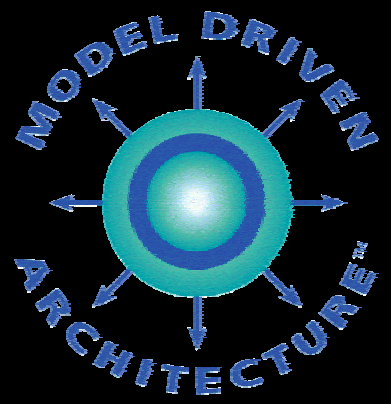
Can MDA help Defense and Government Achieve Interoperable Components?

EDOC

ECA



Introductions

Cory Casanave

cory-c@EnterpriseComponent.com

Primary author of “CCA” in OMG-EDOC

What we must achieve

- Network Centric Warfare
- The Objective Force
- Battlefield Awareness
- Adaptive Responsiveness
- Economy
- Unified Enterprise Architecture
- Agility & Adaptability
  - Design for change
  - Build for adaptability
- Collaboration
  - Horizontal
  - Vertical
  - Coalitions
- Joint Interoperability
- System of Systems

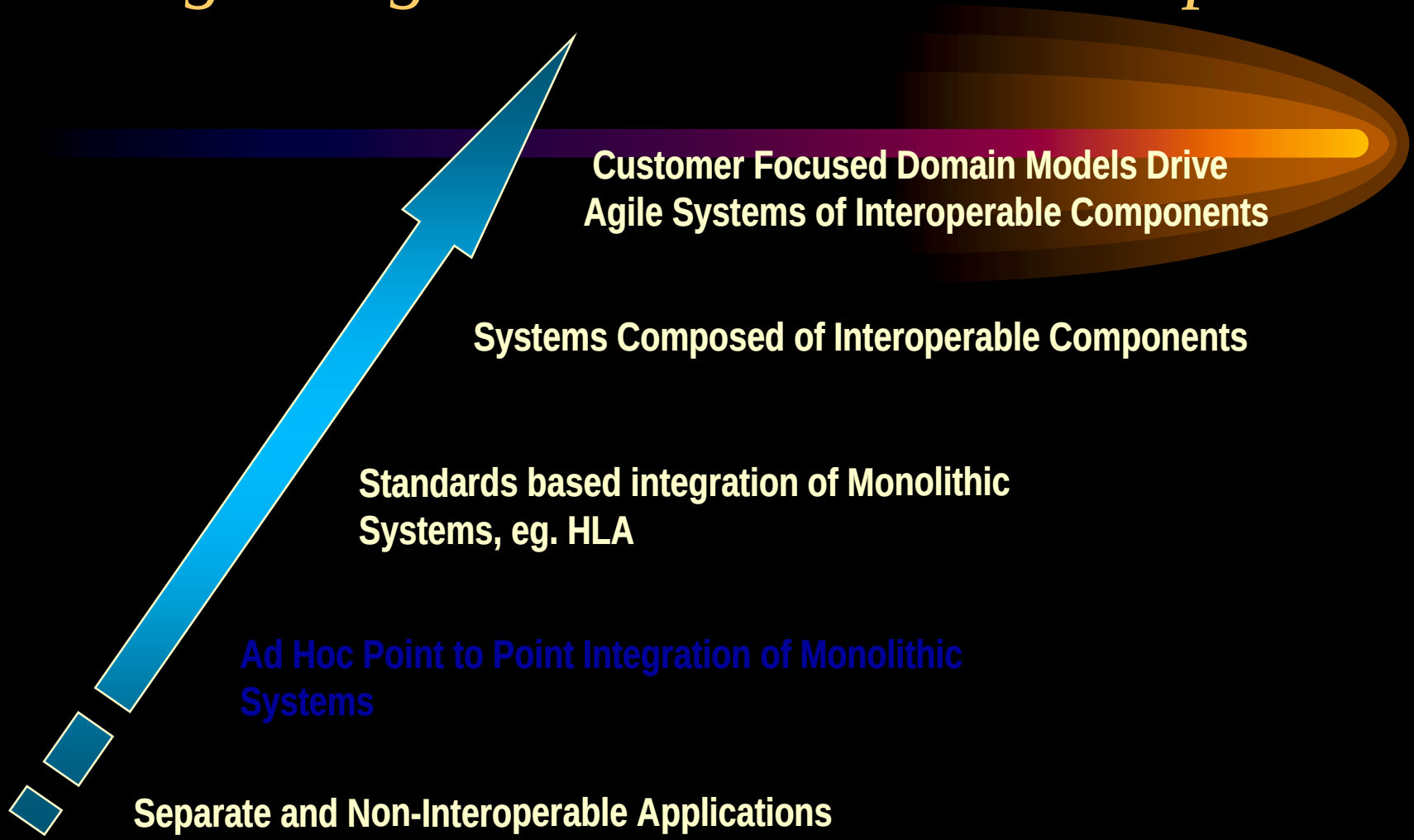
The Sad Reality

- Most Information Systems
  - Do not adapt quickly
  - Do not intemperate
  - Take years to produce
  - Fail or fail to meet needs
  - Are difficult to evolve
  - Lock the user into specific technologies
  - Are not economical
- These are monolithic dinosaurs

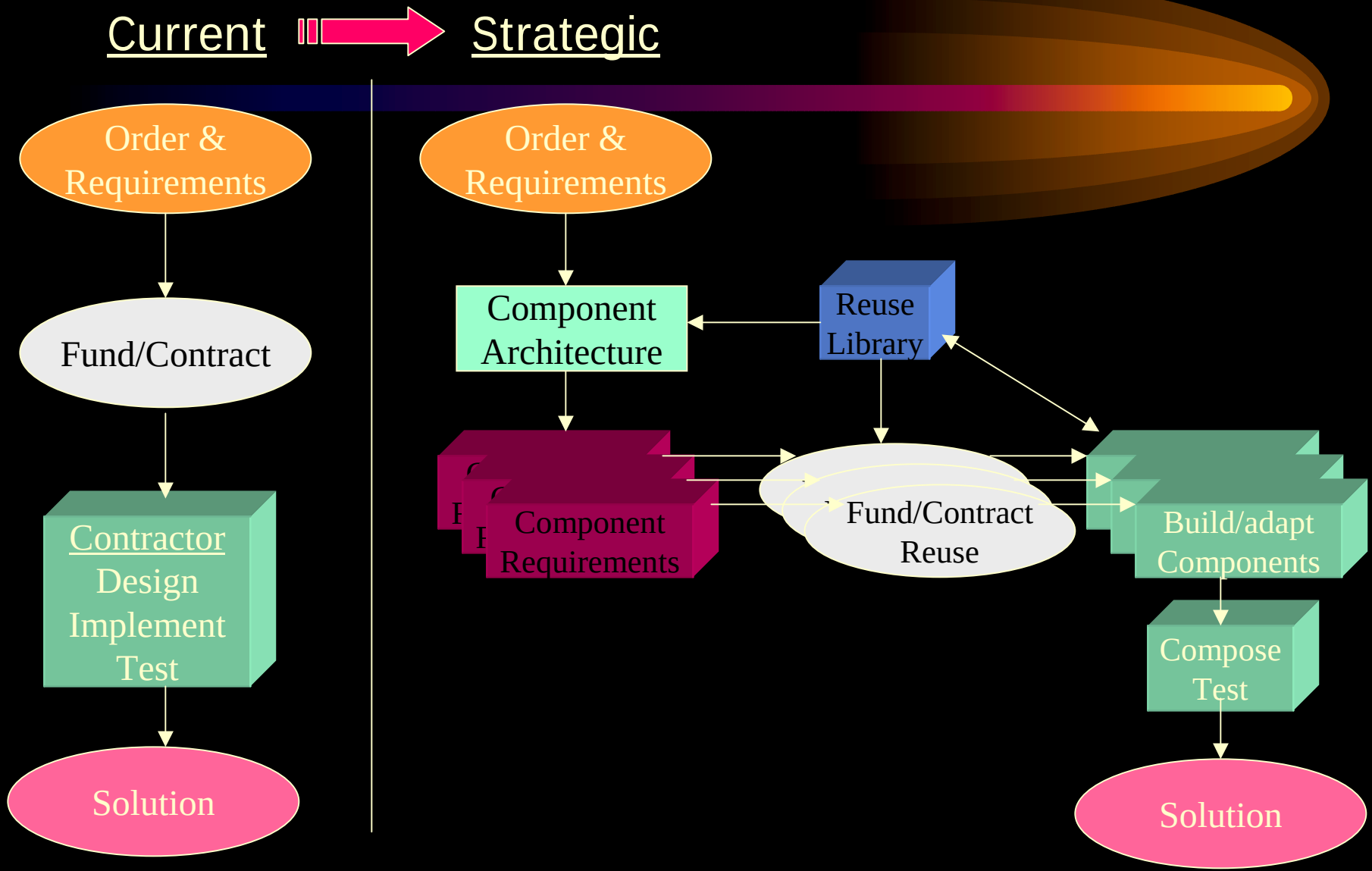
The Problem Space

- Systems of Systems – Wide scale interoperability, reuse and integration
- Massively redundant legacy
- Acquisition methods encourage closed systems
- Solutions are bound to the problem and technology of the day
- Massive information loss – trapped in paper documents and proprietary technologies

