

WELCOME!

INCOSE Enchantment Chapter Monthly Meeting



We're glad you're here.



We respectfully request:



ComputerHope.com

- Mute your audio when you are not speaking
- *6 toggle or in GlobalMeet left-side, your name

Discussion and questions are encouraged!

Put questions in the chat box or unmute yourself to speak up.



Meeting Materials



Slide presentations can be downloaded prior to start of the meeting from Meeting Materials page of our website:

<https://www.incose.org/incose-member-resources/chapters-groups/ChapterSites/enchantment/resources/meeting-materials>

If recording is authorized by speaker, the video will be posted at the link above within 24 hours.



SEP Training



CSEP Courses by *Certification Training International*:

CTI currently is offering online course offerings, see

<https://certificationtraining-int.com/incose-sep-exam-prep-course/>

Our chapter has two SEP mentors:

Ann Hodges alhodge@sandia.gov

Heidi Hahn drsquirt@outlook.com



Upcoming meetings



- May 12, 2021: Dr. Cheryl Bolstad, Human Systems Integration and Its Role in Systems Engineering
- June 9, 2021: Paul Davies, Interface Management – The Neglected Orphan of Systems Engineering
- July 14, 2021: Dr. Dave Peercy, Education as a System of Systems
- August 11, 2021: Pat Foley, WBS Integration with an Effective Schedule



Introductions



- Please type your name, position, and organization in the Chat window



Photo by [Adam Solomon](#) on [Unsplash](#)



Survey



The link for the online survey for this meeting is

- www.surveymonkey.com/r/2021_04_MeetingEval

Your feedback is important!





Enchantment Chapter Monthly Meeting

INCOSE's Guide to Verification and Validation: Context, Progress, and Content

Abstract: This brief will introduce to the community the INCOSE Guide to Verification and Validation, a work-in-progress of the INCOSE Requirements Working Group (RWG). The context of the Guide with respect to the other RWG documents under development will be shared. These other documents are the forthcoming Guide to Managing Requirements (GMR), and the Needs and Requirements Lifecycle Manual (NRLM). A very top-level table of contents of the Guide to V&V will be presented, along with a timeframe for completion and release. The attendee will leave with an understanding of what documents are in-process from the RWG, how they will eventually all fit together, and an approximate timeline for their release to the INCOSE community.





Speaker Bio

Raymond Wolfgang currently works as a Systems Engineer on several programs at Sandia National Laboratories. He has experience on many types of projects - from software development work to multi-year defense programs. Currently he performs system engineering, requirements development and qualification engineering for several development products. He has also performed requirements engineering and management, safety engineering, and verification strategy implementation. Before joining Sandia he worked at the Naval Information Warfare Systems Command (NAVWAR) San Diego (formerly SPAWAR). There, he matured requirements for several programs, performed R&D, and supported acquisition for several ship-board technology upgrades. His interests include using MBSE to improve requirements analysis, and overall SE process improvement. He has presented at several INCOSE conferences. A graduate of both Purdue and Penn State Universities in the United States, he is originally from the Philadelphia, USA area.





INCOSE's Guide to Verification and Validation: Context, Progress, and Content

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What Problem are We Solving

- There is a gap in guidance on how to perform several key requirements activities
 - Managing requirements, especially large sets
 - Organizing and managing Verification and Validation (V&V)
- INCOSE Requirements Working Group (Tami Katz, chair)
 - Guide being developed as part of RWG
 - Will be aligned with existing product, “Guide to Writing Requirements”
 - Lou Wheatcraft, Co-chair

