TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Transitioning Systems Engineering Research into Programs and Practice

NDIA 17th SE Annual Conference 2014

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Transitioning Systems Engineering Research Center (SERC) Into Practical Application

Wayne State University and
TARDEC/RDECOM Effort

Systems Engineering Research
Co-Development With and Transition to End-Users

- Collaboration between WSU/SERC and TARDEC/RDECOM
- Goal: Develop *practical* and *relevant* risk leading indicators
  - Credible and sensible
  - Based on evidence/data available in a timely manner
  - Point to mitigation actions to reduce risk exposure
  - Consistent with PMO perspectives on system development maturity and risk tradeoffs
- Approach
  - Co-develop with risk managers and TARDEC risk management team
  - Use evidence from data in standard CDRL items and reporting requirements
  - Base risk leading indictors on (1) evaluation criteria and development program maturity indicators and risk considerations in representative RFPs, (2) NDIA system development leading indicators, and (3) GAO guidelines and best practices
  - Pilot on a current Program of Record (“on hold” while the program is in source selection)

Systems Engineering Research Co-Development with and Transition to End-Users

- An Early Contribution
  - RFP clearly viewed development maturity as primary criteria to address risk
  - Contract reporting did not provide data to track maturity advancement against actual and planned time and cost
  - Lack of information creates risk exposure
  - SE R&D produced a method to link maturity advancement stages, cost and schedule reporting using the standard reporting tools and requirements
  - Converted RFP maturity advancement stages to IMP events/accomplishments/criteria
- Methods and tools that don't apply to acquisition programs, that need input data that does not exist, that are hard to use, or don't support program decisions will not get used and will not make a difference
- Co-development with end-users and pilot application to acquisition programs ensures the Systems Engineering Research yields practical and relevant results that can be transitioned into use

Systems Engineering Research
Co-Development with and Transition to End-Users

- Desired End State
  - Utilizing Feedback from the pilot program, the goal is to transition the processes and methodologies to programs for their usage
  - Develop a capability and tool for the RDECOM Integrated Systems Engineering Framework (ISEF), as part of the risk reduction practice
    - Leverage programmatic data in the framework
    - Provide the tools from which to extract the data
    - Leverage knowledge patterns from program to program
    - Provide a dashboard for easy insight into program health and risk.

The US Army
Research and Development Engineering Command (RDECOM)
Integrated Systems Engineering Framework (ISEF)

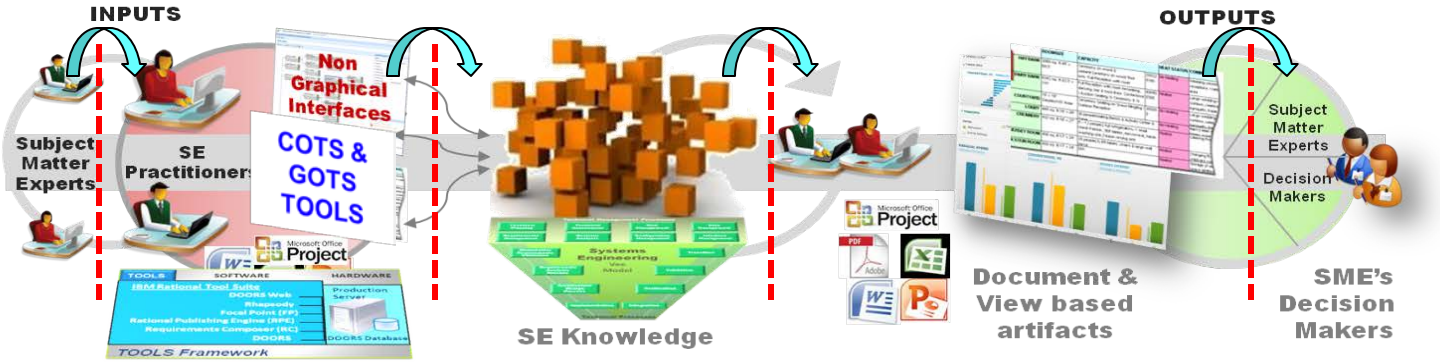
Real World Examples of SE Research Transition

Current Operating Framework

ODASD

Reference: – Engineered Resilient Systems (ERS) S&T priority Description & Roadmap, Dr, Robert Neches, ERS PSC Lead, Advanced Engineering Initiatives, ODASD SE, 31 October 2011

