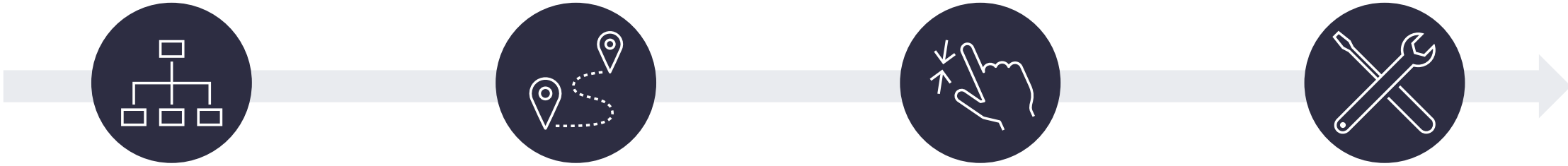
The Future of Systems Engineering: Systems Engineering Application Extensions

A Systems Community Initiative

FuSE Mini-Event: SE and Asset Management, 13 April 2023

Tom Strandberg
Systems Engineering Application Extensions Stream Lead

FuSE Mini-Event Series



MAR 29, 2023
Future of Systems Engineering (FuSE) Introduction and Update and FuSE Foundations Overview

APR 06, 2023
Future of Systems Engineering (FuSE) Vision & Roadmaps

APR 13, 2023
FuSE Application Extensions – SE and Asset Management

APR 20, 2023
FuSE Methodologies Virtual Workshop

Visit https://www.incose.org/about-systems-engineering/fuse or https://www.incose.org/events-and-news for details and registration information

FuSE Mini-Event: SE and Asset Management 13 April 2023

- **Future of Systems Engineering (FuSE)**
- Introduction to the Topic: Asset Management
  Ben Mogridge
- Results from IW2023
- Workshop
- Next steps

Systems Engineering Vision 2035

Executive Summary

- The Global Context for Systems Engineering
- The Current State of Systems Engineering
- The Future State of Systems Engineering
- Realizing the Vision

5 Categories:

https://www.incose.org/about-systems-engineering/se-vision-2035

The world is coming to a conclusion that we need to take a systems approach to solve our challenges.

A better world through a systems approach

The world's recognition of systems engineering and INCOSE is still very limited.

Applications

1. Systems engineering contributes innovative solutions to major societal challenges.

2. Systems engineering demonstrates value for projects and enterprises of all scales, and applies across an increasing number of domains.

Practices

3. Systems engineering anticipates and effectively responds to an increasingly dynamic and uncertain environment.

4. Model-based systems engineering, integrated with simulation, multi-disciplinary analysis, and immersive visualization environments is standard practice.

5. Systems engineering provides the analytic framework to define, realize, and sustain increasingly complex systems.

6. Systems engineering has widely adopted reuse practices such as product-line engineering, patterns, and composable design practices.

Tools and Environment

7. Systems engineering tools and environments enable seamless, trusted collaboration and interactions as part of the digital ecosystem.

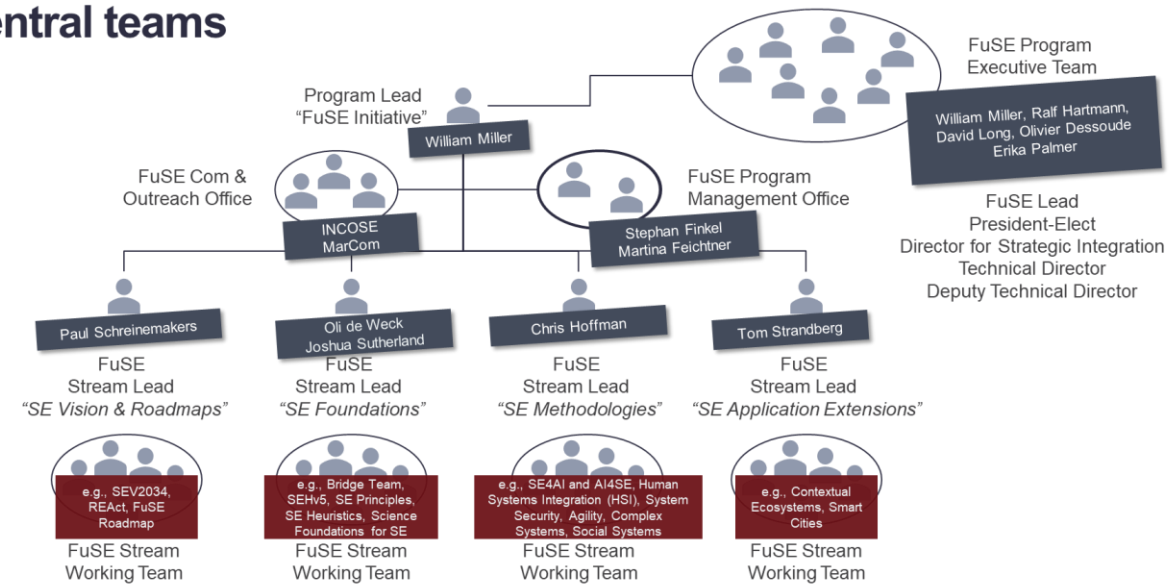
Research

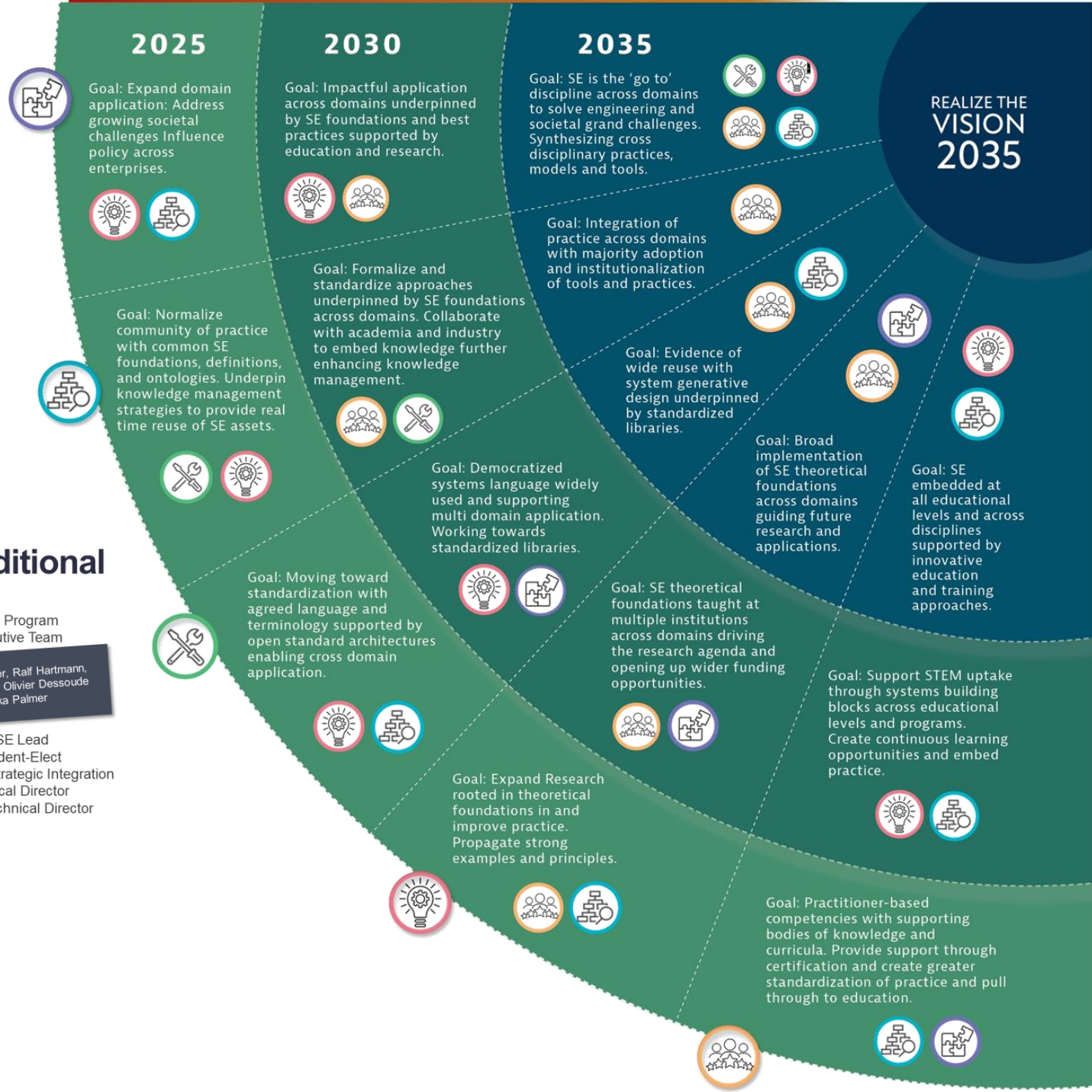
8. Systems engineering practices are based on accepted theoretical foundations and taught as part of the systems engineering curriculum.

