



15th Annual International Symposium

INCOSE 2005

10-14 July 2005

Rochester, New York USA

**Systems Engineering:
Bridging Industry,
Government,
and Academia**

Hosted by: Finger Lakes Chapter

About INCOSE

International Council on Systems Engineering



International Council on Systems Engineering

INCOSE fosters the definition, understanding, and practice of World Class Systems Engineering in Industry, Academia, and Government.

INCOSE is an international organization formed to advance the state of the art of interdisciplinary engineering and associated means to enable the realization of successful systems. **INCOSE:**

- Provides a focal point for dissemination of systems engineering knowledge
- Promotes collaboration in systems engineering education and research
- Assures the establishment of professional standards, guidelines and handbooks for the practice of systems engineering
- Improves systems engineering processes
- Advances the state of the art in engineering of systems

INCOSE is a young, dynamic and growing organization. In some 15 years since its foundation, its growth to date has exceeded 5000 members and 51 chartered chapters or national societies worldwide.

The national or regional chapters, volunteer committees, and working groups provide the energy and direction for the organization. The

overall orchestration of INCOSE is the responsibility of the Executive Committee consisting of the President, President-elect, Secretary, and Treasurer. The Executive Committee, seven Directors and the Technical Director comprise the **Board of Directors**, which guides INCOSE activities. The Corporate Advisory Board, currently composed of some 49 international enterprises from different sectors of industry, academia, and government provides guidance and serves as the "voice of the consumer" for INCOSE's products. Companies come from diverse fields such as aerospace, automotive, defense, electronics, energy, general machine building, health, IT, mining, and transport.

INCOSE conducts a multitude of international, regional, and local meetings. The two principle yearly events are the International Workshop, held early in the year, serving as INCOSE's principal projects planning platform, and the large **International** in the June/July period. The International Symposium is INCOSE's foremost event, drawing up to 1000 participants for four days of technical exchanges, presentations, panel discussions, tutorials, and exhibitions.

For further information and to find links to INCOSE Chapters, Visit: www.incose.org

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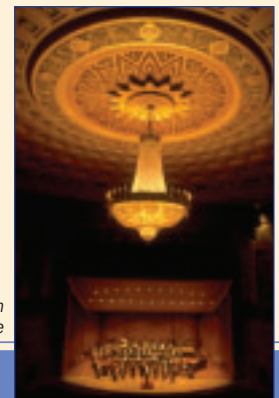
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 James Brill, 1995
 George Friedman, 1994
 Brian Mar, 1993
 Jerome Lake, 1992



Eastman Theatre

Welcome

Welcome to the 2005 INCOSE International Symposium

Welcome from Heinz Stoewer, INCOSE President



Dear Delegates,

The Rochester area is host to a number of world-famous companies operating very successfully in the global commercial markets. This created a welcome opportunity for INCOSE to emphasize the importance of Systems Engineering in commercial

industries. We anticipate stimulating dialogues across many different sectors of small and large enterprises, operating in fields such as printing, informatics, imaging, glass applications, automobiles, and aerospace or defense in R&D and production. At this Symposium we also intend to strengthen our bridges between industry, academia, and government institutions in many sectors, across the globe.

Rochester is may be less well known to most non-US INCOSE members, but let me assure you, it is a wonderful venue, located near vineyards, the famous Niagara Falls, and many small and large lakes embedded in a beautiful country setting. The Rochester Riverside Convention Center is located in the downtown business district and close to inspiring museums and interesting tourist sites.

Let me invite you most heartily to attend this Rochester symposium, which could turn out to be one of the best ever.

Heinz Stoewer
President, INCOSE

Welcome from the Member Board

As Chair of your Member Board, I encourage you to attend the premier event in our annual calendar – the International Symposium. The details of all the planned activities can be found at <http://www.incose.org/symp2005>. You may be interested to know that the theme for this year extends beyond our historical focus on defense and aerospace, to the world of commercial systems engineering. This presents an opportunity to hear from a wide range of practitioners in areas, from which we hope you will derive new and valuable insights. For delegates who are practitioners of commercial systems engineering, you will provide valuable insight into your domain and together we will be able to explore the commonalities and distinctions that exist between the two.

For those of you who are in leadership positions, there also will be opportunities to meet others in similar positions and exchange views and experiences. There will also be opportunities to meet the Board of Directors and discuss issues and concerns you may have.

The Symposium is not only a technical event but also an opportunity to recognize the many contributions to INCOSE and systems engineering. This year, we will celebrate the achievements of our chapters; we will be presenting the Presidents Award for outstanding chapter, and the Directors Award for most improved chapter during the banquet. And, the Circle Awards for chapter excellence will be presented at the Closing Plenary.

I look forward very much to meeting you in Rochester.

Bruce Shelton
Chair, Member Board

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Schedule-At-A-Glance

Schedule-At-A-Glance: 2005 INCOSE International Symposium

■ Saturday • 9 July 2005

- 0800 - 1700 Working Groups
- 1000 - 1700 Cyber Café Open

■ Sunday • 10 July 2005

- 0700 - 1700 Registration & Information Open
- 0800 - 1700 Cyber Café Open
- 0800 - 1700 Working Groups
- 1300 - 1700 Three Half Day Tutorials at no Extra Charge
- 1700 - 1800 Presidents Reception
- 1800 - 2100 Corporate Advisory Board Dinner

■ Monday • 11 July 2005

- 0700 - 1700 Registration & Information Open
- 0700 - 1800 Cyber Café Open
- 0730 - 0900 Continental Breakfast in the Galleria
- 0800 - 0930 Plenary Session
- 1000 - 1700 Academic Forum
- 1000 - 1700 Two Full Day Tutorials
- 1000 - 1200 Two Panels
- 1000 - 1200 Four Technical Paper Tracks (Session 1)
- 1200 - 1300 Lunch
- 1230 - 1330 Key Reserve Papers
- 1300 - 1700 Two Half Day Tutorials
- 1330 - 1455 Four Technical Paper Tracks (Session 2)
- 1530 - 1655 Four Technical Paper Tracks (Session 3)
- 1800 - 2000 Exhibitions Open
- 1800 - 2000 Ice Breaker Reception

■ Tuesday • 12 July 2005

- 0700 - 1700 Registration & Information Open
- 0700 - 1800 Cyber Café Open
- 0730 - 0900 Continental Breakfast in the Galleria
- 0800 - 0930 Plenary Session
- 0930 - 1700 Exhibitions Open
- 1000 - 1700 Two Full Day Tutorials
- 1000 - 1130 Two Panels
- 1000 - 1130 Four Technical Paper Tracks (Session 4)
- 1130 - 1230 Lunch
- 1230 - 1330 Key Reserve Papers
- 1300 - 1700 Two Half Day Tutorials
- 1330 - 1455 Four Technical Paper Tracks (Session 5)
- 1330 - 1655 Working Group Presentations

■ Tuesday • 12 July 2005 (continued)

- 1530 - 1655 Four Technical Paper Tracks (Session 6)
- 1730 - 2130 George Eastman House Reception
(Optional Event for an additional fee; buses depart beginning at 1730)

■ Wednesday • 13 July 2005

- 0700 - 1700 Registration & Information Open
- 0700 - 1800 Cyber Café Open
- 0730 - 0900 Continental Breakfast in the Galleria
- 0800 - 0930 Plenary Session
- 0930 - 1900 Exhibitions Open
- 1000 - 1700 Two Full Day Tutorials
- 1000 - 1125 Two Panels
- 1000 - 1125 Four Technical Paper Tracks (Session 7)
- 1130 - 1230 Lunch
- 1230 - 1330 Key Reserve Papers
- 1300 - 1700 Two Half Day Tutorials
- 1330 - 1455 Four Technical Paper Tracks (Session 8)
- 1500 - 1800 Robotics Competition
- 1530 - 1655 Four Technical Paper Tracks (Session 9)
- 1800 - 1900 Social Hour in the Exhibits Hall
- 1930 - 2200 Symposium Banquet in the Exhibit Hall

■ Thursday • 14 July 2005

- 0700 - 1400 Registration & Information Open
- 0700 - 1400 Cyber Café Open
- 0730 - 0900 Continental Breakfast in the Galleria
- 0900 - 1300 Exhibits Open
- 0830 - 1025 Four Technical Paper Tracks (Session 10)
- 0830 - 1025 Two Panels
- 0830 - 1230 Two Half Day Tutorials
- 1100 - 1225 Four Technical Paper Tracks (Session 11)
- 1230 - 1315 Lunch
- 1230 - 1315 Key Reserve Papers
- 1330 - 1530 Closing Plenary
- 1530 - 1630 Closing Reception

■ Friday • 15 July 2005

- 0800 - 1200 Half Day Technical Tour at Xerox Corporation
- 1300 - 1700 Half Day Technical Tour - ITT Industries

FINAL PROGRAM SUBJECT TO CHANGE

Welcome

Welcome from the Symposium Committee



Message from the General Chair



"Bridging Government, Industry, and Academia." The Finger Lakes Chapter of INCOSE invites you to join us this July in Rochester, New York, USA as we celebrate the fifteenth birthday of the International Council on Systems Engineering! During the symposium, we will celebrate 15 years of building bridges – welcoming our commercial cousins, building on our government heritage, and celebrating the breadth and depth of academic programs.

