

INCOSE/OMG MBSE Initiative PBSE Patterns Challenge Team



Meeting: Dec. 17, 2014

(Schedule adjustable as needed)

Meeting Agenda: INCOSE PBSE Patterns Challenge Team (of MBSE Initiative)

Web Conference Meeting: Wednesday, December 17, 2014, 4:00 – 5:30 PM EST

Pre-reading and Background: Team web site: http://www.omgwiki.org/MBSE/doku.php?id=mbse:patterns:patterns Minutes of meeting of November 10, 2014: http://www.omgwiki.org/MBSE/doku.php?id=mbse:patterns:patterns_challenge_team_mtg_11.10.14	
Meeting start up: <ul style="list-style-type: none"> Review of meeting objectives and agenda 	4:00 – 4:05 PM EST
Challenge Team Current Projects, Reports: <ul style="list-style-type: none"> Wave 1: Six IS2015 papers were submitted by team members that have S*Pattern content-- <ul style="list-style-type: none"> IS2015 paper <u>abstracts</u> from this team may be found at: http://www.omgwiki.org/MBSE/doku.php?id=mbse:patterns:patterns_challenge_team_mtg_11.10.14 Can the IS2015 authors now agree to allow their <u>papers</u> to be read by the other members of this team? Paper drafts were submitted by Nov 9; acceptance responses due from INCOSE Feb 2015; final papers Mar 2015 Continuing activity in progress with the sub-team project members – requests on timing, other needs? Wave 2: Newer join-up interests of other individuals, working groups: <ul style="list-style-type: none"> Health Care (regional WG and MBSE challenge team; Vijay Thukral, Cientive Group) – Clarify timing of collaboration with Patterns Challenge Team, compared to IW2015 MBSE Workshop, concerning model content. SE Social Network Pattern (Chris Hoffman, Cummins)—understand plans are mostly after IW2015—true? Agile Systems Pattern (jointly with Agile Systems WG, chaired by Rick Dove, Paradigm Shift, International)—review of our break out session objectives, outline, plans for ASELCM Project, and some of Agile System Pattern. Our challenge team is providing S*PBSE methodology summary for updated INCOSE list—Intended topical outline; timing and plans for team review of same. The Case for a Stronger MBSE Semantic Model—Parts I and II (B. Schindel)—INCOSE contacts on this to date; your thoughts and advice 	4:05 – 4:30
Walk-through of next segments of S*Pattern(s): <ul style="list-style-type: none"> If you are newer to this S*Patterns team: Where to find information. (Do you need catch up session/sessions?) Walk-through of an S*Patterns topic: Failure Modes and Effects Analysis (FMEA), Fault Tree Analysis, auto population of same from S*Models, improving the systematic coverage and productivity of FMEA generation. 	4:30 – 5:00
Planning Next Activities: <ul style="list-style-type: none"> Planning dates, agenda for next 2 meetings: <ol style="list-style-type: none"> One to schedule in first half of January—focusing on PBSE summary and preparations for IW2015 WG meeting At / during IW2015 (with teleconferencing): Jan 26, 1-3 PM, Mtn Time + Jan 27, 9-11 AM, Mtn Time Outreach: Who else should be involved? Example—other INCOSE WGs that are natural Patterns applications. Ideas? 	5:00 – 5:15
Closing: <ul style="list-style-type: none"> Adjourn 	5:15