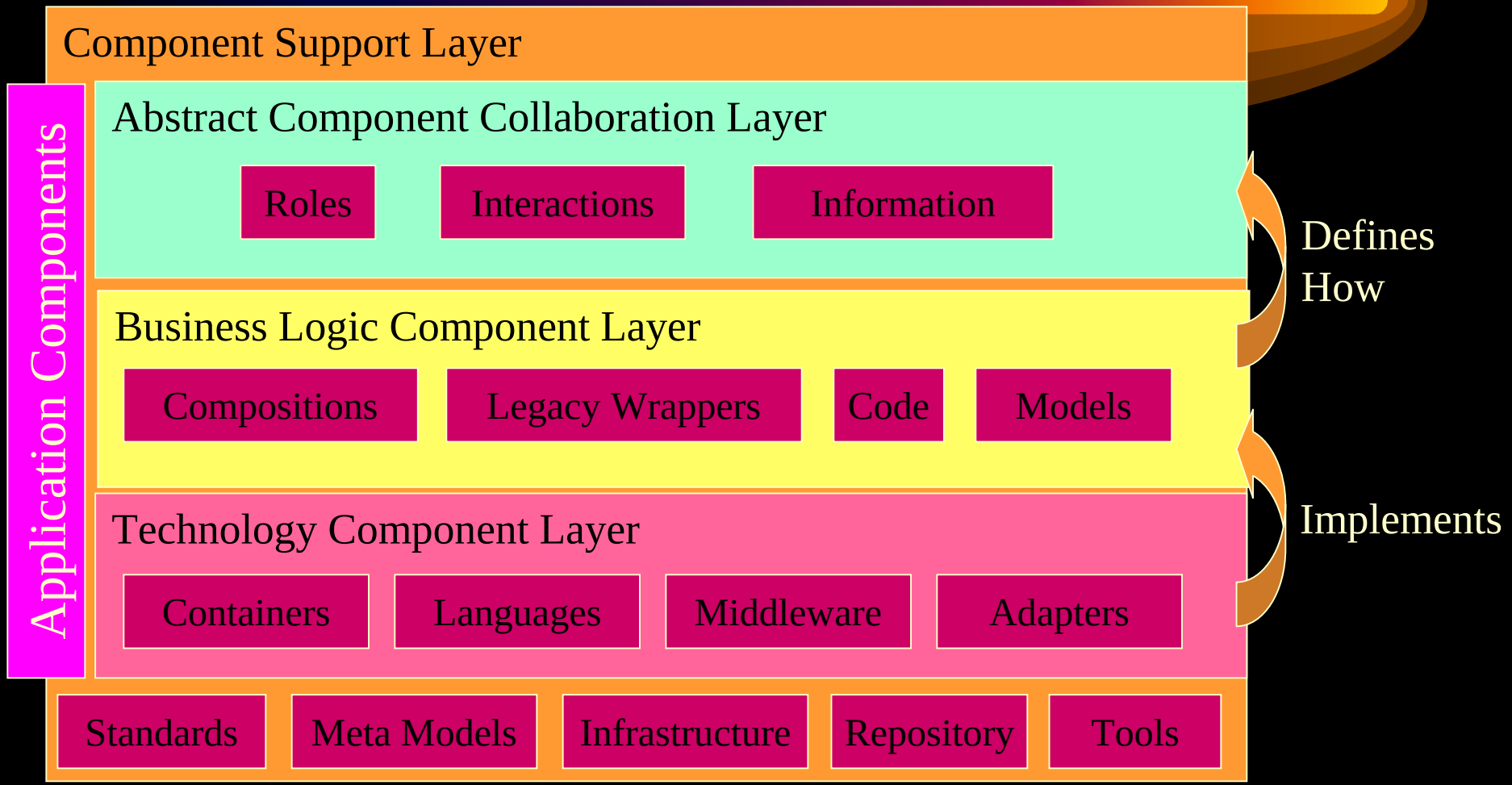
Strategic Migration to Reusable Components