In 1991, one hundred systems engineering pioneers attended the first symposium of our newly appointed organization. The whole of INCOSE was one chapter, and very few universities had course offerings. In 1995, after years of explosive growth, INCOSE included chapters in Australia, the UK, Germany, and Canada. Today, we have over 50 chapters and start-up chapters in Korea, China, Taiwan, South Africa, and many more countries. Our Corporate Advisory Board includes nearly 50 worldwide companies. And, we have nearly 5000 members.

Why should you attend? At INCOSE's 2004 International Symposium, there were over 700 delegates from 30 countries. Together we continued to foster the definition, understanding, and practice of systems engineering. This year, we will strive to further our views and practice. We offer you 17 tutorials, 146 papers, and a robust exhibit hall with tool vendors, universities, and companies willing and able to discuss their contributions to the systems engineering community. In addition, we are providing technical tours at the end of the week, showcasing the innovations in two Rochester companies, namely Xerox and ITT.

Our social program will offer you, your family, and colleagues an opportunity to explore the region's delightful, historical, and intellectual attractions. Be sure to review this brochure, as well as visit the IS2005 website (www.incose.org/symp2005) to learn more about the region's lakes, museums, natural splendors, shopping opportunities, wineries, theater, and music.

INCOSE continues to grow and learn, and you are invited to join us in building bridges. See you in Rochester!

Bob Lyons
Symposium General Chair, INCOSE 2005
Xerox Corporation

Message from the Technical Chair



In its infancy, systems engineering was a term used in government entities, particularly in the defense industry. Over time, academia provided programs in the cross-disciplinary and unique skills needed to perform systems engineering. Sometimes it is said that commercial and consumer product segments have been the last to embrace the

systems engineering and the upfront cost, planning, and technical specification. You may not feel that this is technically correct; many argue that commercial industries have been applying an SE discipline, but call it something different. Regardless of your view, as industrial systems become more complex, the need for the systems engineering rigor is being seen as a necessity not a "nicety."

I think it opportune that INCOSE's 2005 International Symposium is being held in Rochester, New York. Rochester has been the birthplace for many technological and innovative companies that had to create the "whole system" in order to deploy and support their product lines. This includes Xerox with the introduction of the copier system, Corning's innovation in glass and ceramic products, Bausch and Lomb's optics and optical equipment, and Kodak's "you push the button and we do the rest" introduction of consumer photography. There are many others. This region has also been involved in government contract work, including Kodak (now ITT), General Dynamics (who no longer has a presence), Lockheed Martin (located a couple hours south), and many others. The area is endowed with a number of universities that provide systems engineering education, such as the Rochester Institute of Technology and Cornell University.

The symposium theme of *Bridging Industry, Government, and Academia* is very fitting as INCOSE, and this region, expands its outreach and brings together the best minds from around the world to share knowledge and application. We offer you an outstanding program of papers, panels, and tutorials, with keynote speakers who span industrial and government segments. The schedule of events includes daily speakers, as well as the advantage of attending tutorials every day. There will be plenty of opportunities to talk with kindred spirits about our commonalities and differences.

I invite you to come to Rochester, New York this July and participate in a truly "bridging" systems engineering event.

Jack Riley
INCOSE 2005 Symposium Technical Program Chair
ITT Space Systems Division

Keynotes

Keynotes: 2005 INCOSE International Symposium



Tuesday Keynote: Hans Jørgen Lindland **Subsea Production Systems – The Importance of Systems Engineering**

Tuesday, 12 July 2005, 8:30 AM



Hans Jørgen Lindland holds a MSC (equivalent) in petroleum engineering. He is currently Managing Director of FMC Production Services A/S. Mr. Lindland's career comprises seven years with Elf in production and completion operations, and 19 years with Statoil within well technology and subsea production systems.

Mr. Lindland has been Statoil's subsea chief engineer for seven years. He holds several patents relevant to subsea technology. Mr. Lindland has also served as chairman and committee member for various conferences and workshops, and has published several papers on the subject of subsea technology.

Preliminary Abstract: Focus on Systems Engineering for Subsea Exploration and on E-field operations. E-field operations is becoming a key operating mechanism for the oil and gas offshore industry. This field uses the electronic technology to run complicated offshore/subsea operations, from the shore to anywhere in the world.

A systems engineering approach is essential to merge information from the reservoir, the wells, subsea systems, and process systems online at the support/receiving facility.

Tuesday Evening Keynote: James Stoffel **Systems Engineering – An Imperative for Economic Growth**

Tuesday, 12 July 2005, 6:45 PM (at the Eastman House)



Dr. Stoffel joined Kodak in 1997, in the newly created position of vice president and director, Electronic Imaging Products Research & Development. He was promoted to director of Research & Development in 1998. He had previously been with Xerox Corporation.

Jim began his career at Xerox and held various positions of increasing responsibility in research, product development, manufacturing, and marketing. In 1989, he was named vice president & chief engineer; and subsequently, vice president, imaging systems development; and vice president and general manager of the Advance Imaging business unit for Xerox.

Stoffel was elected a corporate officer and vice president of Kodak in 1998. In 1999, he was promoted to Director of Research and Development and vice president, responsible for research and development for all Kodak laboratories worldwide. In 2000, he was appointed Chief Technical Officer and elected a senior vice president. His most recent responsibility was for Kodak Ventures (venture capital and new business incubation) and the new Kodak Display Business Unit. Stoffel retired from Kodak in February 2005.

Stoffel received a BSEE Magna Cum Laude degree from the University of Notre Dame. As a NDEA Fellow at Syracuse University, he received his MSEE degree in 1970 and his Ph.D. in 1972. He is the author/editor of "Binary and Graphical Image Processing," a reference book for graduate students. He holds over 25 U.S. patents and numerous international patents.

Stoffel currently is on the boards of directors for Harris Corporation and NexPress Solutions LLC. He is a member of the advisory board of the graduate school at the University of Notre Dame. He is a Trustee for the George Eastman House. He also serves on the Executive Committee and Board of the Information Technologies Industries Association, Washington, D.C.



The gardens at the Eastman House

Wednesday Keynote: Anthony M. Federico
System Engineering in Advanced Color Imaging

Wednesday, 13 July 2005, 8:30 AM



Anthony M. Federico is vice president, platform development, Production Systems Group of Xerox Corporation, Stamford, Conn. He was appointed to this position in December 2001. He has been a corporate vice president since December 1998. Federico has responsibility for the development and delivery of all Xerox production products including Nuvera, with special focus on DocuColor iGen3, for which he is the chief engineer.

Federico joined Xerox in 1968 and has held various general and program management positions as well as numerous engineering, solutions, information technology, and process re-engineering positions. His more recent positions have been chief engineer Network DocuTech; vice president, general manager, Technology and Document Production Solutions for Xerox Business Services (XBS); and vice president, Market To Collection and North American Information Management. In 1998, he was appointed chief engineer to Xerox. In 2001, he was vice president, general manager for the Production Solutions Business.

Federico earned a Bachelor of Science degree in mathematics and electrical engineering from the University of Rochester and has done graduate work in these areas at Rochester Institute of Technology. He holds 24 patents and has been the recipient of the 1991 President's Award and the 1991 Individual Excellence Award from Xerox. Federico was born in Rochester, N.Y.



Eastman Theatre at night

Thursday Keynote: Steve Easterbrook
Bugs in the Space Program: The Role of Software in Systems Failure

Thursday, 14 July 2005, 1:00 PM



Steve Easterbrook is an associate professor of computer science at the University of Toronto, director of the Bell University Labs, and associate director of the Knowledge Media Design Institute. He received his PhD in 1991 from Imperial College, London, on the topic of negotiation and communication

of system requirements. He joined the faculty in the School of Cognitive Science at the University of Sussex, where he pioneered new degree programs in human-centered software design, leading an interdisciplinary team of cognitive and socialpsychologists, human-computer interaction specialists and computer scientists. From 1995 to 1999, he led the research team at NASA's Independent Verification and Validation (IV&V) Facility in West Virginia. During this time he investigated techniques and processes for software verification, and acted as an expert advisor for NASA on the independent assessment and IV&V contracts for the Space Shuttle Flight Software, the International Space Station, the Earth Observation System, as well as several planetary probes.

