2018 Annual INCOSE
Great Lakes Regional Conference
SYSTEMS AT THE CROSSROADS
17 - 20 October 2018 | Indianapolis, Indiana

Evolving MBSE to Enable the Digital Future

Connecting People, Disciplines, Insights, and Ideas

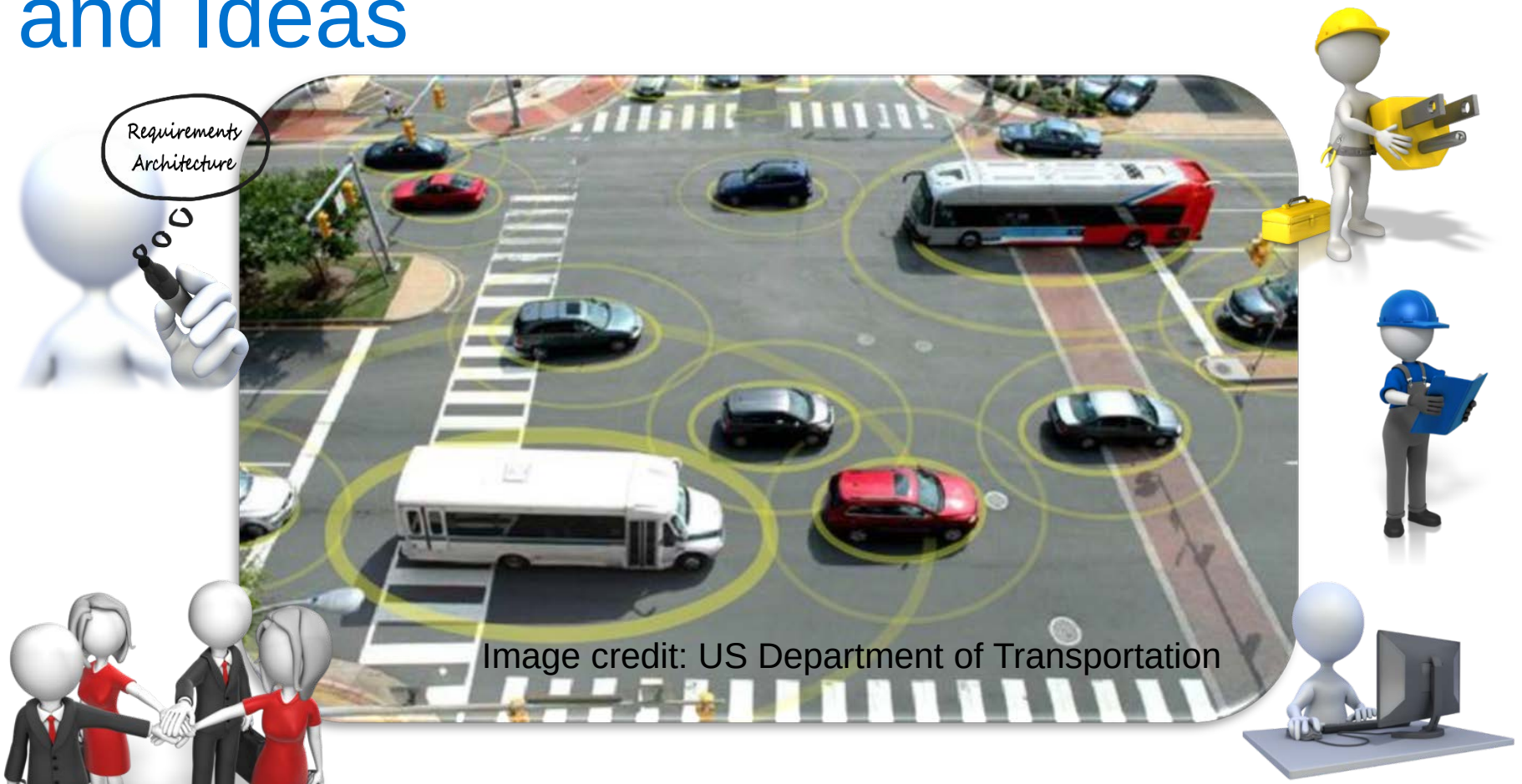
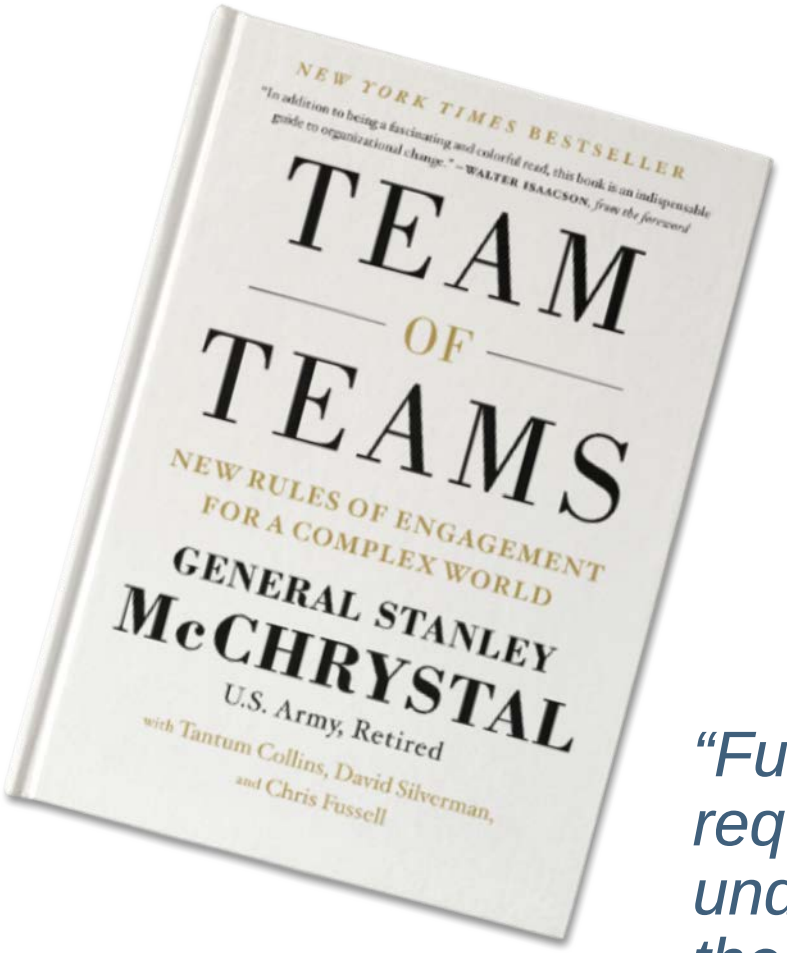


Image credit: US Department of Transportation

Systems engineering focuses on ensuring the pieces work together to achieve the objectives of the whole.

Systems Engineering Body of Knowledge (SEBoK)

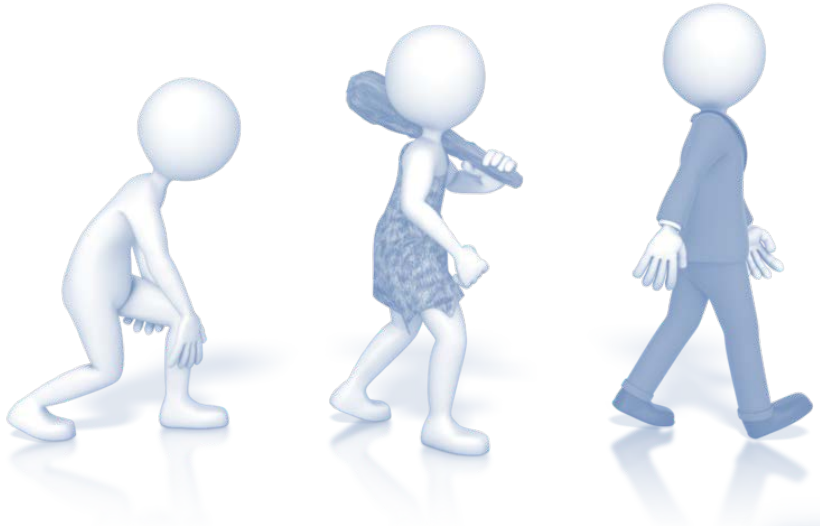
Beyond Seeing the Big Picture: Setting the Big Picture



"One cannot understand a part of a system without at least a rudimentary understanding of the whole."

