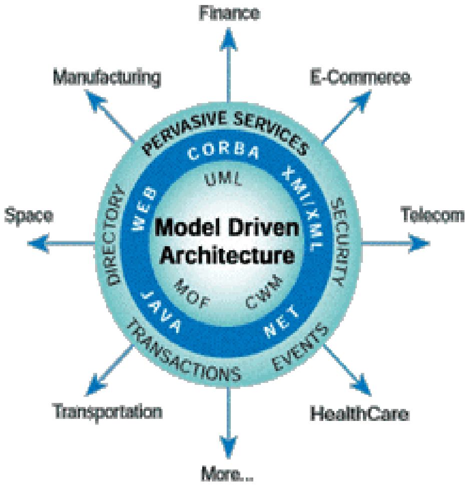
Linking the Real with the Simulated using MDA



Enterprise
Collaboration
Architecture

A tutorial on applying Model Driven Architecture to live and simulated systems

Introductions

DataAccessTechnologies

Where Business Meets Technology

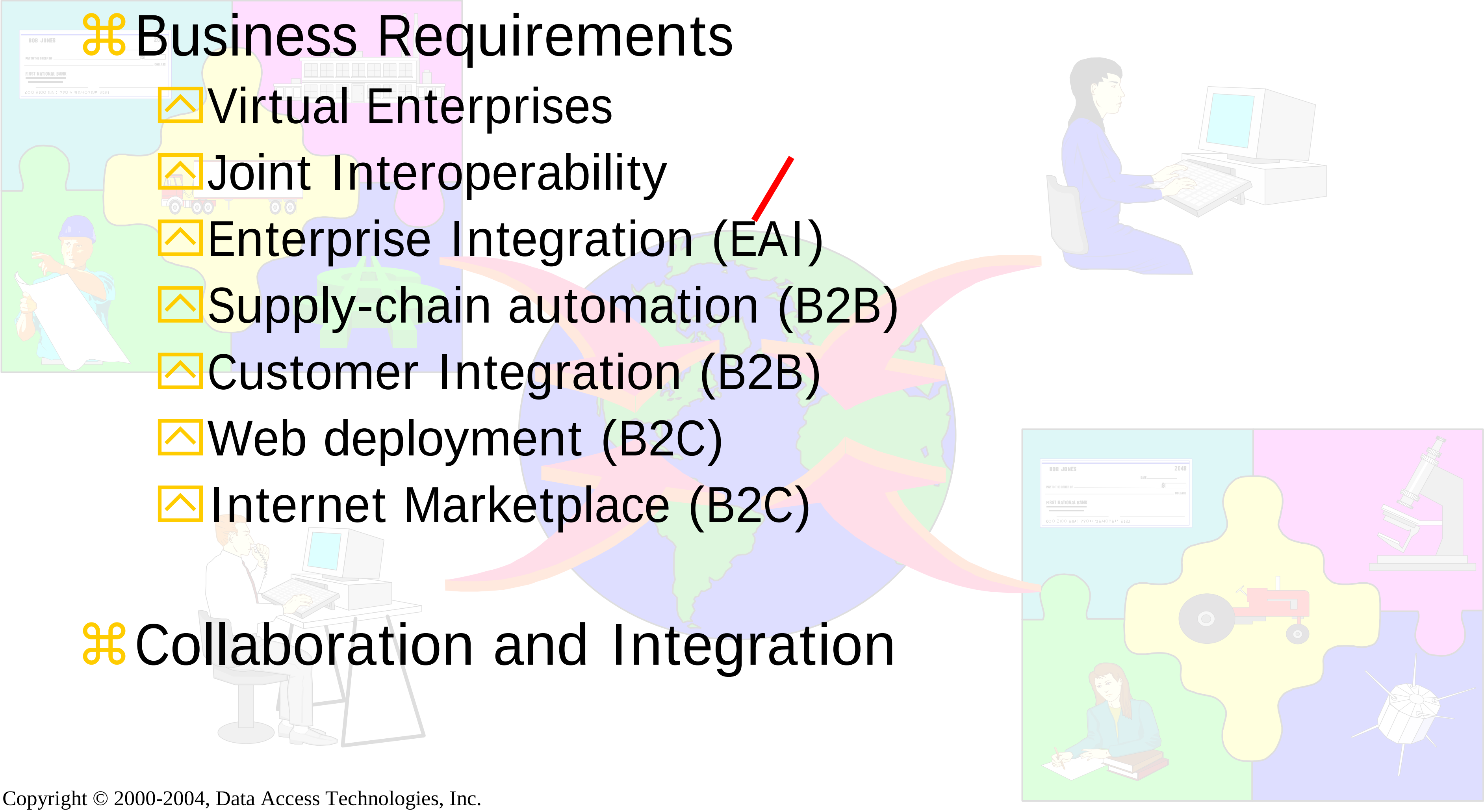
Cory Casanave

cory-c@enterprisecomponent.com

www.enterprisecomponent.com

Primary author of “Component Collaboration Architecture” in EDOC

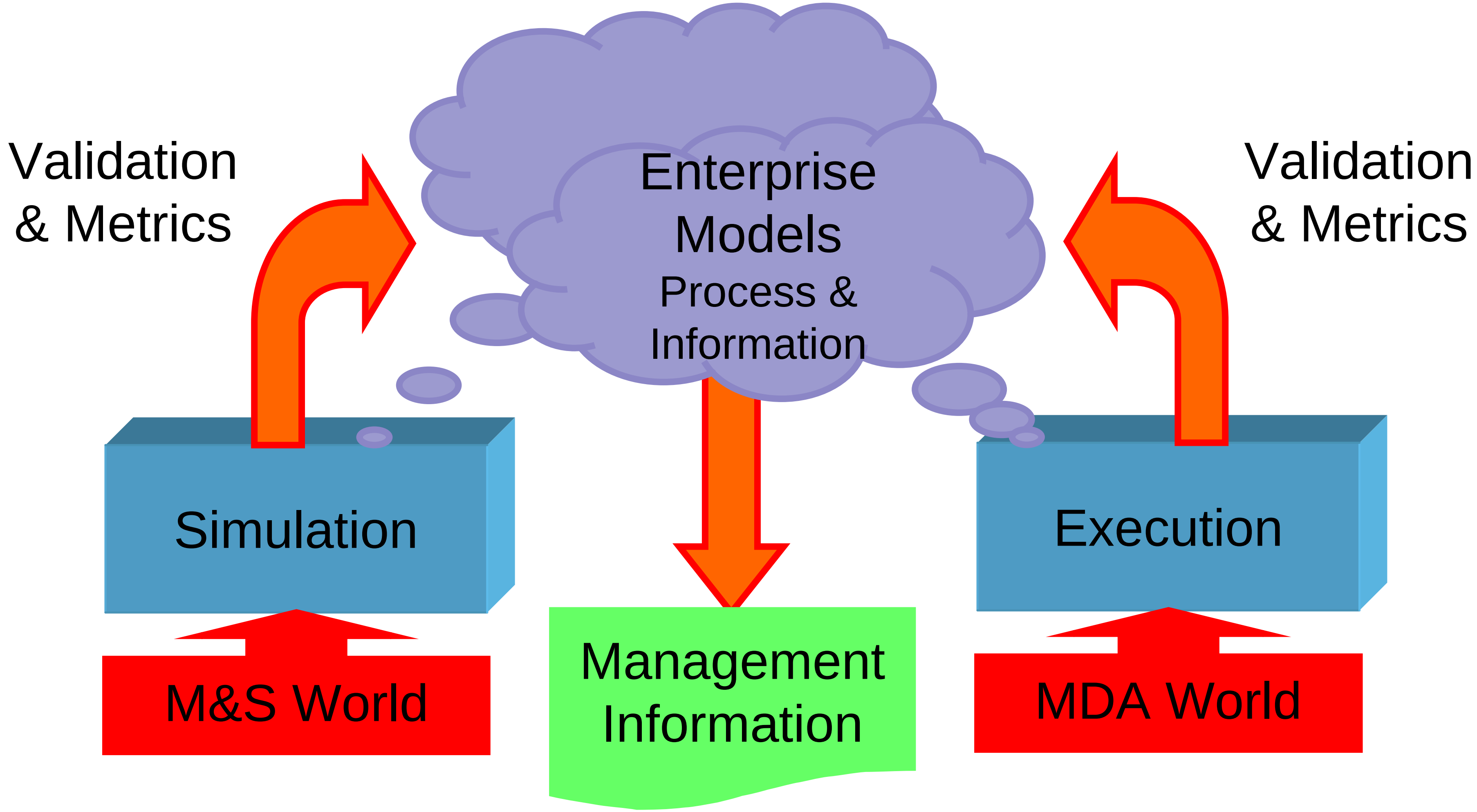
Integrating Enterprises, People & Systems - Worldwide



- Business Requirements
  - Virtual Enterprises
  - Joint Interoperability
  - Enterprise Integration (EAI)
  - Supply-chain automation (B2B)
  - Customer Integration (B2B)
  - Web deployment (B2C)
  - Internet Marketplace (B2C)

- Collaboration and Integration

Model What You Simulate & Perform



Current State – Dead Information

- Trapped in documents
- “PowerPoint architectures” & “Paper tigers”
- No semantics behind the pictures
- Different diagrams not linked
- Not easily modified (Except as a picture)
- Propagating information is manual
- No repository or proprietary repository
- No way to automate *getting value out*

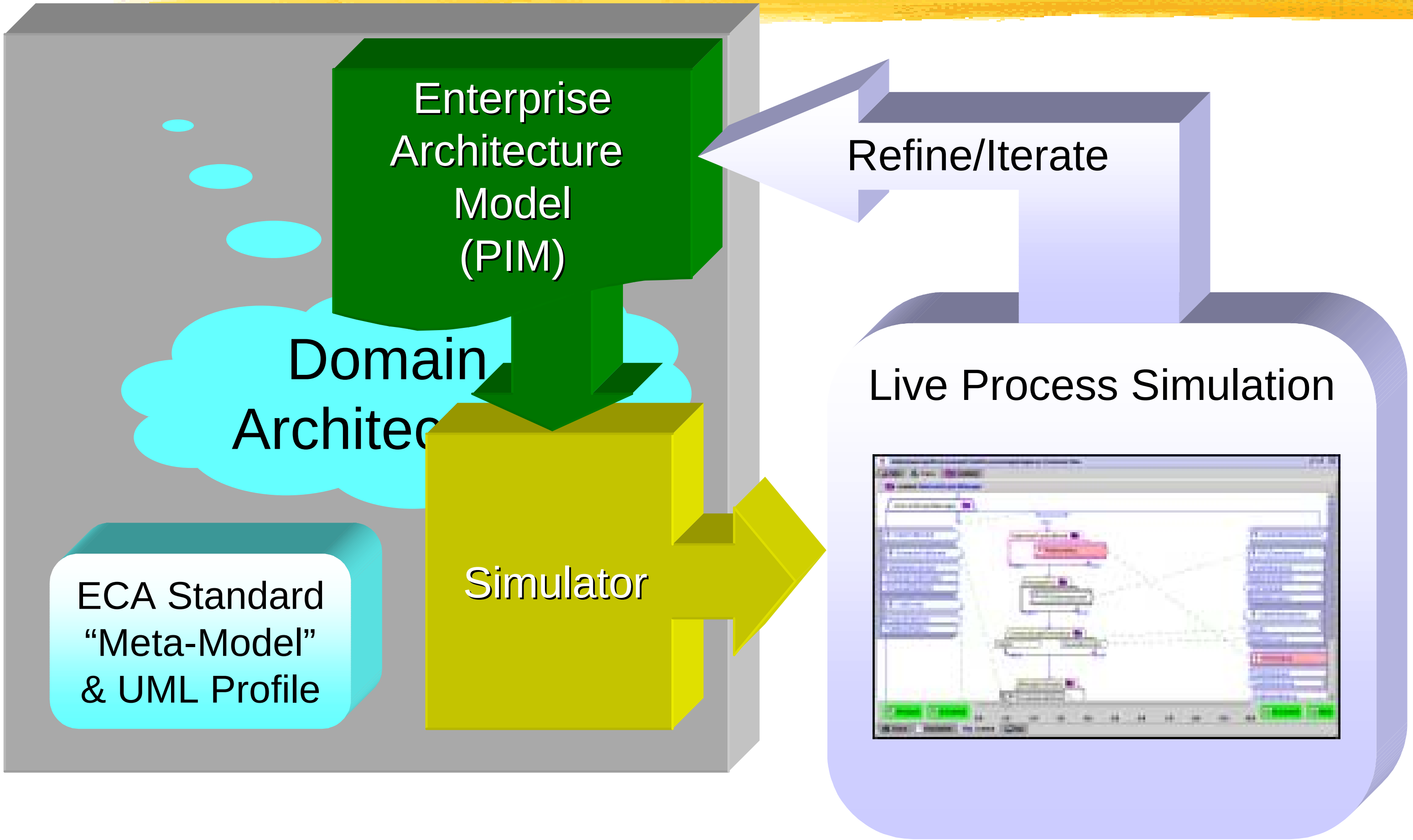
MDA Models

- Information in open repositories
- Semantics behind the models – they mean something
- Can be reverse engineered from dead information
- Designed for value – what do we get out of our architectures?
- Information in multiple diagrams is semantically linked
- Changes are automatically propagated
- Automated production of value
  - Documentation, middleware, simulation, tests, code
- Living information made part of the enterprise and the system

Why Process Simulation?

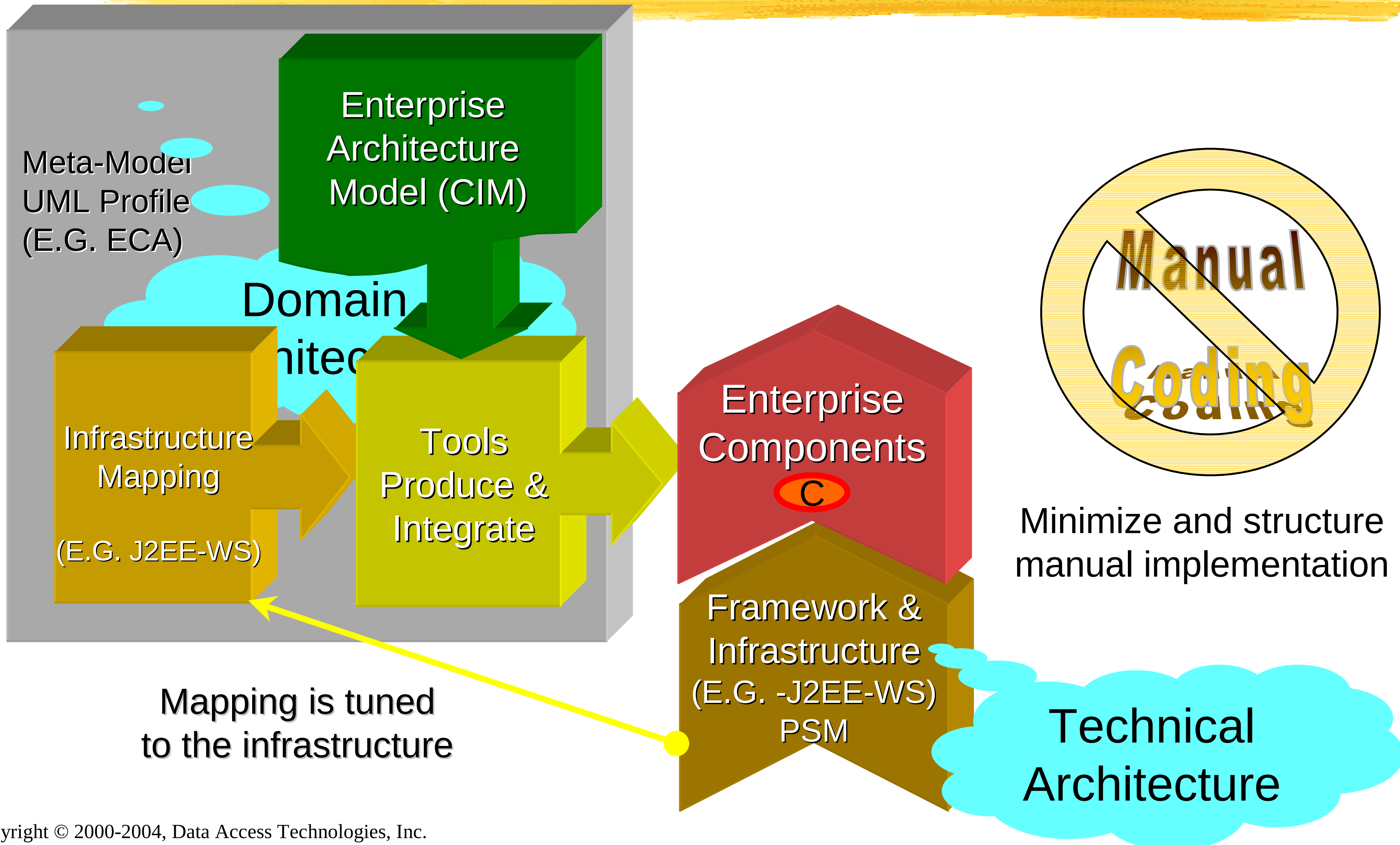
- Validation – Simulation of processes allows stakeholders to validate and refine new processes prior to deployment
- Training – Simulation is a core requirement for training, systems need to be able to operate in a simulation of real mode and dedicated trainers need to simulate the real world
- Testing – simulation is used to test live systems components for performance and conformance
- Decision Support – Simulation can aid in “projecting the future” for decision support

Simulated Model Driven Architecture



Enterprise Architecture Model (PIM)
Domain Architec
ECA Standard “Meta-Model” & UML Profile
Simulator
Refine/Iterate
Live Process Simulation

Automated Model Driven Architecture



Meta-Model
UML Profile
(E.G. ECA)

Enterprise Architecture Model (CIM)

Domain
hitec

Infrastructure Mapping

(E.G. J2EE-WS)

Tools Produce & Integrate

Enterprise Components

C

Framework & Infrastructure (E.G. -J2EE-WS) PSM

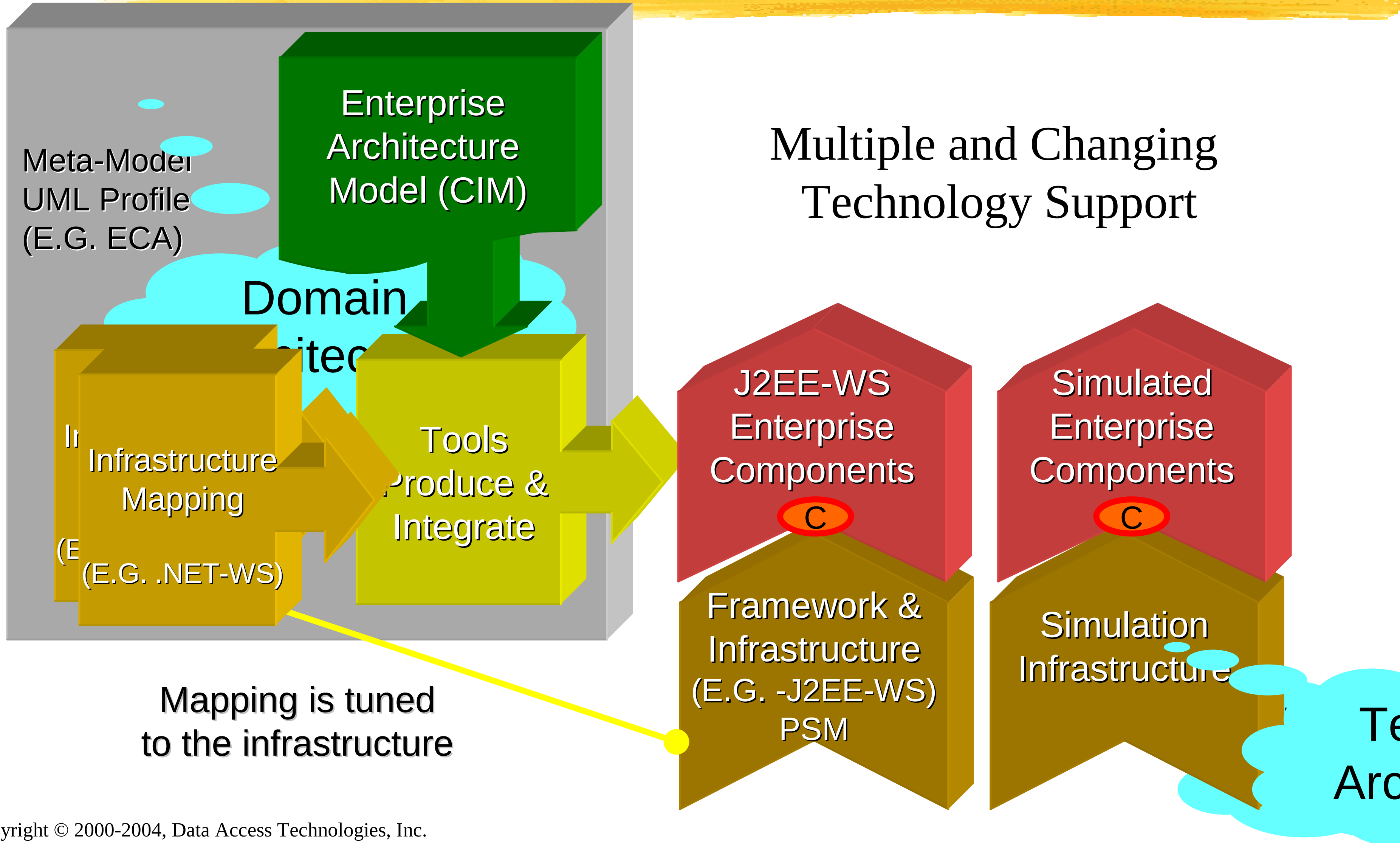
Technical Architecture

Manual Coding

Minimize and structure manual implementation

Mapping is tuned to the infrastructure

Automated Model Driven Architecture


Meta-Model
UML Profile
(E.G. ECA)
Enterprise Architecture Model (CIM)
Domain
itec
In
(E
Infrastructure Mapping
(E.G. .NET-WS)
Tools Produce & Integrate
Multiple and Changing Technology Support
J2EE-WS Enterprise Components
C
Simulated Enterprise Components
C
Framework & Infrastructure (E.G. -J2EE-WS) PSM
Simulation Infrastructure
Te
Arc
Mapping is tuned to the infrastructure

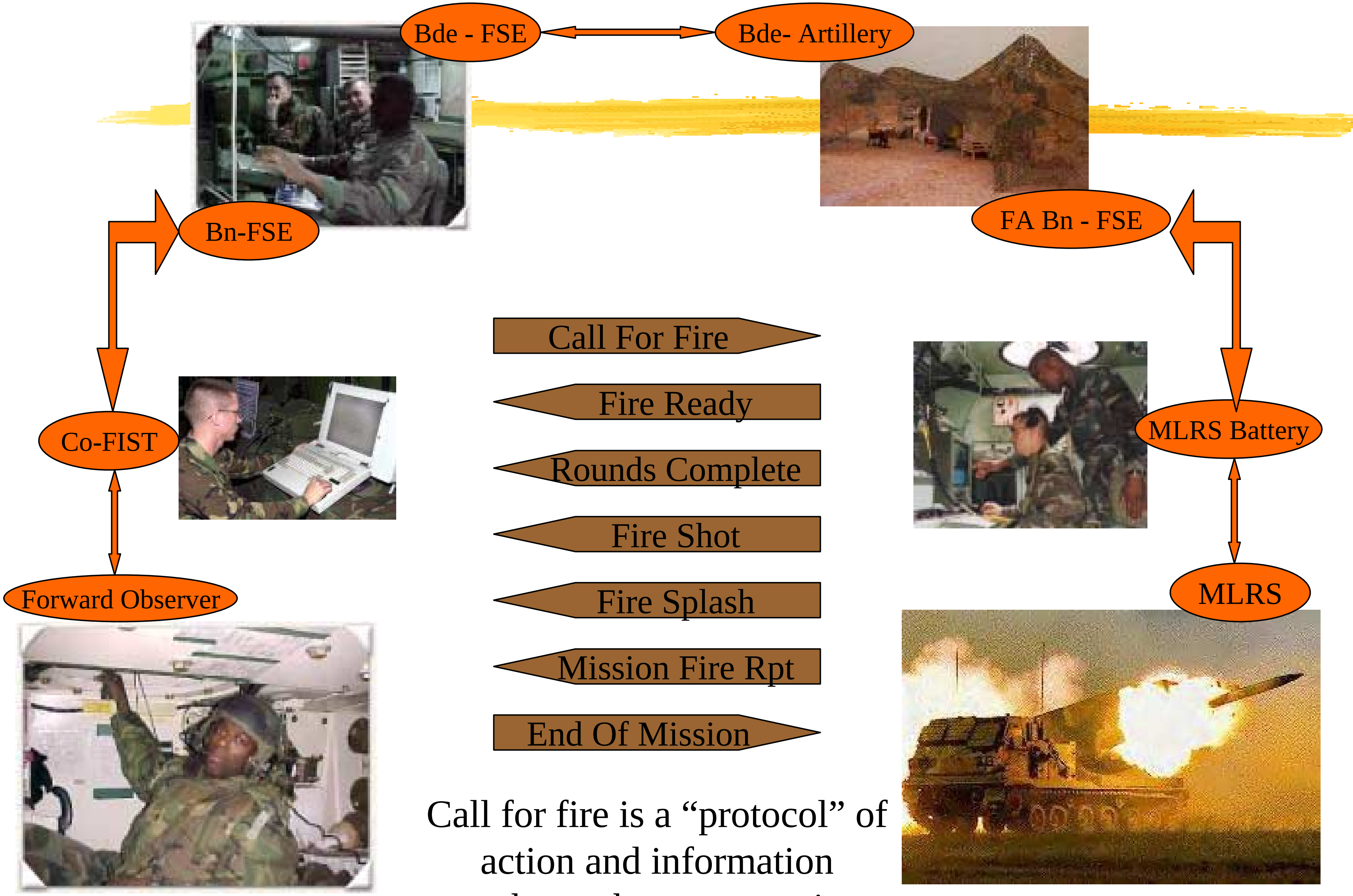
The new center

- 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

Military Example

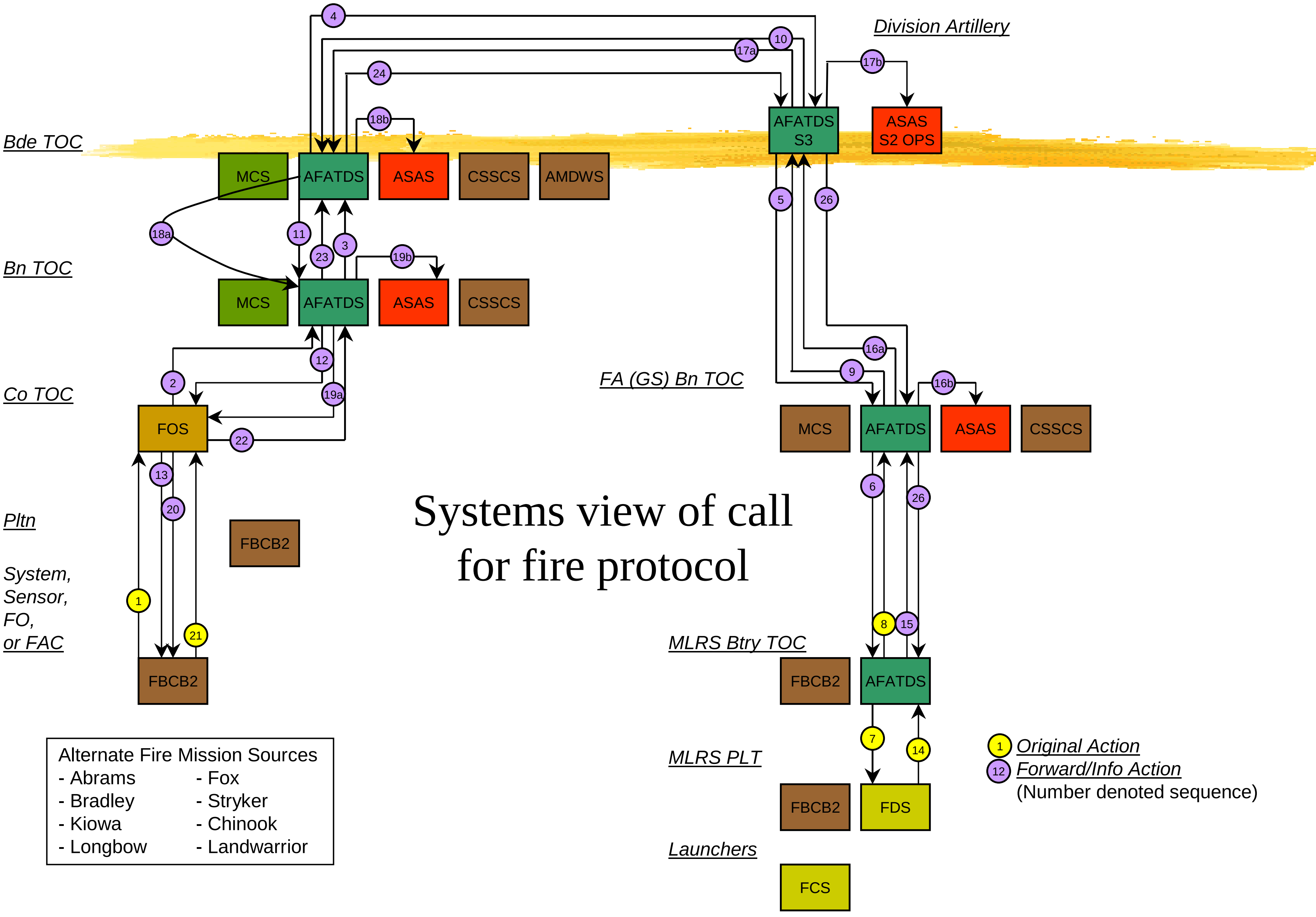
Linking Tactical C2 systems with “Live”, “Virtual” and “Constructive” simulations (SIMCI)

Call for Fire - MLRS



Call for fire is a “protocol” of action and information exchange between parties

Thread 2b - FS: CFF To GS MLRS (AFATDS)

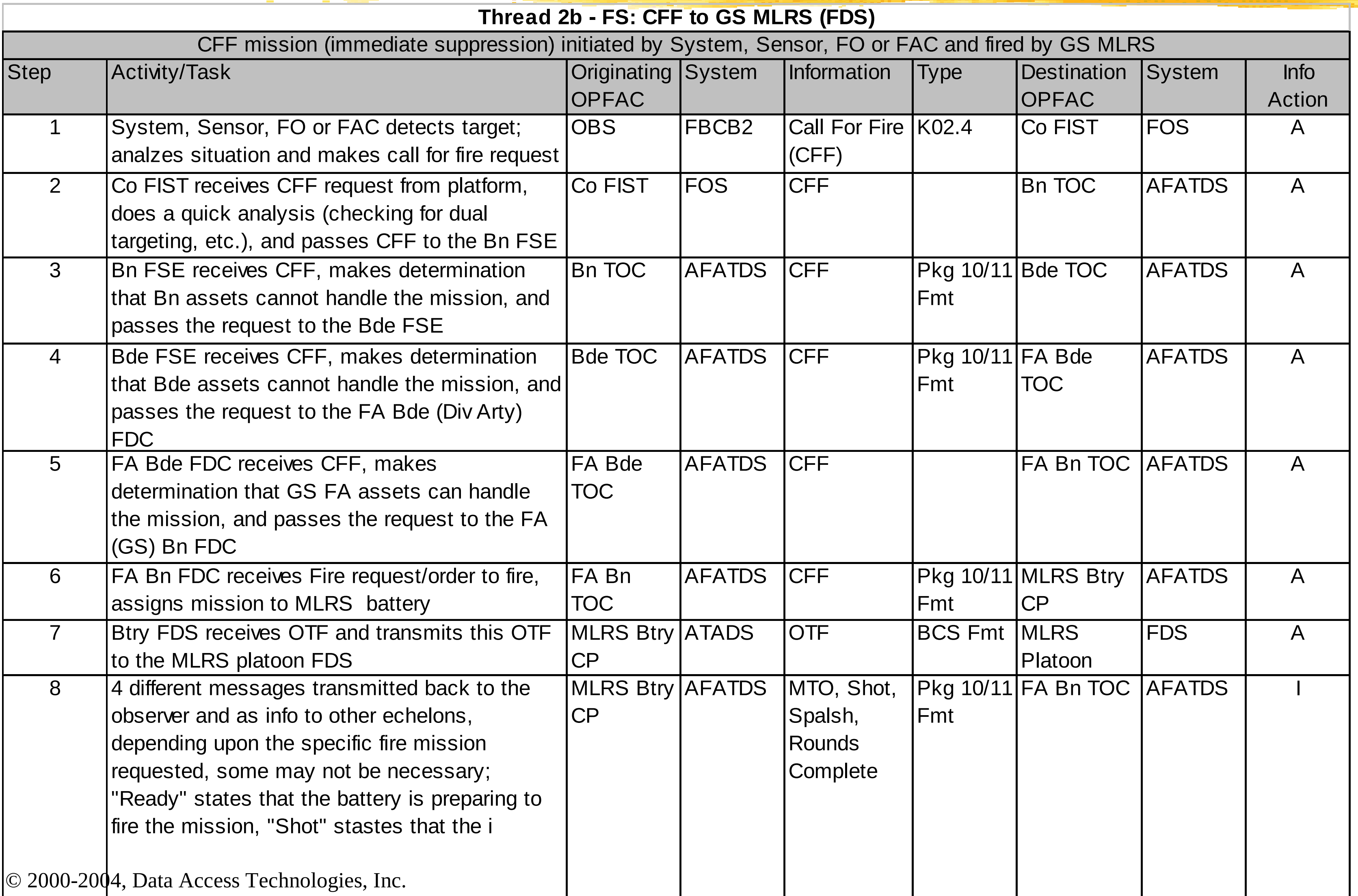


Systems view of call for fire protocol

Alternate Fire Mission Sources

- Abrams	- Fox
- Bradley	- Stryker
- Kiowa	- Chinook
- Longbow	- Landwarrior

Thread Detail (Spread Sheet)

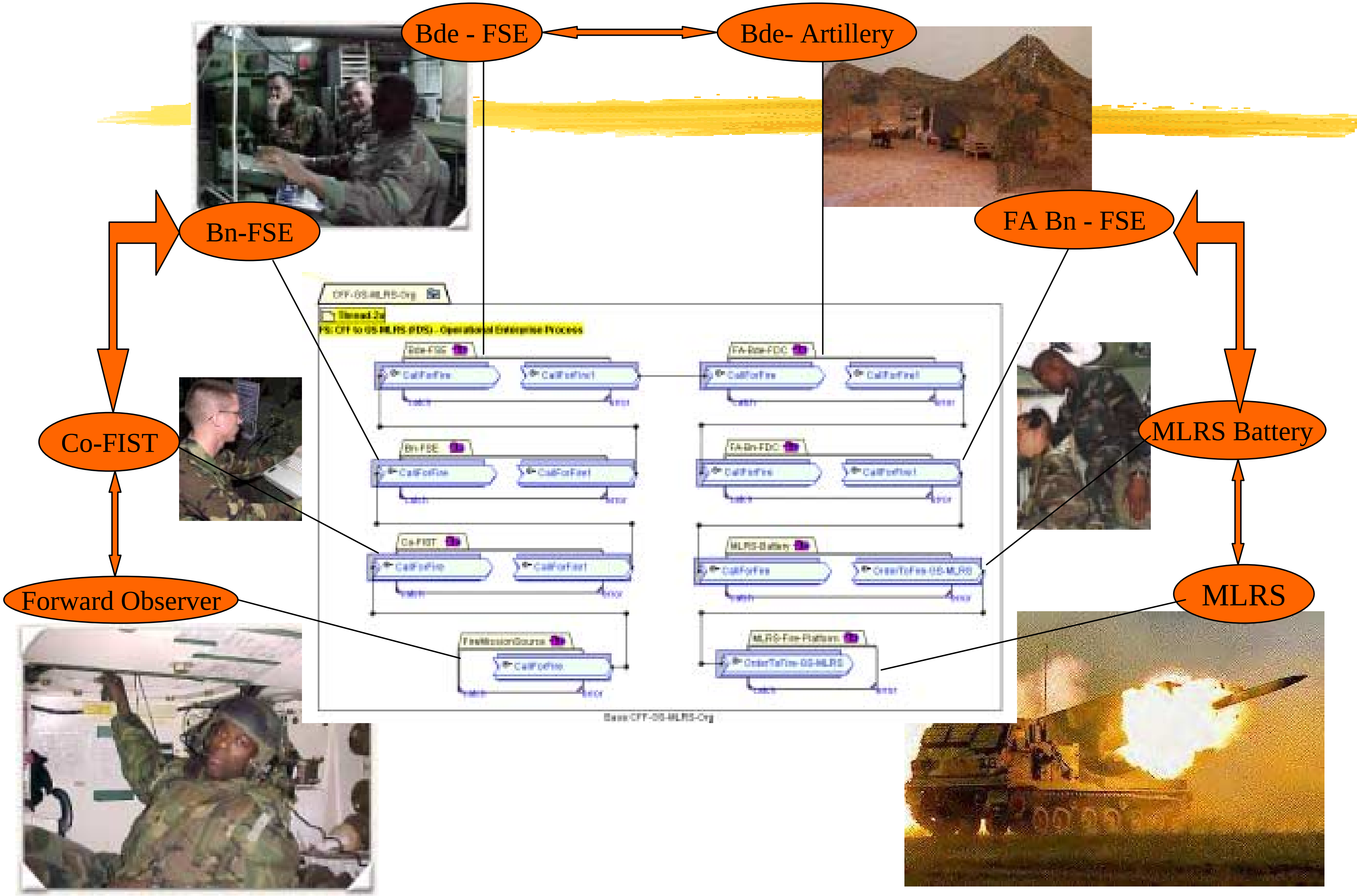


Thread 2b - FS: CFF to GS MLRS (FDS)

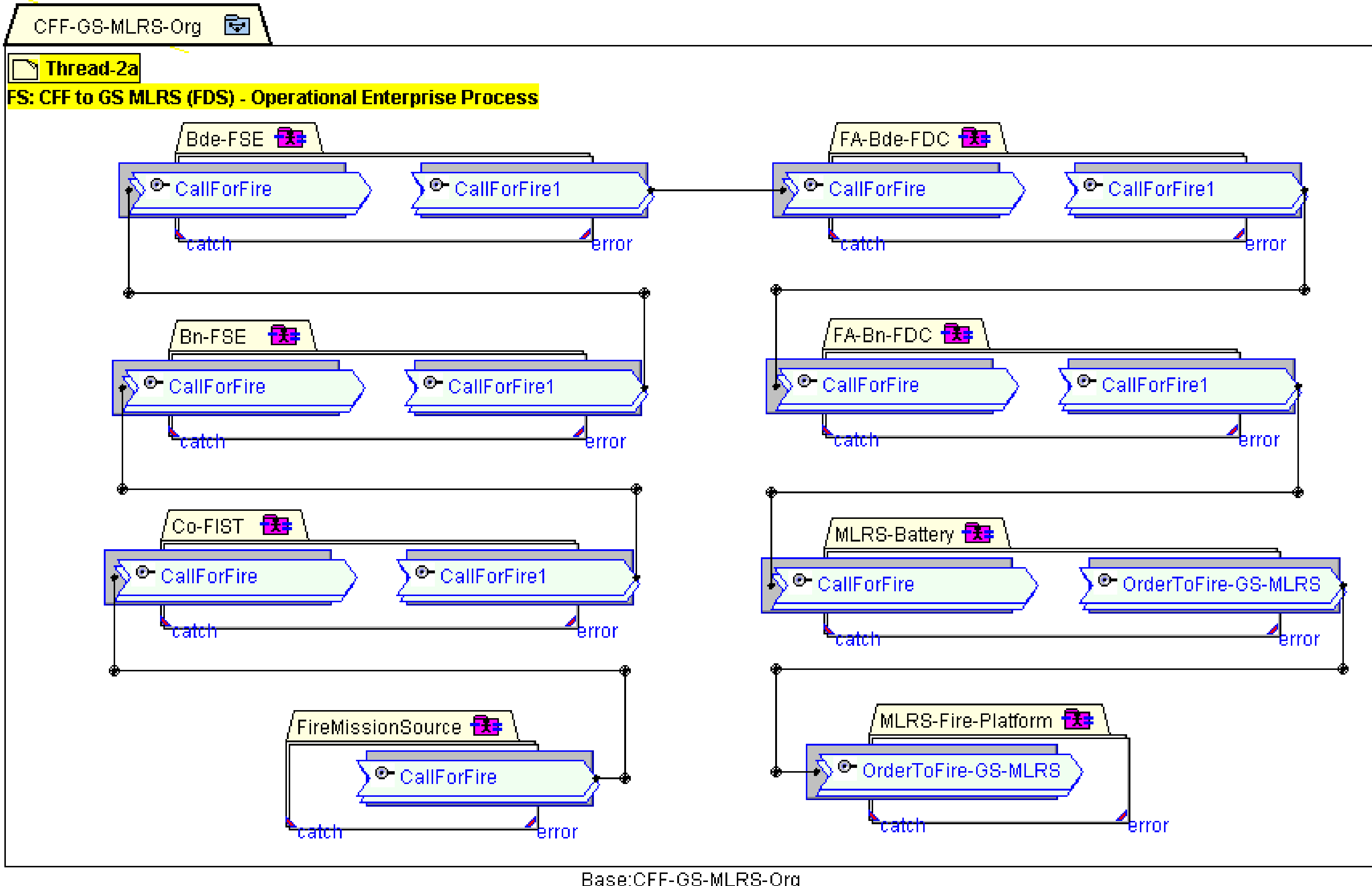
CFF mission (immediate suppression) initiated by System, Sensor, FO or FAC and fired by GS MLRS

