SYSTEMS ENGINEERING
Research Center

Systems Engineering Research Center
Progress and Directions

By
Art Pyster
Deputy Executive Director

Annual SERC Research Review
October 5-6, 2011
University of Maryland
Marriott Inn and Convention Center
Hyattsville, MD

www.sercuarc.org

What is a UARC?

University Affiliated Research Center

1. 14 university research organizations sponsored by a DoD component and governed by DoD UARC Management Plan
2. Provides or maintains DoD essential engineering, research, and/or development capabilities defined as core
3. Maintains long-term, strategic relationships with sponsoring DoD components in specific core areas and operate in the public interest
4. UARCs perform research in specific mission areas. By design, no two UARCs have same mission
5. Receive sole source contract funding from DoD

SYSTEMS ENGINEERING
Research Center

Core competencies

Ability to conduct long-term, comprehensive SE research focused on DoD acquisition, including

- Enable integrated development and management
- New ways to link requirements to design
- Leverage modeling and simulation
- Link technical baselines to architectures
- Apply SE to acquisition of services

Ability to leverage developments in systems architecting, complex systems theory, systems thinking, systems science, knowledge management and SwE to perform research to advance the design and development of complex systems across all DoD domains, including

- System and open systems architecture/analysis
- SE in complex SoS and FoS environments
- Enterprise SE
- SW-unique extensions and modern SW-development technology
- Flexible SE environment
- Knowledge management
- Undergraduate/Graduate SE education needs

Ability to leverage developments in open systems standards, organizational theory, program management, SE management, and IT to provide needed integration of program/technical management MPTs, including

- Integrate TPMs with EVM
- Maturity reviews
- SE team structures, etc. for improvement
- Improved SE information sharing
- Rationale and way ahead for standards
- Toolsets throughout the life cycle
- Analyzing SE costs, accounts, and ROI
- SE metrics and leading indicators

