

# Conference on Systems Engineering Research

## March 19-22, 2012

### St. Louis, MO

#### Tentative Schedule

#### Monday, March 19, 2012

#### SEANET Workshop 2012

7:00 am	5:00 pm	Registration Desk Open	Gateway Gallery
7:30 am	8:30 am	Continental Breakfast	Gateway 3
8:30 am	8:45 am	Welcome by SEANET Organizers  <b>Donna Rhodes</b> , Massachusetts Institute of Technology, USA <b>Ricardo Valerdi</b> , The University of Arizona, USA	
8:45 am	9:00 am	Setting the Stage (Purpose of SEANET and highlights from previous workshops)  <b>Donna Rhodes</b> , Massachusetts Institute of Technology, USA	
9:00 am	9:20 am	Introductions	
9:20 am	10:00 am	Senior Faculty Keynote  <b>Cihan H. Dagli</b> , Missouri S&T, USA	
10:00 am	10:15 am	Break	
10:15 am	10:45 am	Faculty Keynote  <b>Ricardo Valerdi</b> , The University of Arizona, USA	
10:45 am	11:15 am	Invited Talk (Doctoral Student Perspectives on the PhD Journey)	
11:15 am	11:30 am	Report on Doctoral Dissertation Topics  <b>Ricardo Valerdi</b> , The University of Arizona, USA	
11:30 am	11:45 am	Introduction for Doctoral Research Roundtables  <b>Donna Rhodes</b> , Massachusetts Institute of Technology, USA	
<b>11:45 am</b>	<b>1:00 pm</b>	<b>Lunch</b> with Networking	
1:00 pm	2:30 pm	Research Roundtables (2 Rotations)	
2:30 pm	2:45 pm	Break	
2:45 pm	4:15 pm	Research Roundtables (2 Rotations)	
4:15 pm	5:00 pm	Outbrief, Survey, Feedback on Workshop  <b>Donna Rhodes</b> , Massachusetts Institute of Technology, USA <b>Ricardo Valerdi</b> , The University of Arizona, USA	

**Tuesday, March 20, 2012**

**CSER 2012**

7:00 am	5:00 pm	Registration Desk Open	Gateway Gallery
7:30 am	8:30 am	Continental Breakfast	Gateway Gallery
8:00 am	8:15 am	Opening Session – Welcome Dr. David Enke, Missouri S&T, USA	Gateway 2
8:15am	8:45am	<b>Morning Plenary Speaker</b>  <b>Leaders Shaping the Future of Systems Engineering</b>  <b>Christi A. Gau Pagnanelli</b> Boeing Defense, Space and Security-Director, Systems Engineering The Boeing Company, USA	Gateway 2
8:45 am	10:00 am	<b>Panel Discussion</b>  <b>System of Systems Engineering and Architecture</b>  Moderator: <b>John Colombi</b> , Air Force Institute of Technology, USA Speakers: <b>Barry Boehm</b> , University of Southern California, USA <b>Rob Pitsko</b> , Stevens Institute of Technology, USA <b>Ronald E. Giachetti</b> , Naval Postgraduate School, USA	Gateway 2
10:00 am	10:30 am	Break	Gateway 4 & 5
10:30 am	12:00 noon	Concurrent Sessions	

