Future Technology Research Workshop

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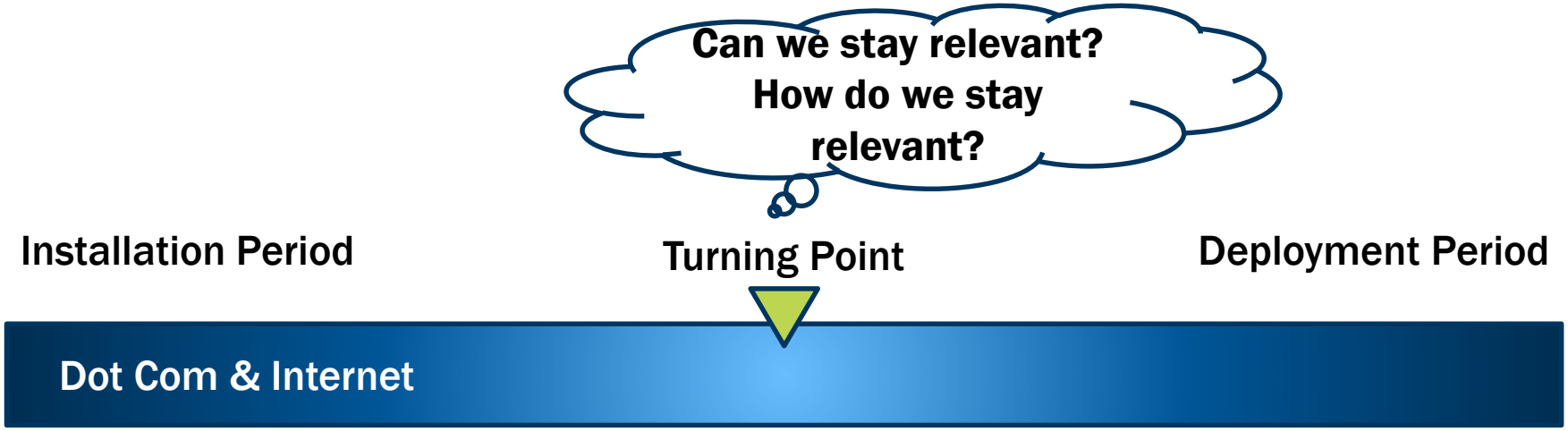
Are You Ready for the 4th Industrial Revolution?

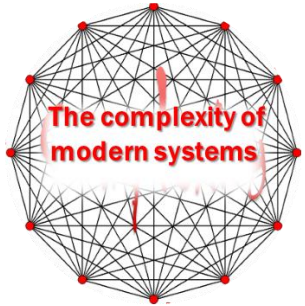
- Exponential changes to the way we live, work, and relate due to social-cyber-physical systems
- Augmentation, machine learning, and artificial intelligence are being used to accelerate capabilities in a non linear fashion



Situation – Demands, Risk, Speed, and Change Threaten Mission Success

Challenging Customer Needs → High Risk Engineering in Complexity → Mission Success Expectations

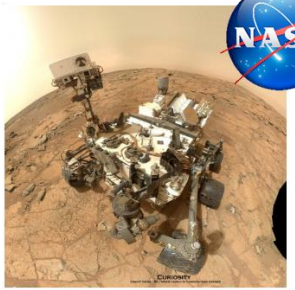
- Sustainable Systems
- Smart Systems
- Stable Systems
- Simple Systems
- Socially Acceptable Systems
- Safe & Secure Systems
- Scalable Systems



"Speed of Relevance"

