Gold Circle Chapter

NEWSLETTER

INCOSE
INTERNATIONAL COUNCIL ON SYSTEMS ENGINEERING

Issue No. 5 — June, 2003

Los Angeles Chapter of INCOSE
www.incose-la.org

COMING EVENTS

LA INCOSE Mini-Conference
Achieving Quantum Improvements

June 7, 2003
8:00 am to 5:00 pm

Location
The Boeing Company
Long Beach, CA

Joint INCOSE and LA SPIN
Meeting - Rescheduled
To be Announced Later

INCOSE 2003
13th International Symposium
June 29 to July 3, 2003

Location
Hyatt Crystal City
Washington D.C

Engineering Tomorrow's World Today!
WWW.INCOSE.org/Symp2003

Information on
Systems Engineering
Certification Beta Testing
www.incose.org

July Dinner Speaker Meeting
SE Tools Interoperability

August Dinner Meeting
FAA Security

2nd ANNUAL CONFERENCE ON
SYSTEMS ENGINEERING RESEARCH
(Formerly Conference on Systems Integration)
April 14-16, 2004

See call for papers (inside page 3)

Location
Los Angeles, California
USC Campus

Intelligent Transportation Systems and Systems Engineering
Michael E. Krueger

This will be part of joint paper presented at the 2003 symposium. This paper is a follow-on to the 2002 panel on Intelligent Transportation Systems and is intended to describe the history, current state of the practice and future trends for Systems Engineering in the ITS domain.

This study is one of the first comprehensive studies of SE in a non Mil-Aero domain and is part of the INCOSE Systems Engineering Application Technical Committee (SEATC) activities. This paper will describe how systems engineering has evolved and the need and opportunity for a strong liaison between INCOSE and the ITS Community.

History of Systems Engineering in ITS:

Intelligent transportation systems (ITS) dates back to the late 1980's when a group of individuals called Mobility 2000 drawn from the Federal Highway Administration (FHWA), academia, and small traffic consulting firms was formed. They recognized that building additional capacity of the transportation facilities to accommodate the increasing growth in congestion would be prohibitively expensive, and that improving the efficiency of the highway through the use of technology (computers, software, communications, surveillance) would provide the best initial cost benefit and would help delay the need to build new highways.

Mobility 2000 was aware of similar activities emerging around the world through programs such as PROMETHEUS and DRIVE in Europe and AMTICS and RACS in Asia that showed promising results.

By 1991, Mobility 2000 became IVHS America (Intelligent Vehicle Highway Systems) and held their first annual meeting in March. The FHWA looked to IVHS America as a technical advisor and wanted to embark on developing a national IVHS architecture that would promote standards, a framework of consistent approaches throughout the country and provide a market for technology products. This architecture program was divided into 2 phases. In phase 1, four teams were selected to develop competing architectures and in phase 2, two teams were selected to integrate the best of the four architectures into a single unifying architecture.

The initial program was completed in 1995 and resulted in the development of 29 user services (predefined set of ITS solutions that is compatible with the National Architecture that Agencies can use when developing State, regional or local systems), plus a logical and physical architecture. Figure 1 is an example of the ITS Architecture (known as the "sausage" diagram). More information can be obtained at http://itsarch.iteris.com/itsarch.
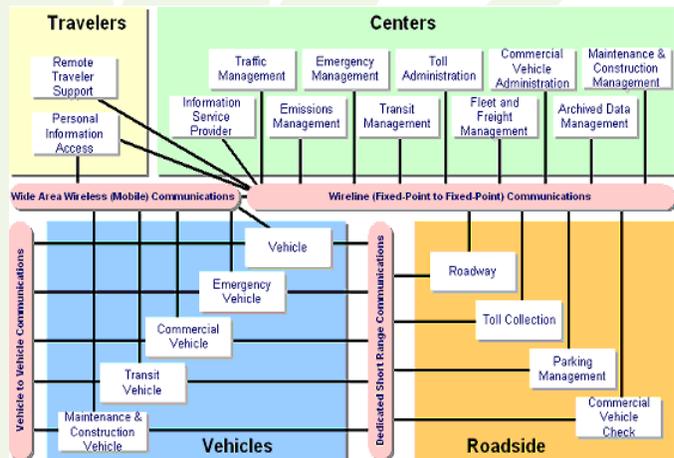