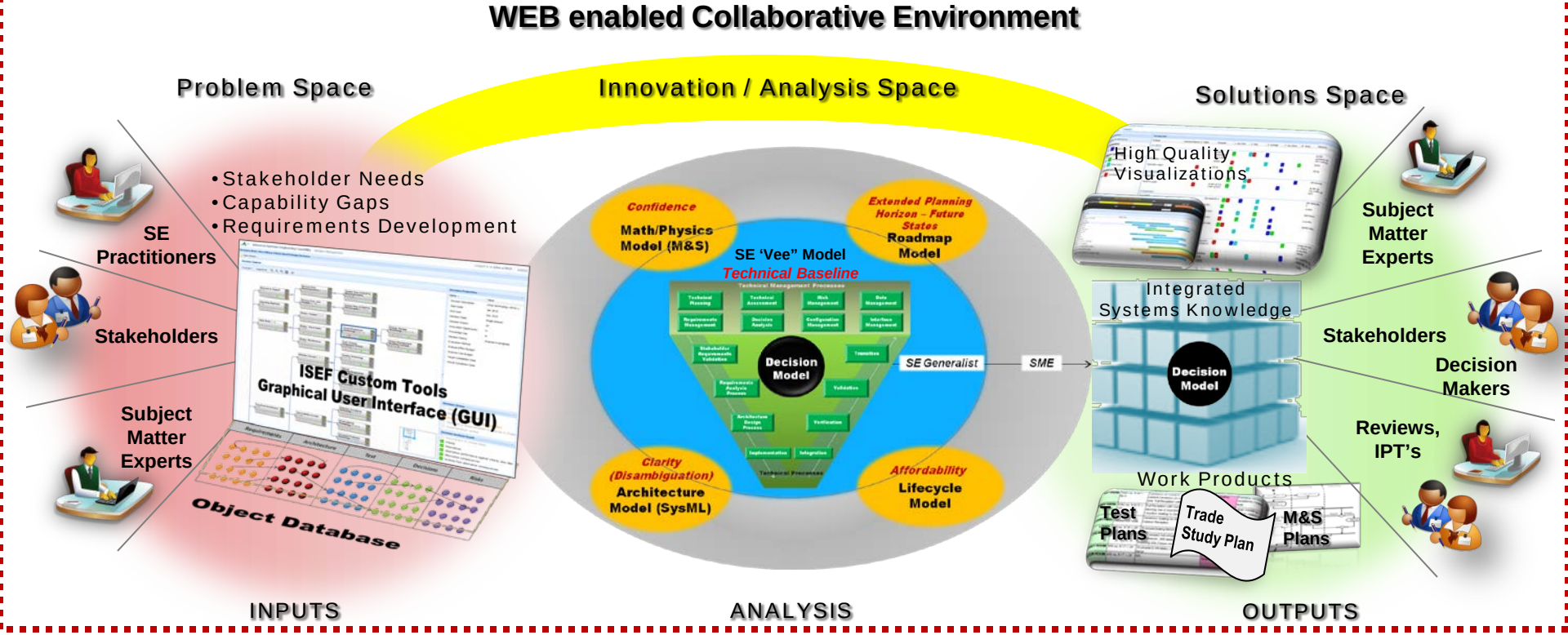
Graphical Representation of Current Operating Environment



- Silos of Information
- No Meta Data transfer
- Two Stage Process – Think and then Link
- Lacks Continuous & Lifecycle Traceability
- Lacks Real Time Collaboration
- Translation Loss

