

Monday, 11 July

0700-0745

Speakers/Session Chairs' Breakfast – *Riverside Court*

0700-0800

Continental Breakfast – *Galleria*

0700-1700

Symposium Registration – *Galleria*

0700-1800

Speaker Ready Room – *Aqueduct AB*

0700-1900

Cyber Café sponsored by **Boeing** – *Empire Lounge*

0800-0945

Opening Plenary – *Lilac Ballroom*

Systems Engineering Challenges at NASA's Jet Propulsion Laboratory

Riley Duren, *Jet Propulsion Laboratory*

History of INCOSE: Jerry Lake

0800-1700

INCOSE Meetings – See INCOSE Business Meeting Sections

0945-1000

Coffee Break – *Galleria*

1000-1200

SESSION 1: Six Simultaneous Technical Paper and Panel Tracks
See page 24

1000-1700

Academic Forum – sponsored by **NAVAIR** – *Hyatt Grand Ballroom BC*

1000-1700

Full Day Optional Fee Tutorials (*Ticket Required*)

Tutorial F01

Advanced Requirement Engineering Specification: For Control of Multiple Critical Performance, Quality and Resource Attributes
Thomas Gilb, *Result Planning Ltd*
Location: *Cascade DEF*

Tutorial F02

Dealing with Uncertainty in Systems Engineering
Mark A. Powell, *Attwater Consulting and Stevens Institute of Technology*
Location: *Highland DG*

1200-1330

Lunch – *Galleria*

Monday, 11 July *(continued)*

1300-1700

Half-Day Optional Fee Tutorials *(Ticket Required)*

- Tutorial H01** **Software as Integrating Technology in Complex Systems**
Gerritt Muller, *Embedded Systems Institute*
Location: *Cascade ABC*
- Tutorial H02** **Architecting and Engineering Systems, Processes and Organizations Using the Design Structure Matrix (DSM)**
Tyson R. Browning, *M.J. Neeley School of Business, Texas Christian University*
Location: *Highland EF*
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1330-1500

SESSION 2: Four Simultaneous Technical Paper Tracks
See page 25

1500-1530

Coffee Break - Galleria

1530-1700

SESSION 3: Four Simultaneous Technical Paper Tracks
See page 26

1800-2000

Exhibits Open / Ice Breaker Reception - Exhibit Hall

Keynote Speaker

Monday, 11 July 2005, 0830

Systems Engineering Challenges at NASA's Jet Propulsion Laboratory

Riley Duren, Jet Propulsion Laboratory

Riley Duren is a Senior staff member at the Jet Propulsion Laboratory (JPL). He is currently the Project System Engineer for the *Keplerspace* observatory, scheduled for launch in 2008 and designed to determine the frequency of extra-solar terrestrial planets. He has held systems engineering positions on other projects associated with exo-planet detection, including the *Starlight* mission (a formation-flying interferometer precursor to the *Terrestrial Planet Finder* mission) and the *Space Interferometry Mission*. He was the Chief Engineer for the Attitude and Orbit Determination Avionics and Mission Operations Director for the *Shuttle Radar Topography Mission*, which in 2000 generated a near-global map of the earth's surface to 10 meter vertical accuracy. He has also served on the Mars Program Systems Engineering Team and is a consultant on metrology systems for large aerospace structures. Before joining JPL, he was a lead Test Engineer on five space shuttle science payloads at NASA's Kennedy Space Center (including tethered satellites, condensed matter physics, astronomy, and remote sensing). His research interests are currently centered on developing rigorous techniques for Validation & Verification and End-to-End Performance Modeling of deep-space systems. He is a recipient of the NASA Exceptional Achievement Medal, holds a BSEE from Auburn University, and studied physics and astronomy at UCLA and the Florida Institute of Technology. He has lectured on Optical Interferometry at USC and is active promoting the enhancement of space systems engineering in various IEEE, SPIE, and AIAA forums.

Abstract:

Deep-space missions have always been challenging and nearly every new mission poses fresh demands in terms of specific technologies. However, the coming decade represents a fundamental leap forward in *system* complexity on multiple fronts. The Mars Science Laboratory (MSL) will employ new entry, descent, & landing techniques and enhanced mobility and longevity to enable access to much of the Martian surface currently off-limits to existing systems. The Mars Sample Return mission will robotically acquire and return Martian rock, regolith, and atmosphere to Earth. These and other planetary missions must employ many cross-cutting measures to satisfy formidable Planetary Protection requirements. NASA is also aggressively pursuing the detection of habitable planets around other stars – requiring a variety of large interferometric and/or coronagraphic systems (e.g., SIM and TPF). And the challenges extend beyond individual missions – large programs require careful attention to overarching requirements and architectures, particularly the infrastructure associated with telecommunications and navigation.