Figure 1 National ITS Architecture (Top Level View)

A number of large companies were initially involved in ITS including, Rockwell, Hughes, IBM, Loral, TRW, and Westinghouse. Because the ITS market was fragmented, all of these companies (or whoever acquired them), lost interest and currently there are no significant players in the ITS market. From a systems engineering point of view, since these companies were no longer involved, the SE discipline for the most part disappeared except for a very few individuals that stayed with smaller spin off companies or small traffic consulting firms. For the past 7-10 years most of these systems development contracts have been given to small consulting firms. These contracts have ranged from a few hundred thousand to several million dollars and very few of the consultant firms and their public agency customers were practicing or aware of the discipline of systems engineering. As a result, most ITS projects implemented since the early 1990's, were done without significant systems engineering discipline.

The practice in systems engineering in the ITS domain is just beginning:

By the late 1990's, IVHS had become the intelligent transportation systems (ITS), and the National Architecture had grown to include 31 user services and is now in a maintenance phase and evolving the architecture as new user services are needed.

Internationally, ITS (Intelligent Transport Systems) has developed in a similar way and currently is based on an architecture called FRAME that evolved out of an earlier project called CARIN led by the Dutch Department of Transportation (see http://www.frame-online.net) FRAME has a very similar set of "user services" as the United States, e.g. Road Traffic Management, Parking Management, Public Transport Management, etc. The older programs like PROMETHEUS and DRIVE have evolved and do not exist under their original identities.)

The FHWA and agencies realized that nearly all of their projects were not well documented, projects were delayed, they cost more then anticipated, the functionality did not meet stakeholder expectations, and the maintenance and evolution of the systems was very costly. In addition, Agencies were captive to a single contractor for the maintenance and upgrades. Recognizing this, a different way to approach projects was needed, so they started to look at applying systems engineering to ITS developments.

In 1999, the first systems engineering course was developed and taught in California for the ITS community. This SE course and classes resulted in the development of the code for federal regulations (23 CFR parts 655 and 940). This ruling states that in addition to the use of the national architecture, systems engineering will be applied to ITS projects. This means that if Federal dollars are to be used to implement ITS projects, the work plans that are submitted to the FHWA must include the use of a systems engineering analysis process. Concurrent with this ruling, the National Highway Institute (NHI), the educational arm of the FHWA, developed a Systems Engineering overview course based on the original California SE course and by the end of 2002, the course had been taught to over 30 state agencies across the country. Recently a follow-on 5 year contract was awarded to continue teaching Systems Engineering. New classes in project management have been recently been completed and a Configuration Management course is in development and is planned to be ready for delivery in late 2003. The Systems Engineering Fundamentals Course has been well received.

In California, the Department of Transportation (Caltrans) supplemented the FHWA classes with custom systems engineering training that included reverse engineering (taking existing software and systems and documenting it to a level that could be put under configuration management), and a Systems Engineering Fundamentals course was taught throughout the State in the past year. Caltrans will be adding seven (7) additional classes in 2003 alone plus new courses in configuration management, requirements, concept of operations,

and architecting are being planned. Caltrans has recognized the need for systems engineering and is at the stage where the Agency is not only developing the classes, but also developing a systems engineering guidebook and associated internal practices and procedures that will start applying these principles to ITS projects statewide. This is only California. The challenge will be to see this kind of culture shift can occur in the other states and in other countries around the world. INCOSE can and should play a key role in this arena. This brings us to the future.

Future Trends for Systems Engineering as applied to ITS:

California Department of Transportation (Caltrans) has been a leader in the field of transportation. As they move forward with the application of systems engineering and with FHWA's 23 CFR ruling, the prospects for the use of systems engineering are very good and will catch on throughout the country and around the world. The following three challenges will need to be addressed:

- Create a case study to show the benefits for the use of systems engineering in ITS
- Show the scalability of SE for small as well as large projects
- Show how systems engineering fits into the existing Transportation procurement practices
- Determine how to get transportation and transport Agencies (MOT's) trained and up to speed in an area that is growing rapidly and where the need for SE is great.

