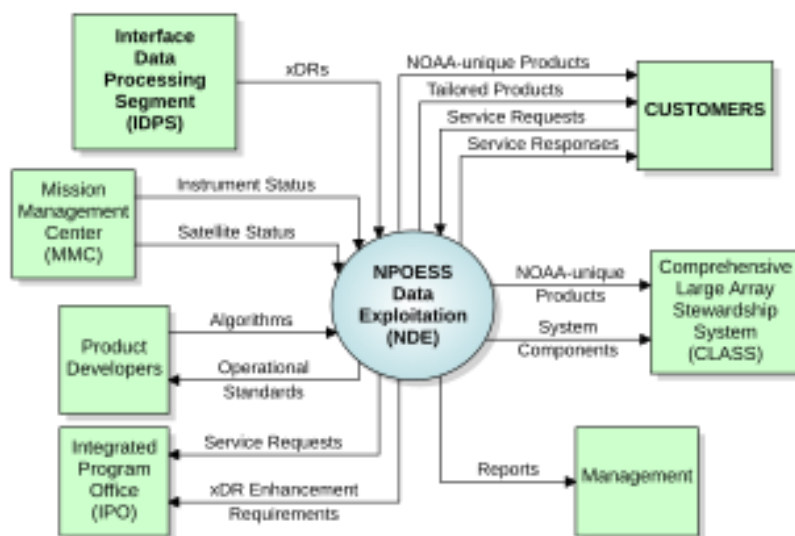


Figure 2. Example of a System Context Diagram [4]

In the case of a process-of-interest (i.e., provide coffee), external entities would be other processes, as opposed to other systems. By drawing the system context diagram, we would have to decide whether the ordering subprocess was internal or external to our process-of-interest, analogous to how a systems engineer would need to decide whether a component was internal or external to a system-of-interest.

Similarly, it would be useful to construct a table of stakeholders and the needs. And we could develop a *concept of operations (ConOps)*. The term ConOps is used in a variety of ways depending in the author. Here, we use the term ConOps to refer to a graphic or textual depiction of how our system-of-interest performs its mission in the broader context. Note that some authors may refer to an *operational concept (OpsCon)*, *Concept of Use*, or an Operational Concept Description (OCD), which is typically a textual description.

There are numerous tools for capturing a ConOps, such as a big picture diagram (Figure 3). *Use case* descriptions would also be useful in understanding intended process operation, such as what should happen if the customer can't pay for the order.

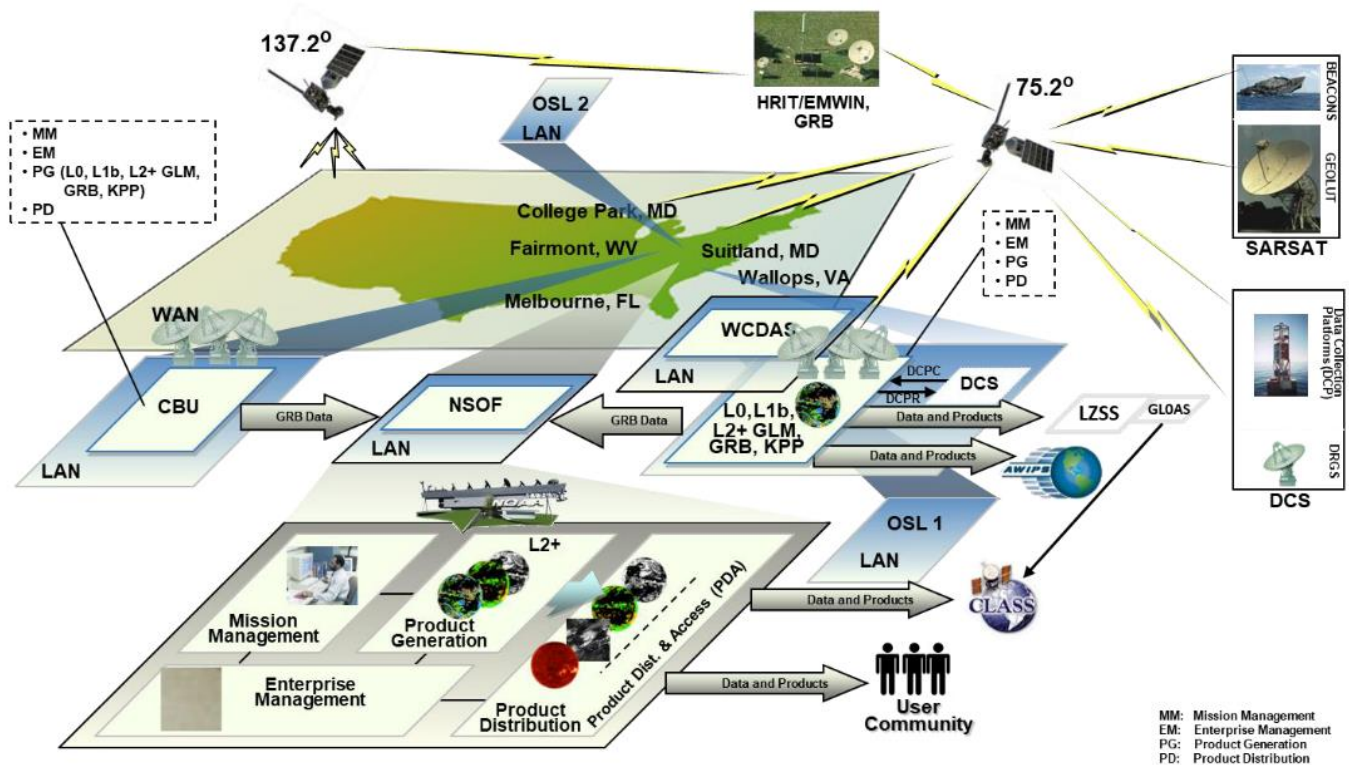


Figure 3. GOES-R System Overview [5]

