Model-based SoS Engineering

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Model-Based SoS Engineering (MBSoSE)

- What is it?
- Challenges
- Advantages
What is it?
Model-Based - What is that?

Doesn’t just involve models

The model is the BASIS of the design!
Model-Based - What is that?

A single system model

Not just domain models

Not disjoint drawings
Model-Based- Why just one?

Results come from relationships
Predicting results is key
To predict we must have system view
MBSoSE Challenges - SoS Nature

Traditional top-down

SoS design
MBSoSE Challenges - Emergence

Sys WXYZ > Sys W + Sys X + Sys Y + Sys Z

Is it enough?
Is it too much?
Is it undesirable?
MBSoSE Challenges - Insight

“(System) properties are destroyed when the system is dissected, either physically or theoretically, into isolated elements.” Fritjof Capra
Model-based advantages
Advantages of Model-Based Systems view

Improved prediction

Systems view
Advantages of Model-Based

Operational Architecture Domain

Performer (Operational Node)

built from
performs
connected to
includes
comprised of
implemented by
refined by
basis of

Operational Activity

Capability

implemented by
refined by
basis of

Operational Item

Needline

transfers
decomposed by
implemented by
inputs / outputs / triggered by
includes
specifies by

System Architecture Domain

Architecture

Component

built from
joins to
includes
connected to
performs

Interface

Link

Component

transfers
decomposed by
includes

Item

Requirement

includes
connected to
specifies by

Function

includes
decomposed by

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Capability understanding
Advantages of Model-Based Interface design
Advantages of Model-Based 

Flexibility - Tailoring and reuse
What will it take?
What do we need?

Metamodel/Schema

Repository/Database

Good Engineers!
MBSoSE- Recap

• What is it?
  • NOT- the new buzz word
  • BASED on single, integrated model

• Challenges
  • Nature of SoS
  • Emergence
  • Insight

• Advantages
  • System view
  • Capability capable
  • Interface design
Thank you!

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