Systems Engineering Research Center (SERC)

University or Research Organization

1. Stevens Institute of Technology
2. University of Southern California
3. Air Force Institute of Technology
4. Auburn University
5. Carnegie Mellon University
6. Georgetown University
7. Georgia Institute of Technology
8. Massachusetts Institute of Technology
9. Missouri University of Science and Technology
10. Naval Postgraduate School
11. North Carolina Agricultural & Technical State University
12. Pennsylvania State University
13. Purdue University
14. Southern Methodist University
15. Texas A&M University
16. Texas Tech University
17. University of Alabama in Huntsville
18. University of California - San Diego
19. University of Maryland
20. University of Massachusetts Amherst
21. University of Virginia
22. Wayne State University

By the Numbers… 2016-2017

16 New Research Tasks

17 Final Technical Reports

102 Faculty/ 84 Students

39 Journal & Conference Papers

- **Dan DeLaurentis**, and fellow authors at Purdue, received the 2016 INCOSE INSIGHT Best Paper Award.
- **Kristin Giammarco**, at NPS, received the Best Paper Award for Transition in Systems Engineering research at CSER 2017. (MITRE Award)
- **Jon Wade** and co-researchers at Stevens Institute of Technology and Georgia Tech received the Best Paper Award at the INCOSE IS.

- **Bi-monthly webinars on key Systems Engineering topics**
- **Usually held first Wednesday of even-numbered months**

  —1–2 pm ET / 10—11 am PT (unless otherwise noted)
- **Talks are available on the SERC Talks page and SERC YouTube channel**

CONTACT

Editor-in-Chief: Dr. Barry Boehm, University of Southern California

boehm@usc.edu

For general question or comments: Ms. Mimi Marcus at mmarcus@stevens.edu.

SYSTEMS ENGINEERING RESEARCH CENTER

SERC TALKS

MODEL-CENTRIC ENGINEERING:

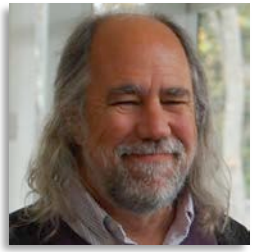
We need a new design perspective for socio-technical systems. Can Complex Network Perspective Be a Viable Candidate?
Babak Heydari, Stevens Institute of Technology
06.01.16

What Were the Top Issues and Opportunities from the SERC Model-Centric Design and Acquisition Forum?
Mark Blackburn and Megan Clifford on behalf of Dinesh Verma, Stevens Institute of Technology
08.03.2016

What Lives at the Intersection of MOSA and Set-Based Design?
Gary Witus, Wayne State
10.05.16

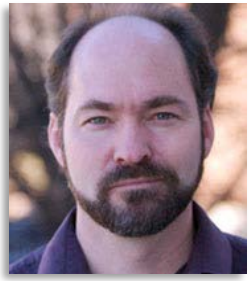
Why is Human-Model Interactivity Important to the Future of Model-Centric Systems Engineering? **Donna Rhodes & Adam Ross, MIT**
12.07.16

CYBER-PHYSICAL LEARNING SYSTEMS:



What is the Self?
Grady Booch, IBM Research
02.01.17

Can Graphical Models Provide a Sufficient Basis for General Intelligence?
Paul S. Rosenbloom, University of Southern California
04.05.17



What Are Cyber-Social Learning Systems And How Will We Form Them?
Kevin Sullivan, University of Virginia
06.07.17

CYBERSECURITY:

How Do We Prepare the People Who Will Need to Manage the Real-time Responses to Cyber Attacks on Physical Systems?
Barry Horowitz University of Virginia
08.02.17

What are the Top Ten Software Security Flaws?
Gary McGraw Synopsys
10.04.17

The Dilemmas of Cybersecurity – Why is Everything Broken?
William Scherlis Institute for Software Research Carnegie Mellon University
11.01.17 at 3PM ET

