



Embedded *Plus* Engineering  
*Innovative Comprehensive Solutions*

# Applying Frictionless Development To Adapt to New Program Capabilities

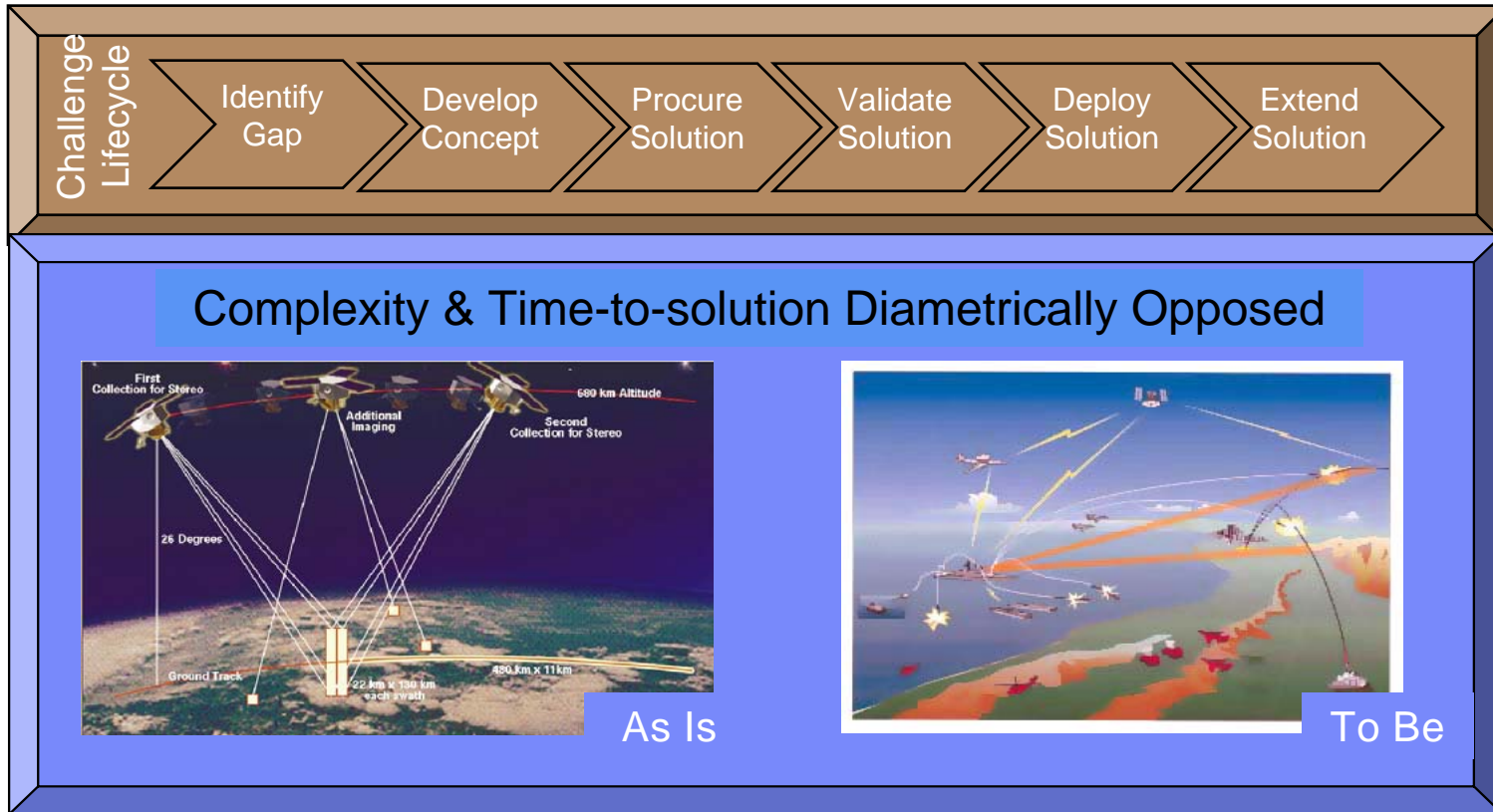
*A Model Driven System Development (MDSD) Approach*

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**IBM: Michael Mott and Ben Amaba**