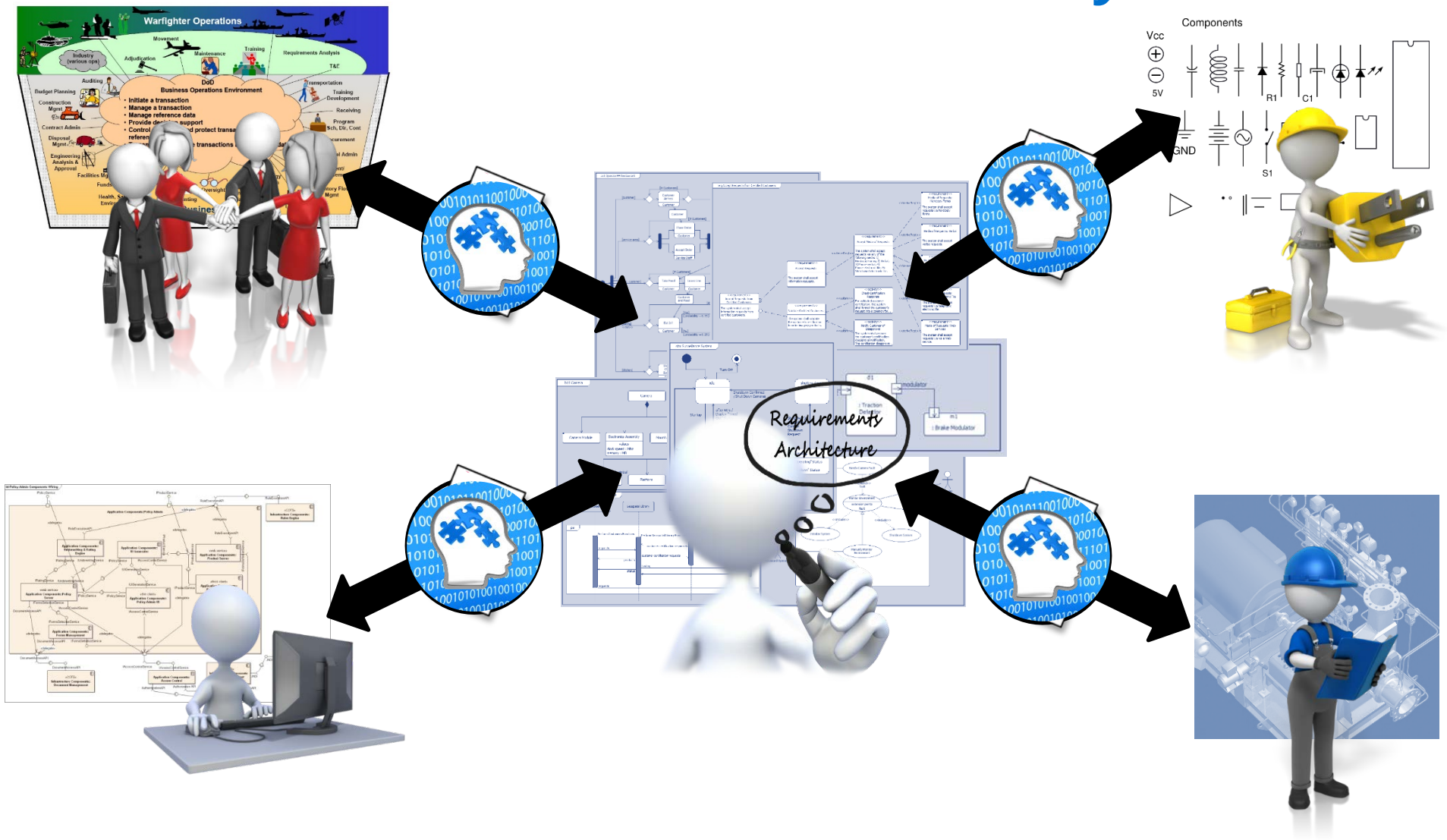
"People can only be empowered if they have enough context to make good decisions."

"Functioning in an interdependent environment requires that every team possess a holistic understanding of the interaction between all the moving parts."

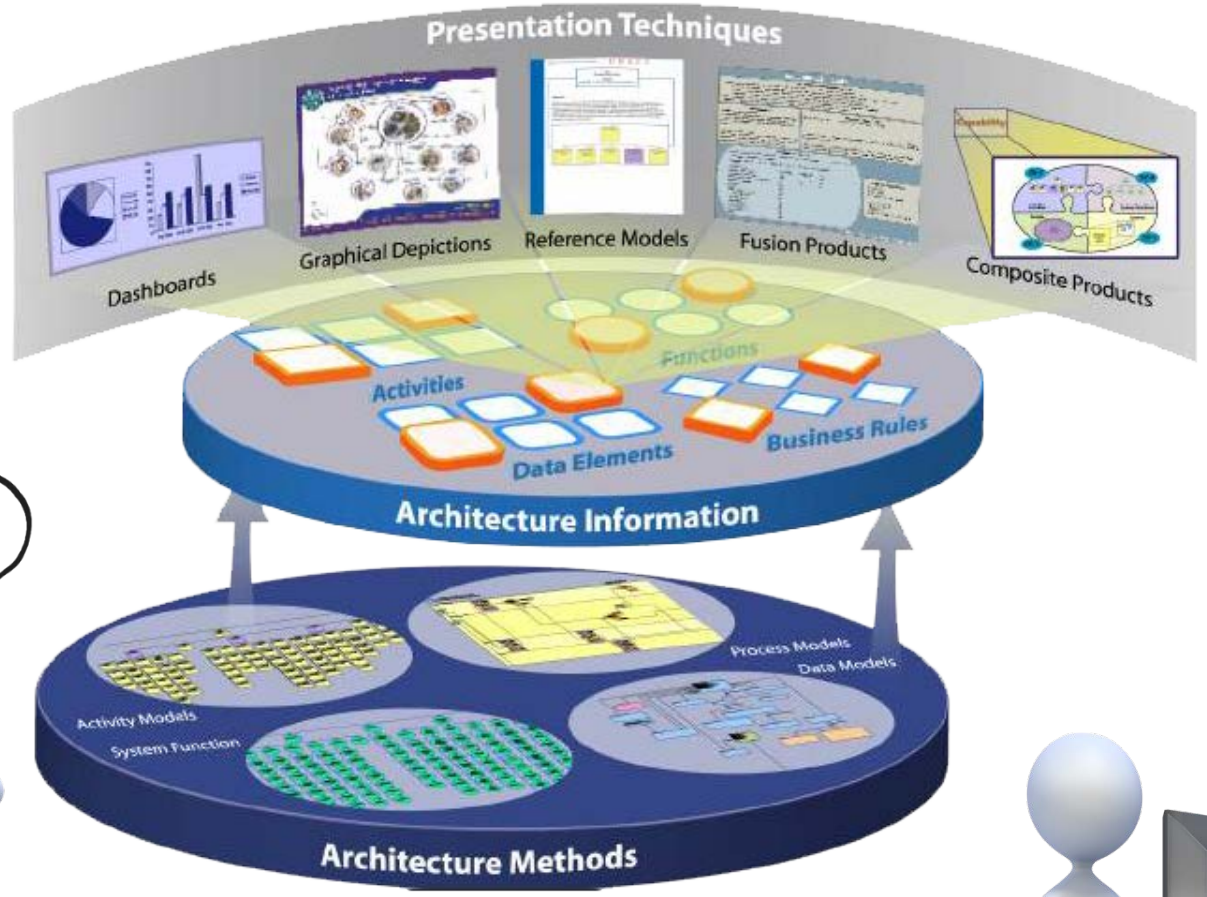


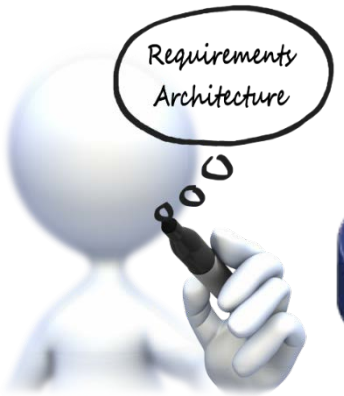
Seeing the Evolution of MBSE

Moving from Ambiguity to Digital Clarity: Communications, Semantics, Analysis



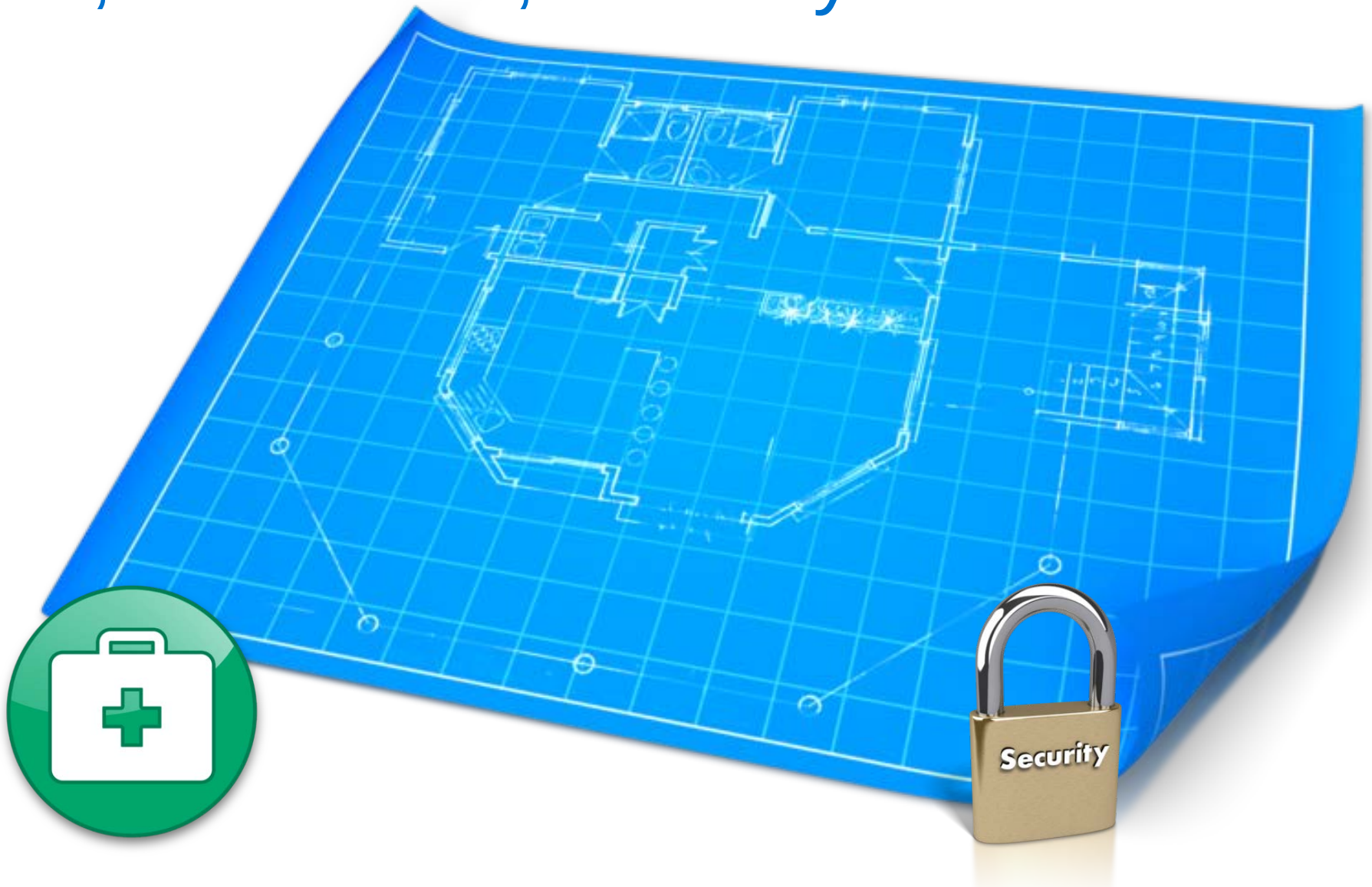
Aligning and Understanding through "Authoritative Source of Truth" and "Fit for Purpose"