The SECOE project that Eric Honour leads to demonstrate the value of systems engineering has been of great value in addressing the first bullet on creating the case for using systems engineering in ITS.

The second challenge is making SE scaleable for a wide range of ITS projects, small projects (from under $100K) through to large projects (of above a $2-10 M or more). Due to lean budgets, Transportation Agencies are very sensitive to the overhead (perceived or real) that is incurred using any process and if the SE process is viewed as overhead and without benefit, it will not be well received. So tailoring and minimizing the overhead based on project size will be essential for acceptance.

The third challenge stems from the "low-bid" construction culture and is being addressed by the FHWA and State transportation agencies e.g. where design and construction begin and end with system hardware and software is not the same as for highways.

The last bullet will be a significant challenge. Teachers and consultants that want to contribute will need to understand the transportation culture and community. As with any non-Mil-Aero/DOD domain this is always a challenge. We (INCOSE) will need to bring transportation practitioners in and mentor them so that they can carry the value back to share with colleagues. In addition we need to develop strategic liaisons with transportation agencies at all levels e.g. local, state and the FHWA in the U.S. as well as internationally within each country's Ministry of Transports.

In Summary:

As with any great opportunity, there are great challenges. There is a great opportunity to expand the systems engineering community to ITS. But there are many more challenges to overcome. A few were mentioned, but to inculcate Systems Engineering into ITS there are language and institutional issues that must be factored into our current systems engineering processes that are not currently addressed. But we have a start, and as ITS interest in systems engineering emerges in other areas of the country, INCOSE must be ready to assist and support it at both the national and local level. The personal challenge for me is to introduce INCOSE to the FHWA and ITS America at this year's symposium in Washington D.C.

INCOSE SYSTEMS ENGINEERING PROFESSIONAL CERTIFICATION ANNOUNCEMENT

SYSTEMS ENGINEERS FROM ALL SKILL LEVELS ARE NEEDED!!!

INCOSE News

The International Council on Systems Engineering, INCOSE, is the international engineering professional society for Systems Engineers. INCOSE's mission is to foster the definition, understanding, and practice of World Class Systems Engineering in industry, academia, and government.

INCOSE is close to implementing a Systems Engineering Professional Certification Program. SE certification will be based on meeting specific criteria relative to experience, education, membership and service with INCOSE as well as passing a test. The test is a requirement, but certification criteria can be meet without having points in all the other areas.

The INCOSE annual symposium is June 30th through July 3rd in Alexandria, Virginia (see INCOSE web site www.incose.org), and INCOSE will be running a beta test, of the exam, on site, on Monday June 30th. A special subject matter expert (SME) workshop developed 300 potential exam questions. The final test form will be 100 questions, but there will be 2 versions.

The beta test will be run to weed out the bottom 100 questions to get to the goal of 200 valid test questions for the two (2) certification test forms. The beta test requires a sample size of a least 50 participants and the sample needs to be representative. INCOSE is asking for volunteers to take the test. It will be six hours long because the testing will be against all 300 questions. The final form will be only two (2) hours, against 100 questions. The operational certification program will cost $350.00 to apply and take the test. Beta test takers will not be charged to take the beta test. If beta test participants pass the test (the test will only be graded on the remaining 200 questions), and meet the other criteria, they will be allowed to get INCOSE Systems Engineering Professional Certification for only the $100 application fee.

If you're interested in being a beta test participant, please go to the INCOSE web site at www.incose.org and link into the beta test information and sign up from the top article.

All are encouraged to take this test. Even if you're a beginner, you have an excellent chance to pass if you study the test basis, the INCOSE Systems Engineering Handbook version II, 2000. The handbook is available free to INCOSE members for download from the INCOSE web site member's only area. Others can get instructions on how to purchase it for $20.00 also from the web site. We need a spectrum of beta test takers to have a representative sample of the population that would be interested in Systems Engineer Certification.