<b>Complex Systems I</b> Gateway 2	<b>Model Based Systems Engineering I</b> Gateway 1	<b>Systems and Systems Thinking</b> Gateway 3
<p>David R. Jacques, Session Chair Air Force Institute of Technology, USA</p> <p><b>45 - A Framework for Resilience Thinking</b> C. Wright, Cardiff University, UK V. Kiparoglou, University of Glamorgan, UK M. Williams, The University of Exeter, UK J. Hilton, Cranfield University, UK</p> <p><b>14 - Practical Measurement of Complexity in Dynamic Systems</b> Jason B. Clark   David R. Jacques Air Force Institute of Technology, USA</p> <p><b>31 - An Empirical Investigation of System Changes to Frame Links Between Design Decisions and Ilities</b> J. Clark Beesemyer   Adam M. Ross   Donna H. Rhodes Massachusetts Institute of Technology, USA</p> <p><b>69 - Applying Systems Engineering on Energy Challenges</b> Jamal Safi   Gerrit Muller, Buskerud University College, Norway G. Maarten Bonnema, University of Twente, The Netherlands</p>	<p>Steve Corns, Session Chair Missouri S&amp;T, USA</p> <p><b>188 - Using MBSE to Enhance System Design Decision Making</b> Mike Russell Booz Allen Hamilton, USA</p> <p><b>194 - Ontology and Model-Based Systems Engineering</b> Ing L. C. van Ruijven Croon Elektrotechniek, Netherlands</p> <p><b>201 - A Modeling Language to Support Early Lifecycle Requirements Modeling for Systems Engineering</b> Florian Schneider   Helmut Naughton, Technical University of Munich, Germany Brian Berenbach, Siemens Corporate Research, USA</p> <p><b>207 - Application of Model-Based Systems Engineering on a University Satellite Design Team</b> Dustin Nottage   Steven Corns Missouri S&amp;T, USA</p>	<p>Ricardo Pineda, Session Chair The University of Texas at El Paso, USA</p> <p><b>420 - Service Systems Engineering: Emerging Skills and Tools</b> Ricardo Pineda   Amit Lopes   Bill Tseng   Oscar H. Salcedo The University of Texas at El Paso, USA</p> <p><b>327 - The Systems Engineering Approach to the Design of Laws</b> David G. Schrunk Quality of Laws Institute, USA</p> <p><b>315 - A Work-Centered Perspective on Research Needs for Systems Engineering with Models</b> Lisa Murphy, Atura Integration, USA Paul Collopy, University of Alabama in Huntsville, USA</p> <p><b>402 - The Formation of the Qin Dynasty: A Socio-technical System of Systems</b> Gregory L. Mayhew Saint Louis University, USA</p>

12:00 noon	1:15 pm	<b>Luncheon Plenary Speaker</b>  <b>INCOSE Student Division and Youth Outreach Programs: Preparing the Next Generation of Engineers</b>  <b>David Mason</b> Assistant Director, Student Division International Council on Systems Engineering, USA	Gateway 4 & 5
1:30 pm	3:00 pm	<b>Panel Discussion</b>  <b>BKCASE Viewpoints on the Guide to the SEBoK and GRCSE</b>  Moderator: <b>David Olwell</b> , Naval Postgraduate School, USA Speakers: <b>Stephen Cook</b> , University of South Australia, Australia <b>Gerrit Muller</b> , Buskerud University College, Konsberg, Norway <b>Ricardo Pineda</b> , University of Texas at El Paso, USA <b>Brian Wells</b> , Raytheon, USA	Gateway 2
3:00 pm	3:30 pm	Break	Gateway 4 & 5
3:30 pm	5:00 pm	Concurrent Sessions	
<b>Complex Systems II</b> Gateway 2  Susan Ferreira, Session Chair The University of Texas at Arlington, USA  <b>75 - Unifying Principles for Sudden Transitions in All Systems</b> Jamshid Ghaboussi University of Illinois at Urbana-Champaign, USA  <b>93 - Upcoming Tipping Points in Automobile Industry Based on Agent-Based Modeling</b> Sung Nam Hwang The University of Virginia, USA  <b>81 - Advancing the Development of Systems Engineers Using Process Simulators</b> Susan Ferreira   Misagh Faezipour The University of Texas at Arlington, USA  <b>87 - An Analysis of Processes, Risks, and Best Practices for Use in Developing Systems Engineering Process Simulators</b> Susan Ferreira   Misagh Faezipour The University of Texas at Arlington, USA		<b>Model Based Systems Engineering II</b> Gateway 1  Mark Austin, Session Chair University of Maryland, USA  <b>214 - Software Patterns for Traceability of Requirements to Finite State Machine Behavior</b> Parastoo Delgoshaei   Mark Austin University of Maryland, USA  <b>220 - Compendium for Modular and Platform Based Architecting</b> Harrys Daniilidis   Wolfgang Bauer   Udo Lindemann Technical University of Munich, Germany  <b>226 - Systems Engineering and Metabolic Engineering: A Side-by-Side Comparison</b> Joseph Johnnie   Mark Austin   Ganesh Sriram   Matt Conway   Ashish Misra University of Maryland, USA  <b>232 - Flight Test Results for UAVs Using Boid Guidance Algorithms</b> Jason B. Clark   David R. Jacques Air Force Institute of Technology, USA	<b>Trade Space Optimization</b> Gateway 3  David Flanigan, Session Chair Johns Hopkins University Applied Physics Laboratory, USA  <b>413 - Systems Engineering Framework for Integrated Product and Industrial Design Including Trade Study Optimization</b> Albert Sanders   John Klein Honeywell Aerospace, USA  <b>428 - Highly Efficient Exploration of Large Design Spaces: Fractionated Satellites as an Example of Adaptable Systems</b> Tatiana Kichkaylo   Lucy Hoag   Elizabeth Lennon   Gordon Roesler USC Information Sciences Institute, USA  <b>112 - System of Systems Requirements Capacity Allocation</b> David Flanigan, The Johns Hopkins University Applied Physics Laboratory, USA Peggy Brouse, George Mason University, USA  <b>452 - Senior Project Design Success and Quality: A Systems Engineering Approach</b> Javier A. Flores   Oscar H. Salcedo   Ricardo Pineda   Patricia Nava The University of Texas at El Paso, USA
7:00 pm	9:30 pm	<b>Conference Reception</b> (Poster Session)	Gateway 4 & 5

