



**2020**  
Annual **INCOSE**  
international workshop  
Torrance, CA, USA  
January 25 - 28, 2020

# SETDB: the Systems Engineering Tools Database

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# UPDATE: Systems Engineering Tools Database



- **INCOSE and PPI-Int joint project to bring the Systems Engineering Tools Database (SETDB) back to the INCOSE Web Site!!**
- **Collaboration and Support: the SETDB WG, RWG, CM WG, Architecture WG and TIMLM WG members developing the initial vendor questionnaires (surveys)**
- **The SETDB is an Emerging Working Group : Charter submitted in the 3<sup>rd</sup> quarter of 2019 for approval**
- **Communication: Weekly Project Team Meetings; Monthly TechOps Meetings; Monthly Newsletter Updates to the SETDB WG and TIMLM WG**

# SETDB: Systems Engineering Tools Database



- **SETDB Team Accomplishments:**
  - Operational Concept Document (OCD) completed and released, updated as CapSySRS evolved
  - Developed and Released Capability System Requirements Specification (CapSySRS)
  - Constructed SETDB UIF Prototype MockUps
  - System Use Cases and System Model (SySML) developed and updated as CapSySRS evolved
  - Analyzed CapSySRS using the Mockups and the System Models and Use Cases
  - Initiated V&V Plan development
  - In conjunction with INCOSE IT, developed Mock-ups and a working prototype for IW 2020
- **Prototype is Available at IW 2020!!! [www.incose.org/setdbtest](http://www.incose.org/setdbtest)**
- **Product First Release Scheduled for IS 2020 in Cape Town, South Africa**



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TIMLM - Tool Integration and Model Lifecycle Management