Competencies

9. Systems engineering education is part of the standard engineering curriculum, and is supported by a continuous learning environment.

The FuSE program is organized in 4 streams with additional central teams





2025

Goal: Expand domain application: Address growing societal challenges Influence policy across enterprises.

2030

Goal: Impactful application across domains underpinned by SE foundations and best practices supported by education and research.

2035

Goal: SE is the 'go to' discipline across domains to solve engineering and societal grand challenges. Synthesizing cross disciplinary practices, models and tools.

REALIZE THE VISION 2035

Goal: Integration of practice across domains with majority adoption and institutionalization of tools and practices.

Goal: Formalize and standardize approaches underpinned by SE foundations across domains. Collaborate with academia and industry to embed knowledge further enhancing knowledge management.

Goal: Normalize community of practice with common SE foundations, definitions, and ontologies. Underpin knowledge management strategies to provide real time reuse of SE assets.

Goal: Evidence of wide reuse with system generative design underpinned by standardized libraries.

Goal: Democratized systems language widely used and supporting multi domain application. Working towards standardized libraries.

Goal: Broad implementation of SE theoretical foundations across domains guiding future research and applications.

Goal: SE embedded at all educational levels and across disciplines supported by innovative education and training approaches.

Goal: Moving toward standardization with agreed language and

Goal: SE theoretical foundations taught at

Stream Output

- An overview of initiatives that support the realization of the SE Application Extensions Roadmap.
  - Existing, e.g., Smart Cities Initiative
  - Potential new ones, e.g., Innovation
- Stimula and support to initiatives
  - Typically, cross-WG, cross-organization
- Coordination and collaboration
  - products, papers, workshops, lobbying

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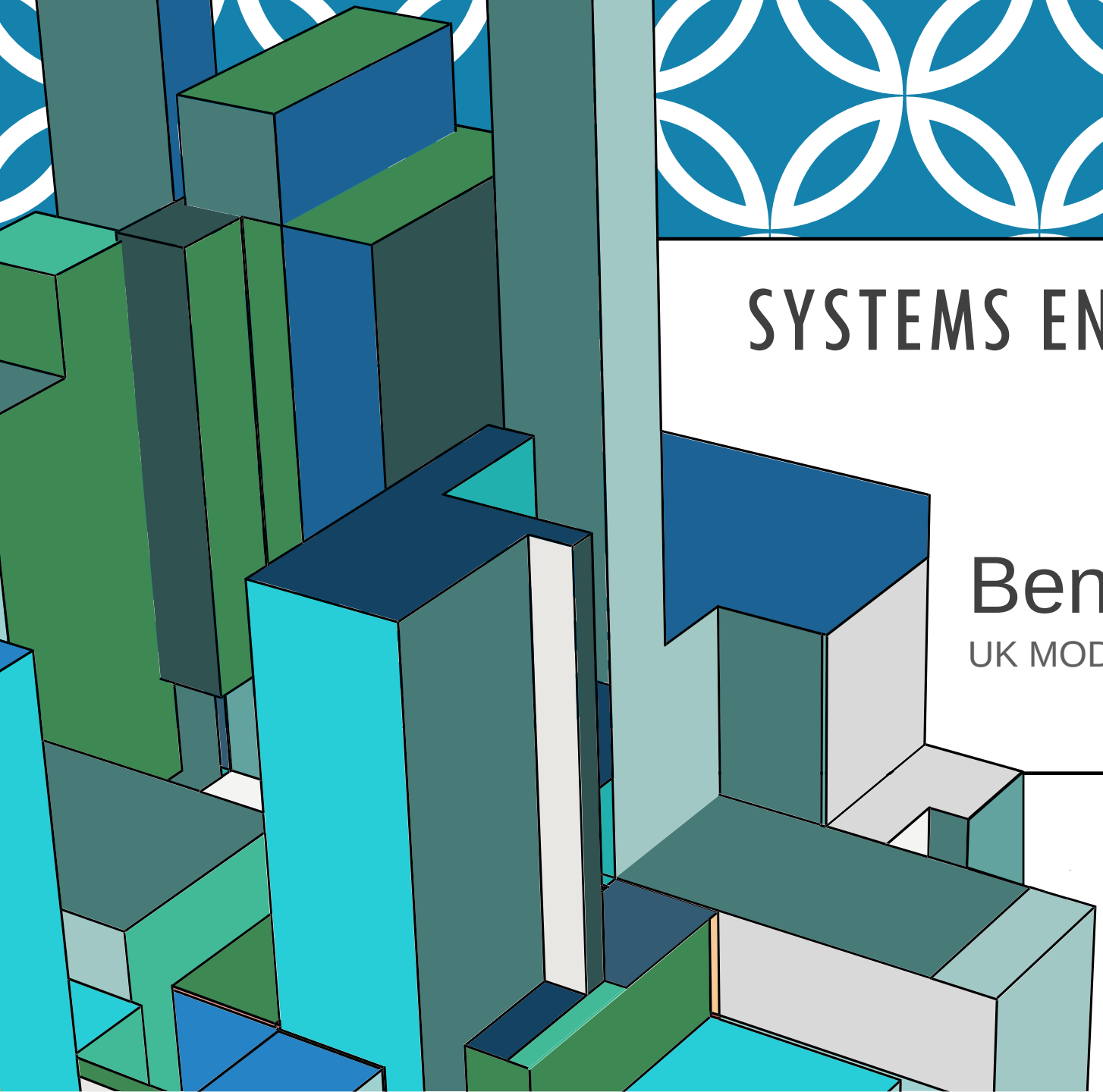


SYSTEMS ENGINEERING & ASSET MANAGEMENT

Ben Mogridge
UK MOD

PRESENTATION COVERAGE

What is Asset Management

Where can we connect INCOSE with Asset Management

Aligning SE to AM

ASSET MANAGEMENT – WHAT IS IT AND WHY?

Asset management is a strategic discipline which gives rigour and accountability to the way organisations decide:

- how, where and in what to invest
- what assets are most critical
- what risks need to be managed
- what demands must be served
- what needs to be known
- how this knowledge should be captured and disseminated how organisations should be structured and led
- what types and teams of people they need how activities should be carried out
- how actual performance should be measured
- that improvements are needed.

BEN'S BACKGROUND

- DE&S ITS SE Asset Management Domain Lead
- Leading the technical implementation of AM in multiple areas of UK MOD
- AMS/1 Deputy Chair
- TC251 Asset Management Leadership Committee
- Developing and supporting SSGs on behalf of the IAM

Ben Mogridge MSc CEng MIET MINCOSE
Asset Management Domain Lead
Internal Technical Support Systems Engineering Consultant
Engineering Group
Abbey Wood South, BS34 8JH
Tel: +44 (0)7966 146 724

ASSET MANAGEMENT – WHAT IS IT AND WHY?

Asset Management - “the coordinated activity of an organization to realise value from assets”
(Clause 3.3.1 of ISO 55000).

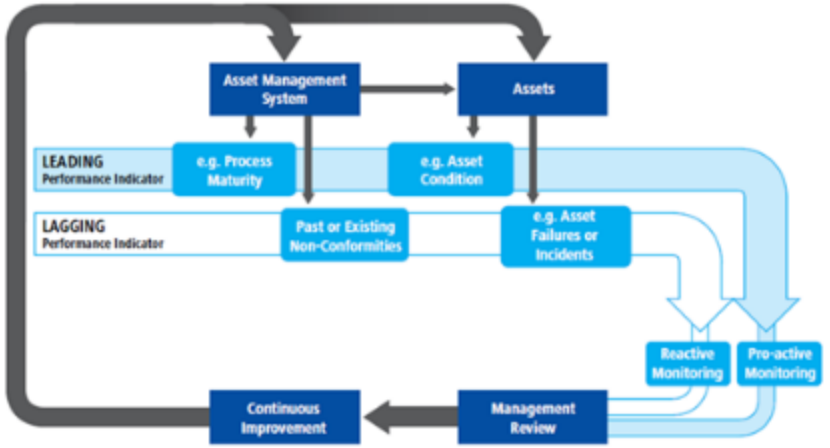
“Asset management is more than doing things to assets - it is about using assets to deliver value and achieve the organisation’s business objectives. It also brings a different approach and way of thinking and a transformation of organisational alignment and culture. Each organisation has to determine what it considers value to be and choose how to manage its assets to derive best total value.”

