



Cleveland-Northern Ohio Chapter Meeting

May 13, 2024

Dennis Rohn

Agenda



- Welcome & Introductions
- INCOSE Services
- Associated Organizations in Northern Ohio
- Systems Engineering Handbook Process Discussion:
 - Defining the problem to be solved
 - Gathering stakeholder expectations
 - Defining requirements
 - Discussion on modes and states

June C-NO Chapter Meeting: Monday, June 10, 6 PM



WELCOME AND INTRODUCTIONS

2024 Chapter Officers



- President – Dennis Rohn
- Vice President – Amber Waid
- Treasurer – Brian Hallett
- Secretary – Sam Ciccone
- At-Large Director – Anna Sanford
- At-Large Director – Joel Knapp

Congratulations



- The Chapter received notification that we once again received a Silver Circle Award for efforts in 2023.



Recent Chapter Activities



FIRST Robotics Judging March 21-23, 2024



Chapter Meeting April 10, 2024



Girls Take Flight April 13, 2024





INCOSE SERVICES & INFORMATION

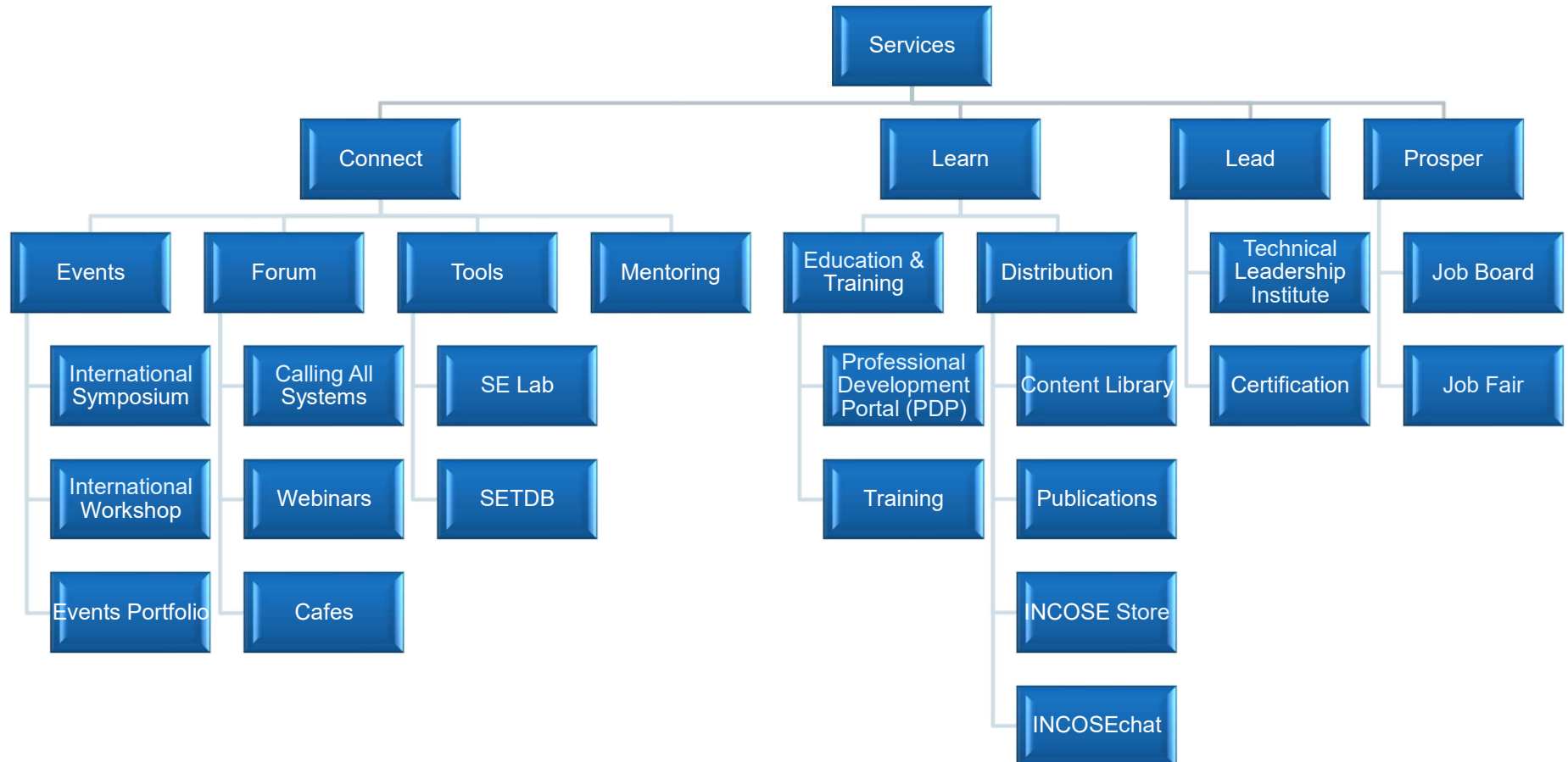
Note that INCOSE has added several paid positions to provide more support to the members and organization: Executive Director - Steve Records; Director of Information Technology - Jay McGraw, etc.