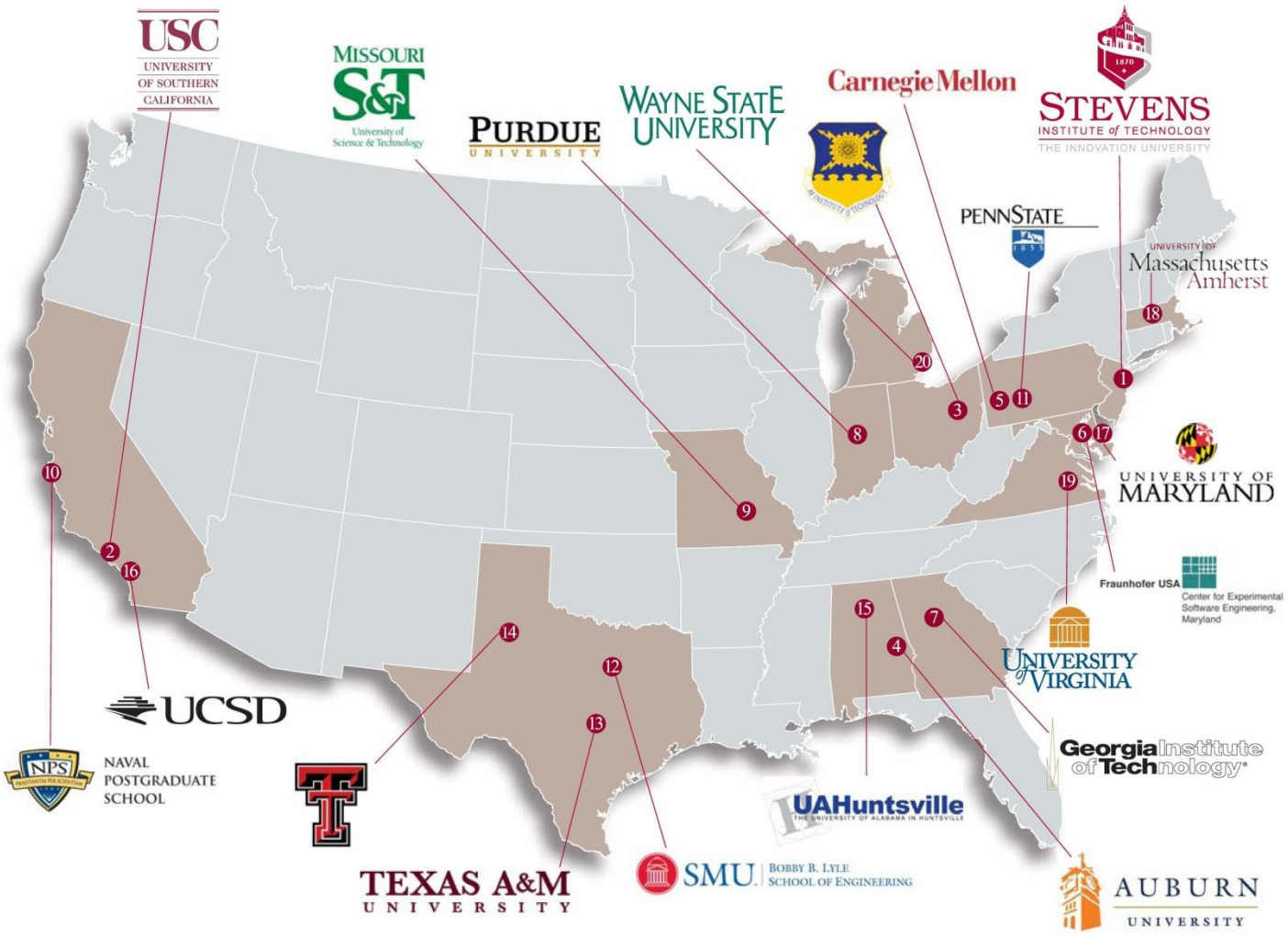
SYSTEMS ENGINEERING
Research Center

SERC Collaborators

The SERC Collaborators

University or Research Organization

1. Stevens Institute of Technology
2. University of Southern California
3. Air Force Institute of Technology
4. Auburn University, Auburn, AL
5. Carnegie Mellon University
6. Fraunhofer Center at University of Maryland
7. Georgia Institute of Technology
8. Purdue University
9. Missouri University of Science and Technology
10. Naval Postgraduate School
11. Pennsylvania State University
12. Southern Methodist University
13. Texas A&M
14. Texas Tech University
15. University of Alabama - Huntsville
16. University of California - San Diego
17. University of Maryland - College Park
18. University of Massachusetts - Amherst
19. University of Virginia
20. Wayne State University



SYSTEMS ENGINEERING
Research Center

SERC leadership

SERC Advisory Board

- Mr. Mike Wynne, 21st AF Secretary (Chair)
- Ms. Marion Blakey, President and CEO, AIA
- Dr. Ruth David, President and CEO, ANSER
- Mr. Al Grasso, President and CEO, MITRE
- Dr. Mike Griffin, Eminent Scholar and Professor, UAH (NASA Administrator, 2005-09)
- Mr. John Grimes, ASD NII/DoD CIO (Retired)

SERC Research Council

- Dr. Barry Boehm, USC (NAE)
- Dr. Abhi Deshmukh, Purdue
- Dr. Mike Griffin, UAH (NAE)
- Dr. Barry Horowitz, UVA (NAE)
- Dr. Bill Rouse, Georgia Tech (NAE)
- Dr. Jon Wade, Stevens

SERC Management

- Dr. Dinesh Verma, Stevens (Executive Director)
- Dr. Art Pyster, Stevens (Deputy Executive Director)
- Dr. Barry Boehm, USC (Director of Research/Chair of Research Council)
- Ms. Debra Facktor Lepore, Stevens (Director of Strategic Programs)
- Dr. Stan Rifkin, Stevens (Director of Technical Programs)
- Ms. Doris Schultz, Stevens (Director of Business Operations)
- Dr. Jon Wade, Stevens

SYSTEMS ENGINEERING
Research Center

Selected milestones in SERC history

- September 2008 — SERC begins operation
- January 2009 — Naval Postgraduate School joins SERC
- August 2009 — 1st Air Force sponsored task; strategic relationship with Defense Acquisition University
- September 2009 — First two tasks completed
- November 2009 — 1st Navy sponsored task
- December 2009 — Georgia Tech joins SERC
- March 2010 — Purdue joins SERC
- July 2010 — 5th publication
- September 2010 — Research Council formed; 20th project launched; $10+M in total awards

