INCOSE UK MBSE WG 19/5/2016
Subgroups Status: Omega Guide; MBSE-MDA

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Subgroup Omega Guide – early progress

- Subgroup primary objective – produce a ‘practical adoption guide for MBSE’
- Achievements to date:
  - Original Team-storming session;
  - Competency related framework – ‘move up the diagonal’
  - 6 W’s - part elaborated; poster
  - Various contributions have been received and consolidated
  - Wiki exploration, see http://www.incosewiki.info/Model_Based_Systems_Engineering/index.php?title=Omega_WIP_page

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Recap of previous update

- Develop detailed “How To MBSE” document based on identified target audience

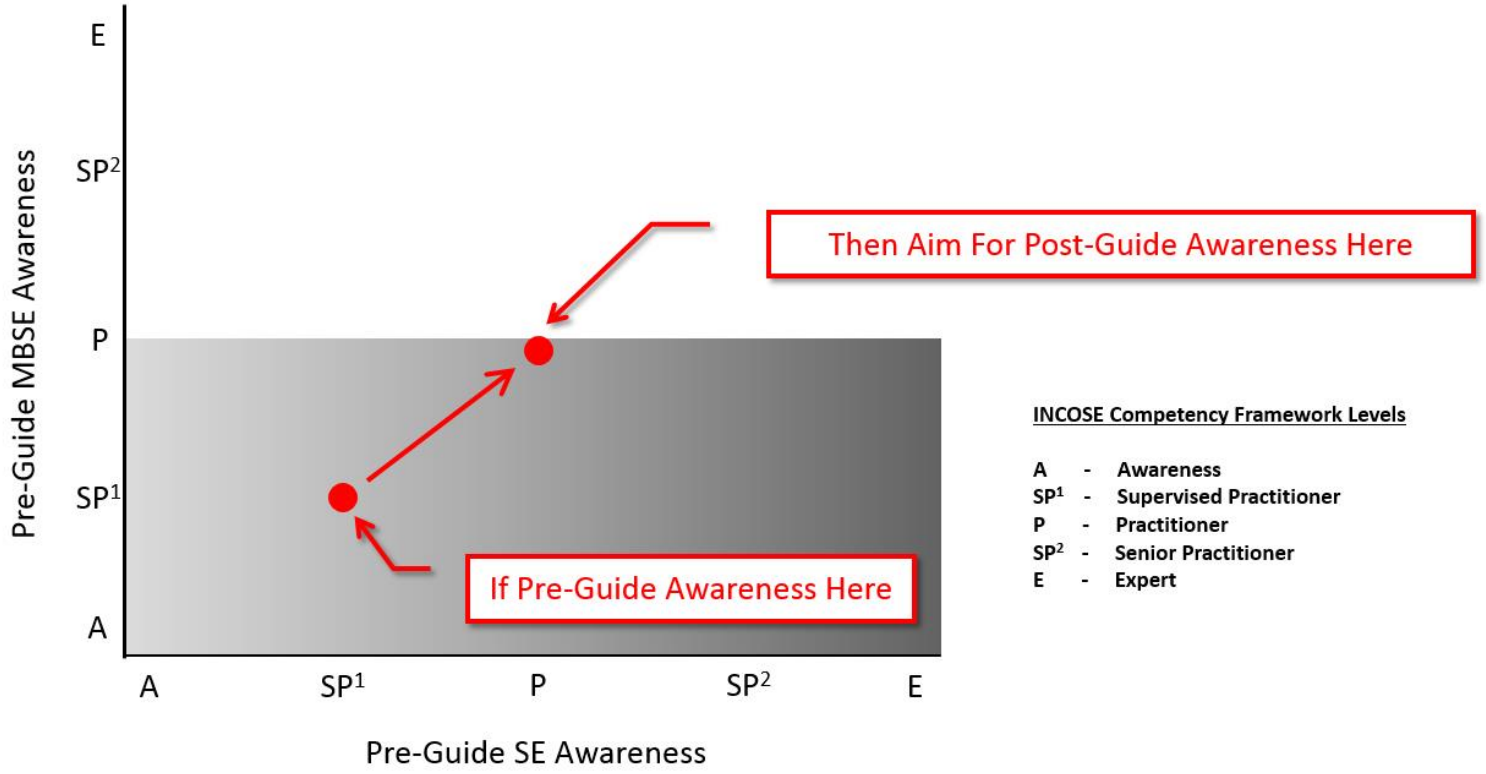

Figure 1: Target Audience SE and MBSE Awareness

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The 6 W's

Current work of the MBSE WG – "How to" Guide

Context:
INCOSE UK MBSE WG are currently developing a MBSE "How to" Guide.
Guiding principles include:
MBSE - "is NOT a one size fits all solution"
MBSE - Its complexity depends on the task in hand and your view on where it can help.
Current Guide structure thinking: 6 questions, as below.