INCOSE Services



- INCOSE Policy SVC-100 defines “Service” as:
“An act of helpful activity. Within INCOSE, service refers to an activity which supports the systems engineering community with professional development, recognition, networking, and/or engagement with systems engineering material.”
- INCOSE Services Contacts
 - Heidi Davidz, Director of Services, Heidi.Davidz@incose.net
 - Christopher Browne, Deputy Director of Services, Christopher.Browne@incose.net
 - Erika Palmer, Technical Products & Services Director, Erika.Palmer@incose.net
 - Alexandra Kowalski, Services Manager, Alexandra.Kowalski@incose.net

Services Portfolio



Event Listing



www.incose.org/events

Upcoming Events

SYSCON 2024 - The 18th Annual International Systems Conference

Apr 15, 2024 - Apr 18, 2025

Montreal, QB, Canada

[READ NOW](#)

INCOSE Orlando: May 2024 Monthly Meeting

May 09, 2024 5:30 PM - 8:30 PM ET

Orlando, FL, USA

[READ NOW](#)

INCOSE Los Angeles: Strategic Planning Meeting 2nd Quarter

May 11, 2024 9:00 AM - 3:00 PM PT

Manhattan Beach, CA, USA

[READ NOW](#)

2024 MBSE Cyber Systems Symposium

May 13, 2024 - May 16, 2024

Dallas, TX, USA

[READ NOW](#)

INCOSE Cleveland-Northern Ohio: May 2024 - Systems Engineering C-NO Café #2

May 13, 2024 6:00 PM - 8:00 PM ET

Bay Village, OH, USA

[READ NOW](#)

INCOSE Los Angeles: Pushing the Boundaries of Autonomous Robotic Exploration of Planetary Bodies

May 14, 2024 5:30 PM - 7:30 PM PT

El Segundo, CA, USA

[READ NOW](#)

INCOSE IS 2024



www.incose.org/symp2024

International Symposium (IS)

2-6 July 2024 - Dublin, Ireland

[FIND OUT MORE!](#)



Forums



Calling All Systems

Quarterly panel discussions hosted by INCOSE to bring thought leaders together from around the globe to highlight and bring awareness to “hot topics” in systems engineering

Webinar Series

Monthly technical content presented by INCOSE members and alliances for educational purposes

Cafes

Virtual meet-ups (via Zoom) intended to provide a platform for informal conversation between members

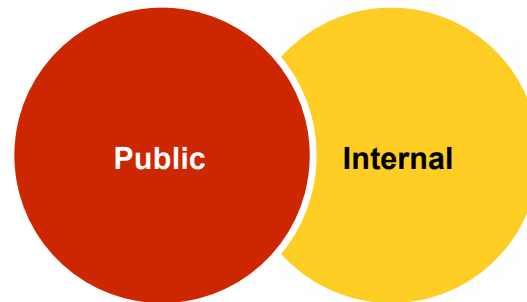
SE Lab Vision & Value Proposition



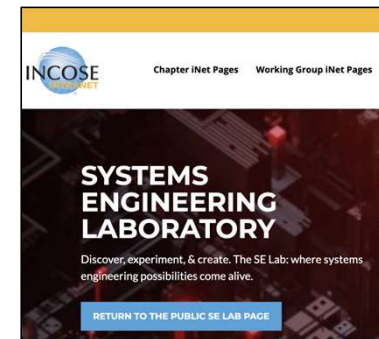
- INCOSE members use real, full versions of SE tools for non-commercial purposes
- Vendors gain exposure for products and promotional consideration for contribution



INCOSE SE Lab Websites



www.incose.org/selab



Public

- Visible to the general public
- Presents SE Lab vision and value proposition
- Publicizes participating vendors and tools

Internal

- Visible only to current INCOSE members
- Requires INCOSE member login credentials
- Mandatory INCOSE SE Lab User agreement

Participating Vendors and Tools



Vendor-Supported Tools

 CATIA MAGIC	 AUTOSAR-UML BRIDGE	 DESKTOP FOR CATIA
 VALIDATOR FOR ENTERPRISE ARCHITECT	 VALIDATOR FOR TEAMWORK CLOUD	 CLOUD FOR CAPELLA
 OPCLOUD	 PUBLISHER FOR IBM RHAPSODY	 PUBLISHER FOR IBM RHAPSODY - CAMEO IMPORTER

 PUBLISHER FOR UNICOM SYSTEM ARCHITECT	 PUBLISHER FOR IBM RATIONAL SOFTWARE ARCHITECT	 INNOSLATE
 SPICY SE	 TRACE.SPACE AI-ENHANCED REQUIREMENTS MANAGEMENT	 GENESYS

Free & Open-Source Tools

 ARCHIMATE MODELLING	 ECLIPSE
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Landing Pages for Vendor-Supported Tools



[INCOSE Home](#) / [INet](#) / [INCOSE SE Laboratory](#) / [SPEC Innovations - Innoslate](#)

Please read carefully the [INCOSE SE Lab Terms and User Agreement](#) before using this site.

By accessing or using the INCOSE SE Lab, you agree to be bound by this agreement.



Access to this tool has been generously donated for INCOSE Members only by

Innoslate, the first web-based MBSE tool, was developed by SPEC Innovations to support the entire system or product lifecycle. This cloud or on-premise application simplifies system or product development while reducing time-to-market, cost, and risk.

SPEC Innovations' flagship model-based systems engineering solution, Innoslate, can help your team reduce time-to-market, cost, and risk on even some of the most complex systems. This cloud or on-premise application uses a modern web browser, with an intuitive graphical user interface.

Want to use this tool?!

Fill out [this form](#) and we will provide you access!