Other tools not normally associated with systems engineering could be useful in capturing context. SIPOC (Figure 4) is a visual tool that helps businesses map out processes and identify areas for improvement and is particularly useful for scoping. SIPOC stands for:

- Suppliers: The people or sources that provide the inputs
- Inputs: The resources, products, or services needed to complete the process
- Process: The high-level steps for converting the inputs into outputs
- Outputs: The results of the process, such as a product or service
- Customers: The people who receive the outputs or benefit from the process

## FEATURE ARTICLE

Supplier	Input	Process	Output	Customer
<ul style="list-style-type: none"> <li>• Vehicle owner</li> <li>• Customer service representative</li> <li>• Facility manager</li> <li>• Parts window</li> </ul>	<ul style="list-style-type: none"> <li>• Repair inquiry</li> <li>• Vehicle for repair</li> <li>• Permission to proceed with individual recommendations</li> <li>• Open bay</li> <li>• Parts for approved repairs</li> <li>• Observations</li> </ul>	<ul style="list-style-type: none"> <li>• Schedule visit</li> <li>• Diagnose problem</li> <li>• Prepare work order</li> <li>• Source parts</li> <li>• Perform repairs</li> <li>• Notify that service is complete</li> </ul>	<ul style="list-style-type: none"> <li>• Appointment date and time</li> <li>• Repair recommendations and cost estimates</li> <li>• Work order</li> <li>• Parts for approved repairs</li> <li>• Repaired vehicle</li> <li>• Telephone/e-mail/text message notification</li> </ul>	<ul style="list-style-type: none"> <li>• Vehicle owner</li> <li>• Mechanic</li> <li>• Customer service representative</li> </ul>

Figure 4. SIPOC [6]

**Requirements Definition** is the process of translating stakeholder needs into clear, measurable, and testable system requirements. This activity ensures that all functional and non-functional expectations for the system are fully captured. One key artifact from this phase is the *requirements specification*, which provides a detailed list of what the system must do (functional requirements) and the constraints it must operate under (non-functional requirements). For example, in a software development project, the requirements specification might outline how quickly the software should process data and the maximum allowable system downtime.

A requirements specification would be appropriate for a process-of-interest, too. For serving coffee, we might want to specify the maximum time from placing an order to when the order is provided to the customer. Or we might want to define functions that should be performed as part of the provide coffee process, such as taking the customer's payment.

A *functional architecture* is a useful SE artifact, which captures the hierarchy of functions, subfunctions, sub-subfunctions, etc. the system-of-interest must perform. A potential draft of functions for the serving coffee process is shown in Figure 5. In some sense, this starts to look like a design of the process. But it is useful to remember that these are the functions the process is *required* to do. In the next phase, we will decide which processes we will *design* it to do.

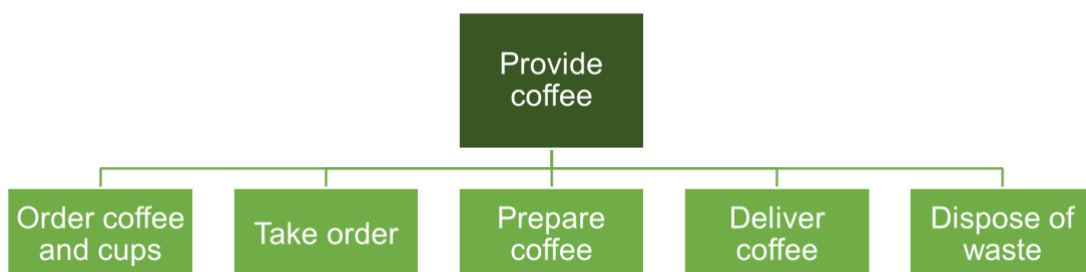


Figure 5. Functional Architecture for Provide Coffee

**Architecture Design Definition** involves developing the high-level structure of the system, showing how different components will interact to fulfill the requirements. This phase establishes the system's modularity, interfaces, and data flows. A common artifact here is the *structural architecture*, which visually represents how the system-of-interest is broken in subsystems, components, etc.

For a process-of-interest, the structural architecture differs from the functional architecture in that it represents the design choices. In a physical system, we may choose to allocate each function to one or more components, or to allocate multiple functions to a single component. Likewise, we may wish to allocate a process functional requirements to one or more subprocesses or design a subprocess that implements multiple functions. Figure 6 shows one example, where the ordering supplies subprocess and the disposing waste functions have been allocated to a single supplier subprocess.

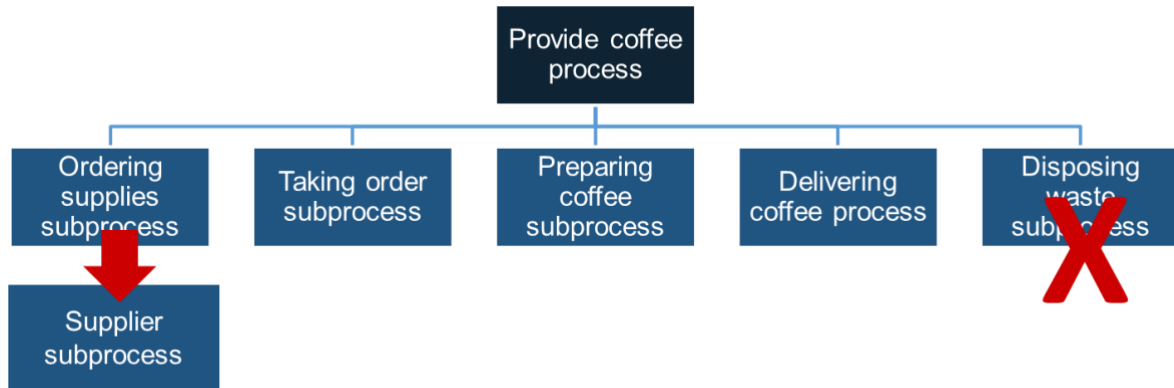


Figure 6. Structural Architecture for Provide Coffee

**Detailed Design Definition** breaks down the high-level architecture into specific, detailed designs for each component, including hardware, software, and interfaces. This is where the exact specifications of each system part are defined. An example artifact from this phase is a *detailed design document*, which provides technical specifications such as circuit layouts for hardware or class diagrams for software systems. A detailed design document could be generated for a process-of-interest, and might spell out specific procedures for component processes, such as opening or closing the shop.