## Wednesday, March 21, 2012

7:00 am	5:00 pm	Registration Desk Open	Gateway Gallery
7:30 am	8:30 am	Continental Breakfast	Gateway Gallery
8:00 am	8:05 am	Session Convenes & Announcements	Gateway 2
8:05 am	9:00 am	<b>Morning Plenary Speaker</b>  <b>How fast can we engineer effective solutions... and how?</b>  <b>Debra Facktor Lepore</b> Industry Professor and Program Director, Technical Leadership Stevens Institute of Technology, USA	Gateway 2
9:00 am	10:00 am	<b>Morning Panel Discussion</b>  <b>Product Line Architecture</b>  Moderator: <b>Jamie Kanyok</b> , Lockheed Martin, USA Speakers: <b>Brian Wells</b> , Raytheon, USA <b>David Berwald</b> , Northrop Grumman Electronic Systems, USA <b>Thomas Herald</b> , Lockheed Martin, Global Training and Logistics, USA <b>Charles Dickerson</b> , Loughborough University, UK <b>Jon Wade</b> , Stevens Institute of Technology, USA	Gateway 2
10:00 am	10:30 am	Break	Gateway 4 & 5
10:30 am	12:00 noon	Concurrent Sessions	

<b>Complex Systems III</b> Gateway 2	<b>Human System Integration I</b> Gateway 1	<b>System Engineering Success Patterns</b> Gateway 3
Brian White, Session Chair CAUSES, USA	John Colombi, Session Chair Air Force Institute of Technology, USA	Gerrit Muller, Session Chair Buskerud University College, Norway
<b>39 - Practical Application of Chaos Theory to Systems Engineering</b> David M. Curry The Boeing Company, USA	<b>273 - Engineering Systems Thinking: Cognitive Competencies of Successful Systems Engineers</b> Moti Frank Holon Institute of Israel, Israel	<b>321 - Validation of Systems Engineering Methods and Techniques in Industry</b> Gerrit Muller Buskerud University College, Norway
<b>53 - Value Models for Engineering of Complex Sustainable Systems</b> Edin Arnautovic, Vienna University of Technology, Austria Davor Svetinovic, Masdar Institute of Science and Technology, United Arab Emirates	<b>242 - Allocation of Communications to Reduce Mental Workload</b> Travis Pond   Brandon Webster   John Machuca   John Colombi   Michael Miller   Randall Gibb Air Force Institute of Technology, USA	<b>297 - Principles for Successful Systems Engineering</b> Barry Boehm   Supannika Koolmanojwong   Jo Ann Lane, University of Southern California, USA Richard Turner, Stevens Institute of Technology, USA
<b>59 - Let's Do Better in Limiting Material Growth to Conserve Our Earth's Resources</b> B. E. White CAUSES, USA	<b>255 - Relationship Between Age-Related Decline of Cognitive Functions and Willingness to Work Using a Computer</b> Keiji Ogata   Kazutaka Ueda   Tohru Ifukube, The University of Tokyo, Japan Satoru Suto, Shizuoka University, Japan Takatsune Kumada, National Institute of Advanced Industrial Science and Technology, Japan	<b>303 - Patterns of Success in Systems Engineering of IT-Intensive Government Systems</b> George Rebovich, Jr.   Joseph K. DeRosa The MITRE Corporation, USA
<b>22 - Evaluating System Change Options and Timing Using the Epoch Syncopation Framework</b> Daniel O. Fulcoly   Adam M. Ross   Donna H. Rhodes Massachusetts Institute of Technology, USA		<b>309 - Effectiveness of Kanban Approaches in Systems Engineering within Rapid Response Environments</b>

