C.8. Technical Leadership in a Digital Future

Technical Leadership in a Digital Future. This session invites contributions that explore topics in technical leadership across all domains, particularly with respect to leadership in interconnected systems. Presentations should explore the challenges to expand the application of SE across industry domains, learning from other technical approaches, shaping policy, advancing tools and methods and growing SE capability in the workforce.

Lead: Contact the Technical Committee if you can assist in Chairing this session
Domains: All domains welcome

Submissions Summary:

1. **Leadership and Management in the Age of Emerging Digital Technologies**
   Panels and Workshops
   Brett B Thiele 1, Engineers Australia - College of Leadership and Management, Canberra
2. **An Information Management Framework and its Application for Managing a System Engineering Workforce**
   Full Paper
   Derek Rogers 1, Jon Hallett 1, Shoal Group Pty Ltd, Adelaide, SA, Australia
3. **Project Governance, a critical system for Project and Programme Assurance of Infrastructure Investment outcomes.**
   Full Paper
   Edward (Ted) Edward Tooher 1 2, College of Leadership and Management . Engineers Australia, Sydney TGA/USYD, Sydney, ACT, Australia
4. **Perspective and Influence and Leverage, Oh My! Leadership for Systems Engineers**
   Paperless Presentations
   David Long 1, Blue Holon, Blacksburg, VIRGINIA, United States
5. **The view from the bottom the state of Systems Engineering inAotearoa New Zealand**
   Paperless Presentations
   Jess Tucker 1 2, John Welford 2 3, Thomas McKay 1 2, Nick Pickering 2 4, Dhanush Laxman 2 5, Beca, Auckland CBD, AUCKLAND, New Zealand, INCOSE NZ, Auckland, New Zealand, WSP, Nelson, New Zealand, School of Engineering, University of Waikato, Hamilton, New Zealand, Aurecon Group, Auckland, New Zealand
6. **Exploring the Role of Digital Twins in Advancing SORA Compliance for BVLOS Operations in Australia**
   Paperless Presentations
   Elita Huynh 1, Philip Swadling 1, Thales, Melbourne, VIC, Australia
7. **A model-based digital engineering approach to realize enterprise transformational programs**
   Paperless Presentations
   Sam Mancarella 1, Memko, Melbourne, VIC, Australia
8. **Leadership and Organisational Implementation of Systems Engineering in the Infrastructure Sector**
   Paperless Presentations
   Ruben Welschen 1, Thomas Boxoen 2, Overmorrow Consulting Pty Ltd, Sydney, NSW, Australia, Transport for New South Wales, TfNSW, Sydney, NSW, Australia

21223 Leadership and Management in the Age of Emerging Digital Technologies

Authors
Brett B Thiele 1, Engineers Australia - College of Leadership and Management, Canberra
Provided Keywords
Leadership; Management; Technical Transformation
Natural Language Keywords
emerging, leaders, leadership, lens, life, management, managers, moral, session, technology
Presentation format decision
Plenary Panel
Stream submitted
C.8. Technical Leadership in a Digital Future
Stream proposed
C.8. Technical Leadership in a Digital Future

Abstract

The proposed format is a facilitated Q&A session designed to summarize the presentations and themes of the day.

All current and perspective leaders and managers should attend this session. Leadership around the use and implementation of emerging technology such as AI into business and everyday life provides some very interesting moral and ethical questions. The intent of this panel is to discuss the pros and cons of emerging technology within a leadership lens, and to hear from three distinguished leaders in their field how they are navigating this challenge.

20640 An Information Management Framework and its Application for Managing a System Engineering Workforce

Authors
Derek Rogers 1, Jon Hallett 1, Shoal Group Pty Ltd, Adelaide, SA, Australia
Provided Keywords
information management, strategic workforce management, tactical workforce management, competency, lessons
Natural Language Keywords
decisions, engineering, information, management, paper, people, strategic, tactical, use, workforce
Presentation format decision
Full Paper - Presentation Preference
Stream submitted
D. Other
Stream proposed
C.8. Technical Leadership in a Digital Future

Abstract

This paper presents a framework for managing and using the information associated with a system engineering workforce. The typical uses associated with information regarding an organisations systems engineering workforce can be grouped into strategic workforce management and tactical workforce management. Strategic workforce management covers the aggregate of people in the organisation whilst tactical workforce management is directly concerned with the individuals. Strategic workforce management makes decisions about the general areas to recruit, develop or subcontract to address the long-term capability needs for the positioning of the business. In contrast tactical workforce management makes decisions about who to allocate to projects or specific training courses, and supports considerations related to promotion. To make these decisions in a repeatable and reliable manner, processes need to be defined and use authoritative information covering the knowledge, competencies, and skills of people. The definition and use of that information is the subject of this paper.