**Verification** is the process of confirming that the system has been built correctly according to its requirements. This phase checks whether each component meets its design specifications and is functioning as intended. It answers the question, “Did we build the system right?” In the case of a process, we would want to verify that the process meets its requirements as outlined in the requirements specification. Note this would involve executing the process, perhaps under controlled conditions, and measuring the results.

**Validation** ensures that the system fulfills the stakeholders' needs and operates effectively in its intended environment. It answers the question, “Did we build the right system?” For a process, we might ask whether we specified it correctly. For example, we may have specified that the average customer should be served coffee within 5 minutes of the order being placed. But the first week that the shop is open, we find that customers are being served within 5 minutes but feel that 5 minutes is too long to wait. Customer feedback surveys could help us understand what the requirements SHOULD have been.

**Conclusions**

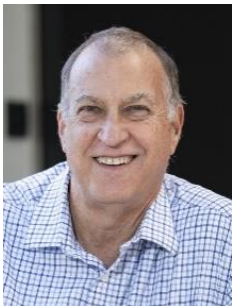
The application of systems engineering to process design demonstrates the potential for more structured, efficient, and optimized workflows across various industries. Through artifacts such as context diagrams, ConOps, and functional architectures, systems engineering provides a robust framework for systematically capturing stakeholder needs, defining processes, and ensuring their effectiveness in meeting stakeholder needs. However, further work is needed to refine and extend

these methodologies. Specifically, there is a growing need to apply advanced modeling techniques, such as model-based systems engineering (MBSE) to process design. These tools could provide real-time insights and allow for continuous optimization of processes in dynamic environments. Moreover, as industries become more interconnected, future efforts should explore more adaptive, scalable systems engineering practices that can handle the complexity and uncertainty of complex processes and unpredictable environments. Continued research and innovation in these areas will be critical to fully unlocking the potential of systems engineering in process design.

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- [6] Available at: <https://en.wikipedia.org/wiki/SIPOC>

### About the Author



Rick Hefner, PhD, serves as Executive Director for the Center for Technology and Management Education (CTME) at the California Institute of Technology, where he designs and delivers professional and executive training programs. Dr. Hefner has over 40 years of experience in industry, government, and academia and has worked with over 50 organizations in the aerospace, defense, communications, electronics, and health sciences industries. He is active professionally, with over 200 presentations and publications.

# PPI SyEN SPOTLIGHT: Key Takeaways from SETE 2024 - Shaping the Future of Systems Engineering through Innovation, Leadership and Ethical Practice

By Rene King (Senior Engineer & Business Development Manager, Project Performance International)

I had the pleasure of representing Project Performance International, along with my colleague Shalani de Silva, at SETE 2024 from 22-25 September.

SETE 2024, the premier conference for SESA and the Southern Cross Chapter of the International Test and Evaluation Association (ITEA), marked a significant milestone by welcoming Simulation Australasia (SimAust) as a collaborative partner. With the theme *Advancing in an Emergent Digital World*, the conference challenged professionals in systems engineering (SE), test and evaluation, and modeling and simulation to explore how these fields both shape and are shaped by an increasingly interconnected world. This year's event offered a transdisciplinary platform for learning, collaboration, and innovation, and here are some key takeaways that I believe will be valuable for PPI SyEN readers.

One of the most impactful sessions was the panel discussion titled *A Conversation on Systemic Approaches and Leadership - Lessons and Opportunities*. Experts like Michael Hall (QinetiQ) and Jawhar Ball (SESA president) reflected on how SE needs to return to human-centric values. The panel posed the question of how to communicate the value of SE without overtly "selling" it, recognizing that many professionals from other disciplines engage in similar practices with different terminology. They also emphasized that systems engineering practitioners must move beyond performance metrics and demonstrate holistic success in system functionality. SE practitioners, they concluded, should assume leadership roles to shape cross-industry discussions, particularly in policymaking and emerging technologies like AI.

Lucio Tirone's presentation on *MBSE-Assisted Integration and Verification of SKA-Low* was another standout, showcasing how Model-Based Systems Engineering (MBSE) was integral to constructing the world's largest radio telescope in Western Australia. The project's complexity and the involvement of multiple stakeholders highlighted the necessity of MBSE for dynamic simulation, performance modeling, and system architecture definition. Model-based tools such as BPMN modeling helped ensure successful integration and stakeholder engagement from the outset, showing the power of these methods in managing vast, technically demanding projects.

David Long's session on *Perspective and Influence and Leverage, Oh My! Leadership for Systems Engineers* addressed the nuances of effective communication in SE. Long described successful communication

as a “miracle of translation,” requiring systems engineering practitioners to listen with not just their ears but also their eyes, heart, and mind. He emphasized that people make decisions based on credibility (ethos), emotion (pathos), and logic (logos), urging SE professionals to prioritize explaining the “why” behind their actions rather than simply the “how.” Long posed the thought-provoking question: “*Twenty years from now, what headline should you have caught today?*”—reminding us to think long-term and across multiple scales when addressing complex problems.

Jon Halley’s (Shoal Group) presentation on *An Information Management Framework and Its Application for Managing a Systems Engineering Workforce* offered valuable insights into workforce management. Halley emphasized the importance of defining project requirements by necessary skills and proficiency levels, not by individuals. His framework integrates competencies, knowledge areas, and skills, providing a structured approach to both strategic and tactical workforce management. Shoal Group’s experience showed the need for clearer distinctions between competencies and skills, and how using project-based information can streamline processes such as INCOSE SEP certification.