SYSTEMS ENGINEERING
Research Center

Recent milestones

- April 2011 — Strategic relationship with Army Research, Development, and Engineering Command (leading to project on Contingency Basing)
- May 2011 — 1st PhD awarded to student funded by SERC
- June 2011 — Assistant Secretary of Defense for Research and Engineering becomes primary sponsor
- August 2011 — Strategic relationship with Deputy Assistant Secretary of the Air Force/Science, Technology, and Engineering (leading to project on Expedited SE); 30th publication
- September 2011 — $18+M in total awards

Trending…

- **Scale and Continuity:**
  - Majority of 2011 funds have extended work begun in 2010; e.g., Experience Accelerator and BKCASE projects
- **Outreach and Sponsor Diversity:**
  - MOU with Federal Aviation Administration agreed to in principle – signing soon
  - Industry Fellow Program agreed to in principle – launching soon
  - Pilot and validation planned from inception – Contingency Basing
  - Number of publications rapidly climbing
- **Project/Deliverable Diversity:**
  - Classified work – contract modification soon
  - Prototype software – Experience Accelerator, System Readiness Levels, Graphical Concept of Operations, …
  - Courseware – STEM Capstone, Technical Leadership
  - Community-based – BKCASE

BKCASE

Guide to the Systems Engineering Body of Knowledge (SEBoK) v. 0.5

(Redirected from Main Page)

Welcome to the *Guide to the Systems Engineering Body of Knowledge (SEBoK)*, version 0.5.

RT-1

quick links
- Main Page
- Note to Reviewers
- Reading the SEBoK
- Acknowledgements
- Copyright Information

outline
- SEBoK 0.5 Outline
- Part 1: Introduction
- Part 2: Systems
- Part 3: SE and Management
- Part 4: Applications of SE
- Part 5: Enabling SE
- Part 6: Related Disciplines
- Part 7: Examples

navigation
- Knowledge Areas
- Topics
- Use Cases
- Case Studies
- Vignettes
- Glossary of Terms
- Acronyms
- Primary References

search
Go | Search

toolbox
- What links here
- Related changes
- Upload file
- Special pages
- Printable version
- Permanent link

Introduction

[edit]

This Wiki site contains version 0.5 of the Guide to the Systems Engineering Body of Knowledge (SEBoK).

The SEBoK 0.5 Introduction contains information about the Purpose of the SEBoK, Scope of the SEBoK, and the Uses of the SEBoK.

This SEBoK is the product of the work of many contributors: sponsor, partner organizations, core team, authors, reviewers, and participants. They are identified and their contributions listed at the Acknowledgements page.

Primary leadership of the project was provided by Stevens Institute of Technology and the Naval Postgraduate School, working together through the U.S. Department of Defense Systems Engineering Research Center. The primary funding sponsor was the office of the Deputy Assistant Secretary of Defense for Systems Engineering (DASD/SE).

For information about the rules for using the information in the SEBoK 0.5, please see About Bkcase Wiki.

Structure

The sidebar contains navigation links to the seven parts. These seven parts comprise the body of the SEBoK. **We recommend you begin with the SEBoK 0.5 Introduction.**

Each part contains knowledge areas and topics, organizational units designed to provide structure to the discussion.

There are additional pages for the glossary and primary references.

To view the articles for a specific category (e.g. all topics in the SEBoK), please click the appropriate term under "navigation" on the sidebar. Note the very useful search box in the sidebar.

For a detailed explanation of the different types of articles, please see Reading the SEBoK.

Review Information

This interim version 0.50 is released for world-wide review, and we respectfully request your feedback. The content of the wiki is locked - all articles contained here may be viewed but they may not be directly edited. Please see the Note to Reviewers for instructions on how to provide a review in the wiki.

Future Releases Planned in 2012

Two more releases are planned for the SEBoK. A minor update is planned for the spring of 2012, and version 1.0 will be released in fall 2012. After version 1.0 is released, stewardship of the SEBoK is expected to pass to INCOSE and the IEEE Computer Society. View the plan for the SEBoK Evolution here.