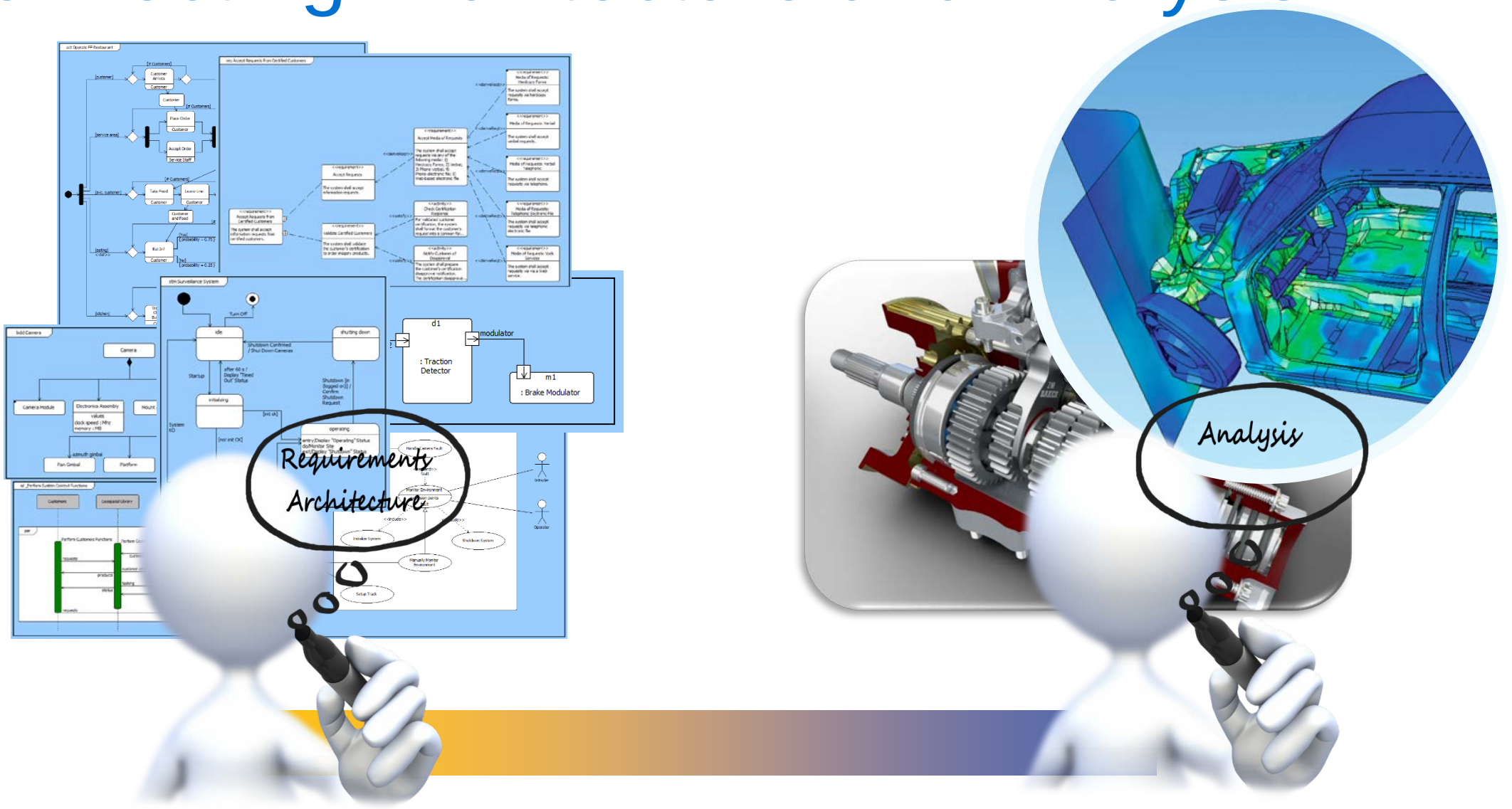
Reprinted from Department of Defense Architecture Framework (DoDAF) 2.0, May 2009

Leveraging Patterns and Architecture for Health, Resilience, Security



Moving from Custom-Built to Composability: SoSE, IoT, Interactions, and Capabilities

Connecting Architecture and Analysis

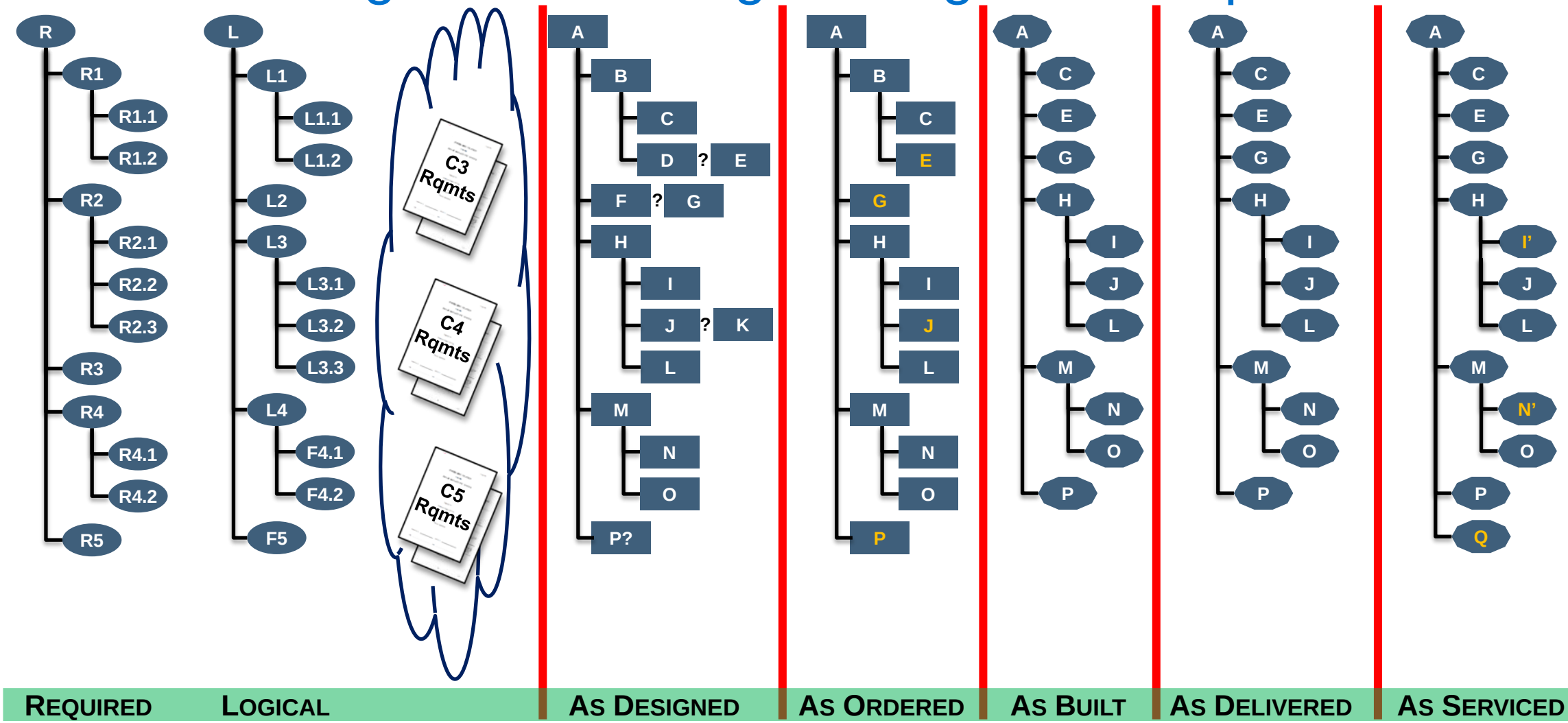


"One model to coordinate them all"