David Long also presented INCOSE’s newly published Strategic Plan, which positions the organization as the global authority on SE practice and methodology. The plan outlines four core objectives: advancing SE as the world’s trusted authority, expanding the SE community, fostering professional development, and achieving operational excellence. Long emphasized that INCOSE seeks to unify rather than control, with the overarching goal of making the world a better place through a systems approach. This strategic direction is set to shape the future of SE, with a focus on roadmaps, partnerships, and promoting SE’s value across industries.

Mick Spiers, COO of Rail Infrastructure at Siemens Mobility Australia and New Zealand, delivered a compelling keynote on *The Future of Emerging Technology through an Ethical Lens*. He urged systems engineering practitioners to consider the ethical implications of their work, stressing the gap between altruistic intent and reality. Spiers cited examples like social media, which may have been intended to connect people but has instead contributed to a culture of comparison and dopamine-driven behavior. Similarly, tools like ChatGPT, while designed to assist, risk exacerbating algorithmic bias and reducing critical thinking. He encouraged attendees to ask themselves: *What have we just made possible?* and *Do the benefits outweigh the negatives?* Spiers reminded us that systems thinkers are the guardians of the future, and we are responsible for ensuring the ethical development of technologies.

Bart van Luling’s outstanding plenary session, *A Systems Approach to Procurement of a Large Power Transmission Program in Europe*, illustrated how SE methodologies supported Europe’s goal of becoming climate neutral by 2050. The project, which involved 140 specifications, 23 contracts, 150 work packages, and 10,000 system requirements, focused on shifting from document-centric to data-driven processes. Van Luling emphasized the importance of trust in digital systems and aligning stakeholder expectations to maintain efficiency throughout the project. His closing remarks highlighted that while systems thinking is invaluable, true success comes from getting the work done.

In conclusion, SETE 2024 provided a wealth of insights into the future of systems engineering, communication strategies, and the ethical responsibilities we bear as practitioners. From leadership in digital engineering to MBSE applications in groundbreaking projects, the conference reinforced the importance of collaboration, forward thinking, and ethical considerations in shaping the future of SE. Congratulations to the Systems Engineering Society of Australia (SESA) and everyone involved in delivering this remarkable event. From insightful plenaries to well-organized logistics, it was an exceptional experience and a standout on the SE conference calendar.





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# SYSTEMS ENGINEERING RESOURCES

*Useful artifacts to improve your SE effectiveness*

## E-Learning: Fundamentals of AI for Simulation Engineers



[NAFEMS](#), the international modeling and simulation association, is offering an e-learning course on 30-31 October titled *Fundamentals of AI for Simulation Engineers*. This software-agnostic course is designed to equip simulation

engineers with a good understanding and practical skills in applying Artificial Intelligence (AI) in their field by prioritizing methodologies and techniques that engineers can apply across various computational platforms.

Topics include:

- Introductory example
- Overview of AI modeling techniques
- Introduction to training deep neural networks
- Physics-Informed Neural Networks (PINN)
- Example project for a deep learning surrogate model for design optimization
- Creating machine learning models from scratch
- Project preparation
- Data preparation
- Sampling
- Measuring model performance and validity
- Consuming the machine learning model
- Limitations of machine learning models

Learn more and register [here](#).

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## System Dynamics: Features Online Courses



The [System Dynamics Society \(SDS\)](#) has compiled a diverse selection of more than 90 online courses that teach system dynamics and systems thinking fundamentals, advanced topics, and application skills. The society offers 16 featured online courses, summarized below.

### Worcester Polytechnic Institute (WPI) System Dynamics Foundations

The Worcester Polytechnic Institute (WPI) System Dynamics Foundations series consists of three on-demand self-paced courses based on the System Dynamics courses that have been taken by hundreds of WPI students from the different degree and professional programs since 2005. The three modules include:

- [System Dynamics Fundamentals](#) (causes of dynamic behavior, standard approach and basic tools/techniques used to develop system dynamics models)

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## SYSTEMS ENGINEERING RESOURCES

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- [Real World Dynamic Models](#) (real world phenomena and their underlying structures, explanation of observed behaviors, fundamental modeling concepts, policy interventions)
- [The Practice of System Dynamics Modeling](#) (development in process)

### [Jay Forrester Seminar Series](#)

The SDS has made available in self-paced online format a seminar series conducted by Professor Jay Forrester in the fall of 1999 for his Ph.D. students in System Dynamics at MIT Sloan School of Management. Six of the eleven planned courses in the series are currently available on the Society's Thinkific platform:

- Course 1: [What is System Dynamics?](#)
- Course 2: [World Dynamics](#)
- Course 3: [Corporate Growth](#)
- Course 4: [Nonlinearity](#)
- Course 5: [Group Model Building](#)
- Course 6: [Theory Underlying Modeling](#)

### [System Dynamics Modelling and Analysis](#)

This free online course at the University of Bergen (Norway) teaches the basics of the System Dynamics method. System Dynamics helps explain how change takes place, why people misunderstand change, and why so many policies fail to solve problems. The method builds on a systems perspective where system parts influence each other and where knowledge from different fields of study are needed. Students learn to recognize typical problem behaviors of dynamic systems, exemplified by global warming, over-utilization of natural resources, epidemics, and price fluctuations. These are all problems of importance for the UN's Sustainable Development Goals.

### [Natural Resources Management](#)

While much relevant knowledge about natural resources exists, natural resources are frequently mismanaged, often with dramatic consequences for those involved. This free online course from the University of Bergen helps build intuitive understanding of the dynamic complexity of resource systems and allows you to work with modern policies for proper management. This course is asynchronous and runs spring and fall.