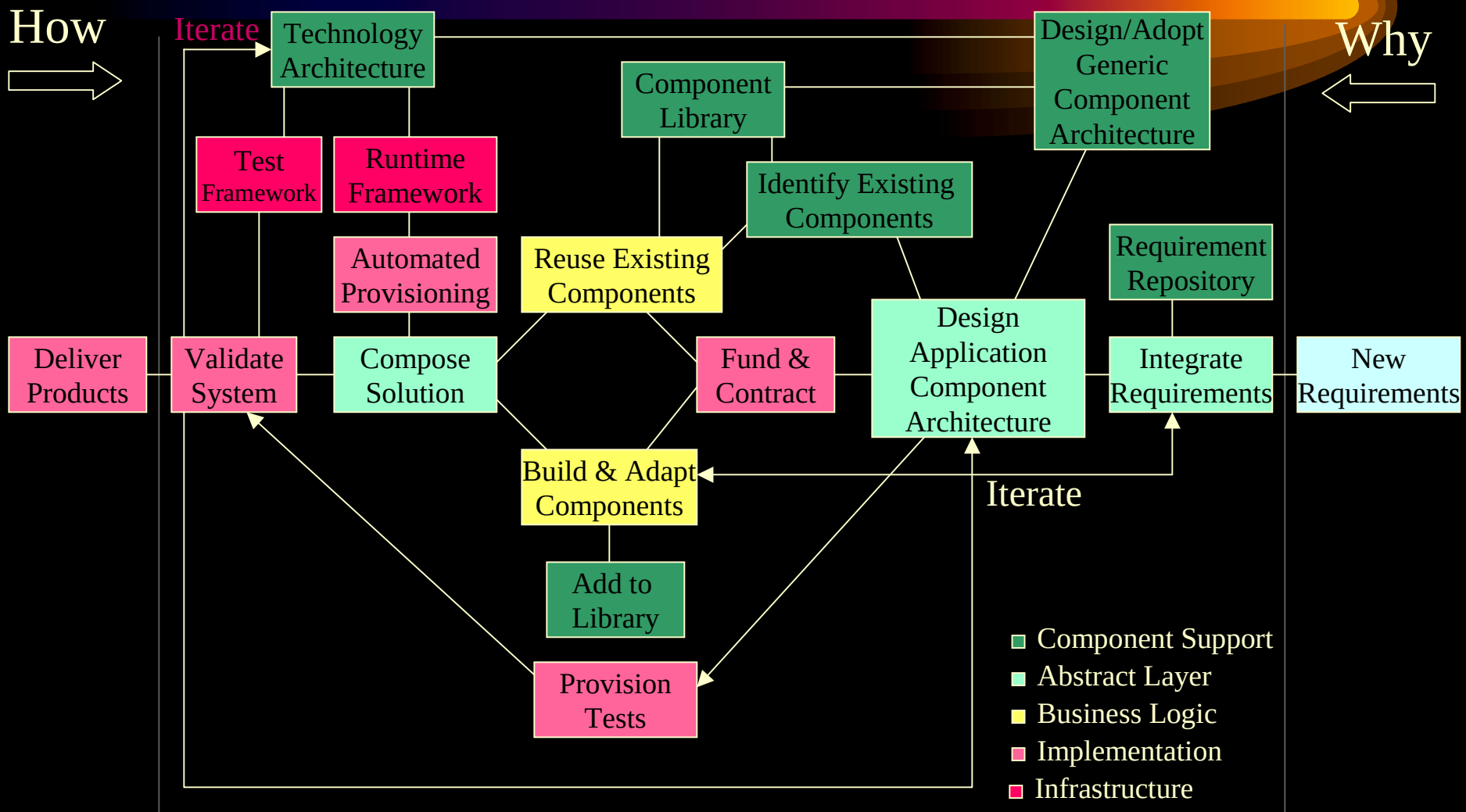
Essential Change



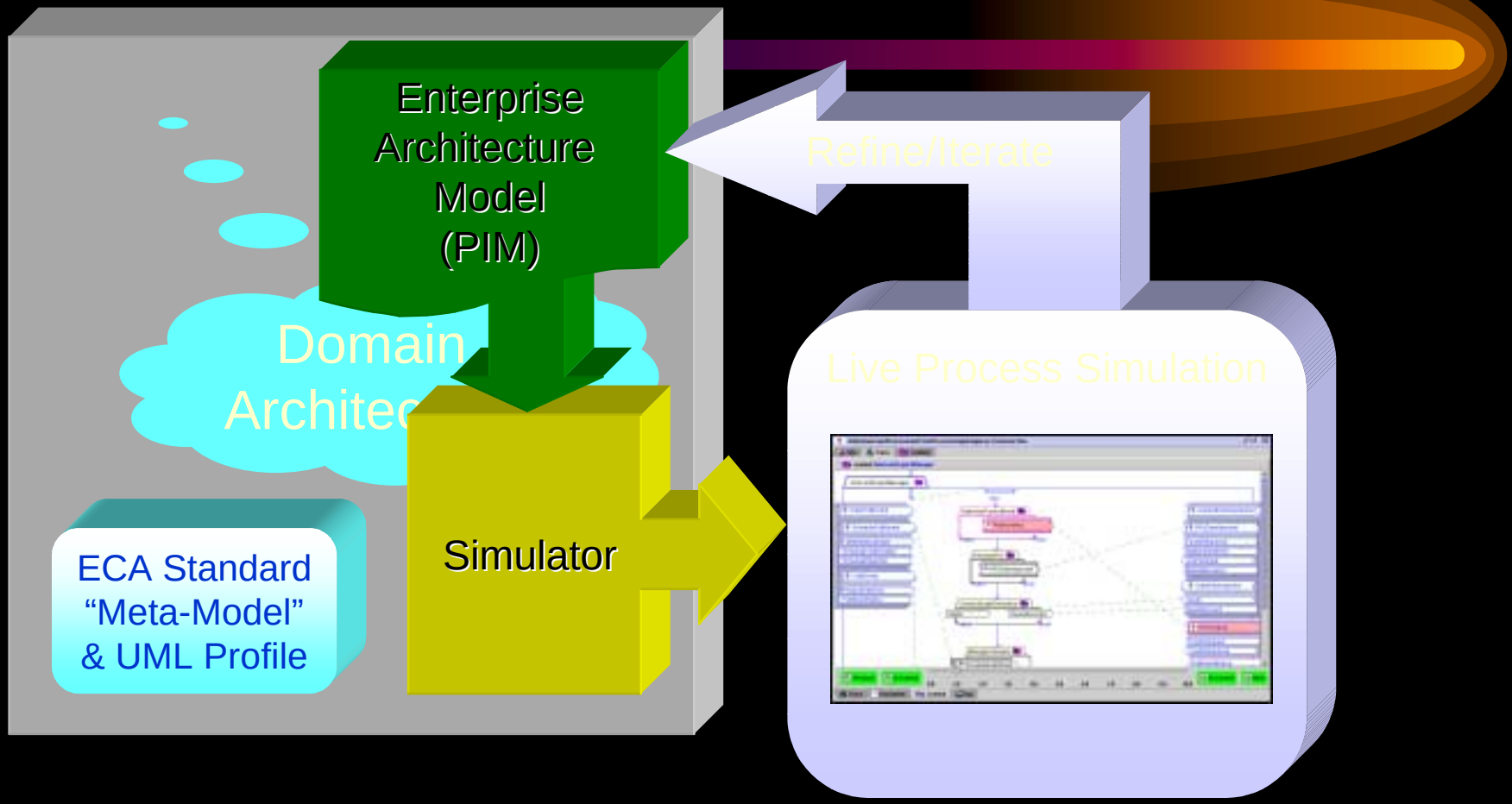
Component Layers



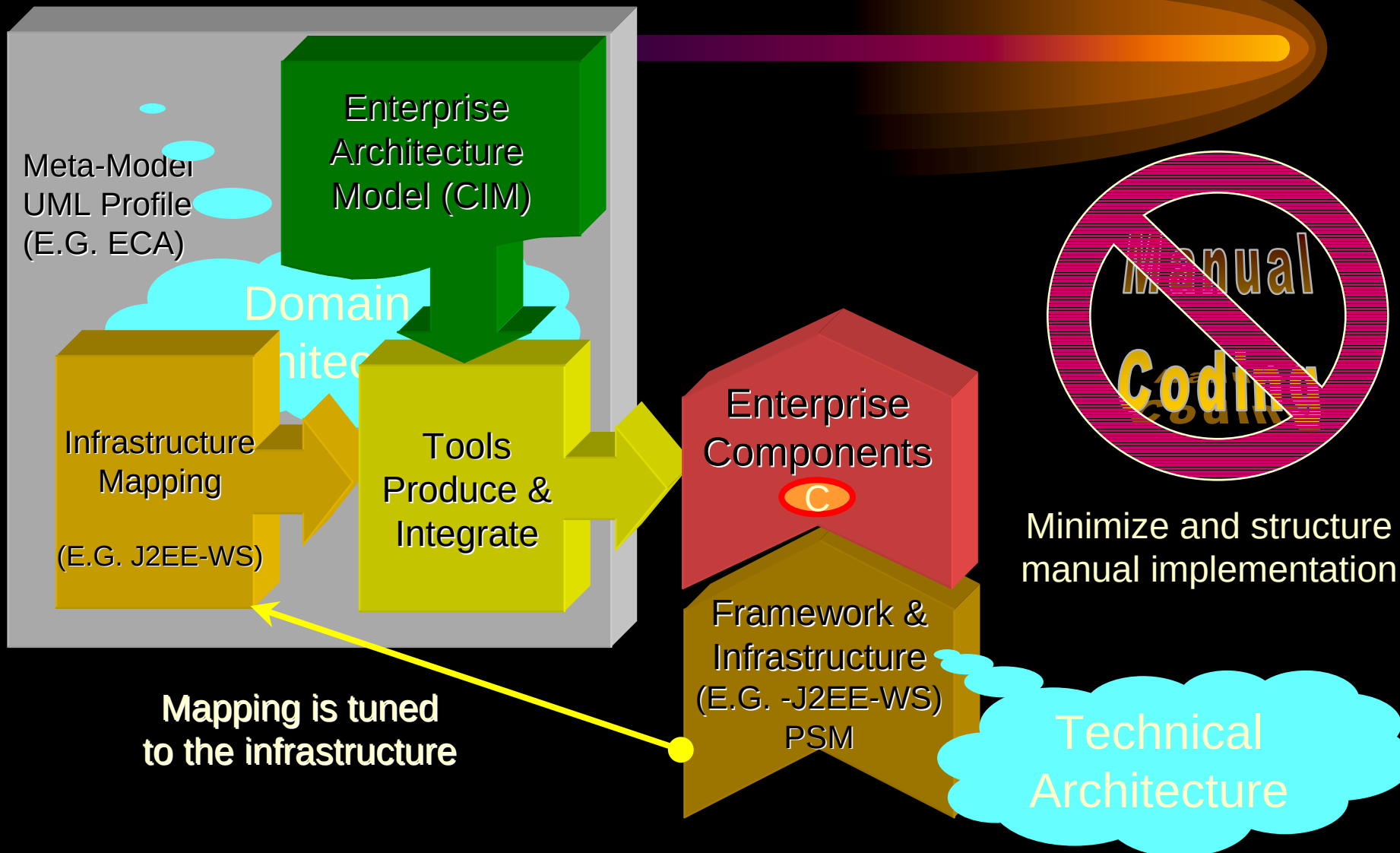
Component Based Solutions Fast Diagram



Simulated Model Driven Architecture



Automated Model Driven Architecture



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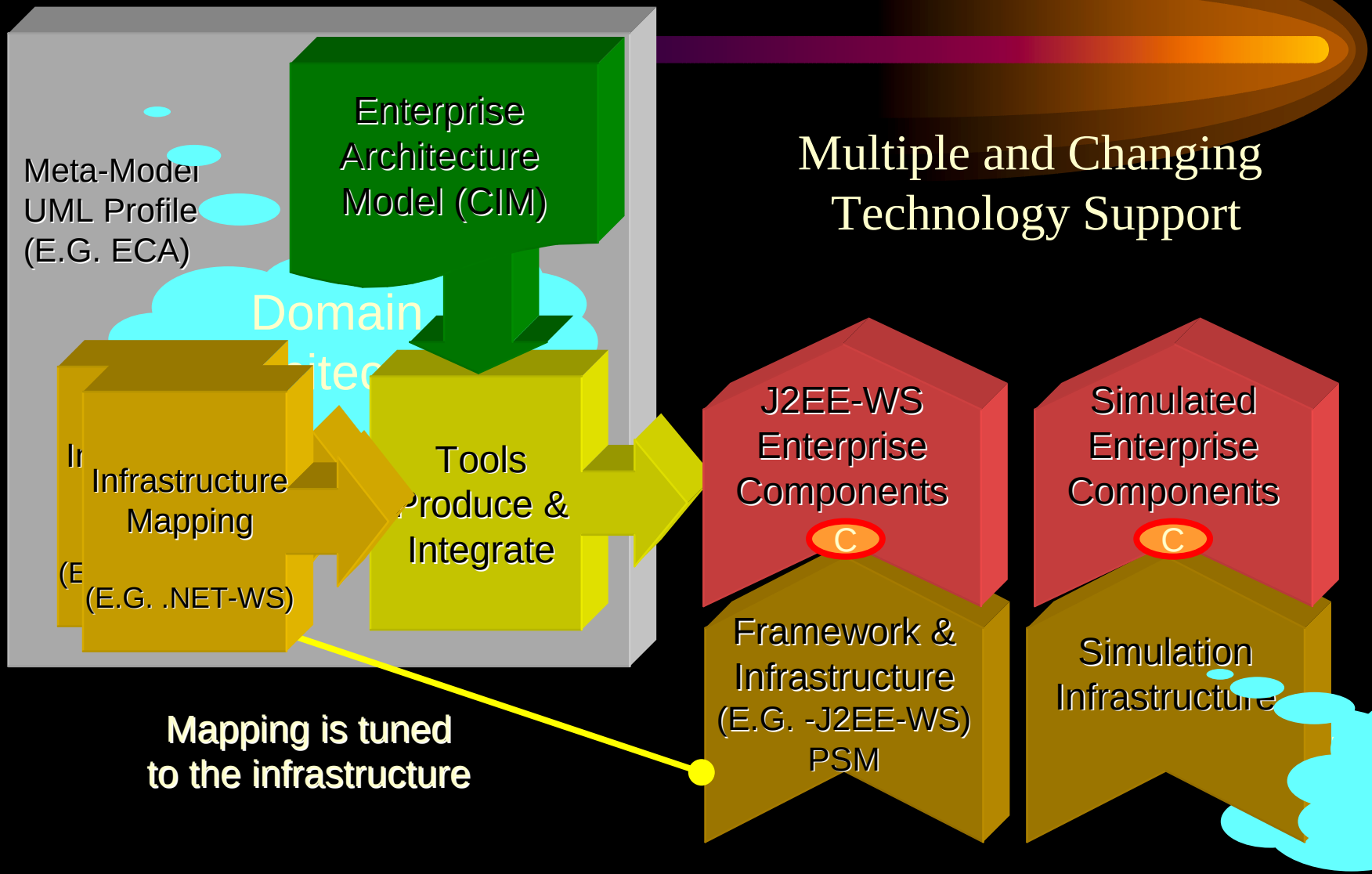


The new center

- The strategic core of you systems must be the enterprise its self
- Only technology independent enterprise focused models will survive the transience of technology and lock-in
- These models can become *part of your solution*, driving enterprise applications and simulations
- Enabler: Model Driven Architecture (MDA) with EDOC-Enterprise Collaboration Architecture

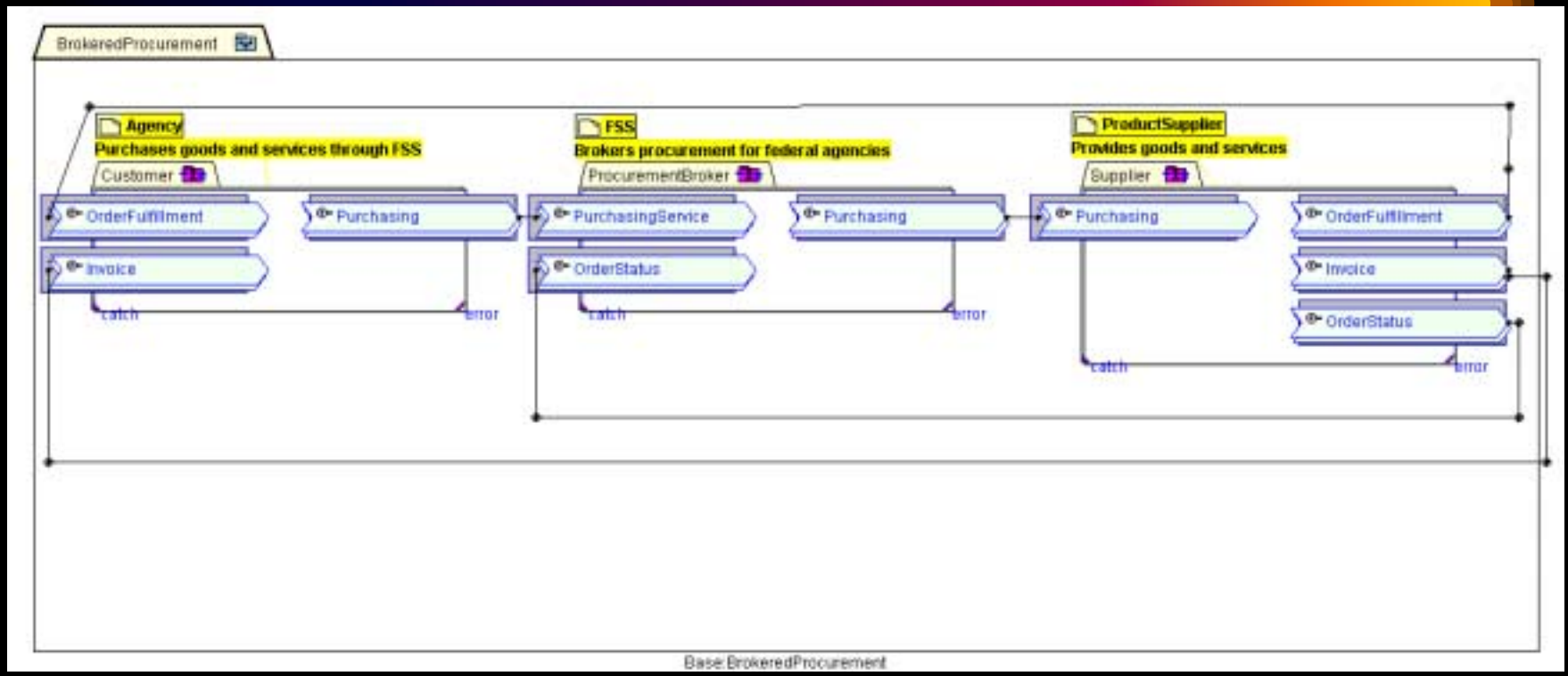
Executable Enterprise Architecture

- MDA at the enterprise level – how systems of systems work together
- Focus on components and processes – components work together for goals
- MDA models work at the system composition level – “code” is useless at this level
- Executable architecture can be simulated and then be refined with “real” components to evolve to the real solution