Joint Military Systems

Deep Space Exploration



National Airspace System

Critical Infrastructure Protection

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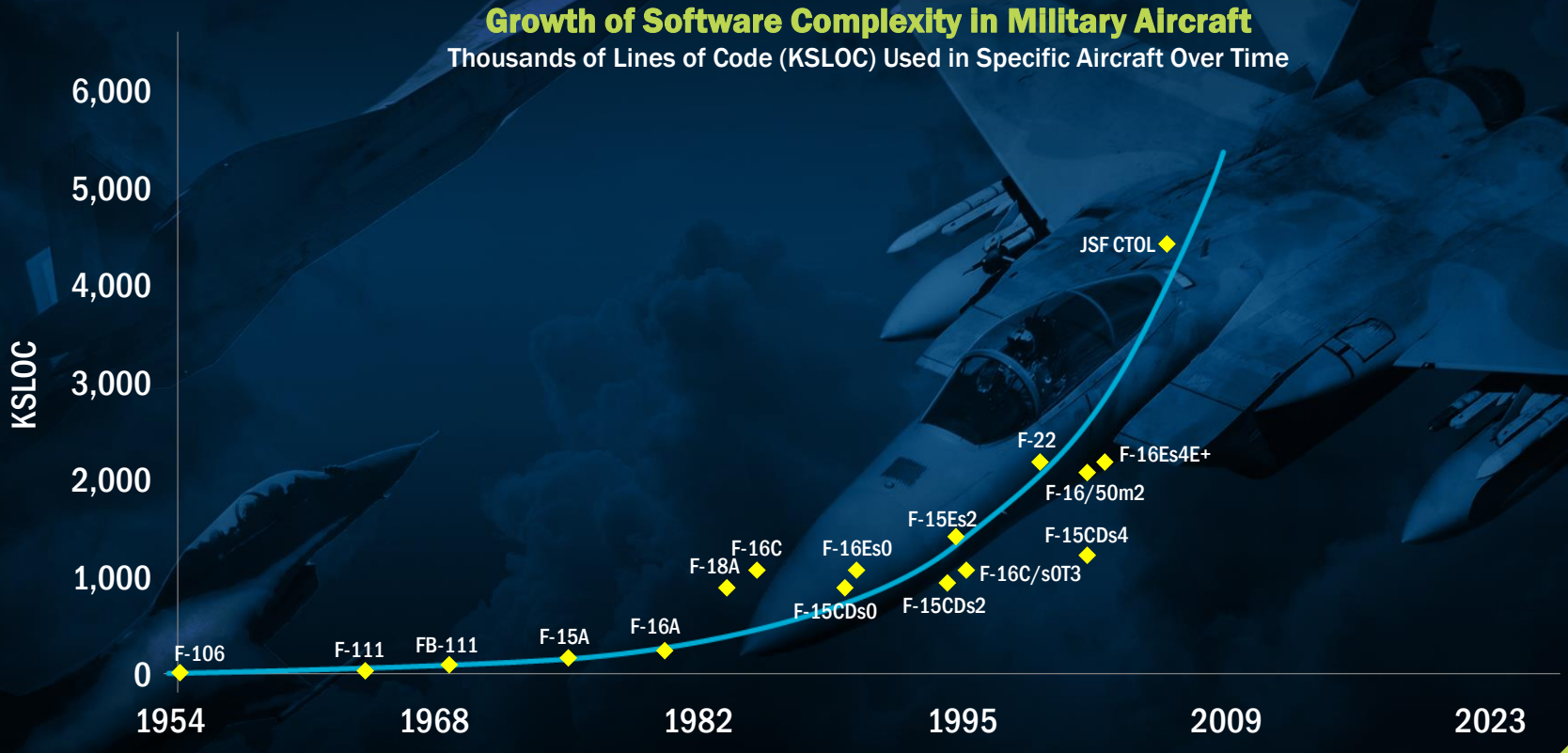
System Complexity is Growing Exponentially



https://savi.avsi.aero/about-savi/savi-motivation/exponential-system-complexity/

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Competing in a Social-Cyber-Physical World

"The world is now changing at a rate at which the basic systems, structures, and cultures built over the past century cannot keep up with the demands being placed on them."