# Integrate Models with Tools

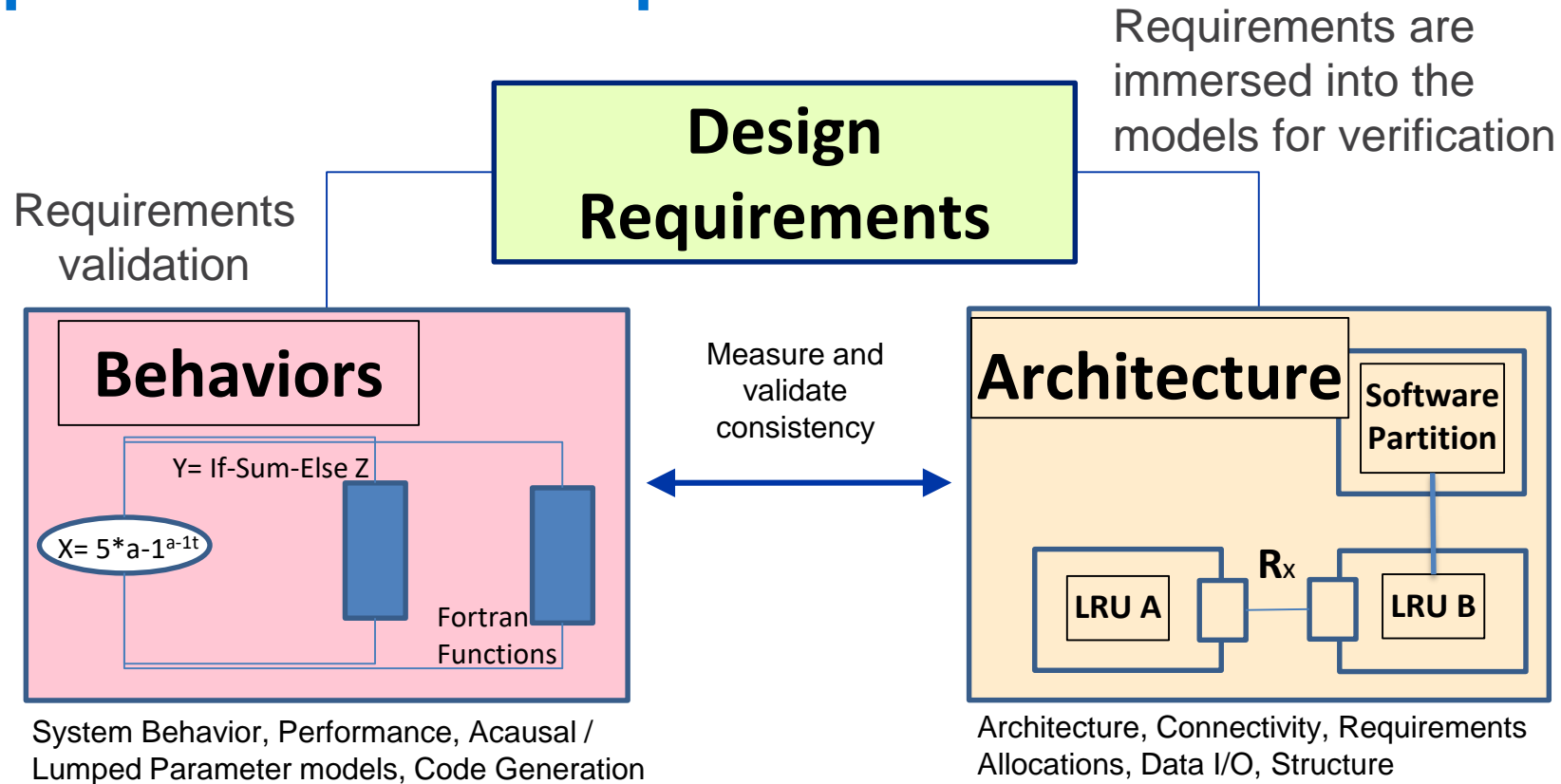


# What is MBSE?

- 1) define **BIG M** (MBSE)  
*all of the digital thread, all domains, all models, the digital twin enabler*
- 2) define little **m** (mBSE)  
*RFLB (Behaviors), not defined by CAD