The 6 key questions: consider for each of Manager and Engineer:

What is MBSE?
MBSE is the systematic creation and sharing of information across a project, based on models – information appropriately structured.

Why should I conduct MBSE?
MBSE will help share and manage information better across your project reducing confusion and error; help with complexity.

Where can an MBSE approach be effective?
MBSE can work across lifecycle, across activities, even across competencies; I can use in requirements analysis, in architecting…

How do I approach using MBSE?.
How do I identify appropriate project / project area? How do I deal with technical & cultural aspects? How do I use in reqts management? How do I develop MBSE competencies?

When do I do MBSE?
What phases do I apply MBSE in? What stage of project X?

Who can do MBSE?
Consider project / organisational stakeholders, a RACI* framework; Consider stakeholders, organisation change management approaches.

* RACI Responsible, Accountable, Consulted, Informed

INCOSE and the MBSE WG are all here to help – you are not alone

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Current W's framework status

Question	Individual Systems Engineer				Engineering Manager			
	Volunteered	drafted	review comments recd	baselined	Volunteered	drafted	review comments recd	baselined
Why should I adopt MBSE?	Julian	Y	N	N	Julian	Y	N	N
What does MBSE mean for my role?	Julian	Y	N	N	Julian	Y	N	N
Where (activity area, disciplines, level of decomp) do I employ MBSE? [1]	James	y	N	N	James	y	N	N
When (temporal e.g. life cycle phase, criteria), should MBSE be employed? [2]	?	N	N	N	~~Goncalo~~	N	N	N
Who else need to participate in MBSE activities? [3]	Ian	Y	N	N	Ian	Y	N	N
How do I make use of MBSE on my project? [4]	~~Goncalo~~	N	N	N	~~Goncalo~~	N	N	N

Note also Robin contributed material to all Q for both Roles in an email of 10/2/2016; incorporated into material by JJ, into MS Word file 2016 02 24 Draft Omega content v3.docx
3/5/2016: James provided maerial for 'Where', in file MBSE Omega Guide Submission - Where v10.docx
26/4/2016: Goncalo is leaving group as relocating UK to US.

From: Copy of Draft Omega progress v4.xlsx

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Current 6W's material and Wiki

JJ has produced a part-populated prototype, and collated other team member inputs:

Contents

Omega Team Reference mate
Overview and the 6 W's .....
Details of 6 W's and responses
Individual Systems Engineer
Why should I adopt MBSE
What does MBSE mean fo
Where (activity area, disci
When (temporal e.g. life cy
Who else needs to particip
How do I make use of MB
An engineering manager .....
Why should I adopt MBSE
What does MBSE mean fo
Where (activity area, disci
When (temporal e.g. life cy
Who else need to participa
How do I make use of MB
Case Studies .....
FAQ.....

What does MBSE mean for my role?

For you as an individual systems engineer it m

- Ensuring your involvement and adoptio strategy; it may mean you follow that st it...;
- ~~Ensure~~ Ensuring you understand the ap
- ~~Browse~~ Browsing the various tutorials a (see elsewhere in INCOSE UK, and IN *here*)
- ~~Gain~~ Gaining access to at least one of t COTS and open source tools available
- ~~Connect~~ Connecting to the local comm your organisation and/or INCOSE;
- ~~Consider~~ Considering commercially ava 'badged' as 'SysML for MBSE' or some
- ~~build~~ building up MBSE experience incr
- Justification for better targetted develop on drudgery and document generation,
- Changes to the way that systems engir less about baselining documents, and r
- Engaging in team collaborative dialogu rather than via documents.

Rationale

Aligning what you do as an individual with your the majority of benefits from MBSE only come around a systems model - and possibly other n could be across 2 or more systems engineers, engineering disciplines, or across engineering management, commercial, product support, pr

It is also important to note that with adoption of navigate requirements, design and V&V materi approach:

- Information is more structured and 'type
- One can navigate up and down levels c
- Access to data can be more controlled

Becoming proficient in performing systems eng

Who else needs to participate in MBSE activities?