Step	Activity/Task	Originating OPFAC	System	Information	Type	Destination OPFAC	System	Info Action
1	System, Sensor, FO or FAC detects target; analzes situation and makes call for fire request	OBS	FBCB2	Call For Fire (CFF)	K02.4	Co FIST	FOS	A
2	Co FIST receives CFF request from platform, does a quick analysis (checking for dual targeting, etc.), and passes CFF to the Bn FSE	Co FIST	FOS	CFF		Bn TOC	AFATDS	A
3	Bn FSE receives CFF, makes determination that Bn assets cannot handle the mission, and passes the request to the Bde FSE	Bn TOC	AFATDS	CFF	Pkg 10/11 Fmt	Bde TOC	AFATDS	A
4	Bde FSE receives CFF, makes determination that Bde assets cannot handle the mission, and passes the request to the FA Bde (Div Arty) FDC	Bde TOC	AFATDS	CFF	Pkg 10/11 Fmt	FA Bde TOC	AFATDS	A
5	FA Bde FDC receives CFF, makes determination that GS FA assets can handle the mission, and passes the request to the FA (GS) Bn FDC	FA Bde TOC	AFATDS	CFF		FA Bn TOC	AFATDS	A
6	FA Bn FDC receives Fire request/order to fire, assigns mission to MLRS battery	FA Bn TOC	AFATDS	CFF	Pkg 10/11 Fmt	MLRS Btry CP	AFATDS	A
7	Btry FDS receives OTF and transmits this OTF to the MLRS platoon FDS	MLRS Btry CP	ATADS	OTF	BCS Fmt	MLRS Platoon	FDS	A
8	4 different messages transmitted back to the observer and as info to other echelons, depending upon the specific fire mission requested, some may not be necessary; "Ready" states that the battery is preparing to fire the mission, "Shot" stastes that the i	MLRS Btry CP	AFATDS	MTO, Shot, Spalsh, Rounds Complete	Pkg 10/11 Fmt	FA Bn TOC	AFATDS	I

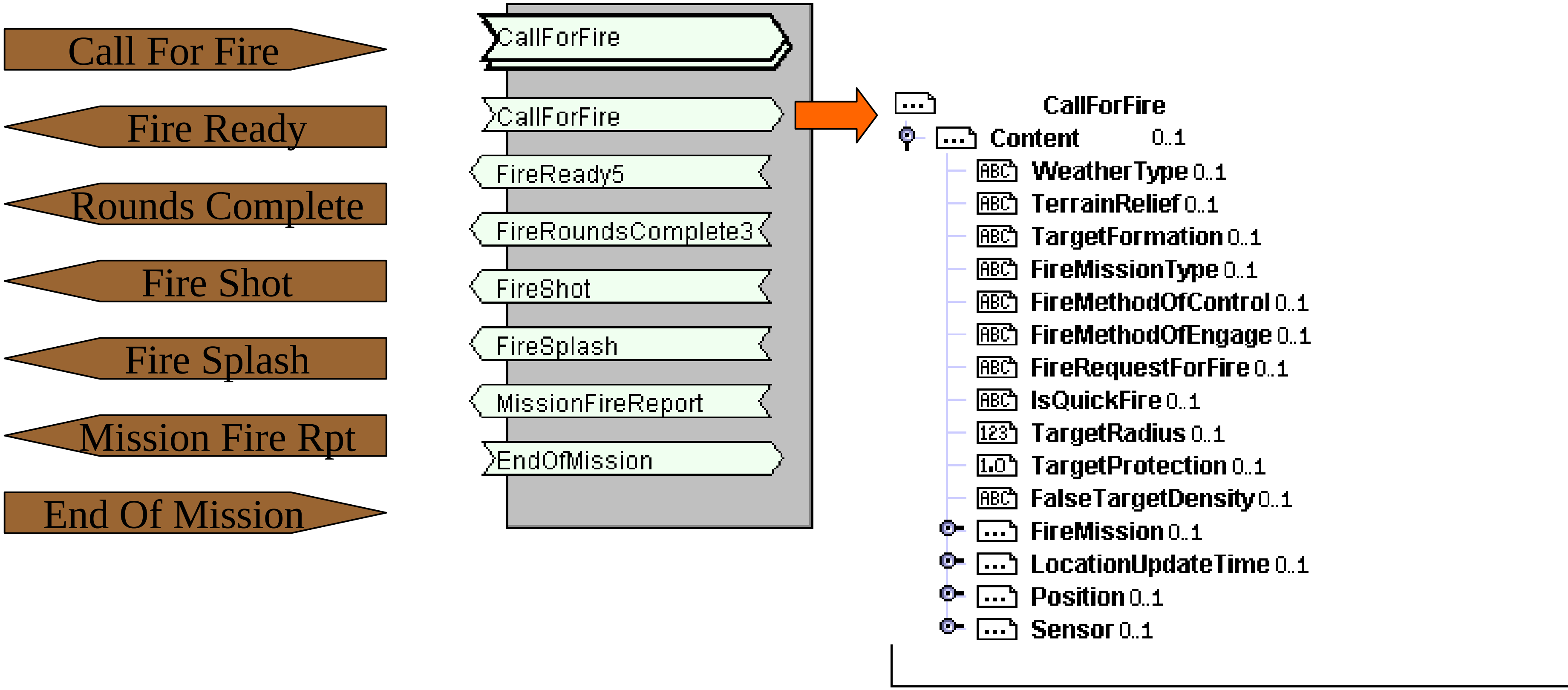
Call for Fire - MLRS



Model Of CFF Thread



Model Information Flows



Call For Fire

Fire Ready

Rounds Complete

Fire Shot

Fire Splash

Mission Fire Rpt

End Of Mission

CallForFire

CallForFire

FireReady5

FireRoundsComplete3

FireShot

FireSplash

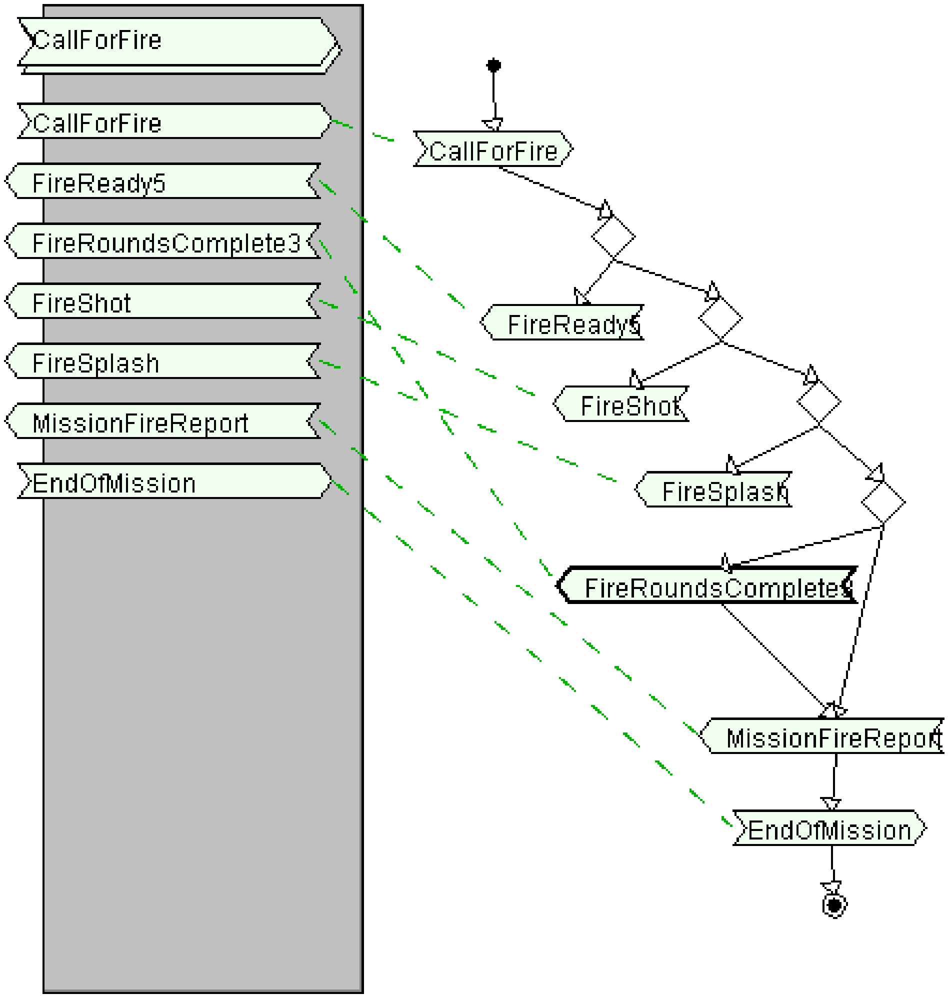
MissionFireReport

EndOfMission

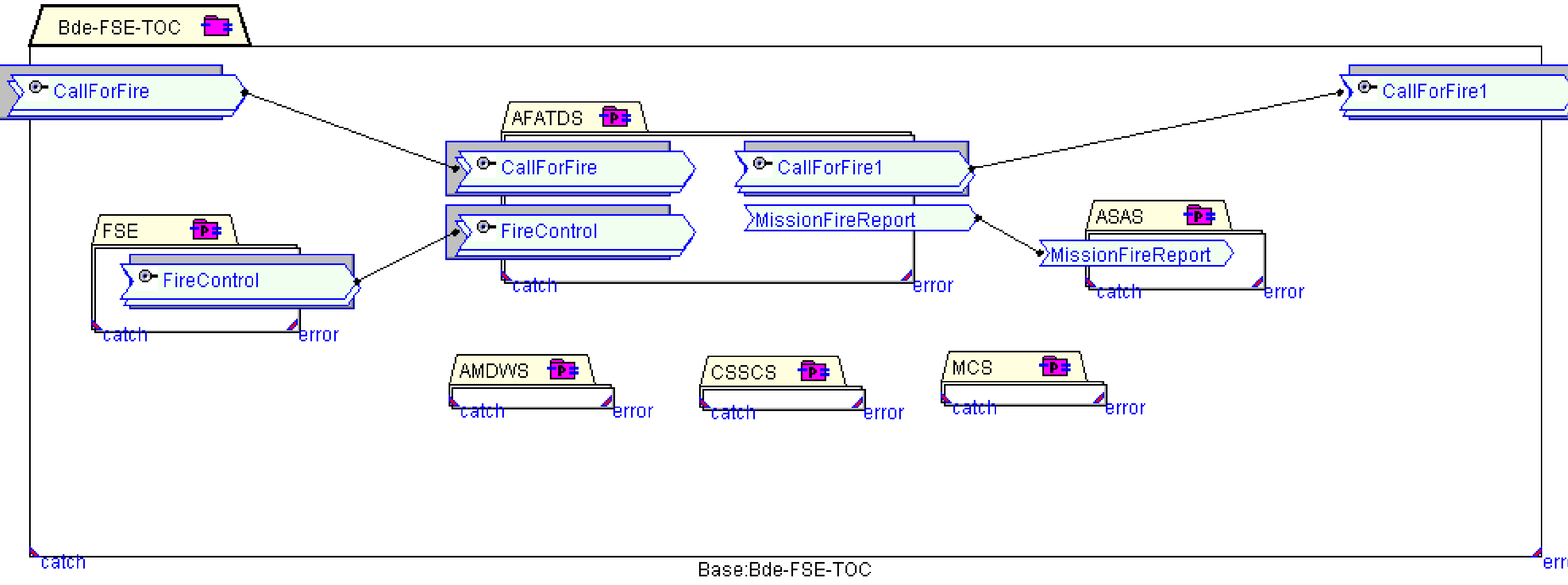
CallForFire
- Content 0..1
  - WeatherType 0..1
  - TerrainRelief 0..1
  - TargetFormation 0..1
  - FireMissionType 0..1
  - FireMethodOfControl 0..1
  - FireMethodOfEngage 0..1
  - FireRequestForFire 0..1
  - IsQuickFire 0..1
  - TargetRadius 0..1
  - TargetProtection 0..1
  - FalseTargetDensity 0..1
  - FireMission 0..1
  - LocationUpdateTime 0..1
  - Position 0..1
  - Sensor 0..1

* Not technology details!

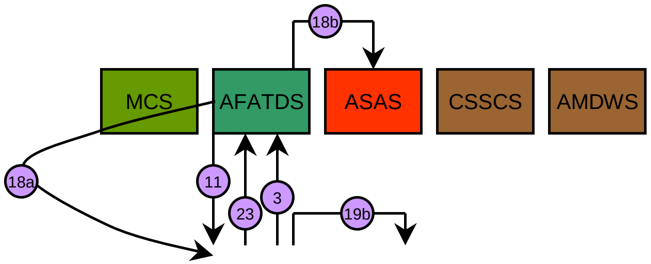
Choreography – Understanding When



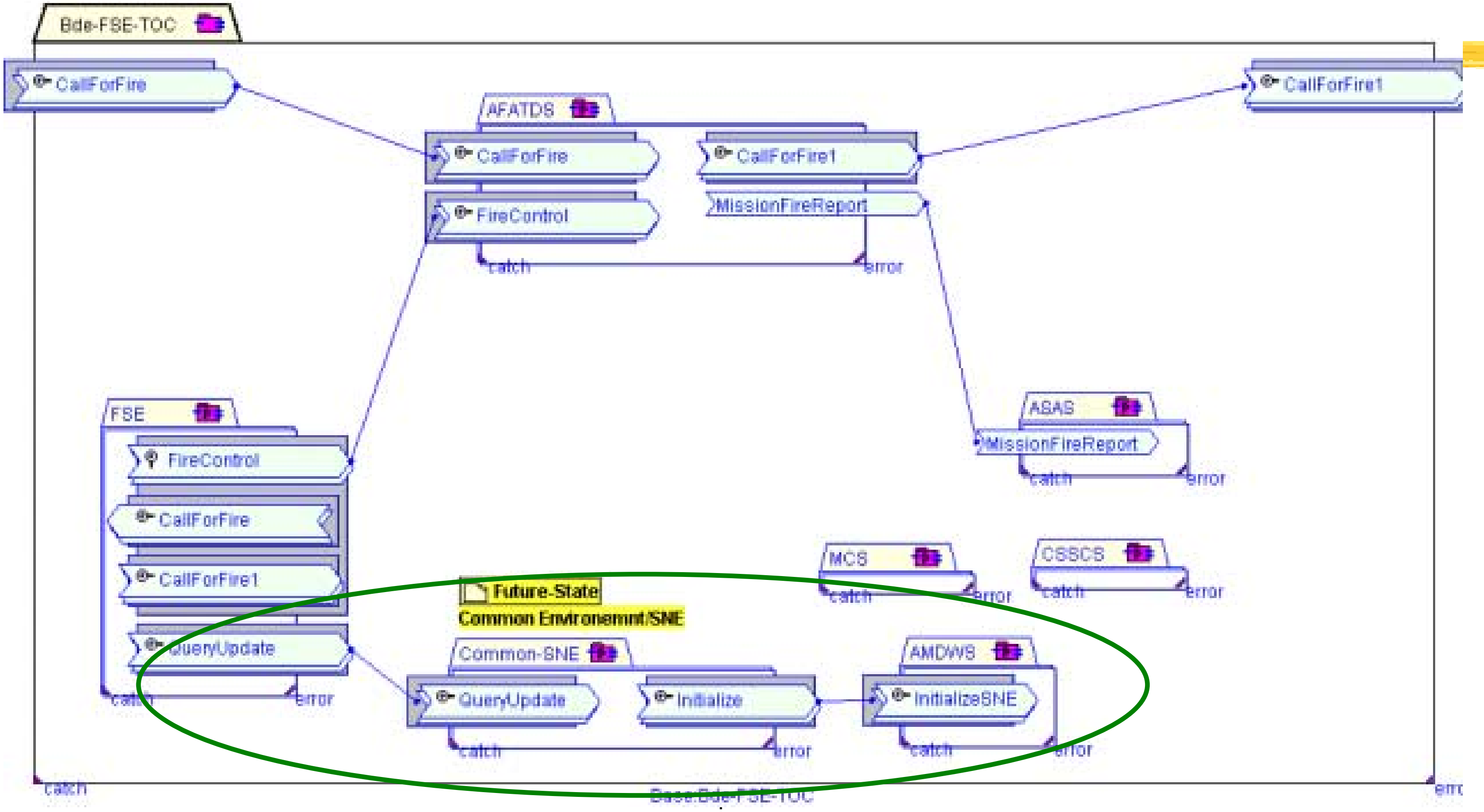
Drill Down - Inside of a TOC



From “threads”

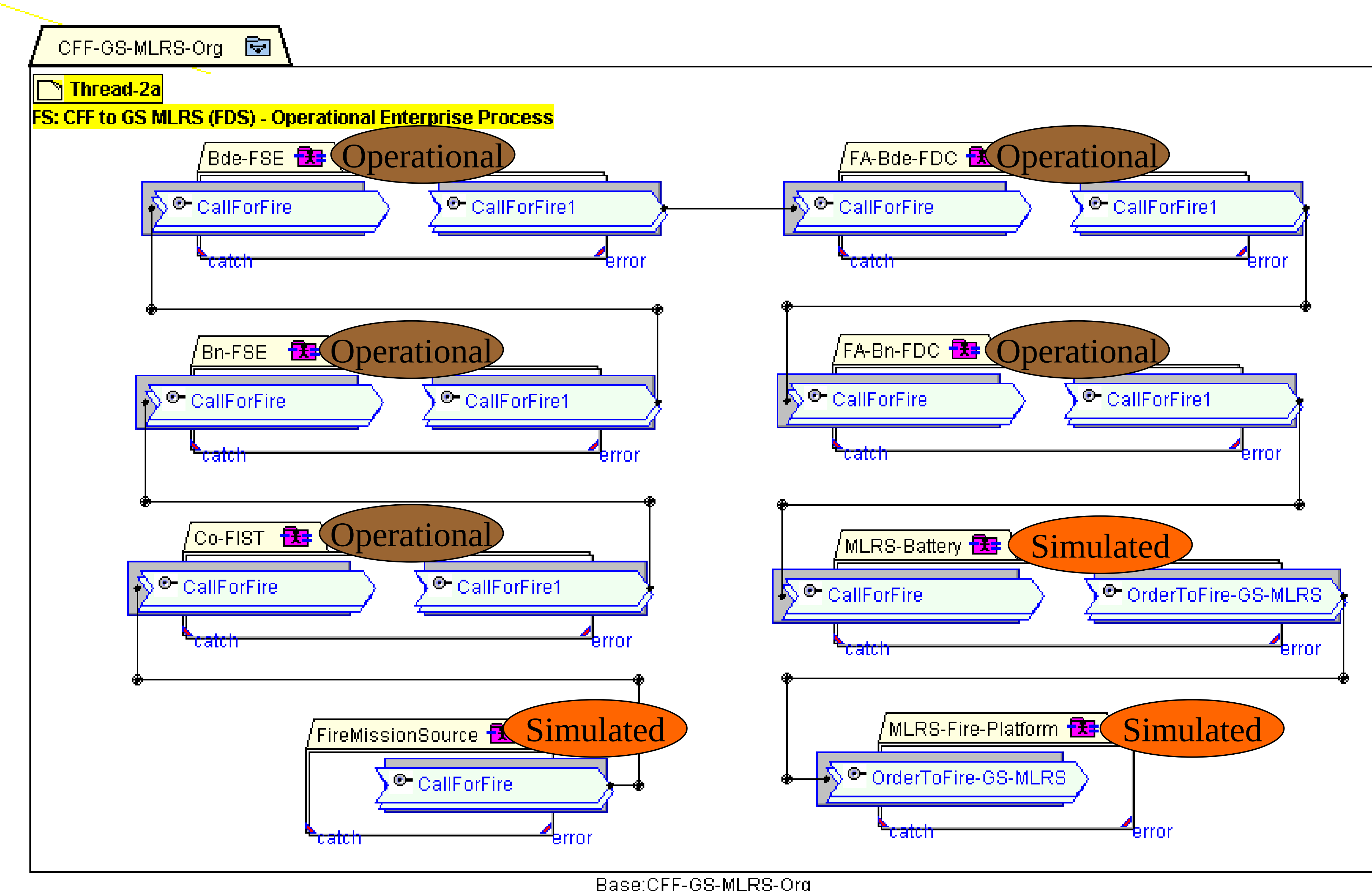


Inside of a TOC



Example Future State

Simulated or Real?



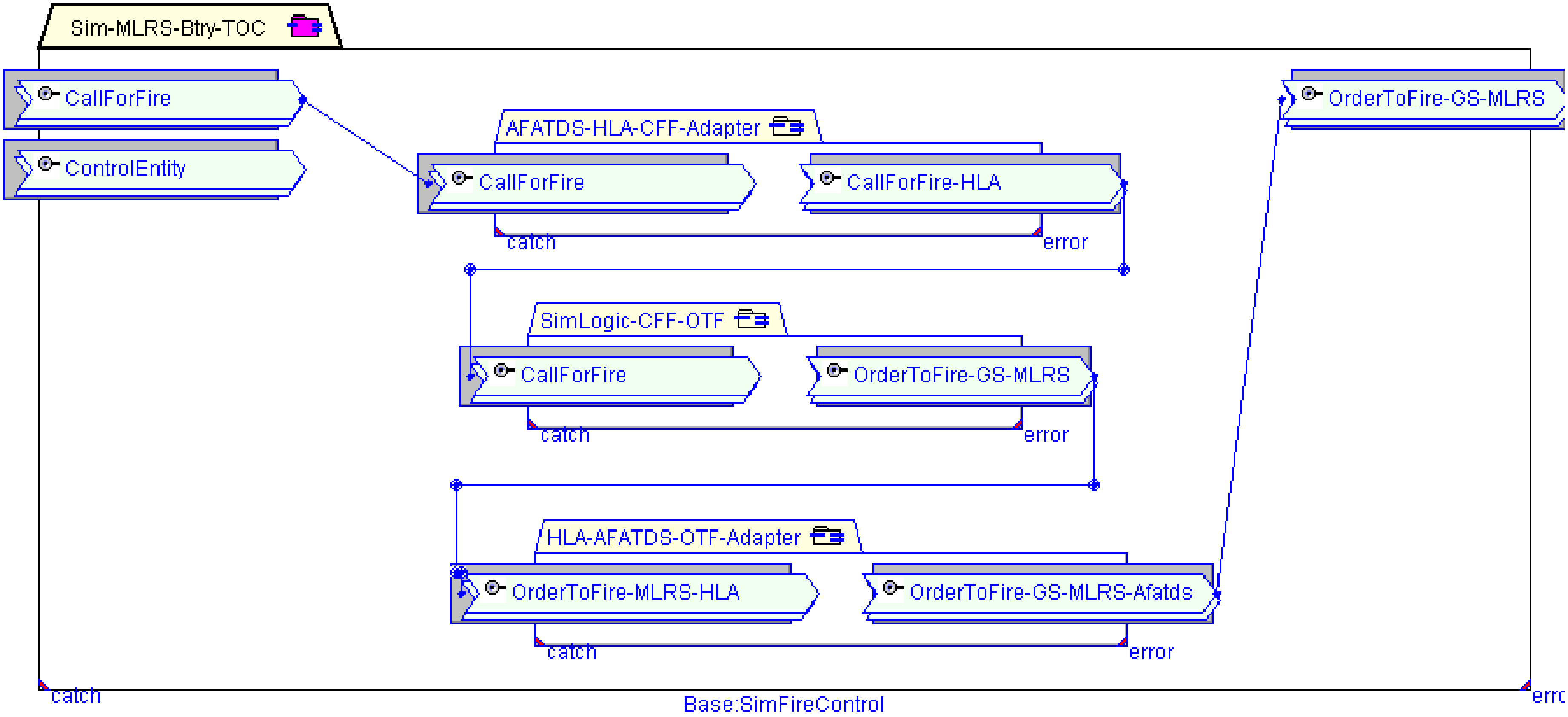
CFF-GS-MLRS-Org

Thread-2a

FS: CFF to GS MLRS (FDS) - Operational Enterprise Process

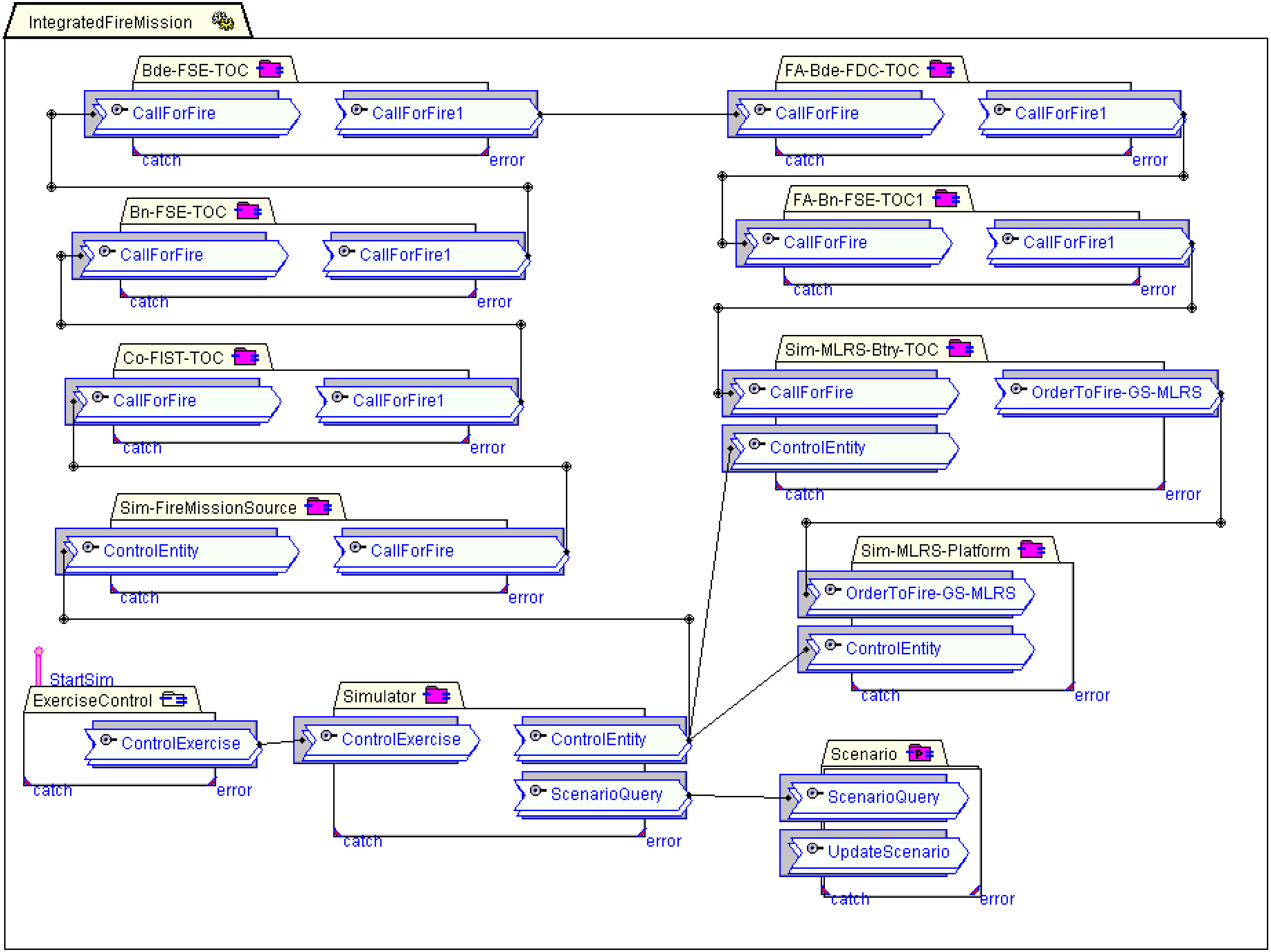
Base:CFF-GS-MLRS-Org

Inside of a Simulated “TOC”

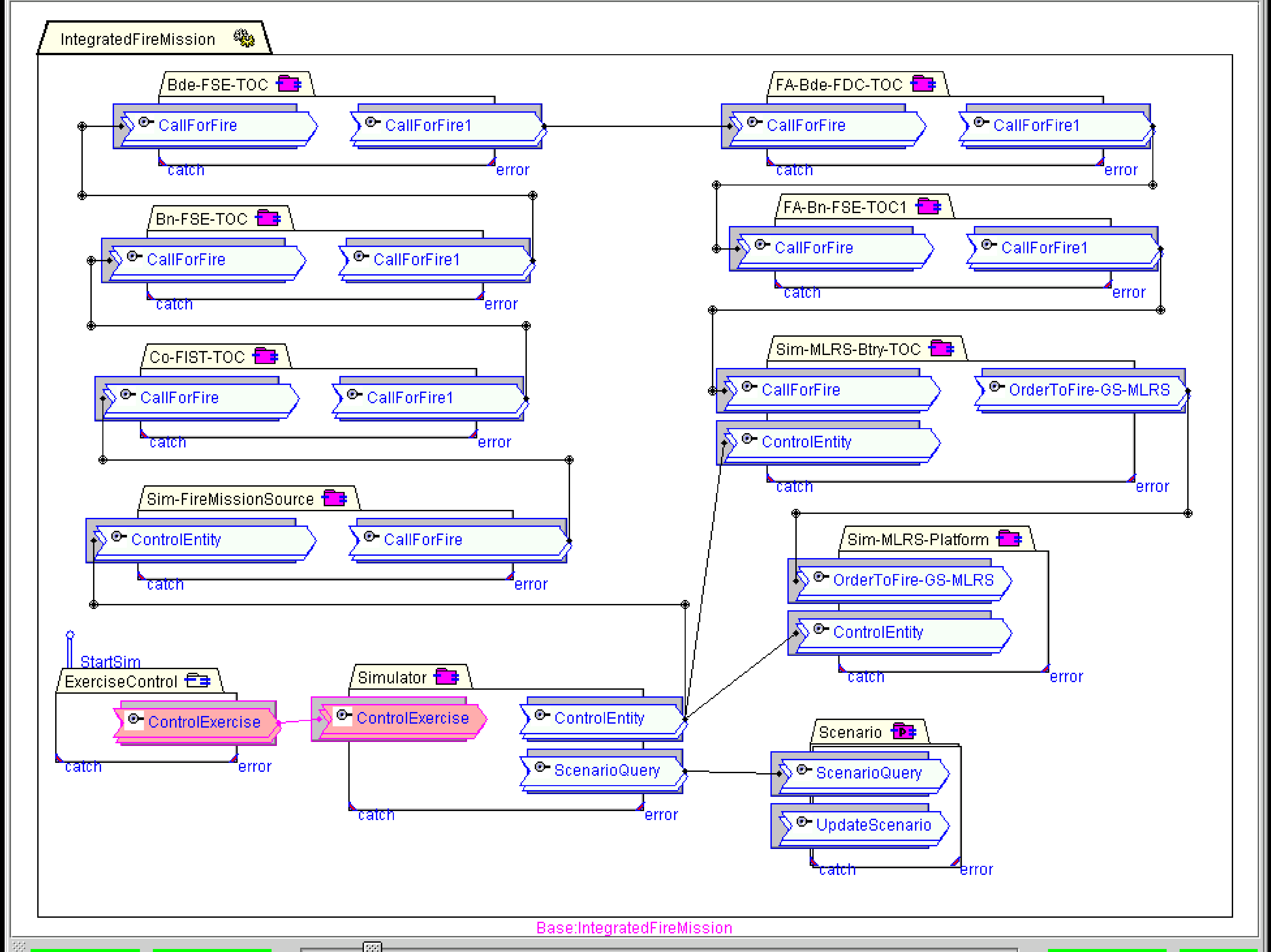


Simulating the Process

Tactical and Simulated components interacting



Base:IntegratedFireMission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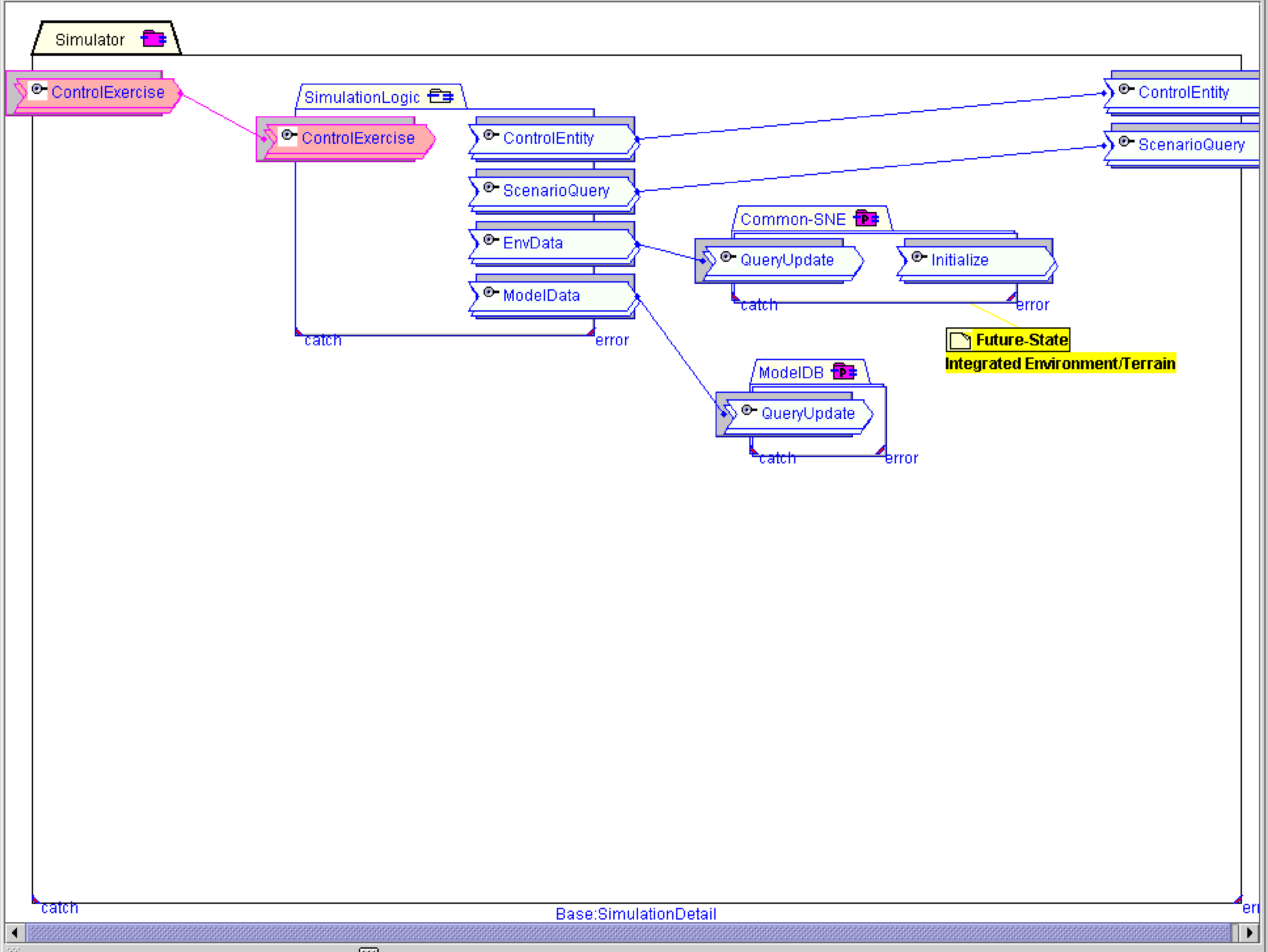
Bde-FSE-TOC
CallForFire
CallForFire1
catch
error
FA-Bde-FDC-TOC
CallForFire
CallForFire1
catch
error
Bn-FSE-TOC
CallForFire
CallForFire1
catch
error
FA-Bn-FSE-TOC1
CallForFire
CallForFire1
catch
error
Co-FIST-TOC
CallForFire
CallForFire1
catch
error
Sim-MLRS-Btry-TOC
CallForFire
OrderToFire-GS-MLRS
ControlEntity
catch
error
Sim-FireMissionSource
ControlEntity
CallForFire
catch
error
Sim-MLRS-Platform
OrderToFire-GS-MLRS
ControlEntity
catch
error
StartSim
ExerciseControl
ControlExercise
catch
error
Simulator
ControlExercise
ControlEntity
ScenarioQuery
catch
error
Scenario
ScenarioQuery
UpdateScenario
catch
error
Base:IntegratedFireMission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SimulationLogic
ControlExercise
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ScenarioQuery
EnvData
ModelData
catch
error
ControlEntity
ScenarioQuery
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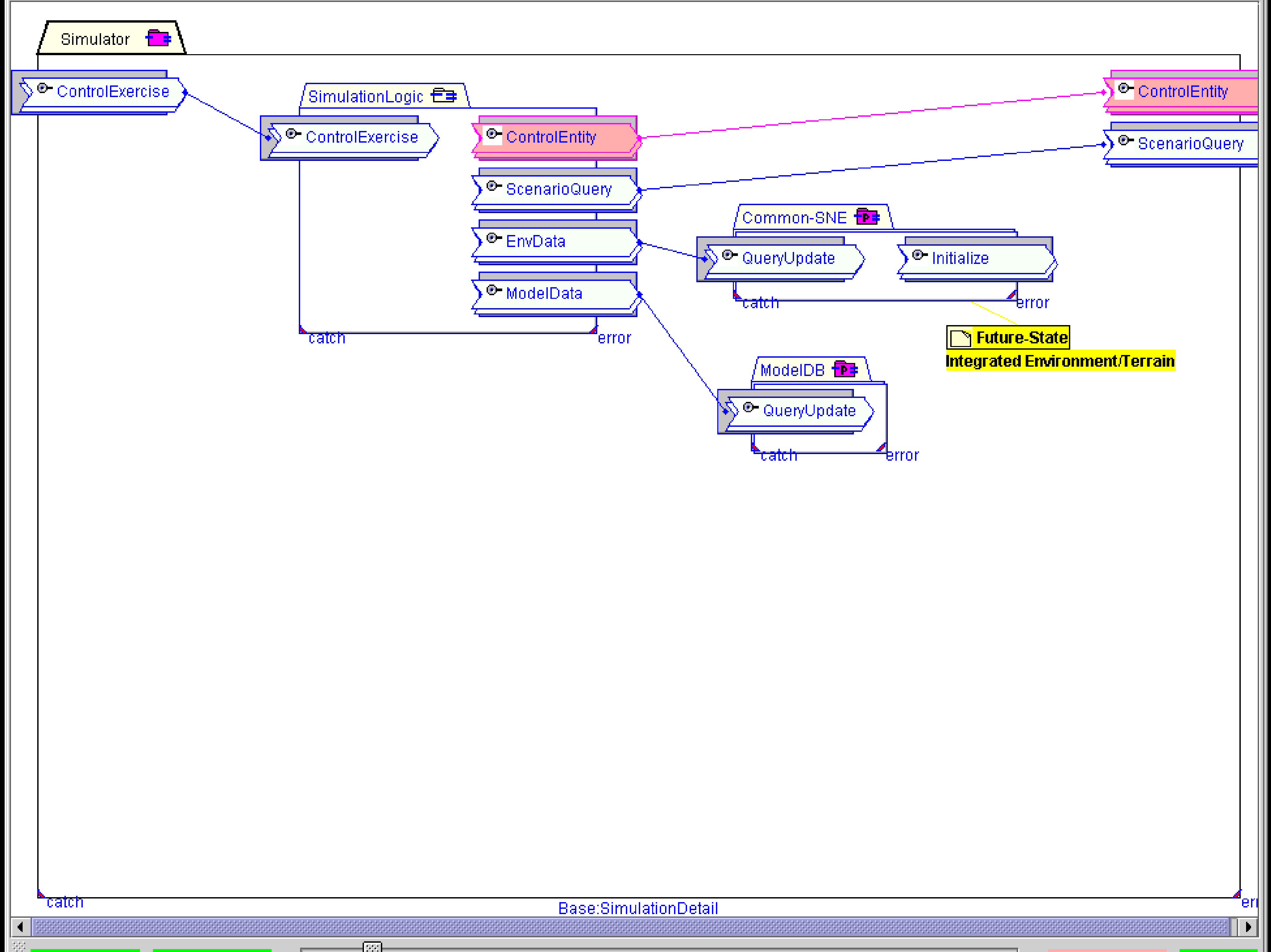
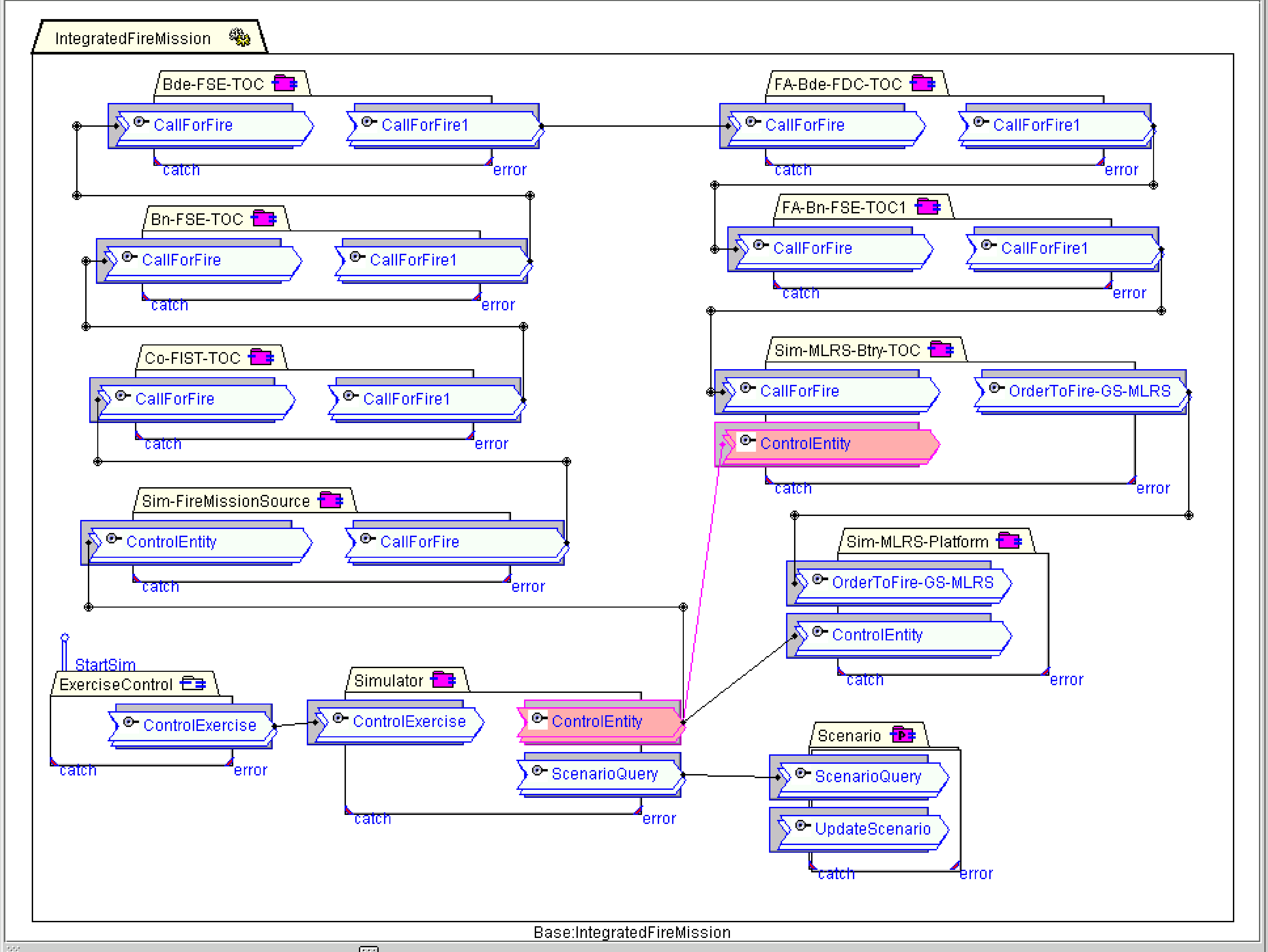
QueryUpdate
Initialize
catch
error
Future-State
Integrated Environment/Terrain
ModelDB
QueryUpdate
catch
error
catch
Base:SimulationDetail
err