SYSTEMS ENGINEERING RESEARCH CENTER

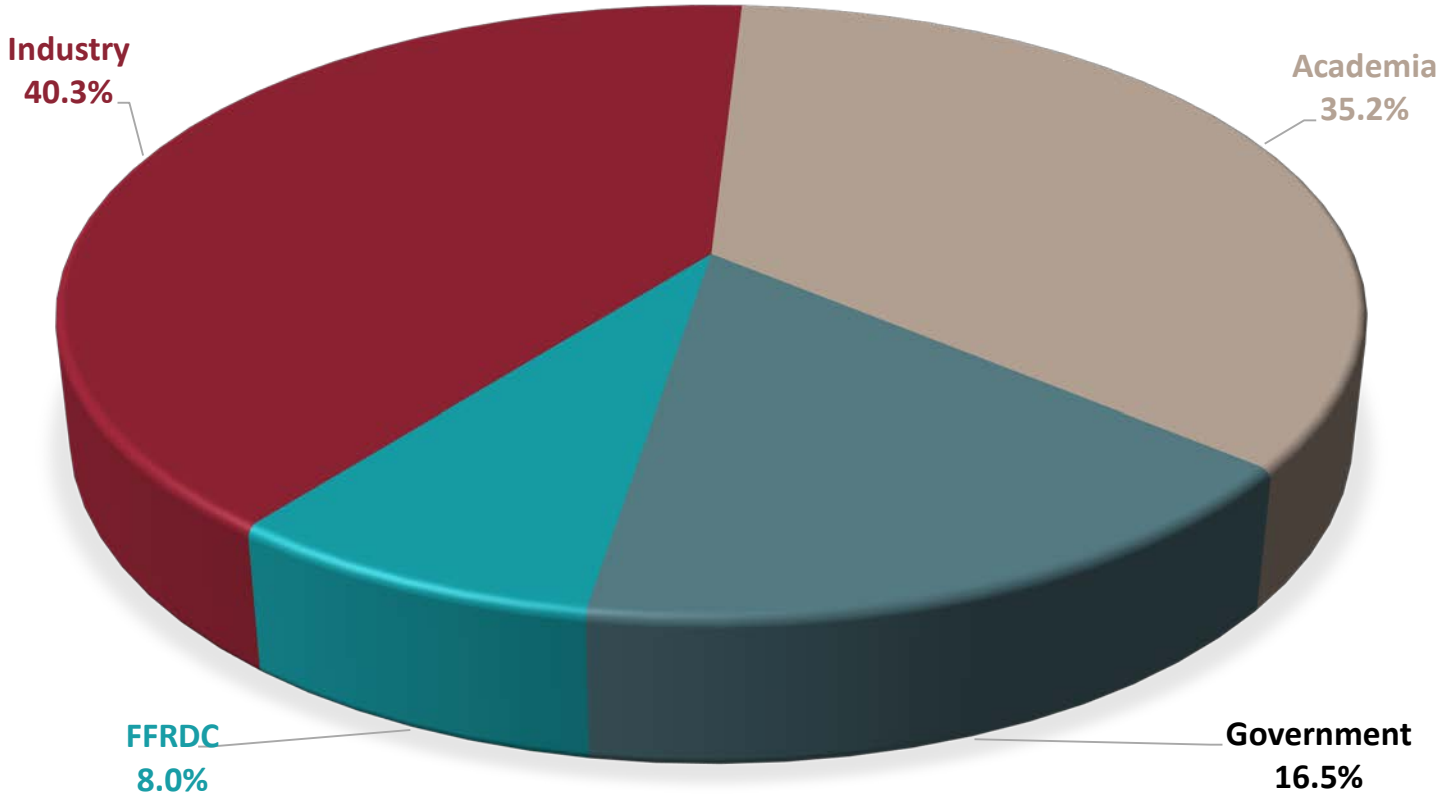
SERC Talks: In Review

Date	Registered	Attended*	Notes	YouTube Views
JUN '16	121	50	Academia: 42%; Industry: 38%; Govt: 15%; FFRDC: 4%	184
AUG '16	160	84	Academia: 31%; Industry: 49%; Govt: 17%; FFRDC: 3%	71
OCT '16	160	75	Academia: 31%; Industry: 43%; Govt: 23%; FFRDC: 2% *(Rescheduled from Oct. 5)*	103
DEC '16	129	80	Academia: 30%; Industry: 28%; Govt: 22%; FFRDC: 20%	520
FEB '17	167	97	Academia: 41%; Industry: 35%; Govt: 14%; FFRDC: 10%	175
APR '17	132	76	Academia: 28%; Industry: 54%; Govt: 9%; FFRDC: 9%	78
JUN '17	86	58	Academia: 47%; Industry: 32%; Govt: 12%; FFRDC: 9%	205
AUG '17	74	42	Academia: 40.5%; Industry: 40.5%; Govt: 12%; FFRDC: 7%	46
OCT '17	117	54	Academia: 30.8%; Industry: 43.6%; Govt: 20.5%; FFRDC: 5.1%	72
Overall	1146		Academia: 35.27; Industry: 40.24%; Govt: 16.48%; FFRDC: 8.01%	1454

*Note: Actual attendance is not reflective of multiple parties viewing from one session or those calling in only

