



# Midwest Gateway Newsletter

## *International Council on Systems Engineering*

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### ***Risk Management Tutorial Presented***

By Dean Bristow and Bob Scheurer

Thirty people attended Dr. Donald Hurta's Risk Management tutorial at Washington University on Saturday, November 7. A former university professor, Dr. Hurta of Executive Seminars is a consultant to major corporations and facilitates decision-making and risk assessment sessions with senior managers.

The tutorial itself concentrated on the need to take well-analyzed risks. According to Dr. Hurta, it is important for engineers and managers to "Take a Chance... Make it Happen." This theme was used throughout his presentation. Innovators or creative thinkers were identified as the types of people who "take chances" while hard workers were considered the implementers who "make it happen."

Dr. Hurta stated that there is a difference between trying not to fail and taking chances. He also proclaimed that being comfortable is a bad thing for risk taking. "People who seek comfort are not risk-takers," according to the instructor. As Dr. Hurta seemed to demonstrate with his nervousness in preparing for this

tutorial, "Fear can be a good thing." He summarized these points by noting that most people live their entire lives avoiding risks.

His approach to risk management is based upon the multi-attribute utility technique for decision-making that he developed years ago. In fact, the decision-making process appeared to be the highlight of the tutorial. One student lauded the "clear delivery of multi-attribute utility analysis techniques – one of the best I've seen in doing this for over 20 years."

In preparing and analyzing components for a risk assessment, Dr. Hurta listed the following ingredients:

- 1) Location,
- 2) Facilitator,
- 3) Decision Maker/Coach,
- 4) Group/Team,
- 5) Openness/Trust, and
- 6) Detachment/Elevation ("Helicopter Factor").

Of the list, the "Helicopter Factor" was viewed as the most important and most unique. He described this notion as the ability or willingness to elevate something (company, organization, product, etc.) to a higher level. He challenged the students to "think at least one level higher than their current level of perspective."

Dr. Hurta's entertaining delivery, anecdotes, and emphasis on class participation were appreciated by the class. This is evident from comments such as "entertaining and able to keep your attention all day", "energetic delivery," and "kept me interested."

Whereas most attendees were Boeing employees, the class also included a representative from Tellabs and a full-time Washington University student. For the Boeing attendees, Midwest Gateway Chapter is working with the Boeing People Organization to secure training credit in personnel records.

As part of the tutorial feedback, several attendees provided good suggestions for the next tutorial, including methods of innovation, Integrated Master Plans, acquisition streamlining, and Technical Performance Measurement.



## ***Measuring the Success or Failure of Your Systems Engineering Process***

By Bob Scheurer

Across the Systems Engineering discipline, and with INCOSE in particular, we are beginning to see attempts at measuring the success or failure of the systems engineering process. These process maturity activities generally involve guidelines called Capability Maturity Models. In recent years, there has been an explosion of maturity models for multiple disciplines.

For Systems Engineering process measurement, the emerging national standard is EIA-731, the Systems Engineering Capability Model. This model, which is currently in the ballot phase to become an interim national standard, is a merger of the SE-CMM and the SECAM (from INCOSE). Requirements imposed upon EIA-731 were that it had to provide coverage of EIA-632 and be consistent with IEEE-1220. Without going into the history of these earlier two documents, suffice it to say that both attempted to provide guidelines into effective implementation of systems engineering processes. One strong attribute of EIA-731 is its succinct way of identifying the components of systems engineering without overwhelming the reader with cumbersome process components, restrictions, or constraints. Watch for this document's formal release in the coming months.

But EIA-731 is only the tip of the process measurement standards iceberg. One of my favorite web sites for tracking all of the various maturity models is called "The Frameworks Quagmire." It can be found at the Software Productivity Consortium's web site at:

<http://www.software.org/Quagmire/>

The situation, illustrated so well on that site, of a myriad of both process standards and process measurement standards results in multiple assessments, multiple training, and multiple expenses for every organization that wants to measure and improve their processes. It also underlines the humor in a statement that I once read that says: "Standards are good. Everyone should have one (or two, or three, or...)!"