Future-State
Integrated Environment/Terrain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CallForFire
CallForFire1
catch
error
FA-Bde-FDC-TOC
CallForFire
CallForFire1
catch
error
Bn-FSE-TOC
CallForFire
CallForFire1
catch
error
FA-Bn-FSE-TOC1
CallForFire
CallForFire1
catch
error
Co-FIST-TOC
CallForFire
CallForFire1
catch
error
Sim-MLRS-Btry-TOC
CallForFire
OrderToFire-GS-MLRS
ControlEntity
catch
error
Sim-FireMissionSource
ControlEntity
CallForFire
catch
error
Sim-MLRS-Platform
OrderToFire-GS-MLRS
ControlEntity
catch
error
StartSim
ExerciseControl
ControlExercise
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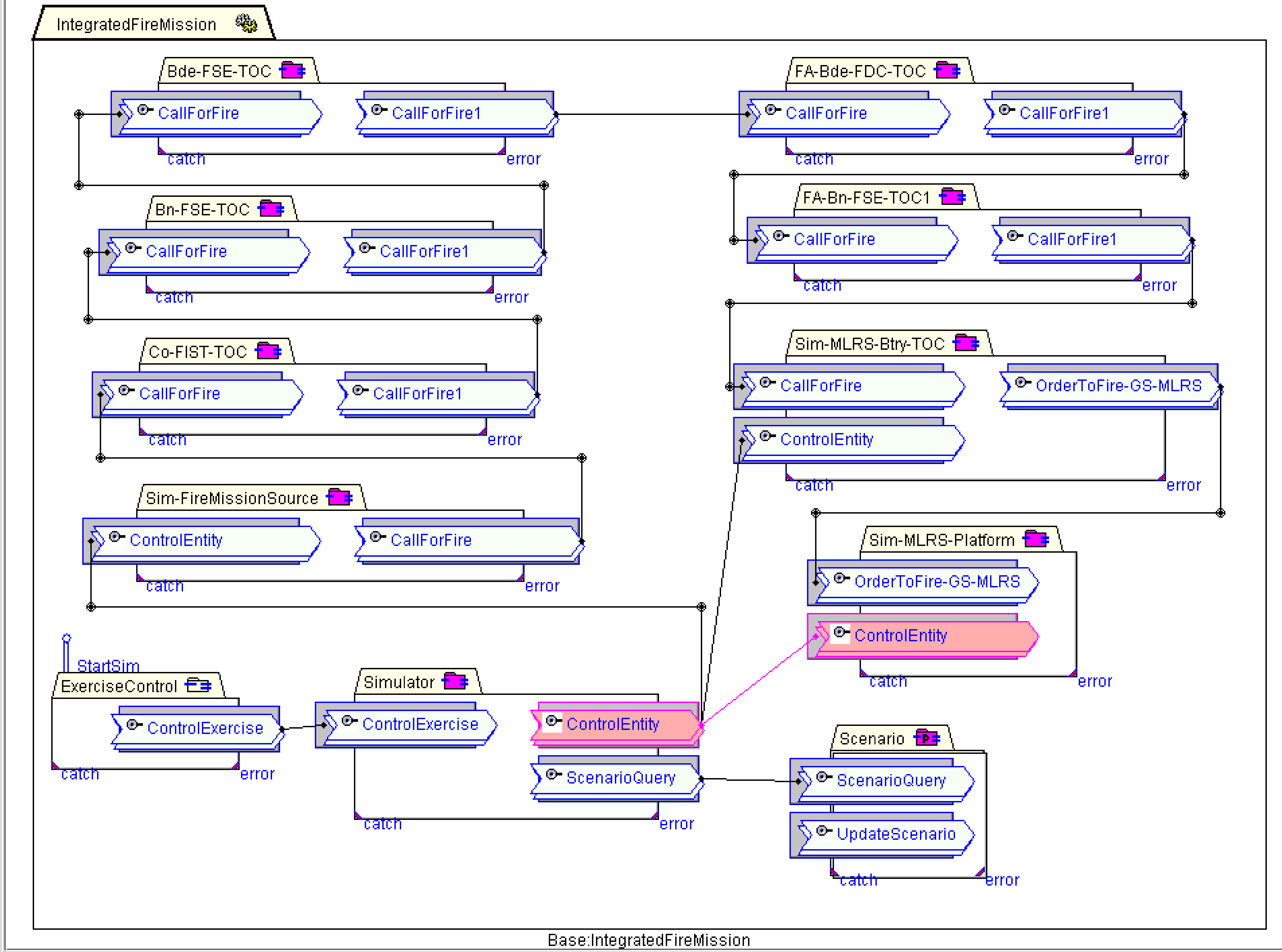
UpdateScenario
catch
error
Base:IntegratedFireMission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CallForFire1
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CallForFire1
catch
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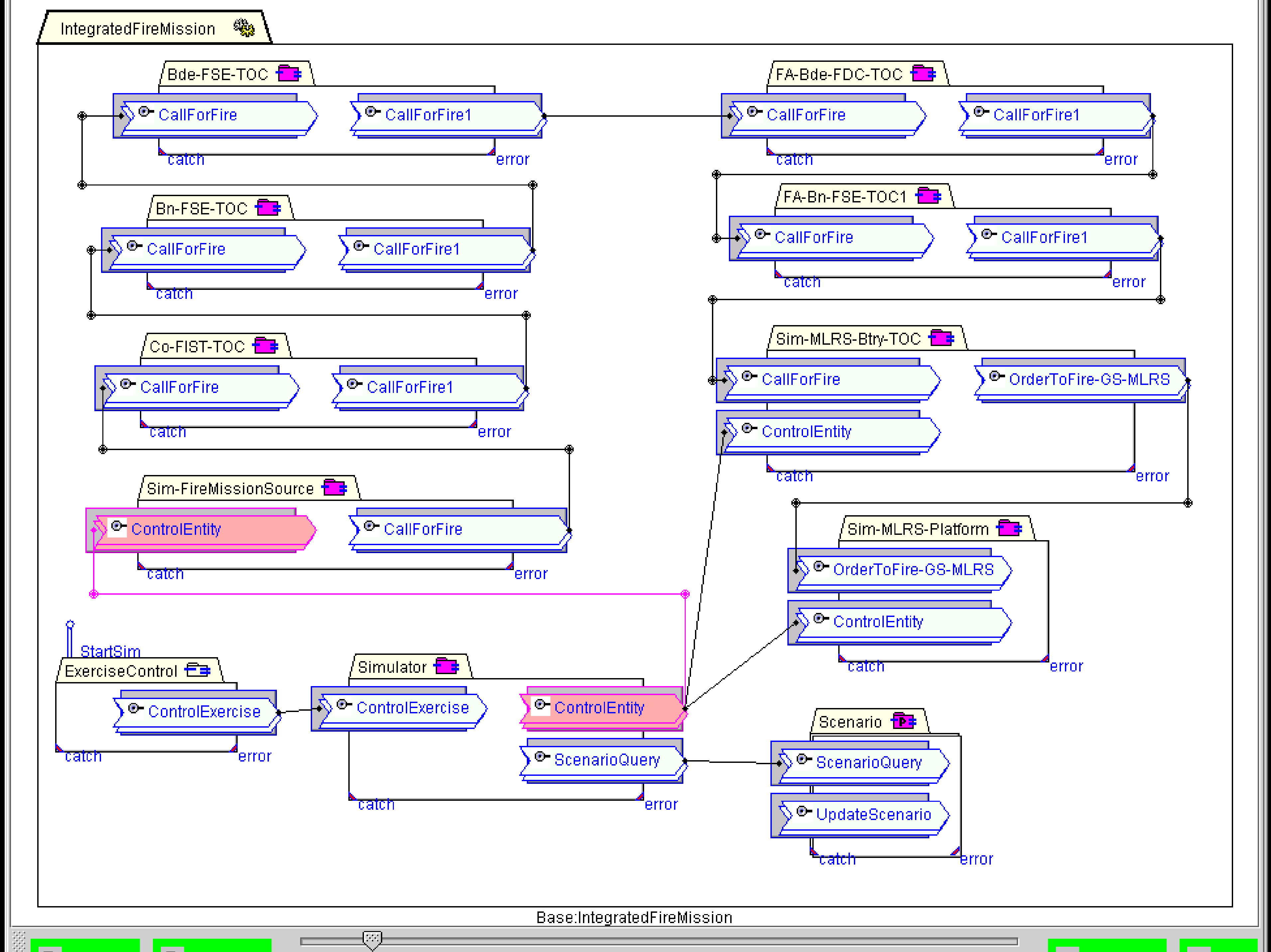
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error
Bn-FSE-TOC
CallForFire
CallForFire1
catch
error
FA-Bn-FSE-TOC1
CallForFire
CallForFire1
catch
error
Co-FIST-TOC
CallForFire
CallForFire1
catch
error
Sim-MLRS-Btry-TOC
CallForFire
OrderToFire-GS-MLRS
ControlEntity
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error
Sim-FireMissionSource
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ExerciseControl
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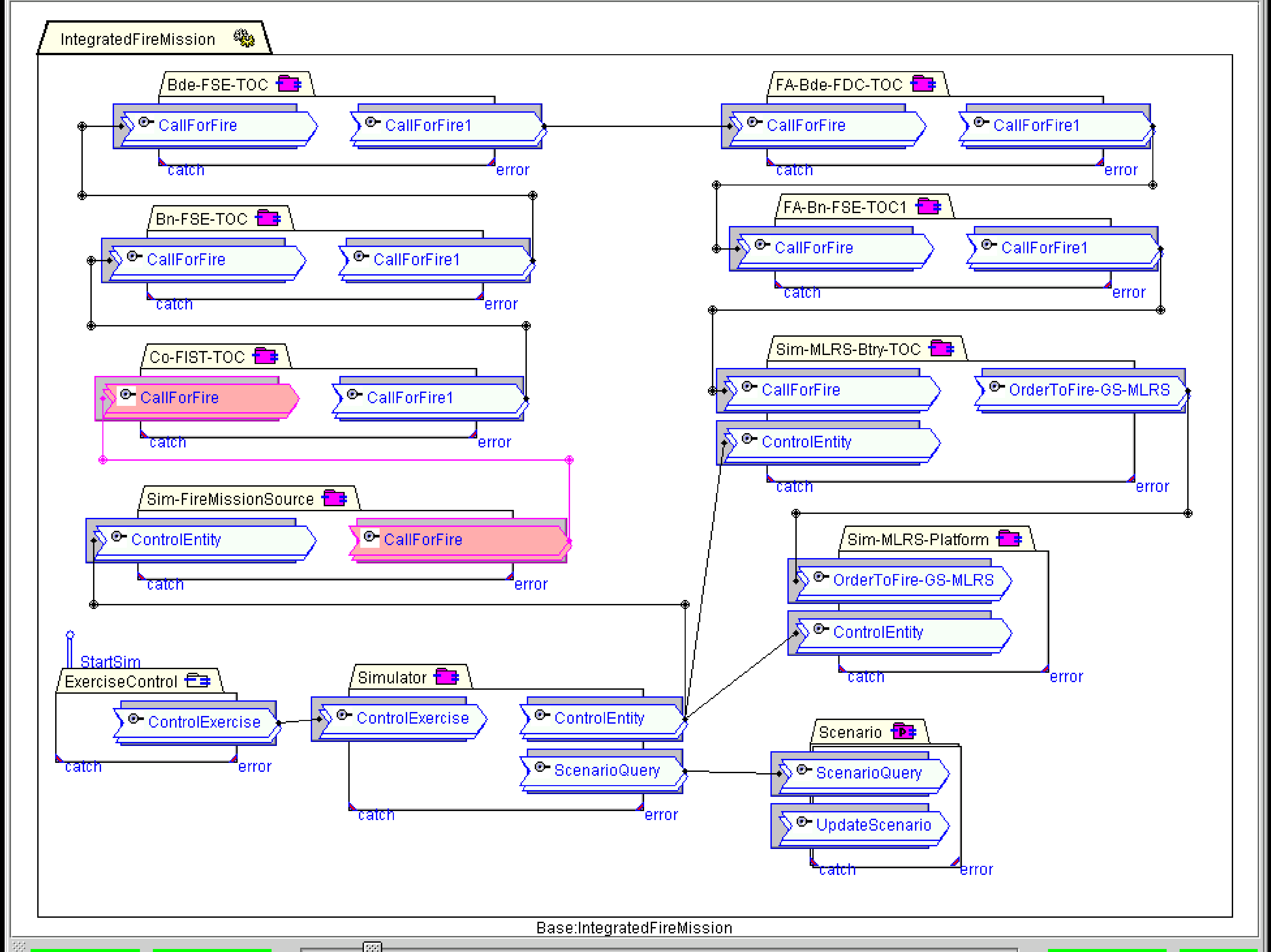
catch
error
Base:IntegratedFireMission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catch
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FA-Bde-FDC-TOC
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CallForFire1
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Bn-FSE-TOC
CallForFire
CallForFire1
catch
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FA-Bn-FSE-TOC1
CallForFire
CallForFire1
catch
error
Co-FIST-TOC
CallForFire
CallForFire1
catch
error
Sim-MLRS-Btry-TOC
CallForFire
OrderToFire-GS-MLRS
ControlEntity
catch
error
Sim-FireMissionSource
ControlEntity
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catch
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ControlExercise
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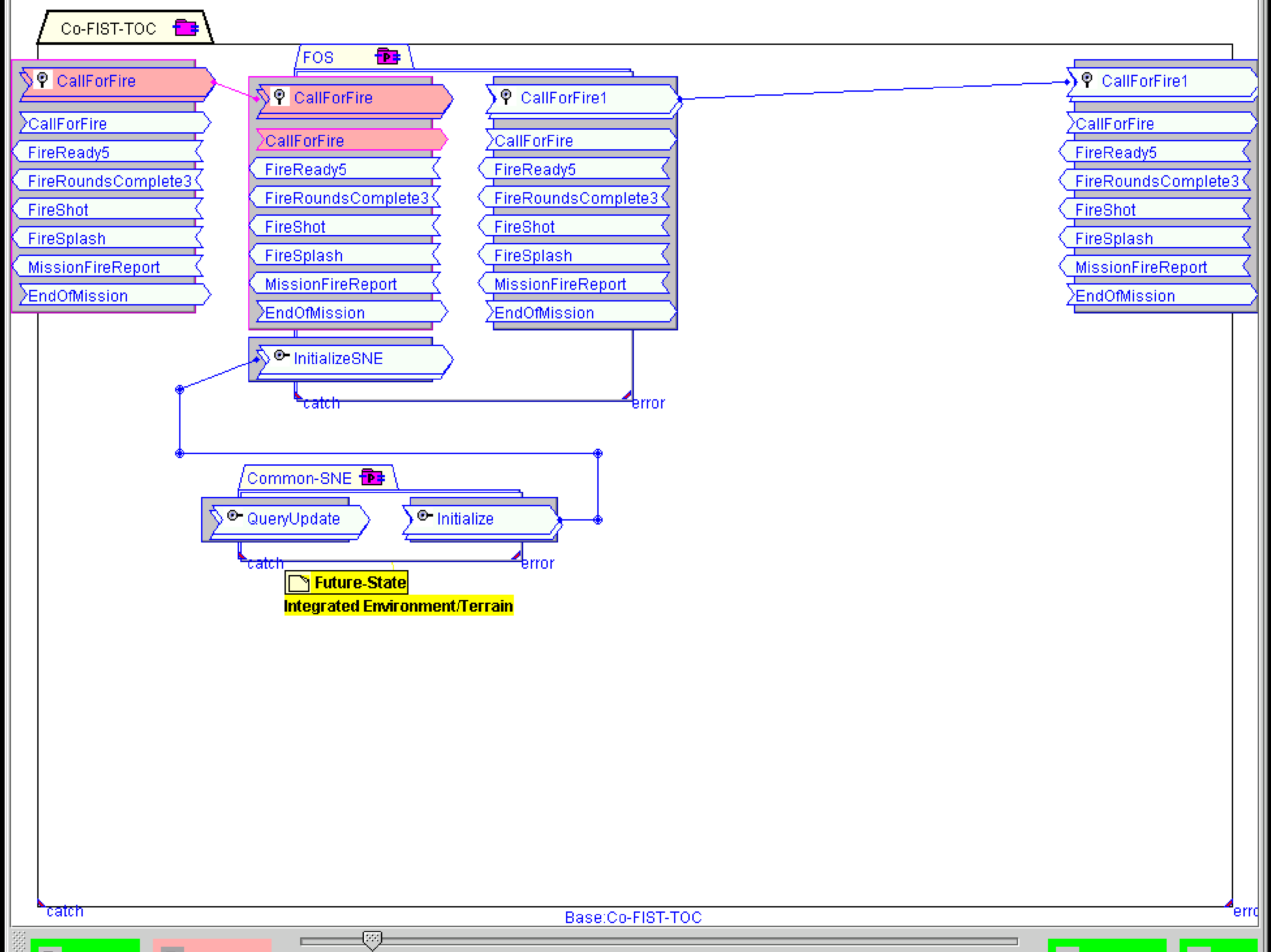
Base:IntegratedFireMission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FireRoundsComplete3
FireShot
FireSplash
MissionFireReport
EndOfMission
FOS
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CallForFire
FireReady5
FireRoundsComplete3
FireShot
FireSplash
MissionFireReport
EndOfMission
CallForFire1
CallForFire
FireReady5
FireRoundsComplete3
FireShot
FireSplash
MissionFireReport
EndOfMission
CallForFire1
CallForFire
FireReady5
FireRoundsComplete3
FireShot
FireSplash
MissionFireReport
EndOfMission
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QueryUpdate
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Future-State
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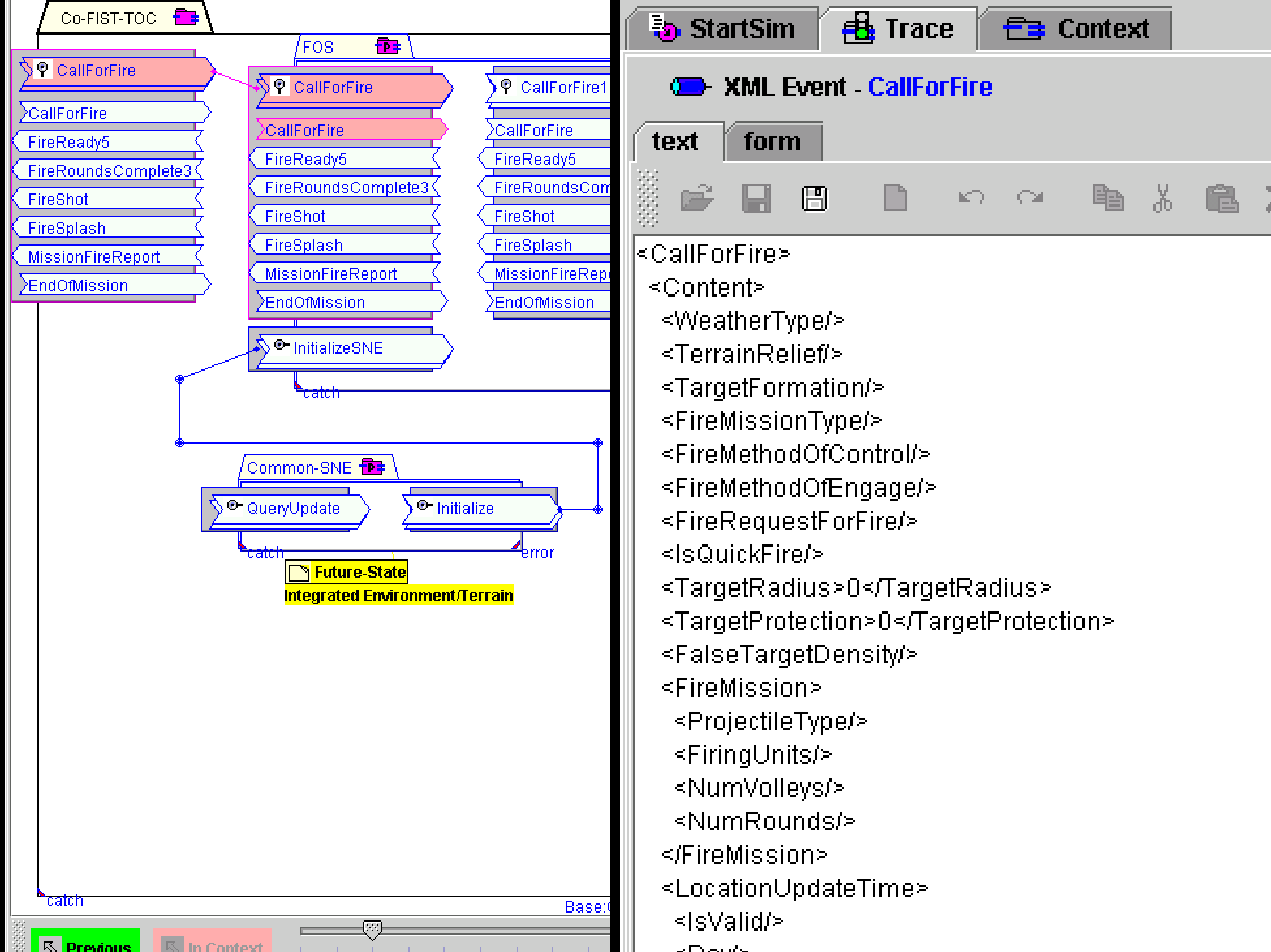