model, Concept Design to Physical Implementation (not spatial)*



# Keep mBSE Simple!



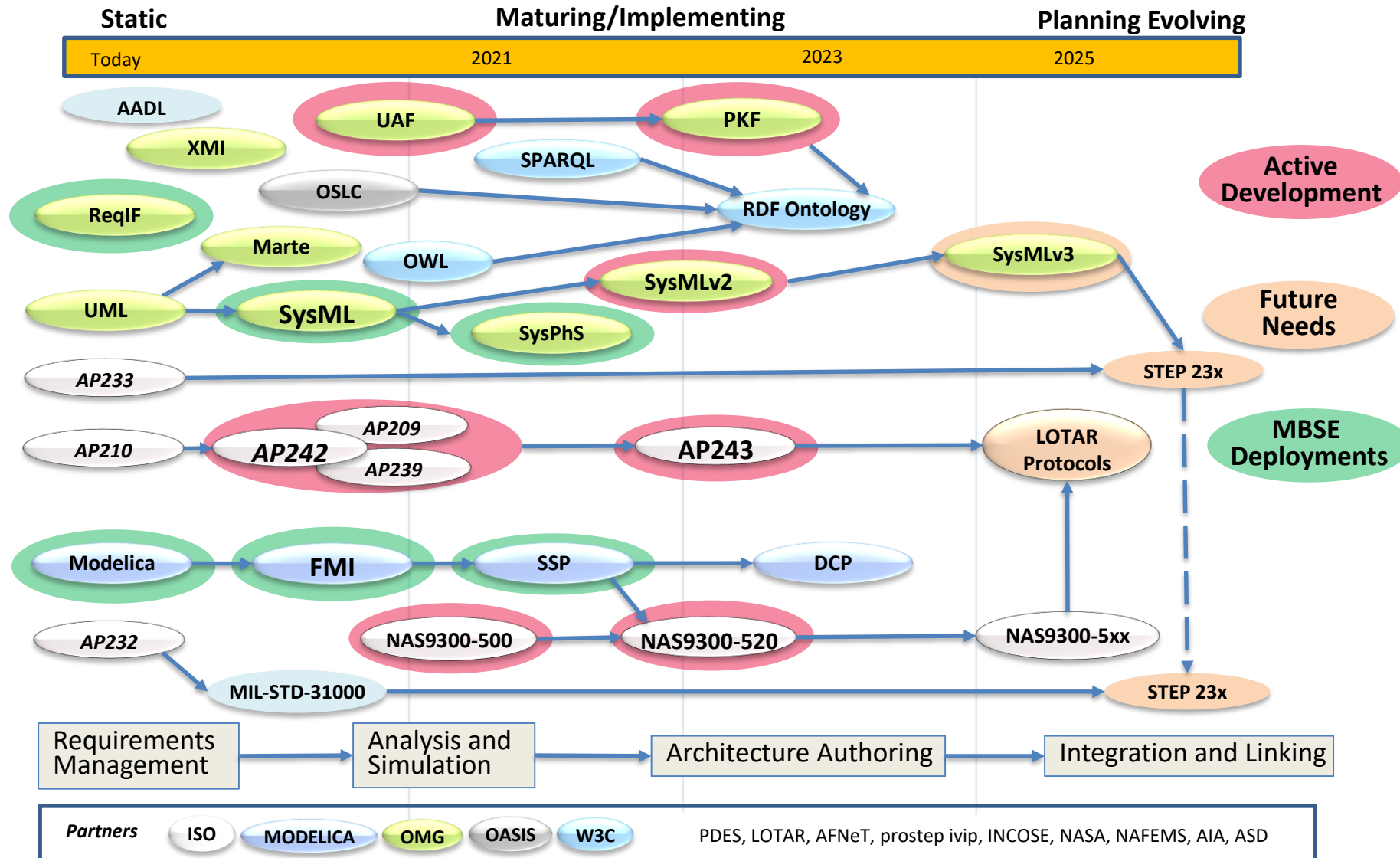
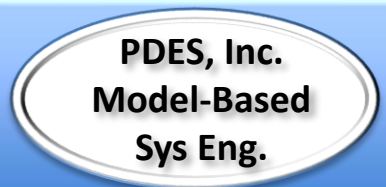
MBSE is achieved if the models are consistent, and are used downstream **without recoding or recreation**