In 1999 he joined the faculty at University of Toronto, where he continues his research and teaching in software verification, systems analysis, and requirements engineering. He has published over 60 papers in software engineering, including pioneering work on the introduction of formal verification techniques into software practice, and on managing inconsistencies in software specifications. He served as general chair for the International Symposium on Requirements Engineering in 2001, and continues to serve on the RE conference steering committee. He has served on the program committees for many international conferences and workshops in Requirements Engineering and Software Engineering, and is a member of the editorial boards of the Requirements Engineering Journal and the Journal of Automated Software Engineering.

Academic Forum Speakers

Academic Forum Speakers: 2005 INCOSE International Symposium

Systems Engineering Challenges That Demand a Response from Academia

Monday, 11 July 2005, 1030 – 1700

The world is changing rapidly:

- Extreme complexity has arisen in most engineered systems
- Energy and environmental sustainability is also a systems problem
- Security is a globally complex issue
- Transportation and space applications are systems problems

In keeping with the conference theme of "Bridging Industry, Government, and Academia," the INCOSE 2005 Academic Forum will feature speakers from all three realms. David Walden, from General Dynamics Advanced Information Systems, T. Tupper Hyde from NASA, and W. Kent Fuchs from Cornell University will address the Forum on challenges and progress from their unique perspectives. The goal is to stimulate a broad-based view of challenges across a spectrum of social and technological fronts. Security, energy, transportation, space exploration, and sustainable development are broad areas of engagement but systems engineering is a critical intellectual tool in addressing all of the issues that arise within these areas. An afternoon panel discussion will take up the themes from the morning keynote and forum speakers and reflect on the different ways in which academia can and should respond to these challenges.

A second theme of the Academic Forum is to share some of the exciting student/faculty projects and research taking place in university Systems Engineering programs. A number of representatives from various universities will present systems engineering projects incorporated into their students learning.

Academic Forum Speakers



David D. Walden, Technical Director and Systems Engineering IPT Lead, *General Dynamics Advanced Information Systems*.

David D. Walden is Technical Director and Systems Engineering IPT Lead on the Future Combat Systems (FCS) Integrated Computer Systems (ICS) program for General Dynamics Advanced Information Systems (GDAIS). In this position,

Dave leads all the Systems Engineering activities of the program. Dave has personnel in five different GDAIS and partner/supplier sites supporting this complex system-of-systems program for the Army. Prior to GDAIS, Dave worked at McDonnell Douglas from 1983 to 1993 as an Avionics Analyst.

Dave is a graduate of Valparaiso University, with a bachelor's degree in Electrical Engineering. He received master's degrees in Electrical Engineering and in Computer Science from Washington University in St. Louis and a master's degree in Management of Technology from the University of Minnesota. Dave is an active member of International Council on Systems Engineering (INCOSE) and is on its Board of Directors as the chair of the Corporate Advisory Board (CAB).



W. Kent Fuchs, Joseph Silbert Dean of Engineering, *Cornell University*

Kent Fuchs has been Dean of the College of Engineering, Cornell University, since 2002. He was formerly Head of the School of Electrical and Computer Engineering, Purdue University and Michael J. and Catherine R. Birck Distinguished Professor. Before serving at Purdue, he was Professor in the Department

of Electrical and Computer Engineering and the Coordinated Science Laboratory, University of Illinois. W. Kent Fuchs received the B.S.E. degree from Duke University, M. Div. degree from Trinity Evangelical Divinity School, and the Ph.D. in Electrical Engineering from the University of Illinois. His research interests include dependable computing, integrated circuit testing, and failure diagnosis. He is a Fellow of the IEEE and a Fellow of the ACM.



Lilac Fest



T. Tupper Hyde, Senior Engineer, NASA

Dr. T. Tupper Hyde is a senior engineer at NASA's Goddard Space Flight Center. His current missions include the James Webb Space Telescope and the Laser Interferometer Space Antenna, as well as proposed future missions for laser communications, and large aperture and interferometric observatories. Dr. Hyde's expertise is space systems engineering and guidance, navigation, and control systems engineering. He received his PhD in Controls and Estimation from the MIT Department of Aeronautics and Astronautics in 1995. Before coming to NASA, Tupper was Manager of Advanced Technology for Honeywell Space Systems.



Erie Canal Schoen Place

■ **Forum Panel Moderator**



Neil Schilke, Managing Director,
Automotive Resources Institute

As Managing Director of Automotive Resources Institute, Neil Schilke provides overall leadership and management for ARI. He is responsible for every day operations and the impact of ARI in the automotive industry.

Schilke has more than 40 years of automotive experience with General Motors Corporation, beginning his career in the manufacturing area with Chevrolet Motor Division and later joining the GM Research Laboratories (GMR). At GMR, he was an active researcher and manager in a number of technical areas including conventional and advanced powertrains, vehicle aerodynamics, acoustics and vehicle control systems. Schilke became a GM project manager in 1984 to help establish integrated vehicle control and systems engineering capabilities for GM. In 1988, he moved to the Chevrolet-Pontiac-Canada Car Group to form the GM Systems Engineering Center, which eventually became part of North American Operations (NAO) Engineering Center. Schilke served as general director of engineering for GM of Canada and went on to work for the GM Public Policy Center.

Schilke is an alumnus of Cornell University, Ithaca, N.Y., where he earned his bachelor's and master's degrees in mechanical engineering, and is a member of the University Council. Schilke is past-president of the Society of Automotive Engineers and was founding director of the SAE Foundation in Canada.



Summer on Main
Street, Rochester

APPLICATION

Acknowledging Uncertainty in the Provision of Defence Capability

E. Rajabally, *Systems Engineering Innovation Centre*; S. Snape, P. Sen, *University of Newcastle*; S. Whittle, *BAE SYSTEMS*

Development of an Object-Oriented Multi-Leg Route Choice Model on Transportation Network Simulation

E-S. Yang, E. Garcia, D. Mavris, *Georgia Institute of Technology*

What are Levels?

T. Bahill, R. Botta, *BAE SYSTEMS*; E. Smith, *University of Arizona*

APPLICATION – COMMERCIAL

Renovate WBS Planning with Technology Roadmap for New Product Development

H-K. Lee, *Institute of Nuclear Energy Research*; C-M. Liu, M-H. Lee, *National Tsing Hua University, Taiwan*

System Engineering Issues in the Transformation to Service Oriented Architecture

M.R. Halley, *The MITRE Corporation*

Towards an Integrated Methodology for the Model-based Development of Embedded Automotive Control Software

K. Buhr, *Technical University Berlin*; M. Conrad, H. Doerr, I. Fey, *DaimlerChrysler Inc.*

APPLICATION – TRANSPORTATION

Applying Quantitative Methods for Architecture Design of Embedded Automotive Systems

O. Larses, *Scania*

Successful Implementation and Application of Continuous Risk Management to Complex Systems Development in the Automotive Industry

H. Negele, *BMW Group*; T.M. Pfletschinger, S. Wenzel, *3D Systems Engineering GmbH*; G. Getto, *KuglerMaag+Comp. Ltd. & Co. KG*

Systems Engineering for the Development of a Decision Support System to Help Manage the Railway Wheel – Rail Interface

V.H. Thanh, C.Z. Roberts, J.S. Williams, K.B., A.B. Stirling, *The University of Birmingham*

EDUCATION

Didactic Recommendations for Education in Systems Engineering

G. Muller, *Embedded Systems Institute*

SERef – A System for Facilitating Access to the Gems of the INCOSE Treasury

E. Herzog, A. Pandikow, J. Andersson, *Syntell AB*

What Can a Project Manager Learn From an Actor? Improving Professional Skill Through Analogical Thinking

G. Backlund, J. Sjunnesson, *Combitech Systems AB*; E. Josephson, *The Royal Dramatic Theatre, Sweden*

EDUCATION – CURRICULA

Conceptual Design of an Environment for Systems Engineering Education

D.M. Buede, J. Ring, *Innovation Management Inc.*; F. Bolling, *University of Michigan-Dearborn*

Structuring a Professional SE Curriculum

S.A. Sheard, M. Swayhoover, *Systems and Software Consortium*

Systems Engineering Degree Programs In the United States

W.J. Fabrycky, *Academic Applications International, Inc*

EDUCATION – RESEARCH & DESIGN

An Approach to Developing R&D Standard Processes

Y.H. Hwang, J-G. Park, *ETRI*

The Core Competencies of Systems Engineering

D.D. Cowper, *University College London*; R. Allen-Shalles, *Thales*; S.F. Brown, *BAE SYSTEMS*; J. Hooper, *Loughborough University*; S. Hudson, *General Dynamics UK*; L. Oliver, *EADS Astrium*; K. Barnwell, *UK Ministry of Defence*