### [Dynamic Business Modeling Course: Strategy Dynamics](#)

This on-demand, online course shows you how to create a "digital twin" of your business that offers quantified, time-based, visual simulations of how the business actually works, while accounting for relevant inter-dependencies, tipping points and feedbacks. Learning outcomes include:

- Modeling performance over time
- Factors driving performance outcomes
- How resources accumulate
- Connectedness, feedback, and growth
- Build a complete model from scratch
- Build a model to tackle any issue
- Build living plans for any function
- Selling dynamic business models

### [Strategy Dynamics for Leaders](#)

This online, on-demand course from Strategy Dynamics will teach you how to build strategic plans

with a digital twin of your business or challenge. Learning outcomes include:

- Use powerful research-backed frameworks
- Exploit a “digital twin” of your business
- Watch your decisions play out like a movie

### [Common Earth Insights – Developing a Systemic Understanding of Climate Change](#)

This free, online course from Common Earth aims to help people develop their ability to see interconnections and to recognize their inherent agency and resiliency, thereby forming a compassionate community of people developing holistic responses to climate change. The course gives participants the opportunity to develop their thinking and understanding alongside people equally committed to moving towards a more sustainable and compassionate planet.

### [Reframing Climate Change](#)

This free, online but abbreviated version of the comprehensive Common Earth course on Climate Change encourages participants to make meaningful connections between ideas and to develop a new understanding of the crises we face while building caring communities around the globe.

### [System Mapping Training](#)

System Mapping Academy’s online, instructor-led course is aimed at helping managers, leaders, policy makers, strategic designers, consultants, and entrepreneurs to use participatory system mapping in their context, to visualize complex problems, and to build a shared understanding within the team and with stakeholders.

Discounts are available for SDS members for some courses. Join SDS [here](#).

Search the full [SDS online course catalog](#) for more learning opportunities.

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## Systems Science Resources: ISSS Mini-Symposia Recordings



The [International Society for the Systems Sciences \(ISSS\)](#) is among the first and oldest organizations devoted to interdisciplinary

inquiry into the nature of complex systems. ISSS exists “to encourage the development of theoretical systems which are applicable to more than one of the traditional departments of knowledge”. ISSS also focuses on the practical application of systems methodologies to problem solving and providing a forum for interdisciplinary sharing of ideas among academic, business, government, and non-profit communities.

In support of these goals, ISSS hosts periodic “mini-symposia” on relevant systems science topics. Recordings of these events, with abstracts and additional details are made public [here](#).

Topics addressed thus far in the 2024-25 Mini-Symposia series are summarized below.

- [Towards an Integrated Framework for Systems Science](#) (Gary Smith, ISSS President)
- [A General Theory of Systemness - Not Systems](#) (George E. Mobus, University of Washington, Tacoma, ISSS Past President)
- [Plans for Systems Education](#) (Clifford Whitcomb, Cornell University, ISSS VP Education)

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## SYSTEMS ENGINEERING RESOURCES

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- [Dimensions Surfacing Heuristics - revealing the dimensions of complex problems in organizations](#) (Mehaad Tegally, Founder, Sustainable Operating Systems Initiative ®)
- [Systems Ethics: Pursuing Something Good or Bad](#) (Manel Pretel-Wilson, PhD)
- [Quantum Decision-Making in Groups -> Quantum Social Learning: A Model for Cultural Transformation Using Quantum Entanglement](#) (R. Eva King, PhD, Fielding Graduate University)
- [A scientific solution to the narreme, the unit of story - via Evolutionary Culturology & Systems Science](#) (Joe Velikovsky, University of Newcastle)
- [Systems Biology 3.0: Integrating Datasets, Toolsets ...and Mindsets](#) (Yoram Vodovotz, PhD, University of Pittsburgh)

Find additional details on prior and planned mini-symposia [here](#). Upcoming topics include:

- A Systems View of a Catastrophic Disaster
- An Overview of Social Systems Theory
- Holistic Flexibility for Systems Thinking and Practice
- Thinking and practice to address the 'Great Work' of our times
- Exploring systemic implementation of an innovation strategy using ISO 56002

Although outside the typical scope of the daily work of systems engineering practitioners, PPI SyEN readers are encouraged to check out these talks for relevant insights into how systems science can inform their problem definition and solution development skills.

Learn more ISSS [here](#).

[Join ISSS](#).

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### Systems Dynamics Software: Getting Started with Stella



Stella®, from [isee systems](#), is one of the most popular software tools for creating system dynamics models. The System Dynamics Society (SDS) has recommended a recorded webinar, "[Getting Started with Stella](#)" to

introduce the concepts and mechanics of using Stella to build and analyze System Dynamics models.

The 57-minute video guides viewers through the construction of a small diffusion model, including the creation of graphs and tables and the exploration of behavior using Stella Live™ and Loops that Matter™. The webinar balances conceptual and mechanical learning and provides an overview of how skills can be further developed. It is appropriate for people who have not used Stella before, as well as those who have not seen the modern Stella software.

See other videos on the [isee systems YouTube channel](#). (22 available)

The [Stella product family](#) includes multiple applications and variants including:

- [Stella® Architect](#)
- [Stella® Professional](#)
- [Stella® Online](#)
- [Stella® Designer](#)
- [Stella® Simulator](#)

- [iThink@](#)

PPI SyEN readers are encouraged to investigate the plethora of systems dynamics modeling resources from isee systems:

- [Webinars and podcasts](#) (17 available)
- [Making Connections blog](#) (88 posts)
- [Tutorials](#) (6 available)
- [Sample models](#) (96 available)
- [Bibliography](#) (49 books and articles)
- [FAQs](#)

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### INCOSE Systems Engineering Laboratory



INCOSE has created a [Systems Engineering Laboratory \(SE Lab\)](#), a set of computing environment where INCOSE members can use real, full versions of systems engineering tools for non-commercial INCOSE purposes, for learning, and for INCOSE projects, at no cost to the member or to INCOSE. Products in the SE Lab may be used in combination, as enabled by integrations also provided for such tools.