These apparently disparate endeavors share a common theme – they're driving systems engineering in general to rapidly evolve our methods, tools, and modes of thinking to meet the new challenges. These systems are tightly coupled, highly distributed, and/or operate in entirely new performance regimes. Traditional black-box based methods of requirements synthesis and functional decomposition must be augmented with sophisticated analytical tools – and with that sophistication comes more complexity and risk. Verification and Validation activities must be rigorously and comprehensively executed to ensure requirements and models accurately reflect the ultimate Need and that reliable “filters” exist for detecting and managing risks/problems in the as-built system. In this talk we will explore these challenges and highlight some efforts underway at JPL to respond to them.

Session Chair:	1.1 Education - Research & Design	1.2 SE Application	1.3 Modeling Tools	1.4 SE Management	1.5 PANEL 1	1.6 PANEL 2
1000-1025	<p>Samantha Brown</p> <p>1.1.1 Industry and Academia: Why Practitioners and Researchers are Disconnected G. Muller, <i>Embedded Systems Institute</i></p>	<p>Stuart Arnold</p> <p>1.2.1 Engineering Information Assurance for Critical Infrastructures: The DITSAP Automation Study S.W. Lee, G.-J. Ahn, R. Gandhi, <i>University of North Carolina at Charlotte</i></p>	<p>Susan Jones</p> <p>1.3.1 Modeling DoDAF Compliant Architectures C. Sibbald, <i>Telelogic</i>, C. Kobryn, <i>Telelogic</i></p>	<p>Melinda Whitfield</p> <p>1.4.1 Governing Systems Engineering as an Enterprise Competence - A Benchmark Study with Pertinence to the US Department of Defense W.P. Mullins, <i>Consultant</i>; M.A. Wilson, <i>Strategy Bridge International, Inc.</i></p>	<p>Panel - How Much SE is Enough? - How Do We Decide? Moderator: Larry Pohlmann, <i>Strategies Consulting</i> Panelists: J. Long, <i>Vitech, Corp.</i> J. Ring, <i>Innovation Mgmt.</i> D. Buede, <i>Innovative Decisions</i></p>	<p>Panel - System Safety in Systems Engineering Moderator: E. Rodriguez-Johnson, <i>OSD</i> Panelists: M. Almesaker, <i>A MANO</i> L. Sollars, <i>Jetblue</i> R. Stroup, <i>FDA</i> B. Murray, <i>Force Modernization</i></p>
1030-1055	<p>1.1.2 Enabling the Researcher: Applying Systems Engineering to Research F. Bulca, <i>MDS Scix</i></p>	<p>1.2.2 Using an Enterprise Architecture to Assess the Societal Benefits of Earth Science Research J.N. Martin, <i>The Aerospace Corporation</i></p>	<p>1.3.2 A Generic, Adaptive Systems Engineering Information Model J.J. Simpson, <i>The Boeing Company</i>; C. Dagli, S. Grasman, A. Miller, <i>University of Missouri-Rolla</i></p>	<p>1.4.2 Performance-Based Earned Value P. Solomon, <i>Northrop Grumman Corporation</i></p>		
1100-1125	<p>1.1.3 The Core Competencies Of Systems Engineering D. Cooper, <i>Sula Systems</i>, R. Allen-Shalles, <i>J. Stoves, Thales</i>; S. Brown, <i>B/E-Systems</i>; J. Hooper, <i>Loughborough Univ.</i>; S. Hudson, <i>General Dynamics</i>; I. Oliver, <i>EADS Astrium</i>; K. Barnwell, <i>UK Ministry of Defence</i>, A. Smith, <i>Univ. College London</i>; El-Factory, <i>SEIC</i></p>	<p>1.2.3 The Systems Engineering Approach To Warship Signatures Management M. Manzini, M. Montigiani, <i>Orizzonte Sistemi Navali S.p.A.</i></p>	<p>1.3.3 Potholes in the Road to Good Systems Engineering J.R. Armstrong, <i>Systems and Software Consortium, Inc.</i></p>	<p>1.4.3 Estimating and Optimizing System's Quality Costs of Transport Helicopter Avionic System Upgrade A. Engel, S. Shachar, I. Bogomoloni, <i>Israel Aircraft Industries (IAI)</i></p>		
1130-1155	<p>1.1.4 Structuring a Professional Systems Engineering Development Program S.A. Sheard, M. Swayhoeover, <i>Systems and Software Consortium, Inc.</i></p>	<p>1.2.4 Towards Network Enabled Capability Delivery Through UK MOD Smart Acquisition D. Kemp, <i>UK MOD - DDSA</i>; G.D. Payne, <i>QinetiQ</i></p>	<p>1.3.4 Object-Oriented Development For DoDAF System of Systems S.P. Stanilka, <i>The Boeing Company</i>; C.H. Dagli, A. Miller, <i>University of Missouri - Rolla</i></p>	<p>1.4.4 Towards a Collaborative Engineering Environment to Support Capability Engineering W. Robbins, S. Lam, C Lalancette, <i>Defence R&D Canada</i></p>		