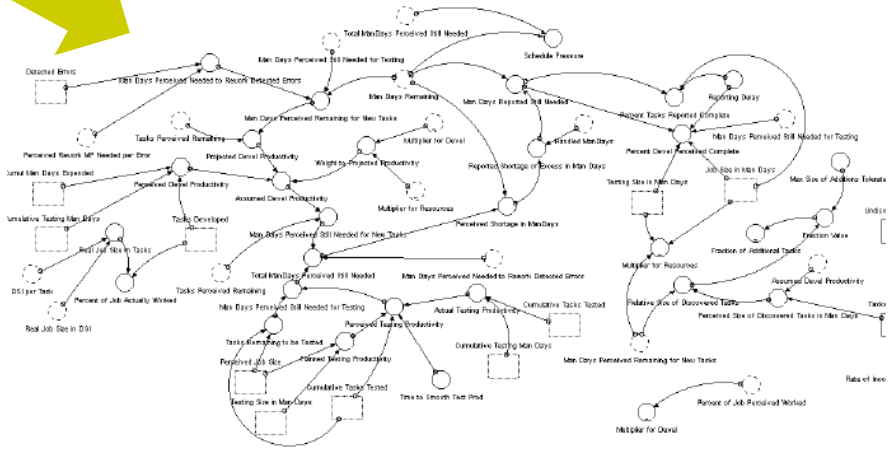
SYSTEMS ENGINEERING Research Center | NPS | SYSTEMS ENGINEERING ESTABLISHED 2002 | STEVENS INSTITUTE of TECHNOLOGY 1870 THE INNOVATION UNIVERSITY

SYSTEMS ENGINEERING
Research Center

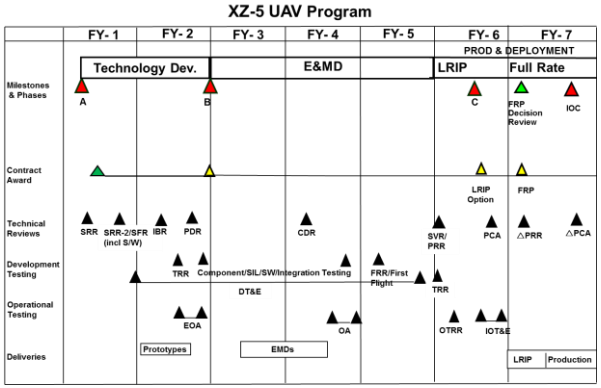
RT-16: Experience Accelerator prototype feedback loop

	Overall System
Schedule:	
Confidence Level to Achieve Program Schedule Goals	<H,M,L>
Actions to address issues:	
Nothing Required	◯
Call in external audit team	◯
Add senior/junior design staff	Sr◯/Jr◯
Add development equipment	◯
Add facilities	◯
Reduce capabilities	◯
Anticipate schedule extension by xx months	<xx>