Enabling the Researcher: Applying Systems Engineering to Research

F. Bulca, *MDS SCIEX*

Industry and Academia: Why Practitioners and Researchers are Disconnected

G. Muller, *Embedded Systems Institute*

A Meeting of the Minds: A Successful Systems Engineering Experiment Using Concept Maps for Effective Communications

C.A. Calimer, *Boeing Inc.*; J.L. BeVier, *John L. BeVier & Associates, LLC*

Towards a Structure for Systems Engineering Research

T.L. Ferris, S.C. Cook, *Systems Engineering and Evaluation Centre*; E.C. Honour, *Honourcode Inc*

Work Practice in Research: A Case Study

N.G. Martin, *Xerox Corporation*

ENTERPRISE SYSTEMS

Bridging Systems Engineering Views with A Structuring Matrix

D.J. Battersby, C. Holden, *BAESYSTEMS SEIC*

Engineering Enterprises Using Complex-System Engineering

B.E. White, M.L. Kuras, *The MITRE Corporation*

Enterprise Architecture and Aesthetics

P. King, *VEGA Group PLC*

Evolving to Intelligent Systems Engineering: An IS2004 Panel Report

J. Ring, *Innovation Management*

Revisiting the Notion of System - Organizations and Enterprises as Systems

A. Faisander, *MAP systeme*

State Analysis Requirements Database for Engineering Complex Embedded Systems

M.B. Bennett, R.D. Rasmussen, M.D. Ingham, *Jet Propulsion Laboratory*

MEASUREMENT & ANALYSIS

A Case Study of Multi-Disciplinary Modeling Using MATLAB Simulink and TrueTime

P. van den Bosch, *Oce-Technologies BV*; E. van de Waal, *Imtech ICT Technical Systems*

Engineering and Implementation of RMS Engineering's DTC Metric

G. Stratton, Q. Redman, E. Casey, *Raytheon Missile System*

Generic Measures of Effectiveness for Systems

T.C. Mackley, *Cranfield University*

Measure Like a Fighter Pilot

J.H. Lindley, *Raytheon*

The Nuts, Bolts and Duct Tape of Establishing a System Engineering Measurement Program

P.J. Frenz, *General Dynamics Advanced Info Systems*

Systems Engineering Measurement Primer: A Metrological Evaluation

T.L. Ferris, *Systems Engineering and Evaluation Centre*

MODELING

Enhanced Interoperability for Systems Engineering Data by a Transformation Report

R. Eckert, W. Mansel, *EADS Deutschland GmbH*; G. Specht, *University of Ulm*

A Lifetime Extension Strategy for Simulation Models

S. Grainger, *General Dynamics C4 Systems*

Managing Effectivity of SE Work Products

D.K. Smith, *UGS Corporation*

MODELING TOOLS

Modeling DoDAF Compliant Architectures

C. Sibbald, *Telelogic, North America*; C. Kobryn

A Generic, Adaptive Systems Engineering Information Model

J.J. Simpson, *The Boeing Company*; C. Dagli, S. Grasman, A. Miller, *University of Missouri - Rolla*

Potholes in the Road to Good Systems Engineering

J.R. Armstrong, *Systems and Software Consortium*

Object-Oriented Development For C4ISR System of Systems

S.P. Stanilka, *IncoSe*; C.H. Dagli, A. Miller, *University of Missouri - Rolla*

MODELING – SysML

Modeling High-Level Requirements in UML/SysML

M.C. Hause, F. Thom, *Artisan Software Tools*

Modeling Interoperability with SysML and Structured Connectivity

M. Park, R.C. Thompson, *The Boeing Company*

SysML – An Assessment

E. Herzog, A. Pandikow, *Syntell AB*

PATTERNS & MODEL-BASED SE

Requirements Statements Are Transfer Functions: An Insight from Model-Based Systems Engineering

W.D. Schindel, *ICTT, Inc., and System Sciences, LLC.*

Application of Patterns and Pattern Languages to Systems Engineering

C. Haskins, *TSS Consulting*

Developing Section 4 Verification Requirements: Getting Early Buy-In from Industry & Government Stakeholders

B.R. Haskins, J.M. Striegel, *The Boeing Company*

PROCESS

A Structured Method for Generating, Evaluating and Using Metrics

R.W. Kitterman, *Northrop Grumman*

An Agile Meta-Process Producing a Deliverable-Centric Process

M. Lizotte, C. Lalancette, G. Dussault, M. Couture, M. Mokhtari, F. Bernier, *Defence R&D Canada - Valcartier*; S. Lam, *Defence R&D Canada - Ottawa*

Observable States May Be Necessary When Using COTS Products

R. Botta, T. Bahill, *BAE SYSTEMS*; Z. Bahill, *Boeing Integrated Defense Systems*

PROCESS IMPROVEMENT

The Axes Guiding Development of a Capability Engineering Process

F. Bernier, M. Mokhtari, M. Couture, M. Lizotte, F. Lemieux, S. Lam, C. Lalancette *R&D Defence Canada - Valcartier*

Improving Process Evolution Using Ideas from the Venture Capital Industry

D.P. Rogers, *University of South Australia*; P. Beukman, *University of Canterbury*

Measuring the Lifecycle Value of a System

T.R. Browning, *Texas Christian University*; E.C. Honour, *Honourcode, Inc.*

Putting Leadership into Systems Engineering - A Model for Systems Engineering

Leadership Development

T.H. Holzer, *National Geospatial-Intelligence Agency*

PROCESS IMPROVEMENT *(continued)*

Seamless Engineering Process to Enhance Systems Engineering Effectiveness

J.R. Jolly, L. Shepard, S. Bean, A. Hough, *BAE SYSEMS*

System Integration Frameworks

J. Simpson, M. Simpson, *System Concepts*

PRODUCT DEVELOPMENT

Exploring Engineering Governance

J.V. Nendick, K. Callan, G.A. Ng, C.E., M.A. Sinclair, *Loughborough University*

Implications of Sociological Systems Theory on Systems Engineering and Product Development

U. Pulm, *Engineering Design Centre EDC*

What Question are You Trying to Answer? Identifying the Right Products for an Architecture Effort

M.S. Russell, *Anteon Corporation*

RELIABILITY

Development of a Sustainable Process for the Generation, Validation, and Application of Human Reliability Assessment Within the Engineering Design Lifecycle

G.A. Ng, M.A. Sinclair, C.E. Siemieniuch, *Loughborough University*

Four Strategies for Reliability - Improving Robustness to One-sided Failure Modes

D.P. Clausing, D. Frey, *MIT*

Systems Reliability Demonstration

A. Zonnenshain, Z. Benyamini, *RAFAEL*

REQUIREMENTS

Developing Requirements for Technology Driven Products

L.S. Wheatcraft, *Compliance Automation, Inc.*

A Hybrid Requirements Capture Process

J.D. Daniels, R. Botta, *BAE SYSTEMS*; T. Bahill, *University of Arizona*

Quantifying the Evolution of Goals in Requirements Engineering: A Study on the Quality Assurance Review Assistant Tool

K.M. Cooper, T. Chowdhury, L. Chung, *University of Texas at Dallas*

RAS-Centered Requirements Analysis

J.O. Grady, *JOG System Engineering, Inc.*

Real Requirements: How To Find Out What The Requirements Really Are.

T. Gilb, *RPL*

Why Are Requirements So Hard To Get Right?

J.W. Carl, *Harris Corporation*

RESEARCH

Accelerating the Development of Senior Systems Engineers

H.L. Davidz, D.J. Nightingale, D.H. Rhodes, *Massachusetts Institute of Technology*

Adaptive Test Process – Designing a Test Process that Adapts to the State of a Project

V. Levardy, *Tech Univ Muenchen*; T.R. Browning, *Texas Christian University*

COSYSMO Sizing Referents

R. Valerdi, J. Lanes, *USC Center for Software Engineering*; J. Raj, *San Diego State University*

Helping New Products Enter a Complex System: Systems Engineering in Healthcare

L.G. Osipenko, *Stevens Institute of Technology*

Improving VVT Process in SysTest Project: Evaluating Results of Pilot Projects in Six Industries

M. Hoppe, *Tech Univ Muenchen*; A. Engel, *Israel Aircraft Industries*

Integrating Views in a Multi-view Modelling Environment

J. El-khoury, O. Redell, M. Toerngren, *The Royal Institute of Technology (KTH)*

RESEARCH (continued)

A System-of-Systems Approach for Application to Large-Scale Transportation Problems

T. Kang, D.N. Mavris, *Georgia Institute of Technology*

Systems Engineering in Environmental Regulation of Offshore Drilling Operations

J. Pettersen, E. Hertwich, *Norwegian Univ. of Science and Technology*; J.E. Paulsen, *Statoil ASA*

Systems Engineering of Socio-Technical Systems

M. Ottens, M. Franssen, P. Kroes, I. van de Poel, *Delft University of Technology*

SE APPLICATION

Data Model: Queen of the Zachman Chessboard

G. Dobbs, *Dynamic Research Corporation*

Engineering Information Assurance for Critical Infrastructures: The DITSCAP Automation Study

S-W. Lee, G-J. Ahn, R. Gandhi, *University of North Carolina at Charlotte*

Is He In Heaven or Is He In Hell That Illusive Systems Integrator? Who's Looking After Your Systems Integration?