As an aside, it is no accident that this information is provided on a software-focused web site. I always tell people that if you want to see where systems engineering will be five years from now, just look at where software engineering is today. While we seem to have a great deal of attributes in common with software (abstract nature, object modeling applications, functions, interfaces, etc., etc.), systems engineering appears to be a follower to software engineering, particularly in the standards arena.

Further work to make sense of this "frameworks quagmire" is underway. At a recent chapter meeting, Bill Schoening, our International President and member of our local chapter, provided insight into an attempt for unifying the various capability maturity assessment processes. This project, dubbed the Capability Maturity Model Integration (CMMI), was initiated in early 1998, with the goal of improving the usability of the capability maturity model techniques into and across a wider set of disciplines. The overall concept of the CMMI is to define common terminology, components and rules for constructing capability models for individual disciplines. In that way, as these techniques are used for new disciplines, the associated costs to industry for such items as training, assessments, and measurement systems would be reduced.

Bill Schoening has been a member of the CMMI author team since the inception of the project last February. Within the CMMI development team, he chairs the architecture team, one of the three common Process Area writing teams, and the systems-engineering-specific Process Area writing team. I look forward to having Bill address the chapter again as the CMMI efforts mature.

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### ***November Plant Tour Had Small But Enthusiastic Group***

#### ***Small Group Toured AmerenUE's Callaway Nuclear Power Plant***

By John Adrian

On November 20<sup>th</sup>, five Midwest Gateway chapter members entered the gates of AmerenUE's nuclear power plant near Reform, Missouri in Callaway County.

After a two and a half-hour tour the group left energized; some might even say they were glowing with enthusiasm for nuclear power. The tour began with a briefing on the basic structure and operation of the plant, as diagrammed on page 3, and how the plant generates electricity (i.e., boil water, create steam, turn generators, deliver electricity). There are actually four steam generators at the plant, though only one is shown in the diagram.

The fuel used at the Callaway Plant consists of ceramic pellets of uranium dioxide, with each pellet about the size of a cigarette filter. Each fuel pellet provides as much energy as 1,780 pounds of coal, 149 gallons of oil, 17,000 cubic feet of natural gas or 1 cord of wood. The Callaway Plant bundles these pellets into "fuel assemblies" that are about 8 1/2 inches square. The reactor core runs on 193 of these assemblies. The plant needs to be "re-fueled" every 18 months. A coal-

fired plant producing the same amount of electricity as the Callaway Plant (1,143 megawatts per year) would burn 100 train carloads of coal per day.

After we completed our discussion on how the plant operates, we turned the discussion to safety issues. Physical safety of the plant is of great concern. To enter the plant after our IDs were verified, we had to go through three gates within the security building: a metal detector, a bomb detector, and a third gate that required two keys kept by two different people to open. Connected to the security building and surrounding the plant, were three 12-foot fences with razor wire as well as concrete barriers, which will prevent someone from crashing through the fences. The security crew carries M-16s and operates out of bunkers built throughout the facility. Believe me, these guards do not mess around. One of the individuals on the tour made a wrong turn and, out of nowhere, a guard was standing in front of him tell him to “Turn around – you will not go through there!”