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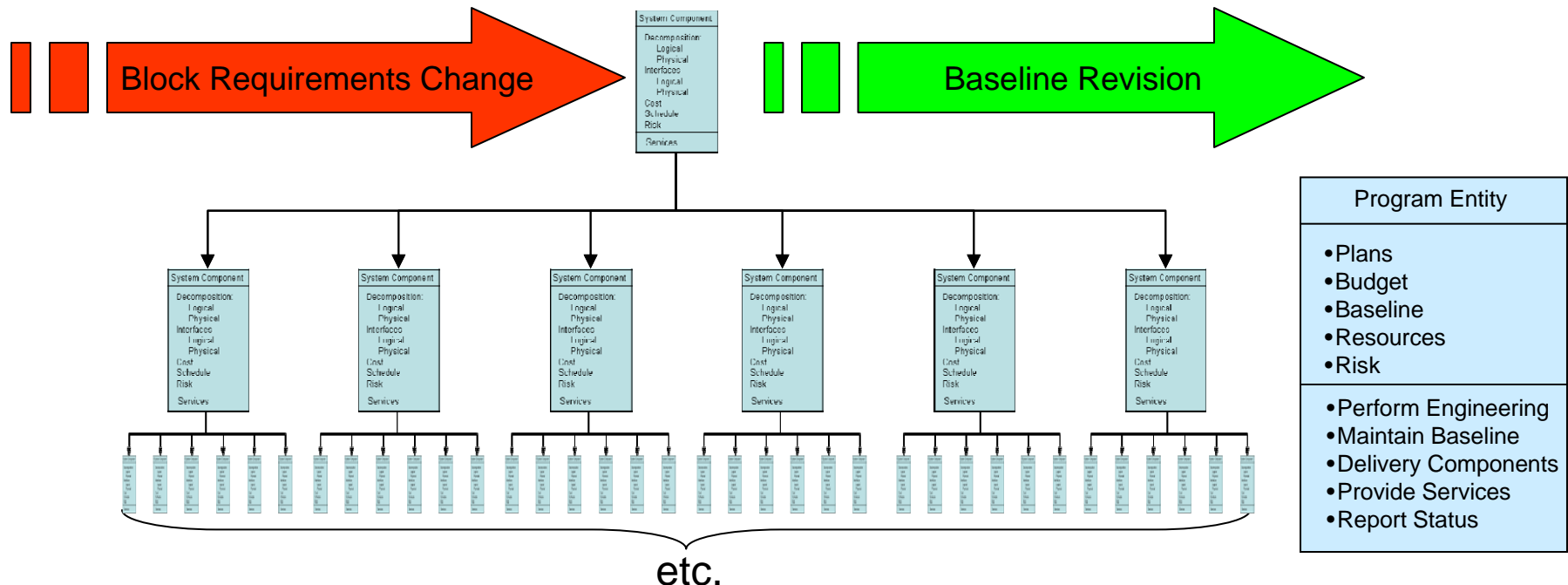
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# Network-Enablement Increases Complexity and Difficulty of Major Systems Development



Rapidly changing requirements establish the need for agile development of systems where IT bridges the gap

# Communication is a Scale Up Challenge



## Block Change Amplifies Program Collaboration Challenges

**Requirements:** Lack of context, design vs. capability description, ambiguity

**Traceability:**

- Slow communication of engineering artifacts and their relationships throughout hierarchy (e.g. KPP/KPI  $\leftrightarrow$  requirements  $\leftrightarrow$  design/analysis)
- Informal association of design analysis with components
- Cost and schedule models linked via tribal knowledge

**Results:** technical baseline rolled up via manual process

Brooks: Programs fail due to termites, not tornadoes....

# Enterprise Agility is Achieved Through Integration



- Systems exist to support the end customer
- Changes in client requirements or **supplier delivery** cascade through the SoS Enterprise
- How does this impact engineering?
  - Migration to architecture and its influence upon enterprise and system lifecycles
  - Requirements and design: Analysis of alternatives, cost, impact and risk across the entire asset base including **all tiers** of supplier
  - Development: Make vs Buy vs Use trade offs involving assets across the enterprise
  - Validation: Virtual **simulation** of SoS early in the development lifecycle
  - Deployment: Harmonizing component dependencies over time
- Reduced time-to-solution → adaptive enterprises gain agility dependent increasingly upon **frictionless flow** of information

# Enterprise Agility is Achieved Through Integration



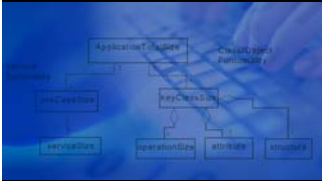
Integration of this scale requires tooling that is as agile as the systems it seeks to help build.