John S Clouet
Northrop Grumman Mission Systems
Former INCOSE President
1475 Harry Sheppard Blvd
San Bernardino, CA 92408
John.clouet@ngc.com

ANNOUNCEMENT AND CALL FOR PAPERS

2nd Annual Collaboration
University of Southern California
Stevens Institute of Technology

**CONFERENCE ON
SYSTEMS ENGINEERING RESEARCH**
(Formerly Conference on Systems Integration)
April 14-16, 2004
Los Angeles, California
USC Campus

The conference theme is the definition of the frontiers of systems engineering research and applications in new directions to provide the robust development and management of future complex systems.

The primary objective is to serve as a forum to identify challenges and research progress within systems engineering while providing decision makers and research leaders within government, industry and academia a forum for the exchange of ideas and concepts.

In cooperation with INCOSE, NDIA, IEEE, and SOLE

Abstract submittal information

Abstracts to be submitted in Microsoft Word format (not to exceed 400 words) and must include:

1) Title
2) Names of Authors and Affiliations
3) Address for the Corresponding Author

Send abtracts to:

Dr. George Friedman,
Conference Chairman at
gfriedma@usc.edu

Key milestones

Abstract Submission Deadline: October 1, 2003
Acceptance and Instructions: November 1, 2003
Camera-Ready Papers Due: March 1, 2004

Website

http://www.usc.edu/dept/engineering/cser

The Board and Officers wish to welcome the following new members in the Los Angeles Chapter of INCOSE:

James G. Allen	JPL	Edward Marcarelli	Control Point Corporation
Arsalan Danish	USC	Jeffrey Moritz	
James Fithian	Spacemark Inc.	Eva F Noda	The Aerospace Corporation
Laurel L. Gutierrez	Raytheon	Leitha Purcell	Northrop Grumman
Stuart Hann	The Boeing Company	Carl Scaglione II	Northrop Grumman
Anthony Jones	ProcessWorks	Gene Talafus	The Boeing Company
Kelvin P. Kemp	Scitor Corporation	Timothy J Vermilion	Scitor Corporation
Scott Whitehead	The Boeing Company	Richard Weiss	The Boeing Company

INCOSE News

*Gold Circle Chaper
Award*

Special Notice:

The Los Angeles Chapter has recently been
Awarded the *Gold Circle Chapter Award*.
This is the highest recognition given to a
Chapter by INCOSE International

The International Council on Systems Engineering (INCOSE) is an organization formed for the purpose of advancing the art and science of systems engineering in various areas of the public and private sectors. The Los Angeles Chapter meets several times per year for dinner meetings, and additionally sponsors tutorials and other activities of interest to those in the systems engineering field or related fields. L. A. Chapter Officers are as follows:

2003 Officers and Board

President:	Michael L. Dickerson	simimike@iname.com or	president@incose-la.org
Vice-President:	John Hsu	john.c.hsu@boeing.com or	vicepresident@incose-la.org
Past President:	Michael E. Krueger	michael.krueger@ase-consult.com or	pastpresident@incose-la.org
Treasurer:	Marsha Weiskopf	marsha.weiskopf@aero.org or	treasurer@incose-la.org
Secretary:	Paul Cudney	paulcudney@dslextreme.com or	secretary@incose-la.org
Membership:	Susan Ruth	susan.c.ruth@aero.org or	membership@incose-la.org
Programs/Speakers:	Gina Kostelecky-Shankle	Gina.M.Kostelecky@aero.org or	programs@incose-la.org
Ways and Means:	Thomas Kudlick	synchrocubed@aol.com or	waysandmeans@incose-la.org
Tutorials/Education:	Saul D. Miller	saul.miller@aero.org or	setraining@incose-la.org
Communications:	Ronald Williamson	ronald.w.williamson@aero.org or	communications@incose-la.org

Those interested in INCOSE membership and/or want to be placed on our E-mail distribution please contact Susan Ruth - susan.c.ruth@aero.org
Newsletter Editor - Michael E. Krueger - michael.krueger@ase-consult.com