The NorthCoast Interfacer

2008 2009 - 2013 2014

President's Corner

Why CSEP

I started thinking about this topic and decided to do a little research, courtesy of my go-to search engine. And here is what I found on the first page of results:

Why you should hire a (CSEP) Certified Special Events Professional…

As a (CSEP) Canadian Society for Exercise Physiology-CPT your certification will stand out…

The goal of (CSEP) Collaboratory for the Study of Earthquake Predictability….

Screening for cash-secured equity puts (CSEP) candidates….

OK, so to the world at-large, the Certified Systems Engineering Professional (CSEP) from INCOSE is not as well known as other CSEPs, but popularity is not the only indicator of value.

There are the classic rationales for obtaining professional certifications that we have heard – validation of knowledge, increased marketability, enhanced reputation and credibility, and benchmarking for employers to cite a few. However, there may be some subtle arguments for spending your time putting together the package and seeking certification. Some of these reasons will surely benefit you as an individual, while others will enhance the standing of Systems Engineering as a profession and INCOSE as the standard-bearer of the profession.

Application for CSEP consists of performing in multiple areas of systems engineering functions for a minimum of 5 years, passing a standardized exam, describing your education and systems engineering work experience, and soliciting input from references who know about systems engineering ***and*** know your work. That last can be a tough hurdle in an age where people move from company to company frequently, and where systems engineering is not necessarily well-understood throughout one's organization.

And that is my focus in this column….educating your co-workers, work area leaders, PMs, supervisors, and managers about systems engineering and how your practice of SE principles and techniques enhances both the value of the end-product and the organization. It's an eye-opening exercise to go line by line through the Summary Table on the Breadth and Depth of Applicant's SE Experience in the application form. Too often in daily work we are focused on practical elements such as developing system documentation or working with SMEs to develop MOEs, MOPs, and TPMs; or we are focused on successfully completing project gate reviews. We don't have the time or opportunity to describe what we are doing and why it's important to others who benefit from that effort.

Going through this process can be a great tool for self-reflection, shedding light on areas in which you have made achievements and identifying those areas you might like to explore in future work opportunities. It's also a great way to spark dialog with others, particularly those outside the profession. These are all things that will contribute to an understanding of the value of a Systems Engineer, and hopefully your value as a CSEP at the end of the process!
Sincerely,

Marian Cronin

C-NO President (2016)

New Chapter Members

We welcomed one new member to the Chapter in March: Chad Gibson of CMD MedTech. The Board of Directors looks forward to meeting you at future Chapter meetings or events.

Dennis Rohn
Cleveland-Northern Ohio Chapter Membership Chair

Past Chapter Meeting Notes

April 26, 2016

Marian Cronin called the meeting to order at 5:37 PM.

Carl Dister gave a brief introduction to Buckminster Fuller, an American architect, inventor, and systems theorist. Carl recently read Jonathon Keats' biography of Fuller, titled *You Belong to the Universe*. Carl noted that Fuller designed the world's largest geodesic dome, located 20 miles east of Cleveland, in Novelty, Ohio. This dome at Materials Park is headquarters to ASM, International. Carl surveyed attendees to gauge their interest in hosting a Chapter Meeting at the dome in July, to discuss the works and philosophies of Buckminster Fuller.

John Juhasz, Chapter Member and Co-Lead of the Power and Energy Systems Working Group, gave an overview of the working group's recent activity at the IW, and pitched the upcoming Energy Tech Conference, which the working group organizes. Energy Tech will host the following tracks: Model Based Engineering of Complex Systems; Smart Grid/Autonomous/Intelligent Controls; Risk Factors in Energy; Advanced Technologies in Power and Energy; Energy, Environment and Policy; and Academic and Posters. John invited Chapter Members to get involved with planning the conference, and authoring papers.

Dennis Rohn presented an engaging presentation on the utility and application of "leading indicators" for systems under development.

Dennis opened the presentation with an analogy to a traffic jam: how might your selected route and mode of transportation on your way into work differ each morning, in light of 'external factors' (the weather, road closures, or traffic data from your smartphone)? Dennis noted that it is much easier to get out of, or completely avoid, a traffic jam when you have sufficient data early in your trip. Similarly, Dennis argued that projects have a better chance of success and more flexibility to deal with challenges when the appropriate leading indicators are monitored by the project.

Leading indicators help predict the future by measuring the past or present, by enabling the assessment of trends or application of heuristics. Measures can be of a product, such as Measures of Effectiveness or Technical Performance Measures, or a process, such as number of verification activities remaining.

Dennis encouraged attendees to review the *Systems Engineering Leading Indicators Guide* (2010), and *Technical Measurement Guide*, both of which are available on the INCOSE website.

Attendees shared their lessons learned related to leading indicators following Dennis' presentation.

Dennis and John Juhasz also shared a summary of the 2016 International Workshop, held in Torrance, CA. This year's IW differed from previous years, in that there was no distinct Model Based Systems Engineering (MBSE) Workshop. Instead, MBSE principles were dispersed across the various working group meetings, in an effort to further the adoption of the technique.