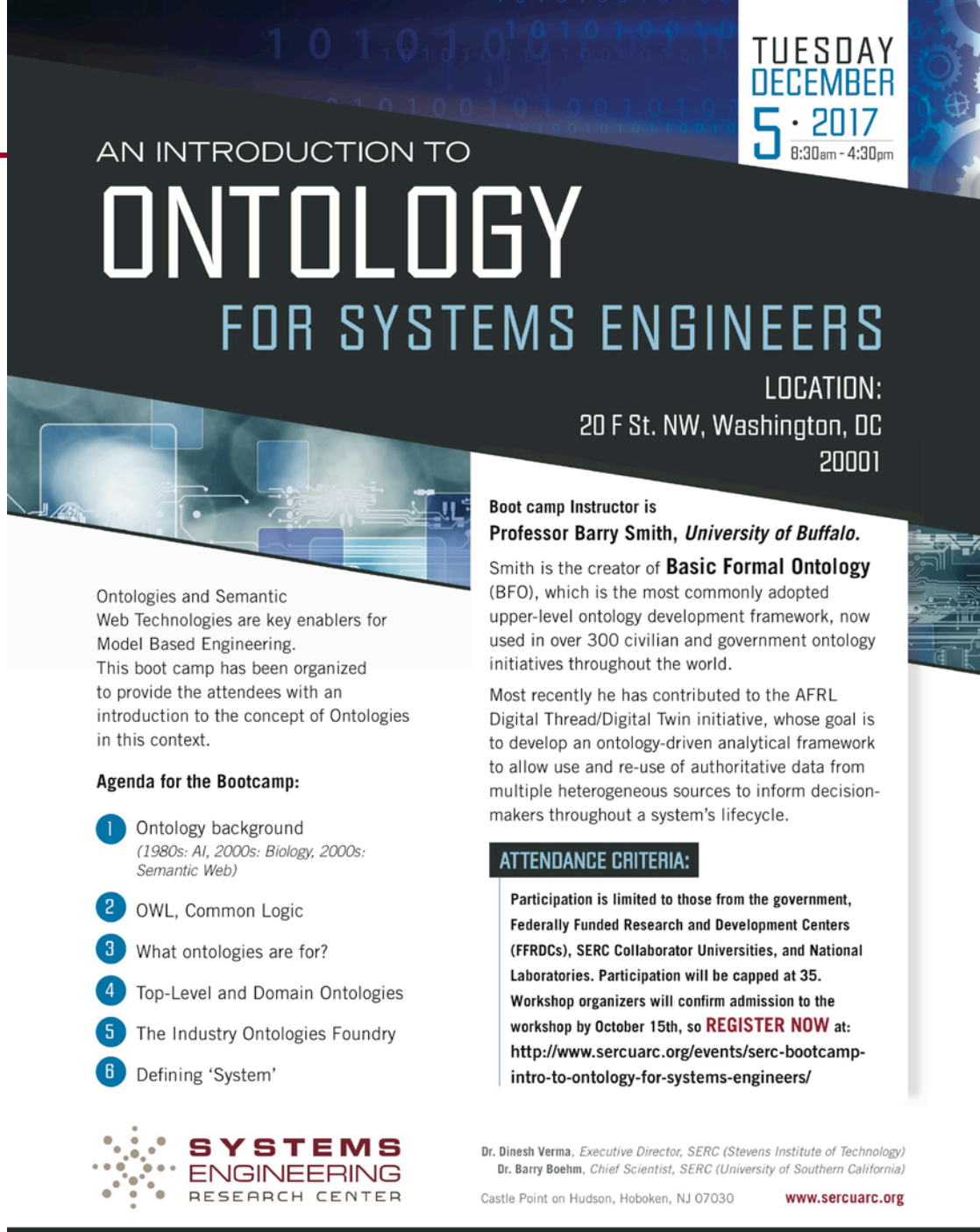
SERC Talks: In Review

- Positive feedback: incorporation into working groups and classrooms
- "SERC Talks" videos have nearly 1,500 cumulative views currently
  - 10/12/2017: 1454 Total
- Average audience of all Talks:



SYSTEMS ENGINEERING RESEARCH CENTER

Registration Status: Oversubscribed



SYSTEMS ENGINEERING RESEARCH CENTER

Registration Status: 45 of 65

TENTATIVE

AGENDA

Wednesday, December 6, 2017

8:30 Welcome

8:45 Introductory Remarks: Priorities with Regard to System Assurance (Security, Safety, Reliability) within a Digital Engineering/Acquisition Environment (Ms. Kristen Baldwin, DASD-Systems Engineering)

9:15 Featured Talk: Model-Based Development: What's New? What's Needed? (Professor Nancy Leveson, MIT)

10:00 Coffee Break

Government Perspective – Challenges and Opportunities with Enhancing System Assurance in a Digital Engineering Environment:

10:15 Challenges with Realizing Robust System Security in Complex Systems (Ms. Melinda Reed, Deputy Director, ODASD – Systems Engineering)