		<p><b>261 - Utilizing Explorable Visual Environments for Experiential Applications</b>          Brian Moriarty   Zak Moy   Caroline Amaba          Stevens Institute of Technology, USA</p>	<p>Richard Turner, Stevens Institute of Technology, USA          Dan Ingold   Jo Ann Lane, University of Southern California, USA          Ray Madachy, Naval Postgraduate School, USA          David Anderson, David J. Anderson Associates, USA</p>
12:00 noon	1:15 pm	<p><b>Luncheon Plenary Speaker</b></p> <p><b>Extending Standard Black Box System Decomposition For Software Intensive Systems and Systems Of Systems</b></p> <p><b>David Sharp</b>          Senior Technical Fellow          The Boeing Company, USA</p>	Gateway 4 & 5
1:30 pm	3:00 pm	Concurrent Sessions	
<p><b>Complex Systems IV</b>          Gateway 2</p> <p>Joseph R. Wirthlin, Session Chair          The Air Force Institute of Technology, USA</p> <p><b>100 - The Integration and Impact of Effective Knowledge Management Systems in the Advancement of the Decision Making Process in Complex Organizations to Realize Economic Growth</b>          Nargis Hossain   Shahram Sarkani   Thomas A. Mazzuchi          George Washington University, USA</p> <p><b>106 - Using Temporal Indicator Functions with Generalized Linear Models for Spatial-Temporal Event Prediction</b>          Jon Fox   Donald E. Brown          University of Virginia, USA</p> <p><b>118 - A System Dynamics Approach to Demand and Allocation of Wireless Spectrum for Mobile Communication</b>          Rikin Thakker   Shahram Sarkani   Thomas Mazzuchi          George Washington University, USA</p> <p><b>124 - Using M&amp;S to Maximize Space Satellite Data Collection with Multiple Ground Stations</b>          Christopher W. Rose   Joseph R. Wirthlin          The Air Force Institute of Technology, USA</p>		<p><b>Human System Integration II</b>          Gateway 1</p> <p>Jon Wade, Session Chair          Stevens Institute of Technology, USA</p> <p><b>267 - Year One of the Systems Engineering Experience Accelerator</b>          Alice Squires   Jon Wade   Richard Reilly   Peter Dominick, Stevens Institute of Technology, USA          Bill Watson, Purdue University, USA          Doug Bodner, Georgia Tech, USA</p> <p><b>249 - Adaptations in the US Army MANPRINT Process to Utilize HSI-Inclusive System Architectures</b>          Andrew Bodenhamer          Missouri S&amp;T, USA</p> <p><b>279 - An Empirical Study of Refactoring Decisions in Embedded Software and Systems</b>          Sara Dersten   Jakob Axelsson   Joakim Froberg          Malardalen University, Sweden</p> <p><b>285 - Requirements for a Metamodel to Facilitate Knowledge Sharing Between Project Stakeholders</b>          Quoc Do   Stephen Cook   Peter Campbell   William Scott, University of South Australia, Australia          Kevin Robinson   Wayne Power   Despina Tramoundanis, Defense Science and Technology Organization, Australia</p>	<p><b>Cyber Security</b>          Gateway 3</p> <p>Ivan G. Guardiola, Session Chair          Missouri S&amp;T, USA</p> <p><b>333 - Applying Variable Coefficient Functions to Self-Organizing Feature Maps for Network Intrusion Detection on the 1999 KDD Cup Dataset</b>          Charlie Obimbo   Matthew Jones          University of Guelph, Canada</p> <p><b>338 - Security Via Related Disciplines</b>          Jennifer Bayuk, Stevens Institute of Technology, USA          Barry Horowitz   Rick Jones, University of Virginia, USA</p> <p><b>345 - System for Detection of Malicious Wireless Device Patterns</b>          Shikhar P. Acharya   Ritesh Arora   Ivan G. Guardiola          Missouri S&amp;T, USA</p> <p><b>351 - Genetic &amp; Evolutionary Biometric Security: Disposable Feature Extractors for Mitigating Biometric Replay Attacks</b>          Joseph Shelton   Kelvin Bryant   Sheldon Abrams   Lasanio Small   Joshua Adams   Derrick Leflore   Aniesha Alford   Gerry Dozier, North Carolina Agricultural and Technical State University, USA          Karl Ricanek, University of North Carolina Wilmington, USA</p>
3:00 pm	3:30 pm	Break	
3:30 pm	5:00 pm	Concurrent Sessions	
			Gateway 4 & 5