Effective Systems Engineering

By Dennis Rohn
April 11, 2016

Introduction

What makes a good systems engineer? Some buzzwords come to my mind, such as: systems-thinking, holistic, problem solving, and the "T"-model of discipline knowledge (depth in one area, broadened out to a breadth in others). Knowing what makes a good systems engineer can help us to identify gaps in our skills, knowledge, and abilities, which can then be addressed through training and development, to make us a better systems engineer. It can also help during recruitment and selection processes, by knowing what attributes to look for in a candidate. There may be many sources of information and opinions on what makes a good systems engineer, but in a recent search for information, I came across four products available through and/or sponsored by the International Council on Systems Engineering (INCOSE). This article is intended to provide a brief summary of the products and where they can be found.

Atlas

The first product is Technical Report SERC-2015-TR-108, *Atlas: The Theory of Effective Systems Engineers*, Version 0.5, published in December 2015. The report was produced by the Systems Engineering Research Center (SERC), which is a federally funded University Affiliated Research Center managed by Stevens Institute of Technology. It can be found at on the SERC website (http://www.sercuarc.org/) in the form of a PDF document: http://www.sercuarc.org/wp-content/uploads/2014/05/Helix-Report-Atlas-0.5-December-2015.pdf.

The report is an output of the Helix project, which as stated in the report, was set up to investigate the "DNA" of systems engineers, beginning with those who work in defense and then more broadly. This version of the report began incorporating data from industries outside of defense. Some of the content that I found interesting within the report includes:

- Primary Values that Systems Engineers Provide
- Criteria for distinguishing the seniority of systems engineers
- Roles of a systems engineer
- Proficiency areas for systems engineers
- Types of mentoring
- Influences, both personal and organizational characteristics that make a good systems engineer
- Visualization of a career path
- Recommendations

The proficiencies capture the knowledge, skills, behaviors, and abilities that are critical to the effectiveness of systems engineers. The six proficiency areas defined by the report are: math/science/general engineering, system's domain & operational context, systems engineering discipline, systems engineering, interpersonal skills, and technical leadership. Each of these are described in detail in the report.

The report also included five primary recommendations for individuals and organizations, gathered by the Helix team through their interviews. They are that systems engineers should seek broadening assignments, should engage in mentoring relationships, should ask probing questions, should take advantage of Education & Training opportunities, and must mind their own careers. This report has been useful to me and I am looking forward to future versions.

SE Competencies Framework

The INCOSE UK Systems Engineering Competencies Working Group prepared, and release through INCOSE, INCOSE-TP-2010-003 *Systems Engineering Competencies Framework*, and its companion INCOSE-TP-2006-002 *Annex A – Guide to Competency Evaluation*, in January 2010. They are available through the INCOSE Store.

(https://incose.ps.membersuite.com/onlinestorefront/BrowseMerchandise.aspx)

The Framework lists three top-level competencies, systems thinking, holistic lifecycle view, and systems engineering management, along with multiple subcategories under each. For each sub-competency area, the Framework provides indicators of the knowledge and experience related to four competency levels: awareness, supervised practitioner, practitioner, and expert.

The Annex A provides an approach to assess and gather evidence related to where individuals are in the competency levels. This would help to define the gaps between an individual and where they want, or need, to be. The approach includes gathering data through interviews, educational records, and evaluation of past experiences/roles.

An Integrated Approach to Developing Systems Professionals

The third product was a paper prepared for INCOSE 2007, the 17th Annual International Symposium. The paper, titled *An Integrated Approach to Developing Systems Professionals*, is by Heidi Davidz and Mark Maier, of The Aerospace Corporation. The paper can be found in the INCOSE Symposium proceedings archives.

This paper is not as in-depth as the first two products, but begins to address how an organization might create a development plan to improve and grow systems engineers. The paper recognizes that the characteristics needed in one organization may be different than that of another organization due to their line of business, and certain characteristics might just be enablers, while others are necessary to perform a job. It also recognizes where groups of systems professionals work together, the combined capabilities might be more important and those of any one individual.

INCOSE Systems Engineering Body of Knowledge

The INCOSE Systems Engineering Body of Knowledge (SEBoK) is a wiki that can be found on the web at: http://sebokwiki.org/wiki/. Within it, there is a page dedicated to discussion of systems engineering roles and competencies. This information is fairly high level and references a number of competency models, including the one in the SE Competencies Framework report discussed above. One interesting concept that it introduces is a four-dimensional concept map, and the fact that competencies may need to be looked at as a combination of more than one factor, such as the combination of a specific phase of a lifecycle and a specific domain. As an example, the competency area might be verification (phase) of radar systems (domain). This might be a helpful concept if broad, all-encompassing competencies are not needed in all cases.

Summary

Systems engineers can be critical to the success of projects if they have the right skills, knowledge and abilities. By understanding and addressing gaps in these, individuals can become visionaries and thought/influence leaders for their projects.

If you have any other thoughts or resources you rely upon related to this topic, I would encourage you to write a short article for the Chapter newsletter, like this one, to share your knowledge.

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If you are on Facebook, search for Cleveland-Northern Ohio INCOSE Chapter and "like" us.

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