**Systems**

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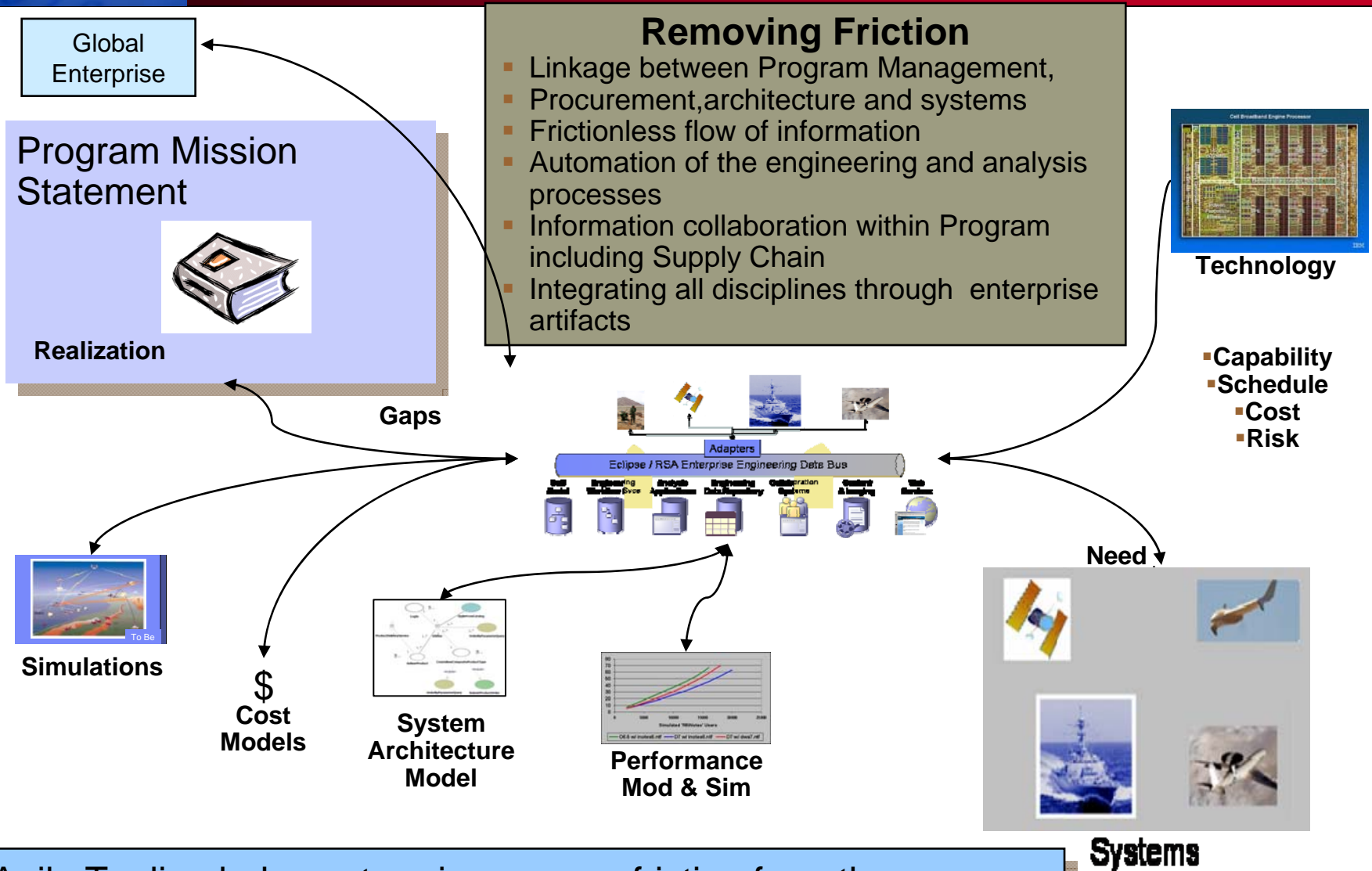


## Need for Frictionless, Predictive Enterprise Tooling

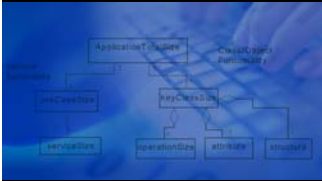
- Various changes in the A&D community require integration of multiple systems across disciplines
  - To decrease latency of program operation
  - For reduced time from when a gap is identified to when a solution is deployed.
  - To increase program adaptability when new functionality is introduced
- Doing this requires
  - Association between program management and supply chain between all the data of the systems
  - Automation of engineering processes to reduce time to solution
  - Begin architecture simulations earlier in lifecycle
  - Concept definition is validated earlier with MDSD
  - Systems development and software development are done hand-in-hand

Model Driven Systems Development (MDSD) is as collaborative & agile as the systems built !