Contact Information:

INCOSE Contact for Innoslate: **Joe Marvin** (joe.marvin@incose.net)

SPEC Innovations Contact for Innoslate: **Support Team** (support@specinnovations.com)

General SE Lab Inquiries: selab@incose.net

- Visible only to current INCOSE members
- Brief description of the tool and tool vendor
(Information provided by vendor)
- Link to form requesting access to tool
- Contact information:
 - INCOSE SE Lab representative
 - Vendor representative
 - Inquiries: selab@incose.net

Legal Agreements Set



User agreement

A screenshot of the INCOSE SE Laboratory Terms and User Agreement page. The page has a white background with a blue header bar containing the INCOSE logo and navigation links: "Engage with INCOSE", "Certification", "Events", "Publications", "Communities", "Learn", and "About Systems Engineering". Below the header, the breadcrumb trail reads "INCOSE Home / Learn / INCOSE SE Laboratory / SE Lab - Terms of Use". The main heading is "INCOSE SE Laboratory Terms and User Agreement". The text explains that the Terms of Service and User Agreement (hereinafter "Terms and Conditions") sets forth the terms and conditions under which you ("you," "your", or "Member") may use and access, including all functionalities and services offered therein, or in connection with your participation in and use of INCOSE's System Engineering Laboratory hosted at www.incose.org/inet/se-lab (and any successor site thereto) collectively the "SE Lab". As a condition of your use in accessing and utilizing the SE Lab, you understand and agree to all policies and procedures established by INCOSE, including these Terms and Conditions, INCOSE's Membership Agreement and Privacy Policy (collectively "Agreement").

1. Use of SE Lab. The SE Lab is an online environment where Member can access third-party vendors' ("SE Lab Vendors")

User Tool Request Form

A screenshot of the INCOSE SE Laboratory's User Request Form. The form has a dark blue header bar with the "smartsheet" logo and the title "The INCOSE SE Laboratory's User Request Form". The text explains that the form is used to request a free license to one of the tools in featured in the SE Laboratory. Access to these free tools is strictly for INCOSE Members only and your membership will be verified before access is granted. By submitting this form, you are agreeing to abide by the [INCOSE SE Laboratory Terms and Conditions](#) and any violation of this agreement will result in disqualification from all current and future use of these tools.

Full Name (First Last) *

INCOSE Member ID *
An active INCOSE Membership is required to be maintained at all times when accessing the tools in the SE Laboratory.

Email Address *

What Company or University are you currently affiliated with? *

Which Tool are you interested in? *
For INCOSE's purposes, you may only request access to one tool per form submission. However, you may fill out this form multiple times if more than one tool is needed.

What INCOSE Working Group or Initiative are you associated with? *
You may select multiple.

Pick One of the Following *

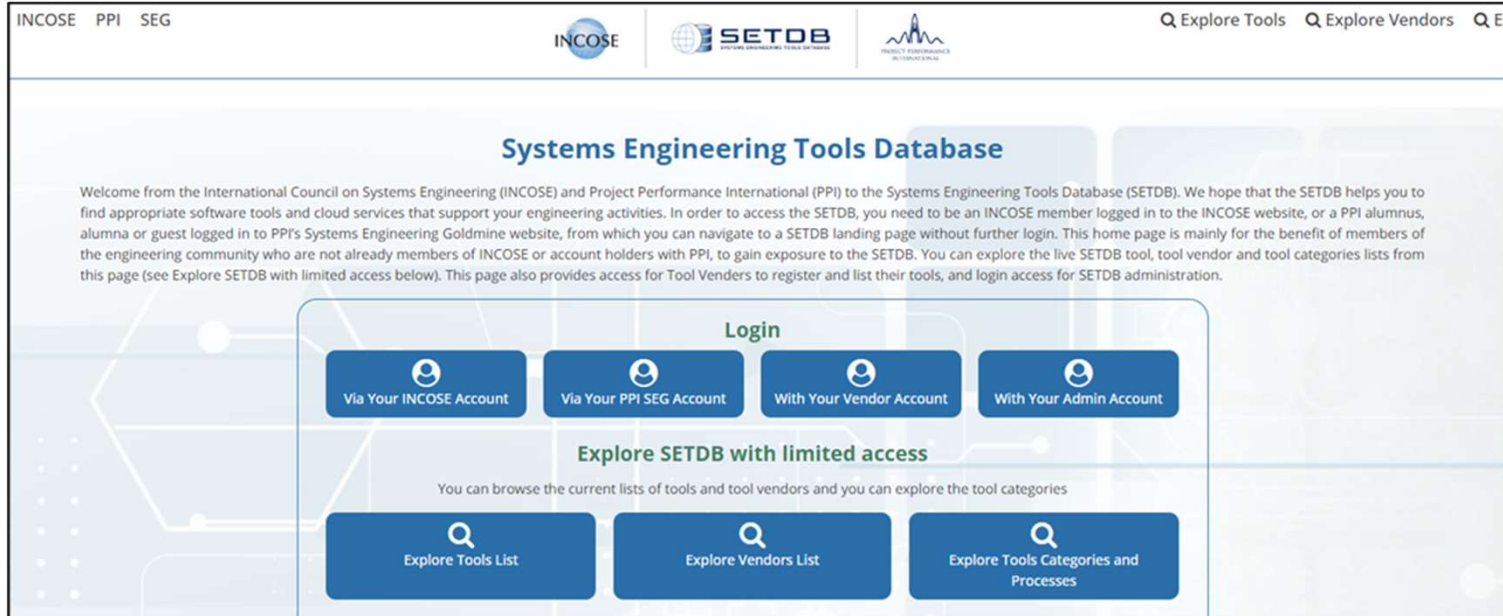
Based on your answer to the above question, please provide a brief explanation for use *
I.e., Specific WG project or product, academic use, INCOSE Initiative, etc.