(The Institute of Asset Management - An Anatomy of Asset Management Ver.3 (2015, December) - p8)

The Institute of Asset Management https://theiam.org/

“What’s going to happen is equally as important as what is happening today…”

“We must balance our duty to commission our Assets as swiftly as reasonably practicable with the need to ensure through-life reliability and availability ”



OVERALL GOALS OF AM

- spending where necessary
- leaving assets in the same state as you would wish to find them managing risks not resources
- thinking in whole systems not their parts
- applying a whole-life perspective
- everyone reading from the same page
- stakeholders understanding the choices made.

ASSET MANAGEMENT PUBLICATIONS

UN SDG'S

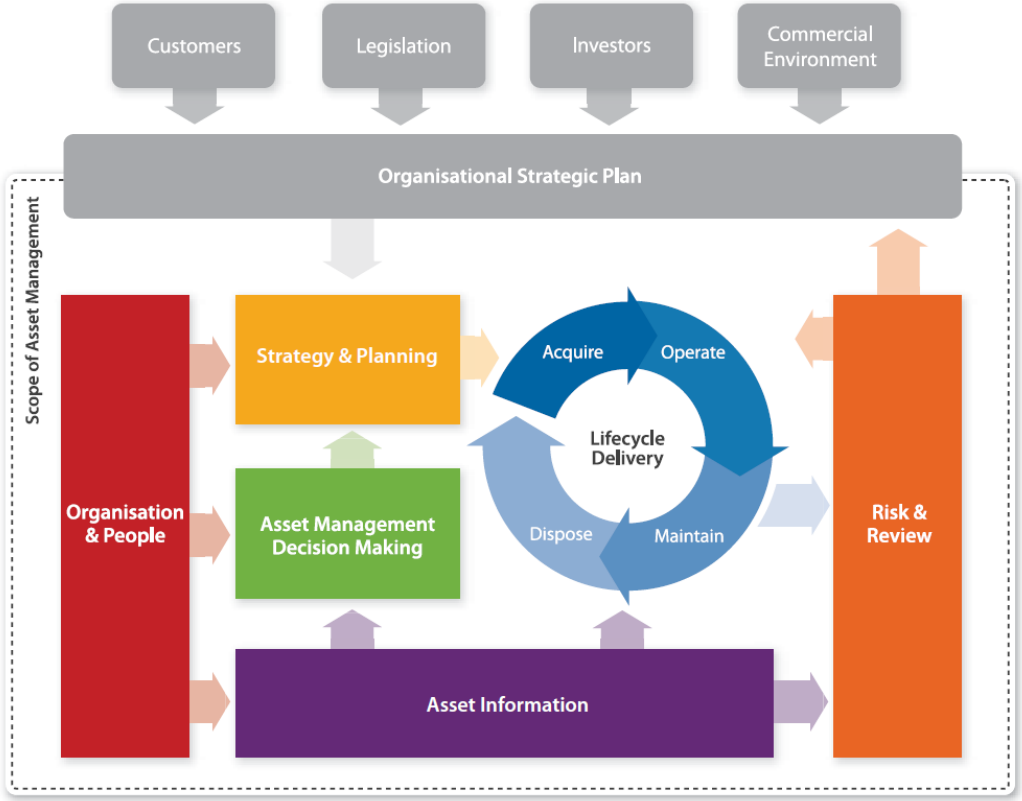
ISO/TC 251 sees its work contributing specifically to the SDG's under categories: 6, 7, 9, and 11

ASSET MANAGEMENT & MANAGING ASSETS – THEY'RE DIFFERENT!

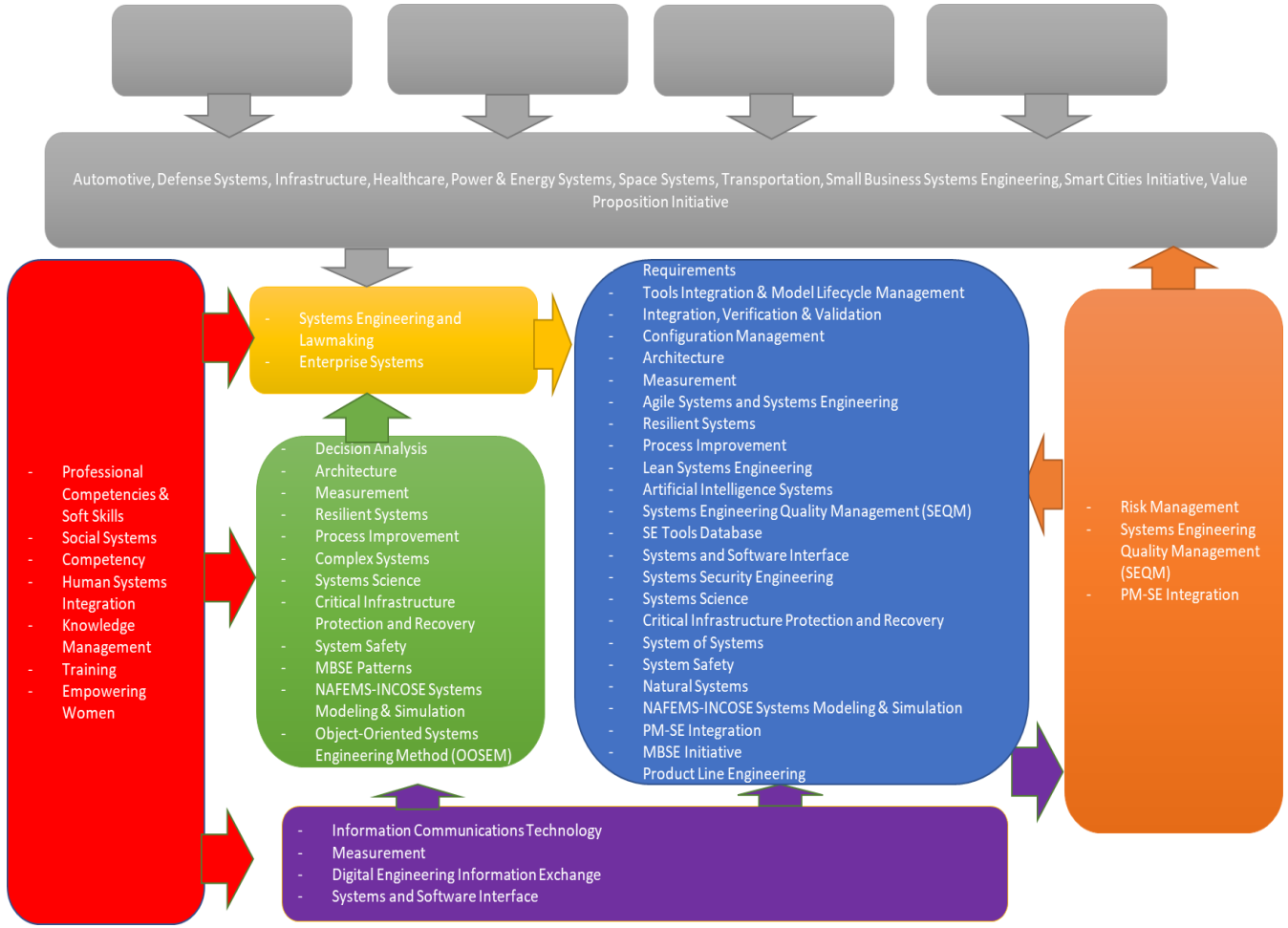
	Managing Assets	Asset Management
Colleague Focus	Asset data, location and condition assessment	Information supported decision making (i.e. with strategic context and related to customer need)
	Current KPIs	Strategies to select and exploit assets over the lifecycles to support business aims
	Department budgets	Collaboration across departments to optimise resources allocated and activities
Stakeholder Focus	Current costs	Triple bottom line and value
	Current performance	Clarity of purpose of the organisation
	Response to failure/ maintain function	Focus on impact of activities of an organisation's objectives
Seniour Focus	Short term gain and loss	Long term value for the organisation
	Departmental/individual performance	Developing competence and capability across workforce
	Savings, especially OPEX	Business risks understood and mitigated
Supplier Focus	Short term contracts and performance	Long term contracts and/or partnering relationships in support of client value and objectives
	Service level agreements focussed on contract specifications	Understanding client strategy and needs in 5-10 years

Table adapted from ISO/TC 251 - Managing Assets in the context of Asset Management – First Edition dated May 2017

ASSET MANAGEMENT SUBJECT GROUPS



INCOSE WG ALIGNMENT TO ASSET MANAGEMENT SUBJECT GROUPS



WHERE CAN WE CONNECT SE TO AM

2 Institutions…

ISO 55000 series

ISO 15288

2 ISO's

Common interests?