A Reality Check for Systems Engineers

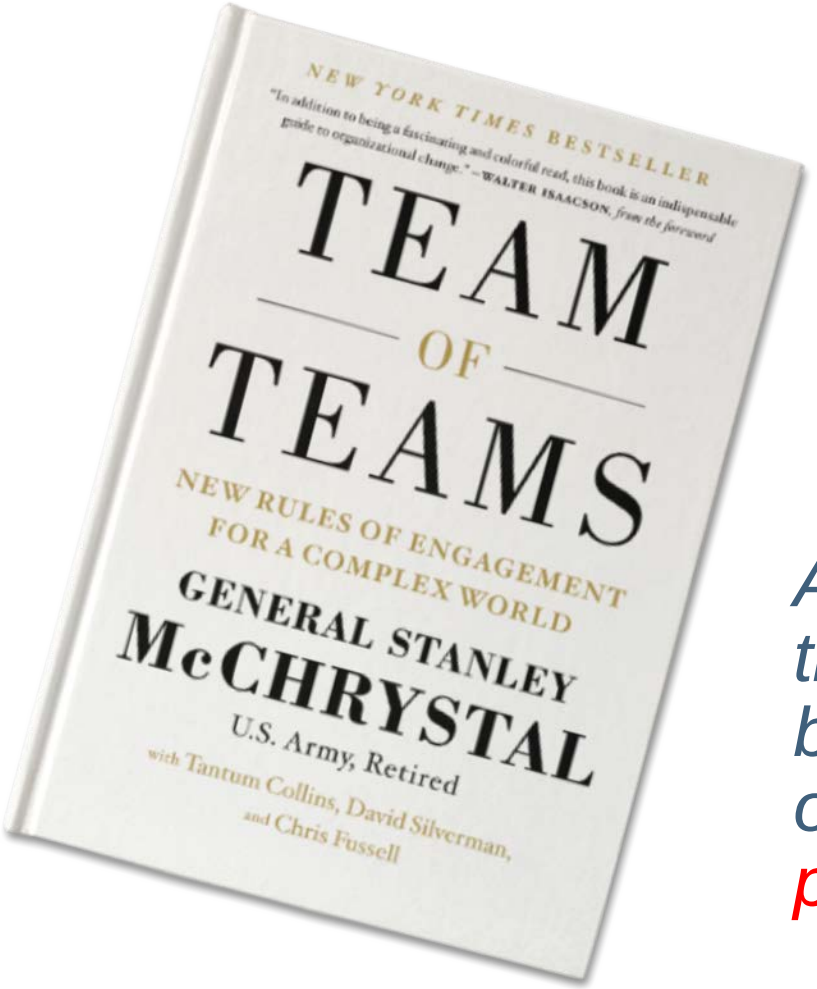
Seeing the Bigger Picture

Transforming Classical Engineering in a Complicated World



Adapted from Aras Corporation, 2018.

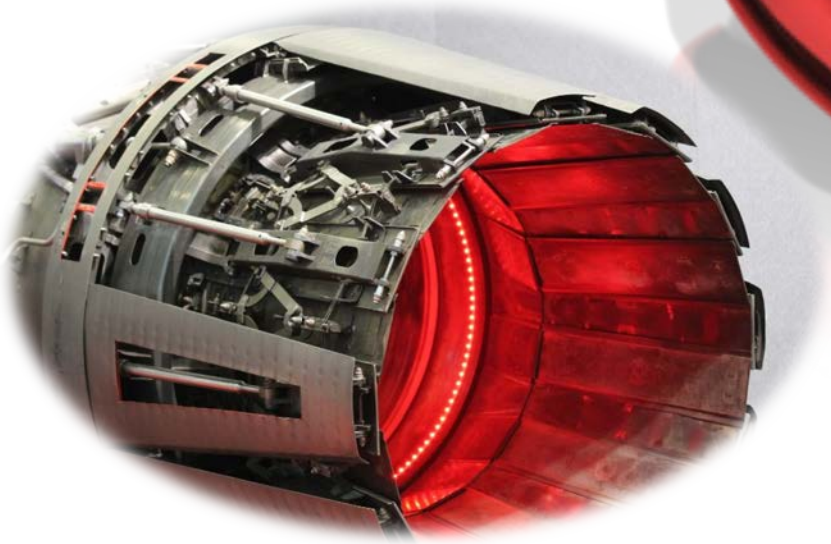
Seeing the Mismatch between Modern Conditions and Classic Approaches



We tend to assume that technological advances will enable us to do what we have always done, only better. However these same technologies imbue our operating environment with escalating non-linearity, complexity, and unpredictability.

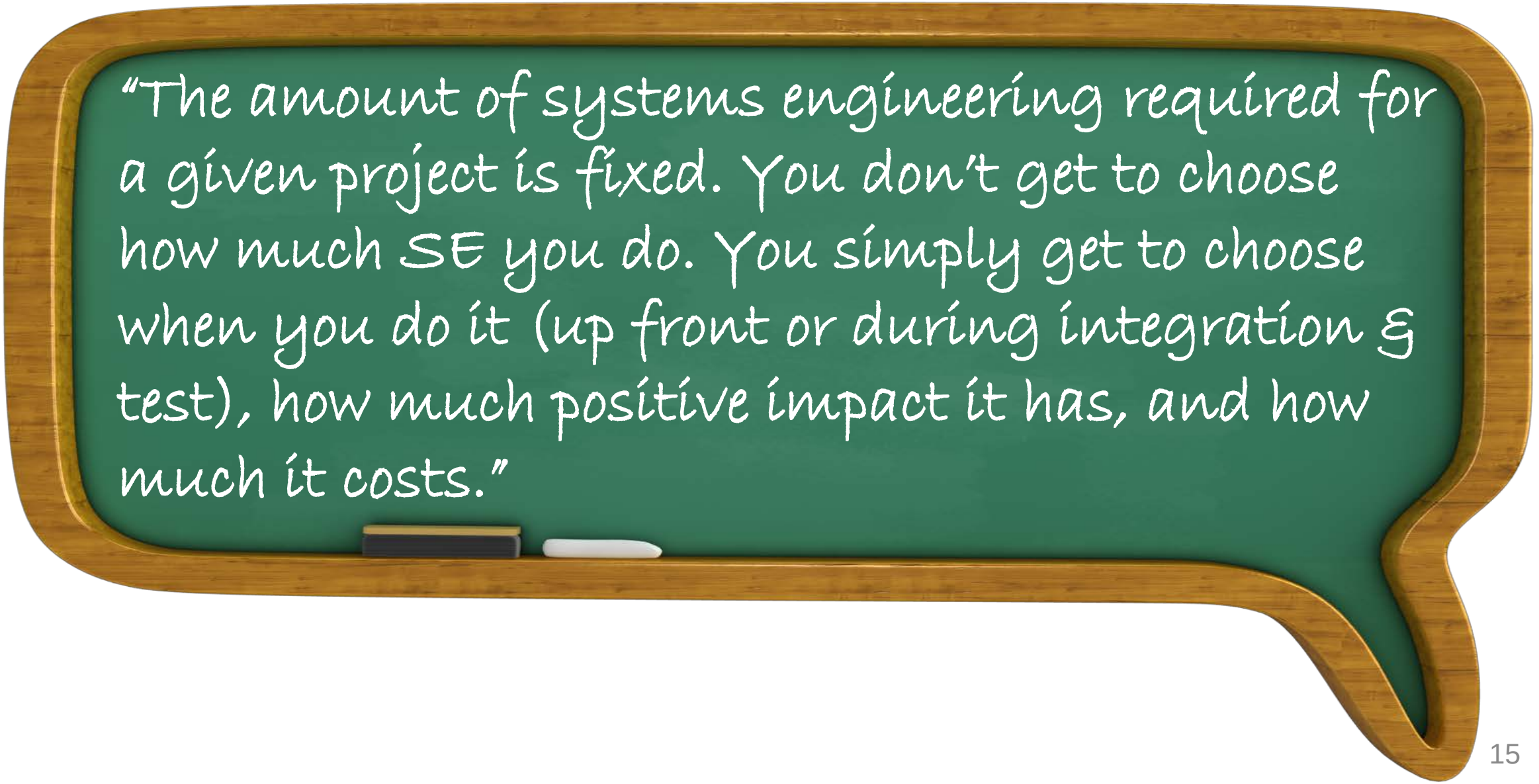
Attempts to control complex systems by using the kind of mechanical reductionist thinking … breaking everything down into component parts, or optimizing individual elements … tend to be pointless at best or destructive at worst.