Vendors also have an agreement in place

SE Tools Database (SETDB)



- The SETDB helps you to find appropriate software tools and cloud services that support your engineering activities through the variety of tool vendors and tool categories lists that participate
- This is a collaborative offering between INCOSE & Project Performance International (PPI)



<http://www.systemsengineeringtools.com/>

Mentoring

Build the future of systems engineering

- Learn from experienced SEs
- Facilitates pairing between mentors and mentees by collecting information
- Mentees select a mentor from the list of members who have volunteered
- Available to individual members only



Mentor and Mentee Forms

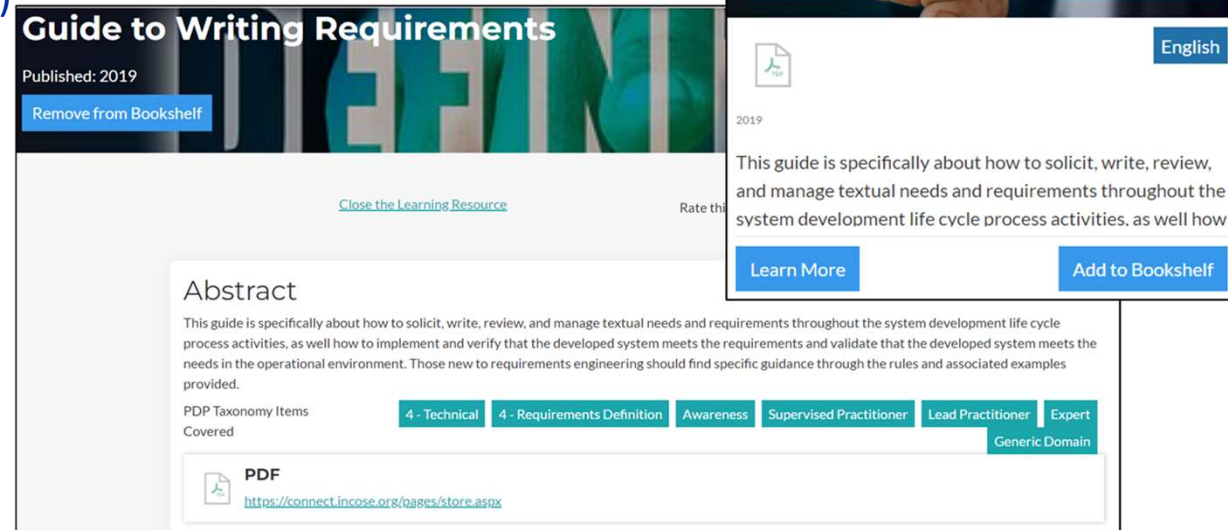
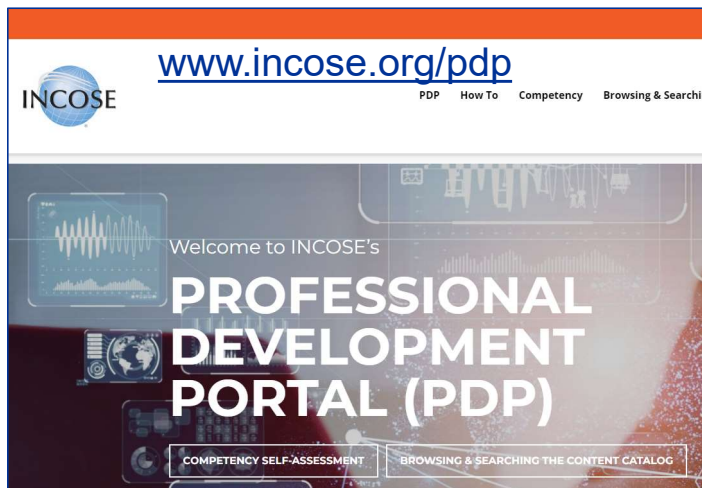
Mentee Information Input	
<p>Welcome to the INCOSE Mentor-Matching Program. Once you enter your information below, our automated system will email you information about available mentors, and ask you which mentor you would like to request. Once you have requested a mentor, the mentor will be asked to accept or decline this mentoring assignment. If the mentor declines, or you do not hear back within a reasonable amount of time, you will need to use the link on the INCOSE mentoring web page to request a new mentor.</p>	
Mentor Information Form Thank you so much for agreeing to be a mentor in INCOSE's Mentoring Program. Please fill out the following fields to be added to the list of mentors.	
Mentor First Name *	Last name (Surname) *
<input type="text"/>	<input type="text"/>
Mentor_Last_Name *	First name *
<input type="text"/>	<input type="text"/>
Mentor Email Address *	Email address *
<input type="text"/>	<input type="text"/>
Mentor Status * Once you have accepted as many mentees as you can handle, please accordingly. If you will be away for some time and not able to answer for your services as a mentor, please set your status to "Temporarily unavailable" then change it back to "Available" when you return. Please ignore the last two choices (our administrators use these purposes). <input checked="" type="radio"/> Available <input type="radio"/> Have as many mentees as I can handle <input type="radio"/> Temporarily unavailable <input type="radio"/> Admin use only (Perhaps just a Mentee) <input type="radio"/> Admin Use only (Not updated)	Employer (if currently working) * Please enter the name of your current employer. If you are not currently working, enter None. <input type="text"/>
I am willing to mentor someone who is * Please select all of the types of people you are willing to mentor. <input type="checkbox"/> A systems engineering student <input type="checkbox"/> A practicing engineer moving into a systems engineering role <input type="checkbox"/> A practicing systems engineer with less than 5 years of experience <input type="checkbox"/> A practicing systems engineer with 5 or more years of experience	University (or school) if currently a student * If you are currently enrolled as a student, please give us the name of your school or university. If you are not a student, please leave "Not currently" in this field. You may also list degrees obtained and the universities which granted the degrees, if you wish to share this information with prospective mentors. <input type="text"/>
	Systems Engineering experience or exposure * Please choose the level of exposure or experience which is the best match to your current situation. <input type="radio"/> I am a student learning about systems engineering <input type="radio"/> I am an engineer transitioning into my first systems engineering position <input type="radio"/> I have worked under 5 years as a systems engineer <input type="radio"/> I have worked 5 or more years as a systems engineer