# Give me my mBSE!

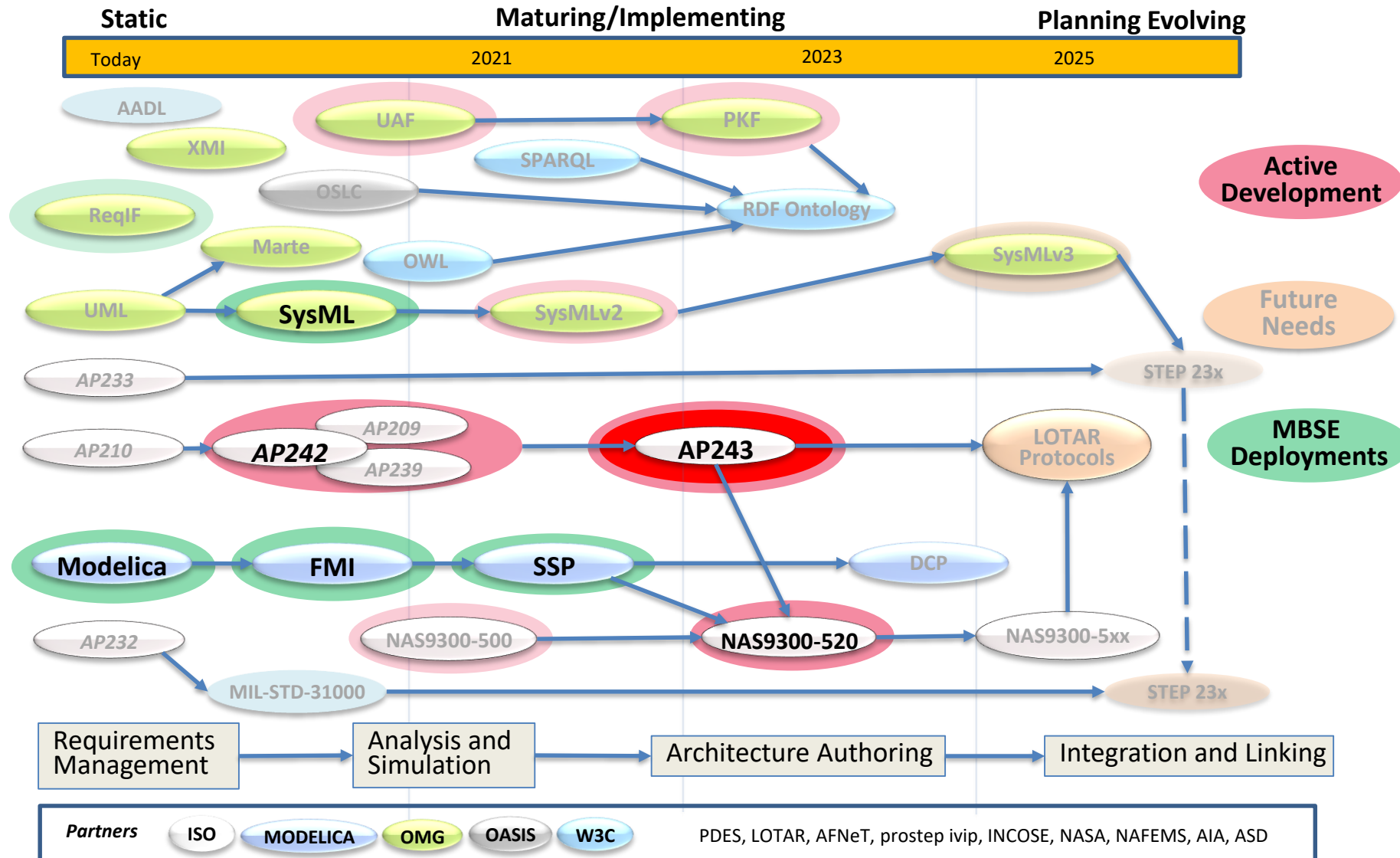
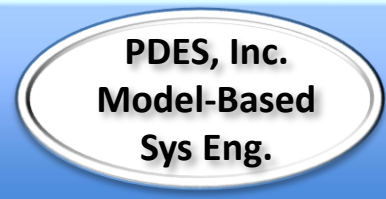
- the slow implementation of mBSE is an industry problem that can be partially attributed to the absence of data standards
- but Data Standards are not an island - dependency on process standards and tool implementations

# MBSE Standards Roadmap





# MBSE Standards Roadmap





# What to do?

- Practice, advocate and participate
- Connect the dots in your product designs and enterprise process documentation
- Recognize good work. Count/measure the exchange of text documents vs model integration discoveries. *(reduce models to text?)*
- Collect metrics, calculate statistics



# What to measure?

Measure time, nodes, labor, authors, links, files, revisions, complexity, reused elements/ components/ models, licenses, licenses per org, consumption, verifications, validations, management interventions, un-modelled elements, document matches, approximations, errors, corrections, tools, revisions, versions, test requirements, copies, automations, integrations, dependencies, translations, conversions, reusable objects, populated metadata parameters.