ALIGNMENT

Asset Management

"enable an organization to achieve its objectives through the effective and efficient management of its assets. The application of an asset management system provides assurance that those objectives can be achieved consistently and sustainably over time"

ISO 55000

Systems Engineering

"a structured and auditable approach to identifying requirements, managing interfaces and controlling risks throughout the project lifecycle"

Z1 - Guide

The Institute of Asset Management

INCOSE

ALIGNMENT

Asset

"An item, thing or entity that has potential or actual value to an organization. The value will vary between different organizations and their stakeholders, and can be tangible or intangible, financial or non-financial."

ISO 55000

System

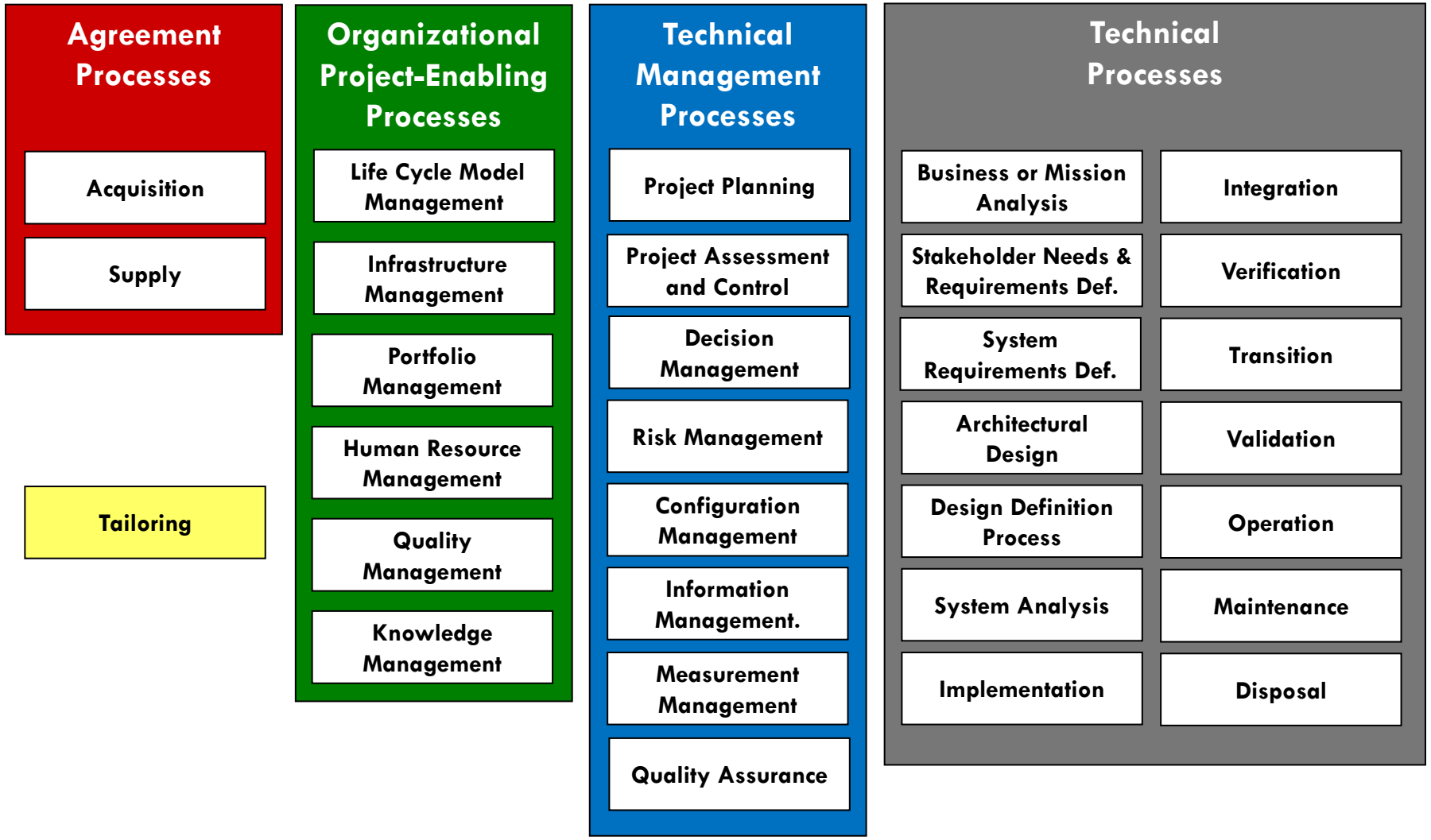
"Combination of interacting elements organized to achieve one or more stated purposes"