For more information, contact--

Bill Schindel schindel@icct.com

Troy Peterson peterston_troy@bah.com

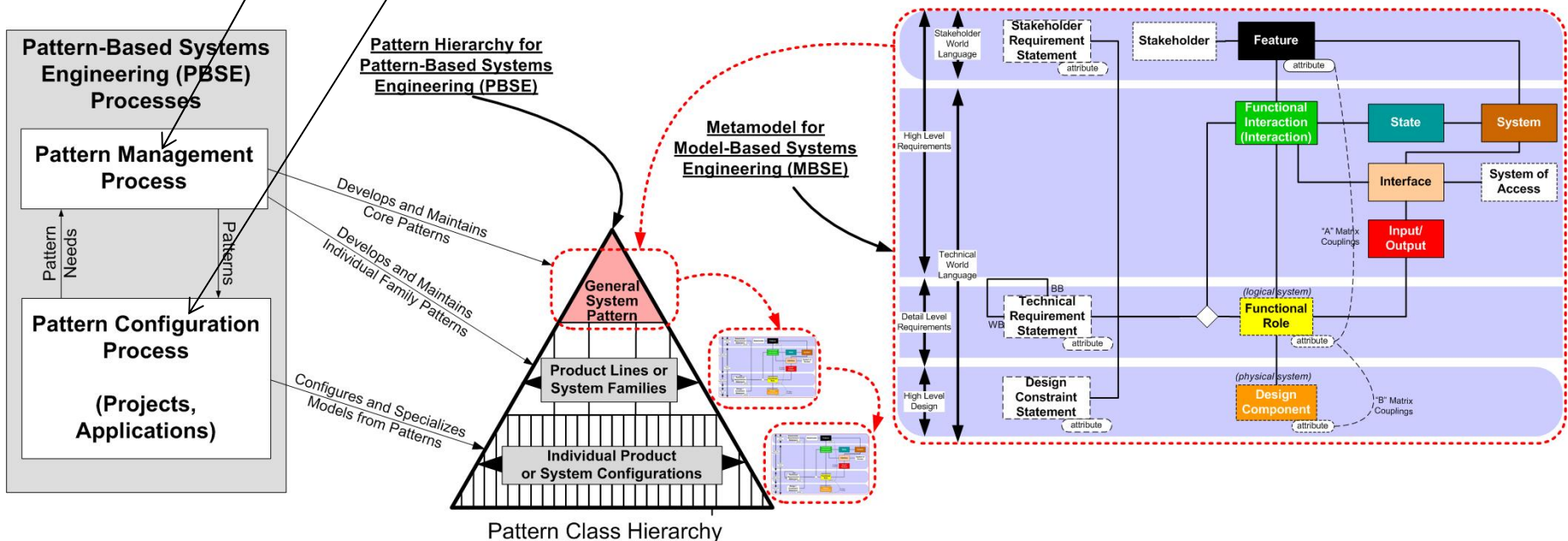
Agenda--Dec 17, 2014 Mtg of PBSE Challenge Team of MBSE Initiative

