Overview

Model-Based Systems Engineering (MBSE) is the formalised application of modelling to support:

- System requirements
- Analysis
- Design
- Verification & Validation

beginning in the conceptual design phase and continuing throughout development and later lifecycle phases. (INCOSE). It contrasts with DBSE Document Based Systems Engineering where the primary artefacts of system engineering activities are documents. Establishing an understanding of, and adoption of, MBSE by individual systems engineers, systems engineering teams and organisations who apply systems engineering are non-trivial. This is an introductory Guide intended to assist individual systems engineers and organisations contemplating or travelling along the path of MBSE adoption. For elaboration of what MBSE is, the reader is referred to the INCOSE UK Z Guide Z9 'Model-Based Systems Engineering'.

Why should I adopt MBSE?

There is a steady trend in the systems engineering community to move from conventional or document-based systems engineering (DBSE) to model-based systems engineering. For both systems engineers and engineering managers, it will require you to understand MBSE philosophy, benefits, how you work within an organisation and team members using MBSE, and (for systems engineers) the use of practical languages (such as SysML) and MBSE-enabling tools. The reasons to adopt MBSE will be different depending whether you are an individual systems engineer, or whether you are an engineering manager.

For a systems engineer, adopt MBSE because:

- MBSE will enable you to perform many if not all systems engineering activities more effectively than you would otherwise do;
- MBSE shifts work from involving much drudgery (manual checking, consistency checking...) associated with the document-centric approach to engineering as an intellectual challenge;
- systems engineers with MBSE experience are likely to be increasingly marketable than those without.

For an engineering manager,

- Use of models increases early rigour, identifies gaps and inconsistencies, and helps to eliminate errors.
- Helps to facilitate checking across domains and disciplines, and increases the degree to which requirements, design and V&V information can be checked by software, complementing the capabilities and skills of engineers.
- Increases the potential for design re-use.

- Although there is mixed evidence of sound Return on Investment (ROI) in MBSE approaches over 'short' time frames, there is compelling evidence that MBSE approaches do systematically offer improved rigour and thoroughness to SE compared with the outcome of the same activities performed with DBSE; some authors would argue that asking 'what is the ROI for MBSE adoption?' is asking the wrong question; a better question would be 'what improvements in quality and error reduction do I realise with adoption of MBSE compared to DBSE?.

What does MBSE mean for my role?

(tbc)

Where (activity area, disciplines level of decomp) do I employ MBSE?

(tbc)

When (temporal e.g. life cycle phase, criteria) should MBSE be employed?

(tbc)

Who else needs to participate in, or will be impacted by the use of, MBSE activities?

(tbc)

How do I make use of MBSE on my project?

(tbc)

Support info

This leaflet is intended as a working guide to adoption of MBSE. This series of working guides is produced by members of the UK Chapter of INCOSE. For further information, advice and links to helpful websites go to: www.incoseonline.org.uk Members can download copies of this leaflet and other Systems Engineering resources online at: www.incoseonline.org.uk For more information about the worldwide Systems Engineering professional community, go to: www.incose.org