10:45 Challenges and Research Priorities with Digital Engineering as an Enabler for Trade Space Exploration/Systems Analysis (Ms. Philomena Zimmermann, Deputy Director, ODASD – Systems Engineering

Industry Perspective – Challenges and Opportunities:

11:15 Hardening Legacy Systems and Cyber Resilient System Architectures

SYSTEMS ENGINEERING RESEARCH CENTER

A U.S. DEPARTMENT OF DEFENSE UNIVERSITY AFFILIATED RESEARCH CENTER

WORKSHOP

MODEL BASED SYSTEM ASSURANCE

ENABLED BY

DIGITAL ENGINEERING

DATE:

DECEMBER 6-7, 2017

WORKSHOP ATTENDANCE IS BY INVITATION ONLY.

LOCATION:

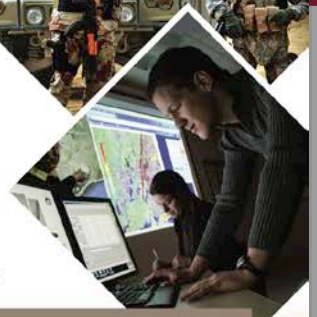
20 F ST CONFERENCE CENTER

20 F STREET, NW WASHINGTON, DC

SYSTEMS ENGINEERING RESEARCH CENTER

MANAGING ACQUISITION AND PROGRAM RISK WORKSHOP

for GOVERNMENT, INDUSTRY & ACADEMIA

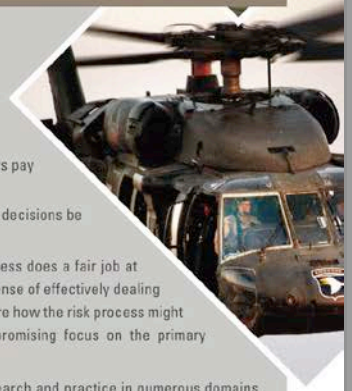


December 13, 2017 • 8am – 5pm • FHI 360 Conference Center
1825 Connecticut Ave Northwest, Washington, DC 20009