# Frictionless Development Organization Concept



Agile Tooling helps enterprise remove friction from the program



# Use Modern Technology to Achieve a Paradigm Shift

**Past**



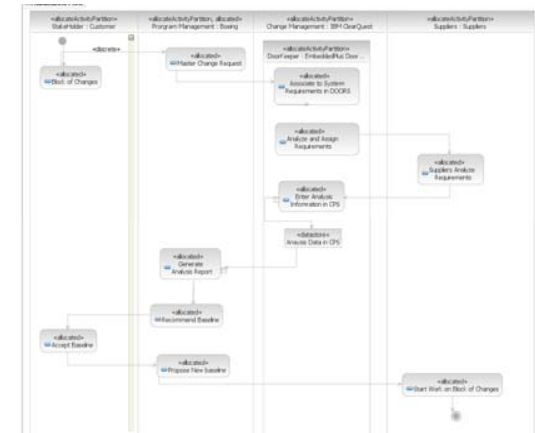
*From*

- Execute
- Break
- Fix

*To*

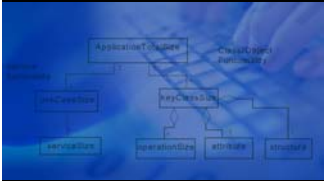
- Manage
- Adapt
- Co-Align

**Future**

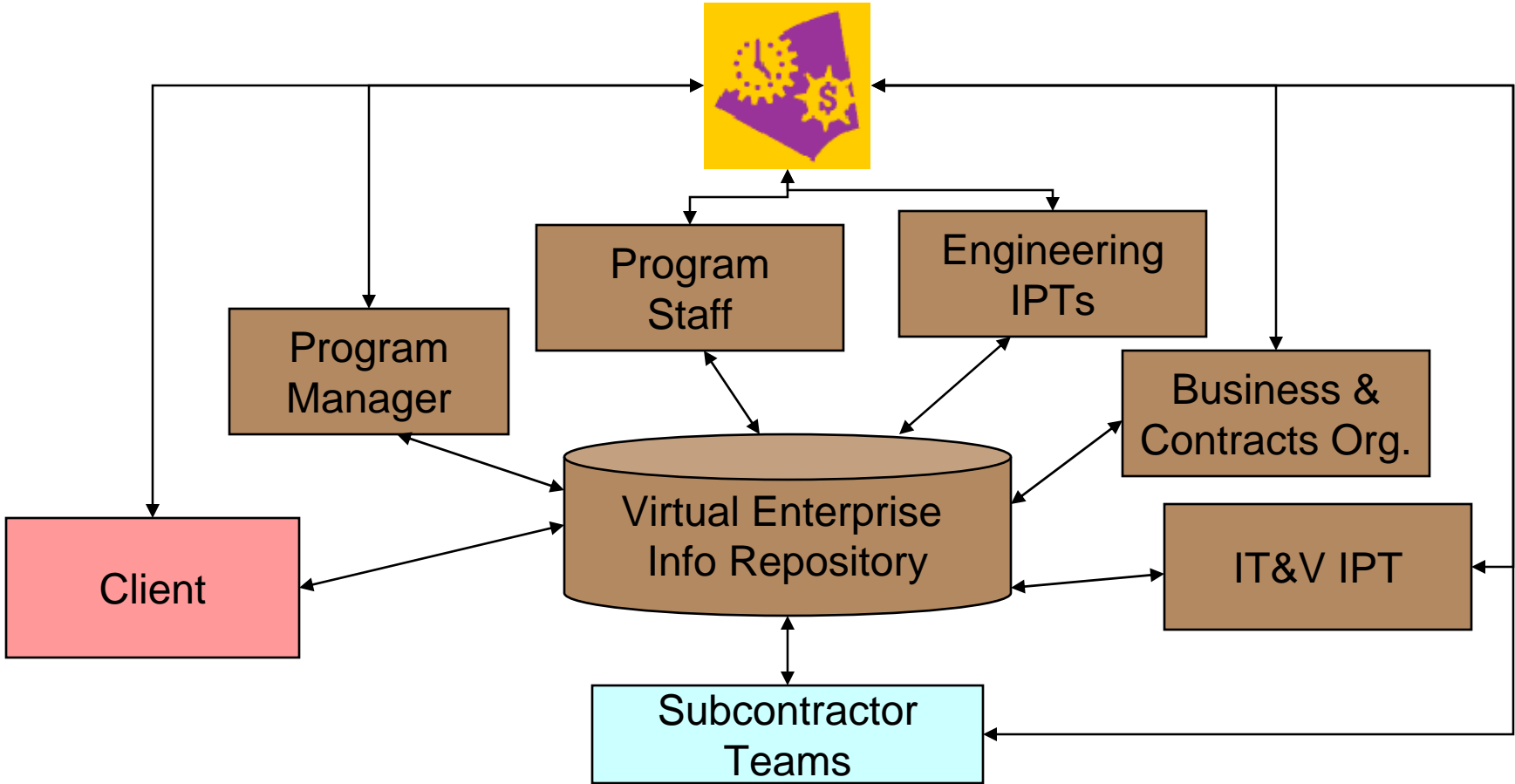


**Tool Innovation - removes latency from program processes by providing real-time information access**



