

The Integrator

INCOSE North Star Chapter



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North Star Newsletter

INCOSE North Star Newsletter Communication

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Quotable Quotes:

"Strive for perfection in everything you do. Take the best that exists and make it better. When it does not exist, design it." – Sir Henry Royce

Systems Engineering at its Best!

ASSESSING THE COMPETENCIES OF SYSTEMS ENGINEERS

Recognition of the need to certify the competencies of systems engineers can be traced back at least as far as (Kasser, 2000). The findings from this research resulted in the emergence of a number of requirements for the competencies of systems engineers (Arnold, 2006; Kasser, et al., 2008). These requirements included:

- Those extracted from a list of specifications or traits for an "Ideal Systems Engineer" (Hall, 1962).
- Being able to define the problem (Wymore, 1993),
- Competent, skilled and knowledgeable systems engineers capable of effectively working on various types of complex integrated multi-disciplinary systems in different application domains, in different portions of the system lifecycle, in teams, alone, and with cognizant personnel in application and tool domains.
- Important skills and knowledge to include in corporate systems engineering training programs (Watts and Mar, 1997).
- The ability to communicate systems engineering principles to others.
- In the acquisition portion of the system lifecycle, facilitate the effective acquisition of solution systems that meet the customer's needs at the time the system is specified, at the time the solution system is actually acquired and during the

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Chapter President's Corner

Mark Elpers, Medtronic

INCOSE North Star Chapter 2010 President

Well, we're nearing the end of another year and by most accounts it's been a successful one for our chapter. In addition to our consistent delivery of timely, useful or interesting lectures, tours and tutorials, we once again obtained gold level status as judged by INCOSE (for 2009). We believe we will retain this standing when the analysis for 2010 is complete in early 2011.

We also are also making every attempt to serve the needs of our chapter with tutorials and lectures aimed at improving your skills. Finally, we have some new people in our leadership team that we hope will breathe new life into our chapter – led by Paul Frenz our incoming chapter president. Also new in 2011, look for an update to our local chapter website to increase it's content and usefulness.

For me, it has been a pleasure serving you this year. I hope we have helped you and your career in systems engineering in some way and at the same time made a contribution to the profession.

Mark Elpers - 2010 President

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full length of its operational life.

- Engineers who are effective at solving open-ended problems (Durward K. Sobek II and Jain, 2004).
- Ways of identifying the five different types of systems engineers (Kasser, et al., 2009).

The measurement of the competency of an individual can then be done in five ascending levels based on the following five types of systems engineers described in (Kasser, et al., 2009):

- **Type I.** This type is an “apprentice” who can be told “how” to implement the solution and can then implement it.
- **Type II.** This type is the most common type of systems engineer. This type has the ability to figure out how to use the systems engineering process to implement a physical solution once told what conceptual solution to implement.
- **Type III.** Once given a statement of the problem, this type has the necessary know-how to conceptualize the solution and to plan the implementation of the solution.
- **Type IV.** This type has the ability to examine the situation and define the problem (Wymore, 1993), page 2) but unlike the Type IIIs they cannot conceptualize the solution.
- **Type V.** This type combines the abilities of the Types III and IV, namely has the ability to examine the situation, define the problem, conceptualize the solution, plan and carry through the implementation of the physical solution.

A number of ways of measuring competencies have been identified, including

- Knowledge, Skills, and Abilities (KSA);
- INCOSE Certified Systems Engineer Professional (CSEP) Examination;
- INCOSE UK Systems Engineering Competencies Framework (SECF) (Hudson, 2006);
- Capacity for Engineering Systems Thinking (CEST) (Frank, 2006);
- The JPL Systems Engineering Advancement (SEA) project (Jansma and Jones, 2006).

Each of the ways of assessing competences has been developed as a result of a different need. The INCOSE CSEP and UK SECF focus mainly on the [systems engineering] knowledge domain. CEST focuses on the cognitive skills, individual traits, capabilities and knowledge and background characteristics of a systems engineer. CEST was developed based on a survey of what people thought were characteristics of successful systems engineers.

The CSEP and SECF focus on assessing declarative and procedural knowledge and tend to produce Type II systems engineers. This reflects the current mainstream

systems engineering paradigm since much of systems engineering is now taught as declarative and procedural knowledge. To be fair, this is not unique to systems engineering (Microsoft, 2008). Today’s need is for Type IV and V systems engineers and managers (engineer leaders) with the cognitive skills, individual traits and declarative, procedural and conditional knowledge to tackle problems to realize solutions.

In the Kasser and Frank paper presented at the 2010 INCOSE International Symposium entitled, “A Maturity Model for the Competency of Systems Engineers”, backed up by the paper presented at Eusec, “Assessing the Competencies of Systems Engineers”, available from the lead author, a two-dimensional maturity model showing the assessment of the competency (the skill in each of the areas) was presented. Where knowledge is required at the conditional level, it includes both procedural and declarative. Similarly, where knowledge is required at the procedural level, it includes declarative knowledge.

The assessment is thus in two parts, one part is by examination, the second is by demonstrated successful experience and an interview which would determine if the candidate is a person who goes by the book (Type II systems engineer (Kasser, et al., 2009)), is able to write the book (Type V systems engineer) or is something in between.

For more information, please contact

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WELCOME, NORTH STAR NEW MEMBERS!

Name	Company	Title
Bill Brocker	Brocker Eng	Owner
Michael Carty	ATK Corp	SE
Joe Fuchs	LMCO	Stf SW Eng
Jean Hudson	Medtronic	Prin IC Des Eng
Steve Miller	St. Jude Med	Sys PM
Cheryl Protas	Medtronic	Sr. Prin SW Eng
John Toedter	Target Corp	QA Engineer

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

Remaining North Star 2010 Calendar:

11 Nov.: “AADL & BLESS” Brian Larson Medtronic

4 Dec.: Holiday Party Santorini's Eden Prairie 7 PM