D.D. Cowper, M.R. Emes, A. Smith, *University College London*

Quantitative Assessment of Expected Space Mission Return in Terms of NASA's Institutional Goals

K.E. Shelton, G. Rodriguez, C.R. Weisbin, A. Elfes, *Jet Propulsion Laboratory*

Using an Enterprise Architecture to Assess the Societal Benefits of Earth Science Research

J.N. Martin, *The Aerospace Corporation*

Systems Engineering Approach to Warship Signatures Management

M. Manzini, M. Montigiani, *Orizzonte Sistemi Navali S.p.A.*

Towards Network Enabled Capability Delivery Through Changing UK MOD Smart Acquisition

D. Kemp, *UK MOD – DDSA*; G.D. Payne, *QinetiQ*

SE APPLICATION – BUSINESS

The ABCs of AFs: Understanding Architecture Frameworks

R. Siegers, *Raytheon*

Agile Specification Quality Control: Shifting Emphasis from Cleanup to Sampling, Measurement, Motivation and Prevention of Defects.

T. Gilb, *RPL*

Development of an Integrated Facilities Management Baseline at a Federal Agency Using a Systems Engineering Approach

R. Thurau, *National Geospatial-Intelligence Agency*; C. Dagli, D. Enke, *University of Missouri at Rola*

How to Routinely Assure Project Success

N. Malotaux, *N R Malotaux - Consultancy*

International Standards for System Integration

R. Martin, *Tinwisle Corporation*

Learning from Lessons Observed – Mitigating Resistance to SE Process Change

T.H. Holzer, *National Geospatial-Intelligence Agency*

A Mark-Up-Language to Support the Exchange of Requirements During a RFQ

R. Kaffenberger, *Kaffenberger SE*

Quantifying Cost Risk Early in the Life Cycle

C.R. Kenley, *Kenley Consulting, LLC*; N. James, *Bechtel SAIC Company, LLC*

Tailoring Systems Engineering Lifecycle Processes to Meet the Challenges of Project and Programme Applications

R. Adcock, *Cranfield University*

SE APPLICATION - SECURITY

Extending Systems Engineering Frameworks for Special Application Areas: Case Study Safety and Security

L. Ibrahim, *U.S. Federal Aviation Administration*; C. Wells, *I-metrics LLC*; R. Bate, *Software Engineering Institute*

SE APPLICATION - SECURITY (continued)

Integrated Communications Architecture for Homeland Security

L.W. Yeoh, K.S. S. Tan, *Defence Science and Technology Agency*

Methodology Selection for the Engineering of Defence Systems

L.J. Vencel, *Vcorp Consulting Pty Ltd*; S.C. Cook, *Systems Engineering & Evaluation Centre*

SE INITIATIVES

Enhancing Commercial Systems Engineering with Design for Six Sigma

C.M. Creveling, *PDSS Inc*

System Engineering Application to Knowledge Intensive Service Industry Development Strategy and Mechanism Formation

T-J. Wang, H. Chin, *System Technology Division, CAST/ITRI*; L. Chang, *ERL/ITRI*

The Systems Engineering Upgrade Initiative at NASA's Jet Propulsion Laboratory

R. Jones, *Jet Propulsion Laboratory*

SE MANAGEMENT

A Case Study Example of the Role Matrix Technique

K. Callan, C.E. Siemieniuch, M.A. Sinclair, *Loughborough University*

Engineering a Corporate Memory: Some Practical Insights

M. Young, *Defence Institute*

Estimating and Optimizing System's Quality Costs of Transport Helicopter Avionic System Upgrade

A. Engel, S. Shachar, I. Bogomolni, *Israel Aircraft Industries (IAI)*

Extreme Leadership for Systems Engineers

T. Fosnes, *Norwegian Defence Materiel Agency*

A Framework for Understanding Uncertainty and Its Mitigation and Exploitation in Complex Systems

H.L. McManus, *Metis Design*; D.E. Hastings, *Massachusetts Institute of Technology*

From Waterfall to Evolutionary Development (Evo) or How We Rapidly Created Faster, More User-friendly, and More Productive Software Products for a Competitive Multi-National Market

T. Johansen, *FIRM AS*; T.S. Gilb, *RPL*

Governing Systems Engineering as an Enterprise Competence – A Benchmarking Study with Pertinence to the US Department of Defense

W.P. Mullins, *Consultant*; M.A. Wilson, *Strategy Bridge International, Inc*

Guidance on Tailoring of Systems Engineering Processes for Quick Reaction Capability (QRC) Developments

A. Richstein, *Space Technology Office*

How the Pro-Active Program (Project) Manager Uses a Systems Engineer's Trade Study as a Management Tool, and Not Just a Decision-Making Process

A. Felix, *U. S. Navy*

Managing Priorities: A Key to Systematic Decision Making

T. Gilb, *RPL*; M.W. Maier, *The Aerospace Corporation*

Performance-Based Earned Value

P. Solomon, *Northrop Grumman*

Proposition of a Methodology for the Management of Innovative Design Projects

C. Baron, S. Rochet, C. Gutierrez, *LESIA*

QuARS: Automated Natural Language Analysis of Requirements and Specifications

R.W. Ferguson, D. Goldenson, *Software Engineering Institute*; G. Lami, M. Fusani, S. Gnesi, F. Fabbri, *National Research Council (CNR), Italy*

Requirements – The Good, the BaD, and the Ugly

J. Martin, *The Aerospace Corporation*; S. Arnold, *QinetiQ*

Towards a Collaborative Engineering Environment to Support Capability Engineering

W. Robbins, S. Lam, C. Lalancette, *Defence Research and Development Canada*

The Tradespace Exploration Paradigm

A.M. Ross, D.E. Hastings, *Massachusetts Institute of Technology*

SE PRINCIPLES

Agile SYSTEMS ENGINEERING versus AGILE SYSTEMS engineering

R. Haberfellner, *Technical University Graz*; O.L. de Weck, *Massachusetts Institute of Technology*

Canadian Capability Engineering Process Foundations

M. Mokhtari, M. Lizotte, C. Lalancette, G. Dussault, M. Couture, F. Bernier, *Defence R&D Canada-Valcartier*; S. Lam, *Defence R&D Canada-Ottawa*

The MSOCC Data Switch Replacement: A Case Study in Eliciting and Elucidating Requirements

J.E. Kasser, *University of South Australia*; C. Michandani, *Lockheed Martin*

Practical Applications of Complexity Theory for Systems Engineering

S.A. Sheard, *Systems and Software Consortium*

Some Really Useful Principles: A New Look at the Scope and Boundaries of Systems Engineering

H.G. Sillitto, *Thales UK*

A Systems Approach to Process Infrastructure

J.R. Armstrong, *Systems and Software Consortium*

SE PROCESS

10 Golden Questions for Concept Exploration and Development

D.C. Surber, *Raytheon Technical Services Company, LLC*

Capability Engineering Process within Canadian Defence: Some Engineering Issues

M. Couture, M. Lizotte, G. Dussault, M. Mokhtari, F. Bernier, S. Lam, C. Lalancette, *Defence Research and Development Canada*

A Conflict Resolution Approach to Capturing System Architecting Lessons Learned

C.J. Bryan, *The Boeing Company*; C. Dagli, *University of Missouri - Rolla*

The Producing System

A.S. Paul, *Howard University*; G.A. Yerace, *US Army Research Laboratory*

Requirements Management, from the RFP to the Project

R. Jakacky, *ITT Corporation*

Requirements Re-use: A Practical Application for Product Line Management

G. Fanmuy, Y. Delu, *PSA Peugeot Citroen*

SYSTEMS ARCHITECTURE

Addressing the System of Systems Challenge

M.A. Wilson, *Strategy Bridge International, Inc.*; J. Boardman, *Elipsis, Inc.*; A. Fairbairn, *JBA, Ltd.*

Architecting Ontological Systems

A.R. Terrill, *The Boeing Company*; C. Dagli, S. Grasman, *University of Missouri-Rolla*

Family-of-Systems Architecture Analysis Technologies

P.P. Jain, *Information Systems Sector*; C. Dickerson, *BAE SYSTEMS*

Introducing the Role of Process Architecting

J.E. Kasser, *University of South Australia*

Network Centric Architectures: Are We Up to the Task?

