

The Workforce is Right - Systems Engineering Edition

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Abstract. This panel session will be conducted in a manner similar to the popular TV reality shows where audience participation determines the outcomes. The panelists will discuss their positions on challenging issues in workforce development for systems engineering. The panelists will then be given an opportunity to elaborate on their respective positions by answering several questions. The audience will make their voice heard by using a voting system to vote for the best answers to these challenging questions faced by systems engineering leaders. The best answers decided by the audience will determine the outcome of the panel session. **PURPOSE:** To involve the audience in assessing and deciding the best answers to tough questions about challenging issues in systems engineering workforce development. In addition to learning these answers on tough issues, the audience should expect to learn that everyone has a role and a voice in workforce development.

Biography

Don S. Gelosh (Worcester Polytechnic Institute) - dsgelosh@wpi.edu

Dr. Gelosh is the first Director of Systems Engineering at Worcester Polytechnic Institute (WPI). He is responsible for growing and developing the various Systems Engineering programs delivered through WPI's Corporate and Professional Education department. Dr. Gelosh has over 37 years of systems engineering experience from the US Air Force, government, industry, and academia. Before WPI, Dr. Gelosh was Deputy Director for Workforce Development, working for the Deputy Assistant Secretary of Defense for Systems Engineering at the Pentagon. In previous assignments, he was lead systems engineer for communications and payload integration on NASA's Vehicle Integration and Test Team supporting the Space Shuttle, he taught Electrical and Computer Engineering at the USAF Academy, he served as Deputy Department Head for Electrical and Computer Engineering at the Air Force Institute of Technology and was Dean of Learning and Technology at the National Defense University. Dr. Gelosh received his PhD in Electrical Engineering from the University of Pittsburgh, a Master's Degree in Computer System Design from the University of Houston at Clear Lake, and a Bachelor's Degree in Electrical and Computer Engineering from The Ohio State University. He holds an INCOSE CSEP-Acquisition certification and is Defense Acquisition Corps Level III certified in Systems Engineering.

Timothy L.J. Ferris (School of Engineering, University of South Australia) - timothy.ferris@unisa.edu.au

Dr. Ferris holds a B.E.Hons in electrical engineering, University of Adelaide, a PhD in measurement theory, University of South Australia, a GradCert in Higher Education, Queensland University of Technology, and a bachelor and honours degree in theology. He has contributed to and led curriculum development in systems engineering at University of South Australia at bachelor, masters and doctoral levels during the past 15 years, and has a total of 22 years' of educational experience. He was sponsored by INCOSE to contribute to the BKCASE project and led the development of the graduate reference curriculum product of the project. He is now a member of the BKCASE editorial board. His research interests include systems engineering education, fundamental philosophical issues in systems engineering, research methods and cross-cultural issues in systems engineering.

Position Paper

Employers often express a desire for educators to make new graduates more 'work ready'. But many of the

attributes which they articulate in their concern relate to things which a person can only learn under the particular pressures of the workplace where delivery of real outcomes of a complex multi-faceted type on schedule is one of the core requirements. Education addresses parts of the knowledge space, usually concentrating on developing the contributing fields of knowledge as separate skills, with limited integration of all the skills into a complex whole. In addition the education sector also tends to be more concessional about what is acceptable work, through having a graded scale of achievement rather than a competency-based threshold assessment method, and for dealing with strange circumstances arising in students' lives. Consequently there are some things the education sector does not, may not be able to, a possibly should try to, do.

Duncan Kemp (UK Ministry of Defence) - Duncan.kemp735@mod.uk

Duncan Kemp is the engineering skills development team leader in Defence Equipment and Support in MOD where he is responsible for developing 5000 engineers from graduates and apprentices up to senior fellows. Duncan is also DE&S' Systems Engineering Development Partner where he is responsible for systems engineering policy, process and development. Previously he was chief systems engineer for rail in the Department for Transport, where he initiated the work on the Rail Value for Money study and led the study's work on asset management, supply chain management and whole system asset management. Duncan is a Chartered Engineer and Fellow of the Institution of Engineering and Technology. He was co-chair of the INCOSE Transportation Working Group from 2009 until his return to defence in 2012. He is on the INCOSE SE 2025 vision team.