The currently available tools in the SE Lab include:

Tool Provider	SE Lab Tools
Archimate Modelling (Open Source)	<ul style="list-style-type: none"><li>• <a href="#">Archi@</a></li></ul>
Ansys	<ul style="list-style-type: none"><li>• <a href="#">Medini Analyze</a></li><li>• <a href="#">ModelCenter</a></li><li>• <a href="#">SAM</a></li><li>• <a href="#">Scade One</a></li><li>• <a href="#">Systems Took Kit (STK)</a></li><li>• <a href="#">Twin Builder</a></li></ul>
Dassault Systemes	<ul style="list-style-type: none"><li>• <a href="#">Catia Magic</a></li></ul>
Dentsu Soken, Inc.	<ul style="list-style-type: none"><li>• <a href="#">iQUAVIS</a></li></ul>
Eclipse (Open Source)	<ul style="list-style-type: none"><li>• <a href="#">Capella</a></li></ul>
IncQuery Group	<ul style="list-style-type: none"><li>• <a href="#">AUTOSAR-UML Bridge</a></li><li>• <a href="#">Desktop for Catia</a></li><li>• <a href="#">Validator for Enterprise Architect</a></li><li>• <a href="#">Validator for TeamWork Cloud</a></li></ul>
Obeo	<ul style="list-style-type: none"><li>• <a href="#">Cloud for Capella</a></li></ul>

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## SYSTEMS ENGINEERING RESOURCES

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OPCloud	<ul style="list-style-type: none"><li>• <a href="#">OPCloud</a></li></ul>
Sodius Willert	<ul style="list-style-type: none"><li>• <a href="#">Publisher for IBM Rational Software Architect</a></li><li>• <a href="#">Publisher for IBM Rhapsody</a></li><li>• <a href="#">Publisher for IBM Rhapsody – Cameo Importer</a></li><li>• <a href="#">Publisher for UNICOM System Architect</a></li></ul>
SPEC Innovations	<ul style="list-style-type: none"><li>• <a href="#">Innoslate</a></li></ul>
Spicy SE	<ul style="list-style-type: none"><li>• <a href="#">Spicy SE</a></li></ul>
TraceCloud	<ul style="list-style-type: none"><li>• <a href="#">TraceCloud</a></li></ul>
Trace.Space	<ul style="list-style-type: none"><li>• <a href="#">Trace.Space AI-Enhanced Requirements Management</a></li></ul>
Vitech	<ul style="list-style-type: none"><li>• <a href="#">GENESYS</a></li></ul>

[Join INCOSE](#) to access this highly capable set of resources. Access to vendor-supplied commercial tools requires completing an additional tool request form. Open-source software may be downloaded directly from within the SE Lab.

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### Recommended Product Development 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.

Recent recommendations include:

- [A Framework for Understanding Emerging Consumer Needs](#) (article)
- [Adopting Artificial Intelligence for New Product Development: The RAPID Process](#) (article)
- [Don't Use Generative AI to Replace Discovery with Real Humans](#) ([Product Talk](#) blog)
- [From Atoms to Bits: Digital Transformation for Physical Incumbents](#)
- [From Concept to Market: Inside Food Product Development](#) (article)
- [How to implement a 2-hour design sprint to solve complex problems](#) ([Product Mastery Now](#) podcast)
- [How to 10x Your Product Management with Generative AI](#) (webinar)
- [How marketers influence product platform decisions: A configurational approach innovations](#) (JPIM research article)
- [Ideation Techniques: Conceptualizing New Products and Services](#) (article)
- [PDMA's Exclusive Radical Product Thinking](#) (webcast)
- [Pixar's Rules of Storytelling Applied to Product Managers & UX Designers](#)
- [Playing the political game of innovation: An integrative framework and future research directions](#) (JPIM research article)

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## SYSTEMS ENGINEERING RESOURCES

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- [projectmedtech](#) (podcast)
- [Selecting the Right AI Solutions for Use in New Product Development](#) (article)
- [Sustainable Product Innovation: Integrating B Corp Principles & UN SDGs](#) (webcast)
- [The Adoption and Performance Impact of AI in New Product Development: A Management Report](#) (article)
- [The Creative Alchemy of Lean Culture](#) (webcast)
- [The Product Vibe](#) (blog)
- [The Human-AI Collaboration Revolution](#) (webcast)
- [Valuation entrepreneurship through product-design and blame-avoidance strategies: How Tesla managed to change the public perception of sustainable innovations](#) (JPIM research article)

Access to kHUB is free and open to the public. Full text access to JPIM research articles requires a PDMA membership or institutional access to the JPIM through the Wiley Online Library; however, kHUB publishes JPIM article abstracts and key takeaways.

Create a guest account or join PDMA [here](#).

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### Integrating Human Needs into the Foundations of Smart Cities – the INCOSE-TUS Approach



The [IEEE Smart Cities Community](#) exists to assist municipalities in managing the transition to urbanization, to raise awareness of the benefits and downsides of technology, and help guide its appropriate uses. The community believes that a Smart City brings together technology, government and society and includes a smart economy, energy, mobility, environment, living and governance.

The community recently hosted a webinar delivered by Jennifer Russell, Chair of the [INCOSE Smart Cities Initiative](#), on the topic, *Integrating Human Needs into the Foundations of Smart Cities – the INCOSE-TUS Approach*.

#### Abstract:

Cities provide opportunities for people to gather, share resources, and satisfy their fundamental needs. Smart cities use technology to provide services. Sometimes, complex technological solutions focus on the capability of the technology and become disconnected from fulfilling human needs. Yet closely integrating human needs with technological solutions leads to increased complexity. The INCOSE-TUS Framework is a robust, tailorable, and systematic way to view and evaluate a smart city as an integrated complex social system. At the heart of the Framework are nine fundamental human needs as defined by Max Neef (1986). The framework connects human needs to functions of city services and technology. To demonstrate the use of the INCOSE-TUS approach, two partner cities have applied the approach: Darkhan, Mongolia to update policy and San Diego, USA to address homelessness.

Learning objectives for this event include:

- Consider a top-down approach to integrating human needs into smart city planning.
- Learn the INCOSE definition of a Smart City and proposed supporting metrics.
- Learn how Model-Based Systems Engineering can support interface management between municipal departments and services.