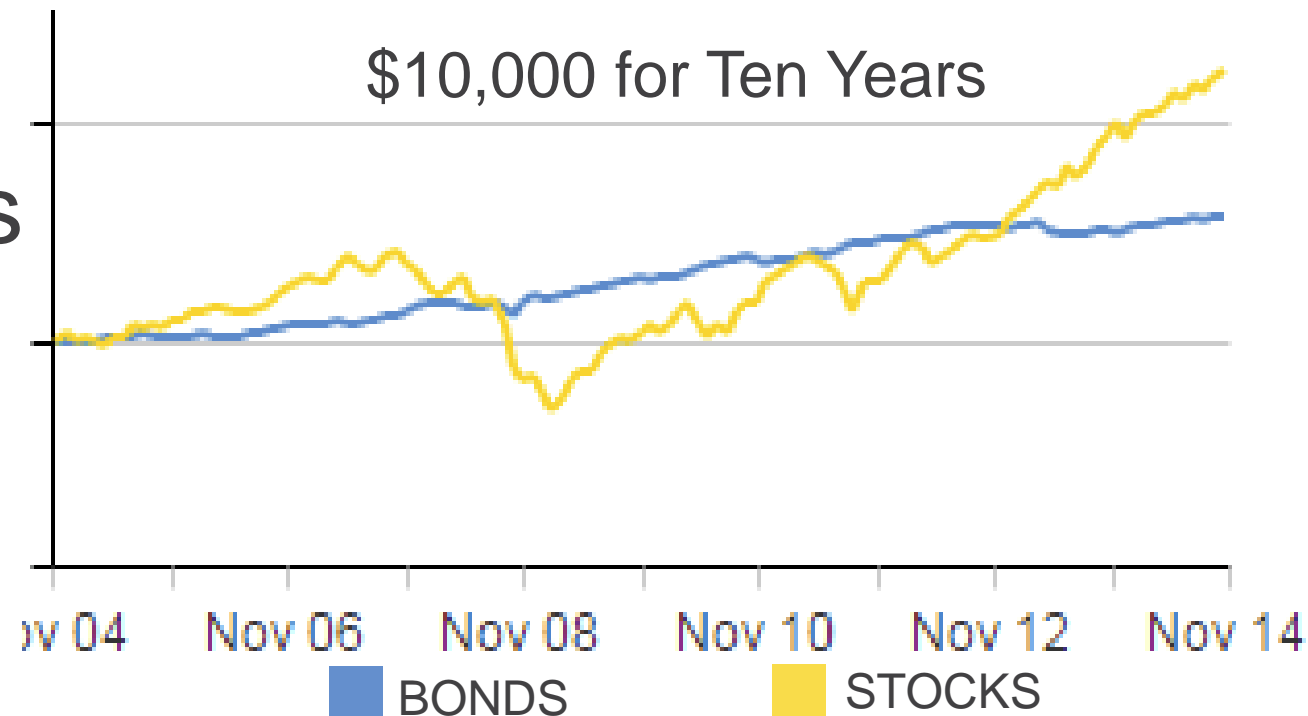
A savings justification before commitment is  
**bad business!**

# MBSE is a FAD!



You earn \$500 mil for every 50 models you reuse.  
(not including overhead savings or error reduction)

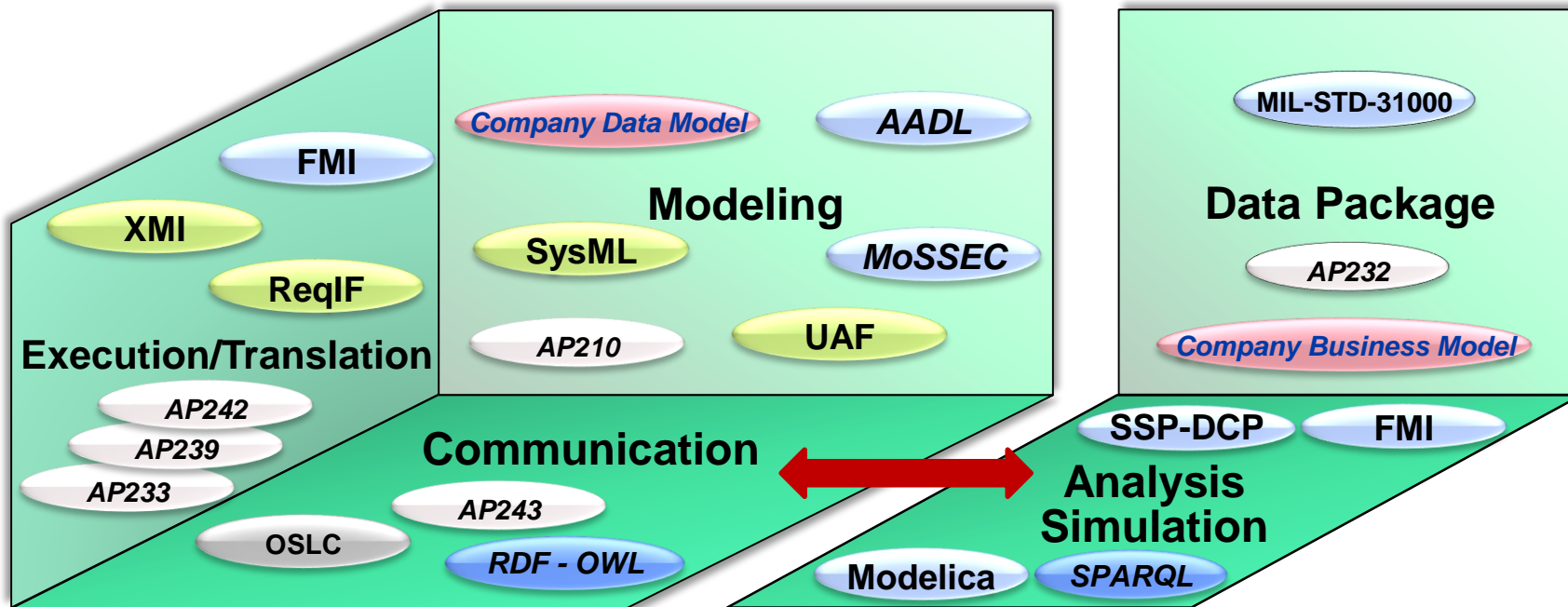
Treat MBSE investments  
like stocks vs bonds.  
Risk vs reliability.