Mercedes-Benz



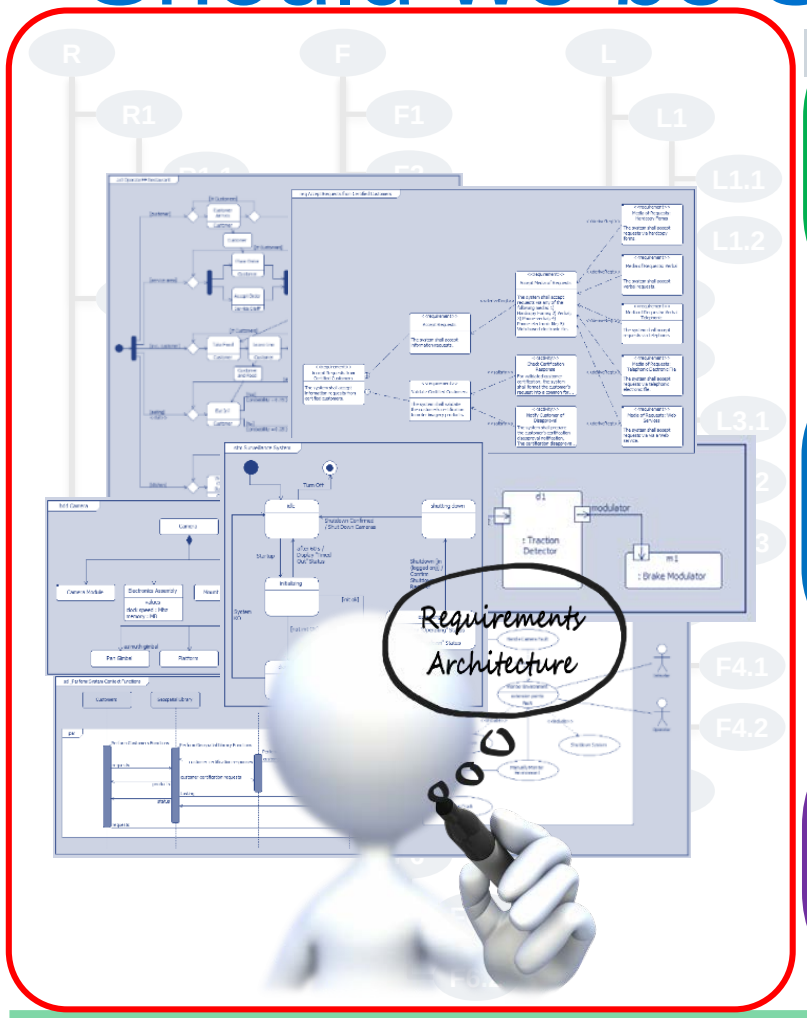
Model Chains: Perception and Reality

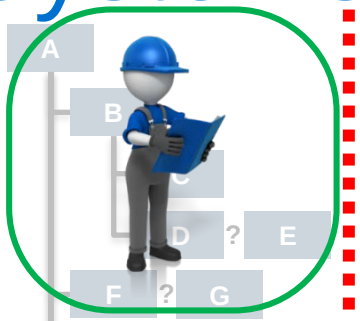
Remember the Law of Conservation of SE

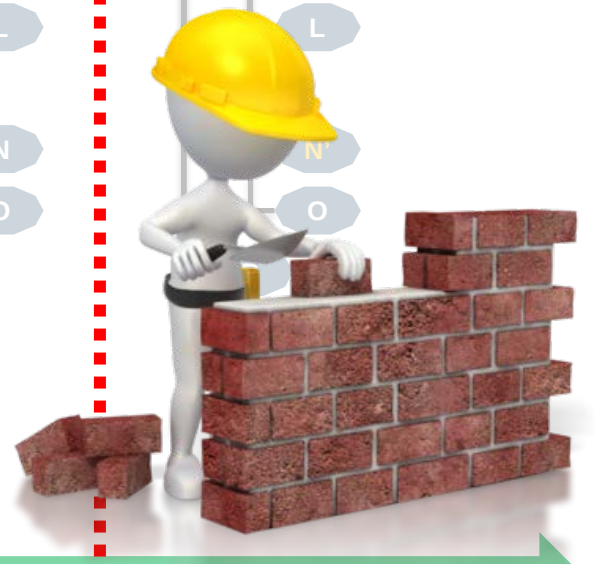


The Systems Perspective:
A System is a System is a System

Should we be Systems Engineering?





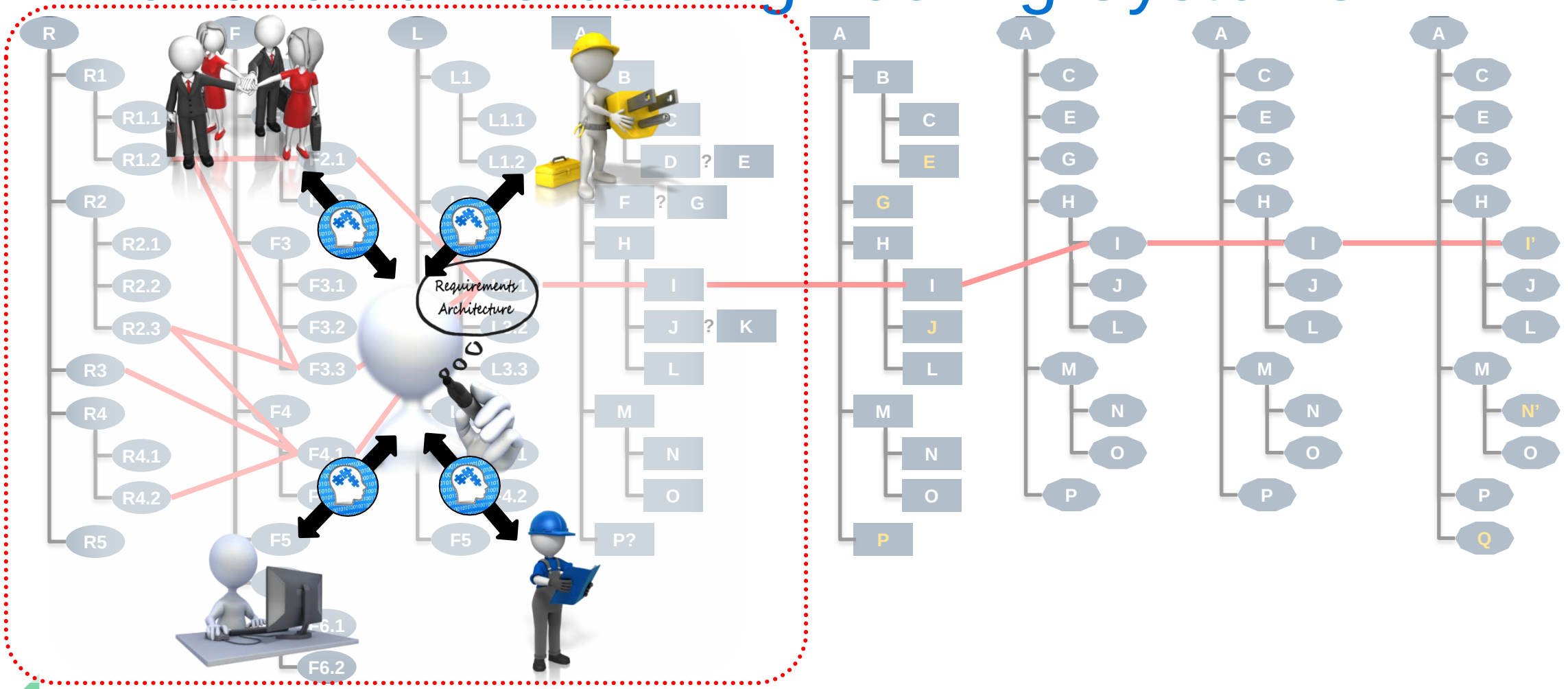


REQUIRED | FUNCTIONAL | LOGICAL | AS DESIGNED | AS ORDERED | AS BUILT | AS DELIVERED | AS SERVICED

CONCEPT | DEVELOPMENT | PRODUCTION | UTILIZATION & SUPPORT | RETIRE

Adapted from Aras Corporation, 2018.

…or should we be Engineering Systems?