ISO 15288

The Institute of Asset Management

INCOSE

ISO/IEC/IEEE 15288:2015
SYSTEMS AND SOFTWARE ENGINEERING - SYSTEM LIFE CYCLE PROCESSES

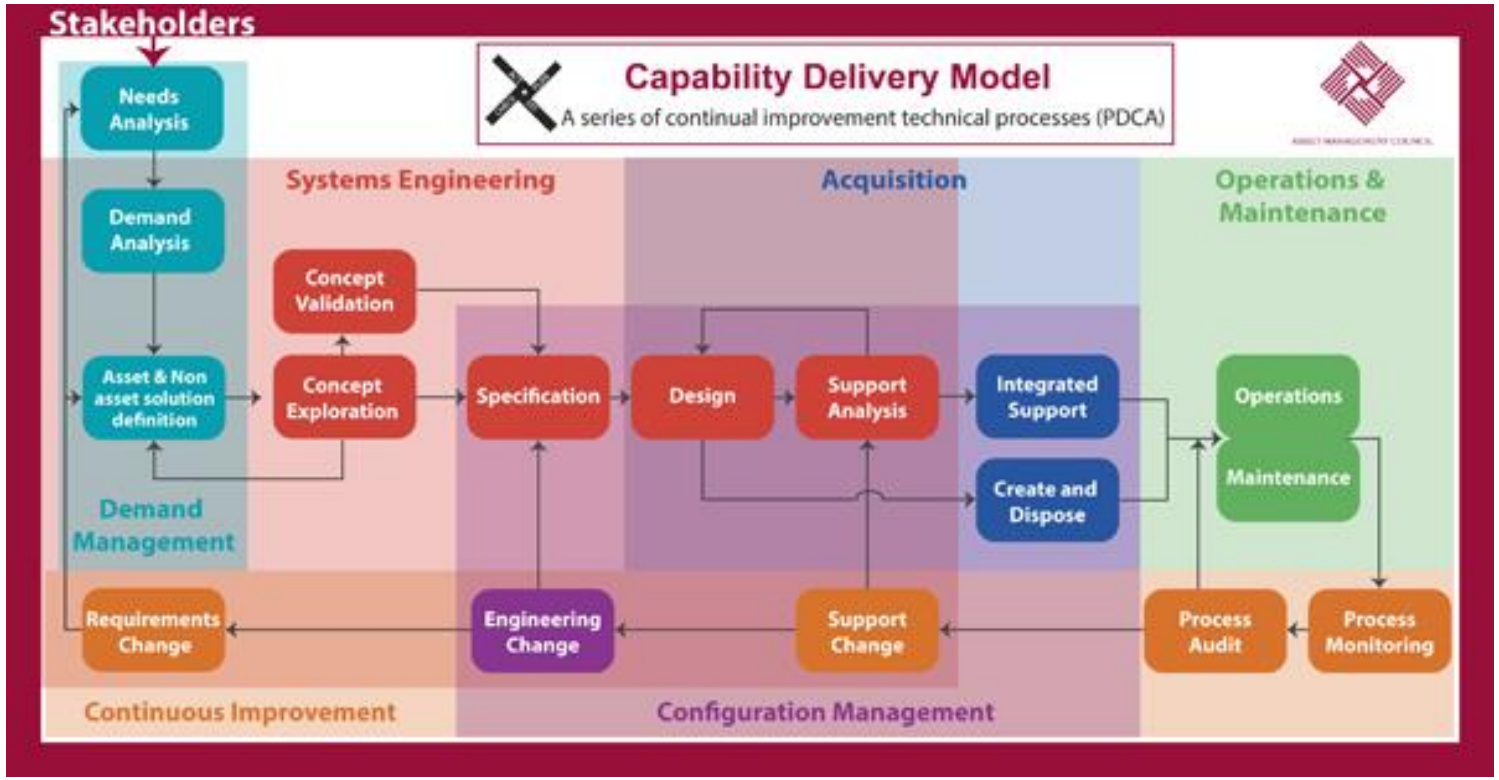


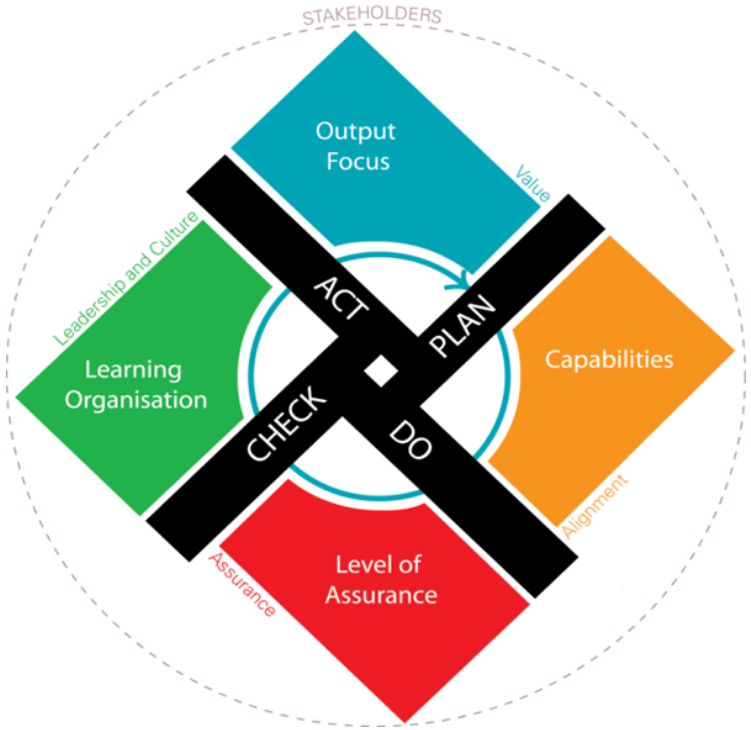
ASSET MANAGEMENT COUNCIL

- Technical society of Engineers Australia
- Founding member of Global Forum on Maintenance and Asset Management (GFMAM)

ASSET MANAGEMENT COUNCIL

Explicitly advises organizations to leverage Systems Engineering practices.





https://www.amcouncil.com.au/knowledge/asset-management-body-of-knowledge-ambok/ambok-models.html

LIFECYCLE EMPHASIS + OPTIMIZING TRADE-OFFS

The goal of asset lifecycle management is to achieve an optimal balance between risk, cost and performance.

Where SE practitioners can build bridges with AM:

- Balance lower capital costs with longer operating life costs (trade-offs)
- Strategies for end of life (retire/replace/renew); with technology migration and procurement strategies
- Provide tools to assess trade-offs to optimize systems performance, cost and risk

QUESTIONS?

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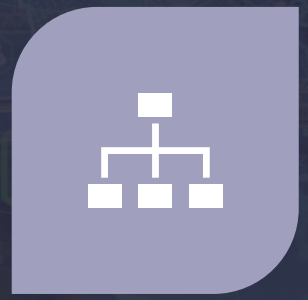
How?

DEFINE TOPICS THAT CAN SUPPORT EXTENDING THE APPLICATION OF SE

DEFINE TARGET GROUPS AND THE MESSAGE REQUIRED

DEFINE HOW TO APPROACH THE TARGET GROUP



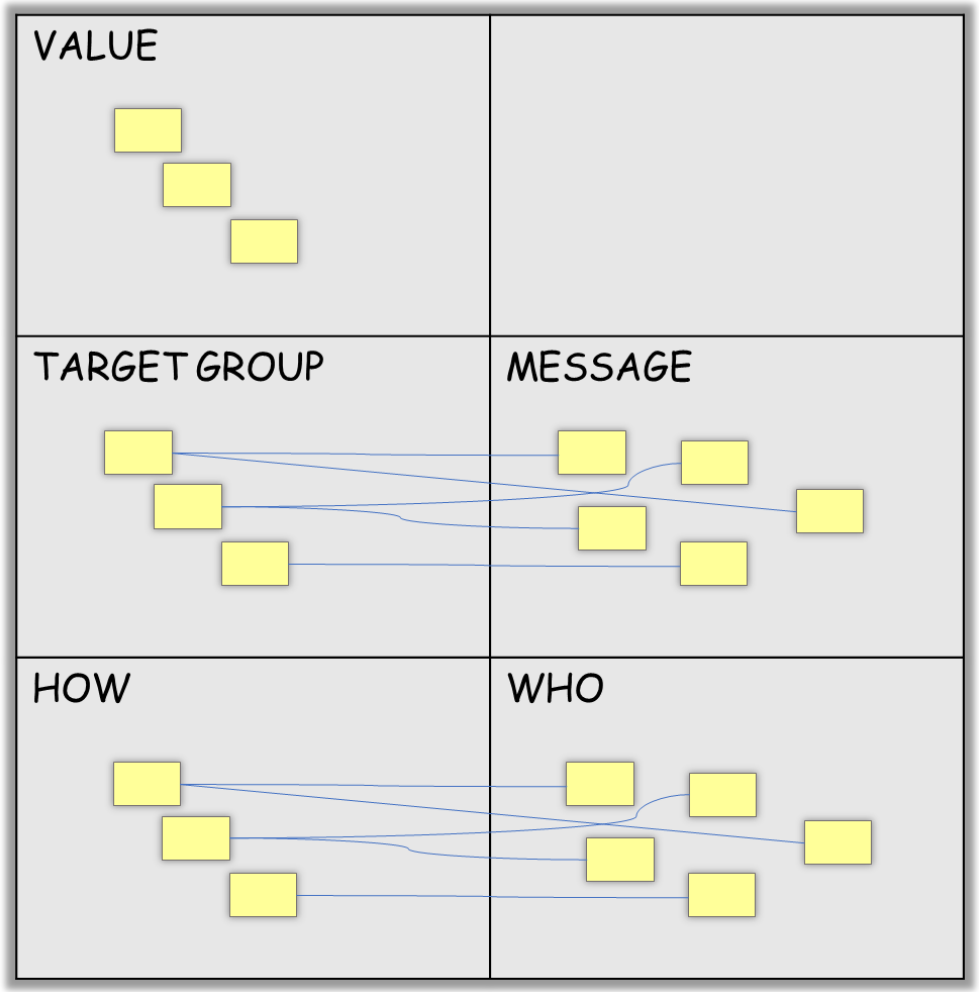
IDENTIFY THE RESOURCES REQUIRED, INTERNAL AND EXTERNAL TO INCOSE

STIMULATE AND SUPPORT JOINT INITIATIVES

INCOSE IW Working Session Breakout (50 min)

Round table hello

1) Feedback on topic and value SE could bring
2) The target groups to approach
3) The message to use when approaching the target group
4) How – what actions are in place or need to be taken?
5) What internal and external resources (collaborations) to engage



SE and AM. Feedback on topic and value SE could bring.

- Harmonize SE and Asset Management Processes and Standards
- Asset Management is the what, SE is how !
- Value : integrated (SE/AM) methodology to apply scientific principles to support decision making
- asset = system
- Look to the bigger picture
- Achieving "Line of Sight" through an org with SE, (People understand their value to the org)
- Thinking forward
- standardization
- predict failure of assets / systems
- Share methods for analyzing systems/assets for achieving missions in a cost-effective long-term manner
- Long-term aspects of AM & SE counters "Accountability Fade" in big infrastructure programs
- Define digital thread requirements: - Eng - Config. - Sustain - Finance - Procure

SE and AM. The target groups to approach & message

- IAM & AMC
- asset owners
- owners /operators of public infrastructures

- Communicate :
  - Value
  - Interest
  - seeking alignment

SE and AM. How – what actions are in place or need to be taken and who will be involved?

HOW?

HOW?

HOW?

HOW?

HOW?

- Gain MoU between INCOSE and each AM Group
- Working groups to harmonize languages - Use cases on how SE /AM work together
- Best practices

- INCOSE - Monthly Meetings:
  - Infrastructure WG
  - Transportation WG
  - Critical Infrastructure Protection and Recovery WG
  - Smart Cities Initiative
- Task force to organize INCOSE resources and define products
- Task force also to manage outreach

WHO?

WHO?

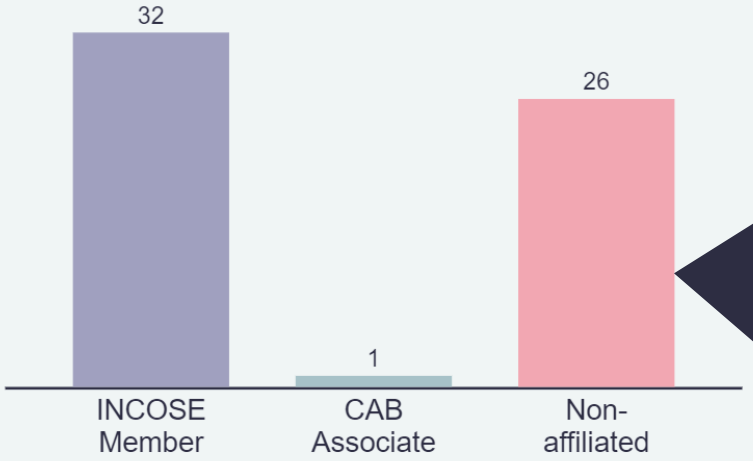
WHO?