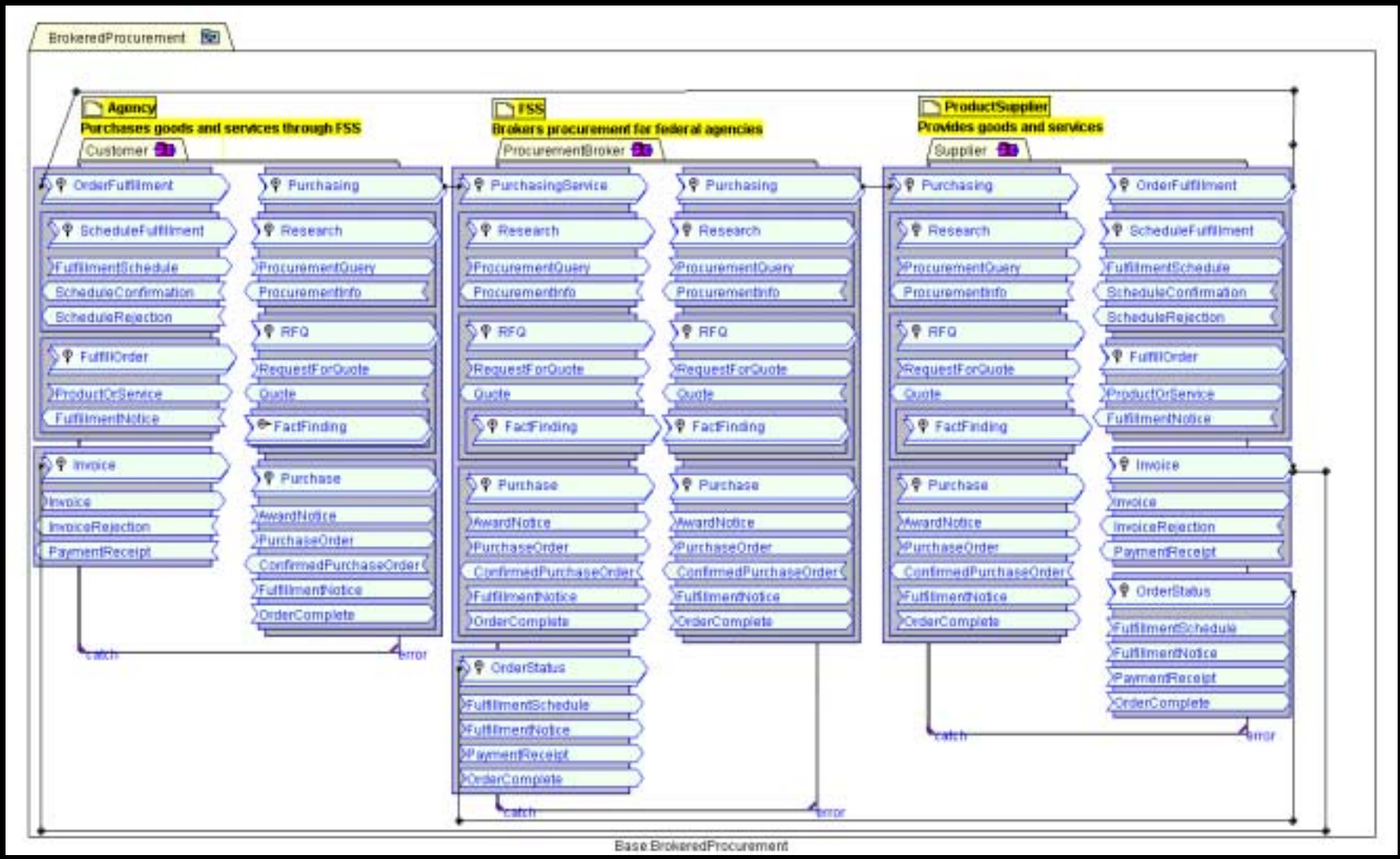
Example - GSA

- General Services Administration
  - Achieve a “one GSA” enterprise architecture
  - Understand how processes can be facilitated with solutions
  - Uncover redundancy
  - Integrate to-be process with legacy systems