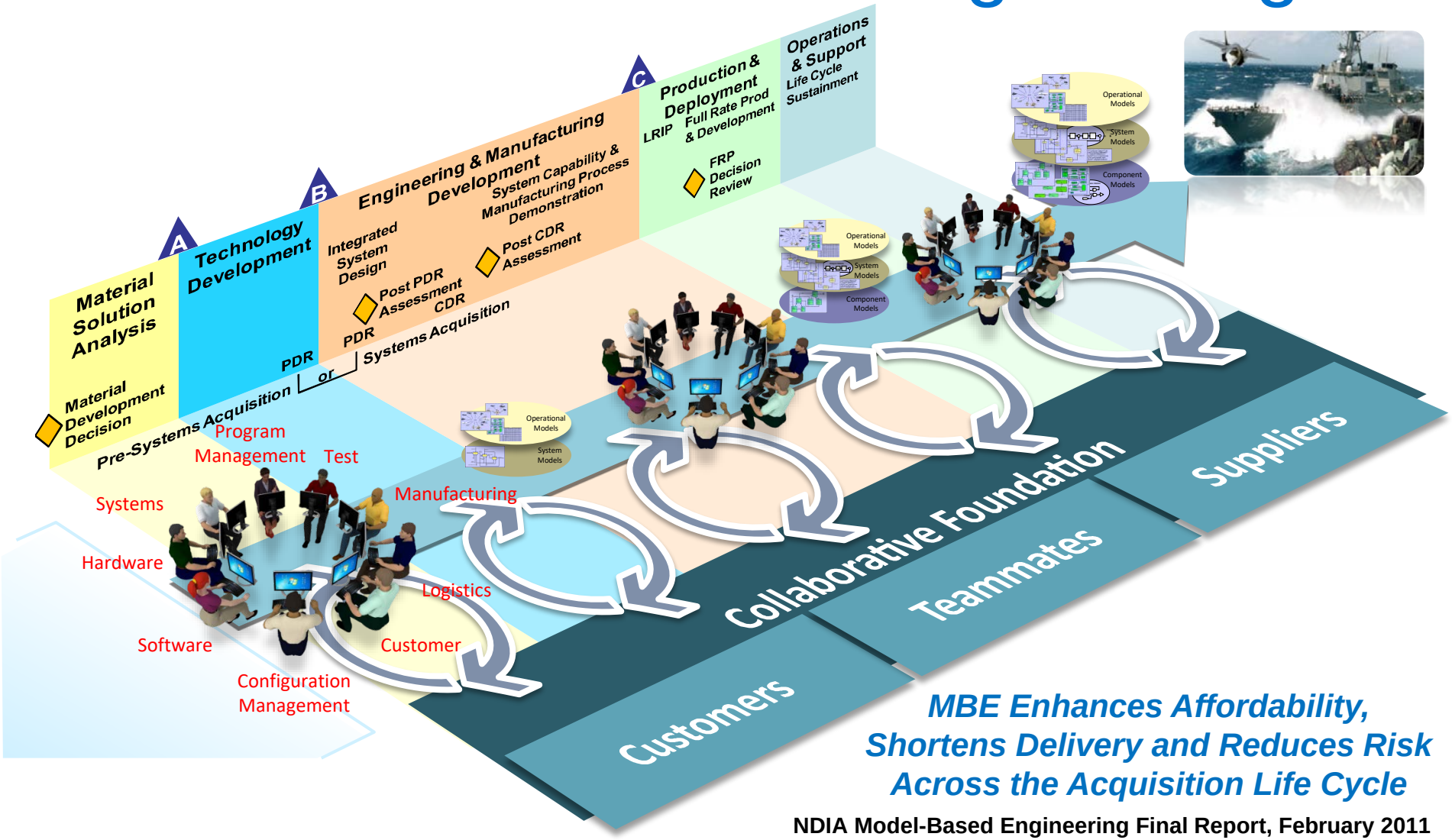


REQUIRED FUNCTIONAL LOGICAL AS DESIGNED AS ORDERED AS BUILT AS DELIVERED AS SERVICED

CONCEPT DEVELOPMENT PRODUCTION UTILIZATION & SUPPORT RETIRE

Adapted from Aras Corporation, 2018.

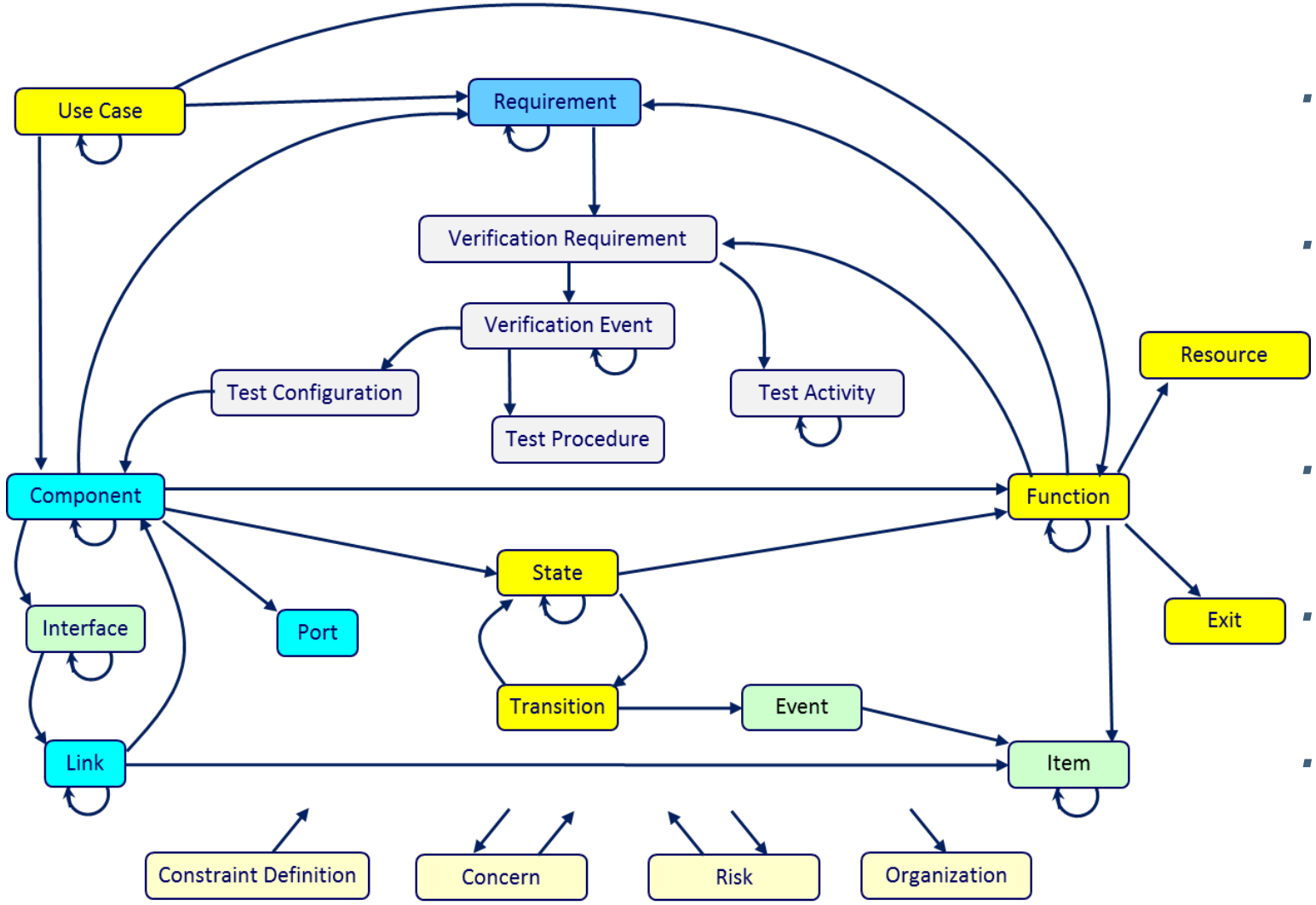
Engineering the Digital Thread: Digital Transformation of the Engineering Lifecycle



MBE Enhances Affordability, Shortens Delivery and Reduces Risk Across the Acquisition Life Cycle

NDIA Model-Based Engineering Final Report, February 2011

Recognizing the Information Needed to Engineer a System (A Simplified View)