WHO?

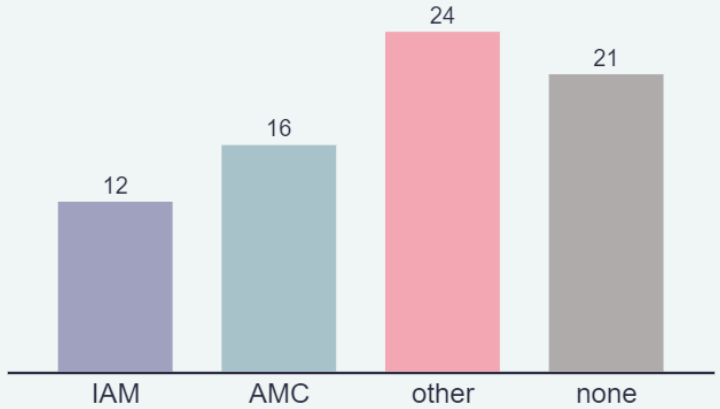
WHO?

Let´s check your connection ☺

How are you tied to INCOSE?



To which (additional) professional society are you affiliated?



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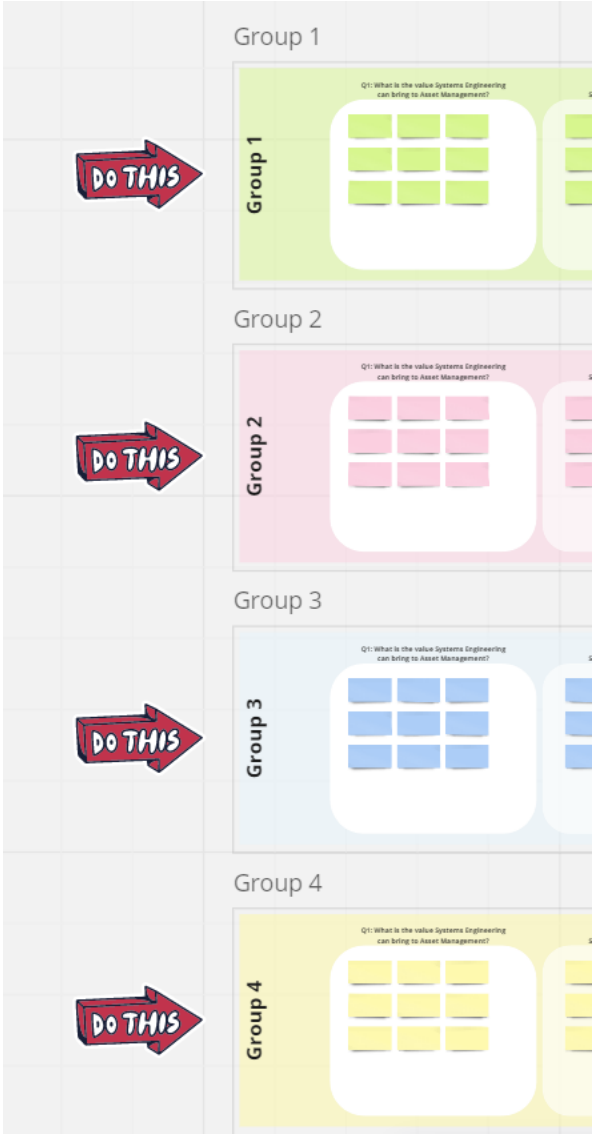
Workshop Setup

In Groups of 5 (automatic set up):

1) Gather at the “swimlane” with the same number as your group and introduce yourselves
2) Reflect on the Question 1 (Q1) individually and put a note on the Board
3) When all have put a note, start discuss your thoughts. Add more notes as appropriate.
4) Wrap up after 15 minutes
5) Feedback on the question from a selected group and others add on (10 minutes)

Repeat steps 2-5 for Questions Q2 and Q3



Results (compiled from > 150 Post-It notes)

Q1: What is the value Systems Engineering can bring to Asset Management?	○ Holistic and Systemic Approach ○ Engineering, Structured Systematic approach ○ Life cycle – support activities from concept to retirement and reuse ○ Transdisciplinarity – integration of technical and financial aspects ○ Traceability from need to implementation - Digital thread
Q2: What holds Systems Engineering back from providing this value to Asset Management?	○ Awareness ○ Understanding, misconception ○ Legacy ○ Language ○ Value
Q3: What measures need to be taken to enable Systems Engineering to bring value Asset Management?	○ Elaborate the SE and AM synergies ○ Provide cases ○ Establish Nomenclature ○ Integrate across organisational barriers, technical and non-technical ○ Reach out

Question	Category	Questions & Answers	Group
Q1	**!**	**Q1: What is the value Systems Engineering can bring to Asset Management?**	**!**
Q1	?	Emphasis on difference between Asset management and managing assets	2
Q1	?	From experience with many clients with AM processes, often lower capability andexperience in Life Cycle Delivery areas (RM, V&V, CM, Reliability)	10
Q1	Acquisition	focus on process and management within acquisition phases	4
Q1	competence	Help with educating 'appliers' in competency development	10
Q1	Development	A single model to look at a project from stakeholder to requirements to historical records.	1
Q1	Development	It provides the basis for translating demand into tangible outcomes	2
Q1	Development	set of vendor-driven tools to deliver user needs into systems design	5
Q1	Development	An agnostic solution set that can help frame need at all levels of the organisation	6
Q1	Engineering	To be an active tool, not just an accounting and asset depreciation tool.	1
Q1	Engineering	Once an organization identify assets that shall be acquired or realize in house to increase its value, systems engineering helps to get them in an effective and efficient manner.	2
Q1	Engineering	Systems engineering is a structured approach that is fundamental to many ISO management systems	2
Q1	Engineering	Technical processes associated with systems engineering provide details to asset management elements	4
Q1	Engineering	good link from SE testing verification to ongoing AM testing during maintenance	5
Q1	Engineering	Structured systematic approach	8
Q1	Engineering	Common ways of working - Consistent structured approach to complex problem solving	10
Q1	Engineering	Decomposition of strategic problems into discrete integrated elements that are able to be operationalised	10
Q1	Engineering	SE assists AM to realize complete systems for a system or grouping of assets to work together	10
Q1	Holistic	Approach for capturing interdependencies between assets systems and the missions they support - in our context,orgs who deliver product and those who sustain assets are independent, so understanding who needs what from whom and when becomes a challenge	9
Q1	Holistic	A focus on more than just physical assets ie. Logic / functional	10
Q1	Holistic	Applying SoS approach and value definition (e.g. like mission anlysis, 7 samurai mode)	10
Q1	Holistic	Connecting Asset Managers with the information / knowledge used by system designers as a full system of systems - as a partner, not another silo.	10
Q1	Information	Make information more widely available and not just asset mgmt professionals.	1
Q1	Lifecycle	Methods to apply to the asset lifecycle.	4
Q1	Lifecycle	Overlaps the lifecycle of assets to the business system for managing assets	4
Q1	Lifecycle	strong lifecycle focus, major projects focus	5
Q1	Lifecycle	Integration of AM into the SE lifecycle	6
Q1	Lifecycle	Structure approach to support the delivery of Asset Lifecycle activities	8
Q1	Needs and requirements	clear defintion and tools to requirements definition	5
Q1	Needs and requirements	heavy focus on user needs input into the design of systems	5
Q1	Needs and requirements	SE approach provides the framework within which the requirements for the AM system and the value to be created by the assets are created and assured	5
Q1	Needs and requirements	Assurance linked to understand if actions taken are delivering value	6
Q1	Needs and requirements	Clear identification of risk aligned to related requirements,	6
Q1	Needs and requirements	Clear line of sight, clear definition of need, not nice to haves, or a leap straight to solutions	6
Q1	Needs and requirements	Frame the requirements to remove nice to haves and structure the requirements in such a way to foster a platform for cost effective innovative solutions	6
Q1	Needs and requirements	Expertise in breaking down overarching business objectives to systems requirements	7
Q1	Needs and requirements	All members of management having knowledge of requirements not just the SE	8
Q1	Needs and requirements	Connection to requirements	8
Q1	Needs and requirements	Requirements management	8
Q1	Needs and requirements	Well defined requirements can help in selection of parts to use in designs	8
Q1	Network	worldwide set of practioneers	5
Q1	Systems thinking	Applies a systems thinking approach to solving problems	2
Q1	Systems thinking	Systems thinking	3
Q1	Systems thinking	Wholistic approach to AM	3
Q1	Systems thinking	Bring systems thinking into the discussion	4
Q1	Systems thinking	can help view assets in a more holistic view rather than as just a physical object	4
Q1	Systems thinking	Place for additional thoughts	4
Q1	Systems thinking	SE approach (thinking) is the basis for AM approach	5
Q1	Transdisciplinarity	Integration of Tech & Fin Disciplines	3
Q1	Transdisciplinarity	Alignment to SE specialty areas	6
Q1	Transdisciplinarity	synergies with other practitioners	6
Q1	Transdisciplinarity	Showing how systems engineering can enhance processes and practices i.e. CMMS/EAM and further techniques i.e. FMEA, RCA etc.	9
Q1	Transdisciplinarity	Apply system engineering to aspect outside ISO55000 i.e RCM RCA using of EAM / CMMS	9
Q1	Transdisciplinarity	Availability, Reliability, etc. as applied into the application itself.	10
Q1	Validation	Increased assurance in programme delivery & line of sight back to organisational need. Provides clarity over “Are we building / maintaining the right system?” vs “Are we building / maintaining the system right”	6
Q1A	**!**	**Place for additional thoughts**	**!**
Q1A	Definitions	Treatment of AI in AM & SE...not just as a tool. Can GPT be treated as an asset/system rather than a tool?	10
Q1A	Information	Data as an asset....	10
Q1A	Lifecycle	Lifecycle construct suits physical assets but less so for advanced software ie. GPT, learning algorithms etc.	10
Q1A	Organisation	Organisation is a system with various sub-systems	2,3
Q1A	Pilot porject	Maybe INCOSE can use a subject particularly used in Asset management and develop a pilot project to show the value Systems engineering can add to asset management	9
Q1A	Process	Maybe asset management is primarily an input to systems engineering, which then becomes an input to "managing assets", as defined during the presentation.	2
Q1A	Process	SE is misunderstood and overcomplicated	2