Learn more [here](#).

Stream the 60-minute [presentation](#). Download [slides](#). Nominal fees apply, with discounts for IEEE Society members. Free for IEEE Smart Cities Community members.

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### 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. Recent posts include:

- [5 Ways to Navigate Scope Creep as an Agile Business Analysis Professional](#): Embracing agility means being proactive, collaborative, and flexible. It involves continuous stakeholder engagement, iterative delivery of quality-driven outputs, and adaptive documentation practices. By fostering a culture of open communication and prioritizing high-value features, we can mitigate the risks associated with scope creep.
- [6 Keys to Unlocking Product Success with Analysis](#): Product success is tightly linked to how well an organization manages its product ownership processes. Product ownership analysis (POA) stands at the intersection of business analysis and product ownership, ensuring that products are developed with precision, insight, and alignment with business goals.
- [Are You Prepared for AI? Poll Insights Revealed](#): A recent IIBA webinar, *Futureproof — Delivering Value with Business Analysis and AI*, explored strategies for delivering value through business analysis and AI. A series of polls taken during the webinar offer a snapshot of where companies stand and highlight the areas that need attention to harness the full potential of AI in business analysis.
- [Business Analysis Blueprint](#): Business analyst and technology consultant Emerson Ramkaran discusses his work on digital transformation projects, the role of Agile practices, and how technologies like AI and advanced analytics are reshaping the industry.
- [How to Harmonize Product Ownership and Business Analysis to Increase Productivity and Profitability](#): Product owners and business analysts collaborate to ensure project success in the software development and project management spaces. Although they share some responsibilities, each role offers a unique perspective and skill set. Balancing these roles is crucial for optimizing the development process and delivering a product that meets business and user needs. Effective collaboration between the product owner and business analyst can help ensure an Agile project runs smoothly, delivering value to the business.
- [The Power of Data: How Savvy Professionals Are Leveraging Business Data Analytics](#): These days, data has become essential for decision-making and strategy. Business data analytics (BDA) is crucial in transforming raw data into actionable insights, enabling organizations to enhance their processes, improve customer experiences, and stay ahead of the competition.

The Analyst Catalyst blog has almost 500 posts, [searchable by content categories, publication date ranges, and keywords](#).

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### DESTA Research: System Dynamics Resources



[DESTA Research](#) is a firm dedicated to providing research and consulting services for sustainable development using systems thinking and system dynamics. DESTA stands for Developing Ecosystems for Systemic Transformation and Adaptation.

DESTA's vision is to create an ecosystem which can enable systemic transformation and adaptation towards the most pressing social-ecological-economic challenges of our time. In support of this mission, DESTA publishes numerous resources that address the application of systems thinking and system dynamics to global challenges. Recently published resources include:

- [Generic Traps and Opportunities in Complex Systems - System Archetypes](#): This 93-minute video lecture features Mihir Mathur's explanation of the theory and application of selected system archetypes. These archetypes are messy stories of our lives that are universally applicable. Why do humans find it so difficult to govern common resources, what leads to escalation and how can we rethink development from a sustainability point of view? Readers may also want to review PPI SyEN's overview of nine system archetypes in a series of articles titled "A Rapid Immersion in Systems Thinking" in PPI SyEN editions [#133 \(February 2024\)](#) and [#135 \(April 2024\)](#).
- [Systems Thinking and Systems Washing](#): In this 68-minute podcast, Mihir Mathur discusses three limitations of the current application of systems thinking to Agribusiness: [Linear causality approaches](#), [Root cause myth](#), and [one-dimensional success](#).

The [DESTA video library](#) contains numerous other informational videos on topics such as:

- [Introduction to Feedback Loops in Systems Thinking](#)
- [Limits of Renewables: Will renewables provide us everlasting energy?](#)
- [Making Loops and Sharing them on STELLA Online](#)
- [Systems Stories: The Cobra Effect](#)
- [Systems Stories: Over Capacity and Under Utilization](#)
- [Systems Stories: Dynamic Equilibrium](#)
- [Systems Thinking for Real World Problems](#)
- [Systems Thinking: What it is and What it isn't](#)
- [Tools of Systems Thinking](#)
- [Types of systems: Complex and Complex Adaptive](#)
- [Why Systems Thinking and What is Systems Thinking](#)

DESTA Research publishes [articles](#) on topics such as:

- [Beyond Tools: Deepening the Understanding and Practice of Systems Thinking](#)
- [Innovation and Standardization](#)
- [Systems Theory of Change](#)
- [We Need a System for Systems Change](#)
- [What does it take to become a Systems Thinker?](#)

View other publications from the DESTA team [here](#).

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### Meet INCOSE's Guide to Writing Requirements With AI Quality Checker



[SPEC Innovations](#) has posted the video of a September 2024 webinar titled [Meet INCOSE's Guide to Writing Requirements with AI Quality Checker](#). This 32-minute presentation shares how to leverage Innoslate's Quality Checker to meet the INCOSE recommendations for writing effective requirements.

Key takeaways include:

- Understand the INCOSE requirements pattern as presented in the Guide to Writing Requirements (GtWR)
- Learn about the features and capabilities of Innoslate's Quality Checker and how it supports the creation of high-quality requirements
- Watch demonstrations on how to use the Quality Checker to identify and correct common issues in requirements, ensuring they meet GtWR expectations (attributes/rules) for a well-written requirement.
- Discover best practices for integrating the Quality Checker into a requirements management workflow

Version 4.0 of the GtWR is available in the [INCOSE Store](#).

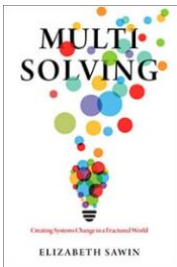
More information concerning the GtWR is available on the [INCOSE RWG YouTube channel](#).

View other SPEC Innovation videos [here](#).