21205 Project Governance, a critical system for Project and Programme Assurance of Infrastructure Investment outcomes.

Authors
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Provided Keywords
Project, Systems Compliance, Resilience, Test and inspection planning.
Natural Language Keywords
delivery, engineering, governance, infrastructure, investment, outcomes, paper, project, public, sector
Presentation format decision
Full Paper - Presentation Preference
Stream submitted
B.5. Sociotechnical Systems
Stream proposed
C.8. Technical Leadership in a Digital Future

Abstract

Abstract Body

This paper addresses key findings of the Productivity Commission report into Infrastructure investment 2014 and related reports that an estimated $30Bn pa of public money is wasted in the delivery of Infrastructure in Australia due primarily to failures of the Project Governance system used in delivery of project for outcomes. The Infrastructure Australia Plan (20160 also addresses the performance requirements of Governance and the need to refocus project deliverables on socially needed outcomes.

For emphasis of the problem facing Engineering leaders if a private sector client had a $30bn pa revenues shortfall due to poor investment decisions then a major investment would be immediately called up to fix the issue. For Public sector Engineering leaders, the question needs to be asked of Engineers how much investment in better governance is immediately needed to make the shortfall available for unfunded investments.

The paper outlines the reason for this shortfall and the ways that Assured Governance can avoid this annual loss in performance.

Systems for Public Sector Governance, how they work in practice and how they can be verified or audited under a Quality assurance framework or gateway review process are explained and proposals for improvement offered.

In addition, the erosion of value or wasted return on investment (ROI) and the transfer of benefits to the Project Delivery team of designers, contractors and suppliers is examined. System design and test and inspection plans (T&IP) for resilience audit are proposed and a Governance Maturity Model is provided to support intervention for poor Governance and to enable transformative Governance.

This paper draws upon the work of the author, Ted Tooher, Tom Crow, Shankar Sankaran in their paper Enough is Enough and the plan for an upcoming Project Governance workshop series to enable Engineering leaders Executives to be delivered in 2022 and 2023.

21210 Perspective and Influence and Leverage, Oh My! Leadership for Systems Engineers

Authors
David Long 1, Blue Holon, Blacksburg, VIRGINIA, United States
Provided Keywords
Technical Leadership, Facilitation, Collaboration, Influence, Perspectives
Natural Language Keywords
engineer, engineers, influence, insights, leadership, leverage, perspective, systems, team, technical
Presentation format decision
Paperless - Presentation or Poster
Stream submitted
C.8. Technical Leadership in a Digital Future
Stream proposed
C.8. Technical Leadership in a Digital Future

Abstract

Overview

As systems engineers, what can we do to create a better tomorrow? our principles and positions, we have the opportunity to make a unique and positive impact. But we must look beyond our technical contributions and embrace our leadership responsibilities.

Context

Systems engineers are familiar with the concept of perspective in the technical domain using viewpoints to explore, analyze, and specify their solution. Embracing perspectives from the human dimension is the starting point for systems engineering leadership. To satisfy and delight, the systems engineer must see the world, the challenges, and the opportunities from the perspective of others as they look at the problem and solution space. This requires the social dimension, emotion, interest, and empathy.

Purpose

Systems engineers can have a unique and positive impact if we look beyond our technical contributions and embrace our leadership responsibilities. Doing so requires that we apply perspective, influence, and leverage to unlock our strengths in combination with those around us and lead for a better future.

