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

Network-Enablement Increases Complexity and Difficulty of Major Systems Development

Challenge Lifecycle:
- Identify Gap
- Develop Concept
- Procure Solution
- Validate Solution
- Deploy Solution
- Extend Solution

Complexity & Time-to-solution Diametrically Opposed

Rapidly changing requirements establish the need for agile development of systems where IT bridges the gap.
**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 ↔ requirements ↔ 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 \(\Rightarrow\) adaptive enterprises gain agility dependent increasingly upon frictionless flow of information
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Integration of this scale requires tooling that is as agile as the systems it seeks to help build.
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

Program Mission Statement

- Linkage between Program Management, Procurement, architecture and systems
- Frictionless flow of information
- Automation of the engineering and analysis processes
- Information collaboration within Program including Supply Chain
- Integrating all disciplines through enterprise artifacts

Global Enterprise

Realization

Removing Friction

- Capability
- Schedule
- Cost
- Risk

Technology

Agile Tooling helps enterprise remove friction from the program

Systems

Need

Gaps

Program Mission Statement

- Simulations
- Cost Models

$ System Architecture Model

Performance Mod & Sim

Agile Tooling helps enterprise remove friction from the program
Use Modern Technology to Achieve a Paradigm Shift

**Past**

Use Modern Technology to Achieve a Paradigm Shift

**Future**

From

- Execute
- Break
- Fix

To

- Manage
- Adapt
- Co-Align

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

Adapters

Eclipse / RSA Enterprise Engineering Data Bus

SoS Model
- Architecture
- Views: DoDAF, MODAF, sysML, UML
- Model-Driven CDRls
- Performance Requirements

Engineering Workflow Svcs
- iSight-F
- WBI
- Etc.

Analysis Applications
- Technical
  - MatLab
  - NASTRAN
  - Foresight
  - Etc.
- Cost
- Risk

Engineering Data Repository
- MSC SimMgr
- Others

Collaboration Systems
- Lotus Notes
- Microsoft Index Server
- IBM Lotus Extended Search
- Sametime
- QuickPlace
- Microsoft Exchange

Content & Imaging
- DB2 CM Family
- Domino.doc
- Documentum
- FileNet
- Open Text
- Stellent
- Interwoven
- Hummingbird

Web Services

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Web Services
Using MDSD to Integrate the Enterprise

Enterprise Management
Program Mission

Realization

Gaps

Battle Simulations

Cost Models

System Architecture Model

Performance Mod & Sim

 MDSD Framework

Technology

Infrastructure Services

- Capability
- Schedule
- Cost
- Risk
A Standards Based Solution for Deploying Frictionless Model Driven Systems Development (MDSD)

**Tool Source**
- IBM
- Embedded+
- Telelogic

**DoorKeeper Change Proposal System**
- IBM Rational ClearQuest

**DK4CQ**
- Telelogic DOORS

**DK4RSDP**
- IBM Rational Rose/RoseRT

**UPDM (DoDAF) Level 1**
- SysML Toolkit for RSDP

**IBM Rational**
- Systems Developer
- Software Modeler
- Software Architect

**Eclipse Platform**

**Simulation Toolkit for RSDP**

**Bridge DOORS to scalable CM infrastructure**

**Bridge DOORS to open collaborative infrastructure**

**Tools for modeling and integration**

**DK4Eclipse**

**Includes**
Frictionless Information Flow: Allows Enterprise to Deliver Faster and Cheaper

Innovative MDSD reduces complexity and time-to-solution
Contact Information

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