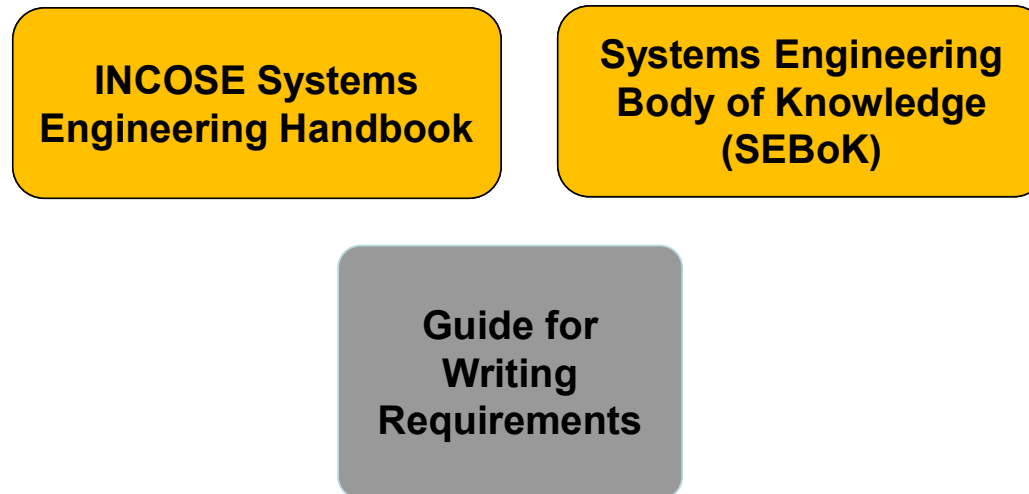
Two guides and one manual are currently in development. All will align with each other.

Outline

- Description of current state
- Context: Evolution of the Guide to V&V, and other guides in development
- Shift in Thinking on SE Process
- Progress: Status and proposed schedule
- Content: High-level outline
- Digital links and video references

What Exists Today

- Two main sources for reference
 - INCOSE's own SE Handbook
 - SE Body of Knowledge (SEBoK)
- Existing INCOSE *Guide for Writing Requirements*



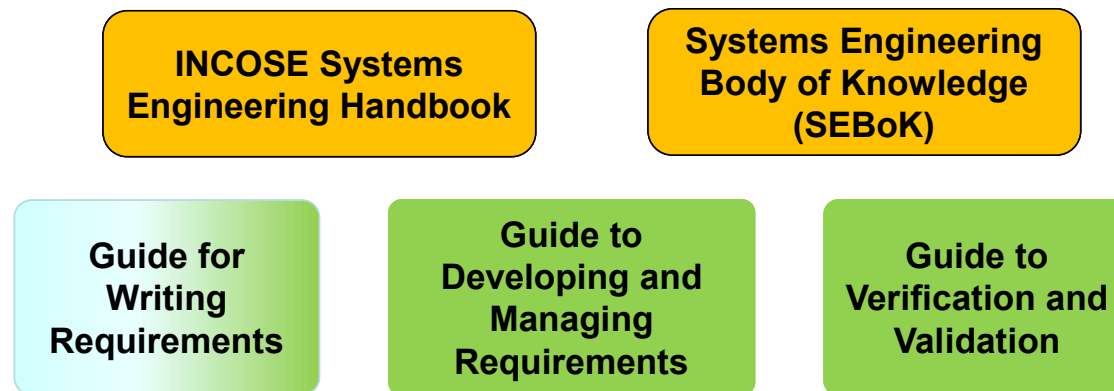
Guide to Writing Requirements

- First edition, April 2012
 - Version 3.0, July 2019
 - Well received by SE community
- Requirements and requirements sets
 - Background theory
 - Writing and authorship: singularity, accuracy, completeness
 - Attributes, other characteristics of requirements and sets
 - Elicitation

While well received, community asked for additional guidance specifically on management and V&V

Creation of Two Additional Guides

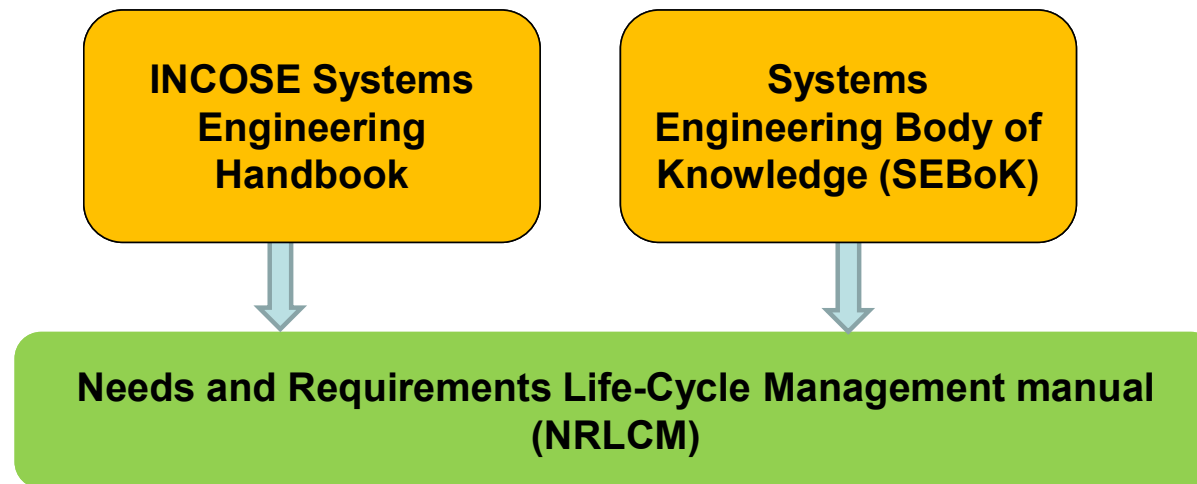
- Current body of work leaves some gaps
 - Managing requirements
 - How to organize large requirements sets
 - V&V
 - How to organize, link and map large bodies of verification evidence