S.T. Booth, *Vitech Corporation*

Obsolescence Management for System-of-System Hierarchies: A Technology-based Approach

T.E. Herald, *Lockheed Martin*

Emergence : The Complexity of Systems Interaction

G.R. McConnell, *BAE SYSTEMS*

Measuring the Performance of the Risk Management Process

B.B. Roberts, *Futron Corporation*; R. Kitterman, *Northrup Grumman Newport News*

Systemes Engineering: Driving the Evolution to Actionable Architecture

J. Popkin, *Popkin Software*

KEY RESERVE PAPERS

Adopting SEER Cost Estimating Tools to Evolutionary Acquisition

E.J. Stump, *Galorath Incorporated*

Calculations of Flexibility in Space Systems

R. Nilchiani, D.E. Hastings, C. Joppin, *Massachusetts Institute of Technology*

Design Evaluation: Estimating Multiple Critical Performance, Quality and Cost Impacts Based on Evidence and Feedback

T. Gilb, *RPL*

DFSS Integrated with Systems Engineering Tools

M. Sampson, G. Gianacakes, *UGS/EDS*

Evolutionary Systems Engineering Principles: The Fundamental Principles of Evolutionary Project Management

T. Gilb, *RPL*

A Highly Automated CMMI-Driven Self-Organizing and Mapped Document Library

D. Beshore, *Enerspace Technologies*

Modeling ISO 15288 & Tailoring Enterprise Systems Engineering Processes for an Organization's Success

L.M. Walker, *Lockheed Martin Corporation*

Modular Building Blocks for Manned Spacecraft: A Case Study for Moon and Mars Landing Systems

W.K. Hofstetter, O.L. de Weck, *Massachusetts Institute of Technology*

Project Failure Prevention: 10 Principles of Project Control, Failure Causes, and Some Practical Cures Such as Specification Rules, Estimation Tools, Policies and Agile Processes

T. Gilb, *RPL*

The Requirements Management System for Maintenance Service Industry

Y-C-K. Chen, P. Sacket, *Cranfield University*

Reuse Applied To Systems Architecting

D. J. Greenhalgh, *The Boeing Company*

Verification of Selection from Product Line Requirements

H. Kaindl, *Vienna University of Technology, ICT*; M. Mannion, *Glasgow Caledonian University*

ACCEPTED PANELS

■ How Much SE Is Enough? – How Do We Decide?

Larry Pohlmann

■ What is Most Important to System Design Success: Models, Design Documents, Process or Something Else?

George Caple

■ Can Government Initiatives Bridge Industry with Academia or Do Links Have to Evolve Naturally?

Ayman El-Fataty

■ Will the Current International Strategy Against Terrorism Result in its Reduction and Eradication?: A Debate on the Issues

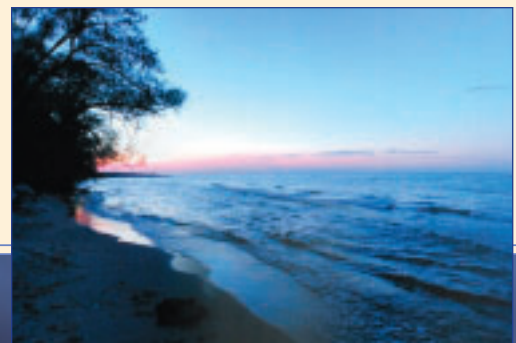
Steve Sutton

■ Requirements Development in Commercial Industry The Value of Systems Engineering to Program Management System Safety in Systems Engineering

■ Psychological, Technical & Managerial Aspects of Effective Design Review

Avigdor Zonnenshain

Lake Ontario coastline at sunset



■ Sunday, 10 July 2005

Free, half-day Tutorials

- H0A **Global Vision of Systems Engineering**
Jean-Philippe Lerat, *Sodius*
- H0B **Model-Based Systems Engineering: A Primer on What, Why, and How**
James E. Long, *Vitech Corporation*
- H0C **Introduction to Patterns Through Writing Systems Engineering Patterns**
Neil Harrison, *Avaya, Denver, CO USA*
Cecilia Haskins, *TSS, Bergen Norway*

**Monday – Thursday Tutorials are available
at an Additional Fee**

■ Monday, 11 July 2005

- F01 **Advanced Requirement Engineering Specification: For Control of Multiple Critical Performance, Quality and Resource Attributes** (full day)
Thomas Gilb, *Result Planning Limited*
- F02 **Dealing with Uncertainty in Systems Engineering** (full day)
Mark A. Powell, *Attwater Consulting and Stevens Institute of Technology*
- H01 **Software as Integrating Technology in Complex Systems** (half day)
Gerrit Muller, *Embedded Systems Institute*
- H02 **Architecting and Engineering Systems, Processes and Organizations Using the Design Structure Matrix (DSM)** (half day)
Dr. Tyson R. Browning, *M.J. Neeley School of Business, Texas Christian University*

■ Tuesday, 12 July 2005

- F03 **Developing Executable Architectures for Systems of Systems (SoS) using DoDAF** (full day)
James E. Long, *Vitech Corporation*
Dr. Steven Dam, *Systems and Proposal Engineering Company (SPEC)*
- F04 **Object Oriented Systems Engineering Methodology (OOSEM)** (full day)
Abraham Meilich, Ph.D., C.C.P.; Sanford Friedenthal; Howard Lykins, *Lockheed Martin Corporation*
- H03 **Requirements Reuse** (half day)
Mike Mannion, *Glasgow Caledonian University*
Hermann Kaindl, *Vienna University of Technology*
- H04 **Standard Approach to Trade Studies for Program/Project Managers and Systems Engineers** (half day)
Art Felix, *U.S. Navy*

■ Wednesday, 13 July 2005

- F05 **Slash Project Time with Evolutionary Methods: How to deliver the best possible results in the shortest possible time** (full day)
Niels Malotaux, *N R Malotaux – Consultancy*
- F06 **A Complete Picture to Model Complex Systems: What, When How and Why Model Systems** (full day)
Alain Faisandier, *MAP Système*; Claude Feliot, *Alstom*; Jean-Philippe Lerat, *Sodius*
- H05 **Continuous Early Validation (CEaVa)** (half day)
Harry Lewis, *SONEX Enterprises Inc*
- H06 **Writing Defect-Free Requirements in Government and Industry** (half day)
Ivy Hooks, *Compliance Automation Inc.*

■ Thursday, 14 July 2005

- H07 **Unified Life Cycle Modeling** (half day)
Peter Hantos, *The Aerospace Corporation*
- H08 **How to Establish and Maintain Integrated Teams – CMMI Level 3.5** (half day)
Tim Kasse, *Kasse Initiatives LLC*



Rochester's High Falls in the evening

Special Events

Special Events: 2005 INCOSE International Symposium

OPENING ICE BREAKER RECEPTION

Monday • 11 July 2005

Join your colleagues and the INCOSE 2005 Symposium exhibitors for the traditional "Ice Breaker" Reception from 1800-2000 on Monday evening. Do not miss an opportunity to reacquaint with INCOSE colleagues, meet new friends, and make plans for your week in Rochester.

EXHIBIT HALL SOCIAL HOUR

Wednesday • 13 July 2005

Do not miss this opportunity to socialize, visit INCOSE 2005 exhibitors, and compete for prizes. We will be featuring a challenging game of "I Spy." Arrive early, visit all the exhibitors, and have a chance to claim a prize.

INCOSE BANQUET

Wednesday • 13 July 2005

All delegates are invited to attend the Symposium Banquet on Wednesday, July 13. The banquet will be held in the Empire Hall following the Social Hour. The evening will feature a multi-course gourmet meal prepared by the chefs at the Riverside Convention Center, followed by internationally recognized entertainment.

ROBOTICS COMPETITION

Wednesday • 13 July 2005

This year's Robotics Competition will showcase some area middle school teams involved in the US First Lego® Challenge. The Teams are in the planning and testing phase and will not compete until the 2005-2006 school year. Members of the Planning Committee are mentoring several of the teams in systems thinking. Activities of functional analysis, requirement analysis, and concept of operation are being introduced to the teams. The teams have to accomplish several tasks such as open and latch a gate, move a CD from the station to a designated location, and climb a set of stairs and end on a platform.

On Wednesday July 13, 2005, the teams will set up and demonstrate some of their learning and a robotics scrimmage. The teams will hold a round-robin scrimmage and answer questions about their activities. We hope you will stop by and watch the scrimmages.