V1.1.3

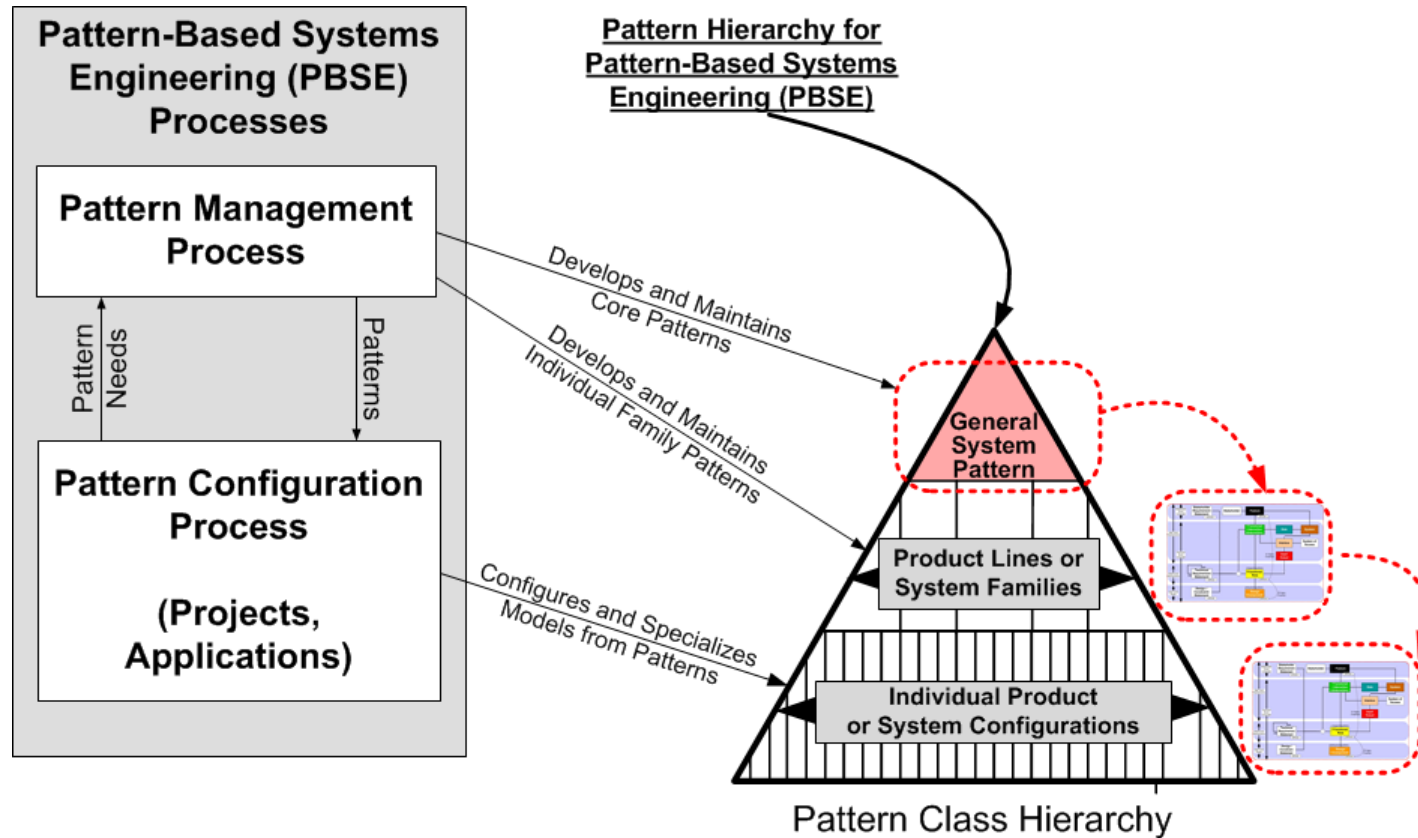
- **This Challenge Team is concerned with configurable, re-usable system models, called “S*Patterns”:**
 - Models containing a certain minimal set of elements are called S*Models
 - May be expressed in any modeling language (e.g., SysML, or other)
 - Re-usable, configurable S*Models are called S*Patterns
 - By “Pattern-Based Systems Engineering” (PBSE) we mean MBSE enhanced by these generalized assets
 - These are system-level patterns (models of whole managed platforms), not just smaller-scale component design patterns

Pattern-Based Systems Engineering (PBSE)

- Pattern-Based Systems Engineering (PBSE) has two overall processes:
 - **Pattern Management Process**: Generates the general pattern, and periodically updates it based on application project discovery and learning;
 - **Pattern Configuration Process**: Configures the pattern into a specific model for application in a project.



Business process optimized for PBSE fulfill a different vision:



Why do most representations of the systems engineering process appear to assume starting from no formal knowledge about the system of interest & its domain?

Patterns Challenge Team:

These are the known pattern sub-team projects known to be underway in recent months (“Wave 1” Projects), with six papers known submitted--

= *Known to have been submitted as IS2015 papers, by deadline*

- **S*Patterns:**

- Multi-domain product/manufacturing process example (Oil Filter Family)
(Bill Schindel, Stephen Lewis, Jason Sherey, Saumya Sanyal)

- Automated Test Systems, Using MBSE/PBSE (David Cook)

- Verification Review System Patterns (Andy Pickard & colleagues)

- Automated Ground Vehicle System Pattern (Troy Peterson)

- Mil/Aero Electronic Systems Pattern (Tamara Valinoto & colleagues)

- **S*Pattern Infrastructure, Methods, and Agile Systems Workshop Prep:**

- Maps or Itineraries? (configuration space versus process, procedure)

- Tracking System Trajectories (movement in configuration space)

Submitted Papers

- **Abstracts of all six above are on the Nov 10 meeting web site, along with whole papers for the last two, for review by members of this team:**

http://www.omgwiki.org/MBSE/doku.php?id=mbse:patterns:patterns_challenge_team_mtg_11.10.14