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### Book: Multisolving - Creating Systems Change in a Fractured World



Elizabeth Sawin, founder of the [Multisolving Institute](#), has written a new book that highlights her journey toward the discipline of multisolving, i.e., using a single investment of time or money to solve many problems at the same time. *Multisolving - Creating Systems Change in a Fractured World*, is a 256-page summary of Sawin's lessons learned through decades of often frustrating attempts to move others to respond to complex, deeply intertwined societal issues through focused, but siloed initiatives.

Topics addressed in this book include:

- Converging Crises, Cascading Solutions
- Multisolving: Promises and Obstacles
- Stocks
- Flows
- Reinforcing Feedback
- Balancing Feedback
- The Behavior of Whole Systems
- Rising to the Challenge of Complex Systems
- Steering Systems
- Multisolving in Action
- Multisolving and Equity
- Multisolving in Tumultuous Times

Paperback ISBN 9781642833775

eBook ISBN 9781642833782

Acquire this book from [IslandPress](#).

### **Video: Which system are we discussing?**

On 18 September, Professor Joe Kasser and Bruce Lerner delivered a talk for the INCOSE Oak Café entitled "[Which system are we discussing?](#)".

Abstract: New definitions of systems have been appearing in the literature for more than 50 years. Prof Joseph Kasser and Bruce Lerner examine a representative sample of the definitions and suggest that the authors of those definitions are not actually defining a system, they are defining their system. They then offer an opinion about the difference between "a system" and "the(ir) system" for discussion.

The outline of this talk included:

- The undesirable situation
  - The different definitions of a system in the literature
  - There is no consensus on "what is a system"
- The assumptions
  - There is a valid reason for the different definitions
- The Feasible Conceptual Future Desirable Situation (FCFDS)
  - An understanding of the reasons for the different definitions
  - There is a consensus on "what is a system"
- The problem (what to do; steps to get to the solution, working backwards)
  - Infer the FCFDS
  - Understand the context in which the definitions were made
  - Look for common elements in the definitions and specific differences
  - Collect a reasonable sample of definitions
- The solution (how the what was done)
  - Examine the definitions
  - Use critical thinking to infer conclusions

Professor Kasser's [YouTube channel](#) hosts numerous videos covering a wide range of topics relevant to systems engineering and systems thinking practitioners. A sample of topics includes:

- [A Case Study on Applying Systems Thinking to Solve Complex Problems](#)
  - [Requirements for flexible systems](#)
  - [Systems thinking as it applies to systems engineering](#)
  - [The nuts and bolts of systems](#)
  - [Two major misconceptions of systems thinking exposed](#)
-

### eBook: AEC Best Practices Guide to Requirements Management



Jama Software has published an e-book titled *“Best Practices Guide to Requirements and Requirements Management in Architecture, Engineering, and Construction (AEC) Industry”*. This 22-page resource provides an overview of requirements management and requirements engineering from the perspective of facilities and infrastructure projects. It highlights the benefits that flow from efficient and optimized requirements management processes, including:

- Effectively tracking changes
- Understanding change impacts
- Swiftly resolving issues to minimize the risks of delays, rework, and cost overruns

Topics addressed in this e-book include:

- Introduction to Requirements
- The Business Value of Better Requirements Management in AEC Projects
- What Better Requirements Can Do for You
- Four Fundamentals of Requirements Management
- Figuring Out the Right Level of Detail in Requirements
- Leveraging Automation for Writing Clear, Concise Requirements, Every Time

Though clearly written to highlight the capabilities of the Jama Connect software and focused on the AEC domain, the e-book contains a good summary of many valuable and universal principles related to effective requirements management and traceability.

[Download](#) the AEC Best Practices Guide.

Browse the Jama Software resource library [here](#).

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*In preparing for battle I have always found that plans are useless, but planning is indispensable.*

**Dwight D. Eisenhower**

# FINAL THOUGHTS FROM SYENNA

## Acronyms run AMUK

Syenna occasionally has the need to look up an acronym or abbreviation in the course of interacting with engineers and the documentation that they generate. It's a bit shocking to find the number and scale of the online aids that are available to help with this formidable task. Dozens of such resources pop up in the simplest online search, even without AI assistance.

For example, [Acronym Finder](#) claims to be the *"largest and most trusted database of over 4 million acronyms and abbreviations."* The Wall Street Journal lauds this site as an *"exponentially expanding dictionary consulted by bureaucrats, translators, doctors, weapons designers and anyone else who needs help decrypting the wide world's daily output of acronyms."*

Beyond the obvious society-preserving links between bureaucrats, doctors and weapons designers, Syenna had never thought, until reading this overview, that anyone would consider tracking the world's daily or annual output of such knowledge-compressing artifacts. One must ponder whether the correlation between the global GDP and Gross Acronym and Abbreviation Product (GAAP) is positive or negative and whether the valuation of such IP is adequately covered in the GAAP standards.

The site's traffic statistics are impressive, with 526 million searches to date and 141 thousand visitors in the 24-hour period preceding this article.

We have all heard acronym-laden presentations that were seemingly designed to mystify the uninitiated and send them back to labor in their hovels. And no decent specification can pass muster without lengthy acronym and abbreviation lists preceding the good stuff, else confusion will reign supreme as a herd of NS's (non-sequiturs) roam freely across its pages.

Syenna pauses to think about the profitability (EBIDTA) of our collective attempts to shorten our speech.

Acronym Finder can even assist in the generation of new such entities, which USA Today notes saying *"if you're really bored, make up an acronym and see what it means."*

Syenna, in a rare moment of boredom, couldn't resist brainstorming possible meanings for AMUK:

- Acronyms Make Us Kinder (AMUK)
- Abbreviations Meld Universal Konsciousness (AMUK)
- Architects Manage Uncontrolled Komplexity (AMUK)
- Artificially Manufactured Units of Kryptonite (AMUK)

With sincere apologies to **Aliansi Masyarakat Untuk Kesejahteraan**, the Indonesian Social Alliance for People's Welfare.

Regards,  
Syenna