Professional Development Portal



Competency Based Development

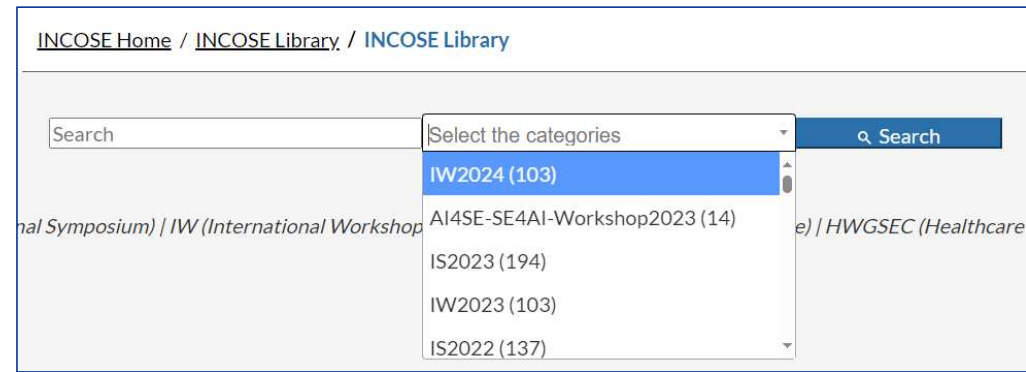
- Index of learning resources for SEs
- Store learning resources on bookshelf
- Resources in eight different languages
- MindEdge professional development added (certificates, PDUs, courses)



Library



- You can now find INCOSE conference papers, presentations and recordings, along with INCOSE webinars, publications and products
- A card is available for each resource and shows all the formats available for that content, such as recording or presentation.



www.incose.org/library

Publications and INCOSE Store



Publications

- The Technical Product Plan (TPP) has been updated to ensure that the entire process (development, technical review, marketing, and publication) is less time consuming for volunteers.
- Staff will be working with volunteers to rebrand and update some publications in the future to ensure all INCOSE products and publications meet industry standards

www.incose.org/products

INCOSE Store

- Once products are completed, they are available for purchase* in the INCOSE Store

*most products are free for members

www.incose.org/store

Technical Leadership Institute (TLI)



- Established in 2015, the Technical Leadership Institute (TLI) is a global learning network of INCOSE members committed to improving technical leadership skills to better address today's product, enterprise, and societal complexity.
- Participants:
 - Gain valuable, practical leadership education and training at no cost for instruction
 - Develop and participate in an international network of outstanding systems engineering technical leaders
 - Prepare for positions of greater leadership and responsibility in your home organization, INCOSE, and society at large

www.incose.org/tli

Certification



What is SEP Certification?

Systems Engineering Professional (SEP) certification formally recognizes your progress through your career as you develop and apply systems engineering knowledge and practices. INCOSE offer three levels of certification ASEP, CSEP and ESEP.

Certification is a formal process whereby a community of knowledgeable, experienced, and skilled representatives of an organization, such as INCOSE, provides confirmation of an individual's competency (demonstrated knowledge and experience) in a specified profession. Certification differs from licensing in that licenses are permissions granted by a government entity for a person to practice within its regulatory boundaries. Certification also differs from a "certificate" that documents the successful completion of a training or education program.

<http://www.incose.org/certification>



Coming Soon



- Job Board – will likely be available in June.
- Job Fair – planned for later in the year
- Training – still in planning, likely some materials from WGs
- INCOSEchat – an AI search of INCOSE publications; plan is to demo at IS24