ISEF – Overview

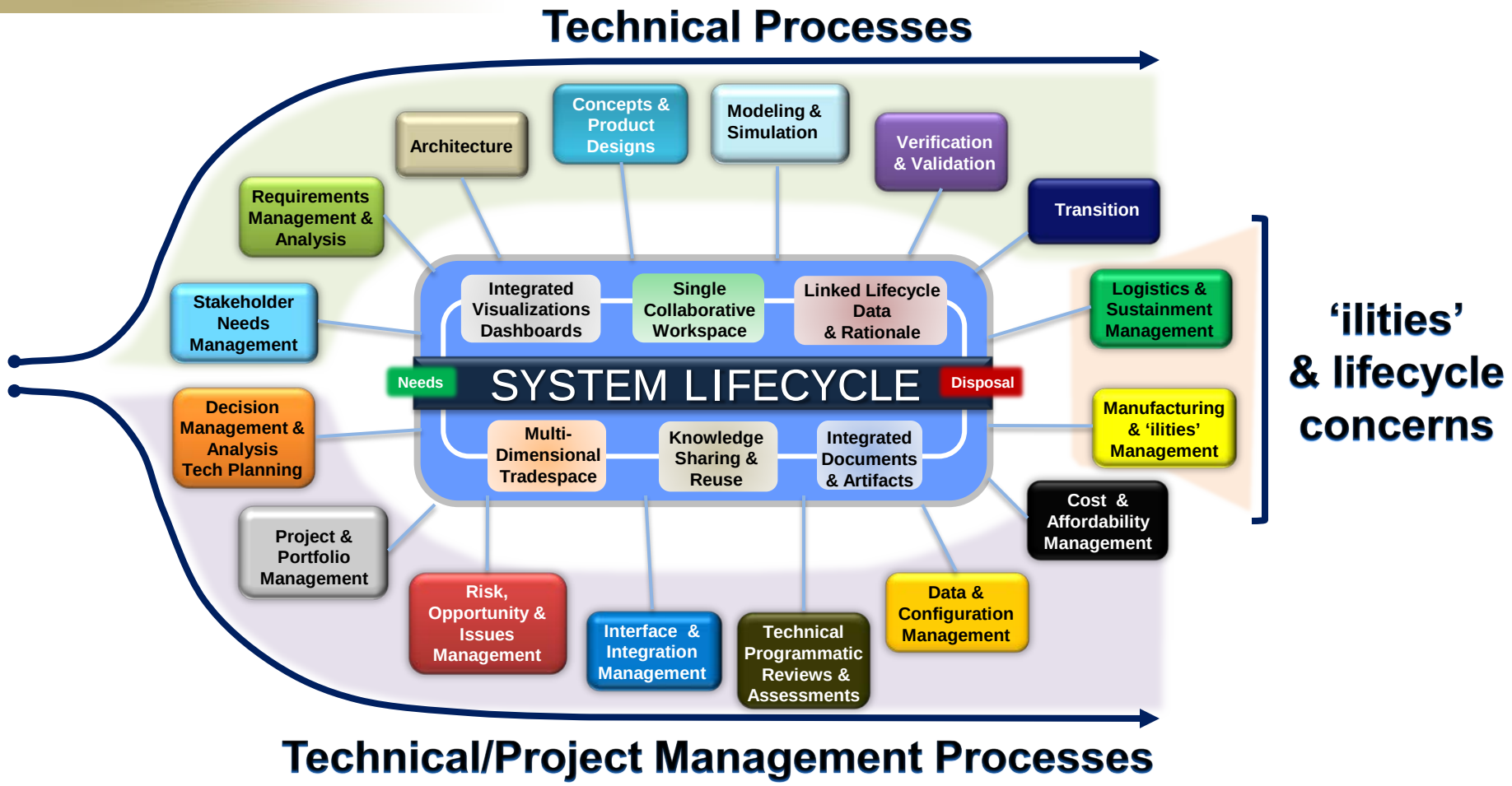
Integrated Systems Engineering Framework (ISEF)



ISEF- Provides Integrated Common Processes/Tools/Methods Across all the Platforms/Portfolios