Approach

Perceptual Positions by Gary Koyen provides framework beyond self, other, and team that enables us to position the systems engineer to leverage the power of perspective for leadership. Based upon 30 years of personal experience and insights from INCOSEs Technical Leadership Institute, these ideas have been synthesized with the concepts of leadership through influence and the leverage of transdisciplinarity.

Insights

Perspectives enable the systems engineer to perceive through the viewpoint of customer, user, team and self, unlocking essential insights. Influence is how the system engineer most often leads not from a position of authority and power but from within the team. Transdisciplinarity including both holism and looking across the full lifecyle empowers the systems engineer to leverage team insights for maximum effect.

21153 The view from the bottom the state of Systems Engineering inAotearoa New Zealand

Authors
Jess Tucker 1 2, John Welford 2 3, Thomas McKay 1 2, Nick Pickering 2 4, Dhanush Laxman 2 5, Beca, Auckland CBD, AUCKLAND, New Zealand, INCOSE NZ, Auckland, New Zealand, WSP, Nelson, New Zealand, School of Engineering, University of Waikato, Hamilton, New Zealand, Aurecon Group, Auckland, New Zealand
Provided Keywords
emerging practice, new zealand, diversification, SE adoption
Natural Language Keywords
chapter, country, discuss, engineering, incose, new, presentation, setting, systems, zealand
Presentation format decision
Paperless - Presentation or Poster
Stream submitted
C.8. Technical Leadership in a Digital Future
Stream proposed
C.8. Technical Leadership in a Digital Future

Abstract

New Zealand is frequently missed off world maps, and until recently was also missing from the global list of INCOSE chapter locations. Happily in the last two years this has been rectified, through the establishment of the INCOSE NZ chapter. This presentation will discuss the current state of Systems Engineering adoption in New Zealand, and the specific challenges of progressing the discipline within a geographically isolated corner of the world, along with the future potential of Systems Engineering in NZ to support national and international challenges.

Our discussion is based on inputs from a range of companies that were practicing SE in the country during the initial setup of an INCOSE chapter.We will also discuss the process of setting up INCOSE New Zealand as a chapter, including setting up an interim committee, jumping through regulatory hoops, voting on a full committee, agreeing a constitution, and recruiting and retaining members. As a modestly sized chapter spread across an entire country, digital and electronic technologies have been core to our operations. We will present approaches that have worked well alongside those that havent.

This presentation will be of relevance to those interested in introducing and promoting Systems Engineering within other countries, and to others considering setting up new INCOSE chapters elsewhere. It will also give a useful overview of engineering in New Zealand that could be of interest to those who might consider working in the country.

21307 Exploring the Role of Digital Twins in Advancing SORA Compliance for BVLOS Operations in Australia

Authors
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Provided Keywords
Natural Language Keywords
australia, aviation, comprehensive, digital, operations, regulatory, safety, sora, technology, twins
Presentation format decision
Paperless - Presentation or Poster
Stream submitted
C.8. Technical Leadership in a Digital Future
Stream proposed
C.8. Technical Leadership in a Digital Future

Abstract

Uncrewed Aerial Systems (UAS) technology shows great promise in providing economic and societal benefits across the world. In response to this demand, the Australian Civil Aviation Safety Authority, as well as their counterparts internationally, has been actively refining its regulations to address the rapidly evolving landscape of UAS technology and applications. One notable development in this regard is the adoption of the Specific Operations Risk Assessment (SORA), which represents a significant step towards enhancing the safety and regulatory oversight of UAV operations in Australia (Denney et al., 2018).

The complexity of the UAS ecosystem, taking in a plurality of stakeholders, requires a comprehensive approach to assessing both technical and regulatory architectures. The complexity is such that using modelling and simulation, in the form of digital twins of the ecosystem, is likely to be the only way to achieve this comprehensive assessment.

The emergence of digital twin (DT) technology in aviation and airspace is a significant shift towards data-driven, proactive safety management practices. Leveraging digital twins to simulate, analyze, and optimize aviation systems and operations, stakeholders can improve safety, mitigate risks, and foster innovation.

This paper will discuss how digital twins can facilitate the application of SORA in the Australian regulatory context. By synthesising insights from literature on digital twins and their applications, and drawing Thales experience in this area, this paper provides a comprehensive understanding of the way in which DTs can be used to enable complex operations, including the associated benefits, challenges, and opportunities. The paper will also consider the broader use of digital twins in the airspace management ecosystem in Australia.