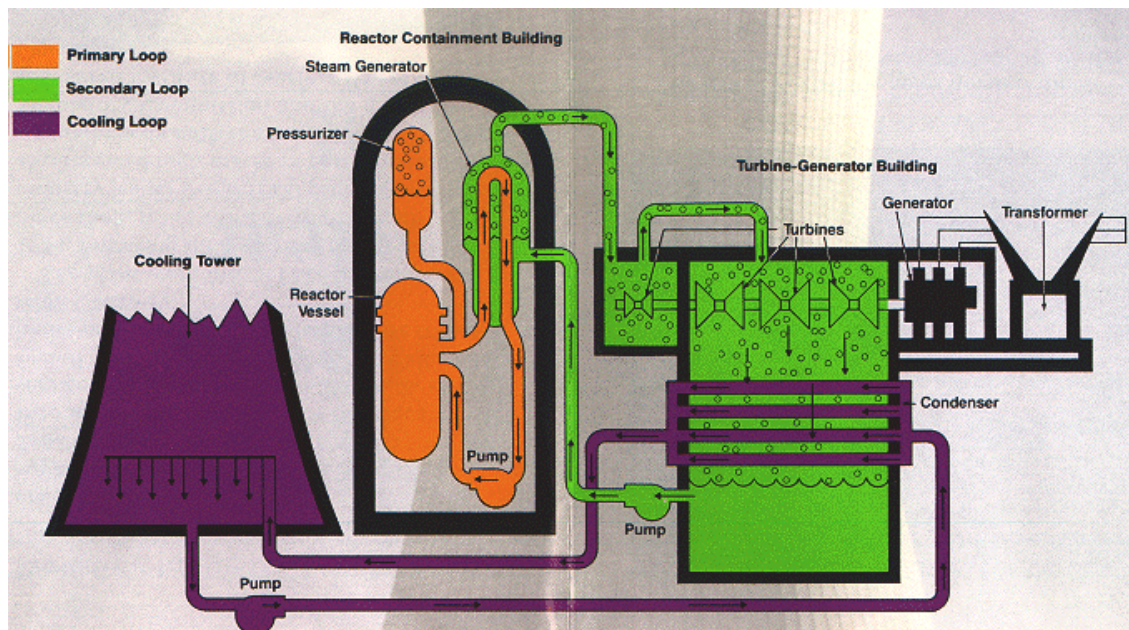
The reactor building itself is built to withstand plane crashes, earthquakes, tornadoes and other natural hazards. The “containment building” was designed to “contain” a pressure of 60 pounds per square inch to keep radioactive material from escaping in a worst-case accident. The building has four-foot-thick, steel-reinforced concrete walls and is topped with a three-foot-thick concrete dome. In addition, the building has a ¼-inch thick inner liner of carbon steel. Three 12-foot fences with razor wire and concrete barriers were added

around the perimeter to prevent someone from crashing though the fences that surround the plant.

Handling and storage of radioactive material is always a critical safety issue. The spent fuel from the plant is stored under water in a stainless steel-lined pool. The spent fuel loses 90% of its radioactivity in just the first year of storage. However, it will take a total of 10,000 years for it to decay to the point that it is less hazardous than the original ore used to make the fuel. All of the high-level waste the Callaway plant will generate during its lifetime could be stored in the space equal to a two-car garage. The plant has enough storage capacity to store 40 years worth of spent fuel on-site. The U.S. Department of Energy is designing a permanent disposal facility to isolate high-level waste from the environment for 10,000 years.

The most ominous physical feature of the plant is the cooling tower. It stands 553 feet tall with a 430 foot diameter base. It cools approximately 585,000 gallons of water per minute. About 15,000 gallons of water per minute are lost through evaporation. The basin under the tower holds 11 million gallons of water and is 12 feet deep. The water entering the tower is 125 degrees Fahrenheit and the tower cools it down to 95 degrees. The Missouri River, five miles south of the plant, supplies the water used in the cooling process.

The average cost per kilowatt-hour produced at the Callaway plant in 1997 was \$1.36 – the 6<sup>th</sup> lowest of all nuclear plants in the U.S. To help keep these costs down, the Callaway plant has improved its processes to



Structural Diagram of Callaway Nuclear Power Plant

allow it to be refueled in just 31 days – the second fastest time among the 27 plants conducting refuelings during the first half of 1997. The Callaway average for prior refuelings was 52 days.

This was a very interesting tour and helped convince some of the individuals in our group that nuclear power was safer than we thought. In fact, some of the attendees would argue that working at a Nuclear Power Plant is safer than riding in a Suburban that is piloted by an ex-helicopter pilot.