Session Chair:	2.1 Enterprise Systems	2.2 Process	2.3 Modeling - Sys ML	2.4 SE Management
1330-1355	Ashok Jain 2.1.1 Revisiting the Notion of System - Organizations and Enterprises as Systems A. Faisander, MAP systeme	George Gibson 2.2.1 A Structured Method for Generating, Evaluating and Using Metrics R.W. Kitterman, Northrop Grumman Newport News	Jim Van Gaasbeek 2.3.1 SysML - An Assessment E. Herzog, A. Pandikow, Syntell AB	Dorothy Mckinney 2.4.1 A Case Study Example of the Role Matrix Technique K. Callan, C.E. Siemieniuch, M.A. Sinclair, Loughborough University
1400-1425	2.1.2 Enterprise Architecture and Aesthetics P. King, VEGA Group PLC	2.2.2 A 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	2.3.2 Verification of Selection from Product Line Requirements H.Kaindl, Vienna University of Technology M. Mannion, Glasgow Caledonian University	2.4.2 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
1430-1455	2.1.3 Engineering Enterprises Using Complex-System Engineering B.E. White, M.L. Kurus, The MITRE Corporation	2.2.3 Observable States May Be Necessary When Using COTS Products R. Botta, T. Bahill, BAE Systems Z. Bahill, Boeing Integrated Defense Systems	2.3.3 Modeling High-Level Requirements in UML/SysML M.C. Hause, F. Thom, A. Moore, Arisan Software Tools	2.4.3 Extreme Leadership for Systems Engineers T. Fosnes, Norwegian Defence Materiel Agency

SESSION 3

Notes

<p>Session Chair: 1530-1555</p>	<p>3.1 Application - Transportation <i>Erik Aslaksen</i> 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, A.B. Sirling, K. Madelin, <i>The University of Birmingham</i></p>	<p>3.2 Reliability <i>Ralf Hartmann</i> 3.2.1 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. Stemienuch, <i>Loughborough University</i></p>	<p>3.3 SE Application - Business <i>Don Gantzer</i> 3.3.1 Quantifying Cost Risk Early in the Life Cycle C.R. Kenley, <i>Kenley Consulting, LLC</i>, J. Nail, <i>Bechtel SAIC Company, LLC</i></p>	<p>3.4 SE Management <i>Jack Riley</i> 3.4.1 A Framework for Understanding Uncertainty and its Mitigation and Exploitation in Complex Systems H.L. McManus, <i>Metis Design</i>; D.E. Hastings, <i>Massachusetts Institute of Technology</i></p>
<p>1600-1625</p>	<p>3.1.2 Quantitative Assessment of Expected Space Mission Return in Terms of NASA's Institutional Goals K.E. Shelton, G. Rodriguez, C.R. Weisbin, A. Elfes, <i>Jet Propulsion Laboratory</i></p>	<p>3.2.2 Four Strategies for Reliability - Improving Robustness to One-sided Failure Modes D.P. Clausing, D. Frey, <i>MIT</i></p>	<p>3.3.2 The ABCs of AFs: Understanding Architecture Frameworks R. Siegers, <i>Raytheon</i></p>	<p>3.4.2 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, <i>NAVAIR Weapons Division</i></p>
<p>1630-1655</p>	<p>3.1.3 Applying Quantitative Methods for Architecture Design of Embedded Automotive Systems O. Larses, <i>Scania CV</i></p>	<p>3.2.3 Systems Reliability Demonstration A. Zonnenshain, Z. Benyamini, <i>RAFAEL</i></p>	<p>3.3.3 How to Routinely Assure Project Success N. Malabaux, <i>M R Malabaux - Consultancy</i></p>	<p>3.4.3 Engineering a Corporate Memory: Some Practical Insights M. Young, <i>Defence Institute</i></p>