Learner Recommendations



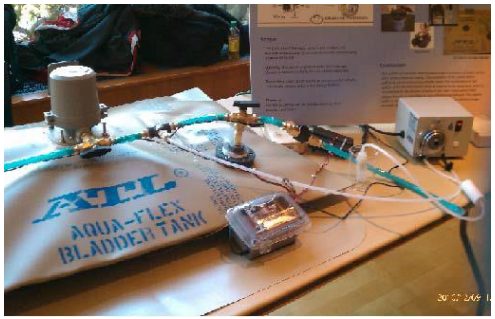
Systems Dynamics Simulations

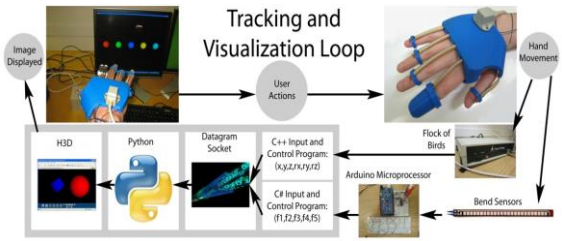


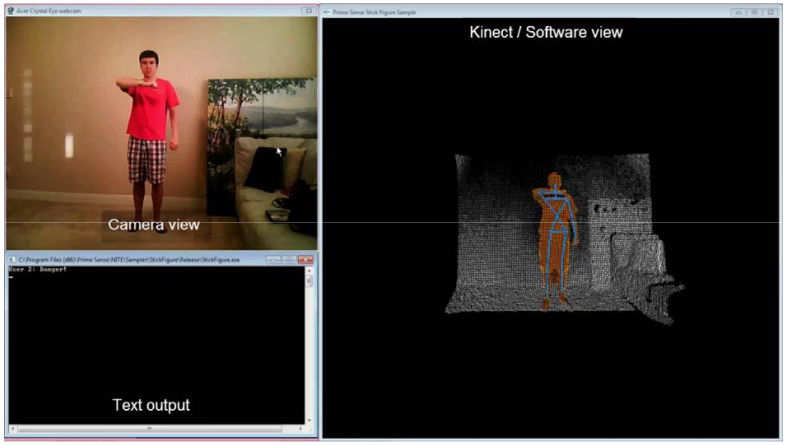
Project Impact

NPC Dialog

RT-19: Integrate SE into the education of all engineers

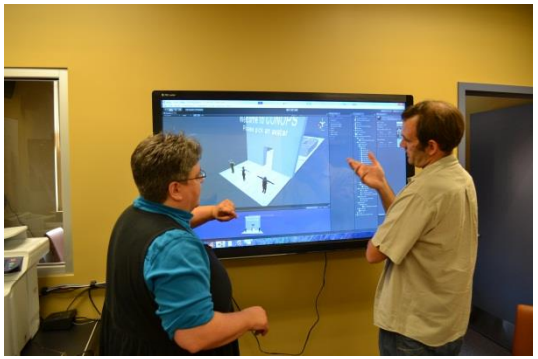


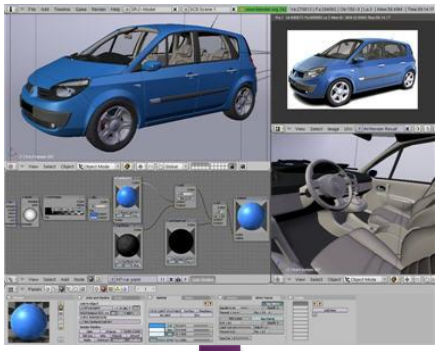




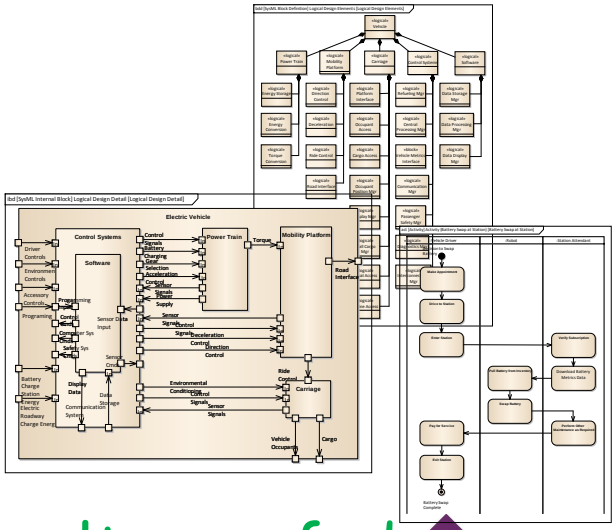
SE woven into senior design or other project courses

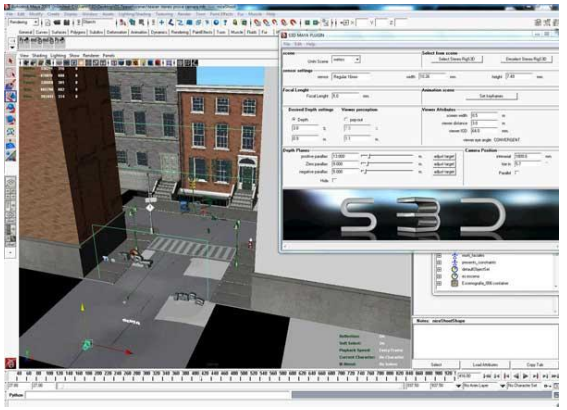
RT-30: Graphical Concept of Operations

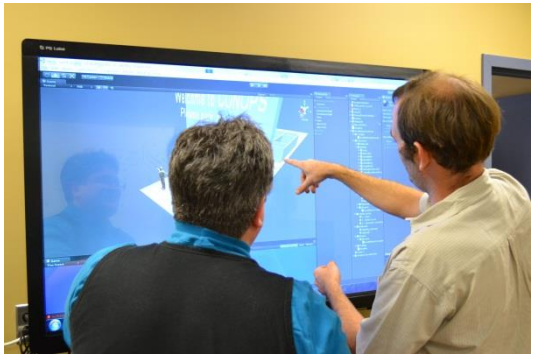




Now we take those composed systems, and integrate them into a scenario fragment







Collaborators are able to execute the scenario, and make adjustments

Results are fed back to the model, updated, and run again

And in the future…