<p align="center"><b>Systems Architecting I</b> Gateway 2</p> <p align="center">Mark Pflanz, Session Chair George Mason University, USA</p> <p><b>135 - Principles for Architecting Adaptable Command and Control Systems</b> Rob Pitsko   Dinesh Verma Stevens Institute of Technology, USA</p> <p><b>141 - An Approach to Evaluating Resilience in Command and Control Architectures</b> Mark Pflanz   Alexander Levis George Mason University, USA</p> <p><b>147 - A Flexible Approach to Realize an Enterprise Architecture</b> Ronald E. Giachetti Naval Postgraduate School, USA</p> <p><b>153 - Challenges Using Modeling and Simulation in Architecture Development</b> Michael W. Schreiner   Joseph R. Wirthlin Air Force Institute of Technology, USA</p>	<p align="center"><b>Computational Approaches</b> Gateway 1</p> <p align="center">G. Maarten Bonnema, Session Chair University of Twente, The Netherlands</p> <p><b>479 - System Design of a Litter Collecting Robot</b> G. Maarten Bonnema University of Twente, The Netherlands</p> <p><b>461 - A Combined Soft Computing-Mechanics Approach to Inversely Predict Damage in Bridges</b> Ahmed H. Al-Rahmani   Hayder A. Rasheed   Yacoub Najjar Kansas State University, USA</p> <p><b>467 - Analysis of GMM by a Gaussian Wavelet Transform</b> Kiyoshi Tsukakoshi, Ashikaga Institute of Technology, Japan Kenichi Ida, Maebashi Institute of Technology, Japan</p> <p><b>473 - Development of Void Prediction Models for Kansas Concrete Mixes Used in PCC Pavement</b> Hakan Yasarer   Yacoub Najjar Kansas State University, USA</p>	<p align="center"><b>Risk Analysis and Affordability</b> Gateway 3</p> <p align="center">Chandru Mirchandani, Session Chair Lockheed Martin IS&amp;GS – Civil, USA</p> <p><b>361 - A Proposed Methodology to Characterize the Accuracy of Life Cycle Cost Estimates for DoD Programs</b> E. Ryan   D. Jacques   J. Colombi   C. Schubert Air Force Institute of Technology, USA</p> <p><b>376 - Why Affordability is a Systems Engineering Metric</b> Quentin Redman Price Systems, L.L.C., USA</p> <p><b>443 - Role of Safety and Product Integrity</b> Shabbir Merchant Boeing Company, USA</p> <p><b>437 - Risk Analysis and Mitigation Strategy for System Design</b> Chandru Mirchandani Lockheed Martin IS&amp;GS – Civil, USA</p>
--	---	--

6:30 pm	7:00 pm	Cash Bar	Gateway Gallery
7:00pm	9:00pm	<p align="center"><b>Banquet, Plenary Speaker &amp; Awards Presentation</b></p> <p align="center"><b>Challenges of Creating Synergies in Systems of Systems Research</b></p> <p align="center"><b>Donna Rhodes</b> Senior Lecturer and Principal Research Scientist Massachusetts Institute of Technology, USA</p>	Gateway 4 & 5