Q1A	Process	Keep it simple - don't over complicate it	6
Q1A	Value	Decision makers needs to understand the value of implementation	2
Q1A	Value	are value defined the same way?	5
Q1A	Value	tools to define value / value aspects	5
Q1A	Value	value is context specific eg for some value is profit for others it is reputation	5
Q1A		Hierarchy of systems	2
Q1A		Asset Management has been transactional in its thinking	4
Q1A		Well defined interconnections are important	8
Q2	!	**Q2: What holds Systems Engineering back from providing this value to Asset Management?**	!
Q2	Adaption	Its application to various business or infrastructure systems is not easy to simplify	2
Q2	Adaption	Systems thinking is applied in many disciplines but in a different context	2
Q2	Adaption	projects vs operations & maintenance domains	5
Q2	Adaption	Insufficient AM requirements	6
Q2	Adaption	Lack of AM in the Project - Program Scope and Budget	6
Q2	Adaption	Integration into Business Development methodologies & tools	10
Q2	Awareness	Awareness and commitment from leadership teams (both client and provider)	10
Q2	Awareness	Weak people network connections (I was unaware of IAM and other similar societies as my company does no	10
Q2	Language	Barriers of Language and Terminologies	2
Q2	Legacy	Industrial practices	3
Q2	Legacy	Most organizations divide engineering functions from asset management functions, which results in differing	4
Q2	Legacy	Engineering / Construction experts are in their own silo in the organisation	7
Q2	Perception	SE is often thought of an IT software engineering and development tool	1
Q2	Perception	Often related to IT systems not asset management by the lay person	2
Q2	Perception	The thought that it is a technical approach as opposed a business approach	2
Q2	Perception	People perception	3
Q2	Perception	The title in itself	3
Q2	Perception	perception that SE is only for large scale procurement of "new and novel " assets	5
Q2	Perception	SE is seen as something engineers (those with Eng Qualifications) do when in fact both Engineers and non eng	5
Q2	Perception	SE isn't seen as a 'universal' or 'useful' problem solver approach in other domains.	10
Q2	Understanding	Little understanding of how SE can contribute to asset management.	1
Q2	Understanding	Good knowledge of the scopes of both disciplines.	2
Q2	Understanding	One is not a subset of the other. They are completely integrated	2
Q2	Understanding	There seems to be a difference in perception between engineers and AM practitioners	2
Q2	Understanding	Artificial barriers and lack of familiarity	4
Q2	Understanding	Asset Management experts need more education in SE	4
Q2	Understanding	Cross domain understanding of the techniques and tools.	4
Q2	Understanding	Most organizations lack systems engineering knowledgeable staff	4
Q2	Understanding	Staff that support asset management focus on different standards and lack familiarity with system engineerir	4
Q2	Understanding	Like all specialist areas both AM and SE folks think how they approach the problem is the only way. in fact we	5
Q2	Understanding	procurement focus on lowering the CAPEX cost of new systems vs the OPEX opportunities through SE process	5
Q2	Understanding	Lack of common lexicon/taxonomy	6
Q2	Understanding	Lack of understanding how the domains complement each other	6
Q2	Understanding	Misunderstanding of the value that both domains bring	6
Q2	Understanding	Ability to translate SE priorities in Financial speak?	8
Q2	Understanding	Companies that haven't used SE and have little knowledge don't understand the value add	8
Q2	Understanding	Clear understanding of Value Proposition across other disciplines	10
Q2	Understanding	Very few people in AM know SE	8
Q2	Understanding	Lack of understanding what asset management organization needs from SE in order to do their task	9
Q2	Value	Like all new processes, the first project does not provide a ROI	1
Q2		Lack of understanding of different terminology related to maintenance, reliability, asset management, manag	9
Q2A	!	**Place for additional thoughts**	!
Q2A		a sample pitch for non asset professionals but familiar with SE could use to speak with Senior managers.	1
Q2A		Not being able to implement SE to its full extent	2
Q2A		Philosophy or Practice	2
Q2A		Siloes between engineering and non-engineering	2
Q2A		The term systems engineering and asset management are not familiar to decision makers	2
Q2A		How do we train systems engineers in AM and Asset Managers in SE?	4
Q2A		Most engineers and maintenance staff focus on specific assets/asset classes and have difficulty thinking abou	4
Q2A		Both SE and AM can be applied at various levels of and organistiaon	5
Q2A		perception that SE doesn't add value to smaller project or endevours	5
Q2A		Create and SE-AM joint pub on AM in SE	6
Q2A		Look to the IT industry - for lessons learned	6
Q2A		Opportunity: Include links to AM documents in the INCOSE Store	6
Q2A		Opportunity: Increase the level of attention to AM in SE practice guides	6
Q2A		Similar outcomes are being pursued from different org areas and teams (even professional societies) - and co	10
Q3	!	**Q3: What measures need to be taken to enable Systems Engineering to bring value Asset Management?**	!
Q3	?	A series of lead indicators that consider the conversion of requirements into value propos as opposed to just	2
Q3	?	Level of AM as a specialty area in cert - recert applications	6
Q3	Cases	How can infrastructure engineering firms responding to procurement bids effectively use SE	1
Q3	Cases	Stories and use cases to help get our heads around this	4
Q3	Cases	Showing a simple approach to systems engineering and the value it can add to asset management and asset r	9
Q3	Cases	Start with a common project on an interesting problem or opportunity	10
Q3	Elaborations	Better define the relationship between systems engineering and other disciplines.	2
Q3	Elaborations	Both disciplines needs to be introduced to general management studies up to the governance levels	2
Q3	Elaborations	Promote understanding of SE's role in asset management.	4
Q3	Elaborations	Level SE Awareness of the importance of AM	6
Q3	Elaborations	Recognise that as long as we do the right things System Engineers can do asset management and vice versa. E	6
Q3	Elaborations	Understanding on how SE can provide value to asset management	9