XML Event - CallForFire

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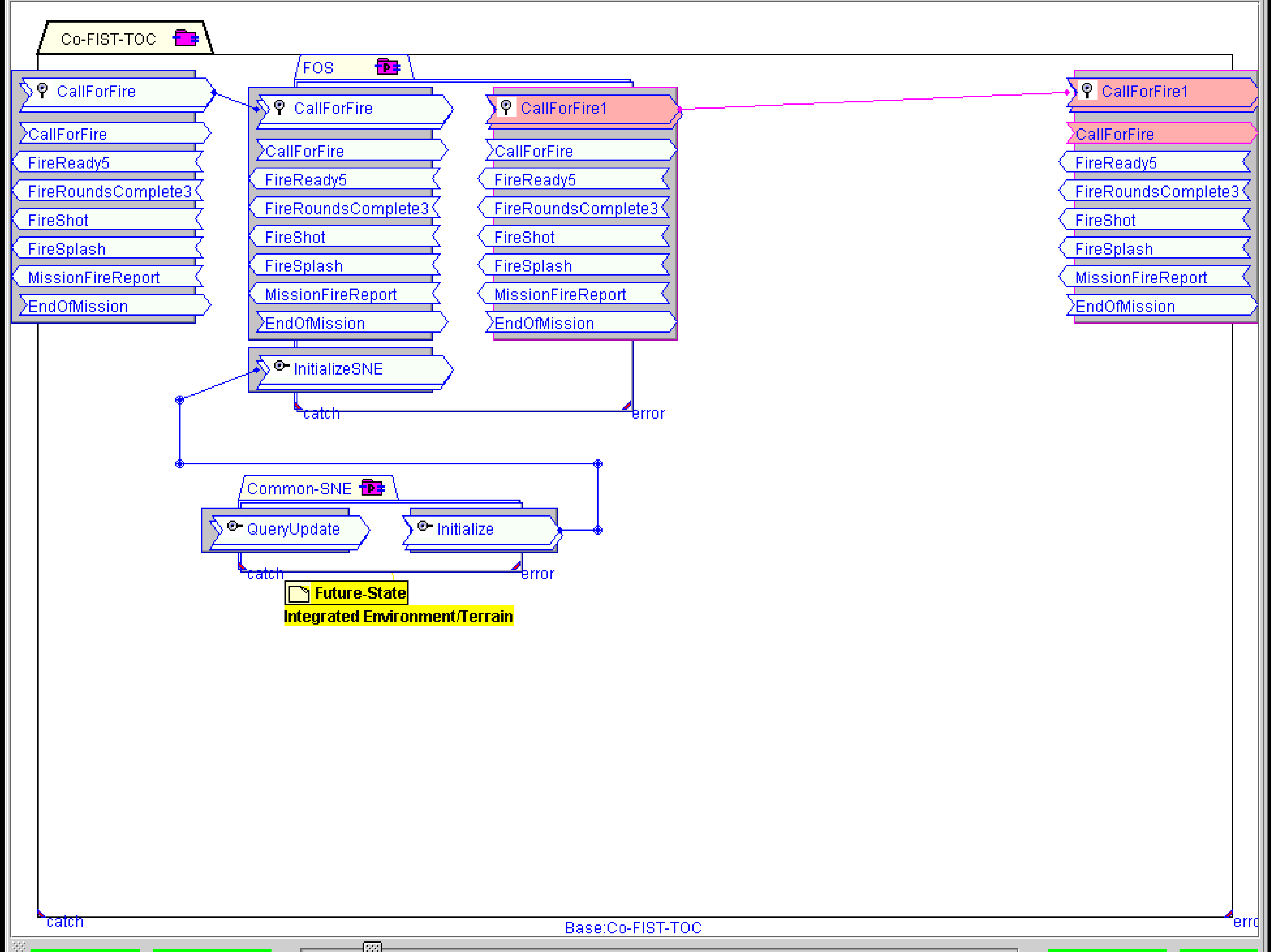
Co-FIST-TOC
CallForFire
CallForFire
FireReady5
FireRoundsComplete3
FireShot
FireSplash
MissionFireReport
EndOfMission
FOS
CallForFire
CallForFire
FireReady5
FireRoundsComplete3
FireShot
FireSplash
MissionFireReport
EndOfMission
CallForFire1
CallForFire
FireReady5
FireRoundsComplete3
FireShot
FireSplash
MissionFireReport
EndOfMission
CallForFire1
CallForFire
FireReady5
FireRoundsComplete3
FireShot
FireSplash
MissionFireReport
EndOfMission
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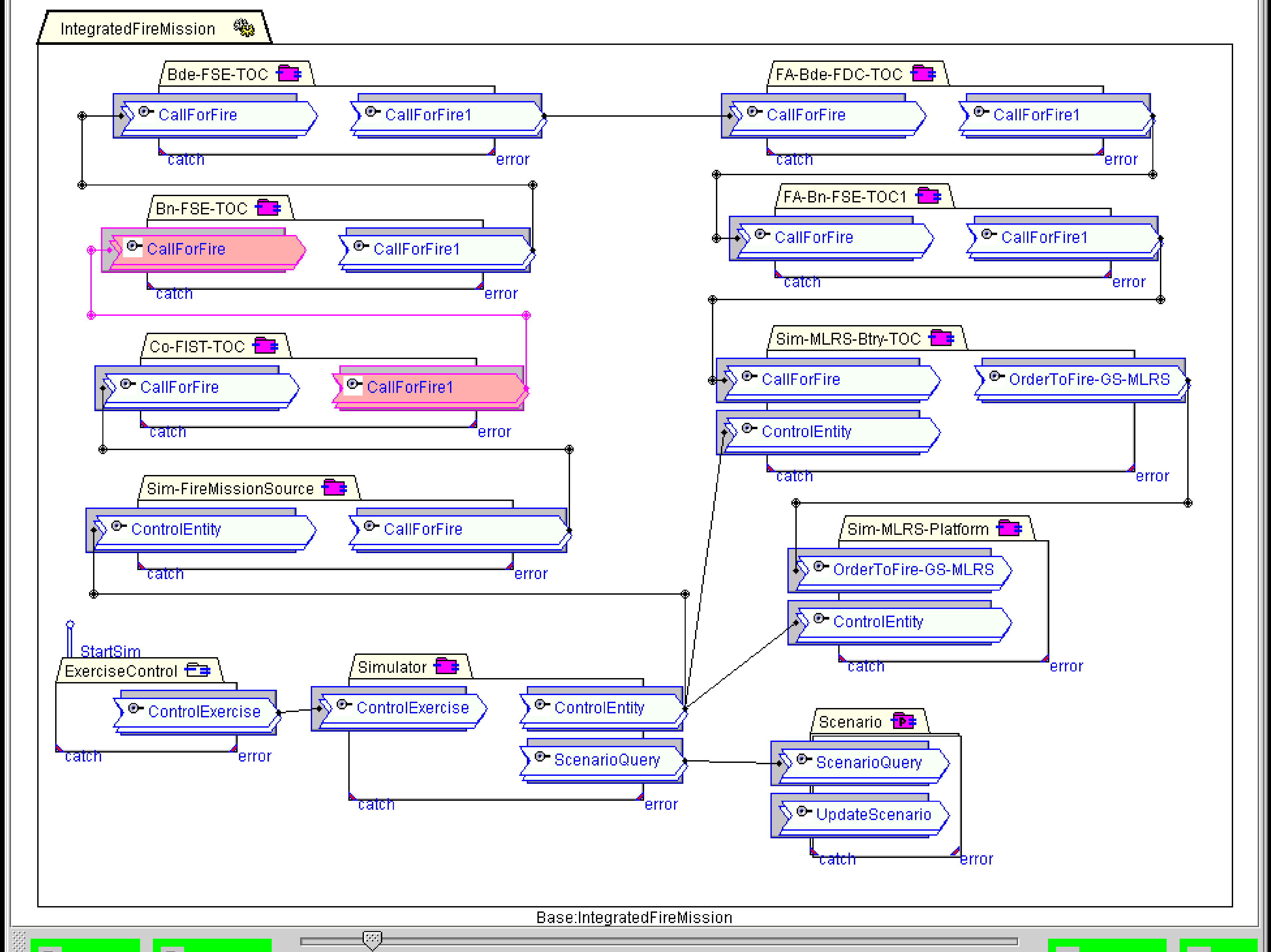
Common-SNE
QueryUpdate
Initialize
catch
error
Future-State
Integrated Environment/Terrain
catch
Base:Co-FIST-TOC
err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FA-Bde-FDC-TOC
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CallForFire1
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Bn-FSE-TOC
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FA-Bn-FSE-TOC1
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Co-FIST-TOC
CallForFire
CallForFire1
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Sim-MLRS-Btry-TOC
CallForFire
OrderToFire-GS-MLRS
ControlEntity
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Sim-FireMissionSource
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Sim-MLRS-Platform
OrderToFire-GS-MLRS
ControlEntity
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ExerciseControl
ControlExercise
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ControlExercise
ControlEntity
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ScenarioQuery
UpdateScenario
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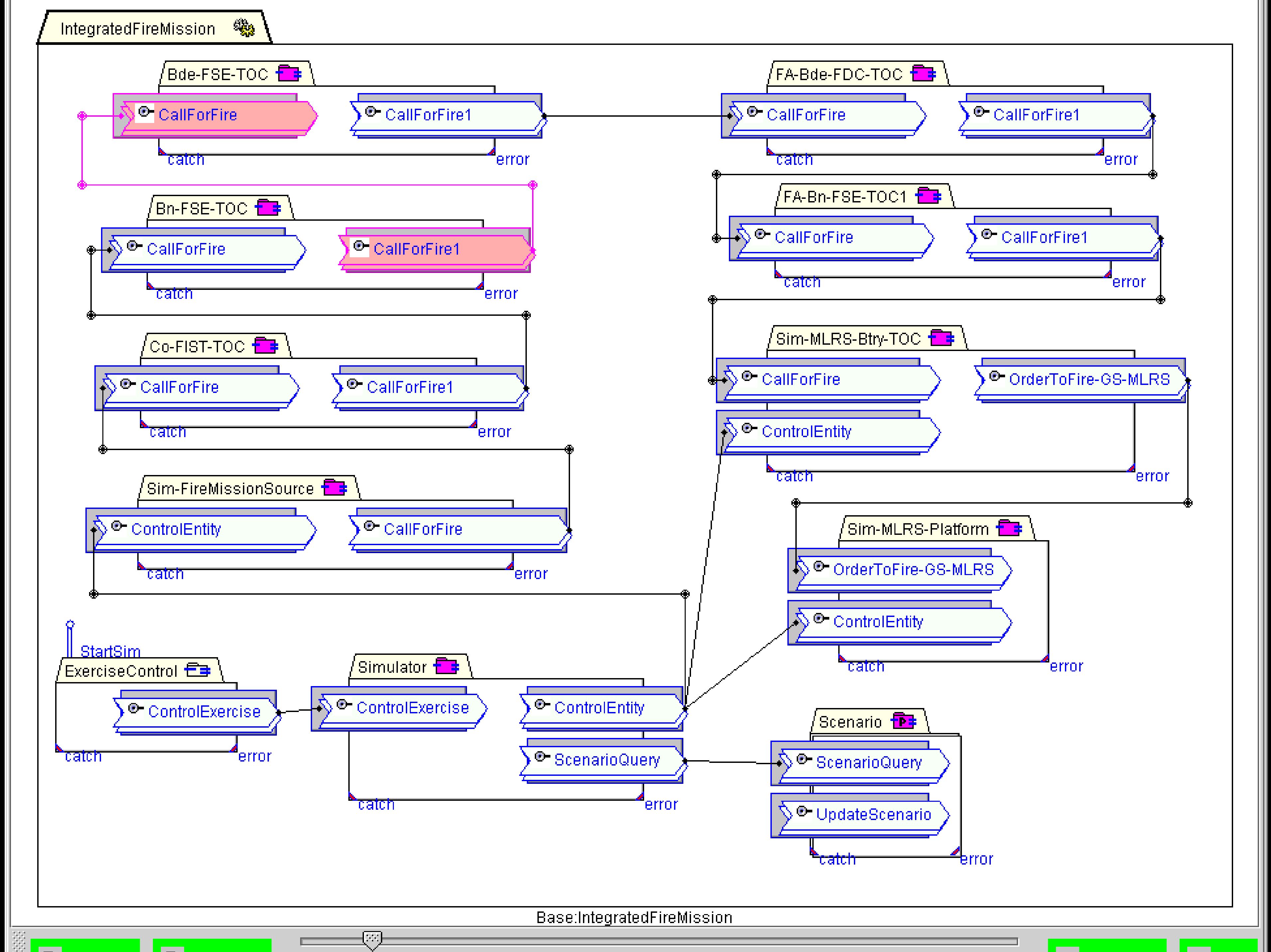
error
Base:IntegratedFireMission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Bde-FSE-TOC
CallForFire
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catch
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FA-Bde-FDC-TOC
CallForFire
CallForFire1
catch
error
Bn-FSE-TOC
CallForFire
CallForFire1
catch
error
FA-Bn-FSE-TOC1
CallForFire
CallForFire1
catch
error
Co-FIST-TOC
CallForFire
CallForFire1
catch
error
Sim-MLRS-Btry-TOC
CallForFire
OrderToFire-GS-MLRS
ControlEntity
catch
error
Sim-FireMissionSource
ControlEntity
CallForFire
catch
error
Sim-MLRS-Platform
OrderToFire-GS-MLRS
ControlEntity
catch
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StartSim
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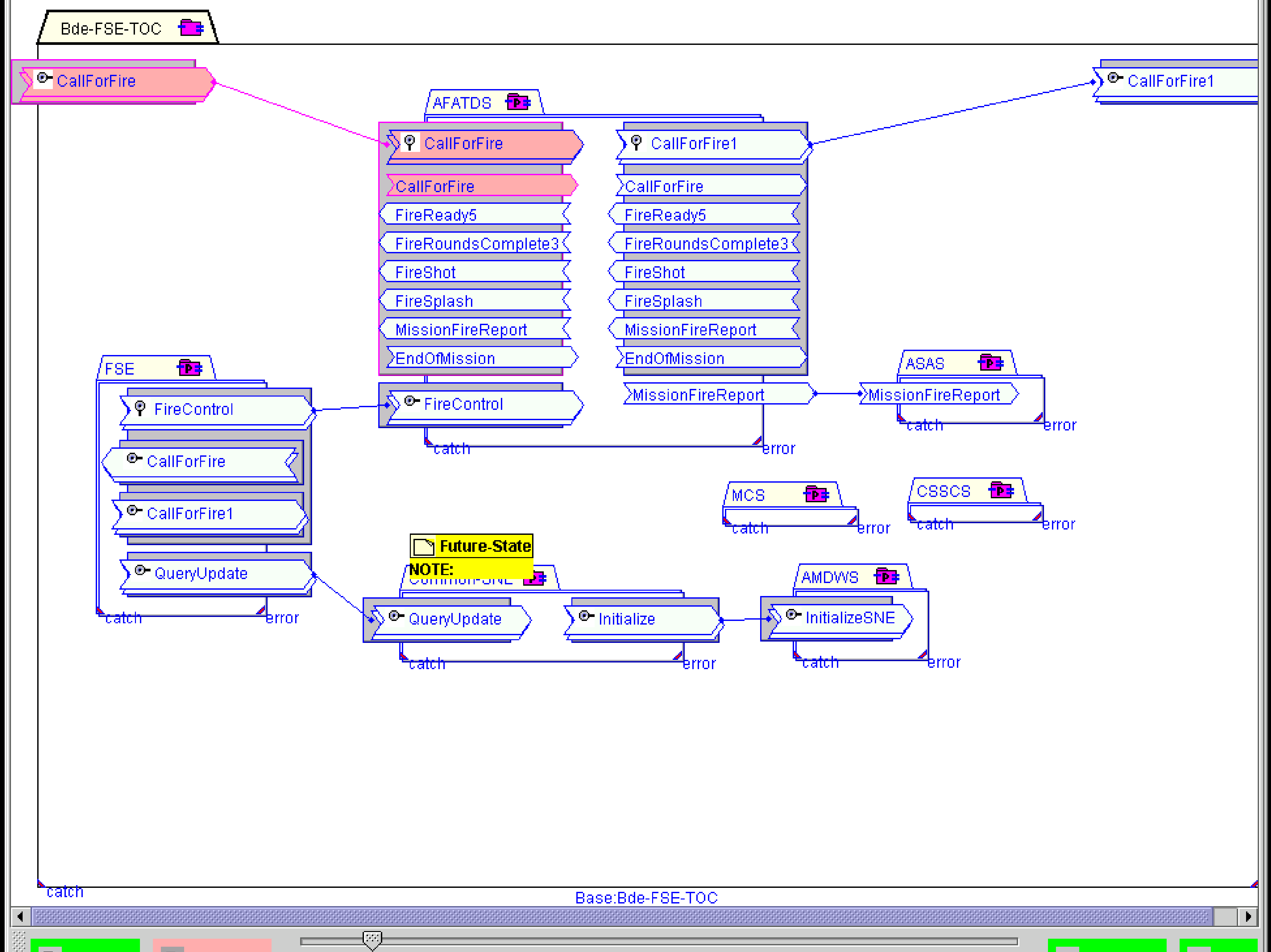
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EndOfMission
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FireRoundsComplete3
FireShot
FireSplash
MissionFireReport
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MissionFireReport
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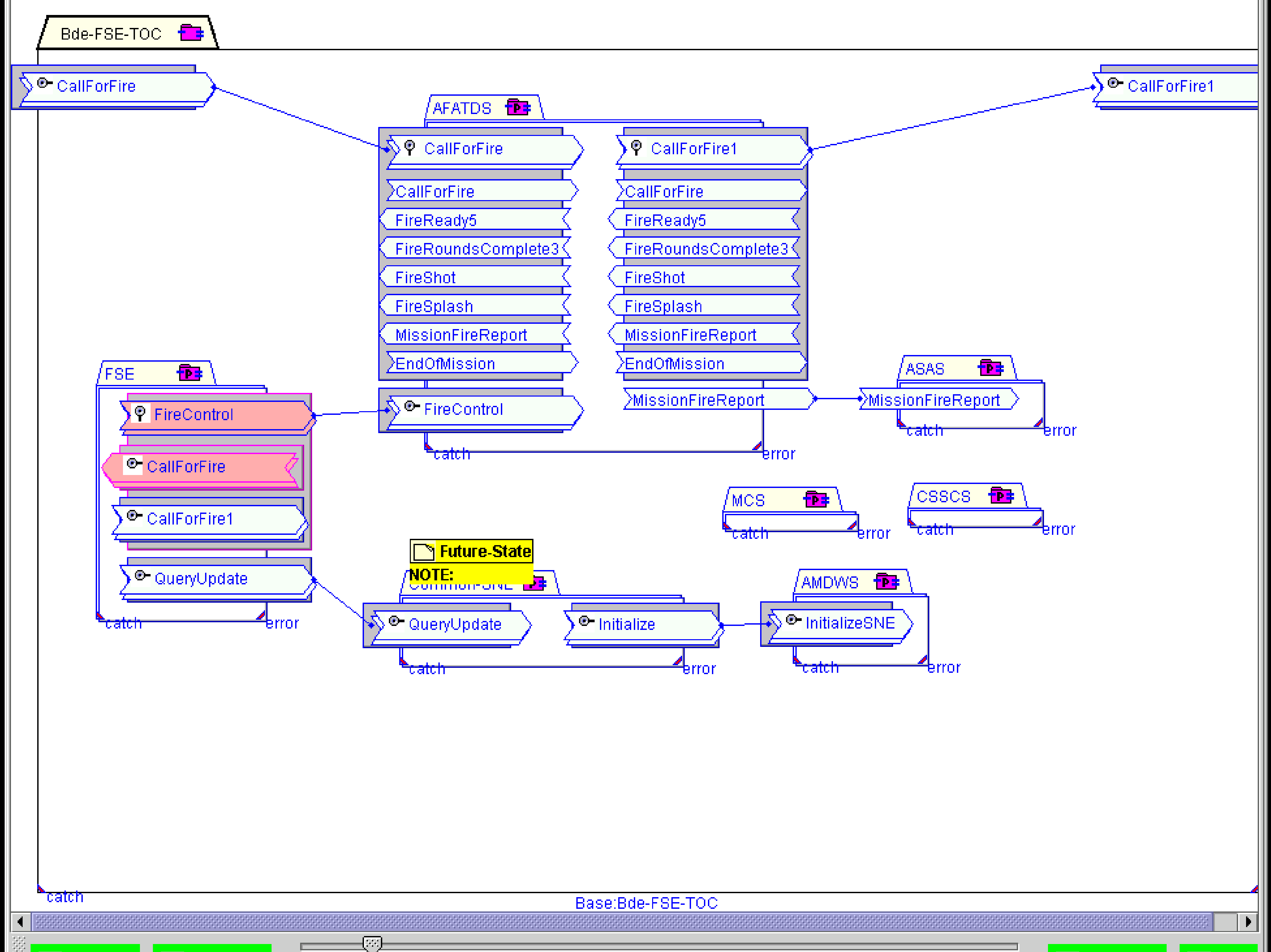
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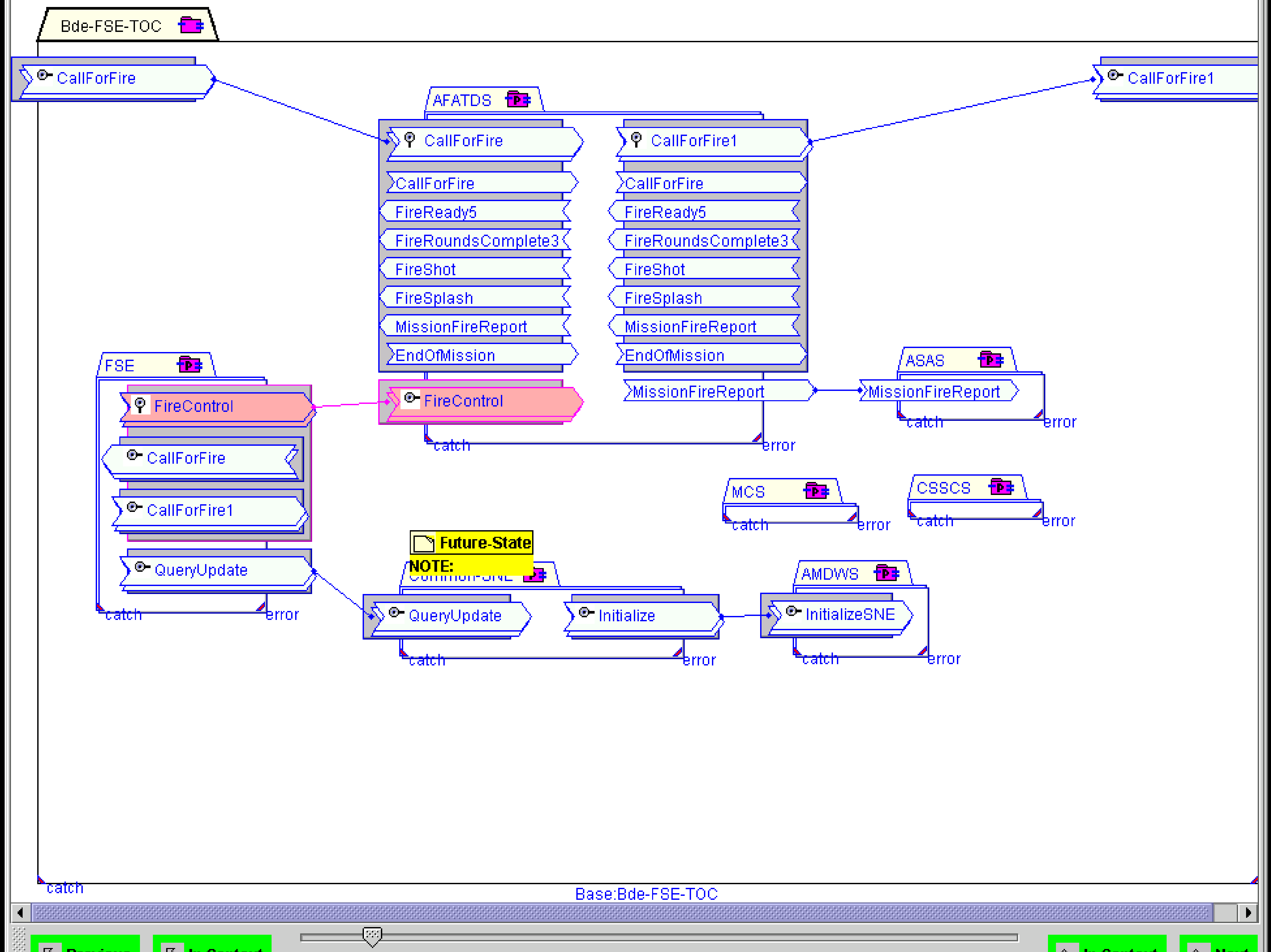
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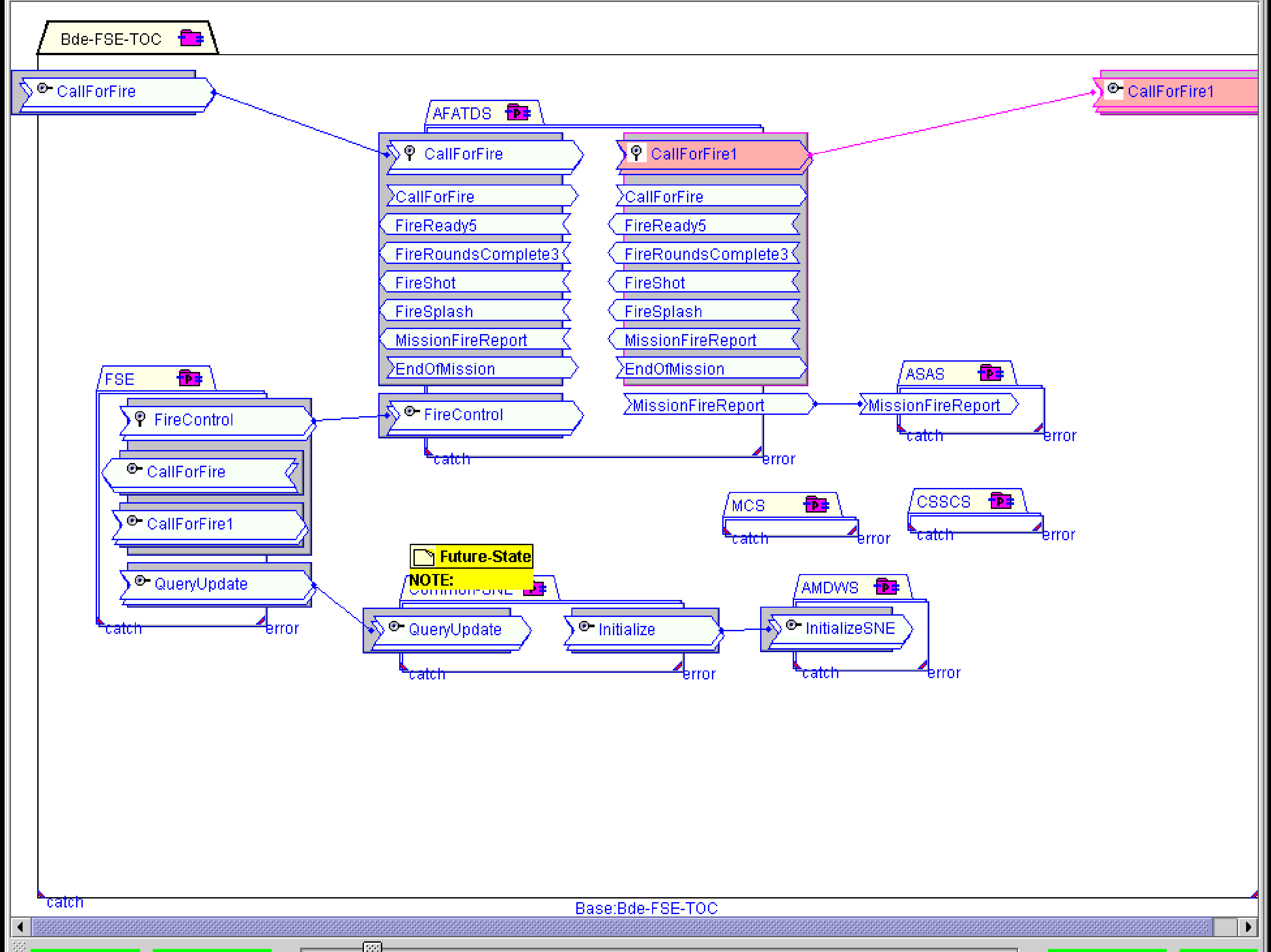
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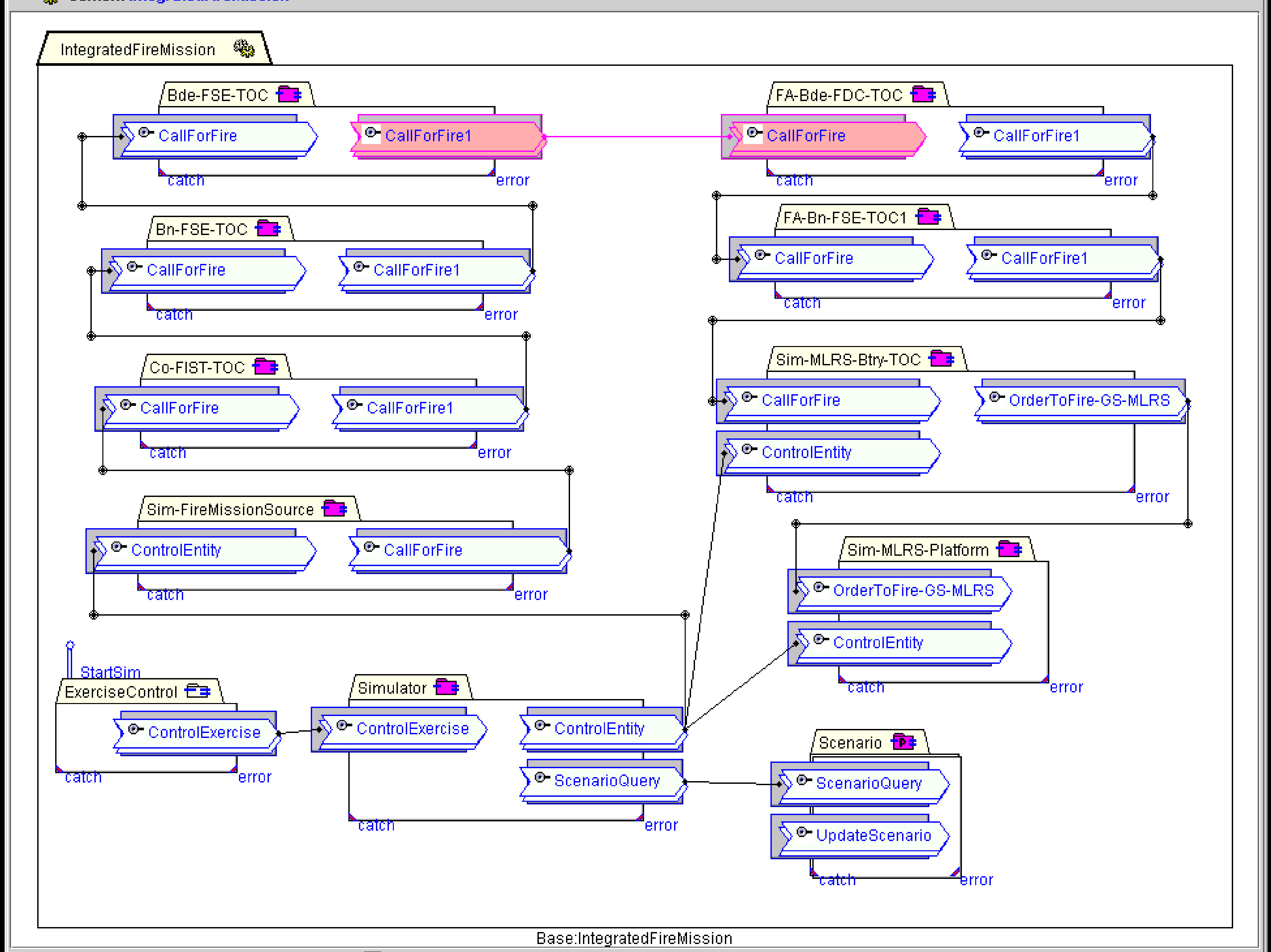
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Bn-FSE-TOC
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FA-Bn-FSE-TOC1
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catch
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CallForFire1
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Sim-FireMissionSource
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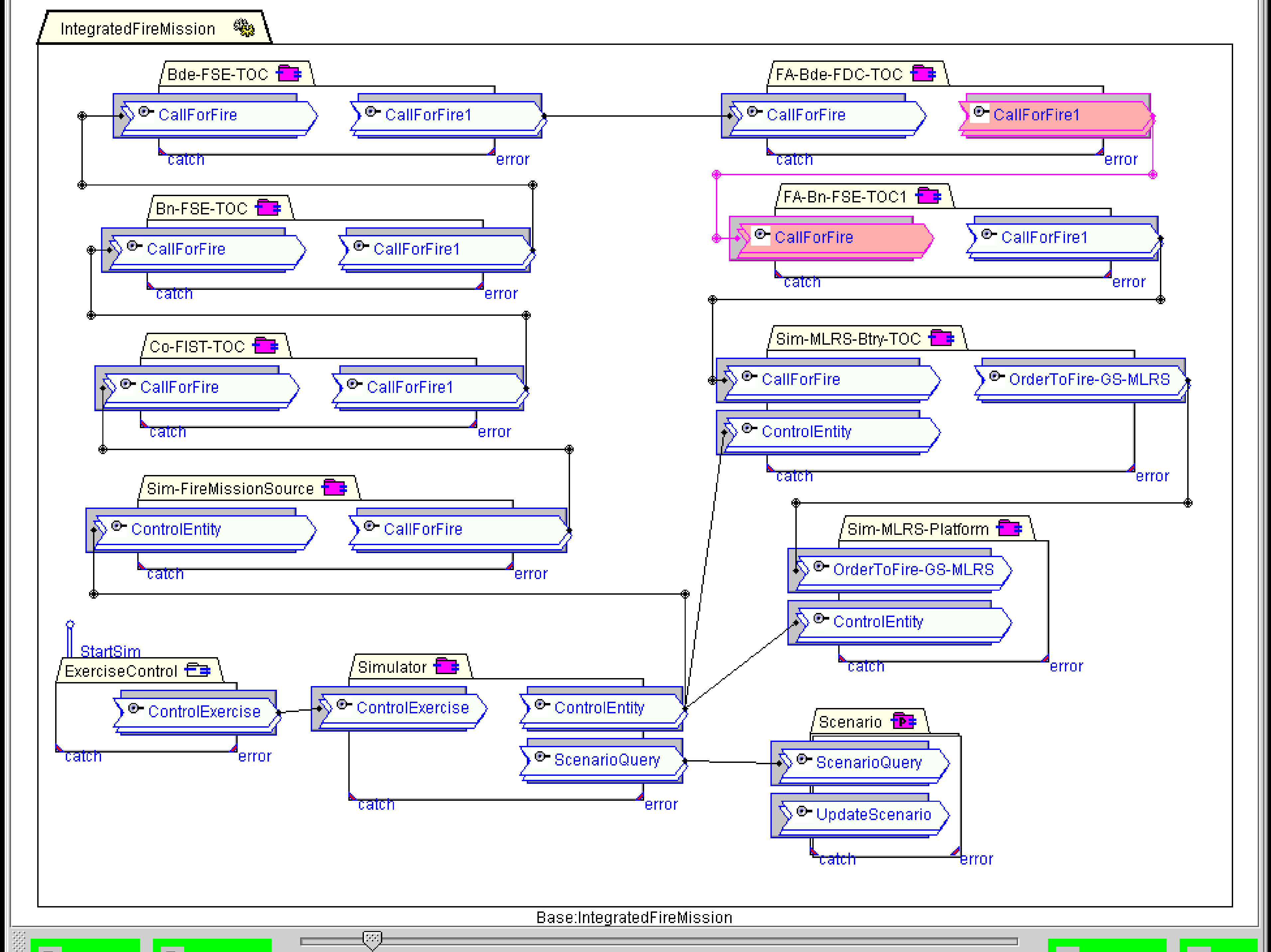
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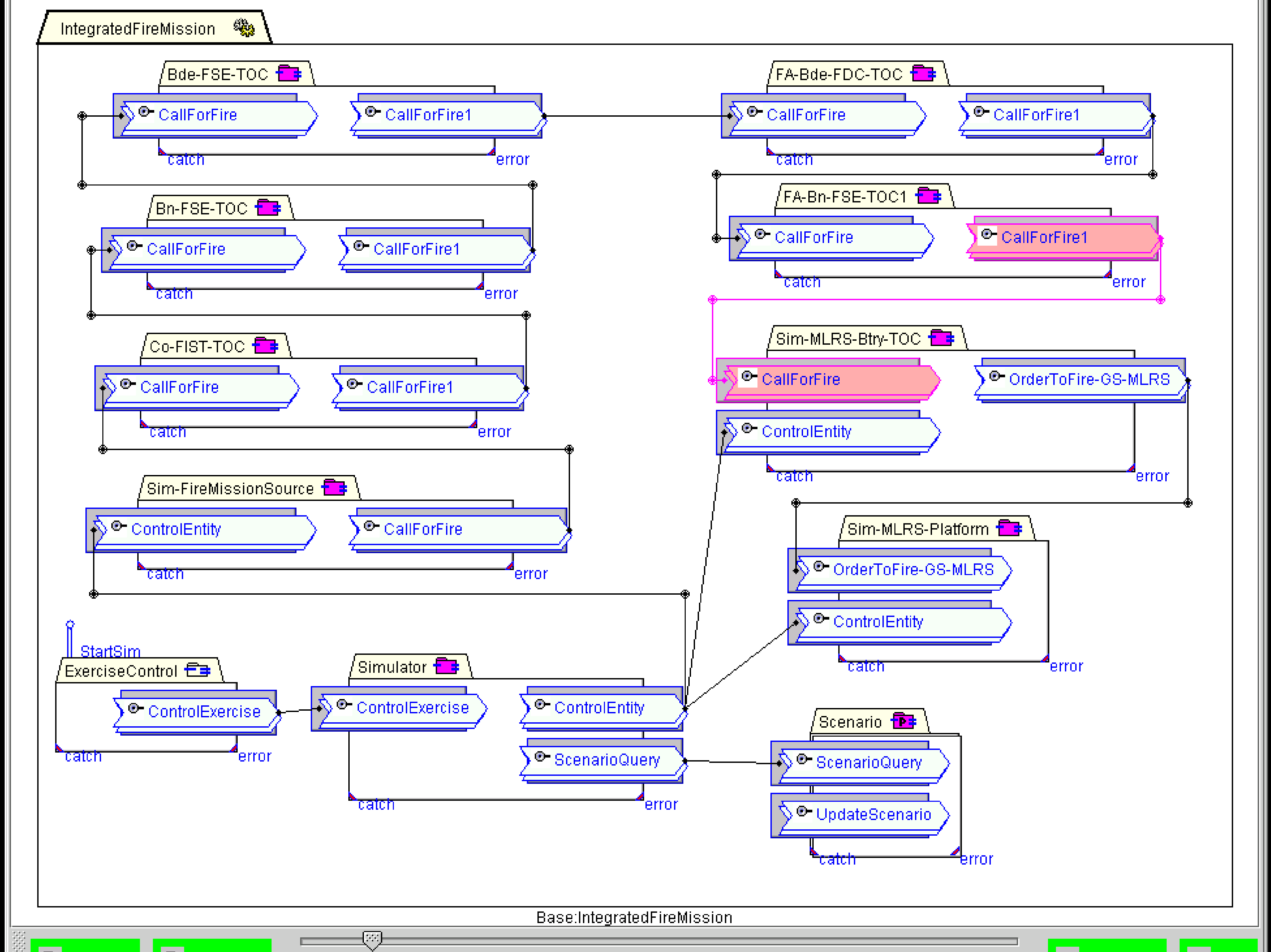
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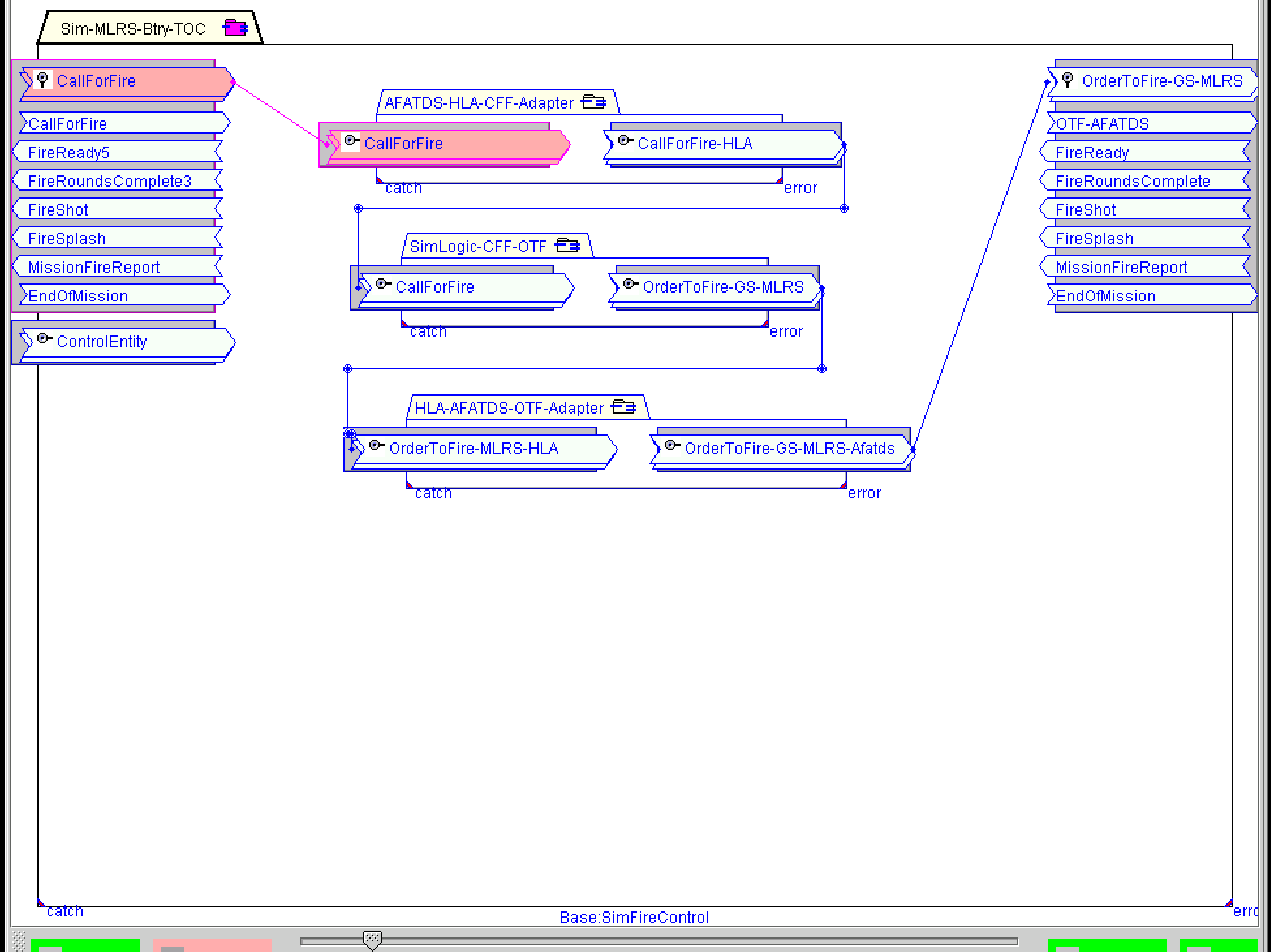
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CallForFire-HLA
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SimLogic-CFF-OTF
CallForFire
OrderToFire-GS-MLRS
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OrderToFire-MLRS-HLA
OrderToFire-GS-MLRS-Afatds
catch
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OrderToFire-GS-MLRS
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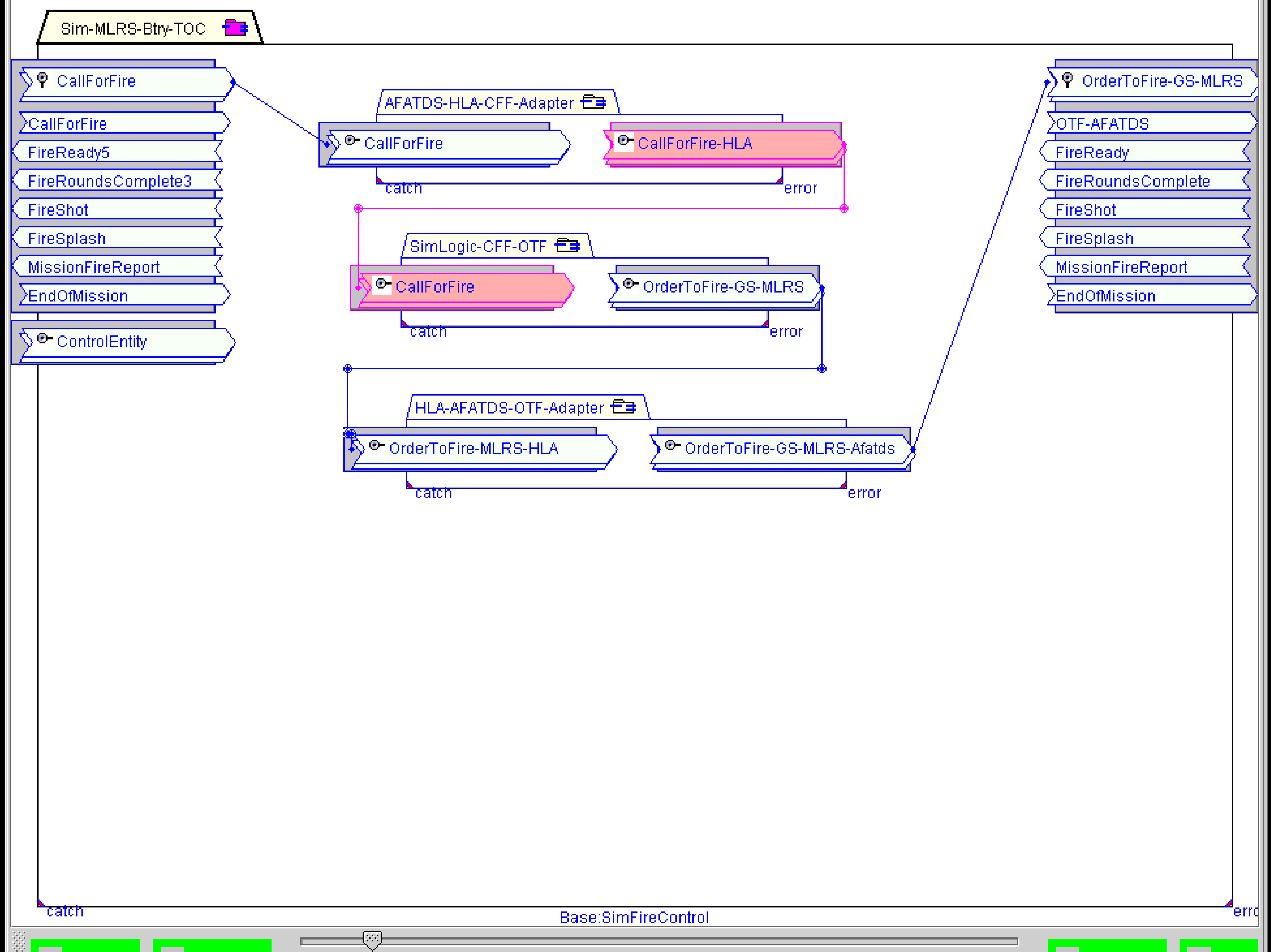
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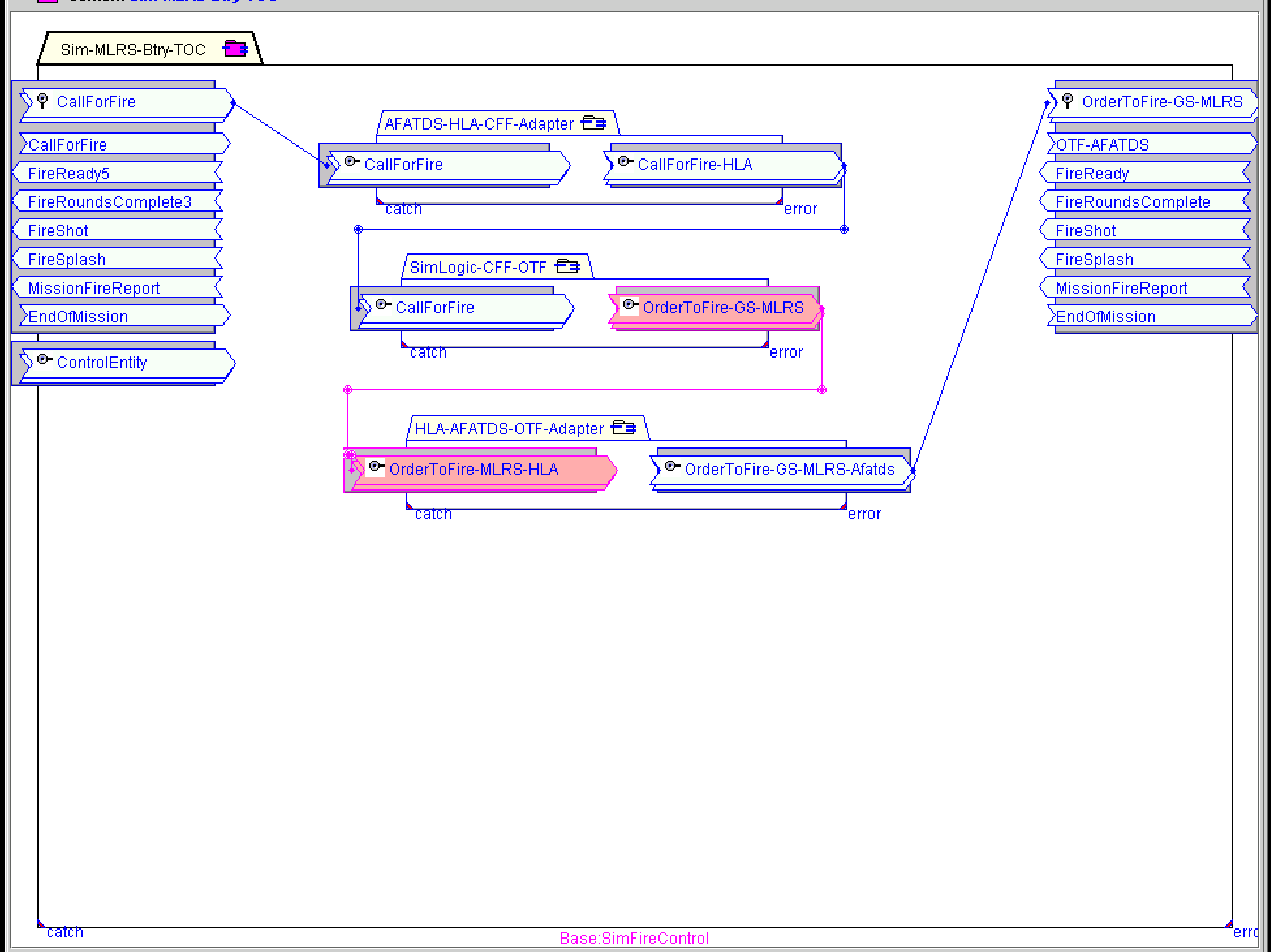
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OrderToFire-GS-MLRS
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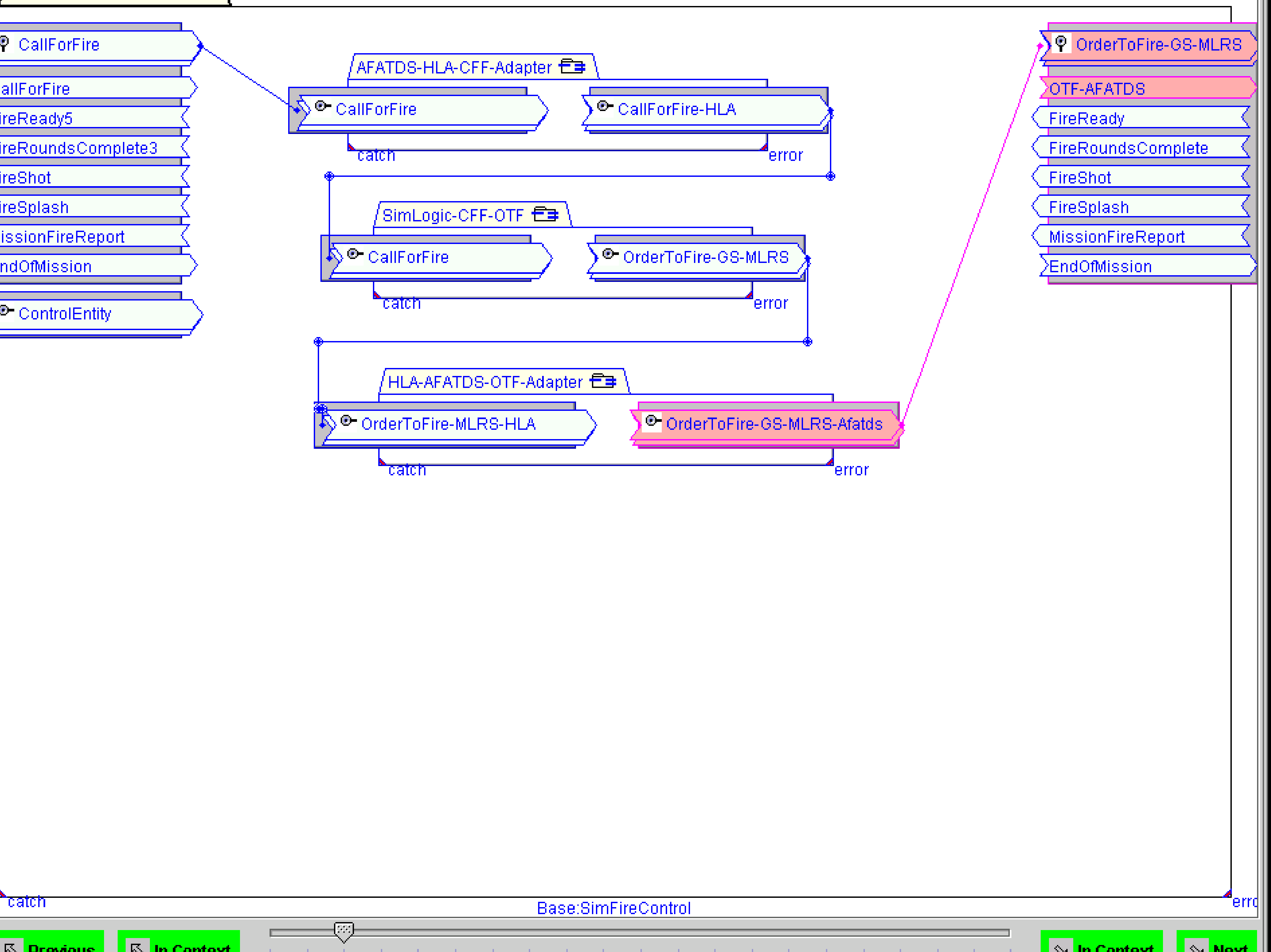
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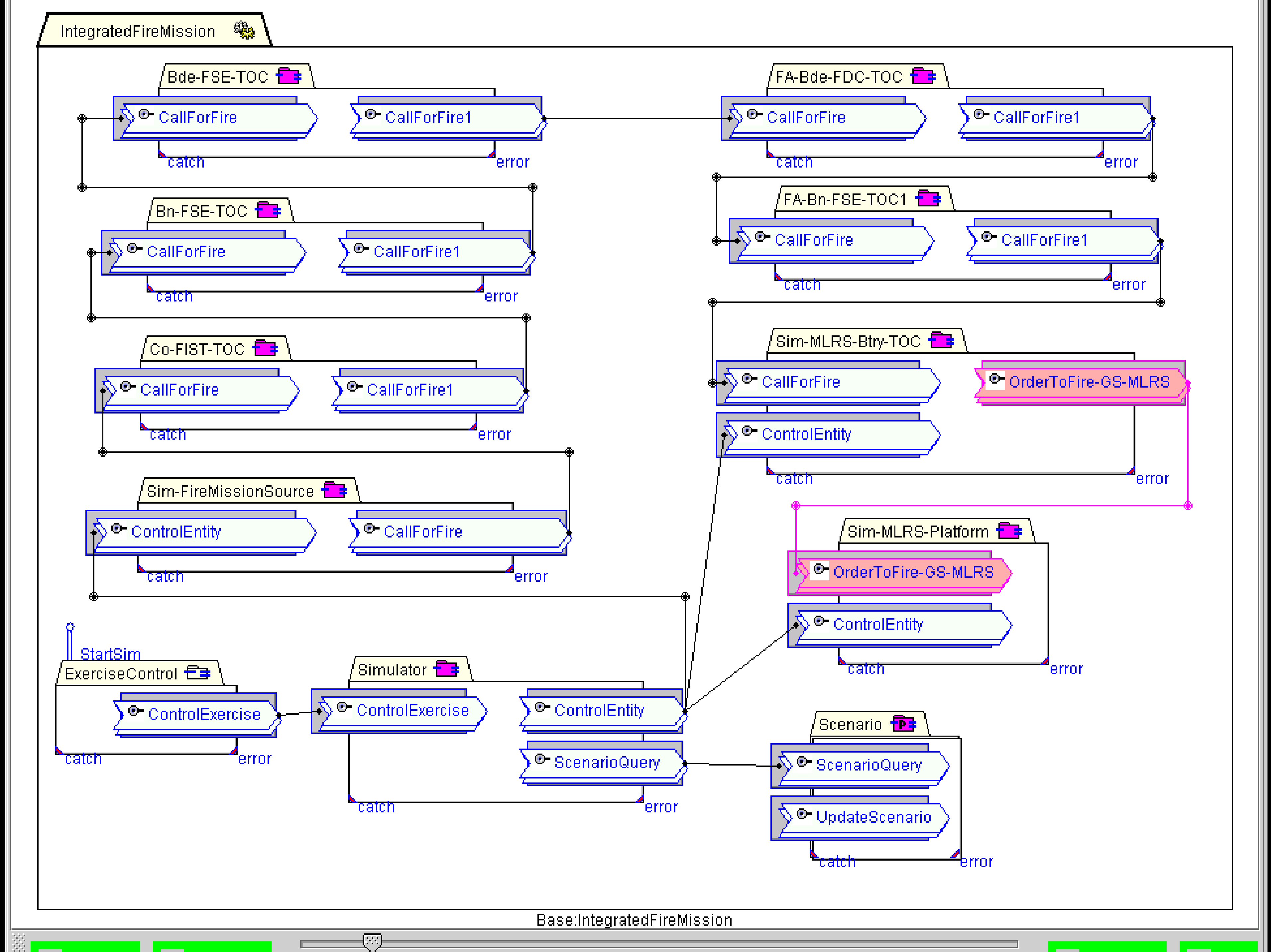
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Bn-FSE-TOC
CallForFire
CallForFire1
catch
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FA-Bn-FSE-TOC1
CallForFire
CallForFire1
catch
error
Co-FIST-TOC
CallForFire
CallForFire1
catch
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Sim-MLRS-Btry-TOC
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ControlExercise
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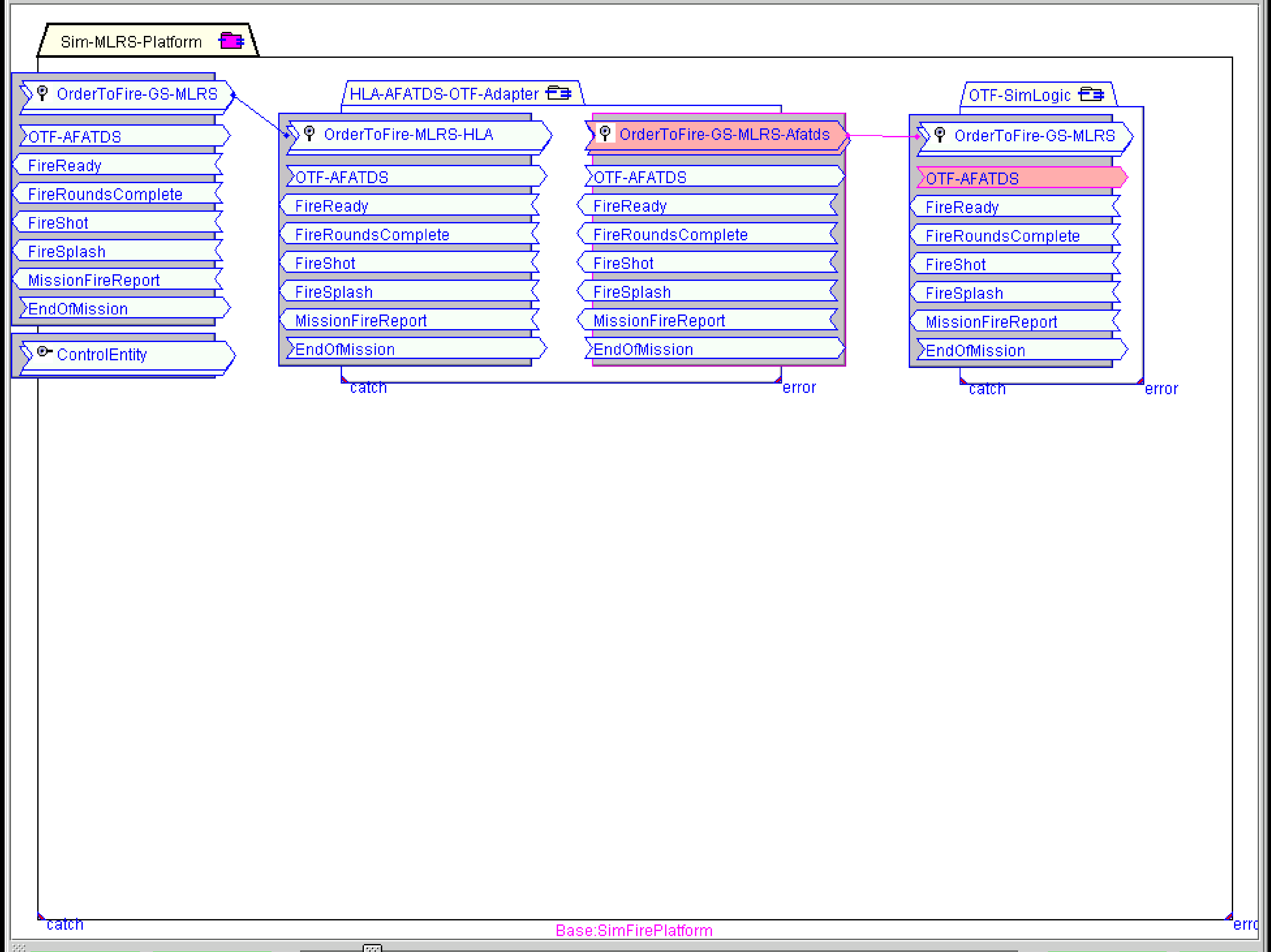
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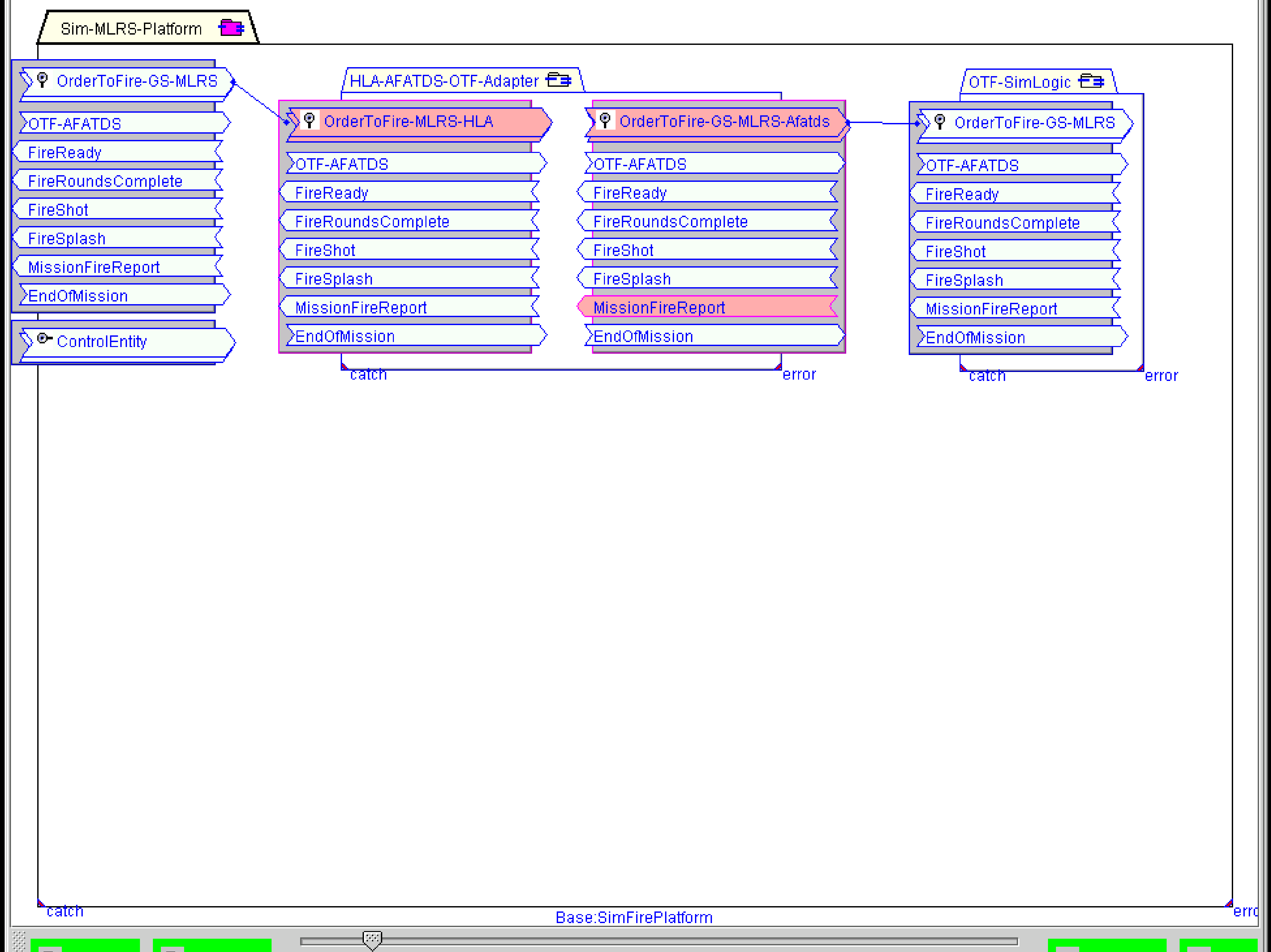
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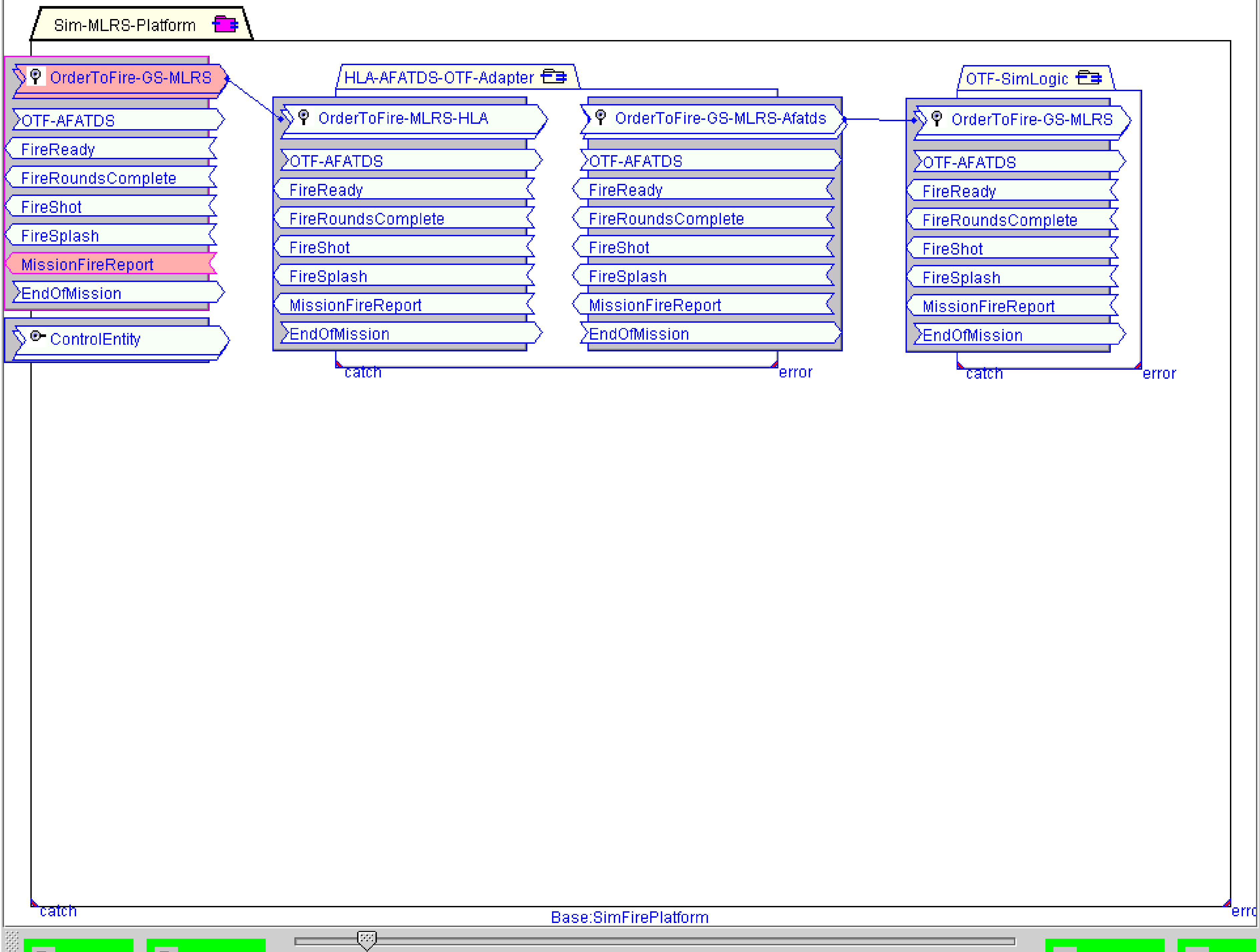
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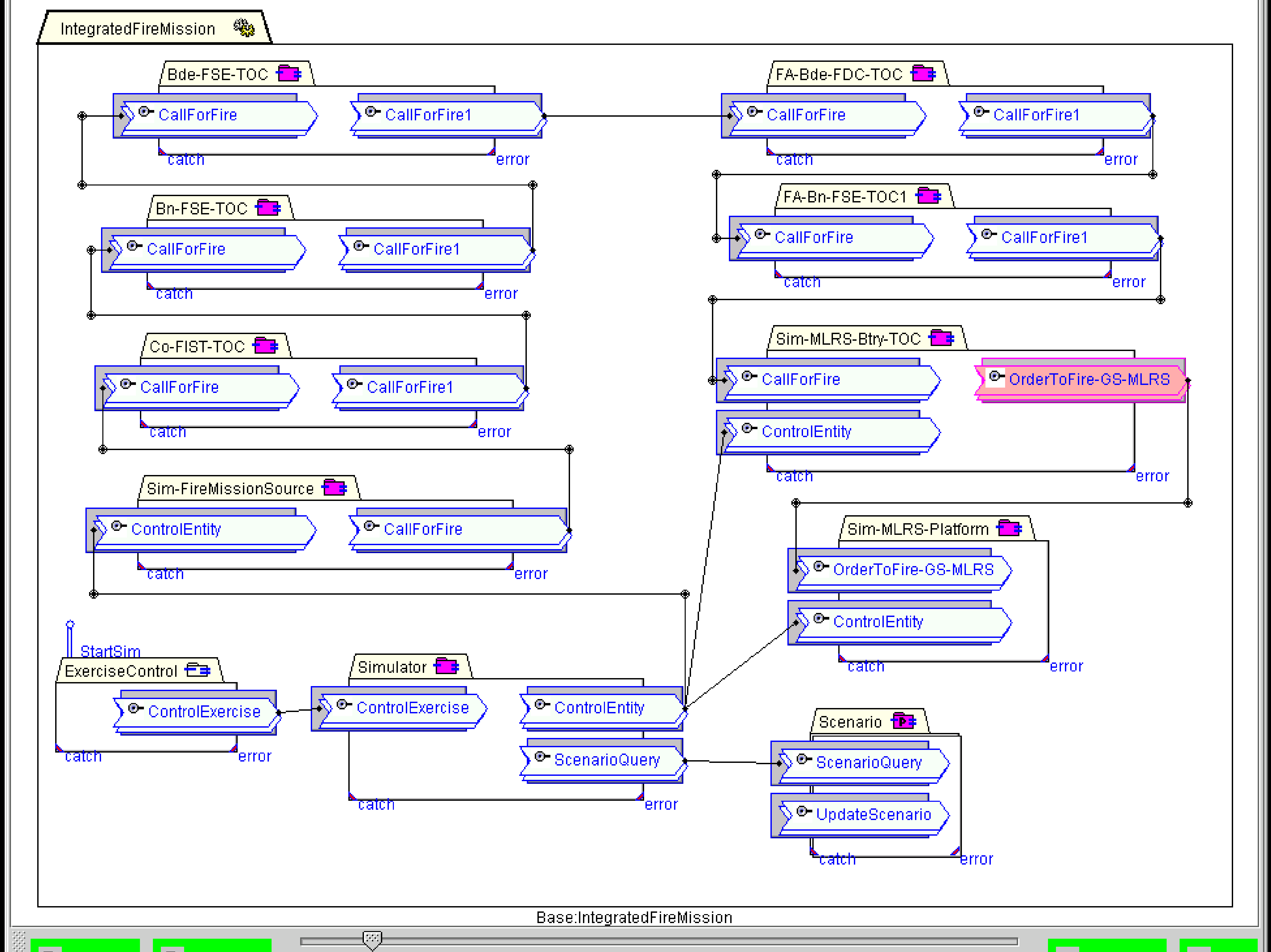
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Bn-FSE-TOC
CallForFire
CallForFire1
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CallForFire
CallForFire1
catch
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Co-FIST-TOC
CallForFire
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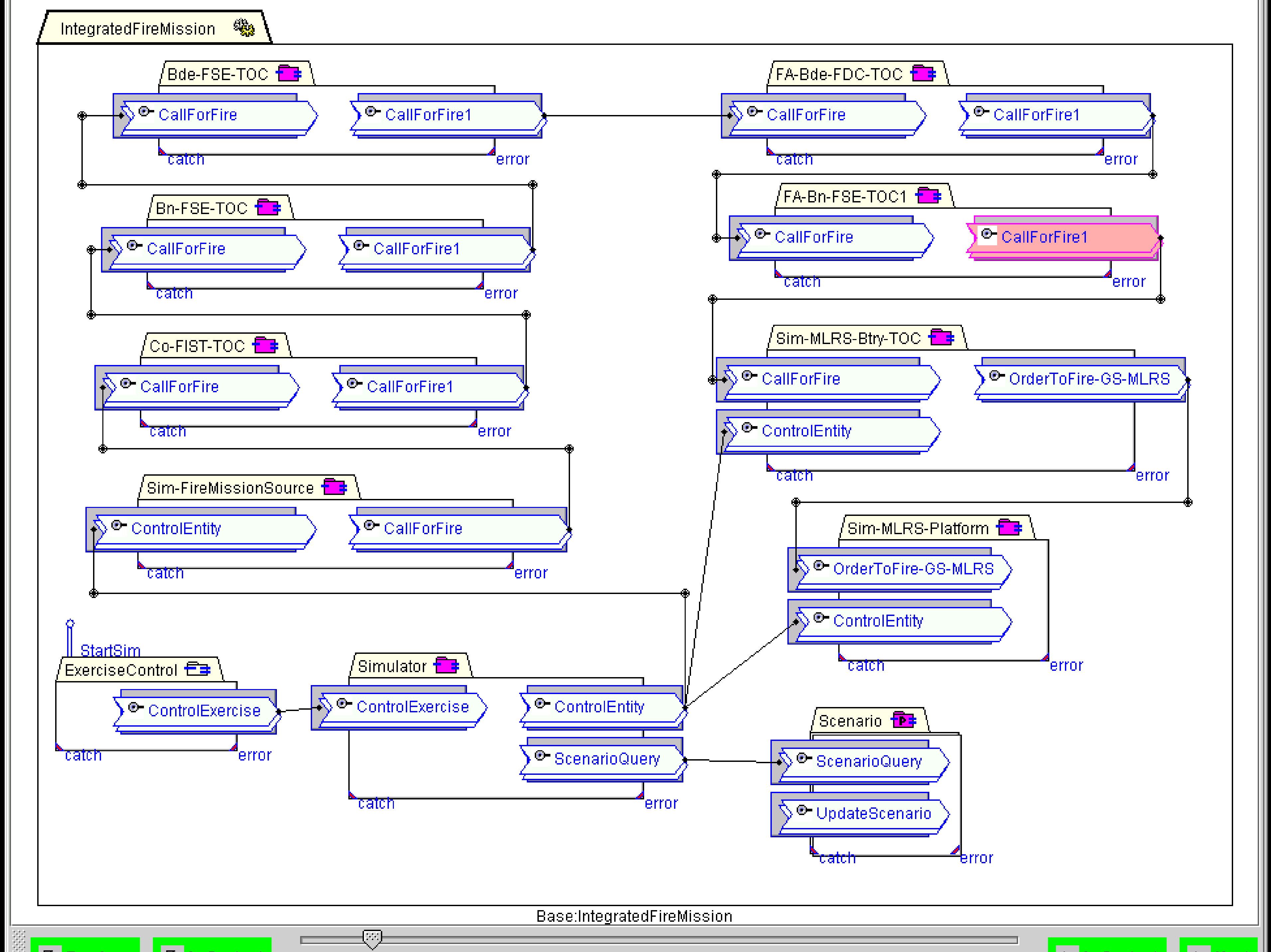
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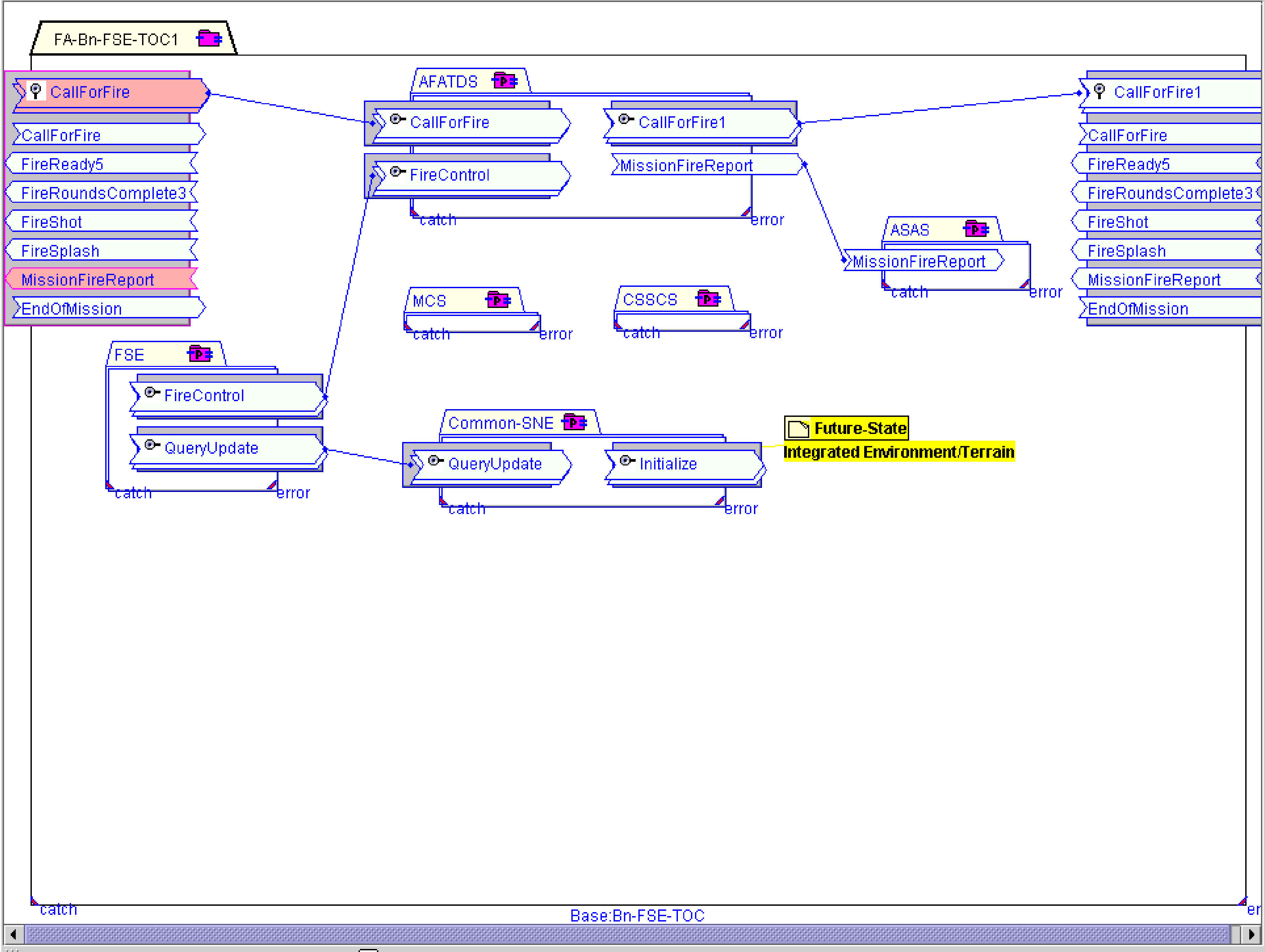
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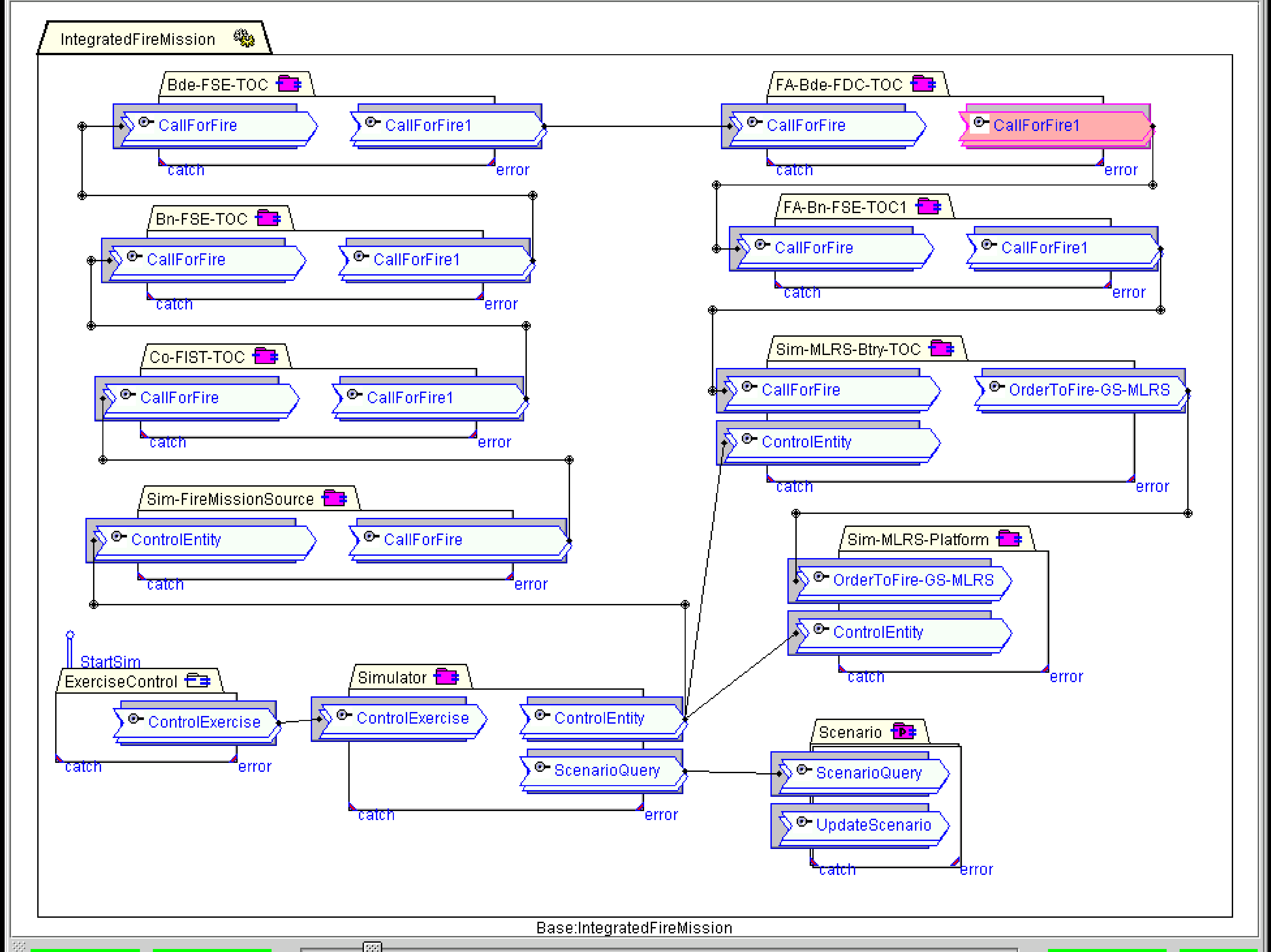
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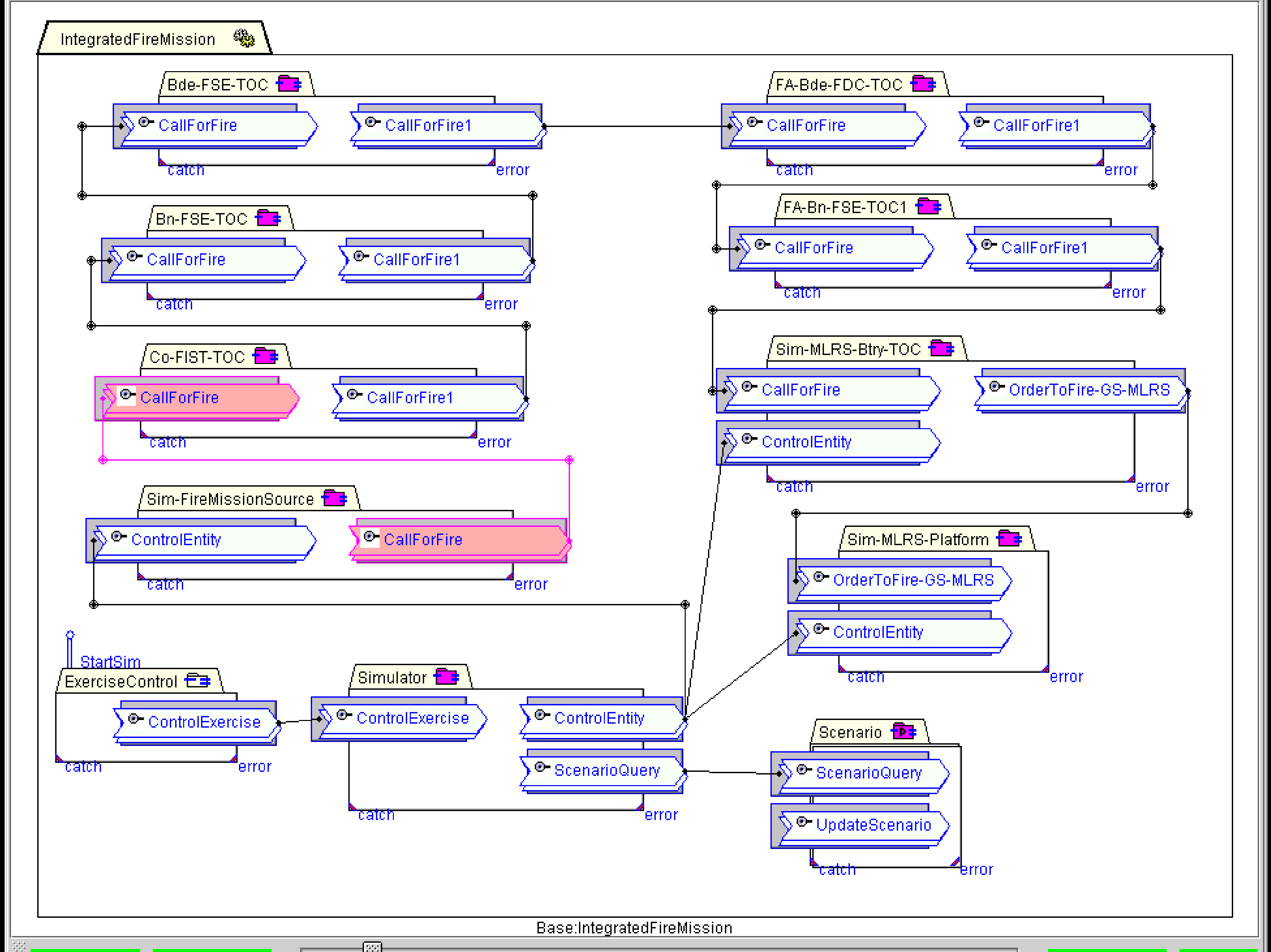
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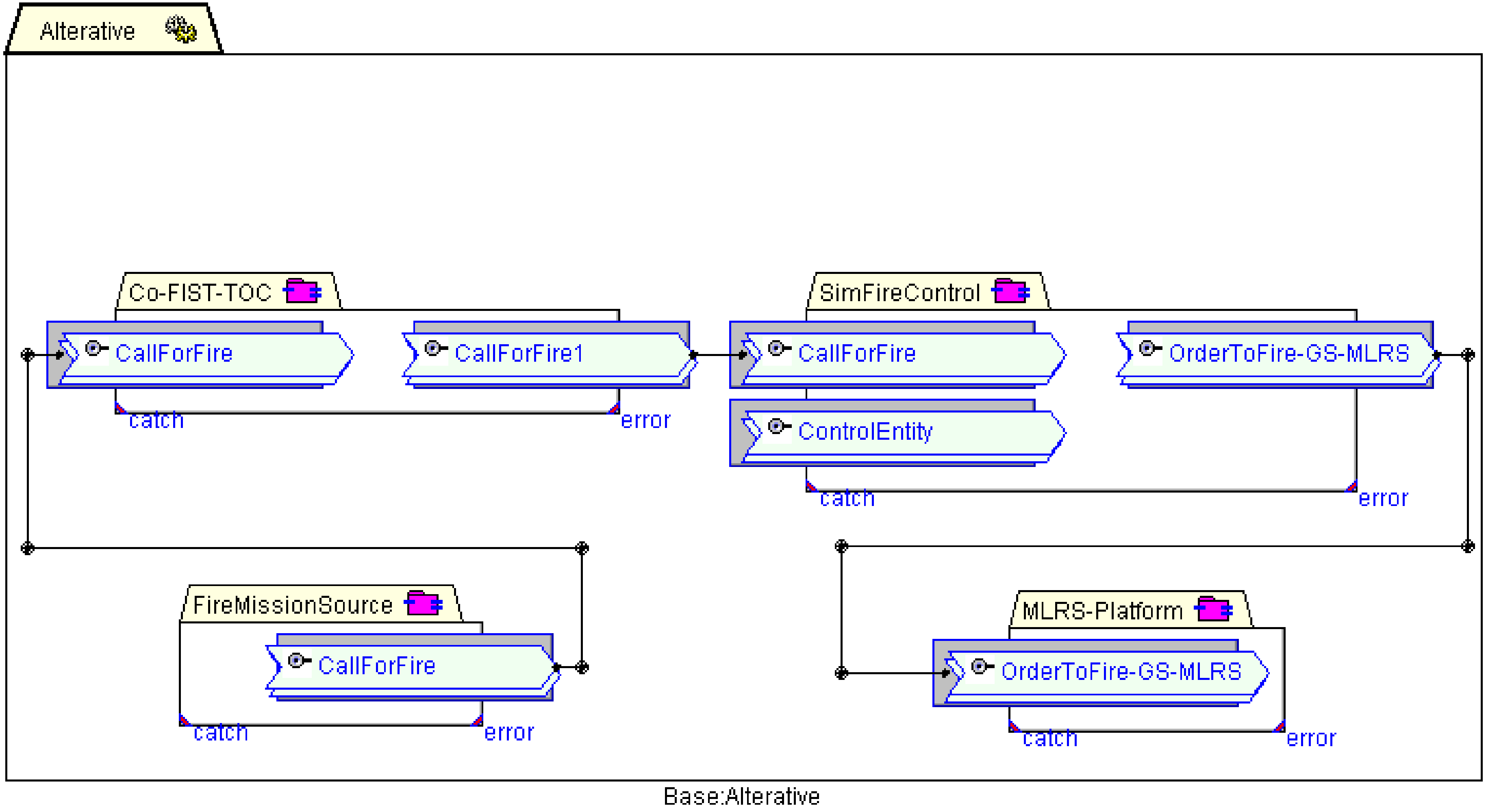
Base:IntegratedFireMission