Something was still missing ...

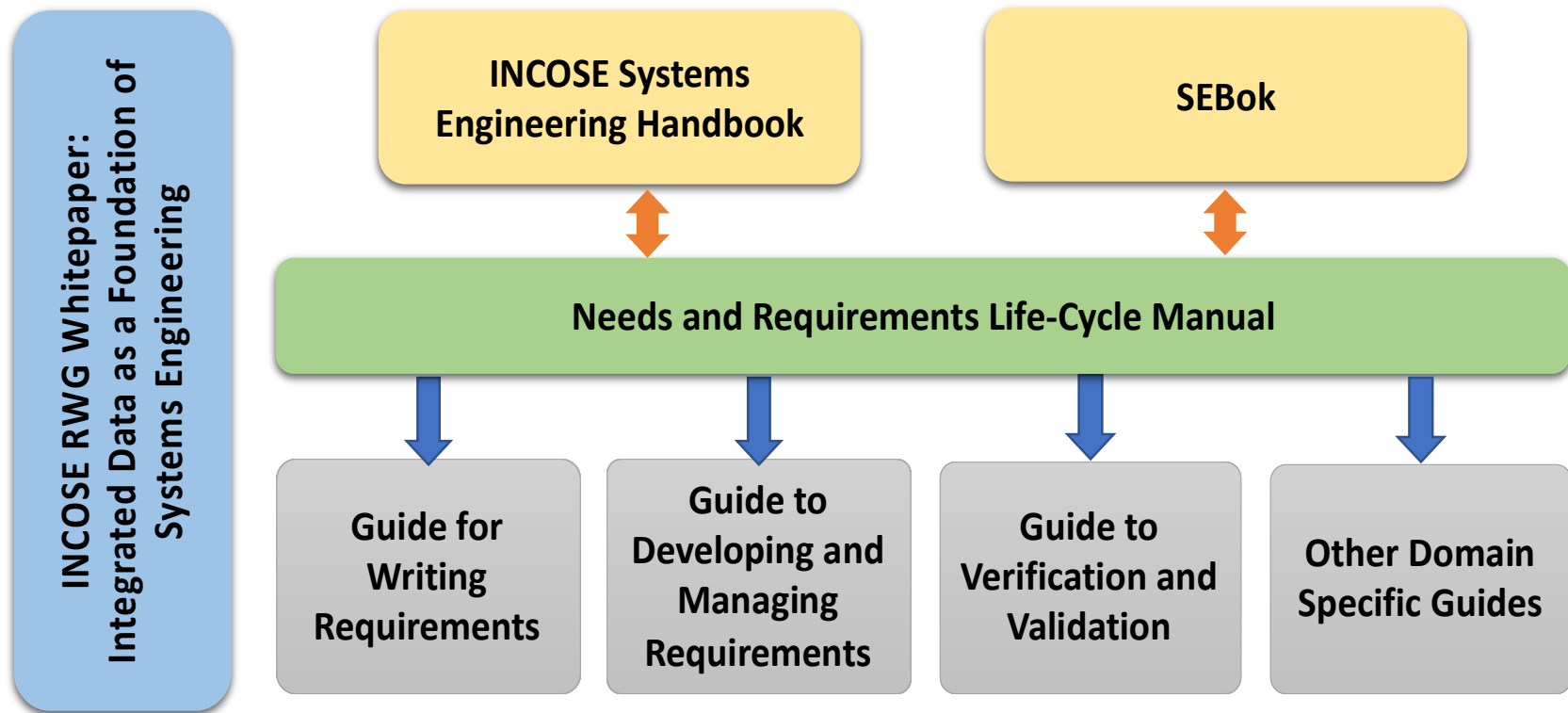
Needed a Home for Background and Theory

- Guides about 50 pgs
 - Much more digestible for entry/mid-level practitioner
- Answer: Needs/Reqmts Lifecycle Manual
 - Background and theory; the “Why” behind the “How”