…more than diagrams

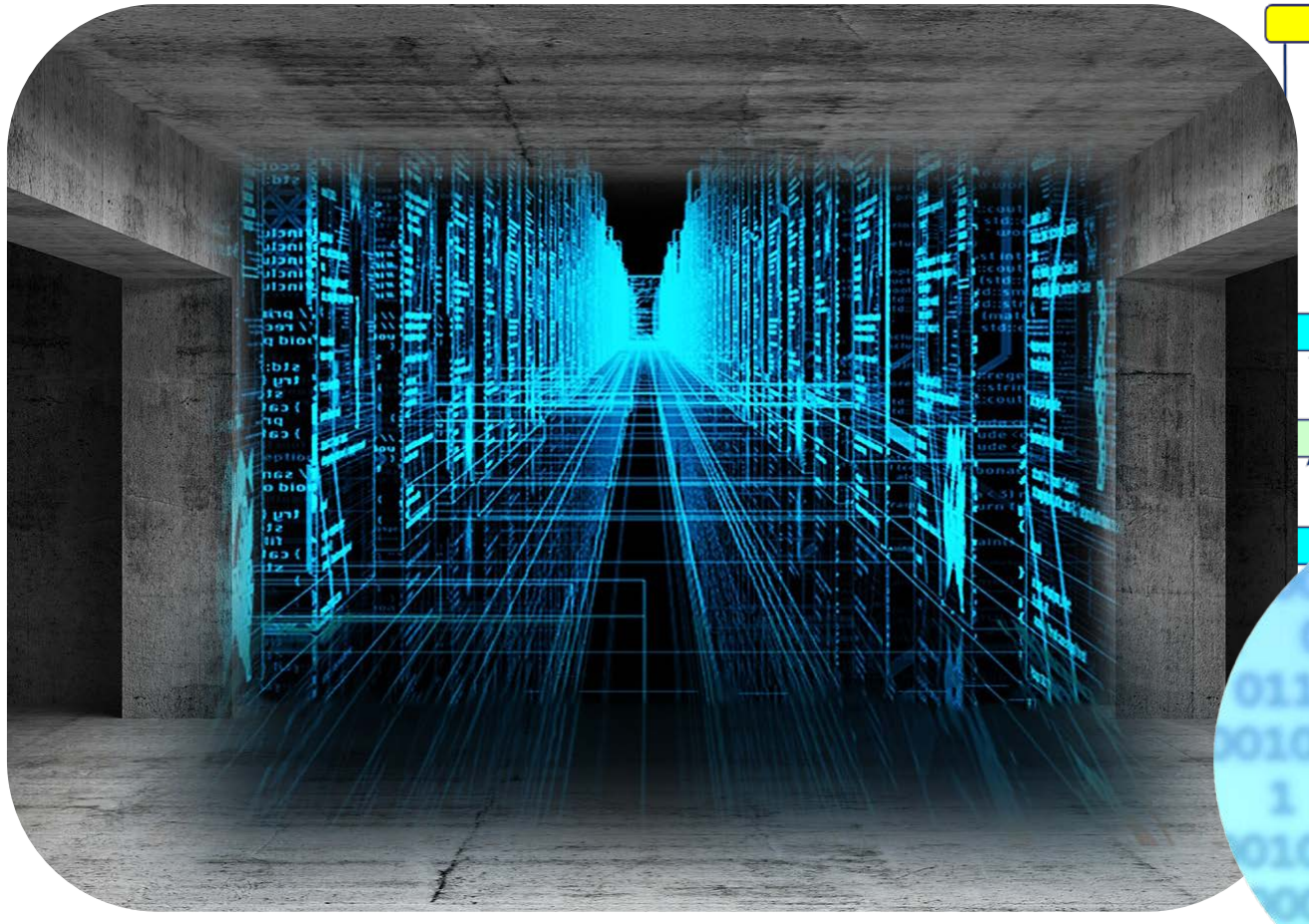
…more than a data dictionary

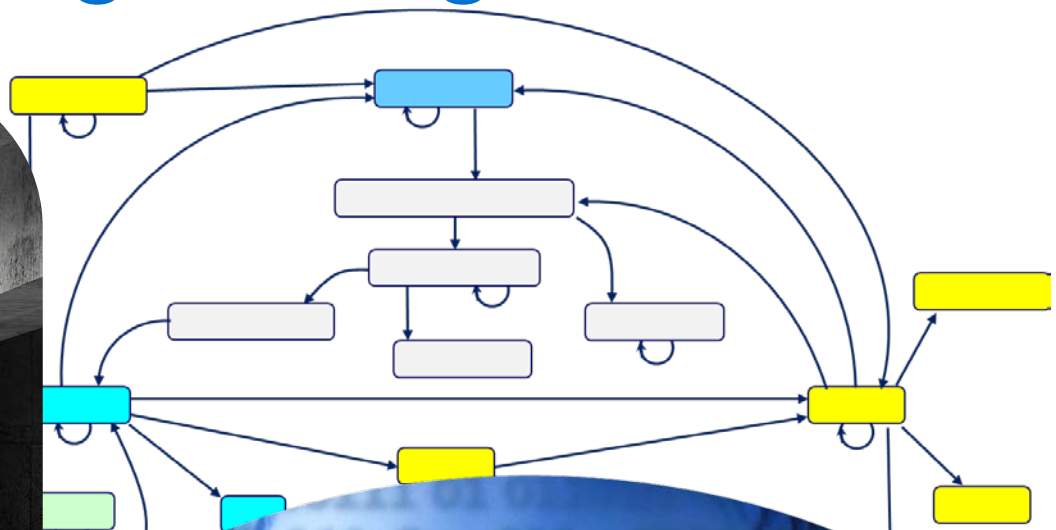
…more than capture

…more than specification

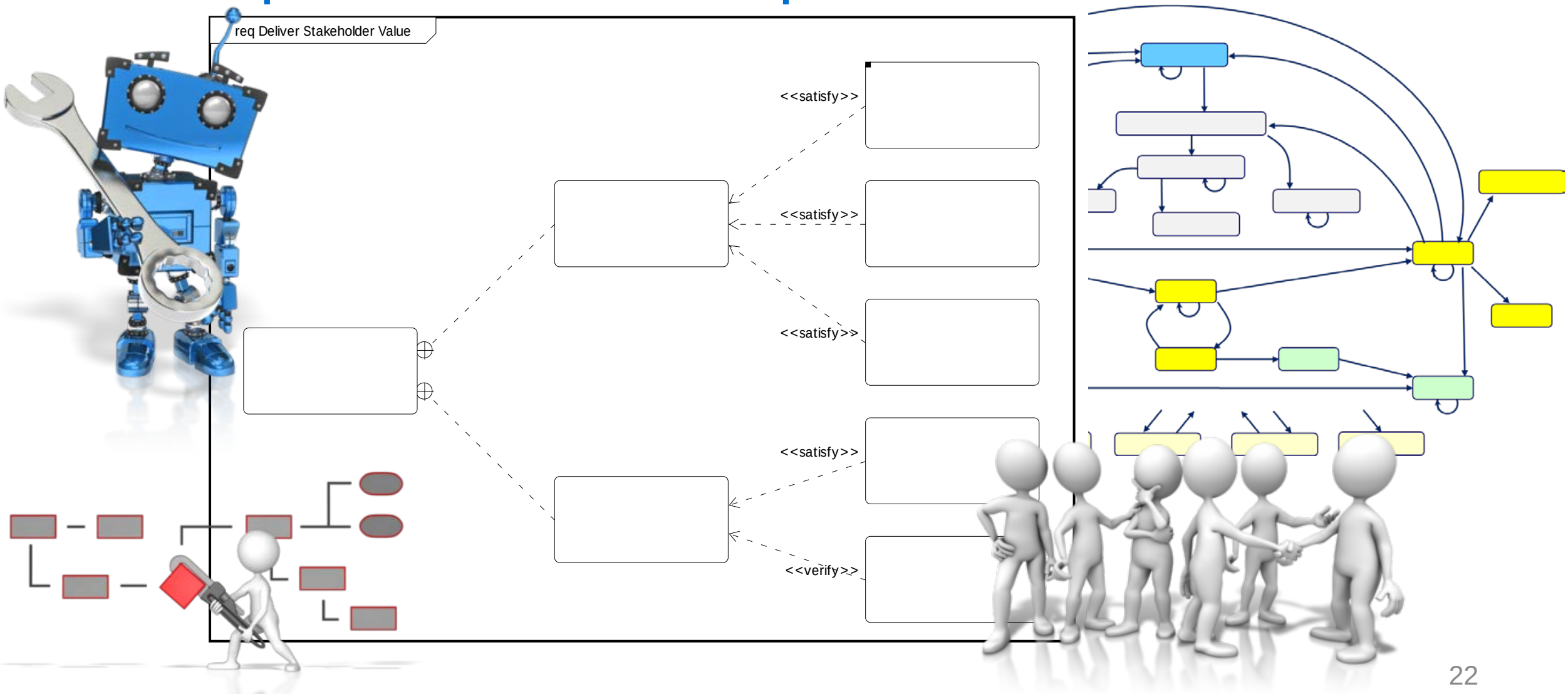
…more than the system of interest

Engaging and Immersing through Life





Identifying the Full Scope: Tools, Information, Concept, Workflow, People, Culture, and Trust



Keeping the Thinking and Systems in the Engineering of Systems

Drawing Inspiration from beyond Engineering

Semantic Science

Systems Science

Visualization

Sociology

Organizational Change Experts

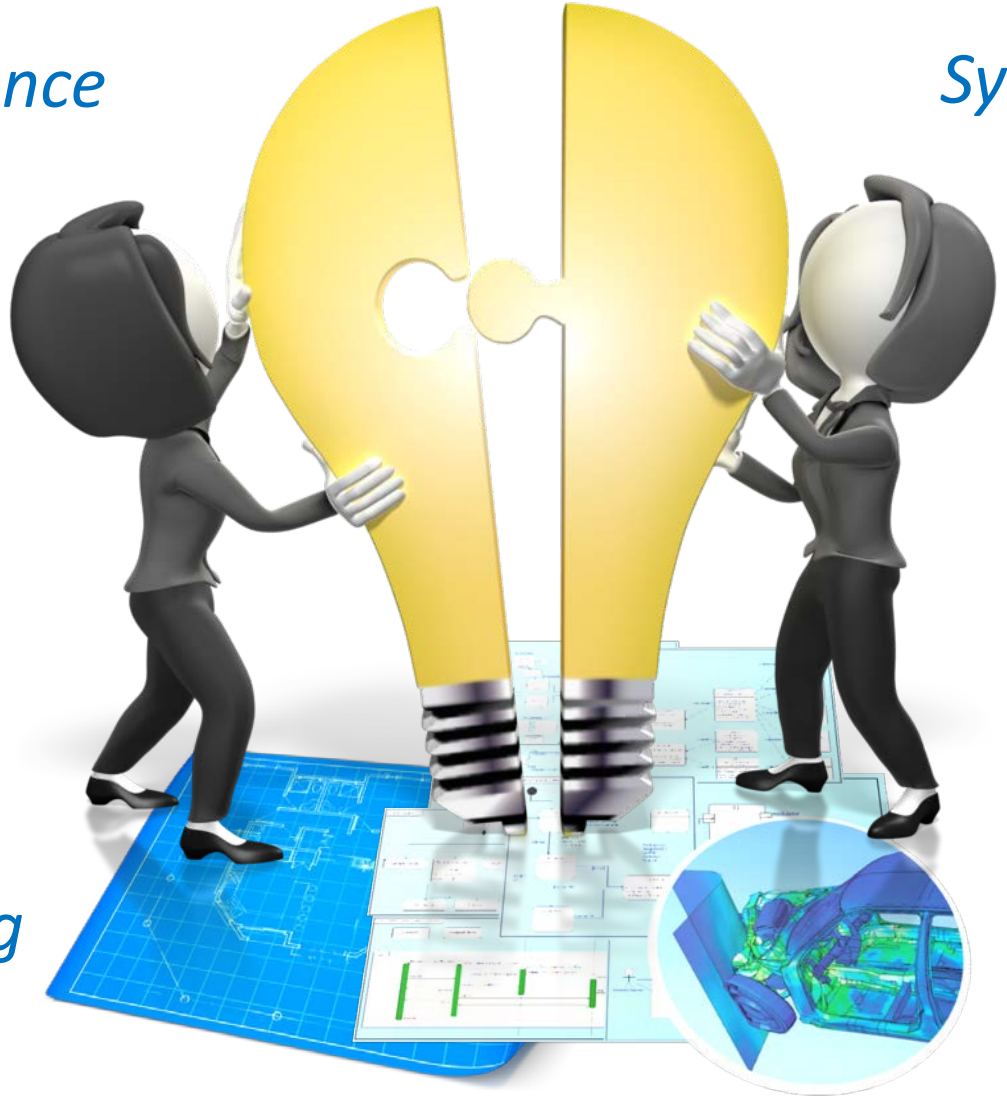
Computational Augmentation

Life Sciences

IT Experts

Design Thinking and UX

Systems Literacy for All



The Journey Forward

Exceeding the Capabilities of Traditional (S)E: Capturing Knowledge, Responding to Change