ASSOCIATED ORGANIZATIONS IN NORTHERN OHIO

Associated Organizations in Northern Ohio

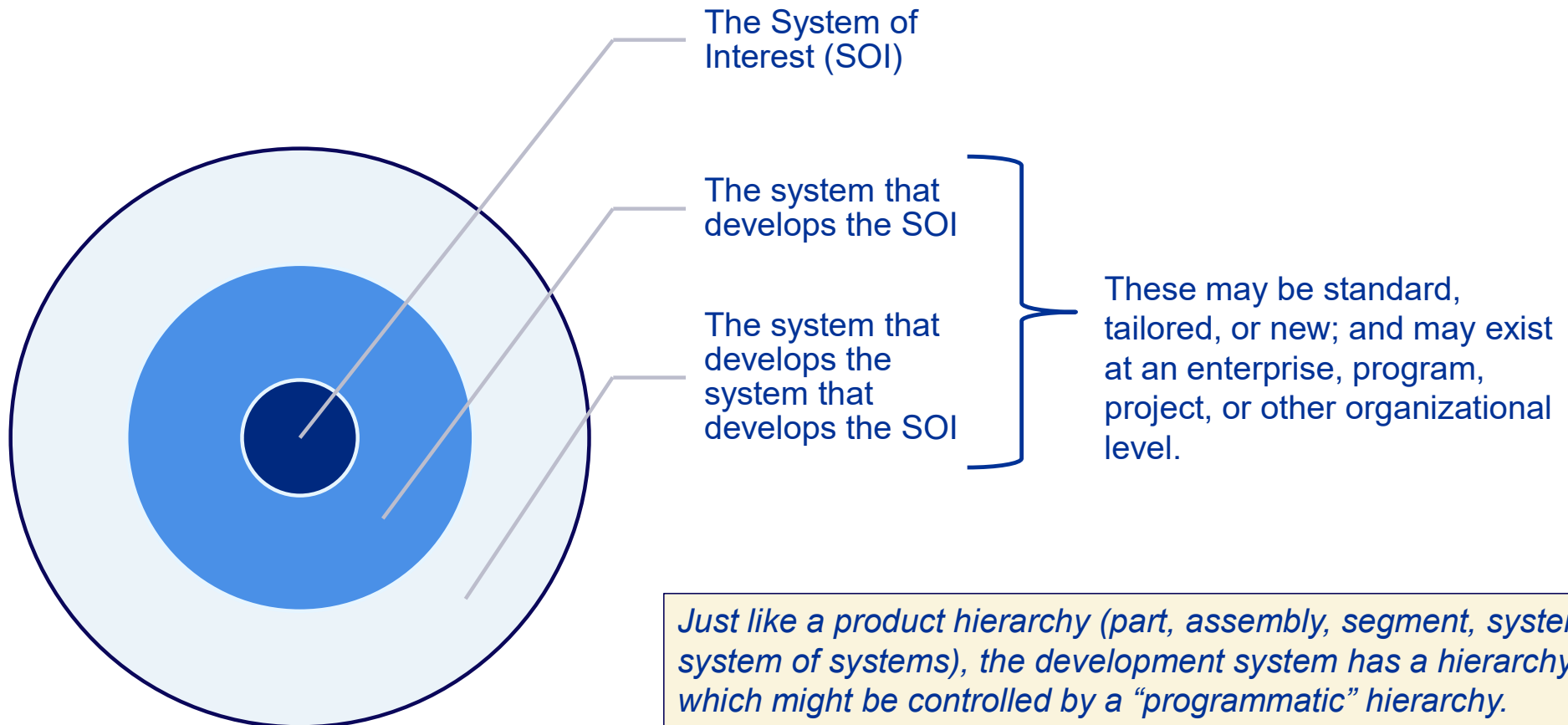


- Cleveland Engineering Society
 - Thursday, June 20, 2024: Leadership Breakfast Series: Great Lakes Biomimicry
- Project Management Institute of Northeast Ohio
 - Thursday, May 23, 2024: Apex Leadership and Technology Webinar Series: Jira Issue Type and Multi-Project Board Customizations
 - Tuesday, May 28, 2024: ProjectBites LIVE! Virtual Panel Discussion: Artificial Intelligence – The New Project Management Tool



SYSTEMS ENGINEERING HANDBOOK PROCESS DISCUSSION

Development Context



Defining the problem to be solved



- Importance

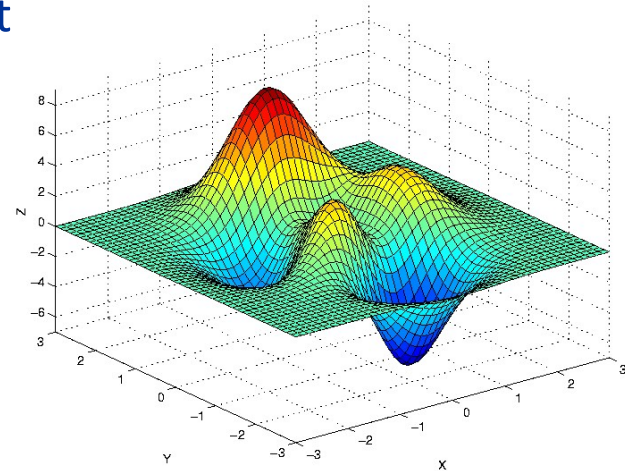
- Leads to a better system:

- Giving the customer what they say they want – maybe okay
 - Giving the customer what they really wanted – better
 - Giving the customer what they really need – best