Current Approach Provides Full Coverage

- SE Handbook / SEBoK feeds NRLM, which feeds smaller “How-to” guides



Larger Shift in Needs and Requirements Thinking

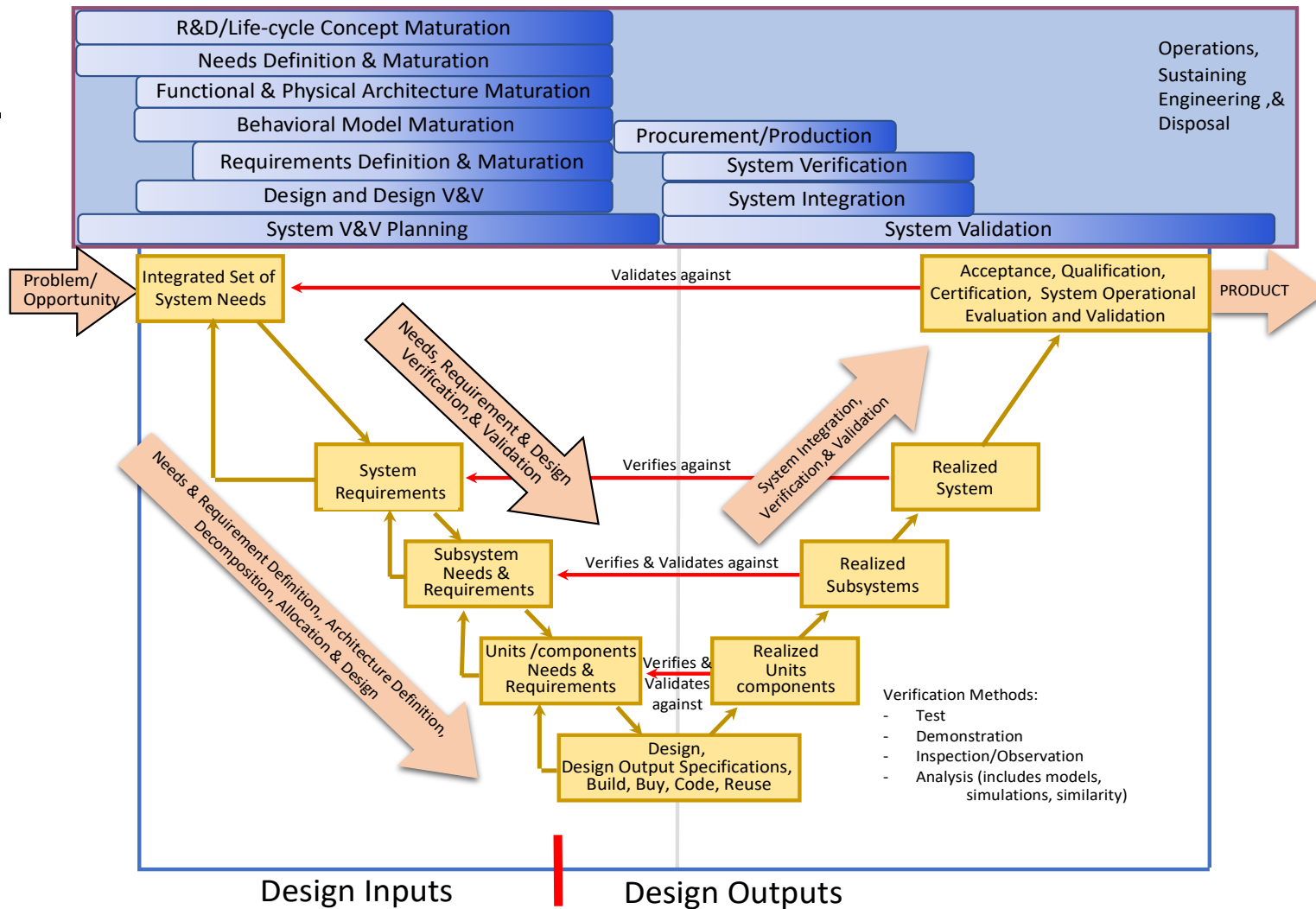
- CONOPS, Goals, ... -> *Integrated Set of System Needs*
- Requirements -> *Design Input Requirements*
- Design -> *Design Output Specifications*
- Product, part, item -> *System (or component) of Interest (SOI)*