System scale

Mission complexity

Technical complexity

Project team complexity

Dynamic complexity

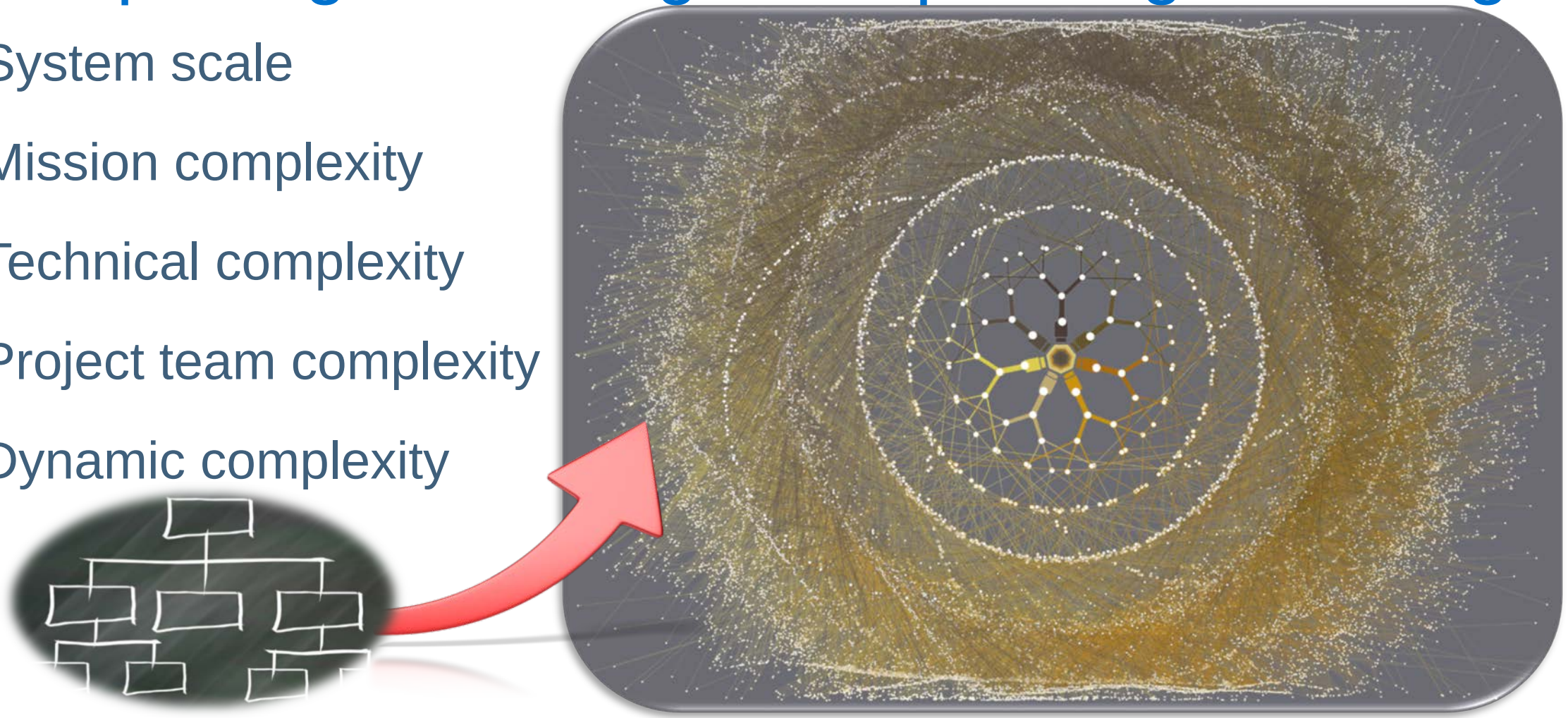
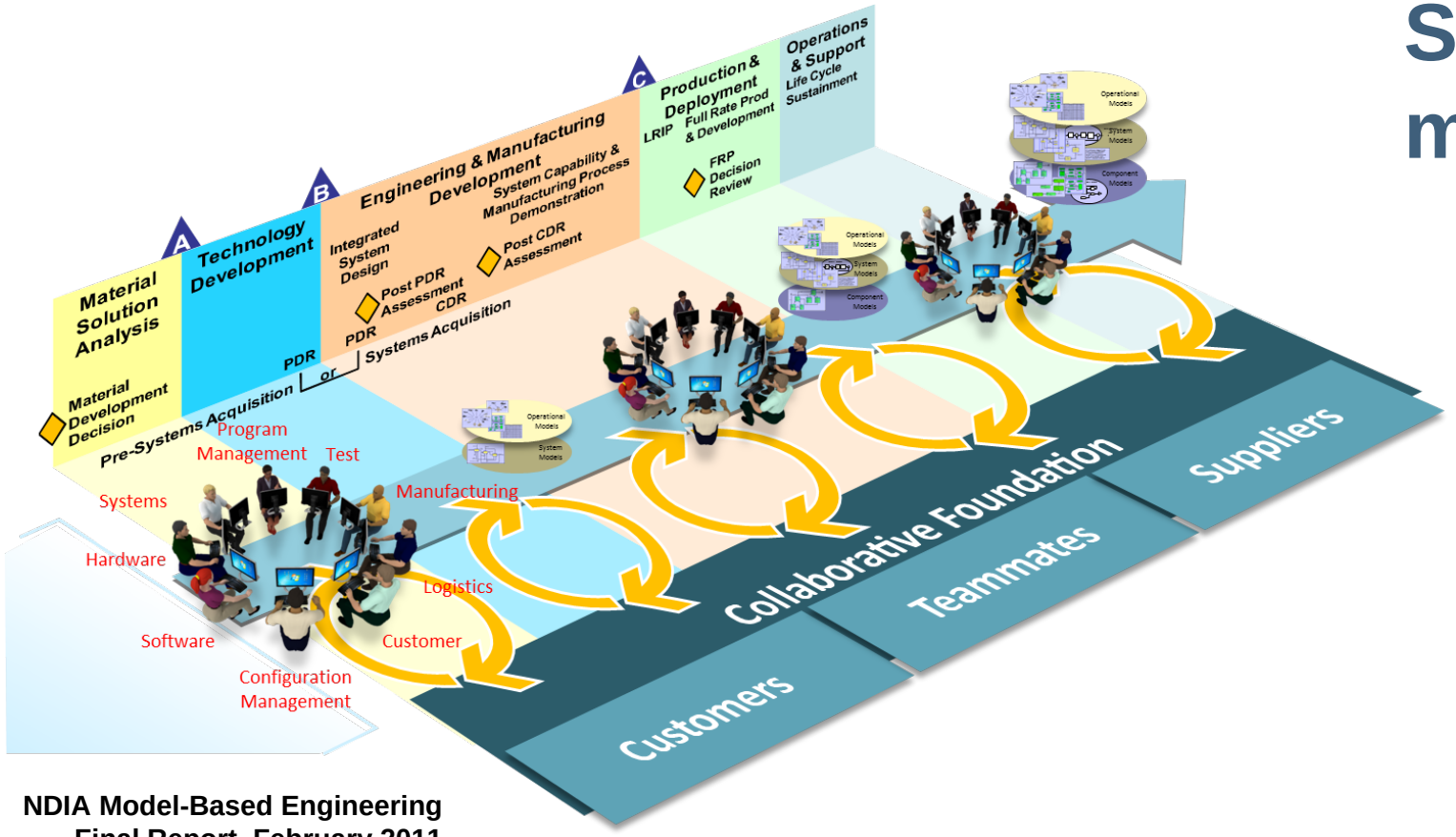


Image credit: Alisa Farr for Letter27. farrimages.com

Applying Our Practices to Ourselves and the Journey – Accidental, Integrated, or Engineered?



NDIA Model-Based Engineering Final Report, February 2011

Systems engineering must live above the silos

seeing the overlaps

addressing the gaps

defining the seams

guarding the why

Questions

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Zane Scott

Zane is the Vice President for Professional Services at Vitech Corporation in Blacksburg VA. He is active in INCOSE as a member of the Chesapeake Chapter and currently serves INCOSE as the Chair of the Corporate Advisory Board and as a member of the Board of Directors.

Zane has taught systems engineering in a variety of settings and formats. He is the co-author (with former INCOSE President David Long) of A Primer For Model-Based Systems Engineering (2 Ed.). For three years running (2013, ‘14 and ’15) Zane was selected as the instructor of the tutorial “Essential Model-Based Systems Engineering – Applied and Practical” presented at the INCOSE International Symposium to sold-out rooms. At the 2016 Symposium Zane and his co-author Dave Walden won a Best Paper Award.

Zane teaches the course Model-Based Systems Engineering for Vitech Corporation where he is the Vice President for Professional Services. He has taught the course on site for a number of private companies and government agencies including NASA Langley, the North Star INCOSE Chapter, the Washington Metro INCOSE Chapter, the Chesapeake INCOSE Chapter and Northrup Grumman Huntsville. He is responsible for the creation and development of the Vitech course and has a designed a variety of formats addressed to the aims of the levels of Bloom’s Taxonomy in meeting customer needs. These range from dinner lectures to half-day, full-day and multi-day formats.

Zane is frequently an invited speaker at INCOSE and other professional society meetings including the Robert S. Hartman Institute Conference on Formal Axiology, the Great Lakes Regional INCOSE Conference, the Los Angeles Regional INCOSE Mini-conference, the NDIA Systems Engineering Conference, the SEDC Conference and the Women in Systems Engineering. He is a regular blogger on systems engineering topics and has produced numerous webinars. His webinar, The 9 Laws of Systems Engineering, has received over 40,000 views on YouTube.

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