- **Can the authors of the papers now agree to make those six papers available to this Patterns Challenge Team for reading?**

- **S*Patterns:**

- Multi-domain product/manufacturing process example (Oil Filter Family) (Bill Schindel, Stephen Lewis, Jason Sherey, Saumya Sanyal)
- Automated Test Systems, Using MBSE/PBSE (David Cook)
- Verification Review System Patterns (Andy Pickard & colleagues)
- Automated Ground Vehicle System Pattern (Troy Peterson)

- **S*Pattern Infrastructure, Methods, and Agile Systems Workshop Prep:**

- Maps or Itineraries? (configuration space versus process, procedure)
- Tracking System Trajectories (movement in configuration space)

Continuing Work Related to Wave 1 Projects

- **This working group is continuing to support the efforts of the same Wave 1 project sub-teams:**
 - Support for update to their patterns, related questions, etc.
 - Support for application of their patterns, related questions, etc.
 - Support for update of their papers, related questions, etc.
 - **Any related requests, as to timing, other needs?**
-
- **S*Patterns:**
 - ☑ Multi-domain product/manufacturing process example (Oil Filter Family)
(Bill Schindel, Stephen Lewis, Jason Sherey, Saumya Sanyal)
 - ☑ Automated Test Systems, Using MBSE/PBSE (David Cook)
 - ☑ Verification Review System Patterns (Andy Pickard & colleagues)
 - ☑ Automated Ground Vehicle System Pattern (Troy Peterson)
 - **S*Pattern Infrastructure, Methods, and Agile Systems Workshop Prep:**
 - ☑ Maps or Itineraries? (configuration space versus process, procedure)
 - ☑ Tracking System Trajectories (movement in configuration space)

- **“Wave 2” Projects: More recent join-ups with this team, on newer / future projects:**

1. **Health Care** (regional WG and MBSE challenge team; Vijay Thukral, Cientive Group) – Clarify timing of collaboration with Patterns Challenge Team, compared to IW2015 MBSE Workshop, particularly concerning model structure / content.
2. **SE Social Network Pattern** (Chris Hoffman, Cummins)—understand plans are mostly after IW2015—is that still true?
3. **Agile Systems Pattern** (jointly with Agile Systems WG, chaired by Rick Dove, Paradigm Shift, International)—in today’s meeting, we will summarize our IW2015 MBSE Workshop break out session objectives, outline, plans for ASELCM Project, and some of Agile System Pattern.
4. Our challenge team is providing **S*PBSE methodology summary** for updated INCOSE list—Intended topical outline; timing and plans for team review of same.
5. The Case for a **Stronger MBSE Semantic Model** — Parts I and II (B. Schindel)—INCOSE contacts on this to date; your thoughts and advice

– *Are you interested in following or involvement in any of these?*

Approach to Agile Systems w/Rick Dove & Agile Systems WG

- Last summer, Bill agreed with Rick Dove and Sandy Friedenthal that Rick and Bill would produce a joint break-out session during the IW2015 MBSE Workshop:
 - Title: “Agile Modeling and Modeling Agile Systems”
- In September, visited Rick in New Mexico and began work on this together, continuing since that time.
- General approach:
 - Combining Rick’s pioneering history in Agile Systems with MBSE/PBSE representations and methods, formalizing the Agile System Pattern.
 - For Agile Systems background, see Rick’s Agile Systems Part 1 and Part 2 papers from IS2014:
 - Copies are on our team’s 11.10.2014 meeting web site
 - Our S*Patterns contributions:
 - Agile System Architectural S*Pattern (including ISO15288)
 - And, the key additional internal role of Patterns within Agile Systems: **PBSE as Agile Modeling. *This is important!***
 - As preparation, see two IS2015 papers on our team’s 11.10.2014 meeting web site (“Maps and Itineraries”; “System Trajectories”)

IW2015: Jan 24-38, 2015

IW 2015 MBSE Workshop Schedule, Sat-Sun, Jan. 24-25, 2015

You must pre-register specifically for the MBSE Workshop to attend.

