The Scarecrow MBSE Embassy presents...

The Evolution of MBSE

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Hello from Jon & Simon!
Protocol and resources

• Please mute microphones
• Raise any questions via chat
  – We will get to you
• Resources available off line
  – Slides with hand-drawn notes
  – Video
  – Access to Scarecrow’s KNOB
  – Access to the MBSE Embassy YouTube channel
1. Overview

1. Successful MBSE
2. MBSE Evolution
3. Summary
1. Successful MBSE

![Diagram showing the relationship between Process, Tool, and Person with labels and multiplicities.]
Deploying MBSE

• Three crucial questions to answer:
  – Why do you want MBSE?
  – What is your current MBSE situation?
  – What is your current MBSE maturity?

• We can answer these using MBSE!
Why do you want MBSE?

- Improve quality of system design
- Reduce the amount of post-manufacture fixes
- Reduce time to market
- Reduce costs
  - Reduce development costs
  - Reduce manufacturing costs

Stakeholders:
- QA
- Manufacturing
- Finance
- Sales
- Marketing
- Systems Engineering

Methods:
- Context modelling
- TeamStorming
- Text
What is your current MBSE situation?
What is your current MBSE maturity?

RAVEnS

Stage 1: Document-based
Stage 2: Document-centric
Stage 3: Model-enhanced
Stage 4: Model-centric
Stage 5: Model-based

Evolution
Deploying MBSE successfully

• Answering these three questions is crucial
• Fundamentals for the Trinity approach
  – If only there was a book coming out in Q3 of 2020, published by INCOSE UK, covering this!!!
• Today, we will be addressing MBSE maturity by talking about the evolution of MBSE
2. MBSE Evolution

• MBSE evolution comprises a number of Stages
MBSE Evolution - Stages

Stage 1: Document-based
Stage 2: Document-centric
Stage 3: Model-enhanced
Stage 4: Model-centric
Stage 5: Model-based
MBSE Evolution

• MBSE evolution comprises a number of Stages
• Each Stage has a number of Outcomes associated with it
  – People
  – Process
  – Tools
Stage 1: Document-based Systems Engineering - Outcomes

- **People**
  - SE competence

- **Process**
  - All artefacts documents
  - Tables, lists, graphs etc
  - Knowledge owned by documents

- **Tools**
  - Office tools – spreadsheets, word processors
Stage 2: Document-centric Systems Engineering - Outcomes

- **People**
  - SE competence
  - Informal notational skill

- **Process**
  - All artefacts are documents
  - Tables, lists, graphs etc
  - Some pictures
  - Knowledge owned by documents

- **Tools**
  - Office tools – spreadsheets, word processors, drawing packages
Stage 3: Model-enhanced Systems Engineering - Outcomes

- **People**
  - Notational competence
  - MBSE awareness

- **Process**
  - Models start to emerge
  - Documents and models
  - Small pilot project
  - Knowledge owned by documents and Model

- **Tools**
  - Multiple candidate tools
Stage 4: Model-centric Systems Engineering - Outcomes

• People
  – MBSE competence
  – Tool competence

• Process
  – Initial ontology, framework, processes
  – Measurement and assessment of pilot
  – Knowledge owned by model and (few) documents

• Tools
  – Tool(s) selected
Stage 5: Model-based Systems Engineering - Outcomes

- People
  - MBSE competence

- Process
  - Mature ontologies, frameworks, process sets
  - Patterns, applications
  - Company roll-out
  - Knowledge owned by model

- Tools
  - Integrated toolsets
  - Profiles
  - Automation
Cross-cutting Concerns

Configuration management, consistency, traceability and maintenance

Stage 1: Document-based
Stage 2: Document-centric
Stage 3: Model-enhanced
Stage 4: Model-centric
Stage 5: Model-based
MBSE Evolution – Transition Between Stages

Stage 1: Document-based
Stage 2: Document-centric
Stage 3: Model-enhanced
Stage 4: Model-centric
Stage 5: Model-based
MBSE Evolution

• MBSE evolution comprises a number of Stages
• Each Stage has a number of Outcomes associated with it
  – People
  – Process
  – Tools
• In order to evolve from one Stage to another, we need to consider a number of Activities
MBSE Evolution – Stage 1-2 - Activities

Assessment
Identify goals
MBSE by stealth

Stage 1: Document-based
Stage 2: Document-centric
MBSE Evolution – Stage 2-3 - Activities

Assessment
- Identify goals
- MBSE by stealth

Notation training
- Tool evaluation

Stage 1: Document-based
Stage 2: Document-centric
Stage 3: Model-enhanced
MBSE Evolution – Stage 3-4 - Activities

Assessment
Identify goals
MBSE by stealth

Stage 1: Document-based

Stage 2: Document-centric

Stage 3: Model-enhanced

Stage 4: Model-centric

Notation training
Tool evaluation

MBSE training
Process definition
Tool selection
Tool training
Framework & ontology definition

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MBSE Evolution – Stage 4-5 - Activities

Stage 1: Document-based
Stage 2: Document-centric
Stage 3: Model-enhanced
Stage 4: Model-centric
Stage 5: Model-based

Assessment
Identify goals
MBSE by stealth

Notation training
Tool evaluation

MBSE training
Process definition
Tool selection
Tool training
Framework & ontology definition

Advanced applications
Competency assessment
Model maturity
Process maturity
Tool tailoring

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3. Summary

• Successful MBSE relies on effective People, Process and Tools

• For effective deployment, we need to consider: the Reason, the Capability and the Evolution

• Evolution
  – Stages, outcomes and activities
  – Ownership of knowledge
  – Start and end points
Further reading
Further information

• Resources available off line
  – Slides with hand-drawn notes
  – Video
  – Access to Scarecrow’s KNOB
  – Access to the MBSE Embassy YouTube channel

• Don’t forget SysML-anary
  – Every Friday morning
  – Follow us on LinkedIn
Coming soon...

• Training courses:
  – 5th: Introduction to MBSE
  – 12th: Introduction to Context-based Requirements Engineering
  – 19th: Introduction to MBSE
  – 26th: Interfaces (The Interface Pattern)

• Free events every Thursday:
  – 1000 – 1045 – a free talk and presentation
  – 1100 – 1145 – the Model-Based Social Event

• Bespoke courses and services also available

Visit: www.scarecrowconsultants.co.uk for more details