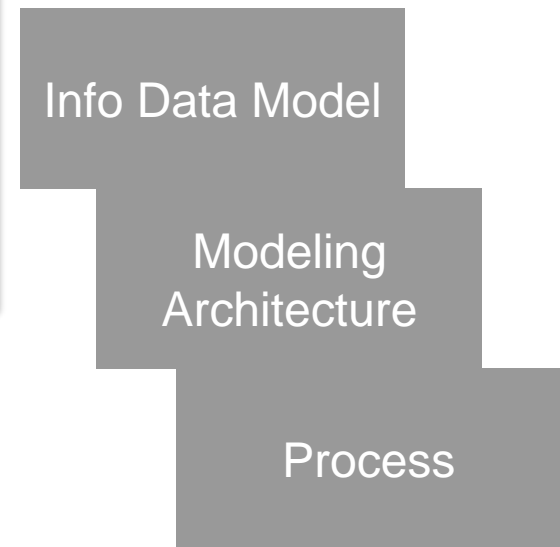
SOURCE: <http://static.diffen.com/uploadz/8/8e/Stocks-vs-bonds-growth.png>



# MBSE Data Standards Domain



## Critical Enablers !



Standard Body Legend





# Summary:

- What can INCOSE do to accelerate your business?
- Do you discuss data standards with your tool vendors?
- Recognize that processes must accompany your data standards
- Can you collect metrics and measure your progress for mBSE?
- *How do we, as an industry, converge on a consistent approach?*
- Join us on Monday at 1PM, Salon F