- Idea is to “**transform**” from one stage to the next – like systems theory

Same ideas, standardized vocabulary will facilitate communication, and help identify gaps in the SE program

We Start with the Systems Vee

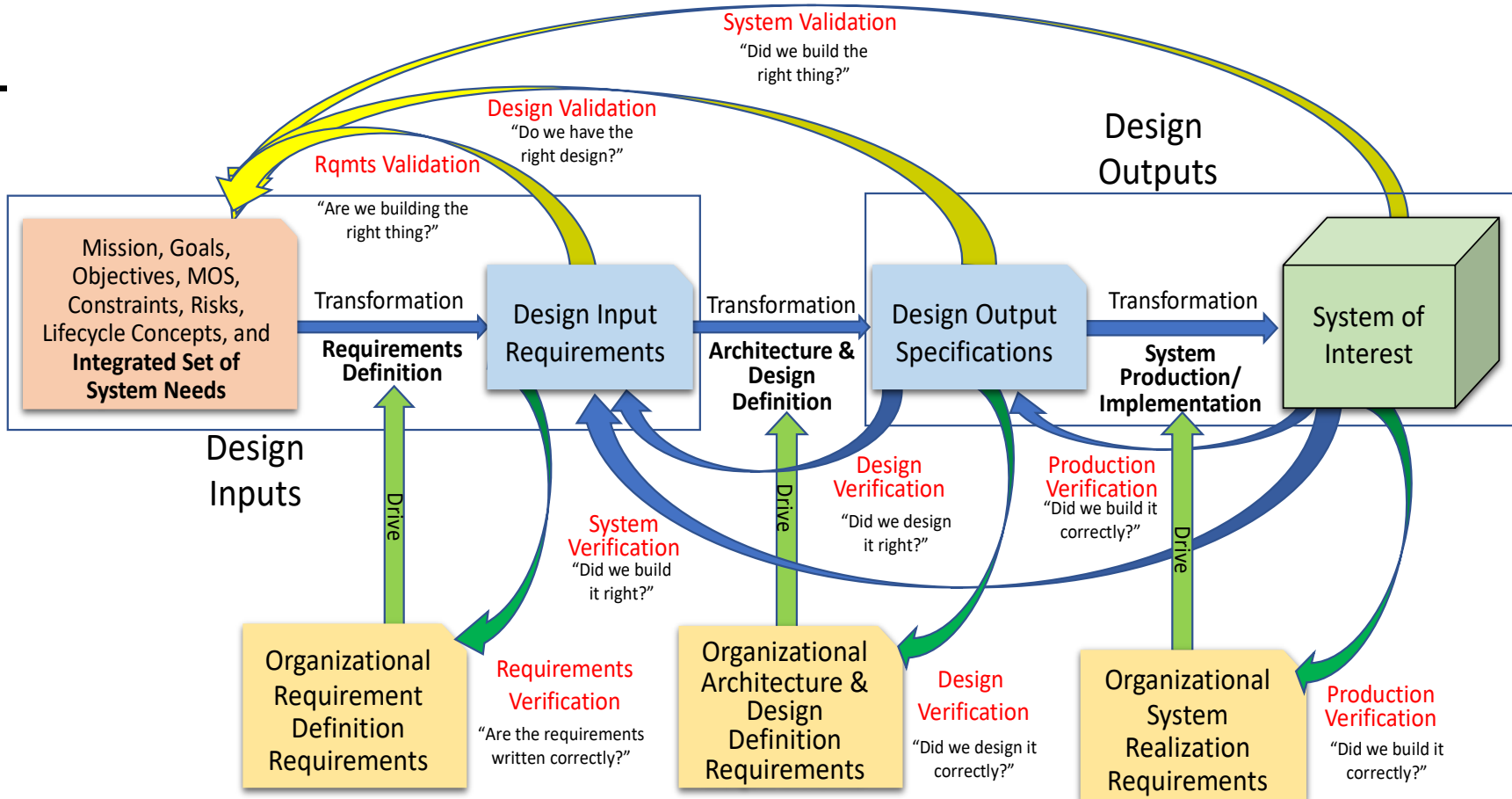
- The Vee we are familiar with still holds true
- If we draw the Vee out into a straight line, left to right ...
- We can open up our model to more clearly show the SE process
 - Including V&V!
 - Easier to see the difference between Verification and Validation