Simulation Summary

- We can simulate a process
- Integrating real and simulated components
- Understanding the interactions
- At any level of detail

Trying Alternatives

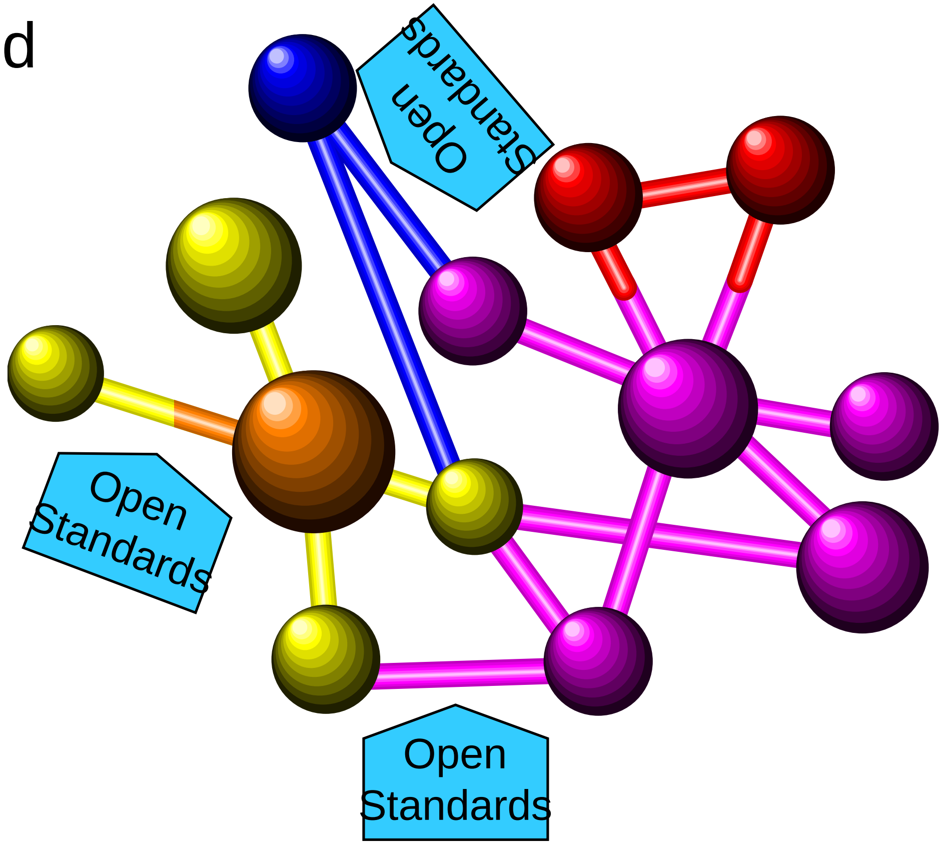


Supporting a Service Oriented Architecture

SOA for real and simulated components

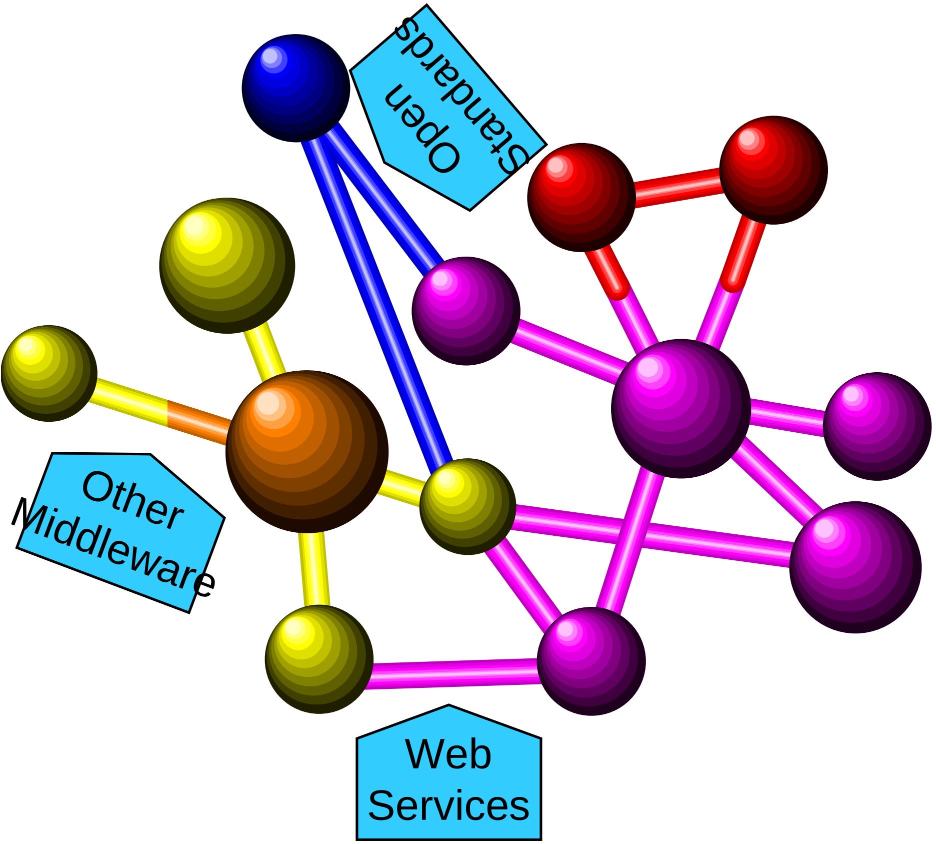
Enterprise Components

- Enterprise Components must be independent and distributable
- While being able to interoperate with each other
- Making the information system or simulation a lattice of cooperating components
- Simulated or Real
  - Same model, same architecture

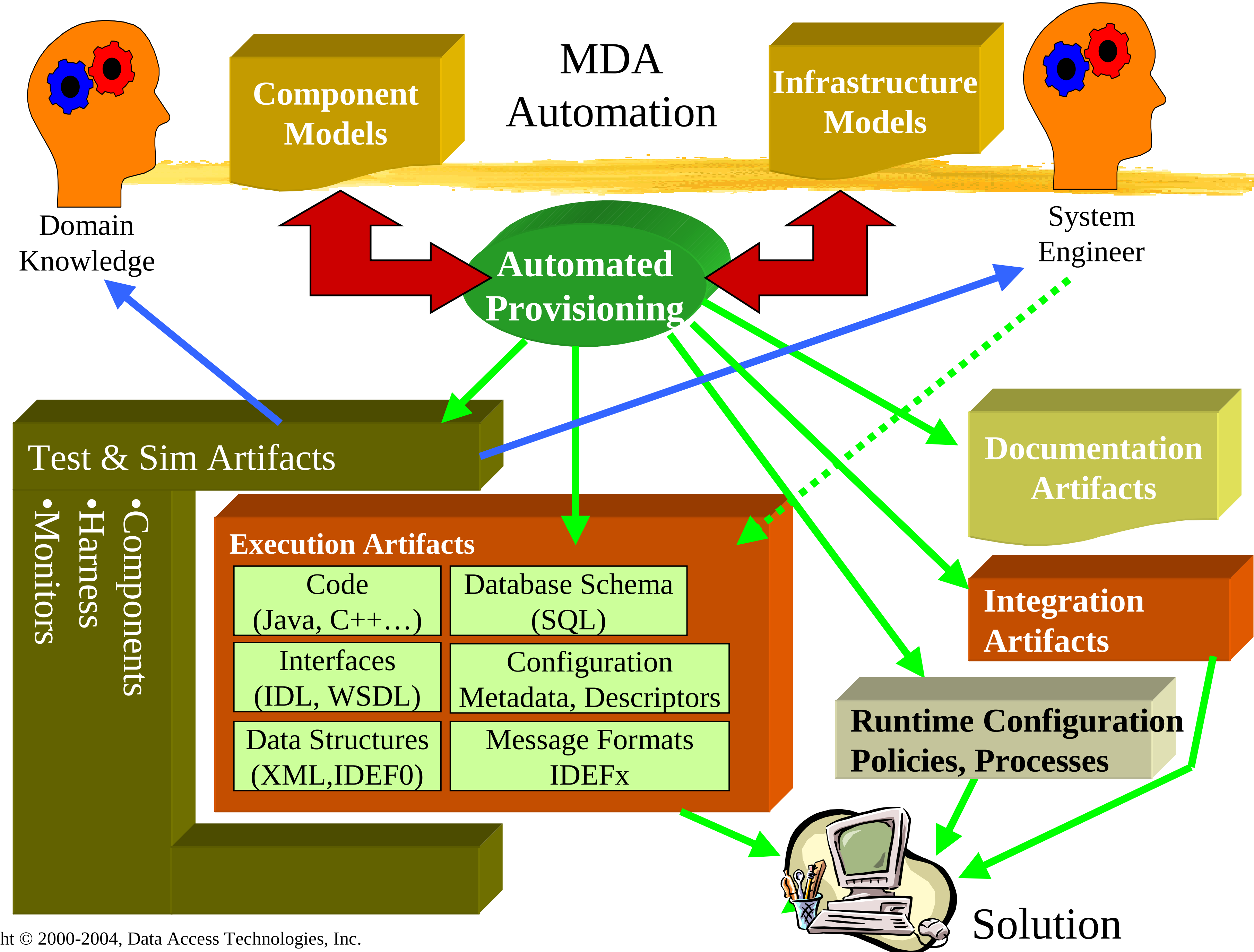


[Web] services provide open connectivity

- ⌘ Services allow components to be independently implemented
- ⌘ While interacting across well defined services
- ⌘ Making the information system a lattice of cooperating components
- ⌘ Simulated or Real
  - Same model, same architecture