TENTATIVE
AGENDA
Wednesday, December 13, 2017

8:00	Welcome (K. Baldwin)
8:15	Scope, Background, and Process for the Workshop (P. Collopy)
8:30	A position statement and a set of challenges on enhancing our ability to assess risks and make informed decisions in the face of risk (J. Thompson)
9:00	Finding and assessing risk – an insurance industry perspective (David Card, formerly of Det Norske Veritas)
9:30	Coffee Break
9:45	Breakout Sessions on Assessing and Communicating Risk
10:45	Debrief by Scribes
11:00	Balancing risk and execution: a view from the investment community (Lou Steinberg, former CTO, TD Ameritrade)
11:30	Working Lunch in Breakout Sessions on Balancing Risk and Opportunity
1:00	Debrief by Scribes
1:15	Confronting Risks with Plans and Decisions (invited speaker)
1:45	Breakout Sessions on Risk Planning and Investment
2:45	Coffee Break
3:00	Debrief by Scribes
3:15	Plenary Discussion on a path to the future in Risk Management
4:00	Collection of Research Topics
4:30	Rating Research Topics
4:50	Wrap-Up (Dinesh Verma)

ABSTRACT



Risk Management in the context of systems engineering attempts to address two needs:

a) What issues should program managers pay particular attention to?

b) How should engineering and program decisions be made in the face of uncertainty?

While the standard risk management process does a fair job at the first need, this is often done at the expense of effectively dealing with uncertainty. This workshop will explore how the risk process might manage uncertainty better without compromising focus on the primary aspects of a program.

Risk management is an active area of research and practice in numerous domains outside of systems engineering. Whole industries, such as insurance, petroleum exploration and pharmaceuticals, critically depend on effectively managing risk, and they invest in research on making strategic decisions in the face of uncertainty.

The purpose of the workshop will be to consider which aspects of acquisition and program risk management in the defense domain can benefit from focusedresearch. Drawing on the rigorous probabilistic tools, and focusing on effective decision-making as the ultimate purpose of risk management, this workshop will map out a direction for improvement and attempt to articulate three to five research questions that should be addressed.

RESEARCH WORKSHOP LEADER:
Dr. Paul Collopy
– Professor, University of Alabama (Huntsville)