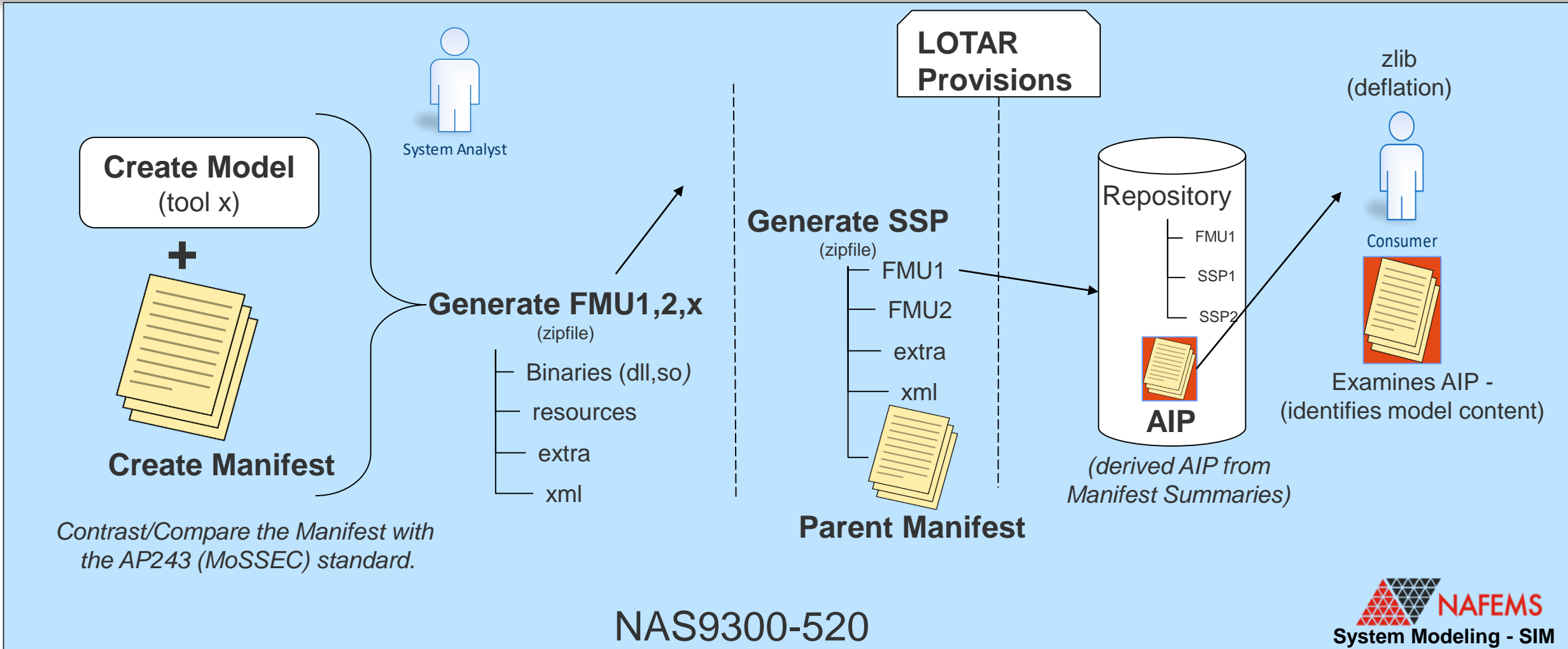
# LOTAR MBSE Data Standards

**Target  
Activity**

- 500: Fundamentals and Concepts
- 510: Requirements management “text, graphics, tables”, “parameter based”, and coded information
- 515: Validation and Verification requirements information
- 520: Lumped parameters models for behaviours and controls described by specification or executable code, containing differential, algebraic and discrete equations
- 530: Models defined using architecture description languages (ADLs), ISO 42010, e.g. industry standards: AADL, SysML, UML



# Archive/Exchange a Behavior Model Package







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slide 2: I don't want to be controversial, but the following two statements are often mis-understood. bigMBSE is the consumer of MBX. mBSE is how we initiate new products.

slide 2: To kick-off the MBSE workshop, Mark Sampson made an important comment: "If your enterprise is still text based you will not survive."

slide 3: The magic dust: Allocate and integrate the Requirements within the architecture models and validate/optimize with the Behavior models.

V&V is supported by the decomposition of the requirements through the process (LH of the VEE) and the big MBSE completes the V&V process (RH of the VEE)

slide 4 : We don't teach the University students about data standards. They generally get a little CAD and Behavior Modeling, and rarely any architecture and requirements decomposition

slide 4: So the problem begins in the curriculum and extends into our enterprises. The enterprise needs that expertise so the focus is employee training

slide 5: Not just SysML, but how many times do you use AP243 or SSP in your discussions. Process standards are not included on this chart, but are an equally important feature of our MBSE implementations.

slide 5: The arrows have different meanings inferring evolution, and relationships thru time

slide 6: Data standards vs language standards, they are complimentary. And you can't choose just one to demonstrate mBSE. The glue between standards is the model.

slide 7: Practice the arts, advocate for the tool vendors to deliver exchangeable capability, and participate in the creation of the standard specifications.

slide 7: Evaluate the design process you use, and compare it with your documentation (if any exists). Nothing beats hard numbers and a score card, but the most valuable recognition is at the Peer level.

slide 9: The FAD may include an ROI, if you invest with a total market long range view.