- John Kotter, XLR8

Emerging Technology Areas to Meet the Future Demands

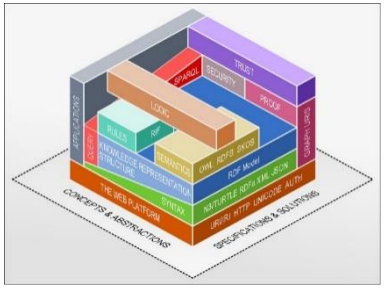
Cognitive

Advanced Data Management

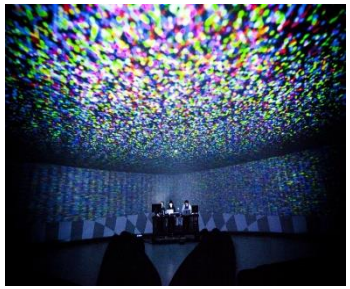
High Power Computing

Crypto

Digital Reality



Semantic



Multimedia & Visualization

Collaborative & Telepresence

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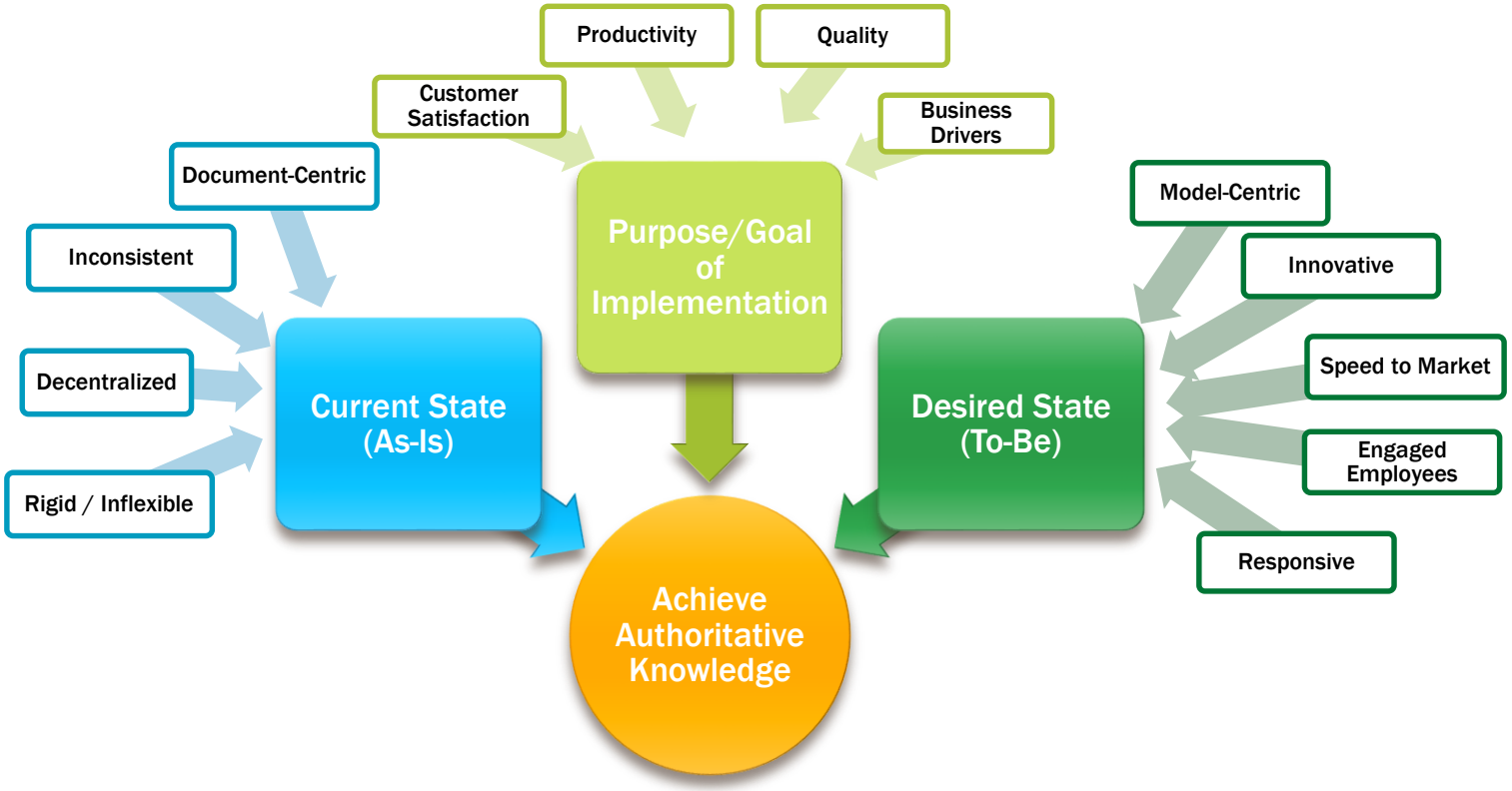
Aligning Outcomes For a Clear Transformation