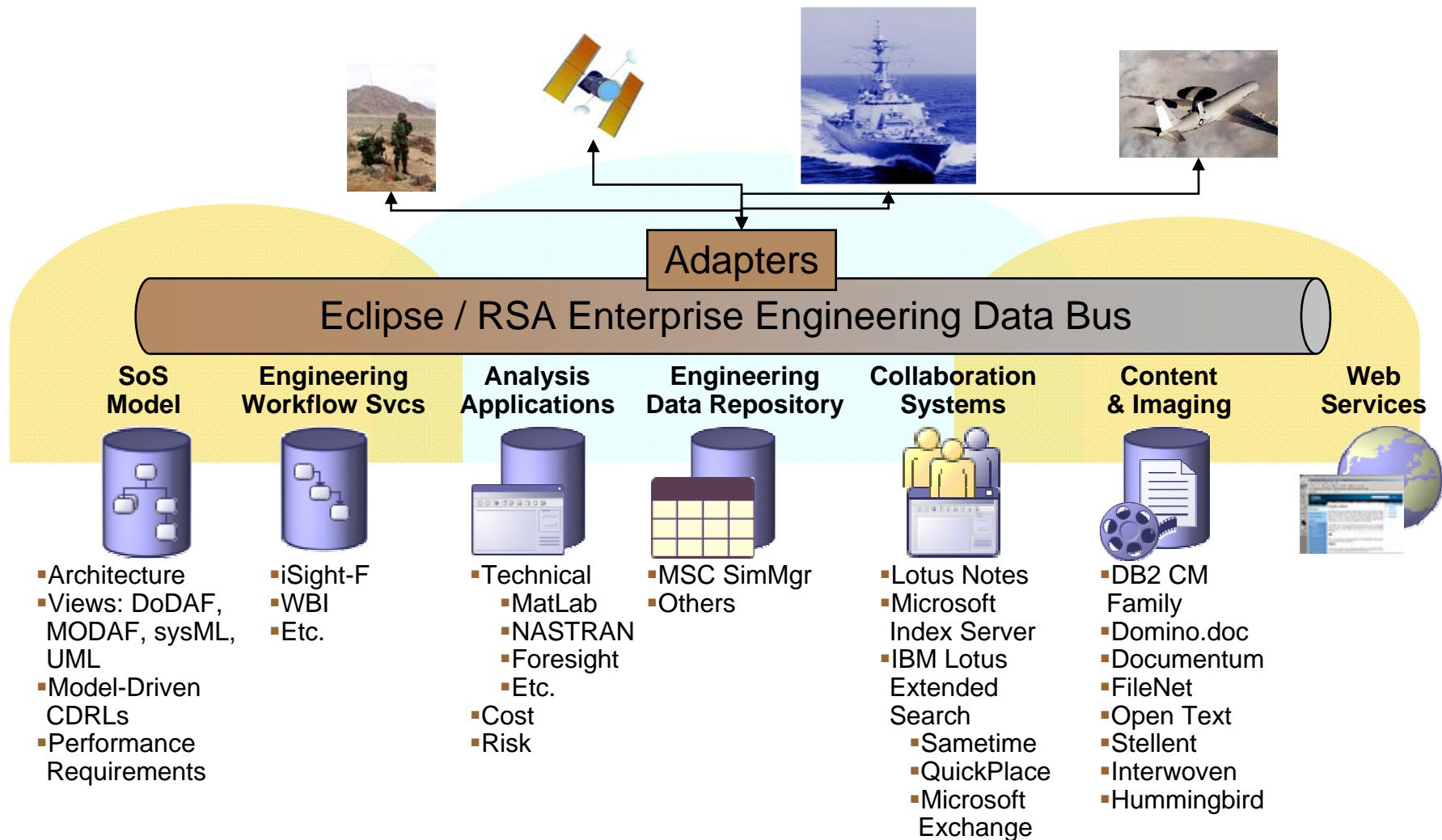


# Frictionless Information Flow: Allows Enterprise to Deliver Faster and Cheaper



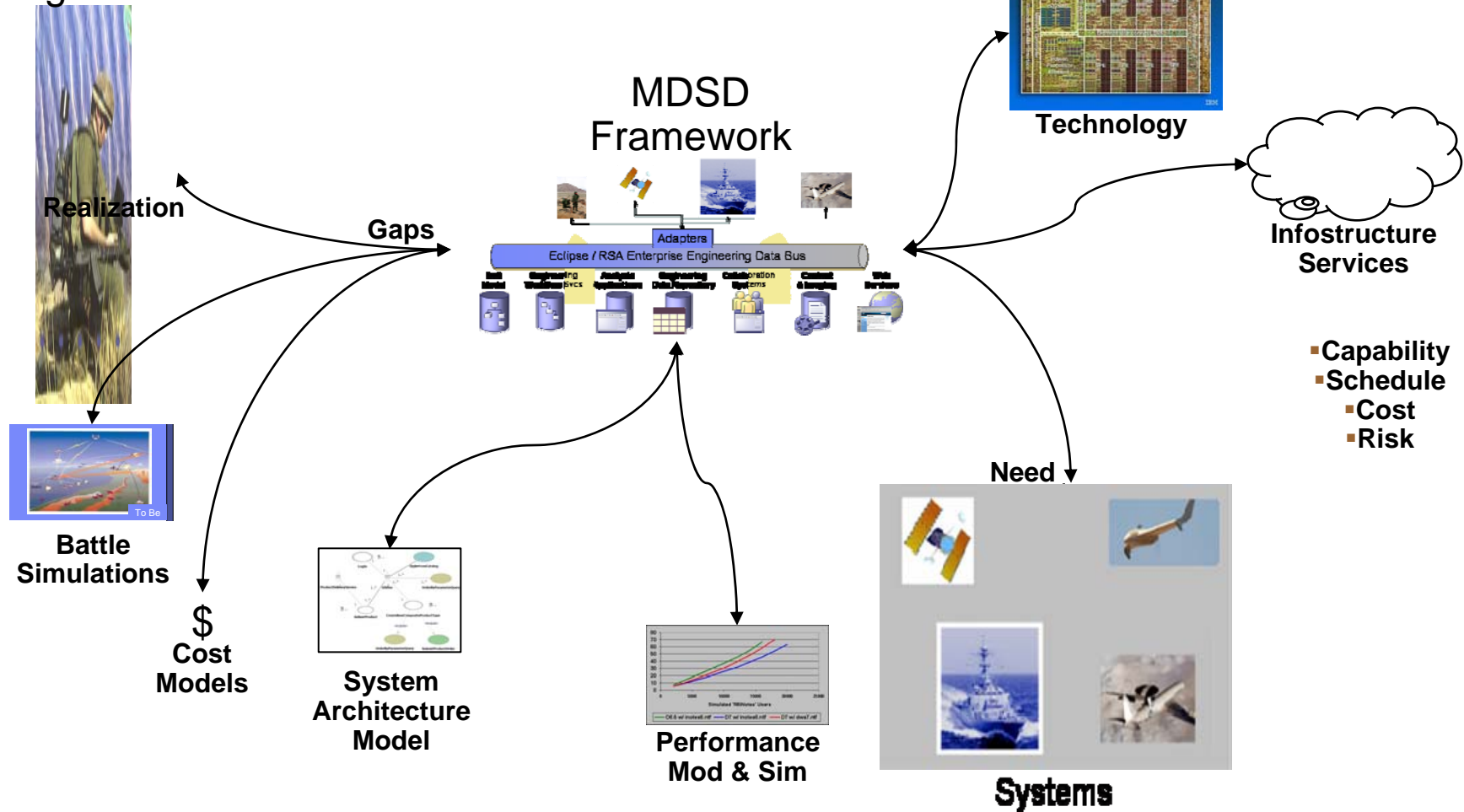
Processes and Tools for **ALL** Disciplines utilize the same Information Repository