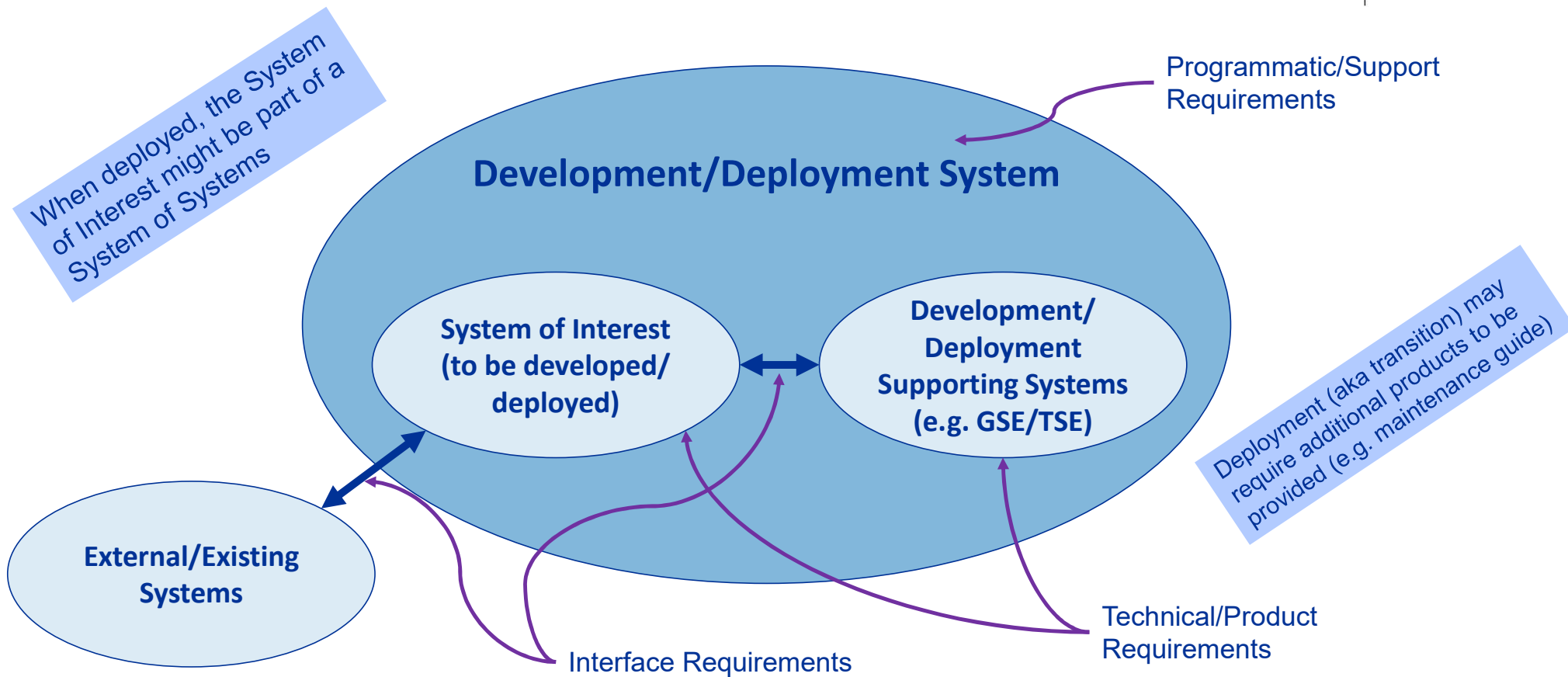
- Understanding the problem

- Understanding the solution space

- Avoiding a point solution



“Systems” to be Considered



Discussion: Defining the problem to be solved



- What does your organization do to try to define the problem?
- Does your organization make use of ConOps or OpsCons?
- Are major stakeholders formally identified?
- How might this be applied in a product line situation?

Gathering stakeholder expectations



- Importance
 - Ensures all stakeholder needs, constraints, and requirements are understood, so nothing is missed.
- If provided by a stakeholder, make sure the team understands them and that the stakeholder provided what they really intended; don't just take them as a given.
- Question, but don't disregard if design solutions, or lower level requirements (i.e. at a level lower than the SOI) are imposed.
- Stakeholder requirements do not equal system (SOI) requirements
- Stakeholder requirements may include both SOI and programmatic requirements

Discussion: Gathering stakeholder expectations



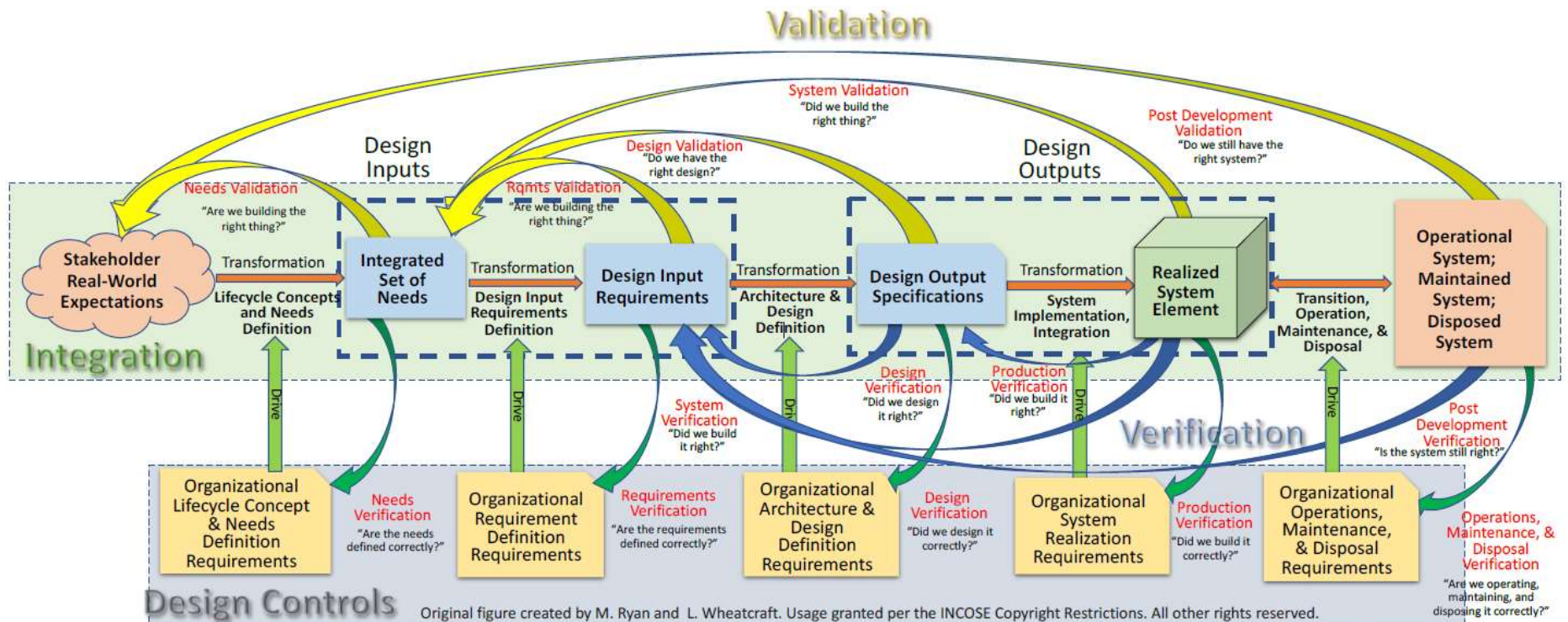
- What tool and techniques do you use to elicit stakeholder needs?
- How do you document stakeholder needs and requirements?
- If you are a multi-tiered project, do you consider the next higher level a stakeholder?