GEORGE EASTMAN HOUSE RECEPTION

Tuesday • 12 July 2005

The 2005 Symposium Planning Committee invites you to join us for a reception at the George Eastman House International Museum of Photography and Film the evening of Tuesday, 12 July. The evening will feature a keynote address by Jim Stoffel, former CTO of the Eastman Kodak Company, a delectable selection of hors d'oeuvres, music, and tours of the world's preeminent museum of photography. The George Eastman House cares for and interprets hundreds of thousands of photographs, is one of the oldest film archives in the United States, and is considered to be among the top cinematic collections worldwide with over 25,000 film titles dating from 1894. The mansion that was once home to George Eastman, founder of the Eastman Kodak Company, and exquisite gardens have been restored and offer visitors access to what was once a privileged view. The George Eastman House Reception promises to be a memorable event in the history of the INCOSE Symposium. Please join us! *This is an optional event offered at an additional fee; see Symposium Registration Form.*



Inside the Eastman House

SOCIAL PROGRAM

In conjunction with the Symposium, the 2005 Planning Committee has created a Social Program that features areas of interest in the Greater Rochester and upstate New York region. All events start between 8:30 and 9:00 AM and finish between 4:00 and 4:30 PM. Early registration is highly encouraged as group sizes are limited. All events will disembark from and return to the Riverside Convention Center. Please consult the 2005 Symposium website for additional event details and registration instructions. The 2005 Social Program will include the following events:

- **Sunday, July 10:** Women's Rights Tour at Seneca Falls
- **Monday, July 11:** Letchworth State Park Tour
- **Tuesday, July 12:** Strong Museum and Seneca Park Zoo
- **Wednesday, July 13:** Genesee Country Museum and Historic Village
- **Thursday, July 14:** Finger Lakes Gardens and Wineries Tour
- **Friday, July 15:** Niagara Falls Tour

Exhibitors

Exhibitors: 2005 INCOSE International Symposium



EXHIBITORS-TO-DATE

AFIT Center for Systems Engineering	Project Performance (Australia) Pty Ltd
BAE SYSTEMS	Serena Software
California Institute of Technology Industrial Relations Center	SODIUS
Compliance Automation, Inc.	SPEC (Systems Proposal Engineering Company)
Cornell University Systems Engineering	Stevens Institute of Technology
ESI International	Telelogic
Galorath Incorporated	3SL
I-Logix	UGS
INCOSE 2006	University of Maryland: Institute for Systems Research
INCOSE Central	University of Missouri – Rolla, Department of Engineering Management and SE
ITT Industries	USC Viterbi School of Engineering Distance Education Network (DEN)
Johns Hopkins University Applied Physics Laboratory	Vitech Corporation
Lockheed Martin	Xerox
MAP systeme	
MIT Engineering Systems Division	

For more information on Exhibiting at the 2005 Symposium in Rochester, please contact Glenn Ewell at Glenn.Ewell@itt.com or Donald Halstead at Donald.Halstead@itt.com or see the web at www.incose.org/symp2005.



16th Annual International Symposium of the International Council On Systems Engineering

Systems Engineering: Shining Light on the Tough Issues

Hosted by the Orlando, Central Florida (Tampa Bay area) and Space Coast Chapters

8-14 July 2006 · Orlando, Florida USA

Omni Orlando Resort at ChampionsGate (near Walt Disney World)

Important dates:

- Call for Tutorials submission deadline: 5 October 2005
- Call for Papers submission deadline: 7 November 2005
- Call for Panels submission deadline: 30 November 2005

For more information and program updates, visit our booth in the exhibit hall, or visit www.incose.org/symp2006.

TRAVELING TO THE UNITED STATES

Most travelers to the United States must hold a valid visa and a passport that is valid six months longer than the intended visit. Visitors planning to visit or attend a meeting will most likely apply for a B-1 visa. Visa applicants are advised to apply as soon as they decide to travel to the United States and at least 3 to 4 months in advance. **By October 26, 2004, all Visa Waiver Program (VWP) travelers will be required to have a machine-readable passport (MRP) in order to enter the United States without a visa.** As a standard part of the visa process, the State Department now requires that consular officers interview almost every applicant. Some consulates may have a long wait for an interview so applicants should contact the consulate to schedule an interview as early as possible. Contact the nearest U.S. consulate or embassy for details on visa application procedures at that post. More information can be found at:

- U.S. Embassies and Consulates <http://usembassy.state.gov/>
- Information on applying for a U.S. non-immigrant visa <http://travel.state.gov/visa/tempvisitors.html>

- The National Academies International Visitors Office http://www7.nationalacademies.org/visas/Traveling_to_US.html
- Homeland Security http://www.dhs.gov/interweb/assetlibrary/Pamphlet_BW_Web.pdf
- Homeland Security News Release http://www.dhs.gov/dhspublic/interapp/press_release/press_release_0332.xml

An **official letter of invitation to the INCOSE Symposium** can be sent, if needed, to international participants for use in obtaining visas. Please provide your name, title, affiliation, complete mailing address and email address, phone and fax numbers and submit to PCMI at incose@pcmisandiego.com.

For information about travel to and arriving in the United States, please refer to the U.S. Customs information found at: <http://educationusa.state.gov/predeparture/travel/customs.htm>

ORGANIZING COMMITTEE

Symposium Chairs

Bob Lyons, *Xerox Corporation*
Mary Ann O'Mara, *Eastman Kodak Company*

Technical Program

Jack Riley, *ITT Industries*

Keynote Speakers

Ken Arnold, *Eastman Kodak Company*

Tutorials

Jeannine Sivi, *Software Engineering Institute*
Lynn Penn, *Lockheed Martin*

Academic Forum

Peter Jackson, *Cornell University*
Albert George, *Cornell University*

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Finance

Mike Eagan, *Eastman Kodak Company*

Special Events and Social Program

Glenn Ewell, *ITT Industries*

CD

Patrick Sweeney, *Lockheed Martin*

Robotics Competition

Jack Riley, *ITT Industries*

Symposium Managers

Cass Jones, *PCMI*
Christine Kowalski, *PCMI*



Registration for 15th Annual International INCOSE Symposium • 10-14 July 2005

Register by 27 June to be included in the Symposium List of Participants!

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Are you the **presenter of a paper** in a technical track? Yes No

PLEASE COMPLETE THE FOLLOWING WORK DEMOGRAPHICS (circle all that apply):

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- **Job Function:** Systems Engineer, Systems Management, Management, Product Engineer, Product Management, Educator, Purchasing, Sales/Marketing, Mechanical Engineer, Electrical Engineer, Aerospace Engineer, Civil Engineer, Mathematical Engineer, Physics, Chemistry, Business System Architect, Logistician, Cost Analyst, Schedule Analyst, Quality Assurance, Test & Evaluation, Software Engineer, Information Systems Security, Requirements Engineer, Project Engineer, Other _____

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- When making payment by wire transfer, **all bank fees** are the responsibility of the sender and must be paid at the time of the transaction.

Mail completed form with payment to:

INCOSE 2005
7916 Convoy Court
San Diego, CA 92111-1212 USA
Fax (MasterCard, VISA, or AMEX only): +1 858 565 9954

ALL FEES ARE LISTED IN US DOLLARS

By 27 MAY After 27 MAY

■ **SYMPOSIUM REGISTRATION** Includes Technical Paper Sessions, Exhibits, CD Proceedings, Symposium Meals, Receptions in Exhibit Hall, Banquet
 INCOSE Member # _____ \$ 690 \$ 750 \$ _____
 Renew Annual Membership Dues (optional) \$ 105 \$ 105 \$ _____
 Non-Member (Includes 1-year INCOSE Membership) \$ 795 \$ 855 \$ _____

■ **NEW! PASSPORT REGISTRATION** Includes Technical Paper Sessions and Attendance at any of the Optional Tutorials, Exhibits, CD Proceedings, Symposium Meals, Receptions in Exhibit Hall, Banquet. **Limited to first 50!**
 INCOSE Member # _____ \$1100 \$1175 \$ _____
 Renew Annual Membership Dues (optional) \$ 105 \$ 105 \$ _____
 Non-Member (Includes 1-year INCOSE Membership) \$1205 \$1280 \$ _____

Please make your tutorial selections here. **You may only select one tutorial per day** (either one half-day or one full day tutorial). **Capacity is limited! Early selection is strongly recommended.**

MON F01 F02 **PM** H01 H02 **WED** F05 F06 **PM** H05 H06
TUES F03 F04 **PM** H03 H04 **THUR** **AM** H07 H08

■ **STUDENT REGISTRATION** Includes Technical Paper Sessions, Exhibits, CD Proceedings, Symposium Meals, Receptions in Exhibit Hall. **Does NOT INCLUDE Banquet.**

INCOSE Student Member # _____ \$ 80 \$ 80 \$ _____
 Renew Annual Student Dues (optional) \$ 20 \$ 20 \$ _____
 Student Non-Member (Incl 1-year INCOSE Membership) \$100 \$100 \$ _____
 Discounted Student Full Day Tutorial \$200 \$225 \$ _____
 Discounted Student Half-Day Tutorial \$100 \$115 \$ _____

Please make your tutorial selections here. **You may only select one tutorial per day** (either one half-day or one full day tutorial). **Two half-day tutorials may be substituted for one full day tutorial. Capacity is limited! Early selection is strongly recommended.**

MON F01 F02 **PM** H01 H02 **WED** F05 F06 **PM** H05 H06
TUES F03 F04 **PM** H03 H04 **THUR** **AM** H07 H08

ATTENTION NON-MEMBERS:

The non-member fee includes a complimentary one-year INCOSE membership.