Adapted from Ryan, M. J.; Wheatcraft, L.S., "On the Use of the Terms Verification and Validation", February 2017 and INCOSE SE HB, Version 4, Figures 4.15 & 4.19

INCOSE's Guide to V&V: Progress, Context, and Content – Raymond Wolfgang





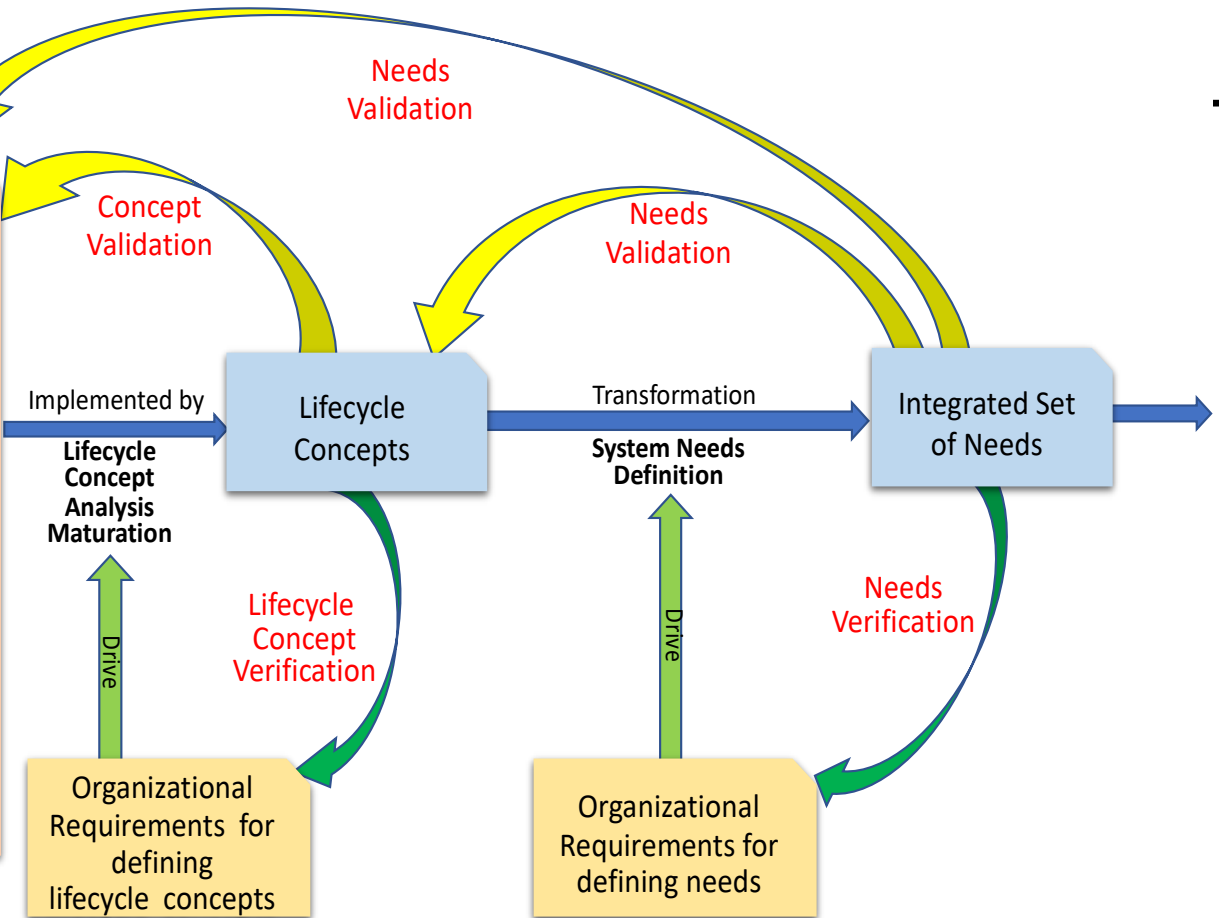
Derived from Ryan, M. J.; Wheatcraft, L.S., "On the Use of the Terms Verification and Validation", February 2017