Defining requirements



- Importance of good requirements:
 - From the book Customer-Centered Products, talking about the failed adoption of new management systems (software): “Because the requirements were not understood before selecting a ‘solution.’”
 - From the Precision Systems, Inc. website: “Project failure typically stems from missing requirements, ambiguous requirements, or requirements that are incomplete, conflicting, or duplicative.”
 - From the Practical Analyst website: “According to the IEEE, more than 50% of the projects that fail are due to poor requirement definition and scope creep. The US Air Force has reported that 41% of all system defects are due to poor requirements.”
 - Bad requirements take more to fix, the further along you are in development

INCOSE Guide to Writing Requirements V4 – Summary Sheet



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The *Guide to Writing Requirements* is an INCOSE Technical Product prepared by the International Council on Systems Engineering (INCOSE). It, as well as this summary, is approved by the INCOSE Technical Operations Leadership for release as an INCOSE Technical Product.

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Use. Given this is summary of the Guide to Writing Requirements, permission to reproduce and use this summary is granted, with attribution to INCOSE and the original author(s) where practical, provided this copyright notice is included with all reproductions and derivative works.

Readers of this summary are encouraged to obtain a copy of the full INCOSE *Guide to Writing Requirements* from the INCOSE store.

www.incose.org/cleveland

Writing to Ensure Excellence in Requirements

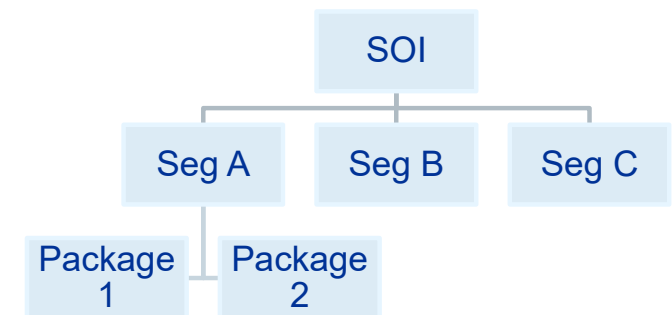


- Design Decisions Drive Requirements Flowdown
- ABC Model for Design Decisions
- Requirement Allocations
- Requirement Decomposition
- Traceability – up and down, decomposing and combining
- Using Specification Outlines
- Requirement Completeness
- Attributes of Acceptable Requirements
- Using Requirement Template – PPI Parsing Template
- Modes and States

Requirements at the Right Level



- Differentiate between SOI/product and programmatic requirements
 - Often captured in different artifacts – e.g. system requirements document versus a project plan
- Sort stakeholder requirements and place them at the right product level
 - Tracing, avoids everything having to flow through the system requirements document
- When decomposing requirements, if the only thing that changes is the subject, it might be a poor requirement



States & Modes (or vice versa)



- An automobile likely has requirements like the following:
 - ...shall move forward ...
 - ...shall move rearward...
 - ...shall prevent motion...
- Can it do all three at the same time?
- States and modes allow for a set of requirements only needing to be met under a certain condition(s) and what causes a transition between the state and modes



	State A		State B	
	Mode 1	Mode 2	Mode 3	Mode 4
Capability A	X		X	
Capability B	X	X		
Etc.				X

Attributes of Acceptable Requirements



- Characteristics for Individual needs and requirements
 - Necessary
 - Appropriate
 - Singular
 - Correct
 - Conforming
 - Unambiguous
 - Complete
 - Feasible
 - Verifiable
- Characteristics for Sets of needs and requirements
 - Complete
 - Consistent
 - Correct
 - Feasible
 - Comprehensible
 - Able to be validated

From: INCOSE Guide to Writing Requirements V4 – Summary Sheet

Requirement Completeness



- The System shall measure the temperature of the ABC box.
- The System shall measure the temperature of the ABC box at location xyz.
- The System shall measure the temperature of the ABC box with an accuracy of $\pm 1\%$.
- The System shall measure the temperature in $^{\circ}\text{F}$ of the ABC box xyz with an accuracy of $\pm 1\%$ $^{\circ}\text{F}$ once per second during daylight hours.

How accurately?

Or what?

What box?
Which surface?
Average over the surface?

What units?
How frequently?

Requirements Help



- INCOSE Requirements Working Group and its products*:
 - Guide to Needs and Requirements
 - Guide to Writing Requirements
 - Needs and Requirements Manual
 - INCOSE Guide to Writing Requirements V4 – Summary Sheet (free to all)

* Soft Copies are typically free to INCOSE members

Discussion: Defining requirements



- Does your organization use a standard requirements document template?
- How are SOI and programmatic requirements documented?
- If procuring parts (not manufacturing), should there be traceability down to part level requirements?