Please provide your preferred Chapter Affiliation (see www.incose.org/chapters/findchapter.aspx):

■ **ONE or TWO DAY REGISTRATION** Includes Technical Paper Sessions, Exhibits, Lunch, CD Proceedings

1-DAY Registration \$240 \$270 \$ _____

Check ONE: Mon., 11 July Tues, 12 July Wed, 13 July Thurs, 14 July

2-DAY Registration \$450 \$490 \$ _____

Check TWO: Mon., 11 July Tues, 12 July Wed, 13 July Thurs, 14 July

INCOSE MEMBERSHIP RENEWAL FEE (optional) \$105 \$105 \$ _____

■ **SUNDAY FREE TUTORIALS** - Sunday, 10 July • Free Afternoon Half-Day Tutorials - no cost, but seating is limited and pre-registration is required

HOA Global Vision of SE (PM) YES, I plan to attend _____

HOB Model-Based SE: A Primer (PM) YES, I plan to attend _____

HOC Introductions to Patterns through Writing SE Patterns (PM) YES, I plan to attend _____

■ **TUTORIALS (MONDAY-THURSDAY TUTORIALS AVAILABLE at an ADDITIONAL FEE unless Passport Registration is selected.)** Please indicate your selections.

Monday

H01 Software as Integrating Technology (PM) \$150 \$175 \$ _____

H02 Architecting & Engineering Systems, Processes and Organizations Using DSM (PM) \$150 \$175 \$ _____

F01 Adv. Requirement Engineering Specification (FULL) \$275 \$325 \$ _____

F02 Dealing with Uncertainty in SE (FULL) \$275 \$325 \$ _____

Tuesday

H03 Requirements Reuse (PM) \$150 \$175 \$ _____

H04 Standard Approach to Trade Studies (PM) \$150 \$175 \$ _____

F03 Developing Executable Architectures for Systems of Systems (SoS) using DoDAF (FULL) \$275 \$325 \$ _____

F04 Object Oriented Systems Engineering Methodology (OOSEM) (FULL) \$275 \$325 \$ _____

Wednesday

H05 Continuous Early Validation (CeaVa) (PM) \$150 \$175 \$ _____

H06 Writing Defect-Free Requirements in Government and Industry (PM) \$150 \$175 \$ _____

F05 Slash Project Time with Evolutionary Methods (FULL) \$275 \$325 \$ _____

F06 A Complete Picture to Model Complex Systems (FULL) \$275 \$325 \$ _____

Thursday

H07 Unified Life Cycle Modeling (AM) \$150 \$175 \$ _____

H08 How to Establish and Maintain Integrated Teams (AM) \$150 \$175 \$ _____

■ **Event Tickets for Guest, and Extra Proceedings** (additional cost items)

Included with **FULL** and **PASSPORT Registrations**

Ice-Breaker Reception & Wednesday Social Hour \$ 30 x _____ \$ _____

Symposium Banquet (Wednesday) \$ 75 x _____ \$ _____

Proceedings (CD-ROM) \$ 60 x _____ \$ _____

Lunch: Mon. Tues. Wed. Thurs. \$ 30 x _____ \$ _____

Social Tours - see www.incose.org/symp2005

■ **Eastman House Reception** (Tuesday) \$ 30 x _____ \$ _____

■ **Optional Technical Tours**

ITT Payload Assembly Tour, Friday, 15 July \$ 15 x _____ \$ _____

Xerox iGen R&D Tour, Friday, 15 July \$ 15 x _____ \$ _____

Name of Guest(s) (Required for badge if purchasing guest events/meals or optional tours)

■ **TOTAL REMITTANCE** \$ _____

General Information: 2005 INCOSE International Symposium

Conference Headquarters, Hotel Information and Reservations

The **Rochester Riverside Convention Center** in Rochester, NY is the headquarters for the 15th International Symposium, INCOSE 2005. The RRCC is centrally located in Rochester's downtown business district.

The RRCC is within walking distance of Frontier Field, home of the Rochester Red Wings, as well as local restaurants and several entertainment districts, including the Center at High Falls and East End. Just minutes away by car is the nationally renowned Eastman Theatre and Eastman School of Music, the Memorial Art Gallery, Rochester Museum and Science Center, Strong Children's Museum, and GeVa Theatre.



HOTEL RESERVATIONS

The Hyatt Regency Rochester Hotel, connected by an indoor walkway to the Rochester Riverside Convention Center, is the headquarters hotel for INCOSE 2005. The Hyatt is holding a block of rooms at discounted rates for INCOSE delegates. Hyatt guest rooms include telephones with voice mail and data ports, hair dryer, iron and ironing board, and coffee maker. The hotel features a heated pool, sundeck and whirlpool and health club. Wireless Internet access is available in guest rooms for an additional fee.

Delegates are encouraged to make their hotel reservations early, directly with the hotel, to guarantee their confirmed reservations at the group rate. **Delegates must identify themselves as INCOSE Symposium participants** in order to receive the discounted group rate. Preferred room types may be requested but cannot be guaranteed.

Discounted rates apply until the **reservation deadline of 10 June 2005** or until all rooms in the group block have been reserved, whichever occurs first. After 10 June, guest rooms and discounted group rates might not be available. We encourage you to confirm your reservations early and in writing to avoid any confusion. A credit card number or check will be required to guarantee your reservation. Please inquire with the hotel regarding cancellation policies, early departure fees, check-in and checkout times, parking fees, airport shuttles, etc.

INCOSE 2005 Group Rates at Hyatt Regency Rochester

- \$129 single or double (one or two guests; one king bed or two queen beds)
- \$149 triple or quad (three or four guests; two queen beds)

Government Rates will be available for a limited number of reservations. To qualify, you must provide appropriate identification at check-in. Early requests for government rate are recommended as the block could sell out in advance of the reservation deadline.

■ To book your hotel reservation at the Hyatt:



Hyatt Regency Rochester

125 East Main Street | Rochester, New York 14604 USA

Tel: +1 585-546-1234 | Fax: +1 585-546-6777

Website: <http://rochester.hyatt.com/property/index.jhtml>

INCOSE 2005 Group Rate Link: rochester.hyatt.com/groupbooking/icse

INCOSE 2005 Government Rate Link: rochester.hyatt.com/groupbooking/icsg

The Crowne Plaza Hotel, located one block from the Rochester Riverside Convention Center, is holding a small number of guest rooms at discounted rates for INCOSE delegates. Crowne Plaza guest rooms include telephones with voice mail and data ports, wireless Internet (for an additional fee), hair dryer, iron and ironing board, and coffee maker. The hotel features an outdoor heated pool, sauna, and on-site fitness facility.

■ To book your hotel reservation at the Crowne Plaza:



Crowne Plaza Hotel

70 State Street | Rochester, NY 14614-1359

Phone: +1 585 546-3450 | Fax: +1 585 546-8714

Website: <http://www.rochestercrowne.com/>

INCOSE 2005 Group Rate Link:

<http://www.rochestercrowne.com/index-main.shtml>

Click on Reservations, and enter **INC** for Group Booking Code.

If you qualify for the government rate, please select "Government Rate" from the Rate Preference pull-down menu and *do not enter the INC Group Booking Code*.

GROUND TRANSPORTATION

The Hyatt Regency Rochester offers a complimentary shuttle service to and from the Rochester International Airport during the hours of 6:00 am-11:00 pm daily. This service is available by calling the Hyatt from the complimentary phone located in the Baggage Claim area. The Crowne Plaza Hotel offers a complimentary shuttle, but you must phone the hotel directly (+1 585 546-3450) to arrange for pick up from the airport. Taxi service is available at a cost of approximately \$15-\$20 to either hotel.

ATTIRE

Attire for all INCOSE Symposium sessions and events is "business casual." Slacks and shirts with collars are recommended. For the INCOSE Banquet, the 2005 Planning Committee is recommending business casual attire. Normal summer temperatures often exceed 80°F. To check on weather conditions for Rochester, NY, visit: <http://www.weather.com/activities/other/other/weather/tenday.html?locid=14604>

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THE PLACE TO MEET.

For more information on Sponsoring at the 2005 Symposium in Rochester, please contact Mark Smith at is2005-sponsors@incose.org or see the web at www.incose.org/symp2005.



International Council On Systems Engineering
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