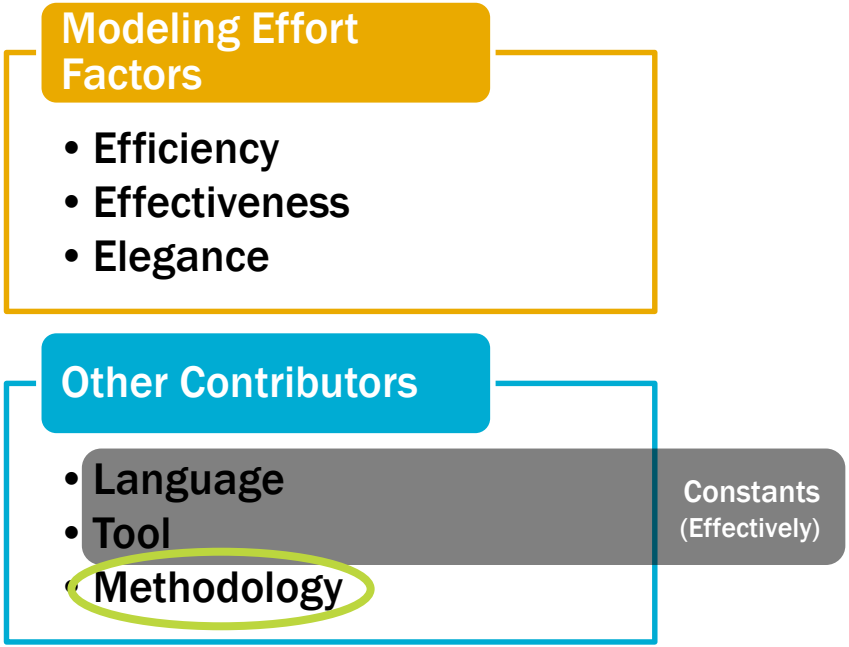


SAICs Pillars for Digital Engineering Transformation

Driving Goals

Model Elegance	**Interoperability**	**Curation Process**
To Provide Consistent, Quality Visual Models That Enhance Reuse & Communication	To Enable a Semantically Interoperable Systems Engineering Ecosystem	To Enable Capability Delivery at the Speed of Relevance