MDA Automation



Component Models

Infrastructure Models

Domain Knowledge

System Engineer

Automated Provisioning

Test & Sim Artifacts

- •Components
- •Harness
- •Monitors

Execution Artifacts

Code (Java, C++…)	Database Schema (SQL)
Interfaces (IDL, WSDL)	Configuration Metadata, Descriptors
Data Structures (XML,IDEF0)	Message Formats IDEFx

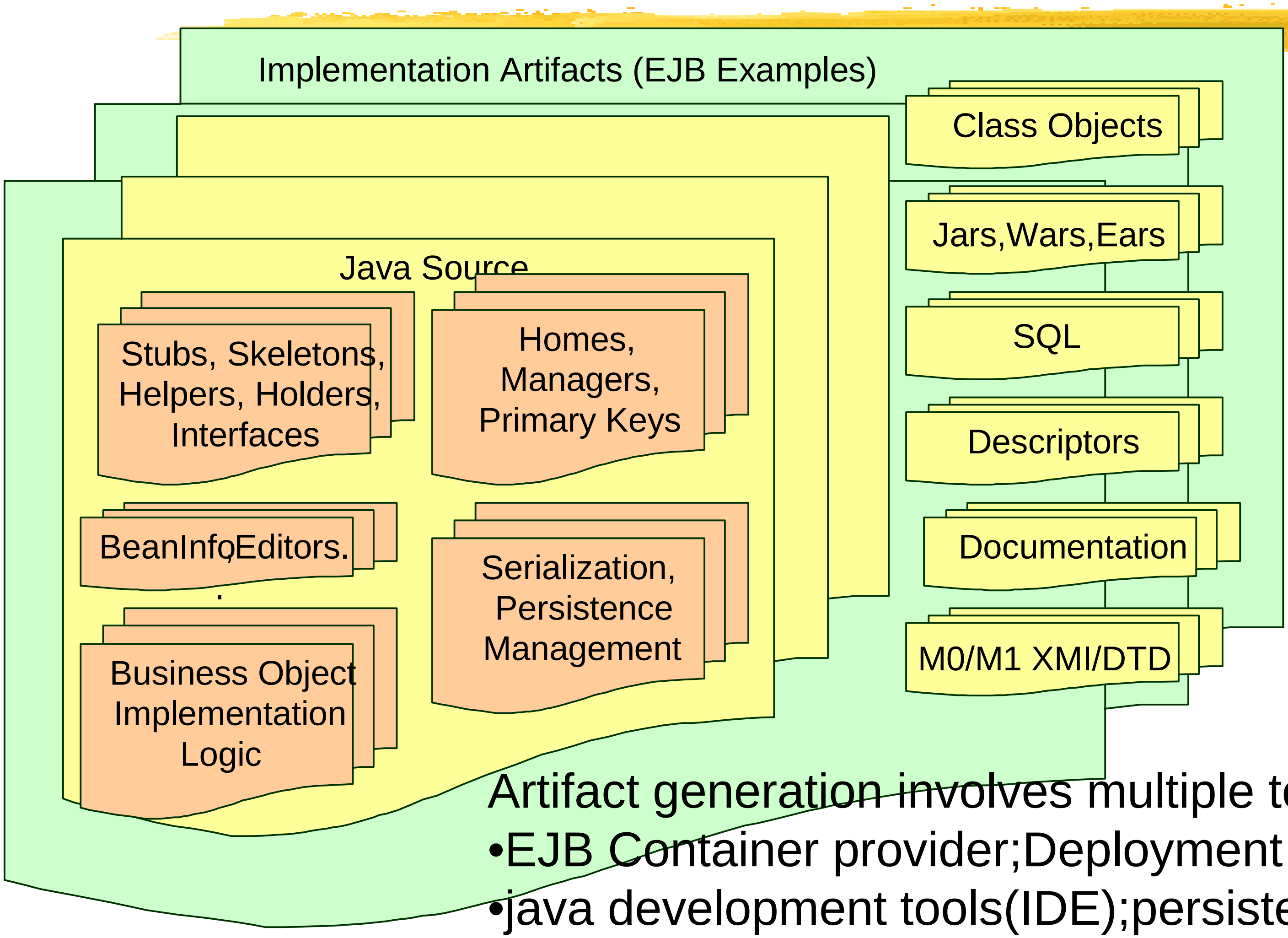
Documentation Artifacts

Integration Artifacts

Runtime Configuration
Policies, Processes

Solution

Example Generated Artifacts


Implementation Artifacts (EJB Examples)
Java Source
Stubs, Skeletons, Helpers, Holders, Interfaces
Homes, Managers, Primary Keys
BeanInfo, Editors.
Serialization, Persistence Management
Business Object Implementation Logic
Class Objects
Jars,Wars,Ears
SQL
Descriptors
Documentation
M0/M1 XMI/DTD

Artifact generation involves multiple tools

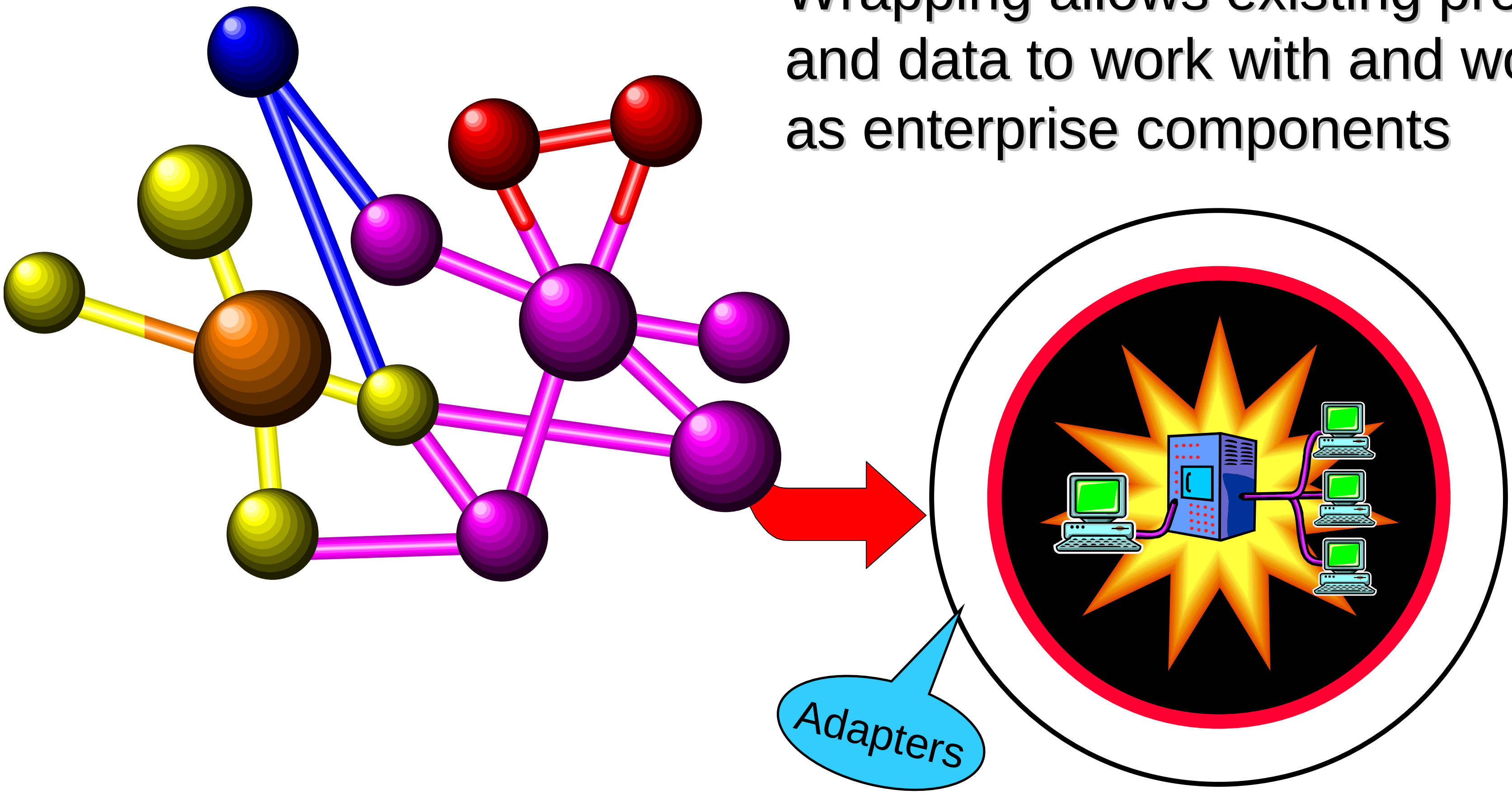
- •EJB Container provider;Deployment tools;Packagers;
- •java development tools(IDE);persistence provider;…

Typical 10-20 per PIM Classifier

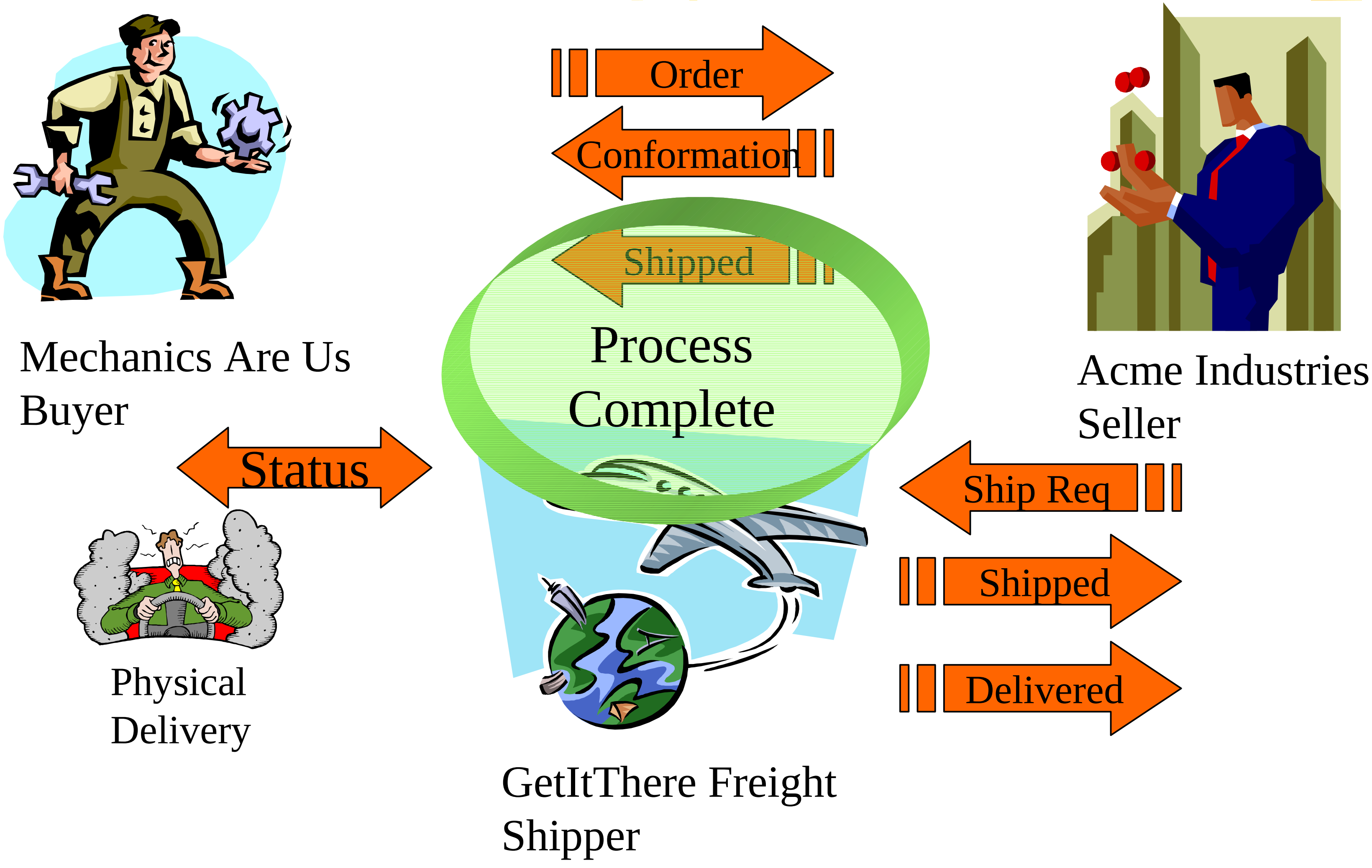
0-20% manual override

Legacy “Wrapping”

Wrapping allows existing programs and data to work with and work as enterprise components



The Marketplace Example



Mechanics Are Us
Buyer

Order

Conformation

Shipped

Process
Complete

Acme Industries
Seller

Status

Ship Req

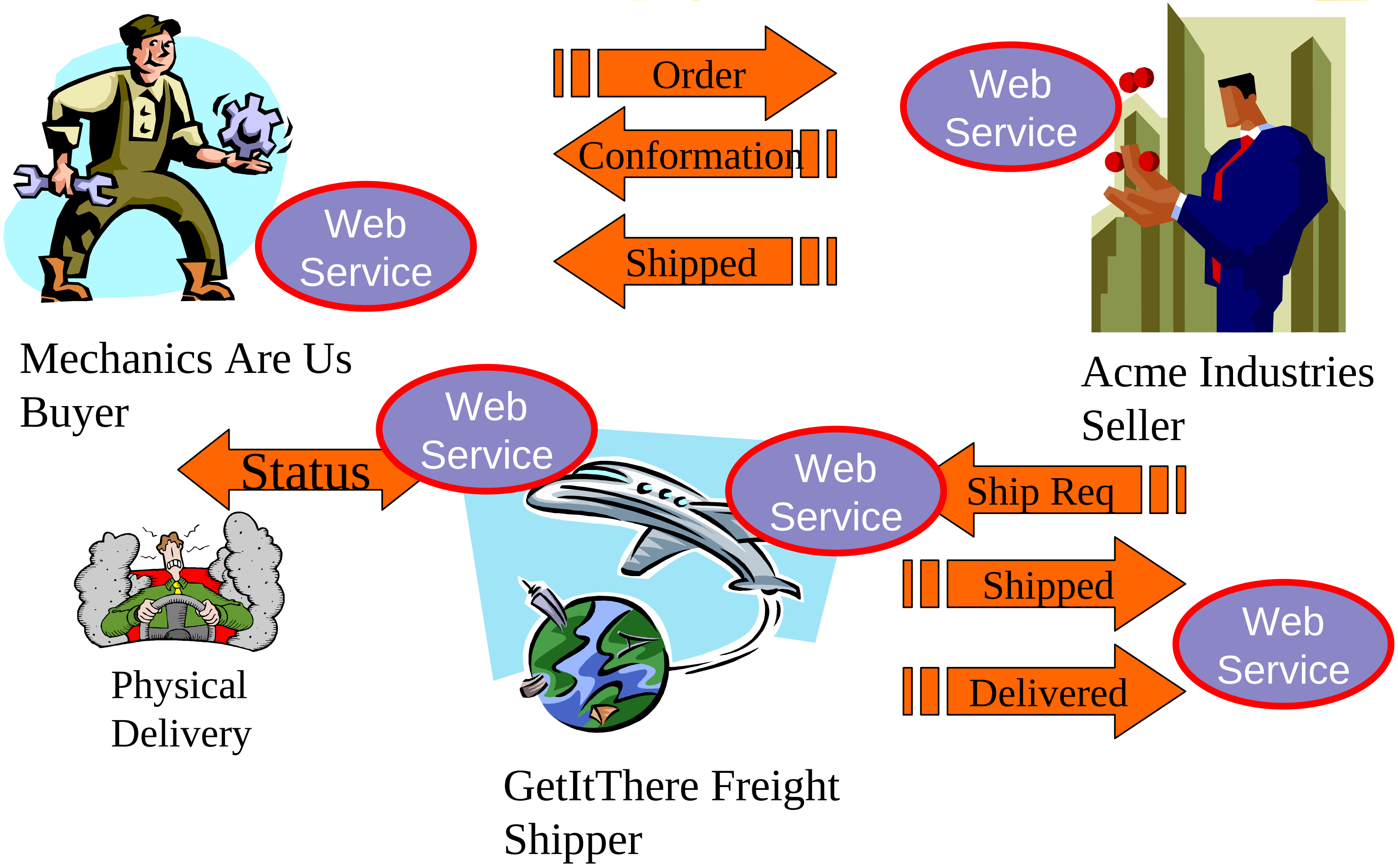
Shipped

Delivered

Physical
Delivery

GetItThere Freight
Shipper

Where are the services?



Web Service

Mechanics Are Us
Buyer

Order

Conformation

Shipped

Web Service

Acme Industries
Seller

Status

Web Service

Web Service

Ship Req

Shipped

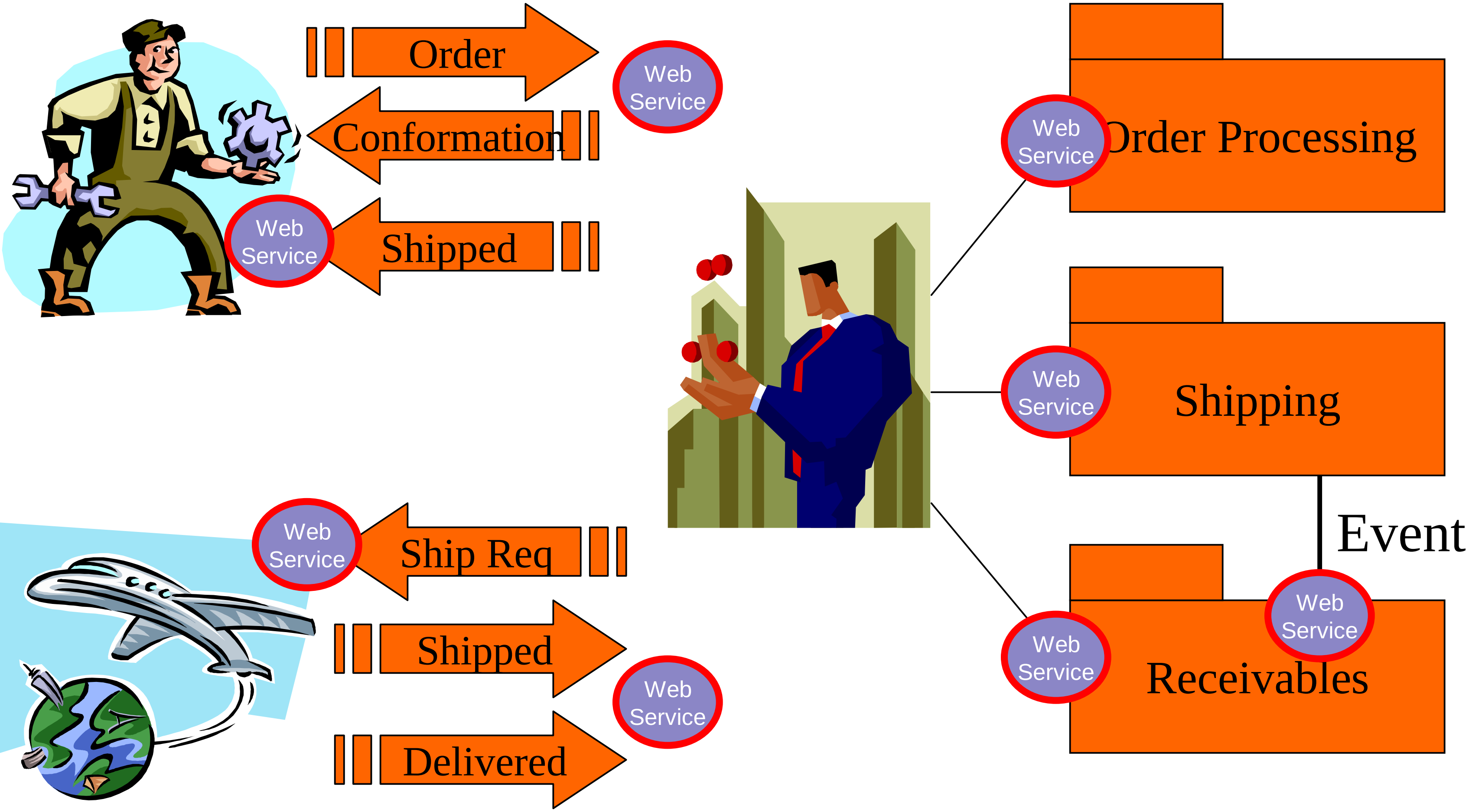
Delivered

Web Service

Physical
Delivery

GetItThere Freight
Shipper

Inside the Seller



Order

Web Service

Conformation

Web Service

Shipped

Web Service

Order Processing

Web Service

Shipping

Event

Web Service

Web Service

Receivables

Web Service

Ship Req

Shipped

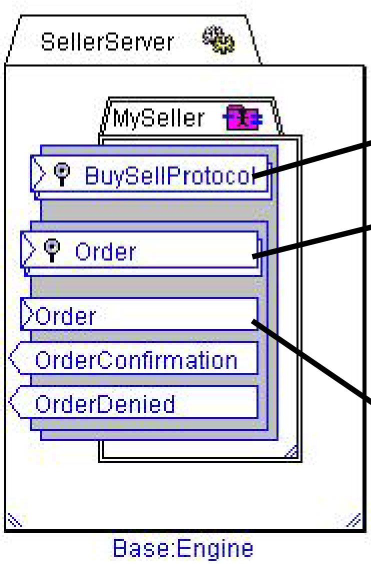
Web Service

Delivered

MDA Models and SOA

- An application could be constructed of hundreds of services
- MDA Models help us understand the context of service interfaces
- How they serve enterprise processes and requirements
- How they work together and (if require), work internally
- MDA can generate the service specifications –
  - completely consistent with the architecture
- MDA can then assist in the generation and implementation of the components behind the interfaces

Mapping of a protocol binding to web service technology



Aspects

WSDL

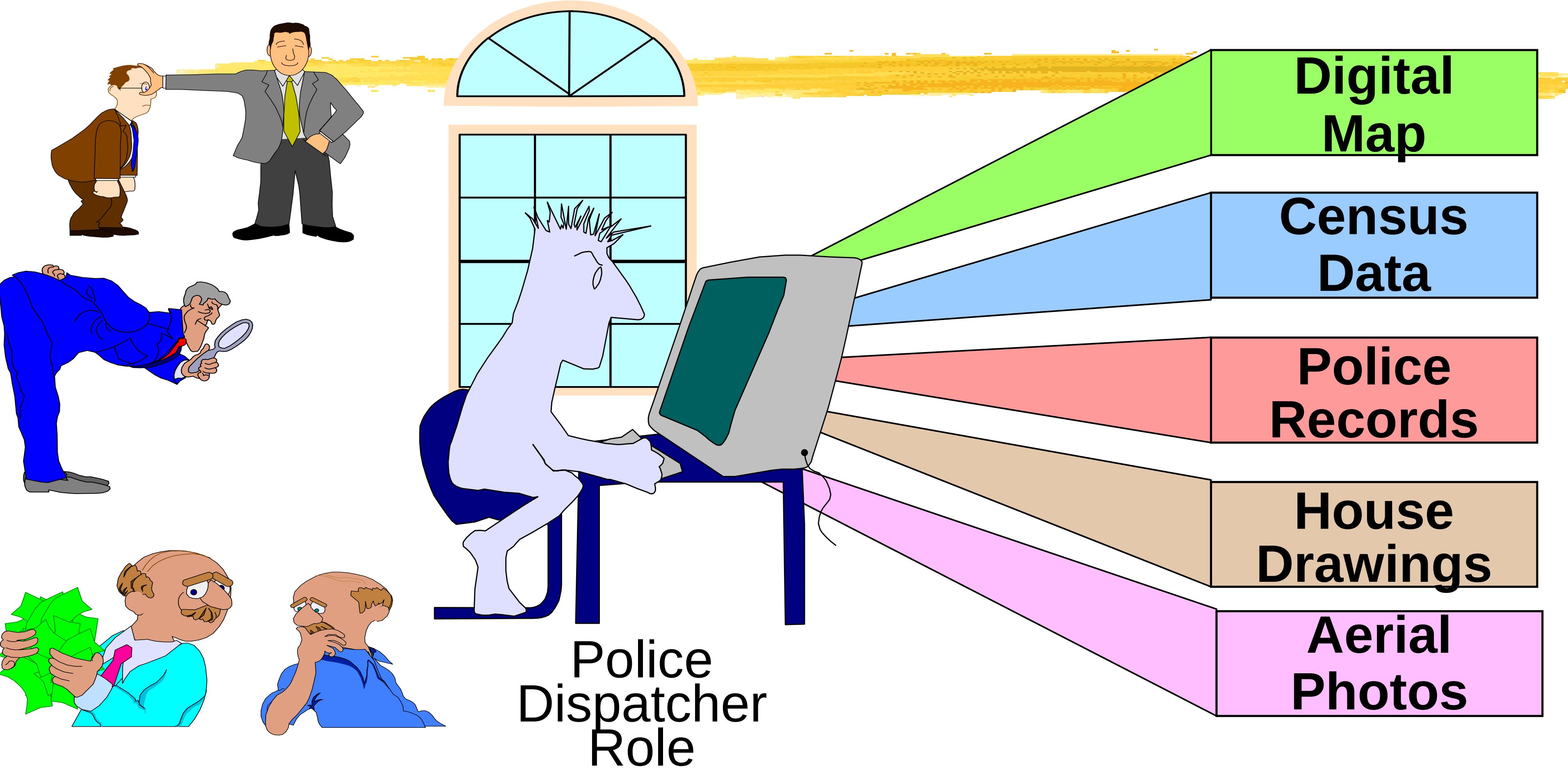
WSDL-SOAP

```
- <binding name="BuySellProtocol"
   type="tns:BuySellProtocol">
  <soap:binding
      transport="http://schemas.xmlsoap.org/soap/h
      style="rpc" />
- <operation name="Order">
  <soap:operation
      soapAction="urn:/BuySell/Community/BuySellPr
      col/Order" style="rpc" />
- <input name="Order">
  <soap:body use="encoded" namespace="urn:SellerServ
      encodingStyle="http://schemas.xmlsoap.org/so
      encoding/" />
```

The Enterprise Collaboration Architecture

- ECA is a "profile of UML", a way to use UML for a specific purpose - it is an OMG standard
  - That purpose is *modeling enterprise systems and components*.
- You can also think of this as a "modeling framework" for enterprise computing
- ECA is part of the "Model Driven Architecture" (MDA) initiative of the OMG
  - Using precise modeling techniques as part of the development lifecycle to speed development and provide technology independence
- ECA has been adopted by the OMG as part of the EDOC RFP.
- ECA defines an architecture and meta model

The Connected Enterprise
Content and Communication



Digital Map

Census Data

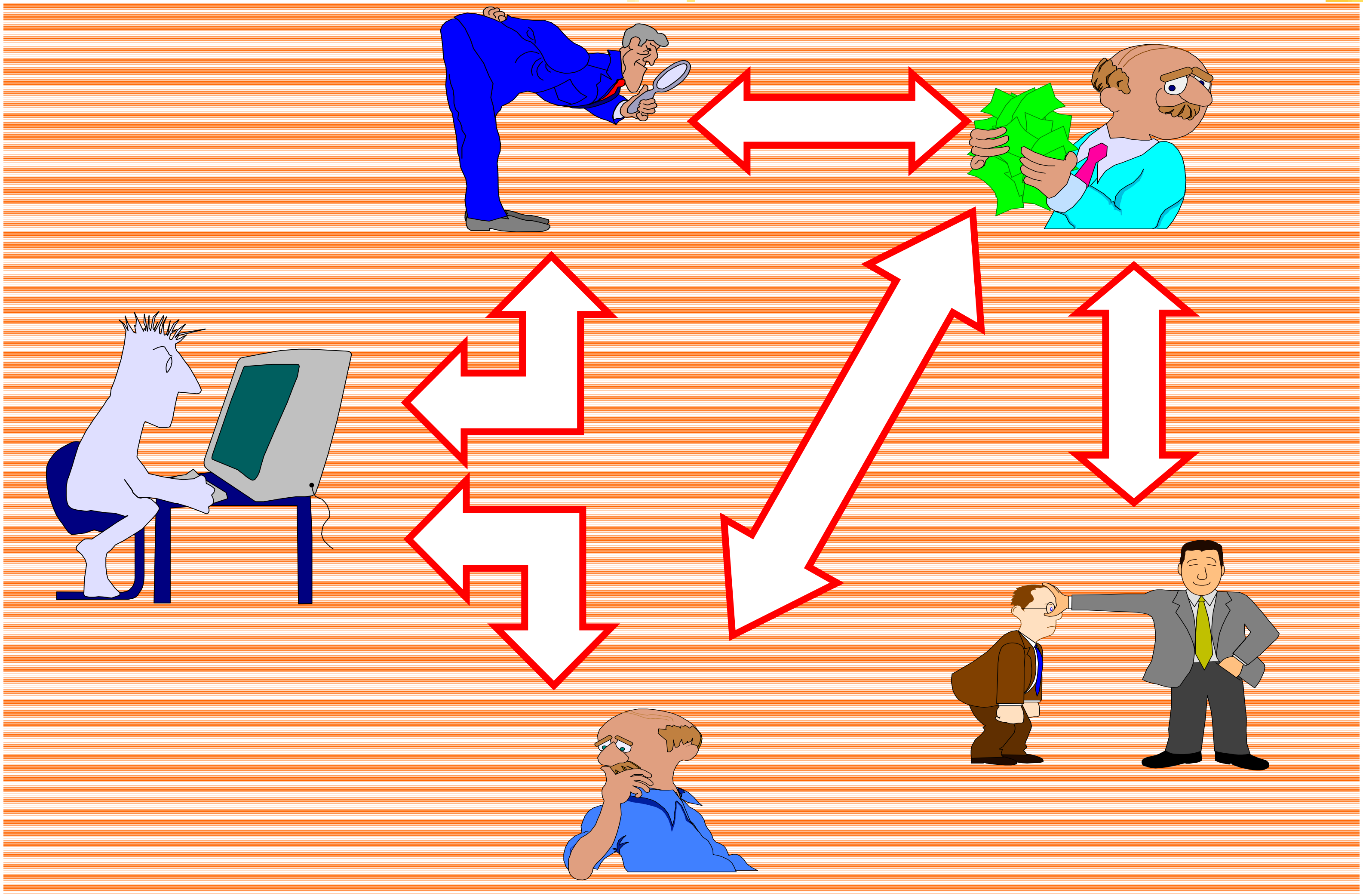
Police Records

House Drawings

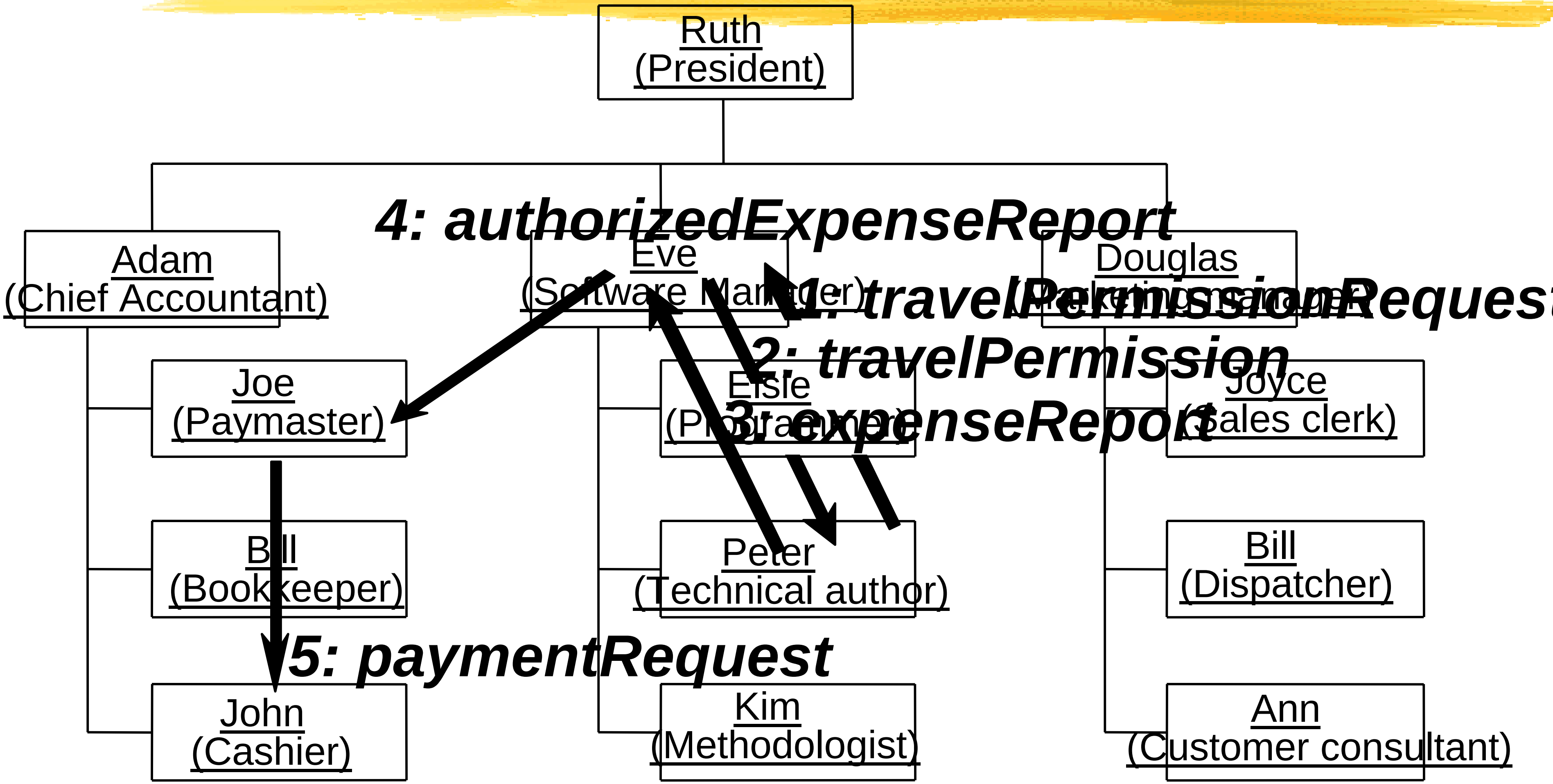
Aerial Photos

Police Dispatcher Role

Multiple roles in a collaboration



Travel Expense Example



Ruth
(President)

Adam
(Chief Accountant)

Eve
(Software Manager)

Douglas
(Marketing manager)

Joe
(Paymaster)

Elsie
(Programmer)

Joyce
(Sales clerk)

Bill
(Bookkeeper)

Peter
(Technical author)

Bill
(Dispatcher)

John
(Cashier)

Kim
(Methodologist)

Ann
(Customer consultant)

1: travelPermissionReques

2: travelPermission

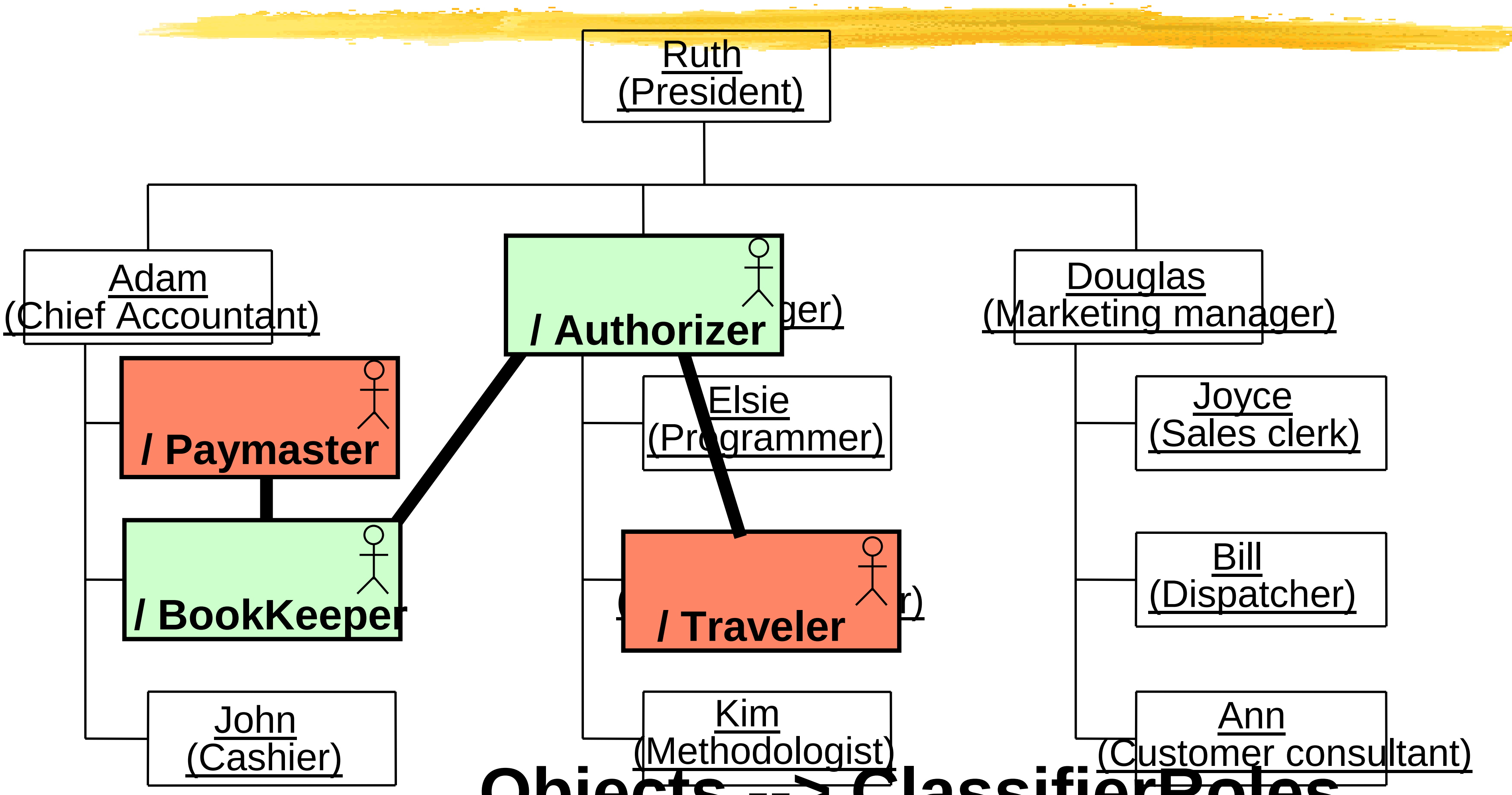
3: expenseReport

4: authorizedExpenseReport

5: paymentRequest

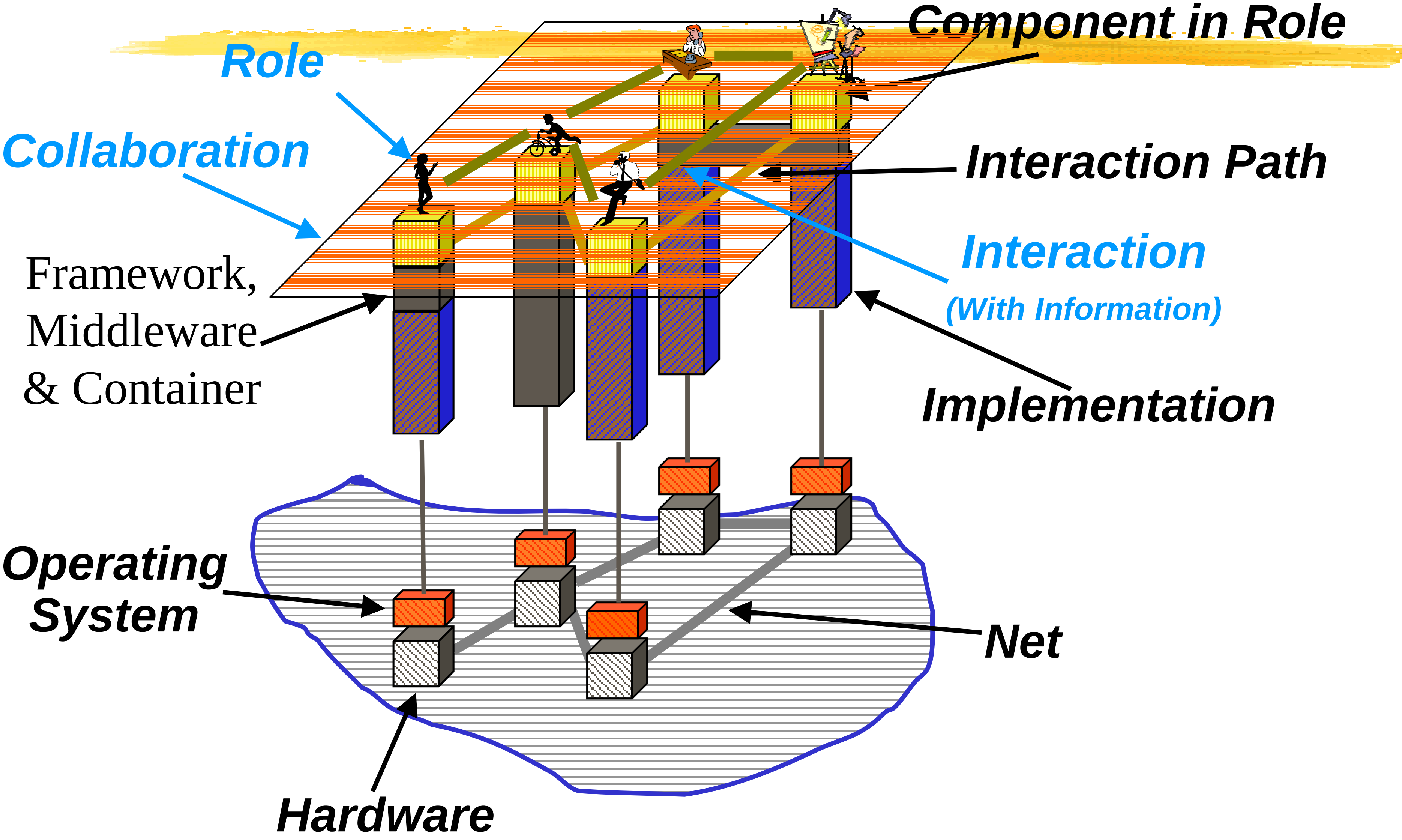
Diagram

Travel Expense Model



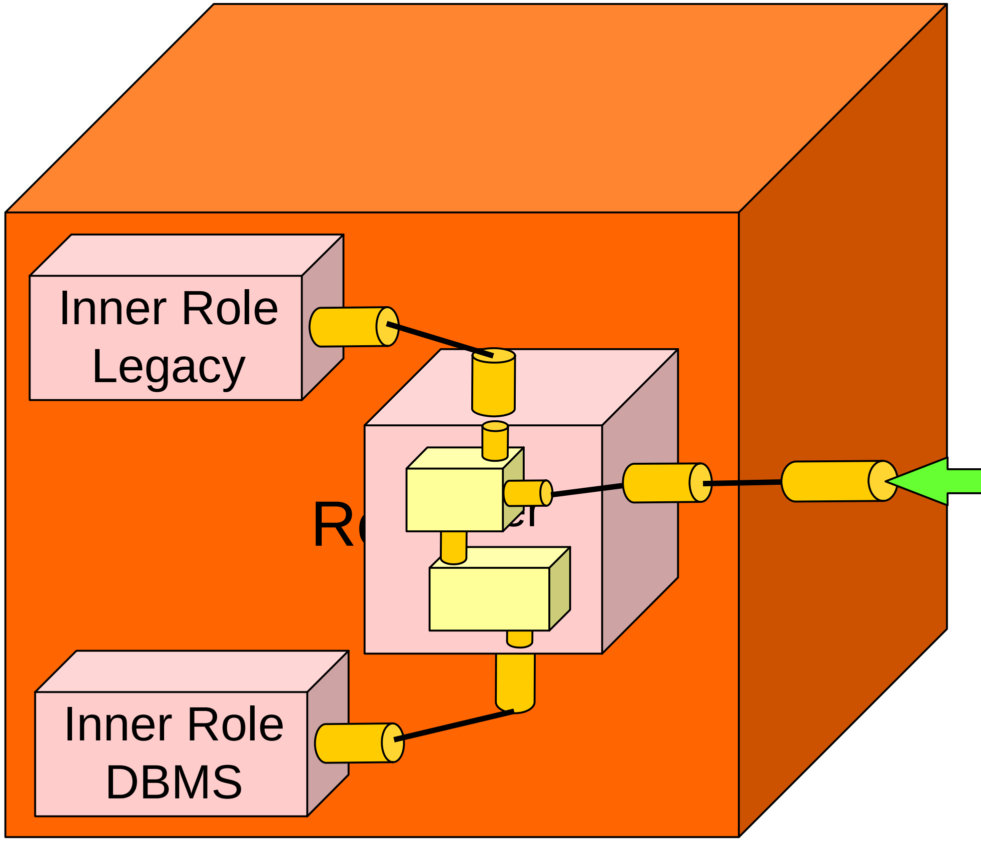
Objects --> ClassifierRoles

Roles to Systems



Drilling down – inside a role

- The open domain should make no assumptions about the “inside” of a role.
- Inside one role you *frequently* find more collaborating “parts” of the enterprise - the same model *may* be used
- Until you get to system inside a managed domain
  - Shared resources (DBMS)
  - Common Management
  - Frequently a legacy system
  - Code