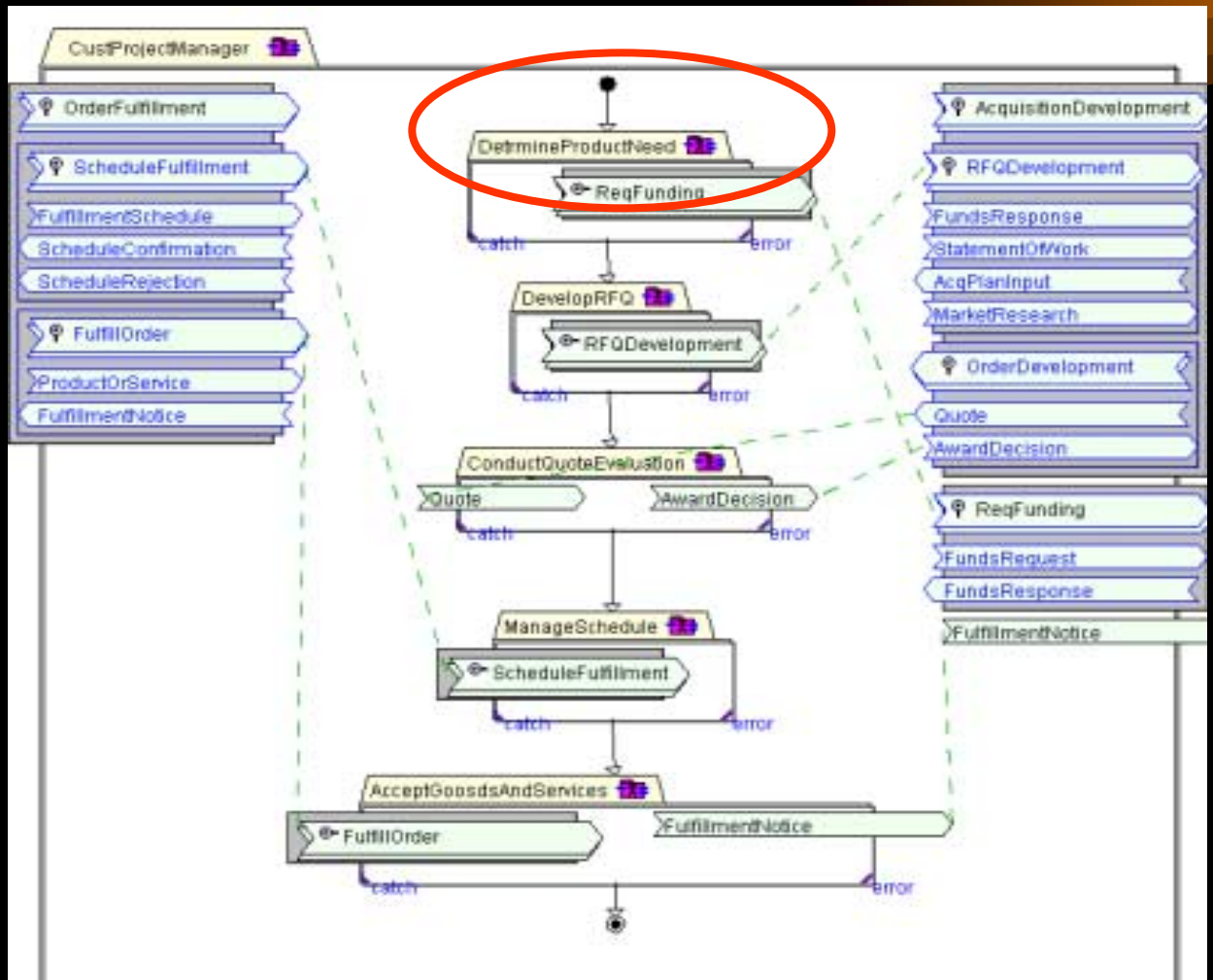
Specifying Interactions



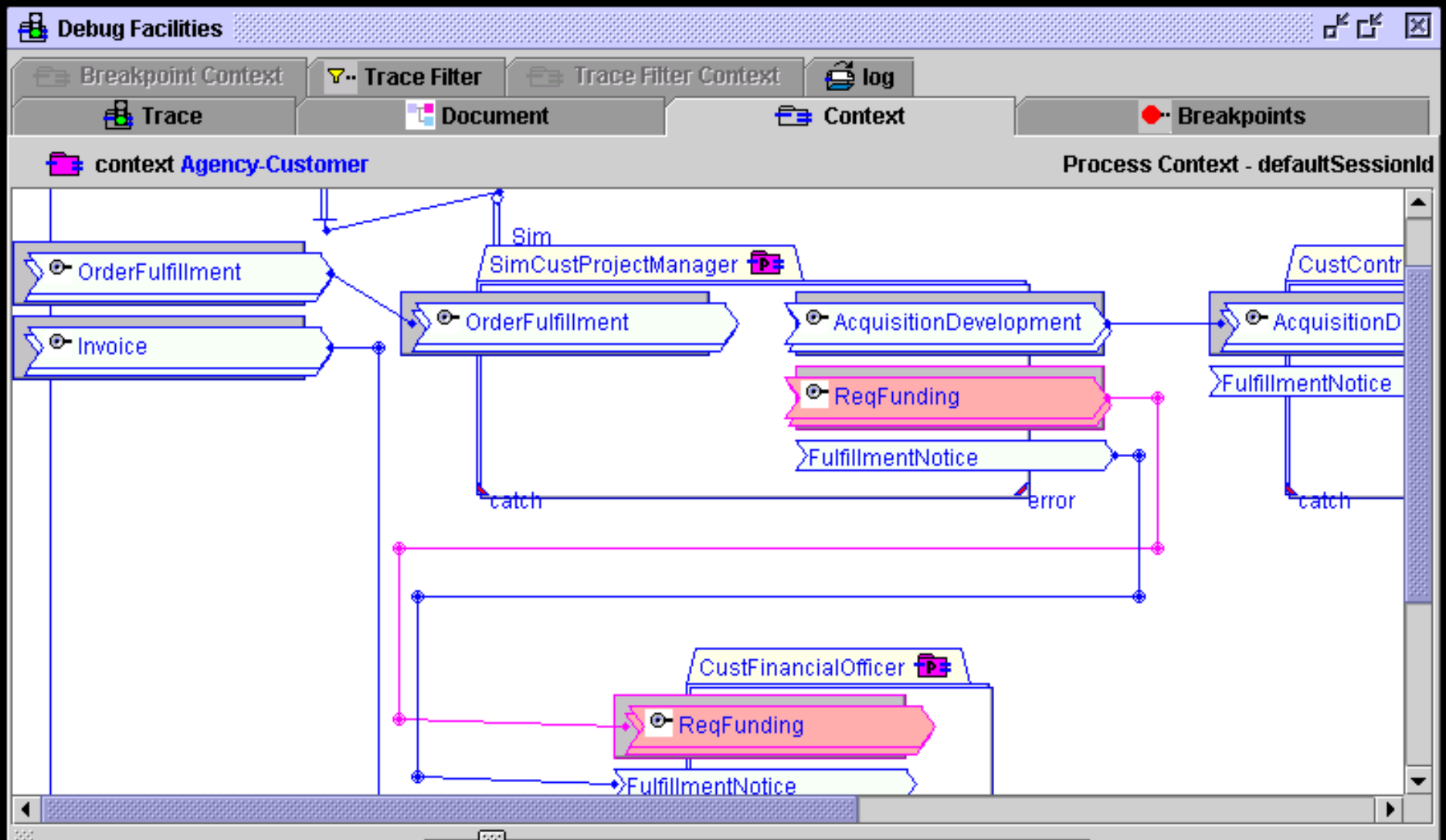
Expanded Protocol Detail



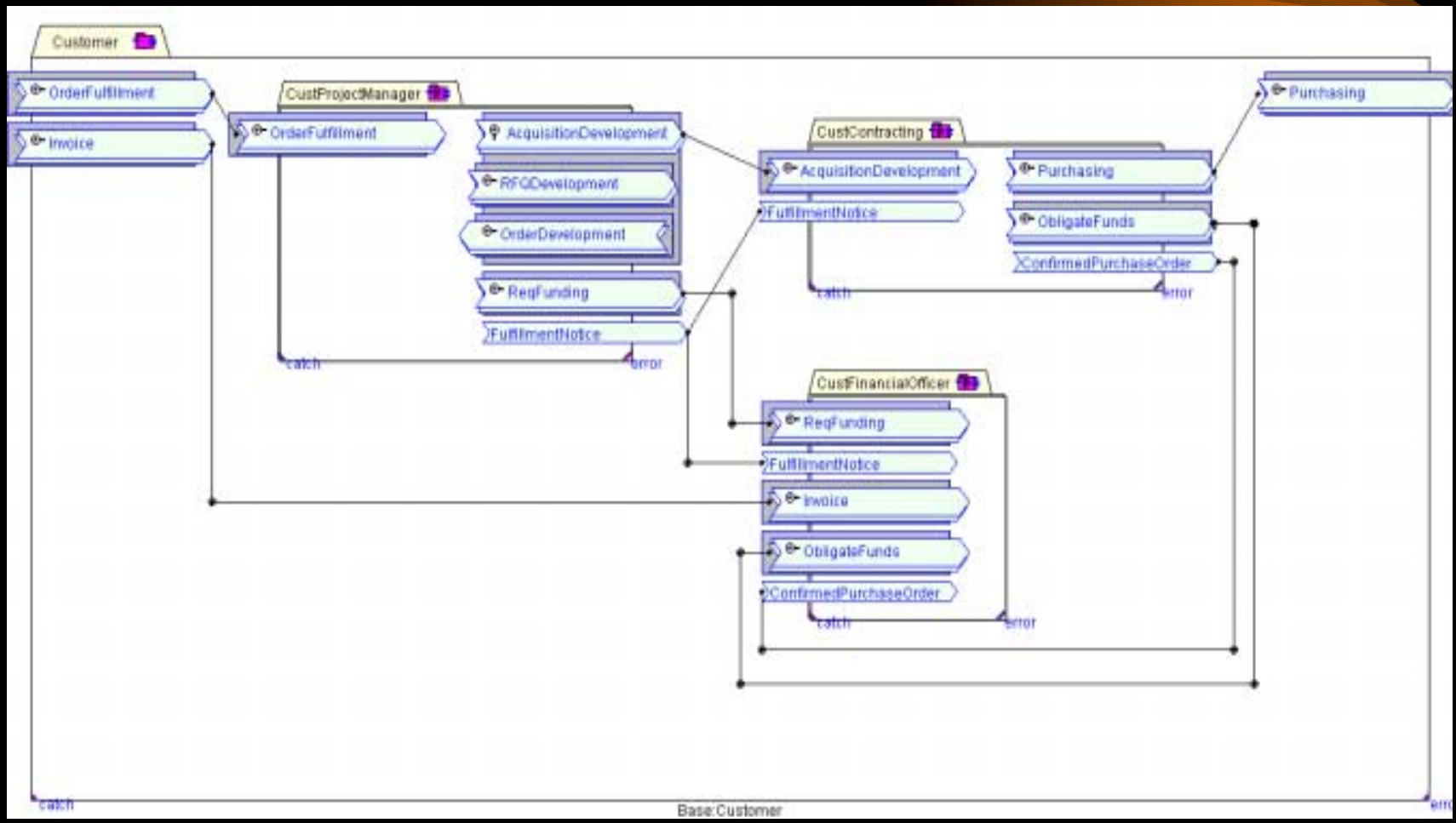
Choreography of Process



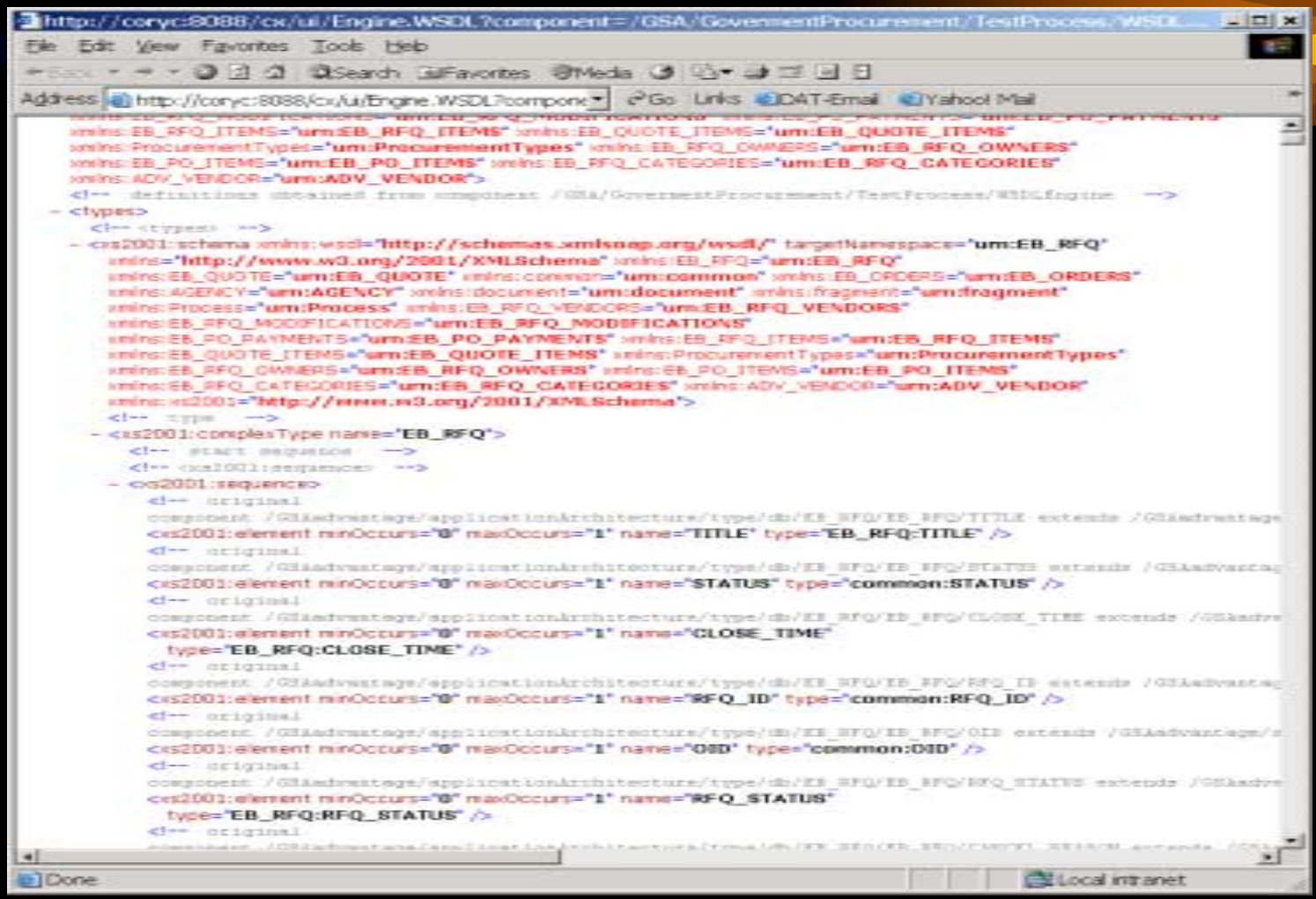
Simulation


Debug Facilities
Breakpoint Context
Trace Filter
Trace Filter Context
log
Trace
Document
Context
Breakpoints
context Agency-Customer
Process Context - defaultSessionId
Sim
SimCustProjectManager
CustContr
OrderFulfillment
Invoice
OrderFulfillment
AcquisitionDevelopment
AcquisitionD
ReqFunding
FulfillmentNotice
FulfillmentNotice
catch
error
catch
CustFinancialOfficer
ReqFunding
FulfillmentNotice

Drilling Down



Generated Web Service



Example – PEO-STRI

- Achieve common components across product lines
- Eliminate artificial boundaries between simulation domains
- Support joint interoperability
- Model how simulations and C2 systems work together
- Create common adapters between simulations and operational systems