Q3	Enablers	Enablers - such as tools	1, 10
Q3	Enablers	Common library of tools / techniques	10
Q3	Integration	Not treat the approach as a them vs us approach, or transactional in nature	6
Q3	Integration	Cross-disciplinary exploration of as-is and to-be of the whole flow from business objectives, via asset strategi	7
Q3	Integration	AM Practitioners to have a better understanding of SE and SE practitioners having a better understanding of A	8
Q3	Integration	QA and SE working together with Asset Management-system wide approach	8
Q3	Integration	Discuss and collaborate !	10
Q3	Lifecycle	Meaningful whole life	3
Q3	Measures	A suggested measure of performance would help.	1
Q3	Nomenclature	nomenclature equivalences defined and shared between AM and SE professionals	5
Q3	Nomenclature	Common taxonomy & framework to share across	6
Q3	Nomenclature	Alignment of terminology & definitions	10
Q3	Nomenclature	Do we need to formalize a "Rosetta Stone" for terms among our disciplines?	10
Q3	Organisation	Cross functional teams	2
Q3	Organisation	Provide unrestricted access to the non-technical people	2
Q3	Organisation	Consider People	3
Q3	Organisation	Break down the barriers!!	4
Q3	Plans	SE management plans include AM	6
Q3	Reachout	Reaching out to extend knowledge	8
Q3	Standards	The two standards need to be related to each other in plain english	5
Q3	Strategy	Start by defining what success looks like. What behavior or working level practice do we want to influence	6
Q3	Tailoring	Clarity on both sides over proportionality and appropriate level and depth of detail (i.e. pareto/pragmatism)	6
Q3	Tutorial	Tutorial for the practitioners. Not just the what but the how.	9
Q3	Value proposition	Value proposition - clear, concise & simple	10
Q3A	!	**Place for additional thoughts**	**!**
Q3A		Additional material on how to use SE to advance Asset Mgmt	1
Q3A		Organisational Culture	2
Q3A		Upskilling of others in the organisation	2
Q3A		Asset Mangement is often seen as applicable to the technical aspects of assets (conduct of maintenannce, m	5
Q3A		sharing nomenclature or standarising definitions is difficult because they are always context specific	5
Q3A		AUS - SE has two flavors: INCOSE SE and IT SE.	10

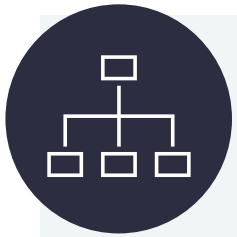
FuSE Mini-Event: SE and Asset Management 13 April 2023

- Future of Systems Engineering (FuSE)
- Introduction to the Topic: Asset Management
  Ben Mogridge
- Results from IW2023
- Workshop
- **Next steps**

Follow up

Documentation will be sent to all the registered for the event with some notes on how to stay in touch

First FuSE Mini-Event Series



Future of Systems Engineering (FuSE) Introduction and Update & Foundations

MAR 29, 2023

Introduction to the Future of Systems Engineering (FuSE) to realize the Systems Engineering Vision 2035. FuSE started at IW2018 and has a dozen ongoing projects including participation by INCOSE working groups and engagement in the broader systems community. We announced the next phase of FuSE at IW2023 with the establishment of a program management office (PMO) and the clustering of projects into four streams: SE Vision & Roadmaps, Foundations, Methodologies, and Application Extensions.

We will highlight the outcomes of the stream workshops at IW2023 and our program plan moving forward. We will have virtual mini-events for each of the streams in April, followed by workshops at EMEA WSEC and AOSEC, and invited content sessions at IS2023. We are also partnering with the broader systems community. We welcome the proactive engagement of individuals, working groups, and initiatives to realize the SE Vision 2035.

Future of Systems Engineering (FuSE) Vision & Roadmaps

APR 06, 2023

The Future of Systems Engineering (FuSE) SE Vision & Roadmaps stream is maintaining the online version of the SE Vision 2035 and populating it with valuable add-on information and white papers. Maintaining and synchronizing the SE Vision's implementation roadmap as well as those of all four FuSE Stream's has our focus.

To prepare for this session, please read chapter 4 (Realizing the Vision) of the SE Vision 2035. (www.incose.org/sevision)

After a short introduction of the Vision & Roadmaps stream an overview of the results from the IW2023 activities is presented. This is followed by interactive involvement of all participants, collecting their additions to the Systems Engineering Challenges and the Roadmap as defined in the SE Vision 2035. The information gathered will be evaluated afterwards for implementation in the near future FuSE activities.

FuSE Application Extensions – SE and Asset Management

APR 13, 2023

The Future of Systems Engineering (FuSE) SE Application Extensions stream is focusing on stimulating and supporting initiatives that broadens the application of systems engineering in non-traditional domains including socio-technical systems. As a means different cross-cutting topics where SE can bring value to new applications were discussed at the International Workshop 2023.

This online session will focus on physical Asset Management (AM), a topic that brings a systems and life cycle approach to in particular the infrastructure domain. The topic will be introduced by Ben Mogridge, AM expert and member of INCOSE as well as representative from organizations focusing on AM. This is followed by interactive involvement of all participants elaborating on the findings from the workshop at IW2023. The information gathered will contribute to the establishment of a joint initiative to reach out to new target groups.

FuSE Methodologies Virtual Workshop

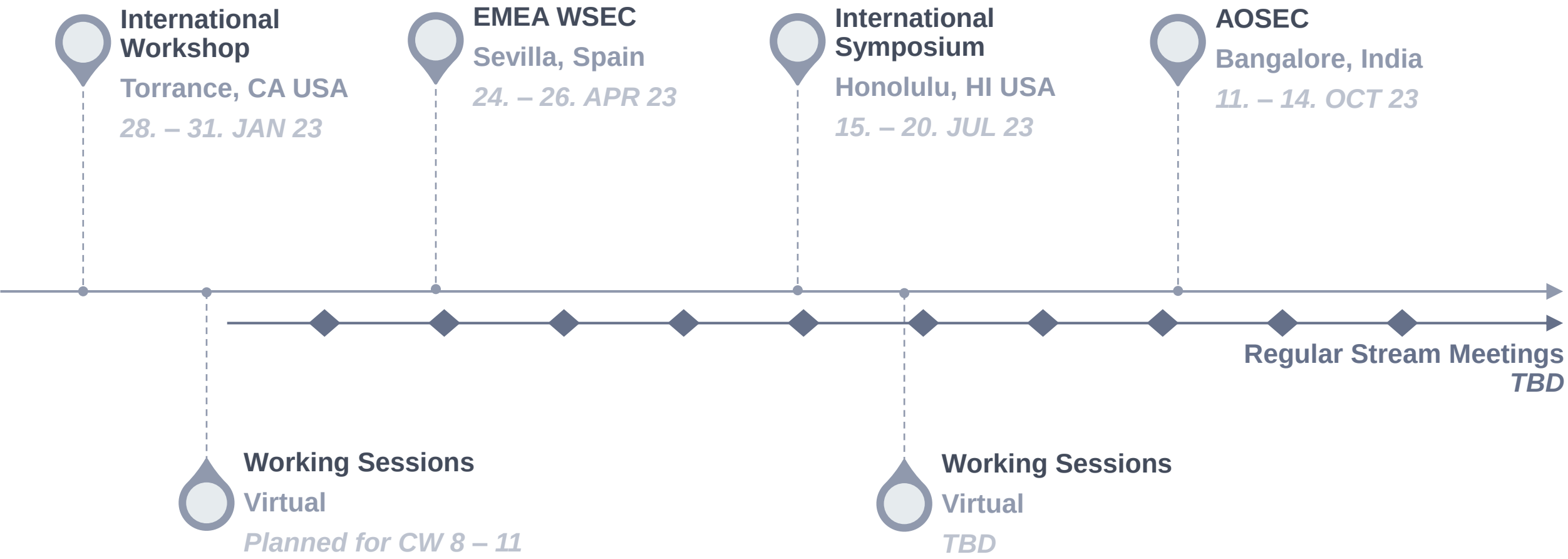
APR 20, 2023

Following previous FuSE sessions at IW2023, how might we evolve System Engineering Methodologies to engineer solutions for a better world? After a brief introduction on FuSE and a summary from IW2023, participants will leverage the SE Vision 2035 publication, the FuSE IW2023 session outputs, and their own wisdom to elaborate on methodology gaps, share work-in-progress to close those gaps, and then propose go-ahead ideas to realize SE Vision 2035 (www.incose.org/sevision). This workshop will require active engagement in a Miro board. No prior training or Miro account is necessary, but participants are encouraged to complete a few Miro tutorials (https://miro.com/app/dashboard/#/lc/getting-started/) ahead of the event to increase their focus on the content and not the Miro tool during the workshop.

Visit https://www.incose.org/about-systems-engineering/fuse or https://www.incose.org/events-and-news for details and registration information

FuSE Targeted Events in 2023

Where to engage



Let's connect.

Or find us on
www.incose.org/fuse

Email fuse@incose.net

Bill Miller
FuSE Program Lead

e William.Miller@incose.net

Paul Schreinemakers
Stream Lead "SE Vision & Roadmaps"

e paul.schreinemakers@incose.net

Stephan Finkel
PMO Contractor | 3DSE

e Stephan.Finkel@incose.net

Oli de Weck
Stream Lead "SE Foundations"

e deweck@mit.edu

Martina Feichtner
PMO Contractor | 3DSE

e Martina.Feichtner@incose.net

Chris Hoffman
Stream Lead "SE Methodologies"

e christopher.hoffman@incose.net

Tom Strandberg
Stream Lead "SE Application Extensions"

e tom.strandberg@incose.net

fuse@incose.net