ECA Methodology

A simple methodology for creating collaborative business processes

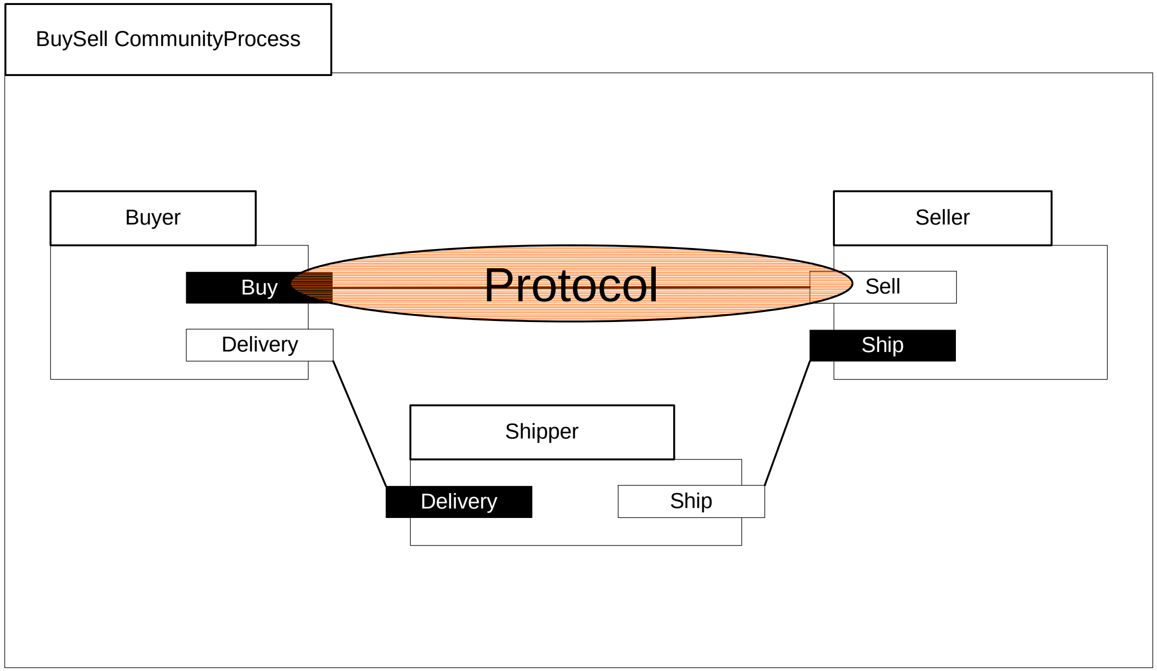
Basic Steps

- Identify roles and organize roles into collaborations
- Define collaboration documents
- Create basic business transactions
- Organize into protocols and events
- Use protocols to define ports on roles
- Drill-down into role detail
- Implement roles
- Configure implementations for deployment with technology specifics
- Deploy

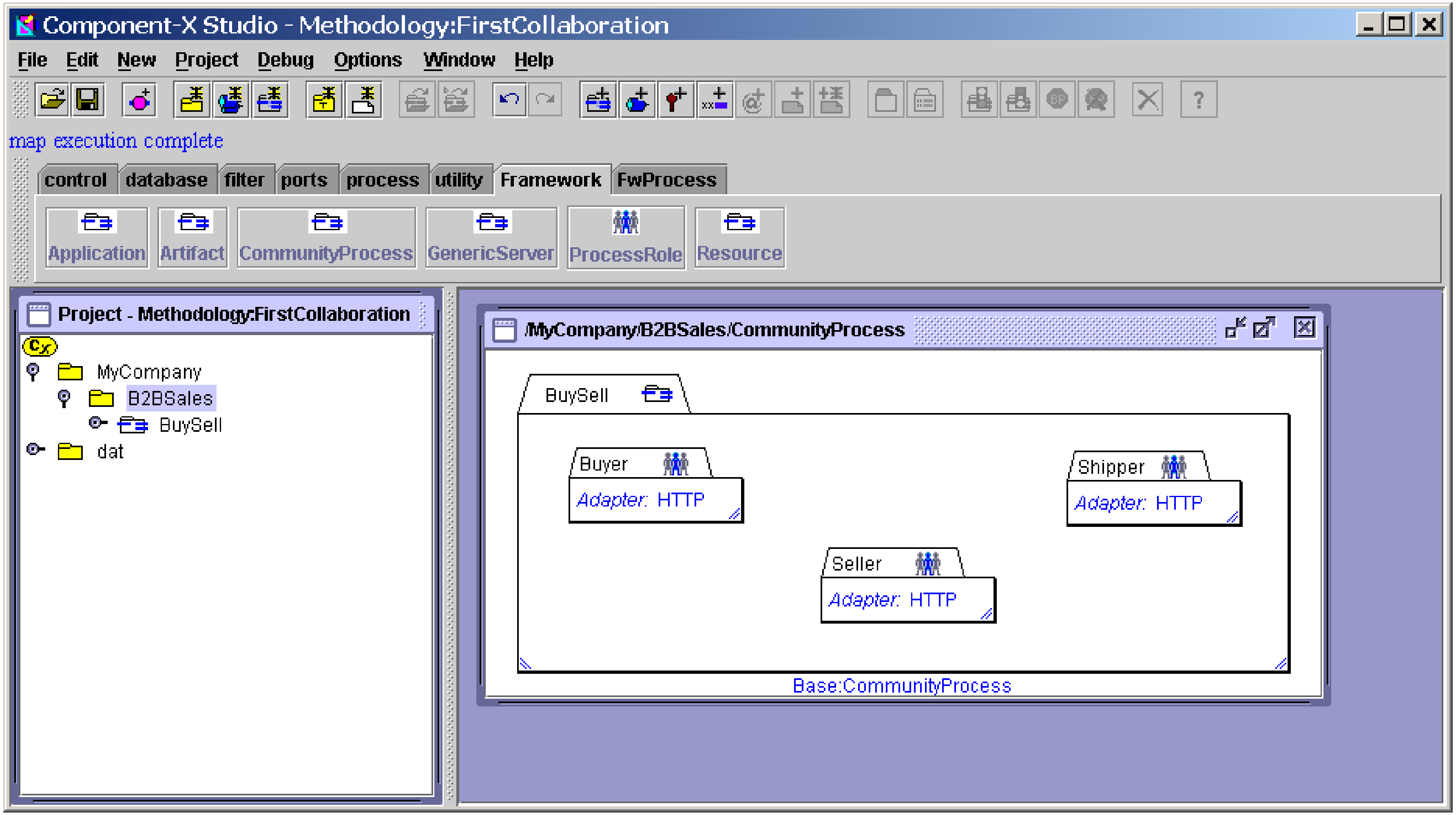
Components collaborate in processes

- Identify a “community process”, the roles and interactions in a collaboration

Models helps organize and define the set of services required for enterprise collaboration and simulation



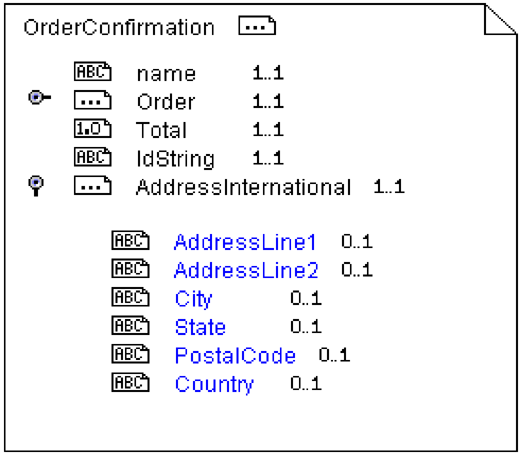
Identifying roles and collaborations



Component-X Studio - Methodology:FirstCollaboration

map execution complete

Identify Documents

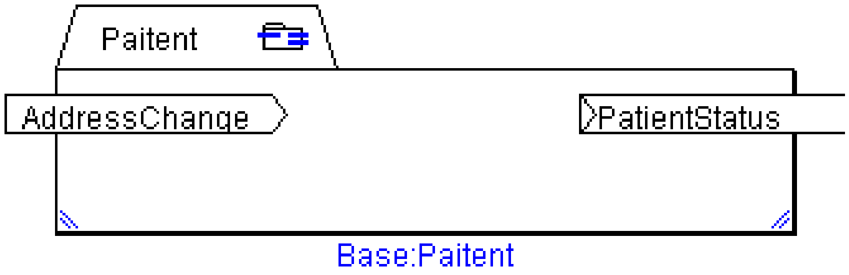


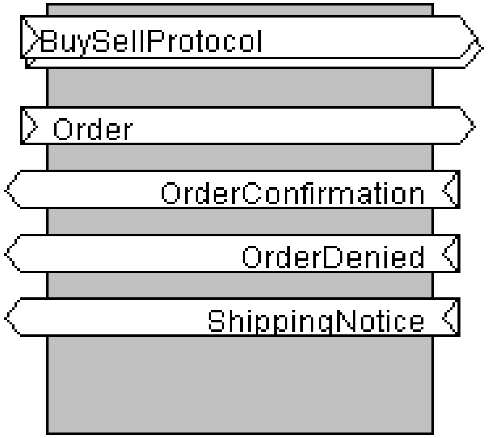
OrderConfirmation

name 1..1
Order 1..1
Total 1..1
IdString 1..1
AddressInternational 1..1

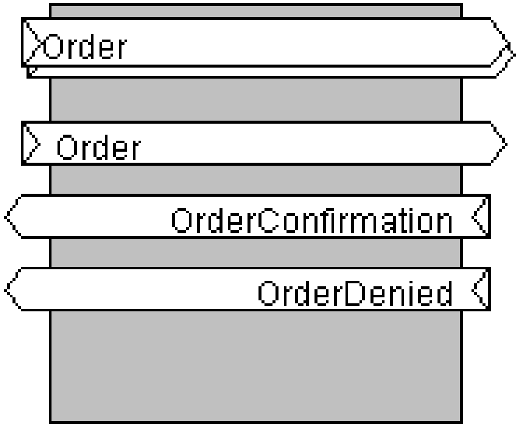
AddressLine1 0..1
AddressLine2 0..1
City 0..1
State 0..1
PostalCode 0..1
Country 0..1

Distinguish protocols and events

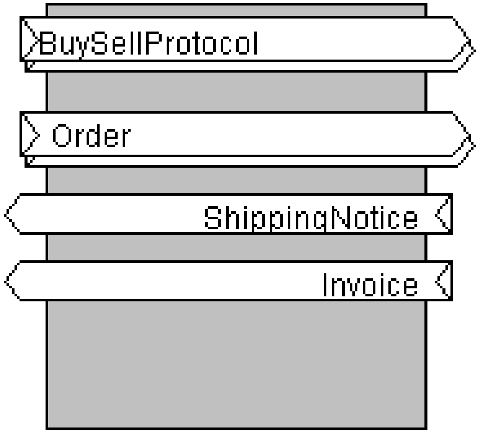


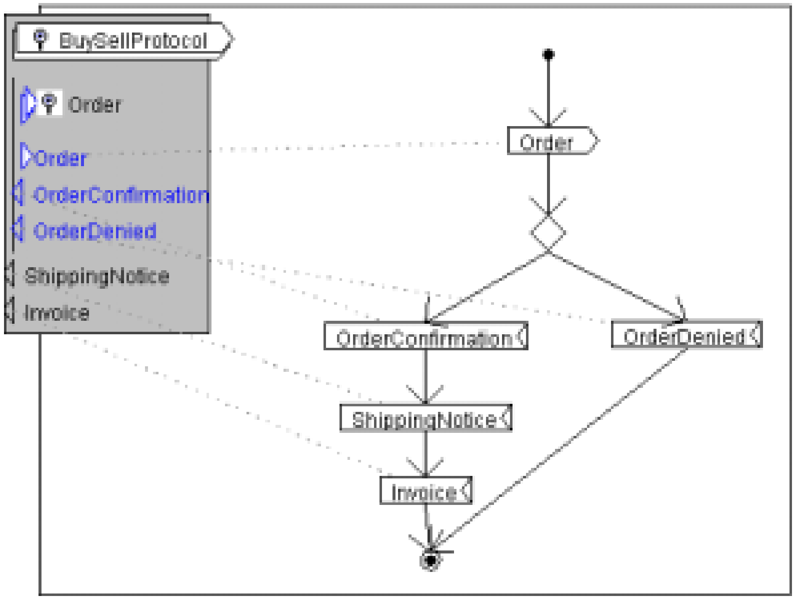


Create Business Transactions

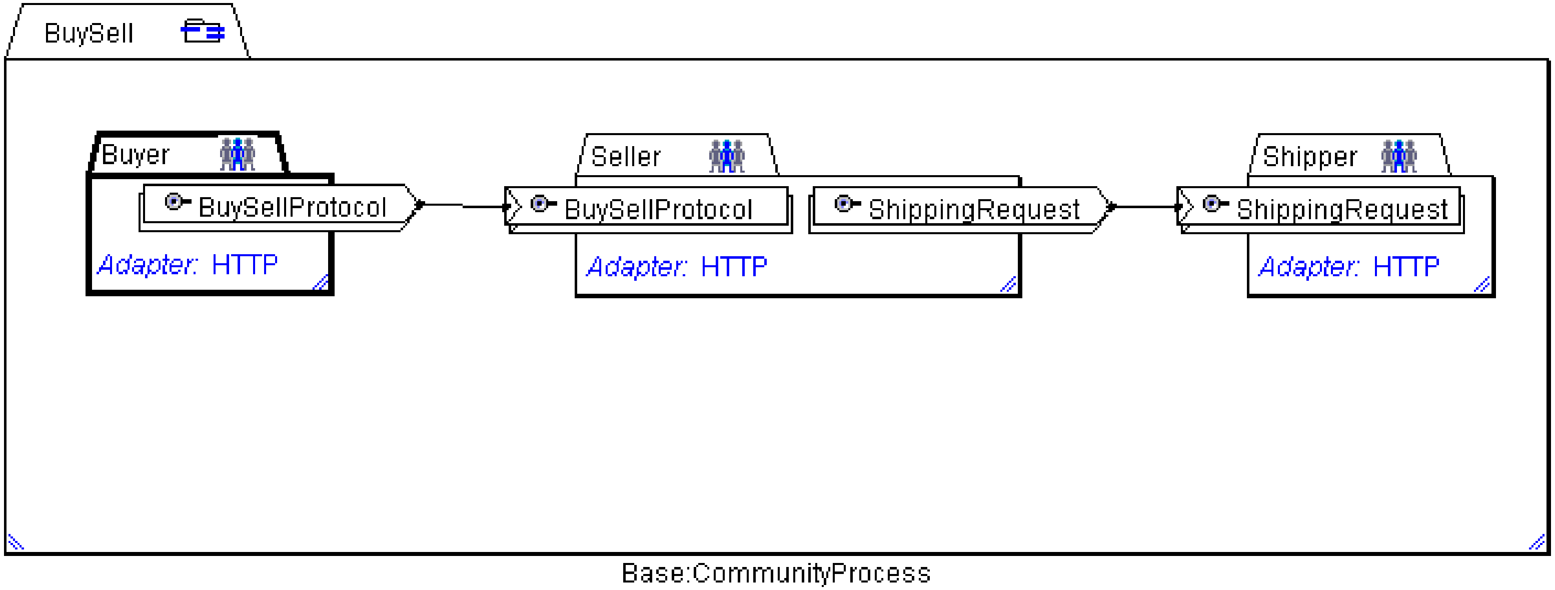


Organize into protocols

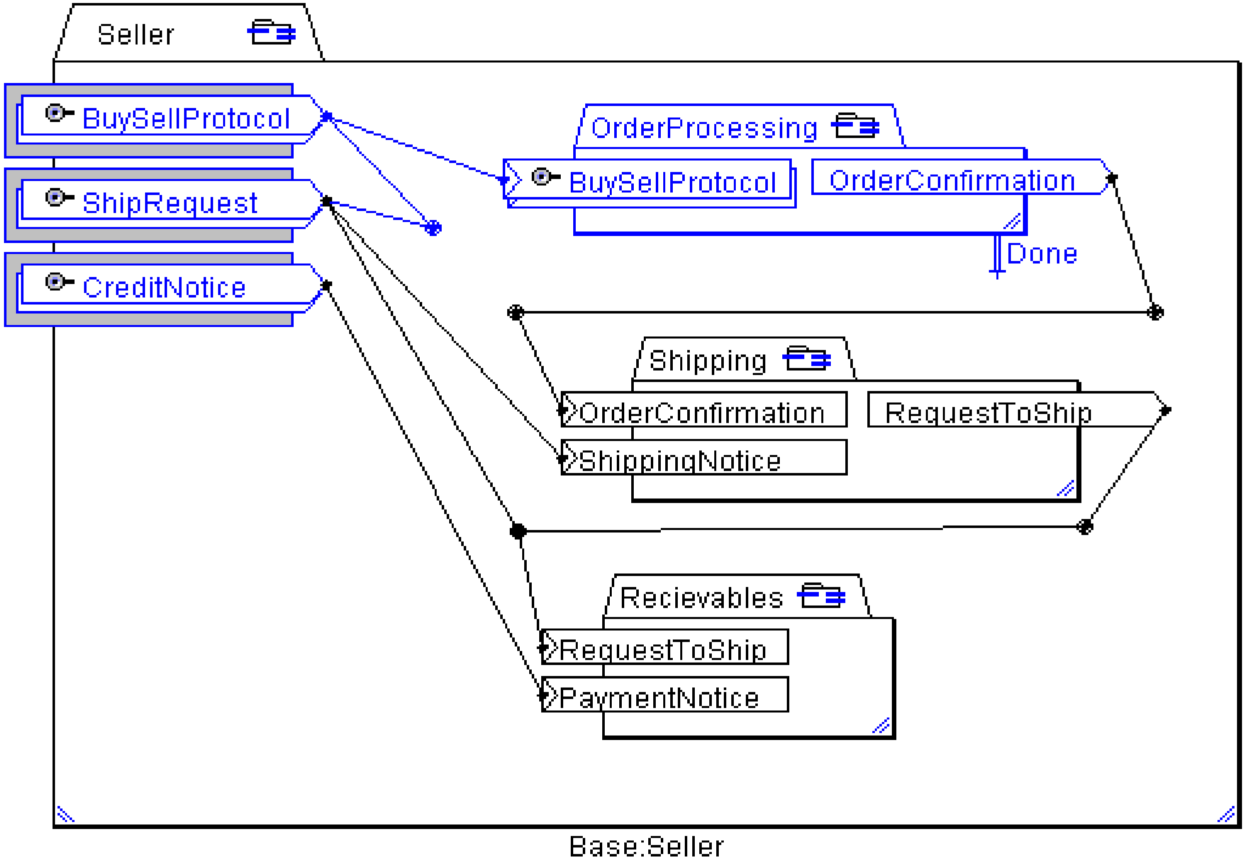




Add ports to complete community process



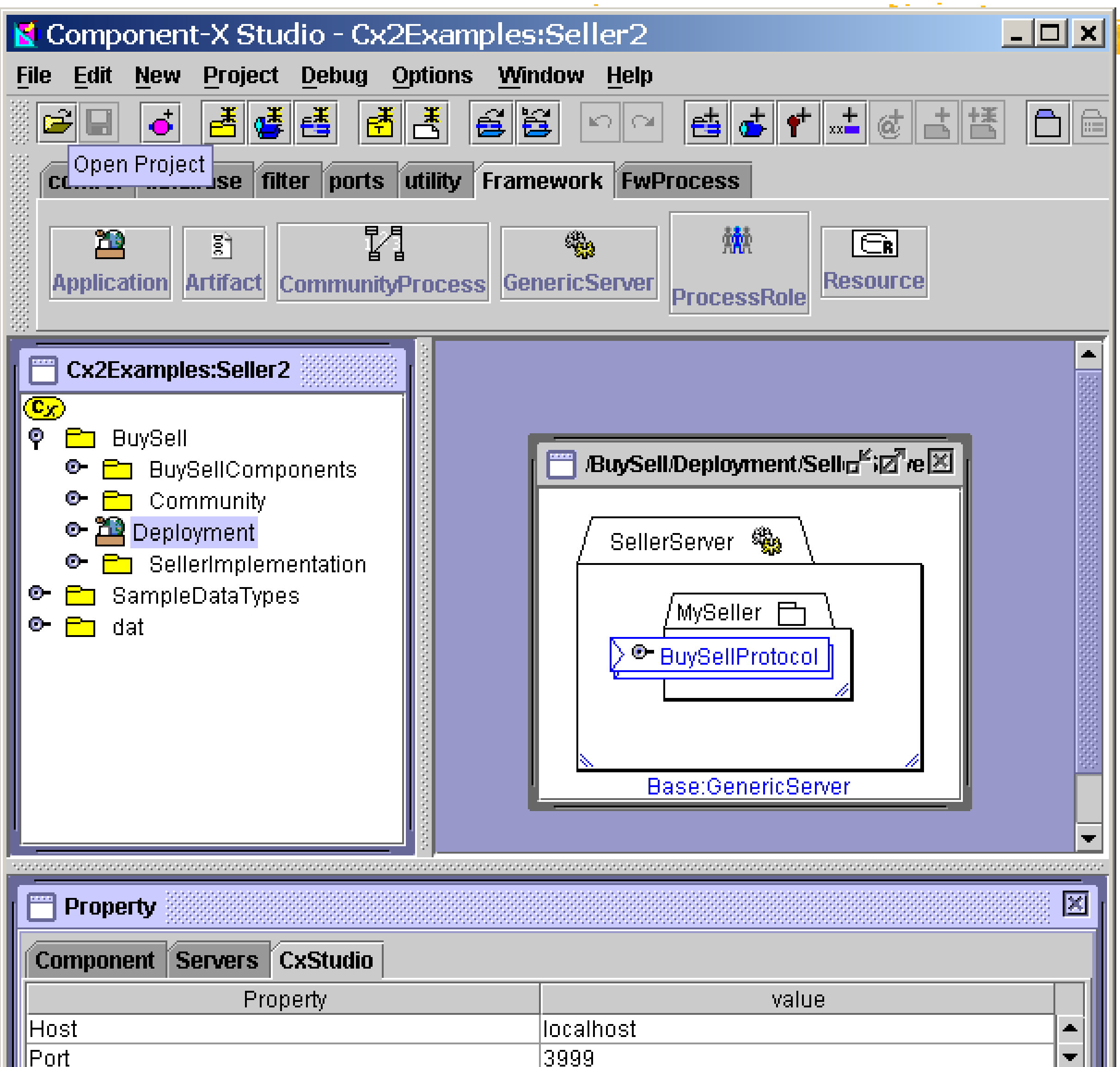
Drill-down


Seller
BuySellProtocol
ShipRequest
CreditNotice
OrderProcessing
BuySellProtocol
OrderConfirmation
Done
Shipping
OrderConfirmation
ShippingNotice
RequestToShip
Recievables
RequestToShip
PaymentNotice
Base:Seller

Add implementation

- As component compositions
- In a programming language
- By using an external service
- Wrap legacy
- As a simulation

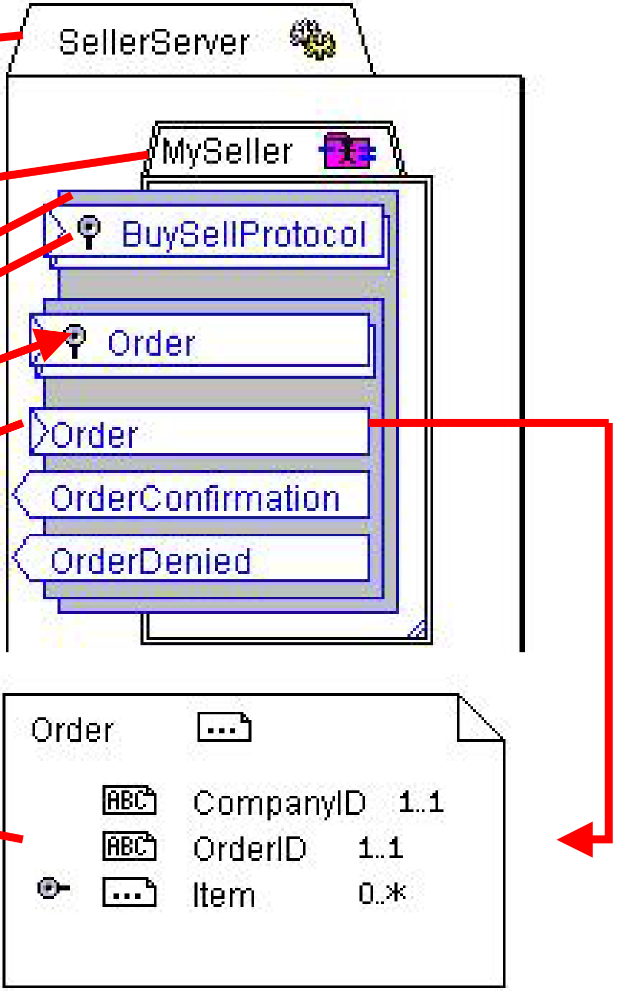
Add technology specifics for deployment



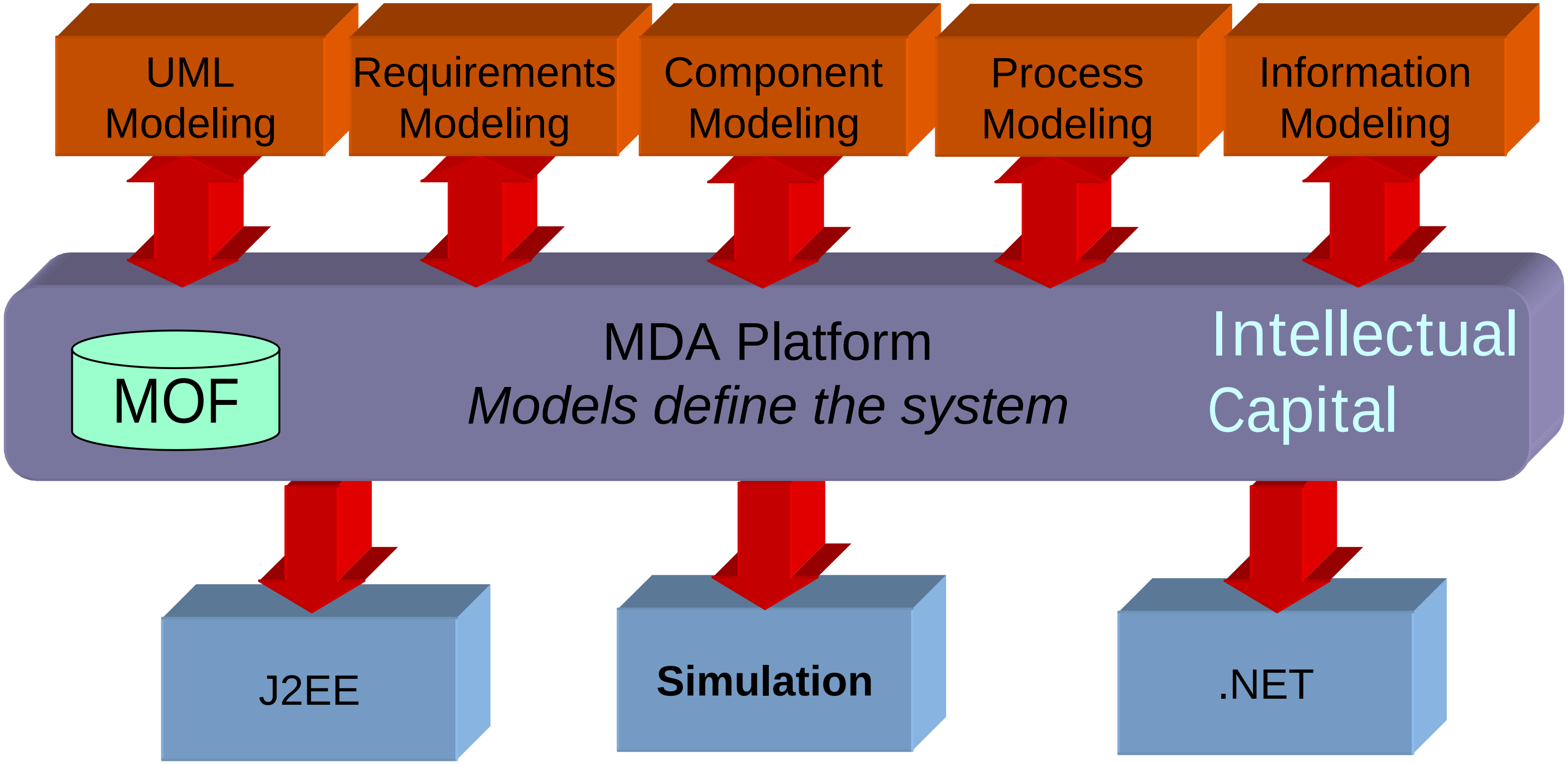
Property	value
Host	localhost
Port	3999

Web services implement connections between components in roles

- Web Service Specification
  - Service
  - Port on the service
  - Protocol
  - Operation
  - Message
  - Schema Type



Integration of Intellectual Capital


UML Modeling

Requirements Modeling

Component Modeling

Process Modeling

Information Modeling

MOF

MDA Platform

Models define the system

Intellectual Capital

J2EE

Simulation

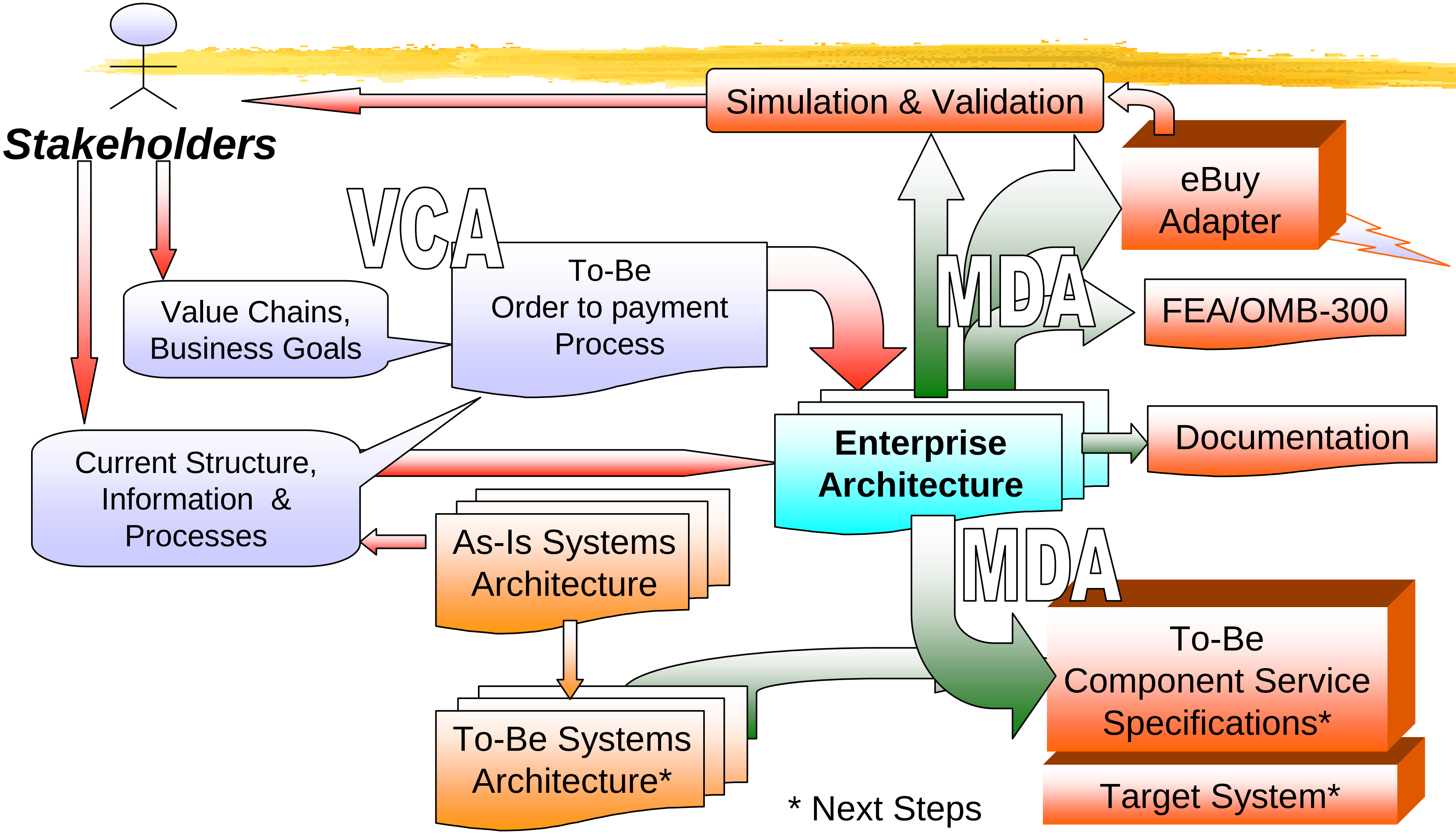
.NET

Integration of infrastructure

GSA
Executable Enterprise Architecture

Thanks to George Thomas
Enterprise Architect
General Services Administration

Achieving Stakeholder Goals
Making Architecture Executable

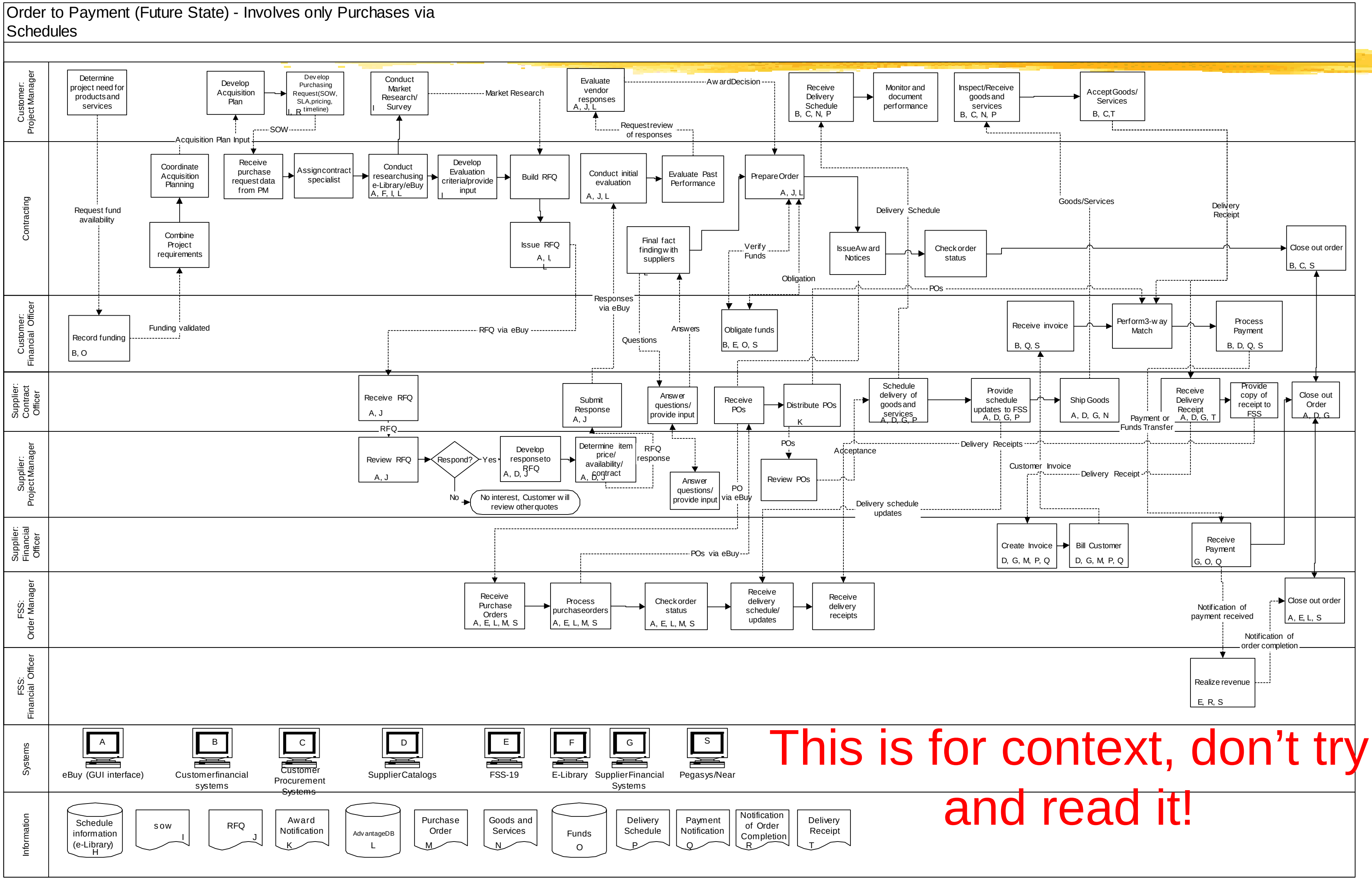

Stakeholders
Simulation & Validation
eBuy Adapter
VCA
To-Be Order to payment Process
Value Chains, Business Goals
MDA
FEA/OMB-300
Current Structure, Information & Processes
Enterprise Architecture
Documentation
As-Is Systems Architecture
MDA
To-Be Component Service Specifications*
To-Be Systems Architecture*
Target System*

* Next Steps

Source Material

- PowerPoint architecture of to-be process
- Systems architecture document
- Source code

Order to Payment Process Diagram



Order to Payment (Future State) - Involves only Purchases via Schedules

Customer: Project Manager

Determine project need for products and services

Develop Acquisition Plan

Develop Purchasing Request (SOW, SLA, pricing, timeline) I, R

Conduct Market Research/ Survey I

Market Research

Evaluate vendor responses A, J, L

Award Decision

Receive Delivery Schedule B, C, N, P

Monitor and document performance

Inspect/Receive goods and services B, C, N, P

Accept Goods/ Services B, C,T

Acquisition Plan Input

SOW

Request review of responses

Contracting

Coordinate Acquisition Planning

Receive purchase request data from PM

Assign contract specialist

Conduct research using e-Library/eBuy A, F, I, L

Develop Evaluation criteria/provide input I

Build RFQ

Conduct initial evaluation A, J, L

Evaluate Past Performance

Prepare Order A, J, L

Request fund availability

Combine Project requirements

Issue RFQ A, I, L

Final fact finding with suppliers L

Verify Funds

Issue Award Notices

Check order status

Close out order B, C, S

Delivery Schedule

Goods/Services

Delivery Receipt

Obligation

POs

Customer: Financial Officer

Record funding B, O

Funding validated

RFQ via eBuy

Responses via eBuy

Questions

Answers

Obligate funds B, E, O, S

Receive invoice B, Q, S

Perform 3-way Match

Process Payment B, D, Q, S

Supplier: Contract Officer

Receive RFQ A, J

Submit Response A, J

Answer questions/ provide input

Receive POs

Distribute POs K

Schedule delivery of goods and services A, D, G, P

Provide schedule updates to FSS A, D, G, P

Ship Goods A, D, G, N

Receive Delivery Receipt A, D, G, T

Provide copy of receipt to FSS

Close out Order A, D, G

Payment or Funds Transfer

RFQ

Supplier: Project Manager

Review RFQ A, J

Respond?