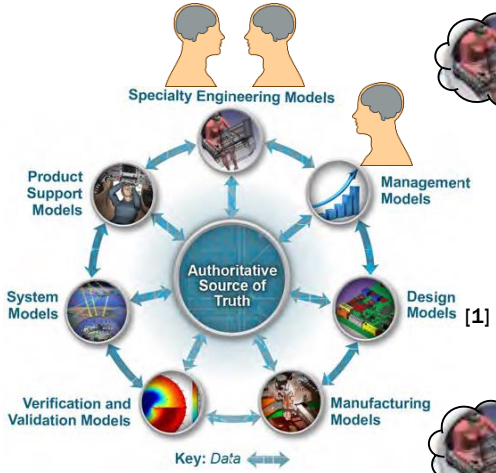
The Importance of Elegance in Modeling

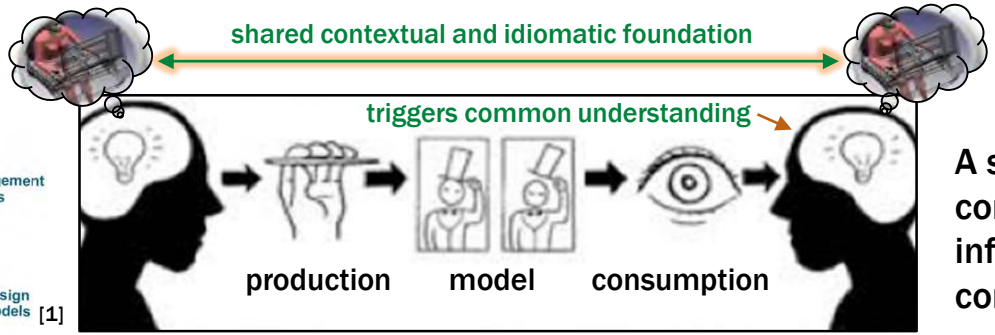


- Modeler then only directly influences the methodology
- When style guides and ontologies are followed, queries may be constructed in the model to return information of interest:
  - Properties
  - Usages
  - Related elements
- Unfortunately the style guide and other rules are not always followed consistently

*Warning:
- Frameworks are not languages
- Languages do not dictate methodology
- Tools do not dictate methodology

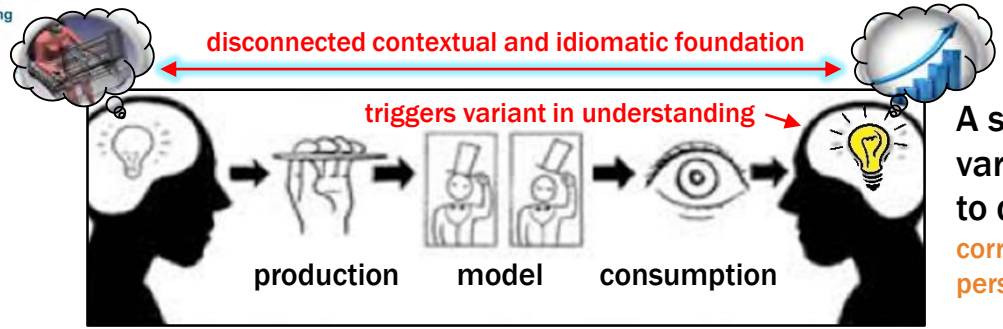
Today's End-to-End Digital Engineering Ecosystem





[1]

A shared artifact triggers a common understanding of information based on a common dialect.



A shared artifact triggers a variant in understanding due to different base dialects.

correct understanding from different perspective – OR – fault in translation

Infrastructure is just a "dumb" data broker.

