

The Integrator



INCOSE North Star Chapter



Volume 5, Issue 4

August 2009

North Star Newsletter

INCOSE North Star Newsletter Communication

Please submit comments and SE articles of interest to Eileen.Arnold@BAEsystems.com. Eileen Arnold, Editor

WELCOME, NORTH STAR NEW MEMBERS!

Name	Company	Title
Curt McNamara	Logic Product Dev.	Prin. Eng.
Tim Meehan	Eaton	SE
John Quackenbush	Blue River Assoc. LLC	Partner
Brian Van Batavia	Eaton – Ind Div	Sr. SW Eng

Systems Engineering at its Best!

System-of-Systems

Contribution to an INCOSE 2009 panel organized by John C Hsu, Written by Dorothy McKinney, LMCO

Developing, refining and controlling System-of-Systems (SoS) presents many challenges. It is instructive to consider how traditional systems engineering and management approaches could be extended and augmented to address the complexities of a SoS. In considering different approaches, it would be optimal to enable participants in SoS development and use it to change their perspective from the more deterministic view we have traditionally had of system development (“We can decide what the system will do and how it will do it”) to a more opportunistic view (“We need to ready ourselves to ‘catch the wave’ and ‘surf the ocean of possibilities’ to surmount, or even harness, the ‘waves’ of emergent behavior we encounter in our attempt to use the SoS for our intended purposes”). In other words, we have the dual challenges of:

- adding new approaches and techniques to deal

Continued on page 2

Chapter President’s Corner

Neill Radke, Eaton Corporation and John Palmer, U of Minnesota, 2009 Co-Presidents

A beautiful summer is rapidly slipping away and the cold days of winter loom on the horizon. With the country/world in economic doldrums and real recovery not clearly in sight, the prospect of a long dreary winter (in spite of what will probably be a beautiful Autumn) might lead you to wonder - why bother to maintain my INCOSE membership or go to the chapter meetings often clear across the city? This would be especially true for the many who have experienced RIFs, forced unpaid vacations or other reductions in pay or benefits. Well, we would submit that now is one of the best times to join INCOSE or renew your membership and become more active! Why? First, misery loves company! Come to our meetings and you can share war/horror stories over some pizza and a soft drink. Everyone needs to vent a little now and then. More importantly, the meetings are a great place to network and find out where opportunities may lie. Where else can you find such a diverse group of interesting people who are willing to share experiences and provide connections? Not only are our chapter meetings aimed at helping but the International Office provides direct assistance through the “Systems Engineering Job Bank” at <http://www.INCOSE.org>. Then, on top of all that, your attendance may even grow your useful knowledge of Systems Engineering! Now is the time to get more active and help in planning next year’s North Star program. The more contacts you make, the more involved you become, the stronger is your hold on your current job, or the greater the probability of a new one. To get more involved, please contact:

ipalmer@usfamily.net or NeillBRadke@Eaton.com

North Star Chapter Website
<http://www.incose.org/northstar>

with the complexities of SoS development and

- changing the culture of our organizations to handle human and organizational complexity and effective use of SoS potential.

The table below identifies some of the non-traditional challenges we face in engineering a SoS. To address these challenges, we can try to control events long enough to get a SoS working to meet formal functional requirements and quality of service targets. This is the “get it right the first time” approach. Or we can try to get a SoS functioning, and then refine its behavior to move closer to desired functional capabilities and quality of service. This is the “get it working first, then try to evolve it in desired directions” approach. The latter approach may be more practical when resources are very limited and/or requirements are changing more quickly than SoS capabilities can be completed and delivered. If we take this latter refinement approach, we need significantly different mechanisms for accounting to stakeholders than the conventional plan-versus-actual progress reporting. Opportunistic refinement of SoS capabilities probably requires much more of a continuing “sale to stakeholders” than does a conventional plan-and-perform-to-plan approach. This kind of “salesmanship” has not historically been a key requirement for effective SE, and may pose real personal growth challenges for many individuals in our profession. The table below does not attempt to address how the needed new mechanisms could be “sold” to stakeholder communities as credible and reliable, but that is clearly part of the work we have to do to be able to more effectively engineering SoS in the future.

Challenges	Insights Needed	Leverage Needs
Re-composing stakeholder groups over time	Identifying affected parties	Multiple mechanisms for engaging stakeholders
Balancing and re-balancing competing system priorities with changing stakeholder needs over time	Opportunities as well as risks posed by emergent behavior	Marketplace mechanisms to allow dynamic trade-offs in both SoS usage and incremental development of new/changed capabilities
Shifting focus of control	Costs/benefits (in term of SoS performance) of ceding control to constituent systems versus exerting control through interface or constraint	How interfaces can be used to constraint and control constituent systems

Information control	When to change between “need to share” and “need to know” for different elements of information and data	Mechanisms to handle changing information control and sharing over time different info/data elements
Diffuse control over inclusion of different constituent systems in the SoS	When users have achieved practical inclusion of new system elements in the SoS (or changed SoS boundaries)	Mechanisms for enabling users of SoS to understand which capabilities have which levels of maturity, credibility and V&V

When we are implementing a plan-then-execute effort in an attempt to “get it right the first time” it is fairly clear when we should focus on “sharpening the saw”:

- When development is proceeding well enough that there is “spare time” to “sharpen the saw” or
- When development falls far enough behind schedule that it becomes painfully apparent that the saw must be sharpened to make adequate future progress.

In the world of Agile Software development this decision is solved by choosing a standard interval (the duration of an agile scrum, typically a timeframe such 4 or 6 weeks), and holding each period of refinement to that interval. The first few days of each interval are used to re-prioritize, and the remainder of the interval is used to design and implement as many of the top priority refinements as possible.

It is not clear that such an approach is feasible for refinement of a SoS, since there are so many more stakeholders, and they are typically diverse enough that getting them to speak with one voice cannot be accomplished within a few days. So we, as a profession, will need to invent the systems engineering SoS equivalent to the Agile Software process if we want to use this refinement-towards desired- capabilities approach.

North Star’s 2009 Meetings

17 Sep	SE in Determining Architecture	Medtronic
8 Oct	SE in Architecture and Trade Studies	Honeywell
12 Nov	SE in Requirements Development	Lockheed Martin
5 or 12 Dec	Member Holiday Party + Guest	TBD