At IW2014, there were 150+ attendees at the MBSE Workshop.

2015 won't be smaller: INCOSE has made move of SE to MBSE a Strategic Objective.

http://www.omgwiki.org/MBSE/doku.php?id=mbse:incose_mbse_iw_2015

INCOSE IW 2015 MBSE Workshop

Workshop Objectives and Agenda. The Model-based Systems Engineering (MBSE) Workshop will be held on Saturday and Sunday, January 24-25, 2015 as part of the INCOSE International Workshop in Torrance, California. This 2 day workshop provides an opportunity to learn about the latest MBSE activities and applications, and to network with others involved in MBSE.

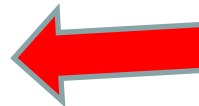
The workshop includes breakout sessions that are intended to inform and engage the participants in a broad range of MBSE related topics. The breakout session topics include both emerging modeling technologies and standards, modeling practices, and modeling approaches used in particular application domains. Each breakout session includes a combination of informative presentations, demonstrations where applicable, and group discussions on the potential impacts on the state of MBSE practice, and the associated challenges and future directions. The specific breakout session topics include:

Model Technologies and Standards

- Functional Mockup Interface (FMI) – current status and how can it be integrated into System Engineering - Frank Popielas/Roger Burkhart
- Open Services for Lifecycle Collaboration (OSLC): Enabling model and tool integration - Axel Reichwein
- Hybrid Manufacturing and 3D Printing: Enabling virtual engineering from requirements to manufacturing - Andreas Saar
- Model Lifecycle Management - Amit Fisher/Gavin Arthurs

Modeling Practices

- MBSE for System of Systems (SoS) - Judith Dahmann
- Agile Modeling and Modeling Agile Systems - Bill Schindel/Rick Dove



Domain Specific Modeling Applications

- MBSE for Automotive - George Walley
- MBSE for Biomedical and Healthcare - Steve Corns/Jack Stein/Bob Malins
- MBSE for Transportation & Rail - Marco Ferrogali
- MBSE and Space Systems – Application Across the “Vee” - Chris Schreiber

The workshop agenda structure is included below. The detailed agenda will be provided as we get closer to the event. Some of the breakout sessions will be repeated to give opportunities to participate in multiple breakouts. We look forward to your participation and contribution to this event.

IW2015: Jan 24-38, 2015

IW 2015 MBSE Workshop Schedule, Sat-Sun, Jan. 24-25, 2015

MBSE Workshop Agenda

Saturday, January 24, 2015

Time	Topic
10:30-11:00	Introduction
11:00-12:00	Keynote
12:00-13:00	Lunch
13:00-16:00	Breakout Sessions
16:00-16:45	Day 1 Outbriefs
16:45-17:30	MBSE Survey Results



Sunday, January 25, 2015

Time	Topic
09:00-12:00	Breakout Sessions
12:00-13:00	Lunch
13:00-16:00	Breakout Sessions
16:00-17:00	Day 2 Outbriefs
17:30-18:30	MBSE Reception

Breakout Sessions (tentative)

Breakout Session	Saturday PM	Sunday AM	Sunday PM
FMI	-	X	Repeat
OSLC	X	Repeat	-
Hybrid Mfg/3D Printing	-	X	Repeat
Model Lifecycle Management	X	-	Repeat
MBSE for SoS	-	X	Repeat
Agile Modeling	X	-	-
MBSE for Automotive	X	-	X
MBSE for Biomedical & Healthcare	X	X	X
MBSE for Transportation & Rail	-	X	Repeat
MBSE for Space	X	-	X



Saturday PM: Agile Modeling and Modeling Agile Systems — 3 Hour Breakout Session of MBSE Workshop, Presented Jointly by Rick Dove & Bill Schindel

Related MBSE Meetings on Monday and Tuesday

Monday, January 26, 2015

Tuesday, January 27, 2015



Patterns Team Working Meeting: Monday AM, Tuesday PM

[Back To MBSE Wiki](#)

25th anniversary
annual INCOSE
international workshop
Los Angeles, CA
January 24 - 27, 2015