[1] Underlying figure copied from McCloud, Scott; *Understanding Comics*

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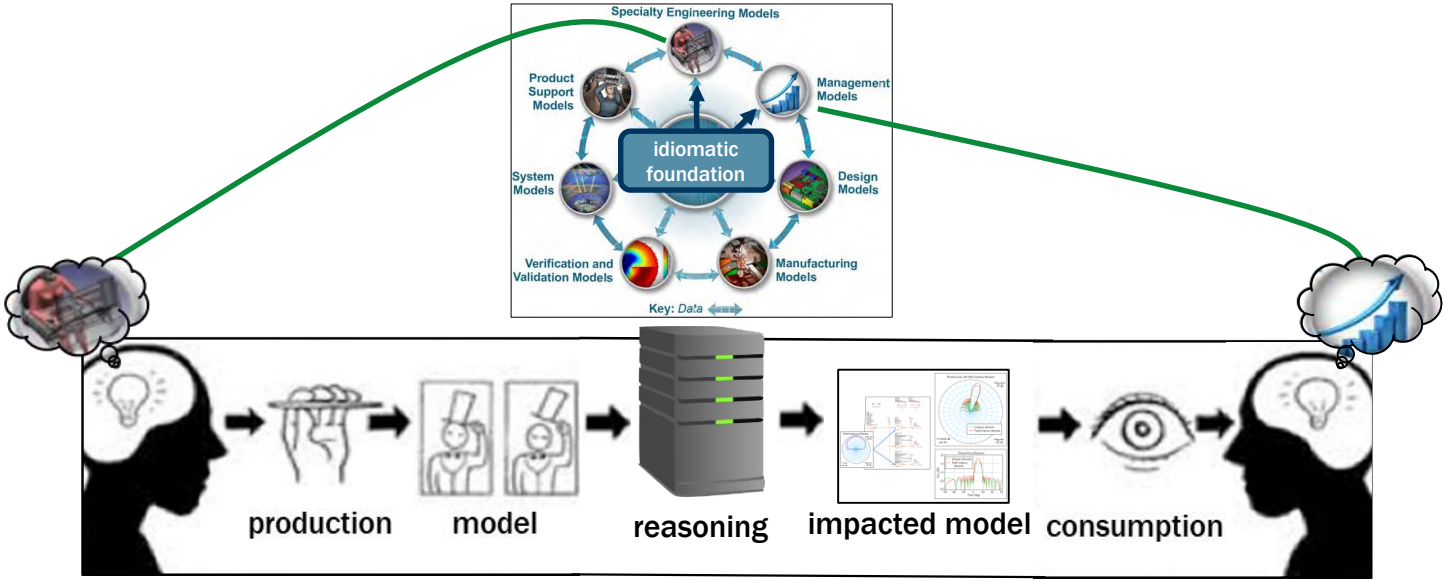
Tomorrow's End-to-End Digital Engineering Ecosystem



Smart Agent recognizes the dialect of a given artifact based on data source and can correctly relate the information into other dialects that share a common idiomatic foundation.

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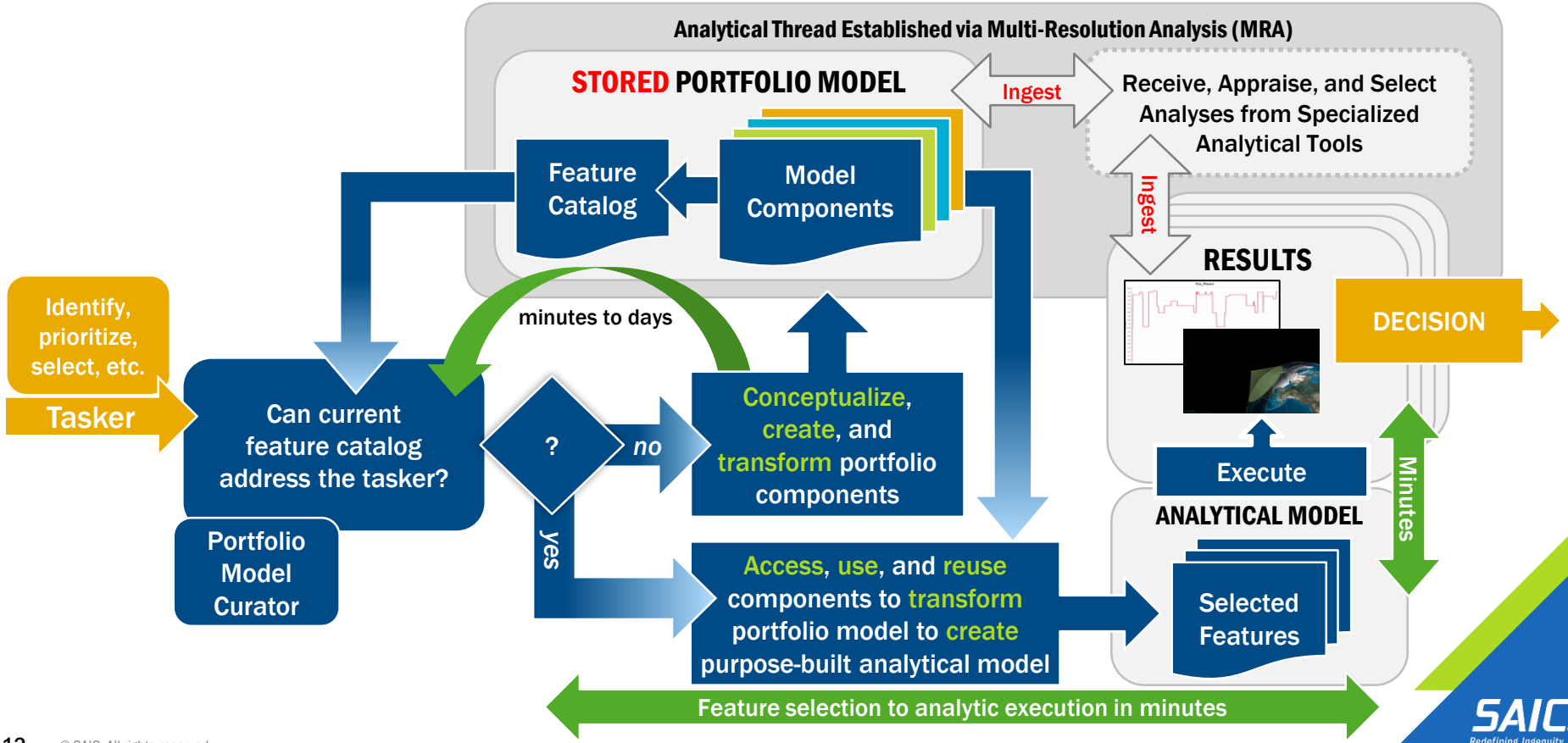
Feature-Based Curation in Decision Making Enterprise