21231 A model-based digital engineering approach to realize enterprise transformational programs

Authors
Sam Mancarella 1, Memko, Melbourne, VIC, Australia
Provided Keywords
MBSE, Enterprise Transformation, System of Systems, Digital Engineering, Data Sovereignty
Natural Language Keywords
approach, data, digital, engineering, mbse, planning, se2035, sets, systems, transformation
Presentation format decision
Paperless - Presentation or Poster
Stream submitted
C.8. Technical Leadership in a Digital Future
Stream proposed
C.8. Technical Leadership in a Digital Future

Abstract

The Systems Engineering Vision for 2035 (SE2035), defined by the International Council on Systems Engineering (INCOSE), sets the engineering vision to direct investments, foster greater collaboration, and advance the systems engineering discipline. SE2035 sets the North Star to enable systems engineers to timely respond to key trends including digital transformation, sustainability, smart systems and complexity growth.

Technology advancements in modelling, simulation, and visualization provide practitioners with decision-making data that is more representative of a system of interest than ever. The combination of these technologies and their utilization is referred to as Digital Engineering. However, the misconception that digital engineering can only be utilized if adopted early in the system lifecycle inhibits its adoption in operation/sustainment phases of a systems lifecycle.

Transformation programs require the deliberate and staged planning and implementation of significant changes to a system of interest. The number of stakeholders, suppliers and other interested parties grows exponentially if that system is a System of Systems (SoS) and that SoS is a complex enterprise. In these circumstances, careful consideration needs to be given to how these enabling technologies integrate, how they interoperate, and how data sovereignty is preserved and enforced between organizations.

This presentation discusses an approach to adopt digital engineering in a complex transformation program. The approach uses Model Based Systems Engineering (MBSE) techniques as the conning tower for planning and decision making which brings together input from Integrated Project Teams (IPTs), supply chains and consumer groups whilst preserving data sensitivity constraints. This presentation outlines the experiences of an adopting organization using MBSE practices for engineering change management and digital transformation planning in a heavy industry context.

20712 Leadership and Organisational Implementation of Systems Engineering in the Infrastructure Sector

Authors
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Provided Keywords
Leadership, Organisational Change, Sector Capability, Infrastructure
Natural Language Keywords
australian, civil, engineering, implementation, infrastructure, leadership, organisational, se, sector, systems
Presentation format decision
Paperless - Presentation or Poster
Stream submitted
C.8. Technical Leadership in a Digital Future
Stream proposed
C.8. Technical Leadership in a Digital Future

Abstract

Overview: In the Australian infrastructure sector, Systems Engineering (SE) is often practised in siloes, by systems engineers only. It is not well engrained in the organisational processes, and not actively championed nor driven by leaders and decision-makers. This results in a fragmented adoption of SE with reduced benefits; inefficiencies and cost overruns; or worse, projects not delivering the required outcomes.

Context: There is a significant mandate and guidance for the application of SE in the infrastructure sector. Transport for NSW Asset Management Framework [1] mandates the adoption of an SE approach for complex transport infrastructure systems over their life cycles. The UK Institute of Civil Engineers extensively documented how systems thinking can improve the delivery of complex infrastructure projects [2]. The Dutch Guidelines for Systems Engineering within the Civil Engineering Sector [3] provide clear guidance for the successful implementation of SE within the sector and organisations. The UK Government recently published documents promoting systems thinking for civil servants [4].

Purpose: SE leadership and implementation in the Australian infrastructure sector is what can be done about it?

Approach: This presentation will analyse and identify causes and solutions through:

i) A review of recent literature, articles and industry reports (assisted by AI when appropriate);

ii) Comparing approaches of the Australian infrastructure sector with other sectors and countries; and

iii) Interviews with thought leaders across the sector.

Insights: Insights will explore the link between improved implementation of systems engineering and productivity [5, 6, 7]; leadership and organisational motivations and competencies,to understandthe most significant barriers to adopting SE more effectively in the Australian infrastructure sector.