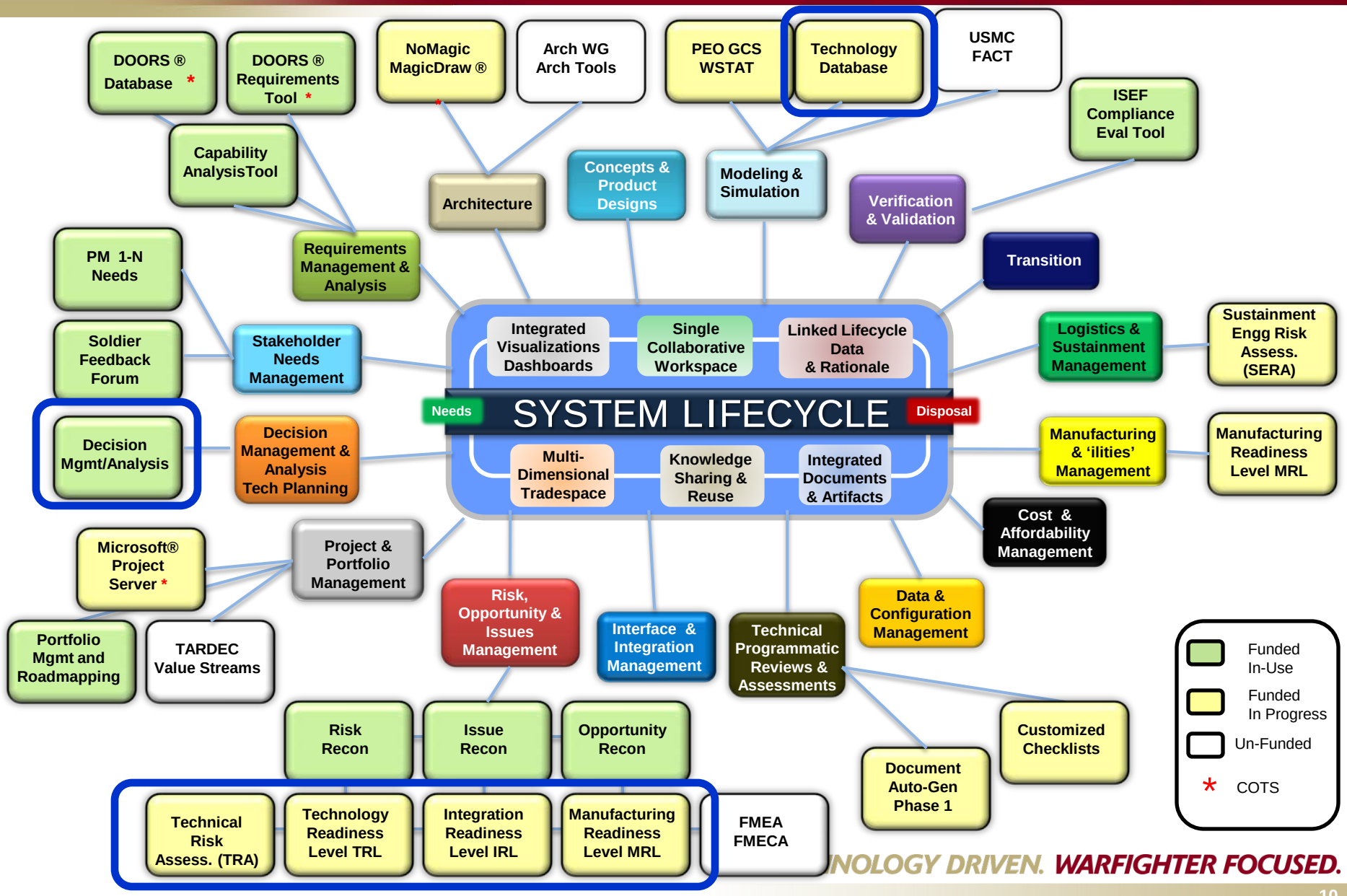
Framework to Improve SE Effectiveness

Framework Concept



An SE framework is a **common environment** that provides an **integrated traceable** systems engineering **analysis capability** throughout the **life cycle** of a program. It provides an essential supporting structure that enables an **iterative collaborative environment** for all stakeholders, practitioners and decision makers to proactively engage in and facilitate **decision making.**

Framework Tools



ISEF Value Proposition

- **Improve quality of SE execution**
  - Decision Confidence
  - Accelerated Delivery
  - Requirements Compliance
  - Architect for Adaptability, Commonality, Modularity
  - Reduced Risk
- **Increased level of knowledge integration**
  - Insights from new connections, visualizations and rollups
  - Reduce perceived complexity
  - Focused knowledge, channeled to the appropriate stakeholders
  - Ability to anticipate ripple effect changes through the lifecycle
- **Increased efficiency and speed to market**
  - Enable seamless, lean business processes
  - Increased level of enterprise collaboration
- **Stretch limited resources**
  - Capture & leverage SME knowledge as patterns
  - Broaden reach of each individual through recursive methods
  - Reduce enterprise software expenditures
- **Government owned IP**
  - Under government control; can tailor by government needs forever
  - Continuous access to cutting edge COTS & GOTS tools
  - Framework for government, industry and academic collaboration
  - Leverage multiple sources of methods/tool innovation. Ex: SBIR, SERC, small business

Challenges Addressed

- Community Culture
- Lack of Common Standards & Arch
- System Complexity
- Lack of Enablers

Accelerated and aligned solutions to meet warfighter needs