A Systems Engineer operates as a member of a team and as such engages with a range of stakeholders to collectively 'engineer' a system. Taking an MBSE approach means that these stakeholders also need to participate in MBSE activities associated with their roles and responsibilities. This is important to ensure that the engineering effort is coherent, collectively effective and efficient, to produce a fit-for-purpose engineered system.

The following stakeholders need to participate in MBSE activities (with the whys and what overviews).

Customer	The Customer … definition and validation of requirement … agreement of requirements and interpretation
User	The User … expression and capture of need …
PM	***See PM under Eng Manager***
Prover (Qualification and Certification? JJ)	***See Prover under Eng Manager.*** it's not just about testing, MBSE can support assurance and certification making use of model-based techniques …
Soft Eng	The Software Engineer … Systems are increasingly software centric …
Support Eng	***See Support Eng under Eng Manager***
Specialist Eng	Specialist Engineers … e.g. Human Factors, engineering complex system usability … Safety, ensuring design rigour and compliance as system complexity increases…. Security, as the threat unknowns increase … 'others' to be identified and elaborated…
Engineering Manager	The Engineering Manager … responsibility and accountability for the engineering of the system and the MBSE approach taken … the skills and suitability of the engineers conducting the MBSE activities
Technical Experts	***Sys Eng has technical dialogue with Technical Experts, see Technical Experts under Eng Manager***
Capability (of Sys Eng)	***Key contributor to Sys Eng Capability***

Rationale

A subset of other stakeholder roles have been associated with Systems Engineer, based on the criteria of: more technical dialogue associated with Systems Engineer, more management / resource / planning dialogue associated with Engineering Manager.

How do I make use of MBSE on my project?

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Latest 6W's - Where – James' thoughts

Id	Source	Target	Effort (L/M/H)	Effectiveness (L/M/H)	Notes
1	Stakeholder	Document	High	Medium	This is the ~~the~~ standard DC method of information capture. The effort is high as it is reliant on the stakeholder being able to express their understanding in natural language and/or informal pictures plus the constraints (such as the use of a template) placed on the format of the document. Effectiveness is medium due to the shortcomings the document has when used to validate its own input. In a DC approach anything non-trivial is difficult to create, consume and comprehend.
2	Stakeholder	Model	Low	High	This is the standard MBSE method of information capture. The effort is Low because the properties of the modelling language allow the stakeholder to better communicate and structure their understanding. Effectiveness is high due to the advantages of navigability and information hiding the model has when it comes to validating the input. MBSE allows stakeholders to manage a greater degree of complexity than traditional DC approaches.
3	Document	Document	High	Low	Effort is dependent on the format of documents and whether transformation can be automated or not. Manual transformation is prone to errors and omissions. Automated transformation is limited by format, structure and languages used in the documents e.g. spreadsheets are easier then text documents. Effectiveness is dependent on scope, detail, format and structure of source and target.
4	Document	Model	Medium	Medium	This is essentially a translation exercise; the effort is governed by the modellers ability to understand the document or ability to simply 'import' it into the model. The effectiveness depends on the scope, detail, format and structure of the input.
5	Document	Stakeholder	Low	Low	The effort in presenting a document to stakeholders is low because no transformation is required. The effectiveness is low though because anything non-trivial is difficult to consume and comprehend.