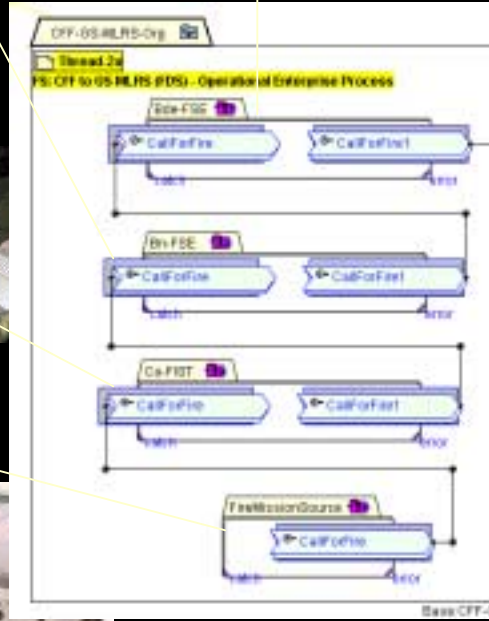
Call for Fire - MLRS

Bde - FSE

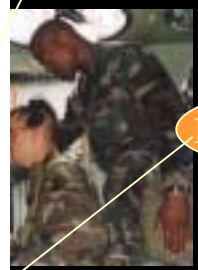
Bde- Artillery

Bn-FSE

FA Bn - FSE



Co-FIST

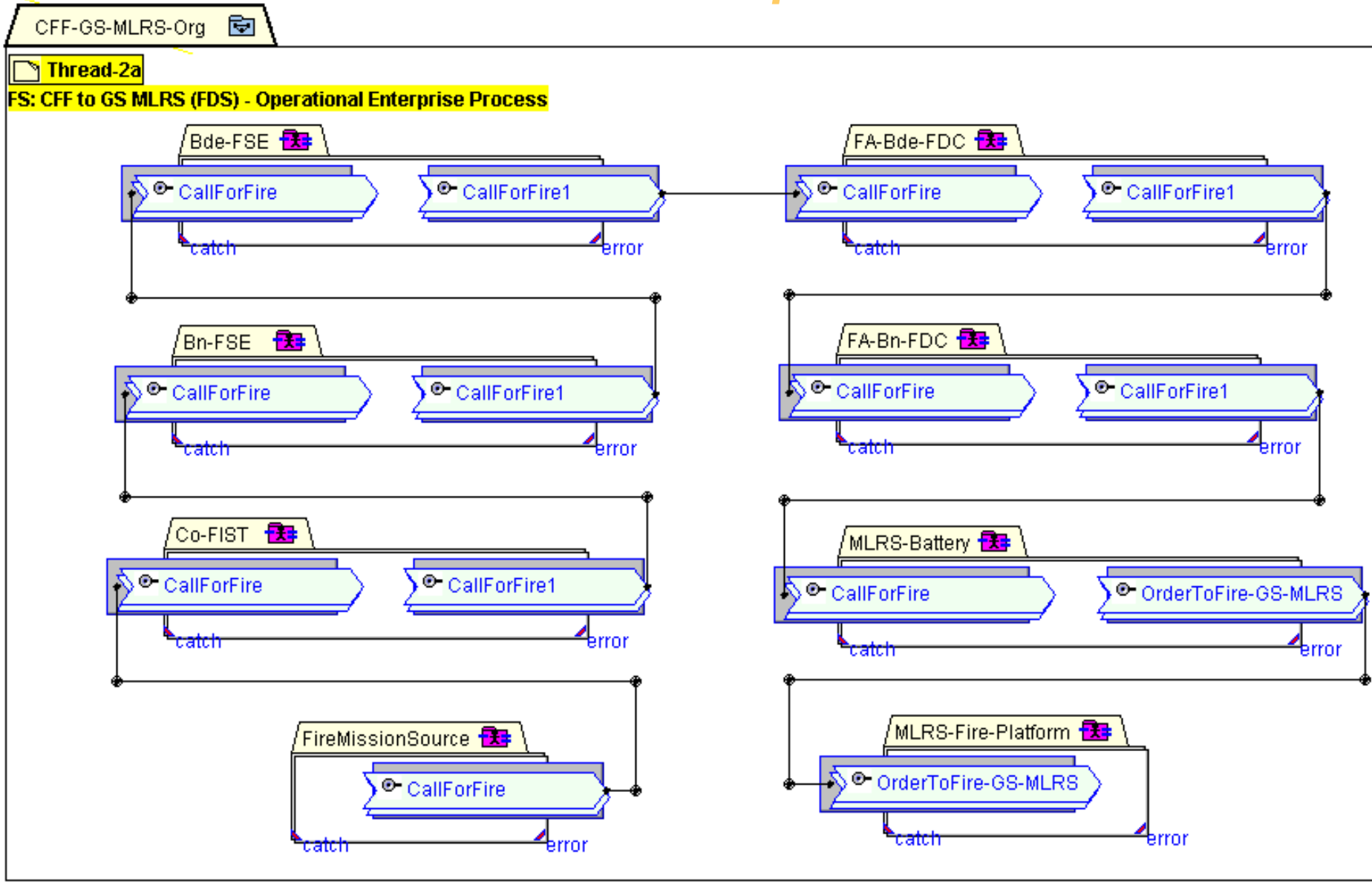


MLRS Battery

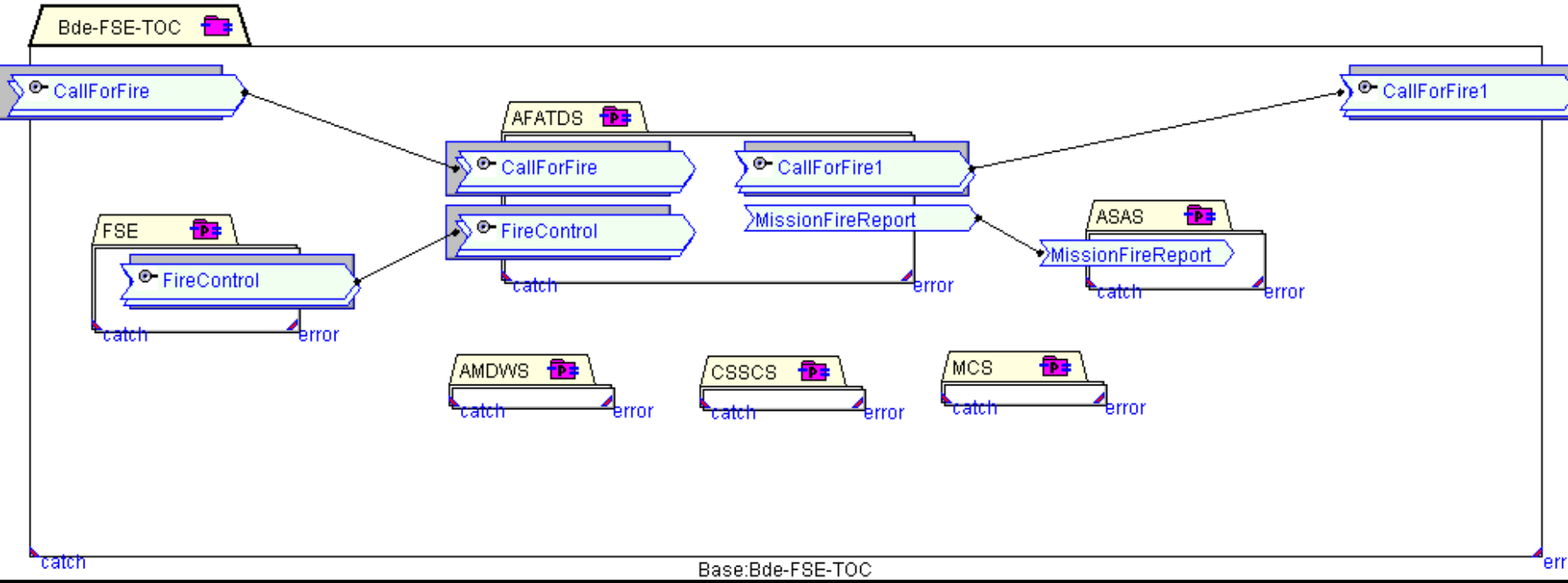
Forward Observer

MLRS

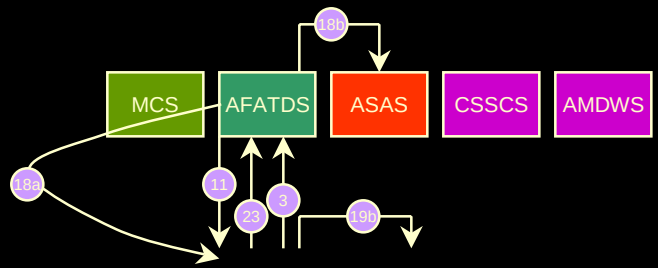
Model Of CFF Thread



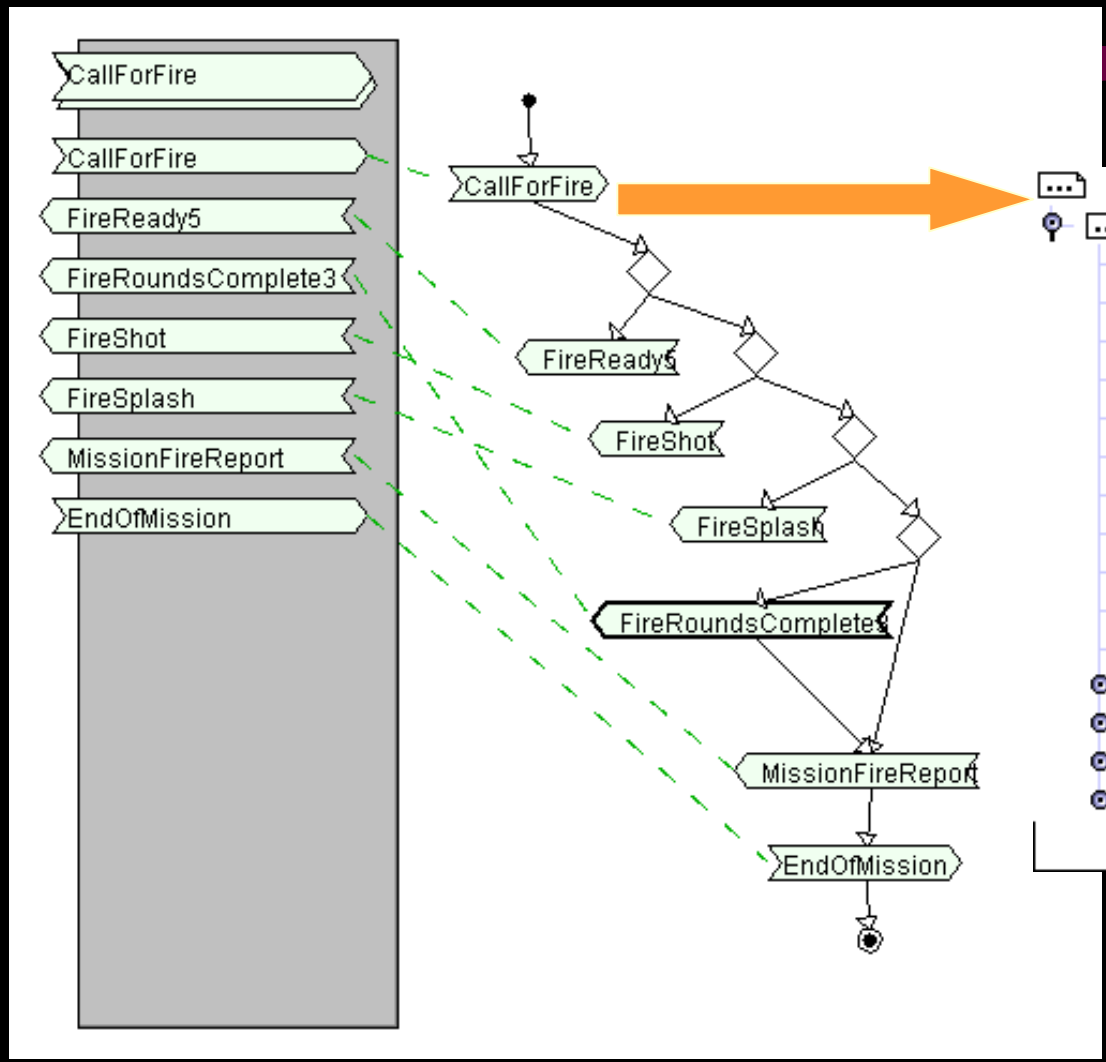
Drill Down - Inside of a TOC

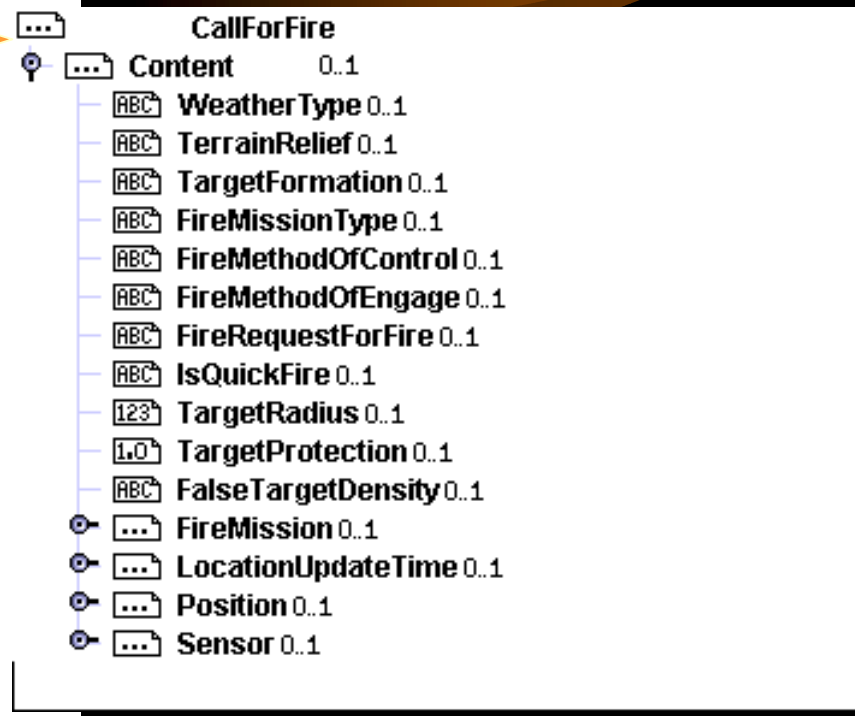


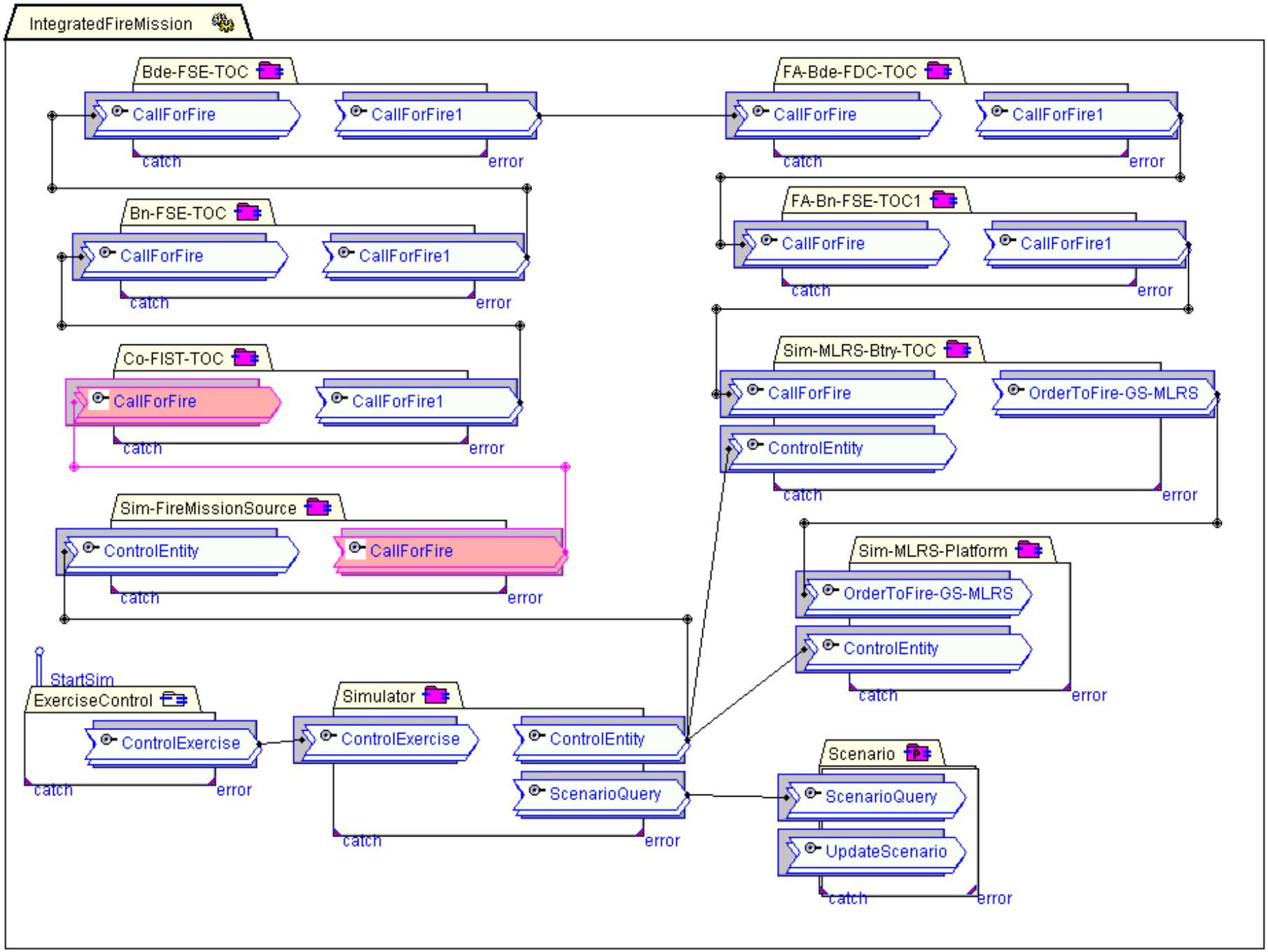
From “threads”



Choreography – Understanding When