LIMITED SAMPLE FROM
DRAFT SESSION SLIDES—
SEE ATTACHMENT 1

The Agile Systems Pattern

An MBSE-Based System Pattern,
with Implications for Agile Modeling

Bill Schindel, ICTT System Sciences
schindel@icct.com

IW2015 MBSE Workshop Breakout Session:
Agile Modeling and Modeling Agile Systems, Jan 24, 2015

wds 1.2.1

Discussion of Plans for Input to INCOSE MBSE Methodologies Summary

-- PBSE Summary

Estefan, Jeff A., "[Survey of Model-Based Systems Engineering \(MBSE\) Methodologies](#)," Rev. B, INCOSE Technical Publication, Document No.: INCOSE-TD-2007-003-01, International Council on Systems Engineering, San Diego, CA, June 10, 2008.

http://www.incose.org/ProductsPubs/pdf/techdata/MTTC/MBSE_Methodology_Survey_2008-0610_RevB-JAE2.pdf

http://www.omgwiki.org/MBSE/doku.php?id=mbse:methodology#mbse_benchmarking_survey

The screenshot shows a web browser window with the URL http://www.omgwiki.org/MBSE/doku.php?id=mbse:methodology#mbse_benchmarking_survey. The page content is as follows:

Milestones

Date	Milestone	Status	Point of Contact
IW11	Summary of Current MBSE Methodologies Listed & References Provided	Complete	Jeff

Team Members

Name	Organization	Contact Information
Jeff A. Estefan	NASA/JPL	Jeffrey.A.Estefan@jpl.nasa.gov
Michelle Sprecht	IBM	michelle.specht@us.ibm.com
John C Watson (Lead)	Lockheed Martin	john.watson@lmco.com
J.D. Baker	No Magic	james.baker@incose.org

MBSE Methodology

Definitions

- Process - A logical sequence of tasks performed to achieve a particular objective. A process defines the "WHAT" is to be done, without specifying the "HOW" each task is to be performed.
- Method - Consists of techniques for performing a task, the "HOW" of each task. The terms "method," "technique," "practice," and "procedure" can be used interchangeably in this context.
- Tool - An instrument that, when applied to a particular method, can enhance the efficiency of a task. Thus, methods help bridge the gap between process and tools. The purpose of the tool should be to facilitate the accomplishment of the "HOWs".
- Methodology - Defined as a collection of related processes, methods, and tools.

List of Methodologies and Methods

Methodologies Surveyed in INCOSE 2008 Report

Name	Primary Point of Contact
INCOSE Object-Oriented Systems Engineering Method (OOSEM)	safriedenthal@gmail.com
IBM Rational Telelogic Harmony-SE	peter.hoffmann@telelogic.com
IBM Rational Unified Process for Systems Engineering (RUP-SE)	mcantor@us.ibm.com
Vitech Model-Based Systems Engineering (MBSE) Methodology Vitech	jjong@vitechcorp.com
JPL State Analysis (SA) Methodology JPL State Analysis (SA)	Robert.D.Rasmussen@jpl.nasa.gov
Dori Object-Process Methodology (OPM)	dori@ie.technion.ac.il

Additional Methodologies Identified as Gaps Since 2008 INCOSE Survey

Weillkiens Systems Modeling Process (SYSMOD)	Tim.Weillkiens@oose.de
Fernandez Process Pipelines in OO Architectures (PPOOA)	joselfernandez@telefonica.net
An Ontology for State Analysis: Formalizing the Mapping to SysML	nicolas.f.rouquette@jpl.nasa.gov
ISO-15288, OOSEM and Model-Based Submarine Design	Paul.Pearce@deepbluetech.com.au
Alstom ASAP methodology	marco.ferrogali@transport.alstom.com

Existing INCOSE
MBSE Methodologies Summary

Estefan, Jeff A., “[Survey of Model-Based Systems Engineering \(MBSE\) Methodologies](#),” Rev. B, INCOSE Technical Publication, Document No.: INCOSE-TD-2007-003-01, International Council on Systems Engineering, San Diego, CA, June 10, 2008.