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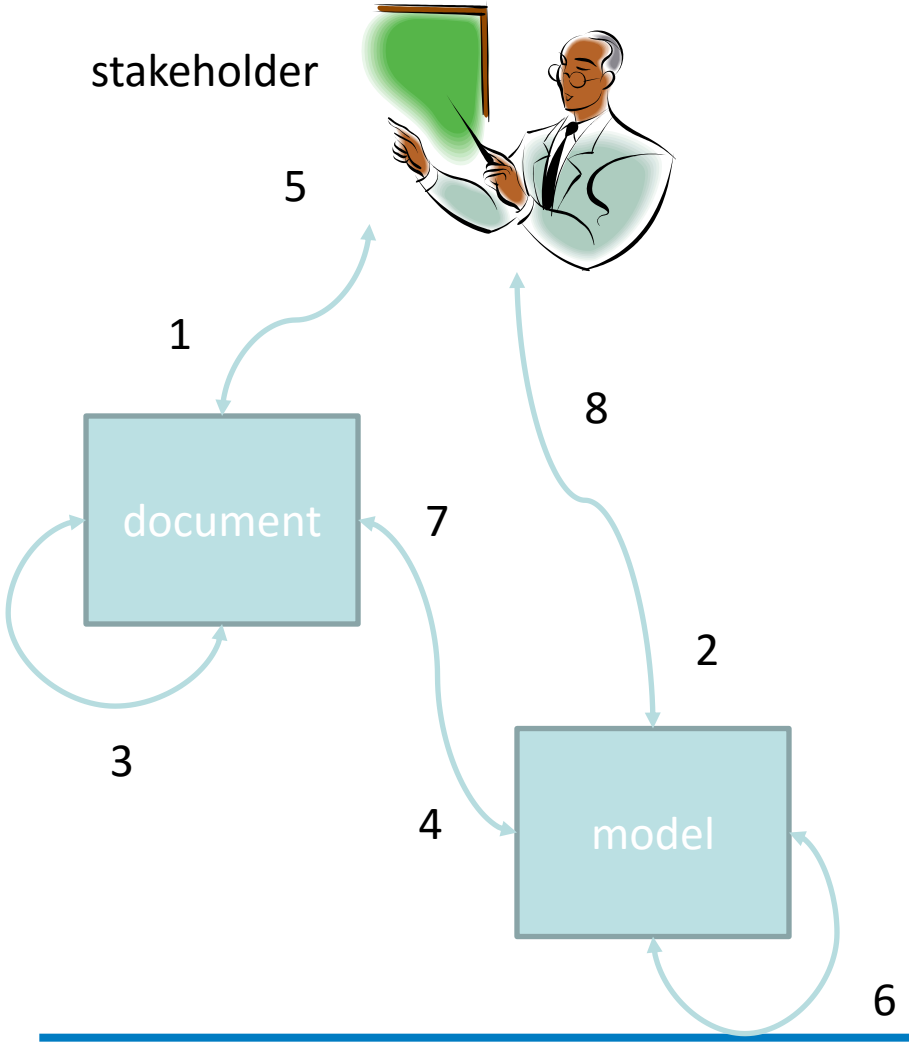
Latest 6W's – Where



Some issues from JJ:

1. Relationship to 'When' Q (phase of lifecycle, creation versus update;
2. Hybrid (document AND model) approach;
3. Human factors issues – acceptability, ease of use, etc;
4. 'different views of same mode' vs views / viewpoints / multiple models;

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Omega Guide – next steps

- Agree how to pragmatically deal with some open issues: James' approach versus:
  - JJ issues;
  - 15288 activities - explosion of material;
- Last of the 6 Q: When?
- Review material?
- Bounce body of material off INCOSE UK Technical Director

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Subgroup Omega Guide membership

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Subgroup MBSE/MDA - status

- Subgroup formed *22/3/2016*
- Subgroup primary objective – produce a succinct explanation of the relationship between MBSE and MDA
- Achievements to date
  - JJ Thoughts presented at MBSE WG, *3/3/2016 Derby*
  - Suggestions for Objectives sent out in email RE: MBSE & MDA subgroup Objectives, 15/4/2016; subsequently useful reactions from team members

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Subgroup MBSE/MDA - Objectives

JJ Email of 26/4/2016:

As a starter for 10 here's my thoughts for objectives for the MBSE & MDA SG in the short-medium term (2-4 months?):

1. Identify two or three definitive sources for a **definition of MBSE** (so as not to reinvent the wheel), but context for 3;
2. Identify two or three definitive sources for a **definition of MDA** (ditto);
3. Form a **coherent explanation (graphical and textual) for the relationship(s) of MBSE and MDA**;
4. Provide one or more **Use Cases or scenarios** in which MDA can support one or more SE activities in an MBSE context, and provide illustrations of same.

I'm particularly interested in the views of the large development organisations (MBDA, Thales, Rolls-Royce), as … the main exploiters of joint MBSE/MDA approaches. …, we can then [develop] one or two deliverables or assets that provide value to the MBSE WG participants and INCOSE.

Responses to ‘Objectives’ email

Person	Response
A	Supportive Definitions: use one e.g. MBSE - INCOSE; MDA - OMG;
B	supportive
C	none

In summary:

- MBSE – MDA subgroup up and running
- JJ will collate some definitions and references on the wiki.

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