# Information Integration and Process Automation across the Enterprise

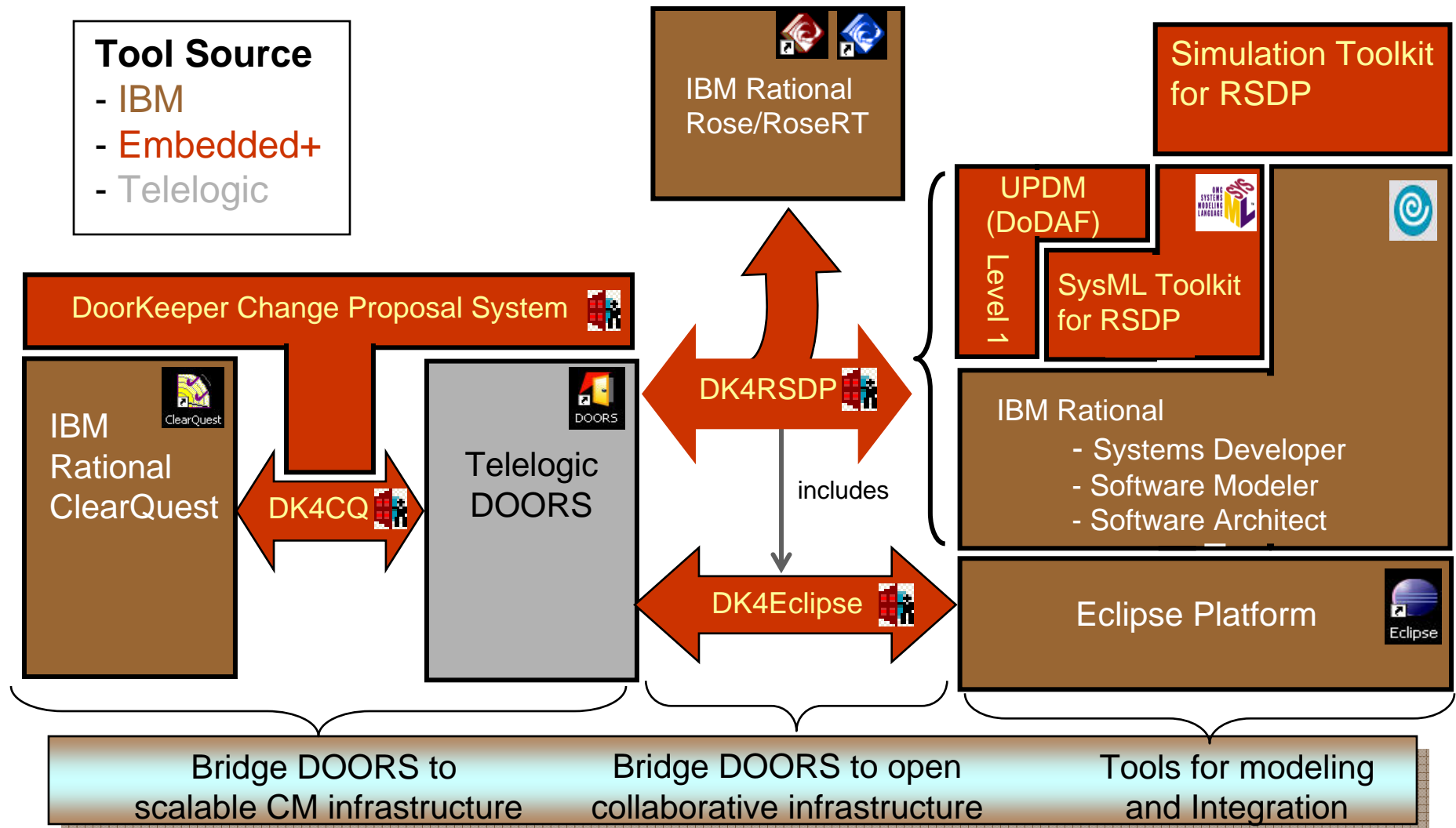


# Using MDSD to Integrate the Enterprise

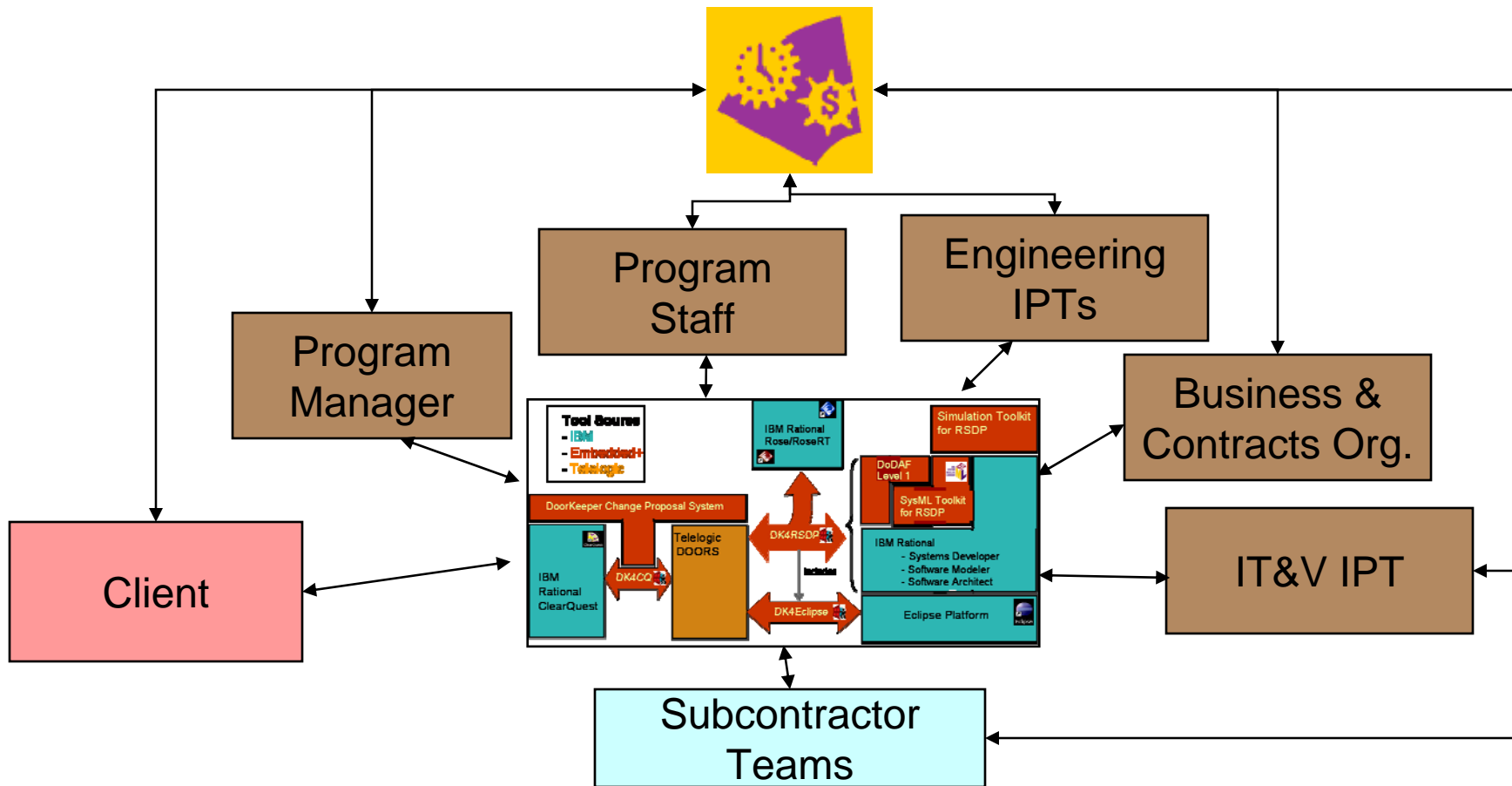
Enterprise Management  
Program Mission



# A Standards Based Solution for Deploying Frictionless Model Driven Systems Development (MDSD)



# Frictionless Information Flow: Allows Enterprise to Deliver Faster and Cheaper



Innovative MDSD reduces complexity and time-to-solution



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