<b>Thursday, March 22, 2012</b>			
---------------------------------	--	--	--

7:00 am	5:00 pm	Registration Desk Open	Gateway Gallery
7:30 am	8:30 am	Continental Breakfast	Gateway Gallery
8:30 am	8:45 am	Session Convenes & Announcements	Gateway 2
8:45 am	10:00 am	<p align="center"><b>Morning Plenary Speaker</b></p> <p align="center"><b>Title</b></p> <p align="center"><b>Tom Christian</b> <b>Title</b> <b>Affiliation</b></p>	Gateway 2
10:00 am	10:30 am	Break	Gateway 4 & 5

10:30 am	12:00 noon	Concurrent Sessions		
<p align="center"><b>Systems Architecting II</b> Gateway 2</p> <p align="center">Alexander Zadorojniy, Session Chair IBM Research, Israel</p> <p><b>159 - Fuzzy Assessor Using Type 1 and Type 2 Fuzzy Sets</b> Paulette Acheson   Cihan Dagli Missouri S&amp;T</p> <p><b>165 - Using System Architecture Maturity Artifacts to Improve Technology Maturity Assessment</b> Matin Sarfaraz   Brian J. Sauser, Stevens Institute of Technology, USA Edward W. Bauer, US Army RDECOM-ARDEC, USA</p> <p><b>171 - Algorithms for Finding Maximum Diversity of Design Variables in Multi-Objective Optimization</b> Alexander Zadorojniy   Michael Masin   Lev Greenberg   Ofer M. Shir, IBM Research, Israel Lawrence Zeidner, UTRC, USA</p> <p><b>177 - A Dependability Assessment Process for Ensuring Consistent Provisioning of Network Recovery</b> Joseph Kroculick, Winifred Associates, USA Cynthia Hood, Illinois Institute of Technology, USA</p>		<p align="center"><b>Energy Systems Applications</b> Gateway 1</p> <p align="center">David Haynes, Session Chair Missouri S&amp;T, USA</p> <p><b>394 - Preliminary Systems Engineering Risk Assessment to Attain National Renewable Energy Generation Targets</b> Joseph W. Nowak, The SI Organization, Inc, USA Shahram Sarkani   Thomas A. Mazzuchi, The George Washington University, USA</p> <p><b>370 - A Proposal to Use Real Time Pricing to Manage the Electrical Grid as a Step Toward Distributed Control</b> David Haynes   Steven Corns Missouri S&amp;T, USA</p> <p><b>388 - Driver Classification for Optimization of Energy Usage in a Vehicle</b> Gurunath Kedar-Dongarkar   Manohar Das Oakland University, USA</p> <p><b>382 - Local Control of Autonomous Power Inverters in a Microgrid</b> Wei Wu   Andy G. Lozowski Southern Illinois University, USA</p>		<p align="center"><b>BKCASE Tutorial</b> Gateway 3</p> <p>Everything You Wanted to Know about Early Adoption of SEBoK and GRCSE. David Olwell Naval Postgraduate School, USA</p>
12:00 noon	1:15 pm	<p align="center"><b>Luncheon Plenary Speaker</b></p> <p align="center"><b>Contingency Basing Integration Technology Evaluation Center – An Experimental Contingency Base at Fort Leonard Wood To Promote Sustainable Design and Construction</b></p> <p align="center"><b>Col H. Garth Anderson, PE</b> Principal Investigator US Army Corps of Engineers Construction Engineering Research Laboratory, USA</p>		Gateway 4 & 5
1:30 pm	3:00 pm	<p align="center"><b>Closing Panel Session</b></p> <p align="center"><b>Modeling and Simulation</b></p> <p>Moderator: <b>William J.(Bill) Bezdek</b>, The Boeing Company, USA Speakers: <b>Robert Kramer</b>, The Boeing Company, USA <b>Tom Bridges</b>, Boeing Training Systems and Government Services, USA <b>Mike Frankie</b>, The Boeing Company, USA <b>Pete Field</b>, F/A-18 Air crew Systems Advisory Panel, USA</p>		Gateway 2