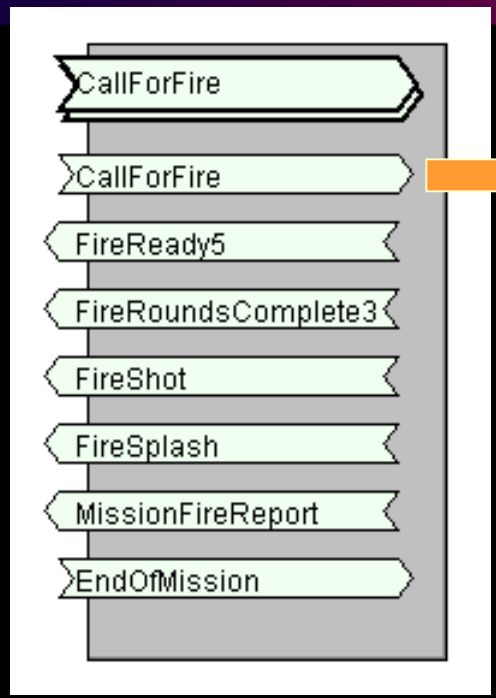


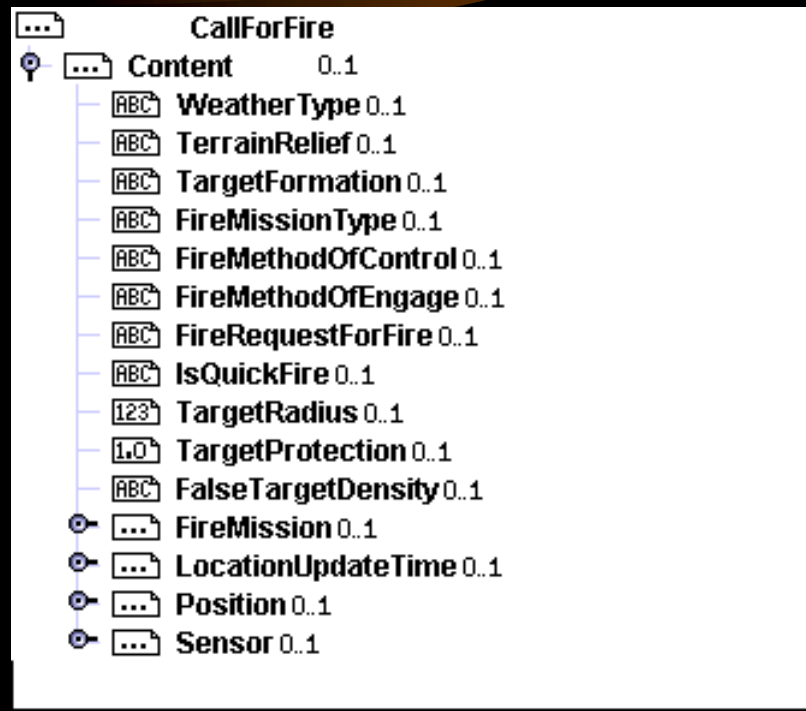


Base:IntegratedFireMission

Model Information Flows

- Call For Fire
- Fire Ready
- Rounds Complete
- Fire Shot
- Fire Splash
- Mission Fire Rpt
- End Of Mission





* Not technology details!

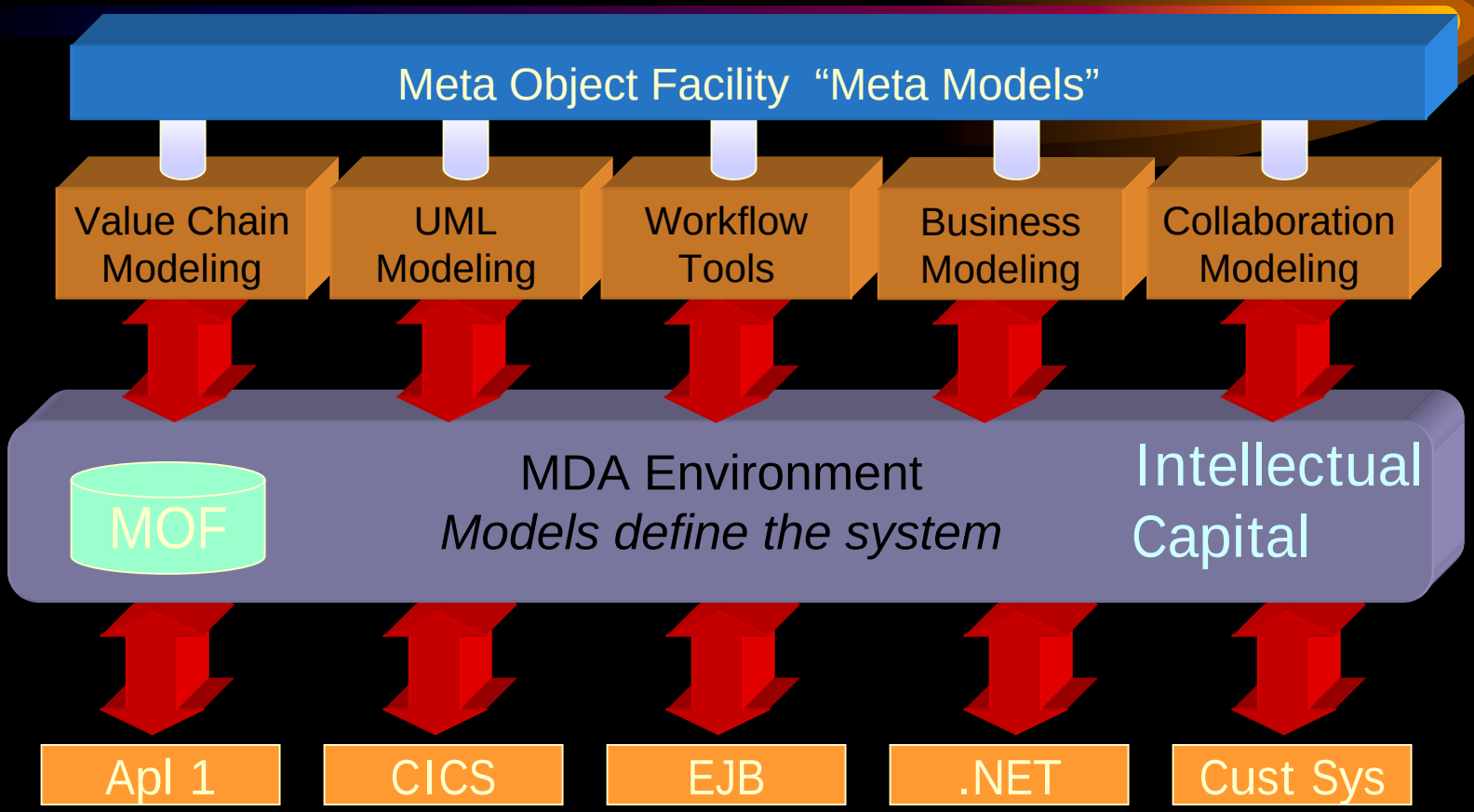
Example - Intelligence

- Integrate diverse information from multiple sources
- Allow any “processor” to utilize any source
- Automate logical and technical transformations
- Highly distributed
- Create common component architecture