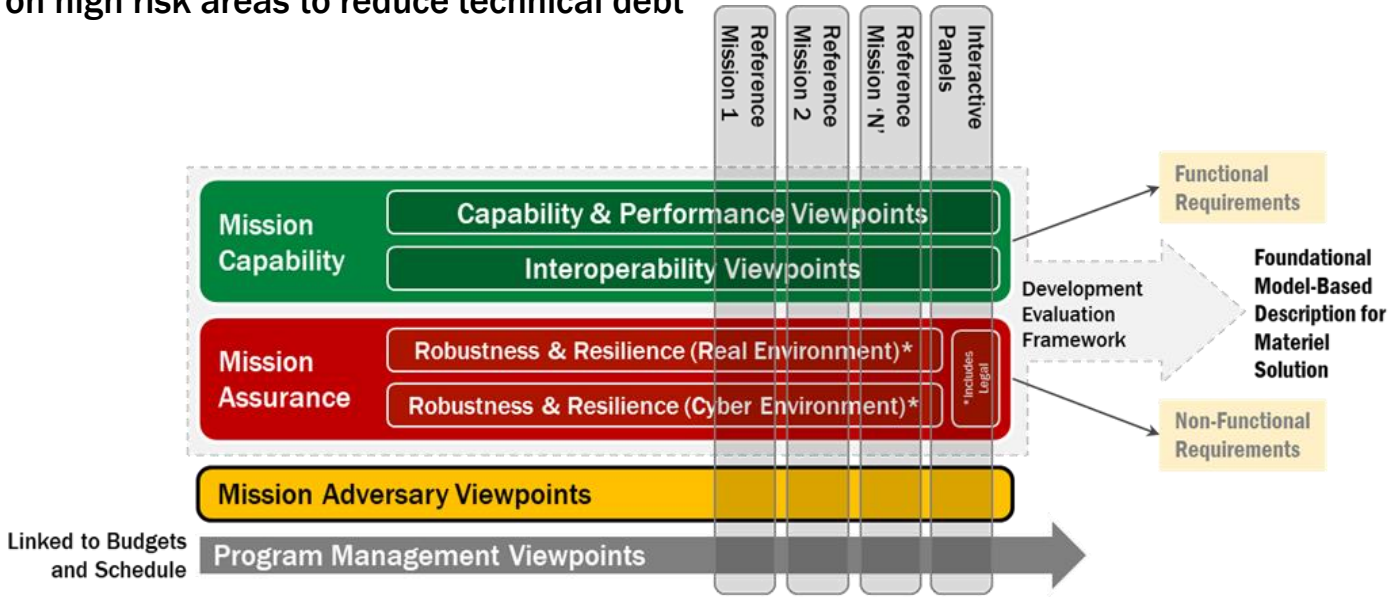
Using the Portfolio Model for Rapid Assessments; Tying Back to Analytical Models & Experts