On the Left - Going Back Further: Lifecycle Concepts

- What are “System Needs”, and where do they come from?
 - Parent needs
 - Drivers and constraints
 - KPPs
 - Measures of Effectiveness
- Lifecycle Concepts
 - Mission
 - Use cases
 - User stories
 - Goals
 - Objectives
 - Concept of Operations (CONOPS)

Can perform V&V on *both* the needs and the lifecycle concepts

- Problem or opportunity
- Mission, goals, objectives
- MOE's, MOPs, TPMs, KPPs
- Preliminary stakeholder needs & requirements
- Use cases, user stories, system concepts, OpsCon, ConOps
- Higher level Needs
- Higher level Requirements
- Higher level lifecycle concepts
- Drivers & constraints,
 - External systems
 - Standards
 - Regulations
 - Technology
 - Operating Environment
- Risks



Do the lifecycle concepts and integrated set of needs represent a system of interest that can accomplish its intended use in the operational environment when operated by its intended users?

Model Drives the Guide Structure

- Guide to Managing Requirements
 - Needs elicitation and creation
 - Requirements development
 - Requirements management
 - Needs and requirements V&V – in particular, validation
- Guide to V&V
 - Picks up with V&V of the design (design output specifications)
 - Drawings, logic flow, prints.
 - System (built or coded product) V&V
 - Special cases, considerations, guidance, in-line examples

So when is this all happening?

Timeframe and Plan for Release

Task	Timeframe
Finish integration of author inputs	Jan – August 2020
Editorial committee (guide leads) review, update	Sept '20 – Jan '21
Release to Requirements Working Group for review	Jan 2021 at IW
Incorporate RWG comments, TechOps review	Spring 2021
Version 1.0 release	Int'l Symposium, 2021

Project is on track; plan exists for timely yet thoughtful release of guides

Guide to V&V: Summary Outline

■ 1. Introduction

- Purpose and Scope
- Audience
- Approach
- Guide organization
- Definitions
- Mapping
- How to Use

■ 2. Design V&V Process

- Architecture and Design Definition Processes Overview
- Early System V&V
- Validation of the System V&V Artifacts
- Design Verification
- Design Validation
- Use of Attributes to Manage Design V&V

Outline

- 3. Production Verification
 - Role of Quality Assurance
- 4. System V&V Principles
 - Planning
 - Defining
 - Execution – Performing Stage
 - Validation of Different SE Artifacts
 - Reporting and Documenting
 - System Approval
 - Use of Attributes
 - Maintaining V&V Artifacts

Outline

- 5. System V&V Processes

- System Verification Process

- Plan
 - Execute
 - Manage Results
 - Considerations for Large Systems

- System Validation Process

- Plan
 - Execute
 - Manage Results
 - Final System Approval

- 6. Use of Off-The-Shelf Elements

- 7. Supplier-developed Systems and System Elements

The concepts are covered in the NRLM; the Guide provides process steps and some examples to show how the concepts might look

INCOSE's RWG – Gone Digital!

- What is the new paradigm, we are asking the community to consider?
 - https://www.youtube.com/watch?v=ZRli_wSCmRg
- Here is a presentation on the Guide to V&V (IW2021)
 - https://www.youtube.com/watch?v=_33sZ0IntwY
- What is the RWG all about?
 - https://www.youtube.com/watch?v=L_Z6Xitprol
- How about an overview of the manual?
 - NRLM: https://www.youtube.com/watch?v=g_fJk_UBONM
- If I wanted to focus on the Integrated Data piece?
 - <https://www.youtube.com/watch?v=Rc3O6IPO5x4>

Guidance is On The Way!

- Multiple guides answer the SE community's request
 - Goes beyond current Guide to Writing Requirements
 - More detail provided than SE Handbook, SEBoK
 - Multiple documents provide different levels of detail and background
 - **Goal is to make our work as complete as possible, and still accessible to most**
- Team effort
 - Over 20 different contributors and reviewers
 - Four different document leads
 - Wider RWG participation forthcoming

Large volume of new work will benefit SE community across disciplines
Target is to release the documents by IS 2021.