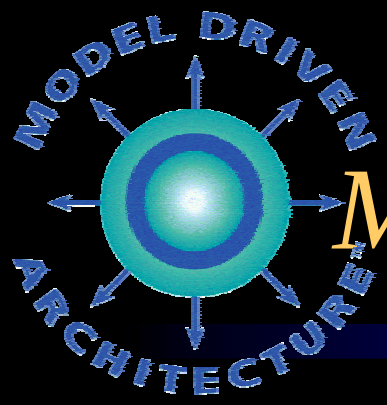
Common Themes

- Component Reuse
- Wide-scale interoperability
- Systems of systems
- Elimination of redundancy
- Technology Independence
- All fit well into the Enterprise Collaboration Architecture Approach
- Political and Acquisition Problems

Common Environment for Intellectual Capital

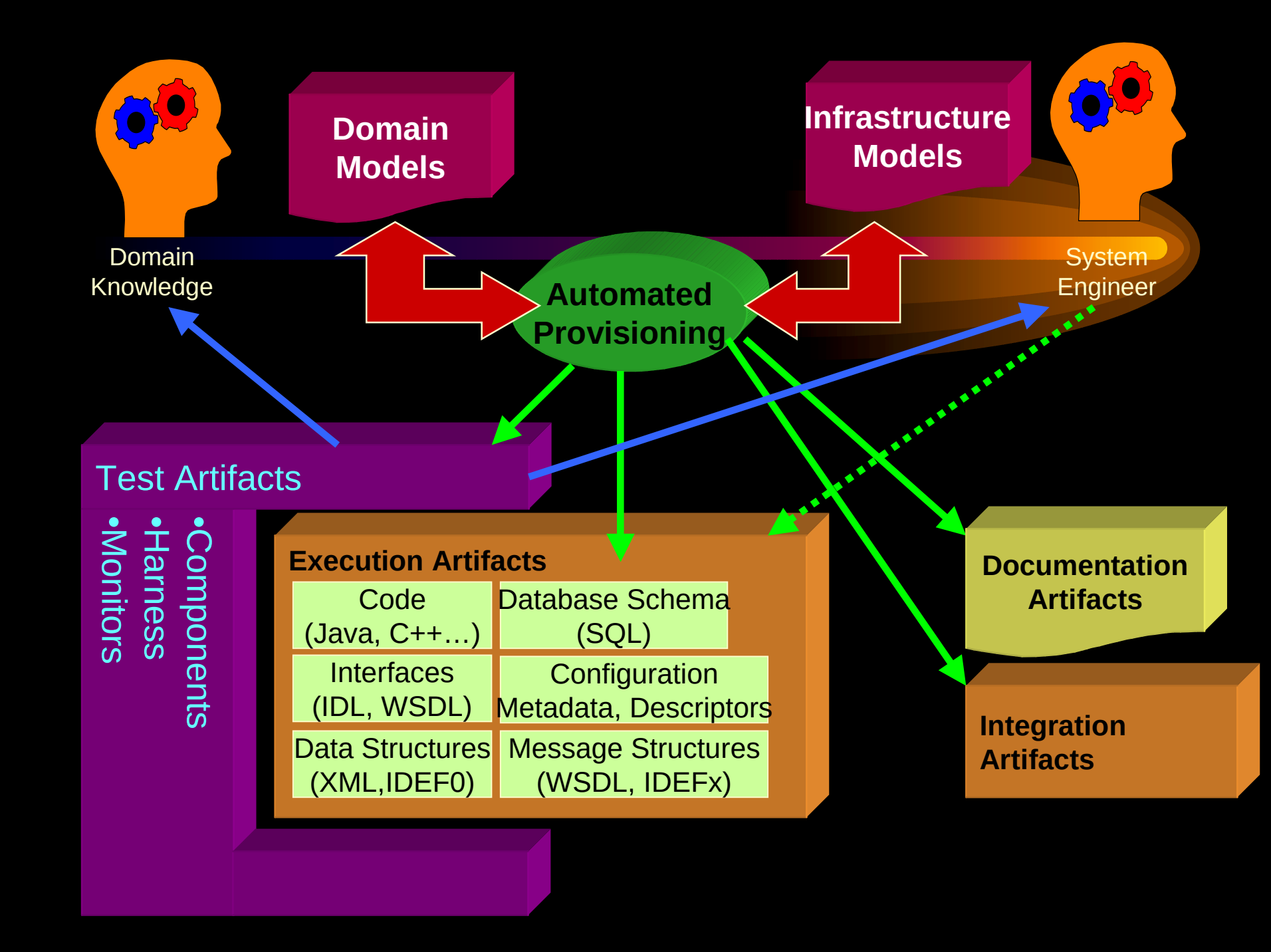


Integration of infrastructure



MDA Sponsorship - the OMG

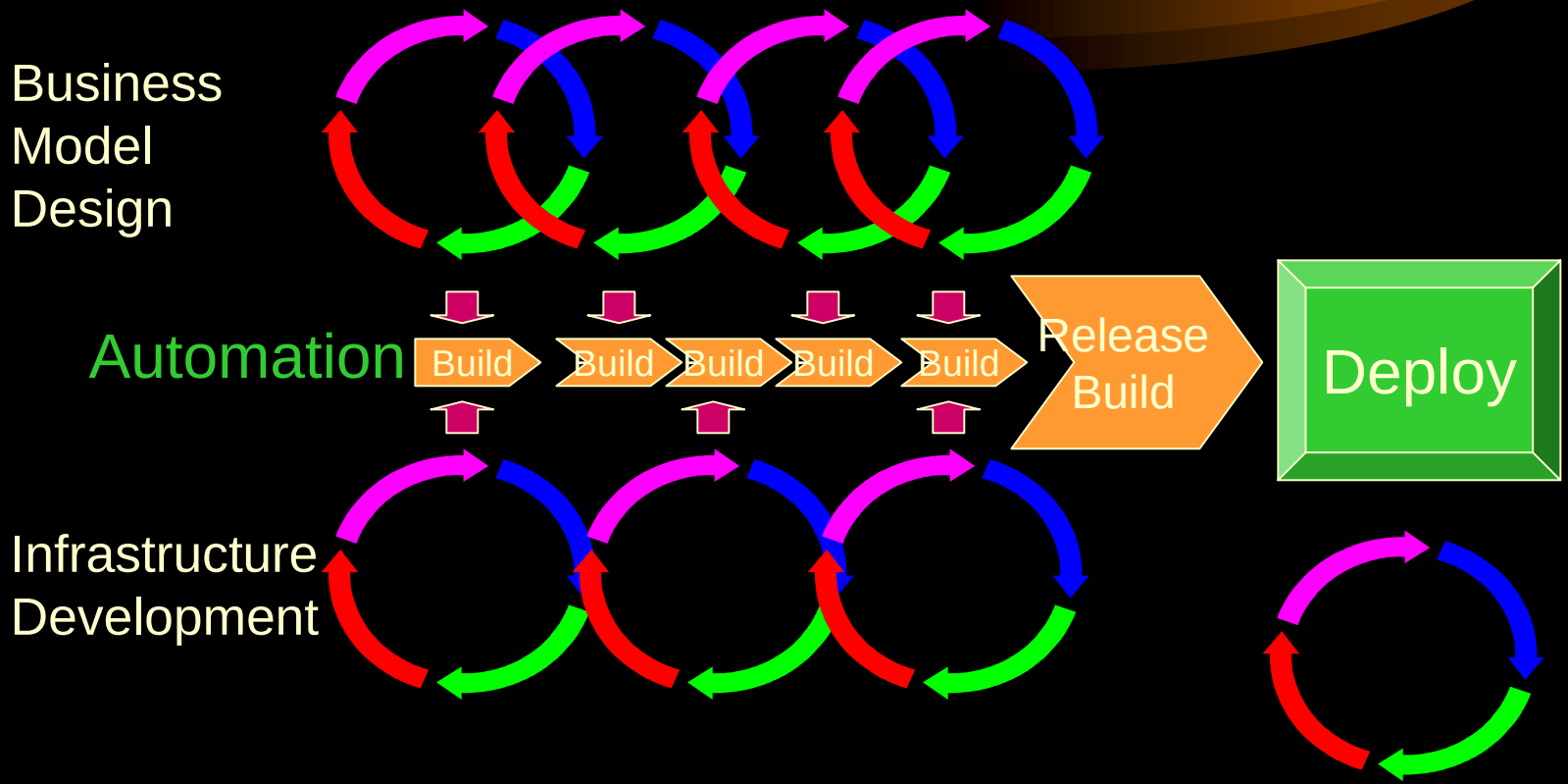
- The Object Management Group (OMG)
  - Major industry consortia for open interoperable systems
  - Hundreds of members - every major vendor
  - Successes include Corba, UML, MOF, CWM, XMI
- The OMG is defining MDA as the way systems will be built and conceived


Domain Models
Infrastructure Models
Domain Knowledge
System Engineer
Automated Provisioning
Test Artifacts
•Components
•Harness
•Monitors
Execution Artifacts
Code (Java, C++…)
Database Schema (SQL)
Interfaces (IDL, WSDL)
Configuration Metadata, Descriptors
Data Structures (XML,IDEF0)
Message Structures (WSDL, IDEFx)
Documentation Artifacts
Integration Artifacts

What MDA Achieves

- Rapid and reliable system specification and development
- Early visibility of results
- Adaptability to changing requirements and technologies
- Technology independence
- Automation reduces time, cost and errors
- Longer system life
- Interoperability and componentization
- Collaboration and integration
- System components become assets, not expenses

Iterative MDA Development



Directly addressing our requirements

- Network centric warfare
- The Objective Force
- Battlefield Awareness
- Information centric
- Adaptable and responsive
- Economy
- Agility & Adaptability
  - Design for change
  - Build for adaptability
- Collaboration
  - Horizontal
  - Vertical
  - Coalitions
- Interoperability
- System of Systems

Important MDA Standards

- Unified Modeling Language (UML)
  - Providing the basic modeling framework
- Meta Object Facility (MOF) and XMI
  - Providing a shared and interoperable repository for models at many levels
  - XMI provides for interchange of models in XML
- Enterprise Collaboration Architecture (ECA)
  - Providing the way to model collaboration and integration using MDA components
  - Provisioning in multiple technologies

Conclusion

- There is a drastic need to solve a related set of problems
  - Component Reuse
  - Interoperability
  - Collaborative Processes
- Enterprise MDA is an essential enabler
- Political problem are the most difficult