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## ***December's Annual Member Appreciation Banquet Scheduled***

By Carol Wilke

On December 8, 1998, chapter members are invited to the 2<sup>nd</sup> Annual Member Appreciation Banquet at Yacovelli's Restaurant in North County. After a social hour with cash bar and dinner, our featured speaker will be Stephen McCracken. Mr. McCracken is the Project Manager for the Weldon Spring Site Remedial Action Project (WSSRAP) of the US Department of Energy. The WSSRAP is a large Superfund site located in St. Charles County, Missouri. The site is radiologically and chemically contaminated. Cleanup cost is estimated to be \$ 985 million. Steve's work on the WSSRAP project began in 1985. He joined the site office as Deputy Manager in 1987. His experience in the cleanup of radiologically contaminated sites extends back to 1980, when he first joined the Department of Energy. His past responsibilities have included Site Manager of other DOE waste sites in the St. Louis area and as Site Manager of waste sites in New York State.

Bob Scheurer, current chapter president, will also present awards to chapter members who have made critical contributions in 1998, and will introduce the new chapter board for 1999.

This event is free to members; visitor tickets are available for \$20.

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## ***January Event Focuses on Systems Engineering in Action*** ***Derek Bennett to Speak on T-38 Avionics Upgrade Program Successes***

By Carol Wilke

The first chapter event for 1999 will be held Wednesday, January 20<sup>th</sup> at a place to be announced. Our guest speaker for the evening will be Derek Bennett, the Systems Engineering and Integration Team Lead for the T-38 Avionics Upgrade Program (AUP).

The T-38 AUP is the first full scale application of Acquisition Reform and Streamlining to be applied to an existing military aircraft upgrade. The system is now finishing Developmental Test and Evaluation at Edwards Air Force Base. Systems Engineering played a key role in the development of the processes, procedures and requirements that were used to acquire the commercial and non developmental equipment for the program. Using these processes, cost reductions of 30 to 40 percent were common for procured equipment when compared to identical equipment used by other military programs at Boeing.

The presentation on the 20<sup>th</sup> will address the paradigm shift that was required to complete the T-38 AUP, and will document results and the successes of the role of Systems Engineering in Acquisition Reform.

Tentative plans are to hold this meeting at the Engineers' Club of St. Louis, with social hour and refreshments from 4:30-5:30 and the program from 5:30-6:30. Look for further announcements about this event in early January, or call Carol Wilke at 314-233-8451 for more details.

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## ***From The President's Desk***

by Robert P. Scheurer

Measuring success and failure can be a difficult undertaking. How do we know when we have attained success? Back in our school days, we received grades indicating our professors' views of how well we succeeded in mastering various courses. In everyday life, it's not always so objective. What some would consider success, others may call failure.

Way back at the beginning of 1998, I set the following objectives for our Chapter:

- 1) Expand membership value with high quality services;
- 2) Raise chapter membership's level of systems engineering understanding;
- 3) Build membership and member participation;
- 4) Have fun.

Each of you has an opinion on how well we've done on meeting those objectives; you will have your chance to express these opinions in our now-annual membership survey in January. As for my own biased opinion, I feel that a lot has been accomplished but a great deal remains to be done. (Isn't that the kind of remark you would expect?)

When we look forward to 1999, I feel the Chapter continues to be in willing and able hands dedicated to advancing the causes of systems engineering. The

recent local and national elections ensure that INCOSE will not only move into the next century, but will thrive in it. I have a great deal of confidence in the people of INCOSE whom we have elected as our leaders. I look forward to working with them next year as Past-President.

So, as I close my last newsletter as your President, please allow me to again invite you to be an active member of this revitalized organization. I know that your time, like mine, is very limited. But the return on investment can be quite impressive, and even offers a bit of professional enjoyment. (Is there a Dilbert cartoon in here somewhere?)

