A Maturity Assessment Framework for Model-Based Design

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Agenda

1. Background
2. Motivation
3. Model-Based Design Maturity Framework
4. Conclusion
Wide adoption of Model-Based Design (MBD) globally

Adoption status of organizations:
- Ranges from Ad-hoc adoption to Optimized
- Most are somewhere in-between and interested in improving maturity
Realization of benefits of MBD is inhibited due to:
- Initial adoption driven by different groups with different objectives
- Initial adoption target different applications
- Limited MBD knowledge and/or experience
- Organizational structure not adjusted to support MBD
**Maturity Assessment Framework for Model-Based Design**

**Motivation**

- **Typical process improvement steps**
  - Assess as-is process, people and tools
  - Compare findings to a standard reference
  - Develop a plan with roadmap to address the findings
  - Implement the plan
  - Monitor and optimize

- **However, no published standard reference for MBD maturity measurement exists**
MathWorks Experience and Efforts

- MathWorks has been conducting MBD Process Assessments for customers for several years

- Papers have been published that provide guidance for those introducing MBD
  1. Best Practices for Establishing a Model-Based Design Culture
     SAE Paper 2007-01-0777, Smith, Prabhu, Friedman
  2. Pragmatic Strategies for Adopting Model-Based Design
     SAE Paper 2010-01-0935, Dillaber, Kendrick, Jin, Reddy

- Framework for assessing the maturity of a MBD deployment has been developed
  - It provides a means of assessing the maturity of MBD deployment and identify specific areas of improvement
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Pillars

- Comprehensive measurement of MBD capabilities
- Independently measure each pillar

- Apply to any level of expertise or domain
- Independent of the process
Example application of the framework

### Group 1 – Software
- Human Capital Alignment
- Infrastructure & Tools & Process
- Verification and Validation
- Modeling
- Design with Simulation
- Implementation

### Group 2 - Controls
- Human Capital Alignment
- Infrastructure & Tools & Process
- Verification and Validation
- Modeling
- Design with Simulation
- Implementation

### Group 3 - Research
- Human Capital Alignment
- Infrastructure & Tools & Process
- Verification and Validation
- Modeling
- Design with Simulation
- Implementation
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Modeling Pillar

MBD Pillars

1. Modeling
- Requirements
- Architecture
- Modeling Language Selection
- Controls/Algorithm Modeling
- Environment/Plant Modeling
- Modeling Standards
- Scope of use

2. Simulation

3. Implementation

4. Verification

5. Infrastructure

6. Alignment

Human Capital

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Architecture Capabilities

1. Modeling

- Requirements
  - Partitioning
  - Size and hierarchy
  - Interface
  - Data Modeling & Management
  - Scheduling
  - Testability

- Modeling Language Selection
- Controls/Algorithm Modeling
- Environment/Plant Modeling
- Modeling Standards
- Scope of use
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Expanded view
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Mapping of Maturity Levels

- Three levels of maturity used in the draft version: Low, Medium, High
- End goal is to refine the maturity model and adjust levels as needed
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Conclusion

- Six pillars and three maturity levels in the maturity framework
- This is a draft version. We will gather feedback and update
- MathWorks will continue to perform guided assessments
- Stay tuned for
  - Paper (2012)
  - Online MBD self-assessment (2013+)
  - MBD Benchmark study (2013+)
Thank You!