http://www.incose.org/ProductsPubs/pdf/techdata/MTTC/MBSE_Methodology_Survey_2008-0610_RevB-JAE2.pdf

http://www.omgwiki.org/MBSE/doku.php?id=mbse:methodology#mbse_benchmarking_survey

The screenshot shows a web browser window with the URL http://www.omgwiki.org/MBSE/doku.php?id=mbse:methodology#mbse_benchmarking_survey. The page content includes:

Date	Milestone	Status	Point of Contact
IW11	Summary of Current MBSE Methodologies Listed & References Provided	Complete	Jeff

Team Members

Name	Organization	Contact Information
Jeff A. Estefan	NASA/JPL	Jeffrey.A.Estefan@jpl.nasa.gov
Michelle Sprecht	IBM	michelle.specht@us.ibm.com
John C Watson (Lead)	Lockheed Martin	john.watson@lmco.com
J.D. Baker	No Magic	james.baker@incose.org

MBSE Methodology

Definitions

- Process - A logical sequence of tasks performed to achieve a particular objective. A process defines the "WHAT" is to be done, without specifying the "HOW" each task is to be performed.
- Method - Consists of techniques for performing a task, the "HOW" of each task. The terms "method," "technique," "practice," and "procedure" can be used interchangeably in this context.
- Tool - An instrument that, when applied to a particular method, can enhance the efficiency of a task. Thus, methods help bridge the gap between process and tools. The purpose of the tool should be to facilitate the accomplishment of the "HOWs".
- Methodology - Defined as a collection of related processes, methods, and tools.

List of Methodologies and Methods

Methodologies Surveyed in INCOSE 2008 Report

Name	Primary Point of Contact
INCOSE Object-Oriented Systems Engineering Method (OOSEM)	safriedenthal@gmail.com
IBM Rational Telelogic Harmony-SE	peter.hoffmann@telelogic.com
IBM Rational Unified Process for Systems Engineering (RUP-SE)	mcantor@us.ibm.com
Vitech Model-Based Systems Engineering (MBSE) Methodology Vitech	jlong@vitechcorp.com
JPL State Analysis (SA) Methodology JPL State Analysis (SA)	Robert.D.Rasmussen@jpl.nasa.gov
Dori Object-Process Methodology (OPM)	dori@ie.technion.ac.il

Additional Methodologies Identified as Gaps Since 2008 INCOSE Survey

Weillkiens Systems Modeling Process (SYSMOD)	Tim.Weillkiens@oose.de
Fernandez Process Pipelines in OO Architectures (PPOOA)	joselfernandez@telefonica.net
An Ontology for State Analysis: Formalizing the Mapping to SysML	nicolas.f.rouquette@jpl.nasa.gov
ISO-15288, OOSEM and Model-Based Submarine Design	Paul.Pearce@deepbluetech.com.au
Alstom ASAP methodology	marco.ferrogallini@transport.alstom.com

Also related to: The Case for a Stronger MBSE Underlying Semantic Model— Parts I and II

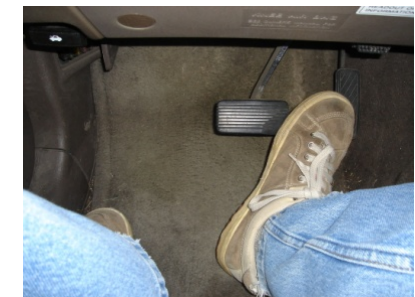


Failure Risk Analysis: Insights from Model-Based Systems Engineering

SEE ATTACHMENT 2



William D. Schindel
ICTT System Sciences
schindel@icct.com



- **Planning Next Activities:**

- One meeting in December: Dec 17, 2015
- One meeting in early January: When?
- Meeting at IW in late January: January 26-27

- We also want to begin planning the agenda of the Jan 26-27 IW meeting:

- Separate from our joint workshop there on Agile Systems, Saturday, Jan 24.

- Your thoughts?

Historical / Back Up Materials:

An example S*Pattern Extract

Lubricant (Oil) Filter Product Family

See Attachment 3