Assembling the Portfolio

Bridging Descriptive Modeling and Dynamic Analytical Modeling

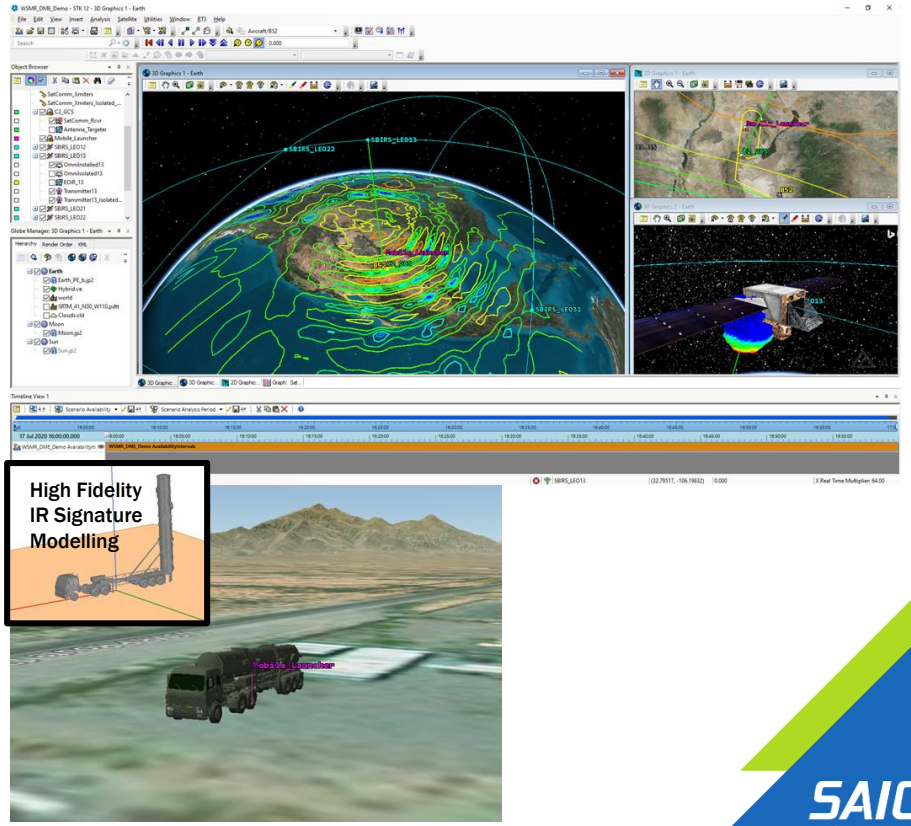
- Using a Feature Based Model Curation Framework we are applying Model Center to meet emerging multi domain operational and system analysis
  - Opens up the aperture to assemble modeling components from mission level to subsystem levels
  - Creates the opportunity to use the “Tee” modeling approach resulting in a multi fidelity modeling environment focused on high risk areas to reduce technical debt



Assembling the Portfolio

Creating an Enterprise Approach

- Customer is expecting more cross organization collaboration and cooperation
  - Will need the ability to assemble analysis from black box contributions
- As DE Ecosystems move to the cloud, the need to capture the run time environments and tool versions will be critical to curating these model components through the lifetime of the program
- Bridging over to Digital Twins to complete digital threads
  - Opportunity to leverage Model Center for extending the digital thread across from mission engineering to operations and sustainment with integration of digital twin



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