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### ***New Officers and Directors for 1999***

By John Schrader

The 1998 Midwest Gateway Chapter Nominations Committee, consisting of John Schrader, Al Bruns, and Ralph Lambert, announced the results from the recent election of the Midwest Gateway Board of Directors. Congratulations go to:

- President-Elect: John Adrian
- Secretary: John Hulsman
- Director: Bill Bezdek
- Director: Jennifer Shylanski

These new board members will join your existing members of Bob Scheurer (Past President), Carol Wilke (President), Richard Schwadron (Treasurer), Clint Moor (Director), and Dean Bristow (Director). Out-going board members are Don Hess (Secretary), Owen Carson (Director), Paul Summers (Director) and John Schrader (Past-President). Kudos go to the Nominations Committee for their efforts, to all of the candidates for agreeing to serve if elected, and to the outgoing board members for their work during their terms of office.

Eric Honour, Chair of the INCOSE Nominations Committee for 1998, announced the newly-elected members of the INCOSE Board of Directors. They are:

- President-Elect: Donna Rhodes
- Secretary: Judith Peach
- Director-at-Large: Peter Brook
- Region I Director: Ken Crowder
- Region II Director: Elliot Axelband
- Region III Director: Terje Fossnes
- Region IV Director: Don Clausing
- Region V Director: Harry Crisp
- Region VI Director: David Watt

These newly elected leaders will be joined by the returning members of the INCOSE Board of Directors:

- President: Ken Ptack
- Past President: William W. Schoening
- Treasurer: Pat Hale
- At-Large Directors: Jim Sturges, Edward W. Conroy
- Region I: Director: Samuel Alessi
- Region II Director: John S. Clouet
- Region III Director: Fariba Hozhabrafkan
- Region IV Director: Nancy D. Rundlet
- Region V Director: Tom Kabaservice
- Region VI Director: Louis Doukas

Also agreeing to serve in 1999 are the Technical Board Co-Chairs, John Snoderly and Heinz Stoewer, and the Administrative Committee Chairs:

- Chapters: Ken Kepchar, Sam Rindskopf
- Communications: Valerie Gundrum, Randy Case
- Membership: Lew Lee, Dona Lee
- Strategic Planning: Lawrence D. Pohlmann
- Symposium: Ginny Lentz, Richard Schwadron
- Ways and Means: Joe DeFoe

Thanks go to the Nominations Committee, Eric Honour, John Clouet, Pat Hale, Fariba Hozhabrafkan, Tom Kabaservice, and Ken Ptack, who gave much of their time to identify and foster the advancement of these leaders.

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### ***Chapter Business***

#### ***Highlights of Actions by the Board of Directors***

The Board of Directors of the Midwest Gateway Chapter meets regularly on the second Tuesday of each month, with special meetings scheduled when needed. Any chapter member is welcome to attend. Actions and discussions at recent Board meetings have included:

- Began review of Chapter bylaws.
- Planned for Membership Survey to be conducted in January.
- Made preliminary plans for a Spring Tutorial

Please contact Board Secretary, Don Hess, for more information on particular items or on how to attend future meetings.

Information on how to contact each board member and the chair of each standing committee is listed on the last page of this newsletter.



## ***Upcoming Programs***

### ***Mark Your Calendar for These Events***

- 8 Dec, Member Appreciation Dinner featuring Stephen McCracken
- 20 Jan, Chapter Meeting featuring Derek Bernett

If you have ideas for upcoming programs, comments on past programs, questions on any of the programs listed or would like to participate on the Programs Committee, contact Jeff James at (314) 233-2869.

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### ***Got an Idea?***

#### ***How to Contribute to this Newsletter***

This Newsletter is published four times a year, with the goals of

- providing technical articles of interest to chapter members;
- stimulating discussion on systems engineering issues;
- keeping chapter members informed on programs and events.

The Newsletter staff is always looking for good articles, information on the technical issues Systems Engineers face on a daily basis, questions you'd like answered about the chapter or the International organization, and topics on which you'd like more information.

You can reach Newsletter editor Carol Wilke at (314) 233-8451. Contributions of articles or announcements, and letters to the editor can be sent to Carol Wilke at [carol.e.wilke@boeing.com](mailto:carol.e.wilke@boeing.com), or

Carol Wilke

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MS Word 6.0 format is preferred, but we can work with text from most word processing formats, if necessary. For graphics, please call. Please include name, e-mail and mail addresses, and phone number in all correspondence.

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