Position Paper

Duncan believes that systems engineering is a critical competence for everyone in the organisation and a specialist skill for a few. His current role gives him a unique perspective as he is responsible for both within the UK MOD's procurement and support organisation (DE&S). Duncan will discuss how the general engineering workforce is being developed to meet the MOD's challenges and the role that systems engineering plays in this. He will describe the importance of, and approach to developing:

- Specialist engineering competence, in areas as diverse as aeronautical engineering, naval architecture and combat system design
- Generic systems engineering, including technology management, requirements management, in-service support
- Soft relationship and leadership skills

Alan D. Harding (BAE Systems plc.) - alan.d.harding@baesystems.com

Alan Harding is the President of INCOSE UK and an Engineering Fellow with BAE Systems. His principal business role is that of Engineering Process Manager where he is responsible for shaping the company's global engineering processes in line with business needs. He also chairs the BAE Systems global community of practice in Systems Engineering. Alan has over 27 years' experience in Systems Engineering applied to programmes across all military domains and the security domain. His specialist interest areas include Capability, Systems-of-Systems, Competency Development and Architecture. Alan is a recognised subject matter expert internationally, an active participant in INCOSE's international activities including co-chairing its Systems of Systems Working Group, and he represents the global BAE Systems business at INCOSE. Alan's academic background is a BSc(Hons) in Physics from Durham University. Alan is Professionally Registered as a Chartered Engineer, achieved through the INCOSE UK/IET scheme.

Position Paper

I have 27 years in a large defence/aerospace/security prime where systems approaches are fundamental to project success. Our products (both goods and services) are highly complex systems, usually designed to operate in complex customer-owned systems of systems. Strategic Workforce Development, looking ahead over a period in excess of 10 years, is a business necessity.

- Our view is that professional systems engineers are vital in this type of project – during both business winning and project execution.
- We see professional registration, CPD, and skills certification as key enablers to develop and maintain world-class systems engineers
- Our business context becomes ever more challenging and competition for the right people gets tougher

Rick D. Adcock (Cranfield University) - r.d.adcock@cranfield.ac.uk

Rick has 20 years experience in defence, working in industry, consultancy and academia. He joined Cranfield

University at the Defence Academy of the UK in 2000 to help set up a Systems Engineering MSc to support MoD acquisition reforms. Rick chairs a Masters in Systems Engineering for Defence Capability, and is responsible for a range of other courses covering Awareness through to Practitioner and Expert level competencies in Systems Engineering. Rick has done research and published on Systems Engineering competencies, Network Enabled Capability (NEC), Enterprise Architecting and Model Based Systems Engineering (MBSE). He is currently engaged in doctoral research on Systems Engineering Competencies and Education and is working closely with the UK MoD Systems Engineering development partner on Systems Engineering competencies and skill assessment for the UK MoD Engineering Strategy. Rick has been a member of INCOSE for over 15 years and was a lead author on the BKCASE Project (www.BKCASE.org), which is creating a Body of Knowledge (and associate Reference master Curriculum) for Systems Engineering. He is a member of the newly formed SEBOK Editorial Board. Rick is an INCOSE Associate Director in the academic matters team. He is responsible for communications and events.

Position Paper

The UK MoD has recognized the importance of Systems Engineering skills in its acquisition organization since the late 1990's. In 1997 an MSc in Systems Engineering for Defence was created at the UK Defence Academy to help provide some of these skills. At that time the standard approach for key technical skills was to send people on a 1 years MSc course before placing them in a defined role. This worked well in helping to create an initial set of acquisition professionals with SE skills. Over the last 15 years a number of things have changed. Defence systems have become more complex and integrated; the way we think about SE skills has evolved, with more focus on individual competencies and less on detailed process definitions; the acquisition workforce has gotten smaller and as a result needs to be more flexible and multi-skilled. The response to this from the MoD has been to move to a more managed skills development process, with individuals expected to be more multi-skilled and to develop their skills across their career. In particular, a Defence Engineering competence set is being developed combining Systems Engineering, domain knowledge and management skills. To support this the Defence Academy is developing a set of courses, including:

- An awareness course on the role of Defence Engineers for none engineers.
- A short course which covers the role of the Defence Engineer across the acquisition lifecycle. This course is used both for new engineers and to make experienced staff aware of the role of engineers to prepare them to move in Defence Engineering roles.
- A part time Post Graduate Certificate in Systems Engineering for Defence
- Advanced courses in Systems Engineering skills, which provide credits towards a full MSc if required
- A set of Master Classes, with experienced practitioners passing on their experience to less experienced staff.

We hope that this combination of education in combination with active skills management by the MoD will provide the Systems Engineering skills needed by all those working in Defence Acquisition. At the same time we want to continue to offer a path towards the more formal education needed for professional recognition for those who wish to specialize in Systems Engineering.