SERC Executive Director:
Dr. Dinesh Verma
– Stevens Institute of Technology

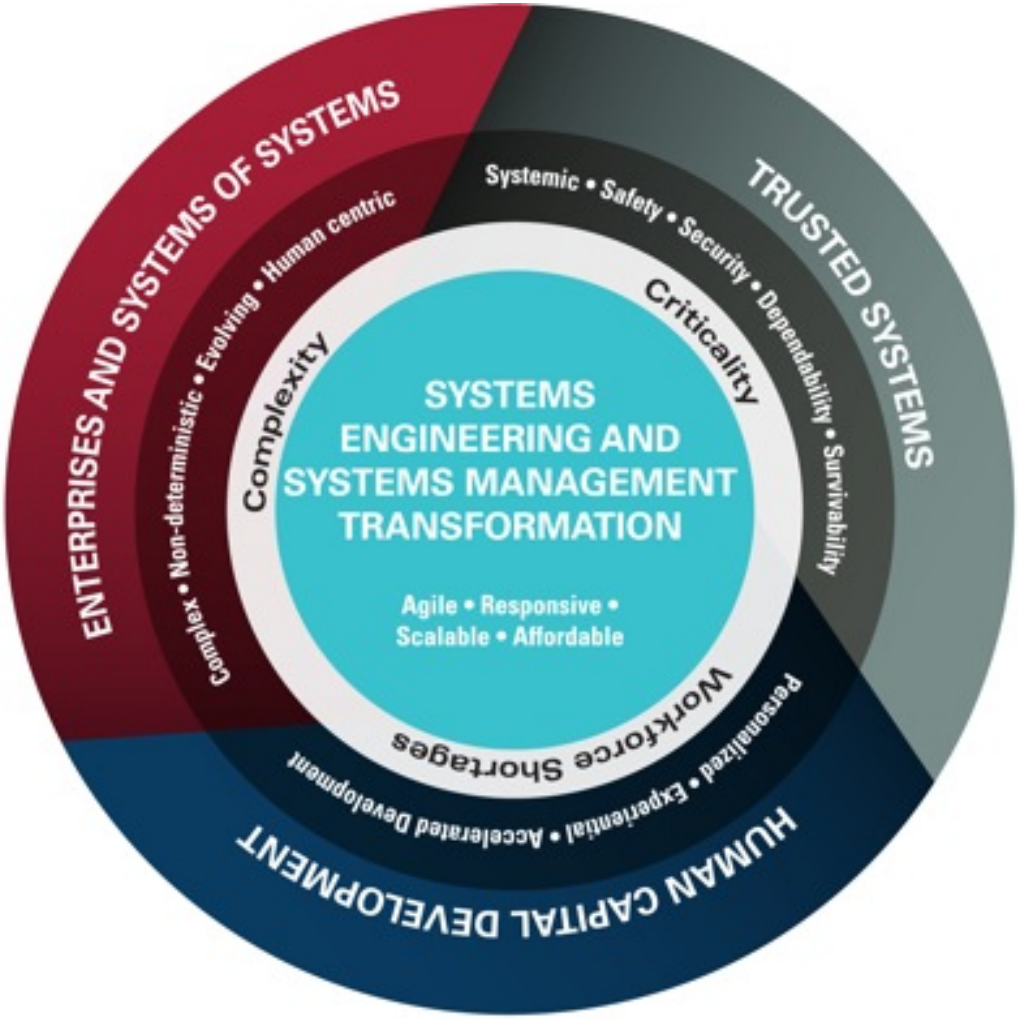
SERC Chief Scientist:
Dr. Barry Boehm
– University of Southern California

To register, please visit:
http://www.sercuarc.org/events/serc-workshop-managing-acquisition-and-risk/
PARTICIPATION IS LIMITED – REGISTER NOW

Registration Status:
20 of 35

Semantic Web Technologies Foundation for Systems Engineering – *to enable Digital Engineering*

SERC Research Thematic Areas



Enterprises and SoS

- *Enterprise Analysis*
- *System of Systems Modeling and Analysis*

Trusted Systems

- *Systemic Security*
- *Systemic Assurance*

Human Capital Development

- *Evolving Body of Knowledge*
- *Experience Acceleration*
- *SE and Technical Leadership Education*

SE & Systems Mgmt Transformation

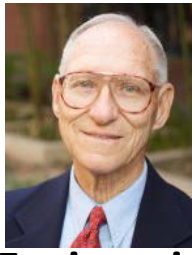
- *Affordability and Value in Systems*
- *Quantitative Risk*
- *Interactive Model-Centric Systems Engineering*
- *Agile Systems Engineering*

Research Council Members


- **Enterprise Systems and Systems of Systems**
  - *Dan DeLaurentis, Purdue*
  - *Bill Rouse, Stevens (NAE)*


- **Trusted Systems**
  - *Barry Horowitz, UVA (NAE)*
  - *Kevin Sullivan, UVA*


- **Human Capital Development**
  - *Tom McDermott, GA Tech*
  - *Jon Wade, Stevens*


- **Systems Engineering and Systems Management Transformation**
  - *Mark Blackburn, Stevens*
  - *Barry Boehm, USC (NAE)*
  - *Paul Collopy, UAH*

SERC Doctoral Fellows Program

11 Doctoral Fellows

A Predictive Analysis Framework For Six Degrees Of Freedom Vibration Qualification, ***Davinia Rizzo,*** Sandia National Laboratories

Advisor: Dr. Mark Blackburn, Stevens Institute of Technology

SERC Founders Award - 2017

SSRR – Kickoff Keynote!