Yes

No

No interest, Customer will review other quotes

Develop response to RFQ A, D, J

Determine item price/ availability/ contract A, D, J

RFQ response

Answer questions/ provide input

PO via eBuy

POs

Review POs

Acceptance

Delivery Receipts

Customer Invoice

Delivery Receipt

Delivery schedule updates

Supplier: Financial Officer

POs via eBuy

Create Invoice D, G, M, P, Q

Bill Customer D, G, M, P, Q

Receive Payment G, O, Q

FSS: Order Manager

Receive Purchase Orders A, E, L, M, S

Process purchase orders A, E, L, M, S

Check order status A, E, L, M, S

Receive delivery schedule/ updates

Receive delivery receipts

Notification of payment received

Close out order A, E, L, S

FSS: Financial Officer

Notification of order completion

Realize revenue E, R, S

Systems

A eBuy (GUI interface)

B Customer financial systems

C Customer Procurement Systems

D Supplier Catalogs

E FSS-19

F E-Library

G Supplier Financial Systems

S Pegasys/Near

Information

Schedule information (e-Library) H

SOW I

RFQ J

Award Notification K

AdvantageDB L

Purchase Order M

Goods and Services N

Funds O

Delivery Schedule P

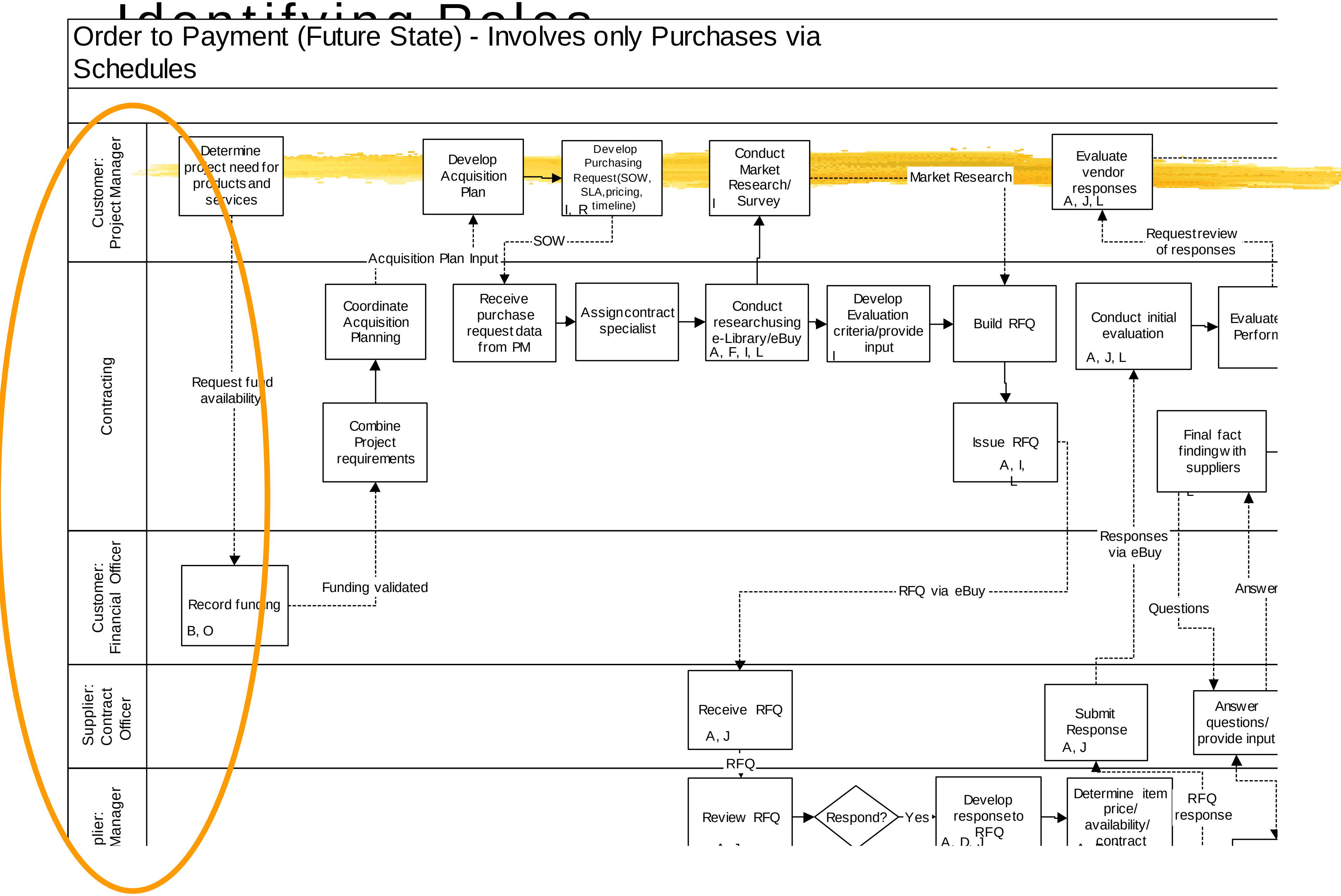
Payment Notification Q

Notification of Order Completion R

Delivery Receipt T

This is for context, don't try and read it!

Identifying Roles



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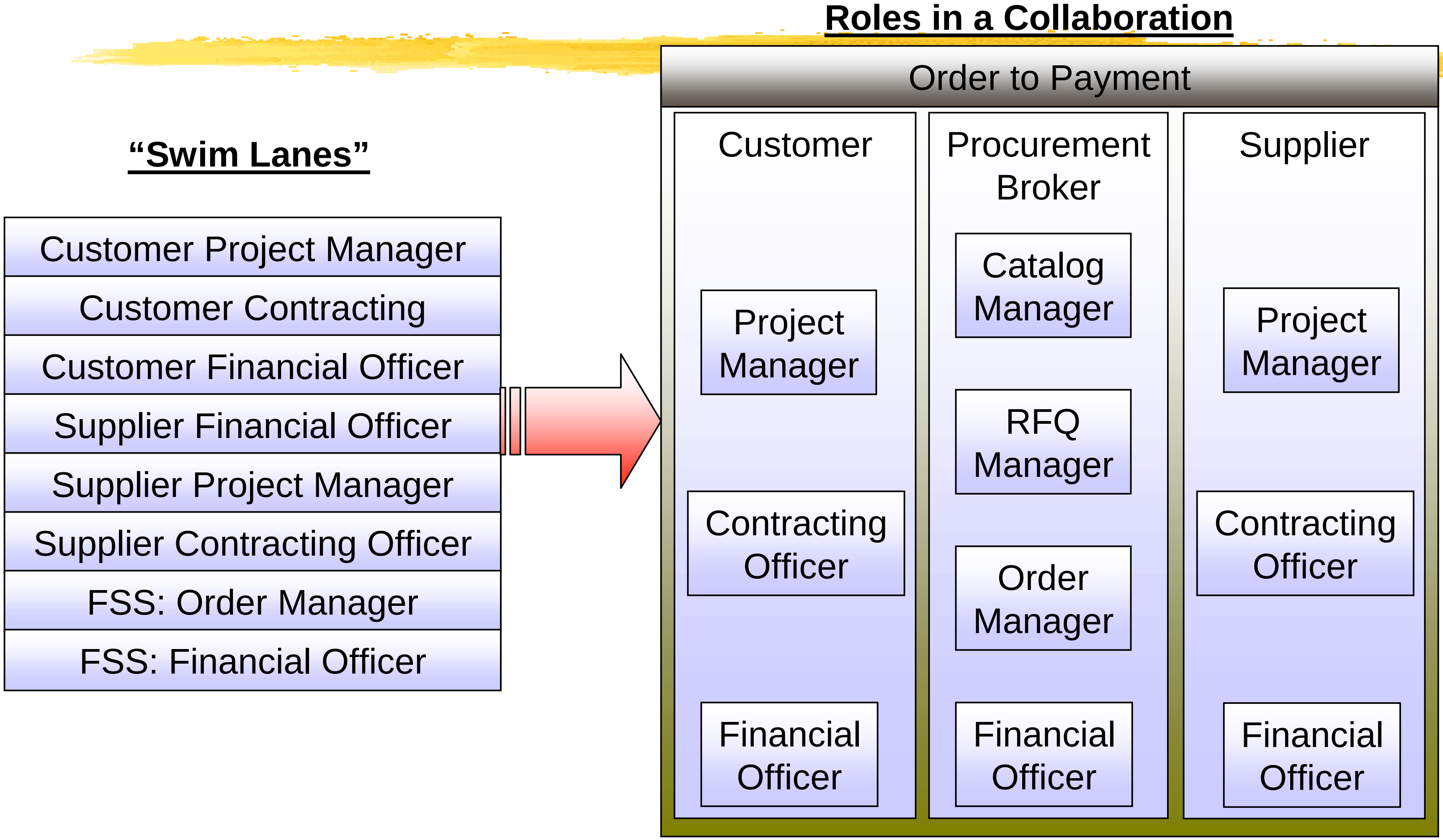
I, R
Conduct Market Research/ Survey
I
Market Research
Evaluate vendor responses
A, J, L
Request review of responses
SOW
Acquisition Plan Input
Contracting
Coordinate Acquisition Planning
Receive purchase request data from PM
Assign contract specialist
Conduct research using e-Library/eBuy
A, F, I, L
Develop Evaluation criteria/provide input
I
Build RFQ
Conduct initial evaluation
A, J, L
Evaluate Perform
Request fund availability
Combine Project requirements
Issue RFQ
A, I, L
Final fact finding with suppliers
L
Customer: Financial Officer
Record funding
B, O
Funding validated
RFQ via eBuy
Responses via eBuy
Questions
Answer
Supplier: Contract Officer
Receive RFQ
A, J
Submit Response
A, J
Answer questions/ provide input
RFQ
plier: Manager
Review RFQ
A, J
Respond?
Yes
Develop response to RFQ
A, D, J
Determine item price/ availability/ contract
RFQ response

Finding the Roles and Inner Roles



“Swim Lanes”

- Customer Project Manager
- Customer Contracting
- Customer Financial Officer
- Supplier Financial Officer
- Supplier Project Manager
- Supplier Contracting Officer
- FSS: Order Manager
- FSS: Financial Officer

Roles in a Collaboration

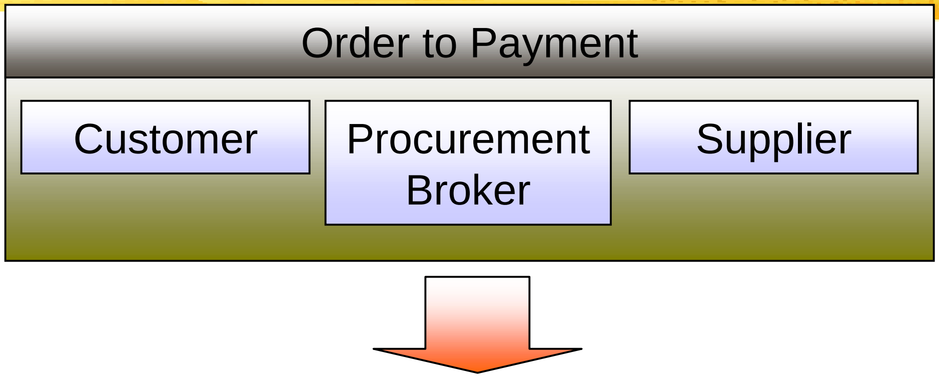
Order to Payment

Customer
- Project Manager
- Contracting Officer
- Financial Officer

Procurement Broker
- Catalog Manager
- RFQ Manager
- Order Manager
- Financial Officer

Supplier
- Project Manager
- Contracting Officer
- Financial Officer

Highest Level Roles In Procurement Collaboration

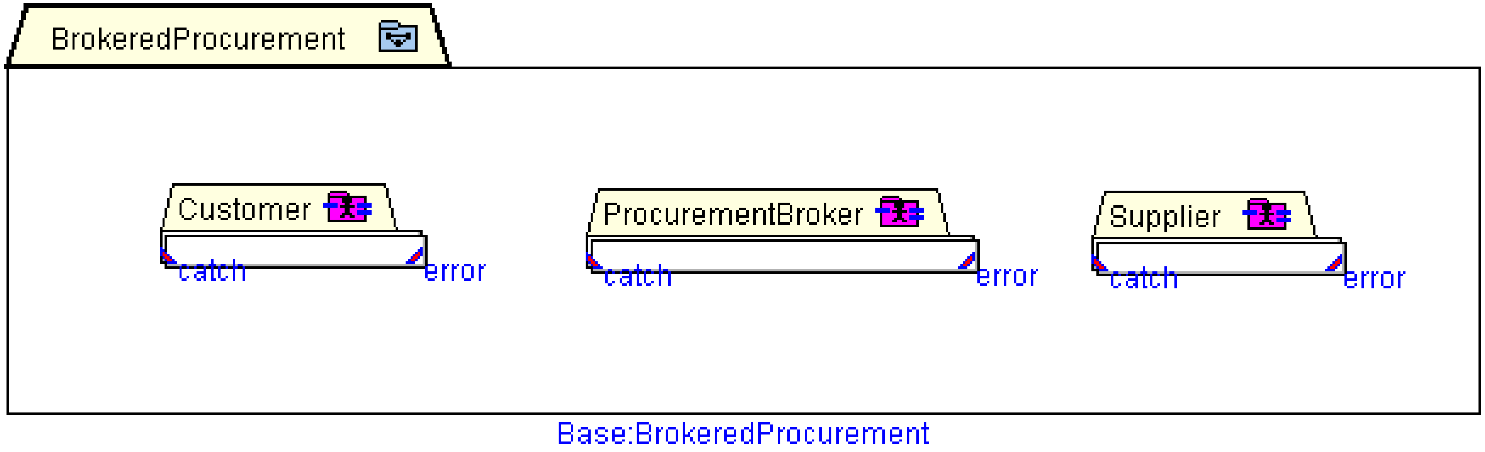


Order to Payment

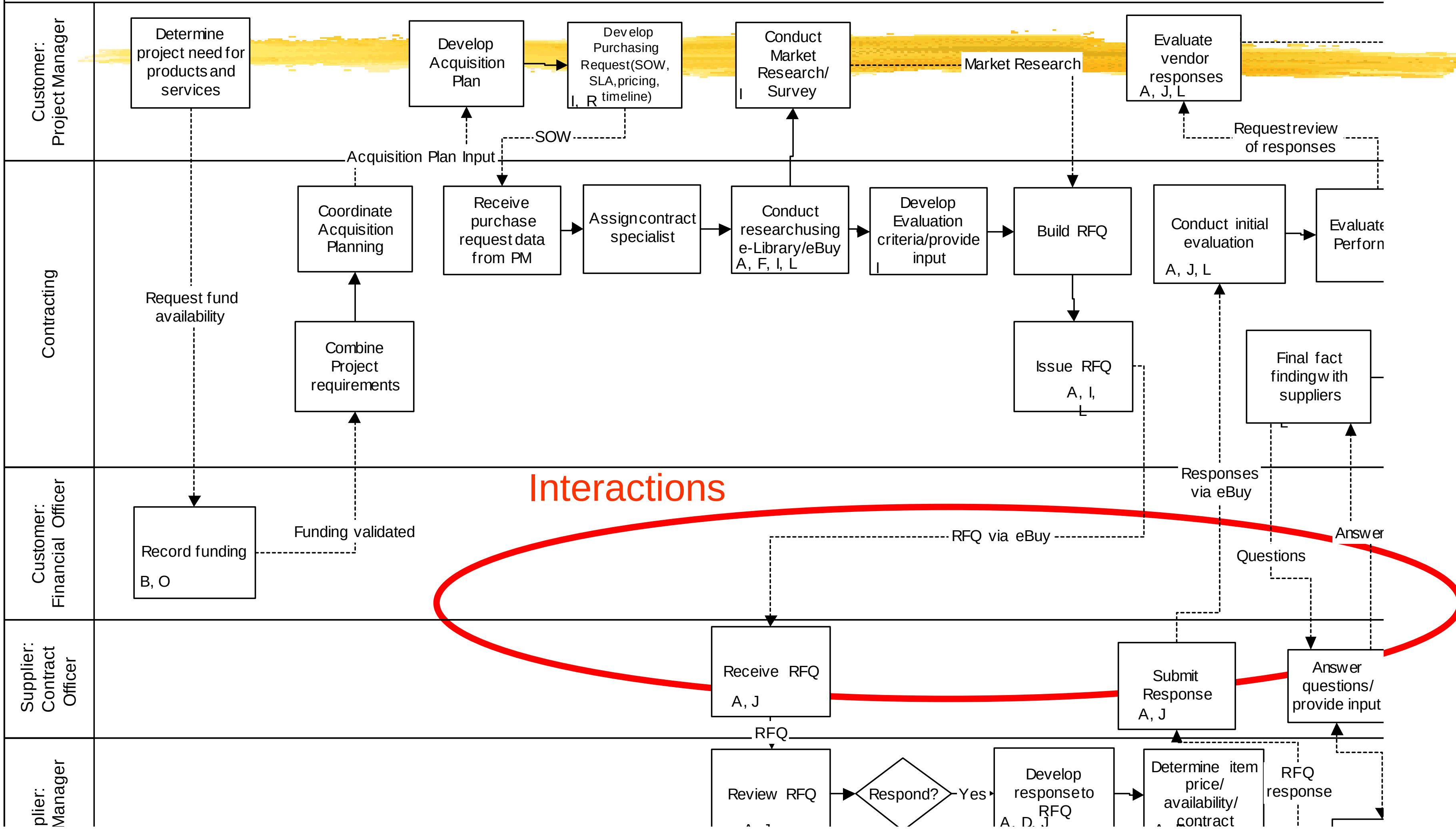
Customer

Procurement Broker

Supplier



Order to Payment (Future State) - Involves only Purchases via Schedules



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Develop Purchasing Request(SOW, SLA,pricing, timeline)
I, R

Conduct Market Research/ Survey
I

Market Research

Evaluate vendor responses
A, J, L

Request review of responses

SOW

Acquisition Plan Input

Contracting

Coordinate Acquisition Planning

Receive purchase request data from PM

Assign contract specialist

Conduct researchusing e-Library/eBuy
A, F, I, L

Develop Evaluation criteria/provide input
I

Build RFQ

Conduct initial evaluation
A, J, L

Evaluate Perform

Request fund availability

Combine Project requirements

Issue RFQ
A, I, L

Final fact findingwith suppliers
L

Customer: Financial Officer

Interactions

Responses via eBuy

Record funding
B, O

Funding validated

RFQ via eBuy

Answer

Questions

Supplier: Contract Officer

Receive RFQ
A, J

Submit Response
A, J

Answer questions/ provide input

RFQ

plier: Manager

Review RFQ
A, J

Respond?

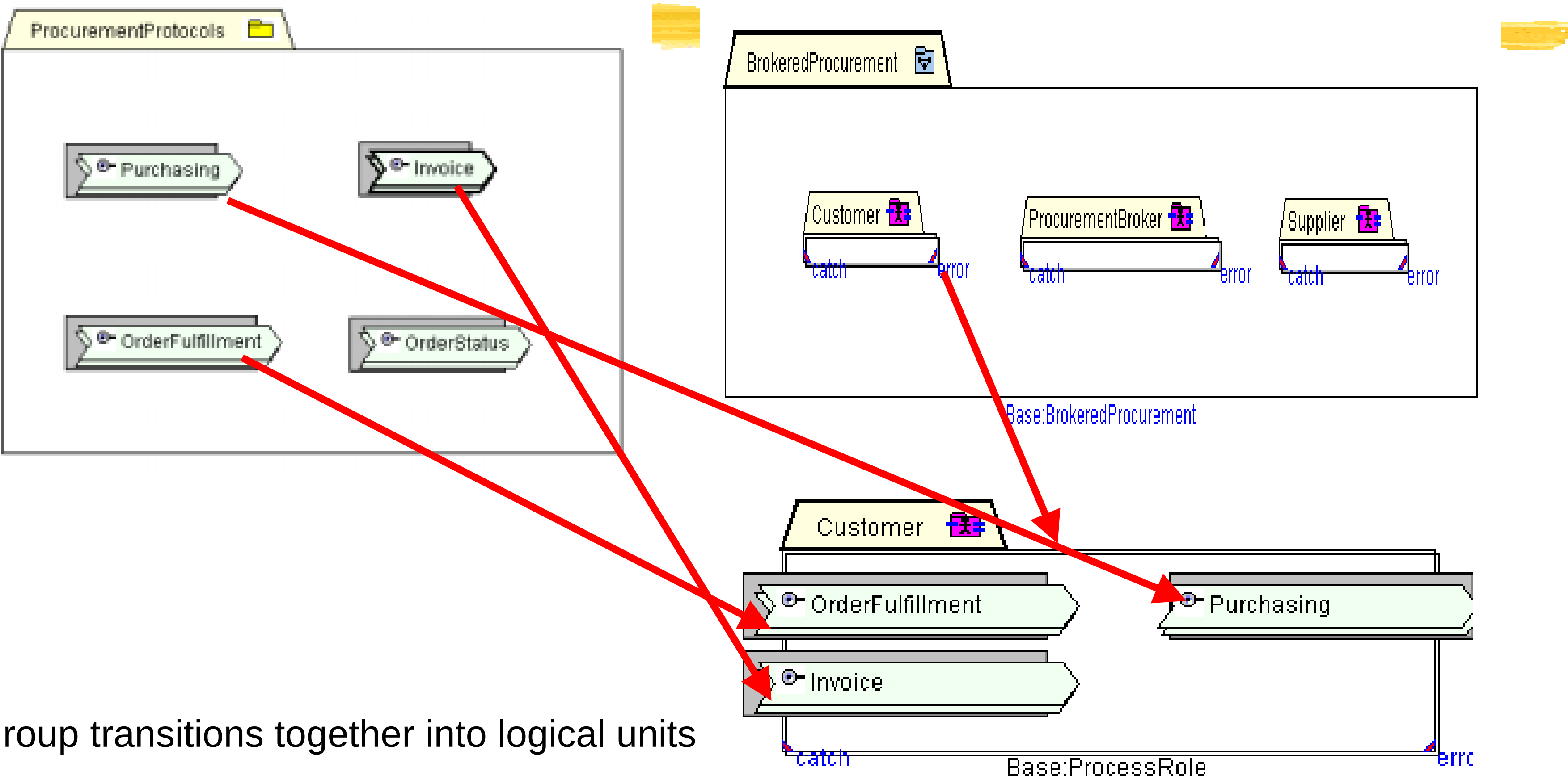
Yes

Develop responseto RFQ
A, D, J

Determine item price/ availability/ contract
A

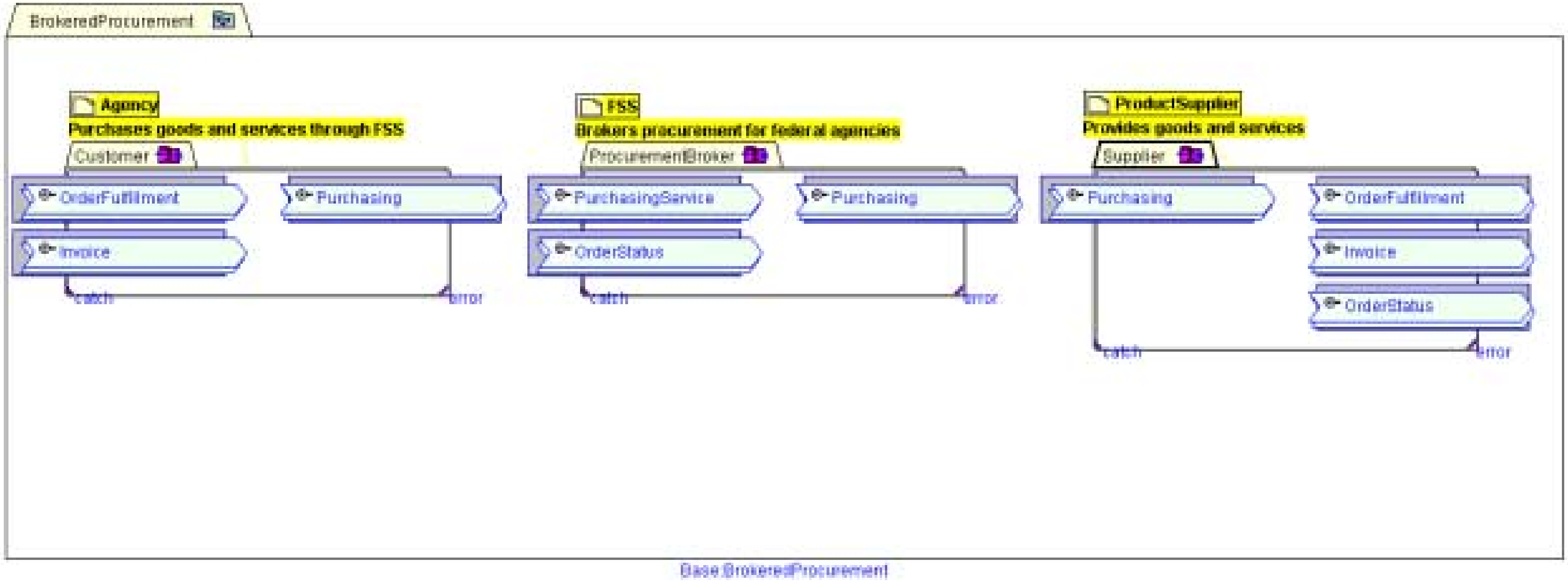
RFQ response

Attach Protocols to Roles as "Ports"

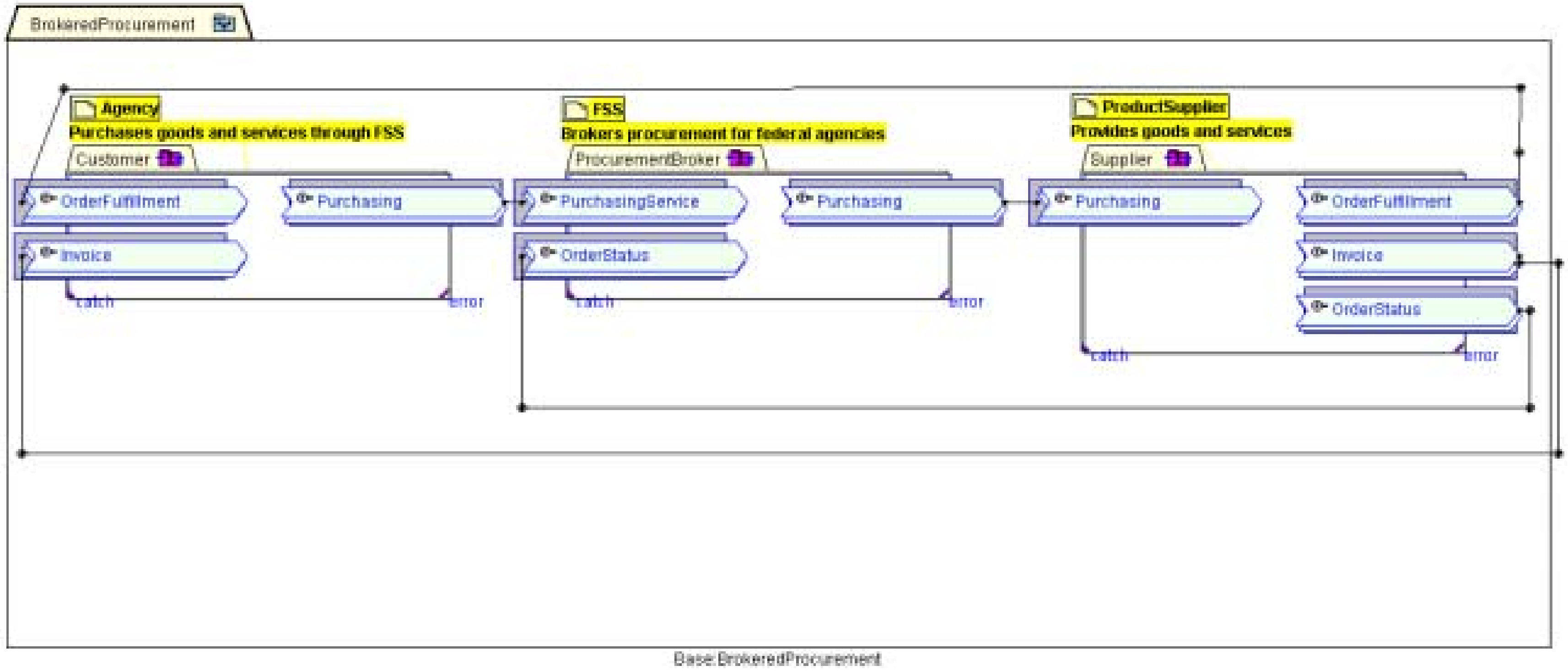


Group transitions together into logical units

Ports are Automatically Propagated

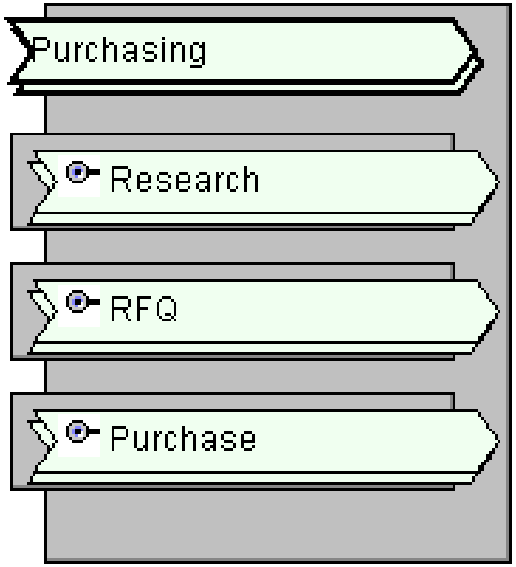


Specifying Interactions

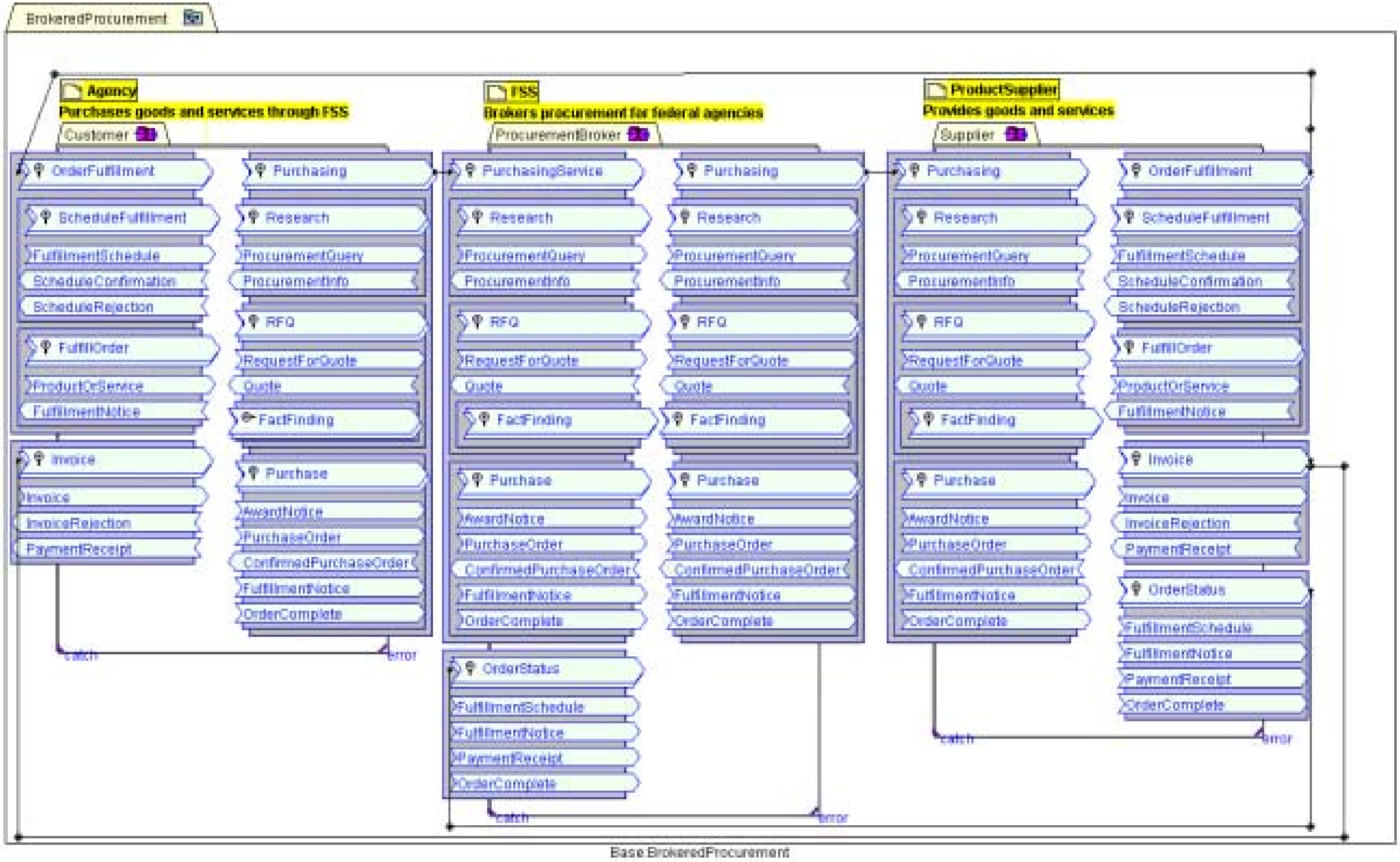


Inner Protocols

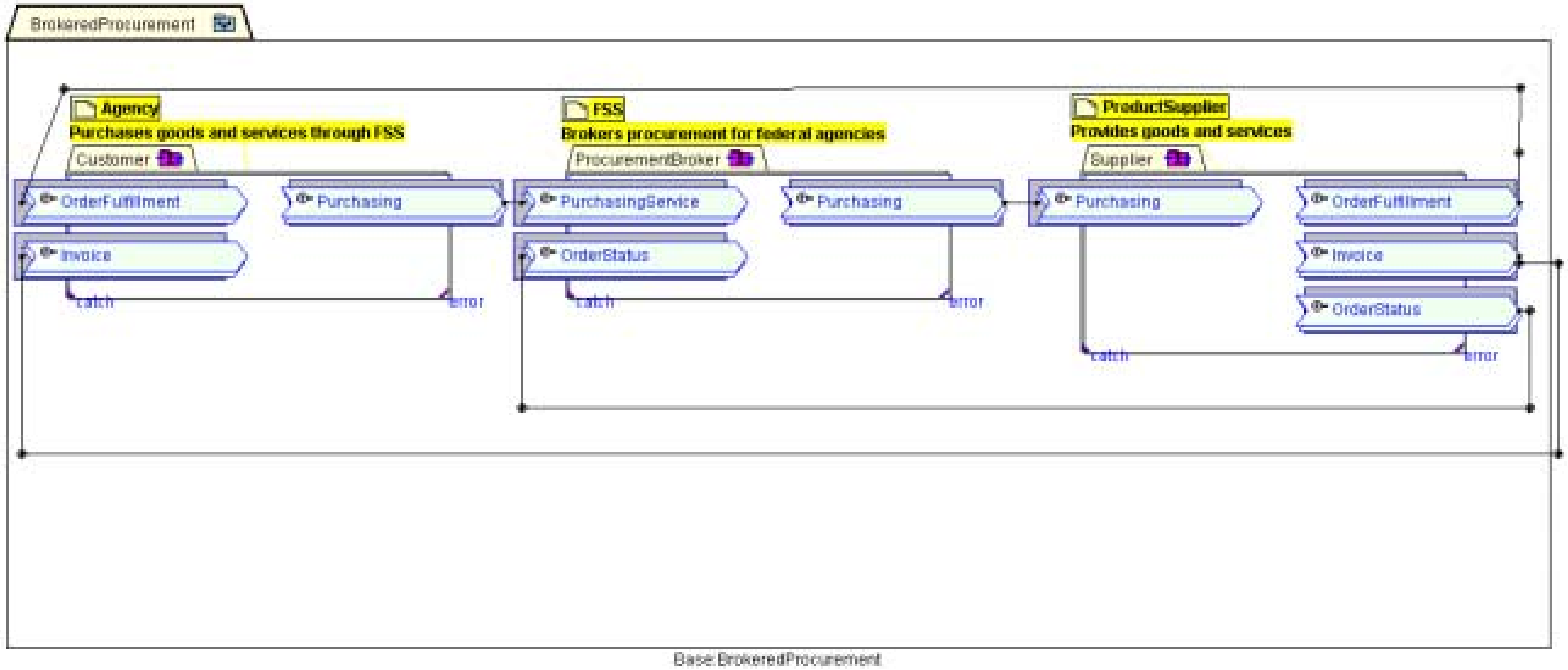
- Protocols represent conversations between roles
- Conversations frequently have sub-conversations, detail about a specific subject
- These sub-conversations are inner protocols
- Inner protocols can also be reused in other protocols or even as top-level protocols
- Protocols can “nest” to any level of detail



FSS Services Collaboration

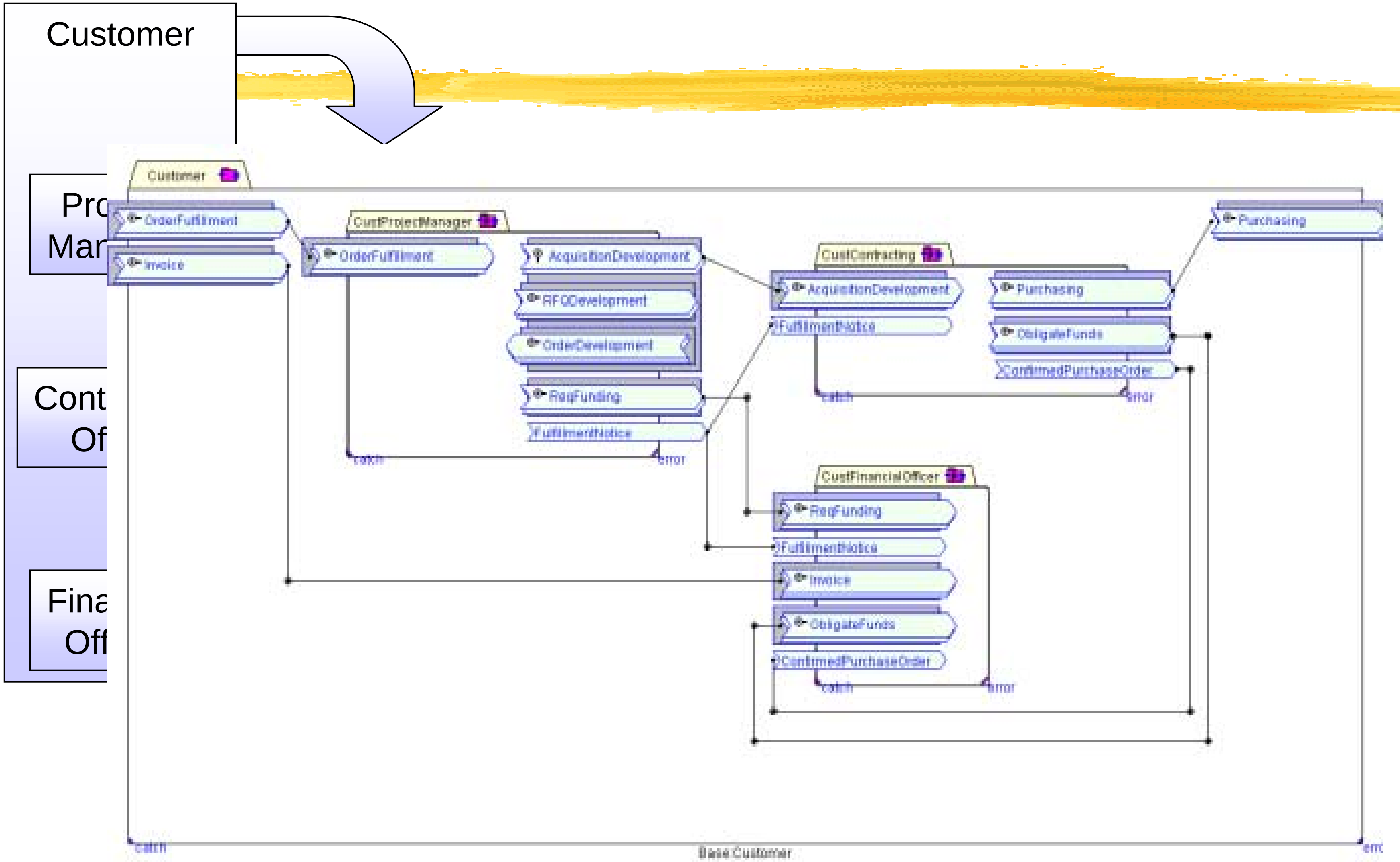


Summary Top Level Collaboration



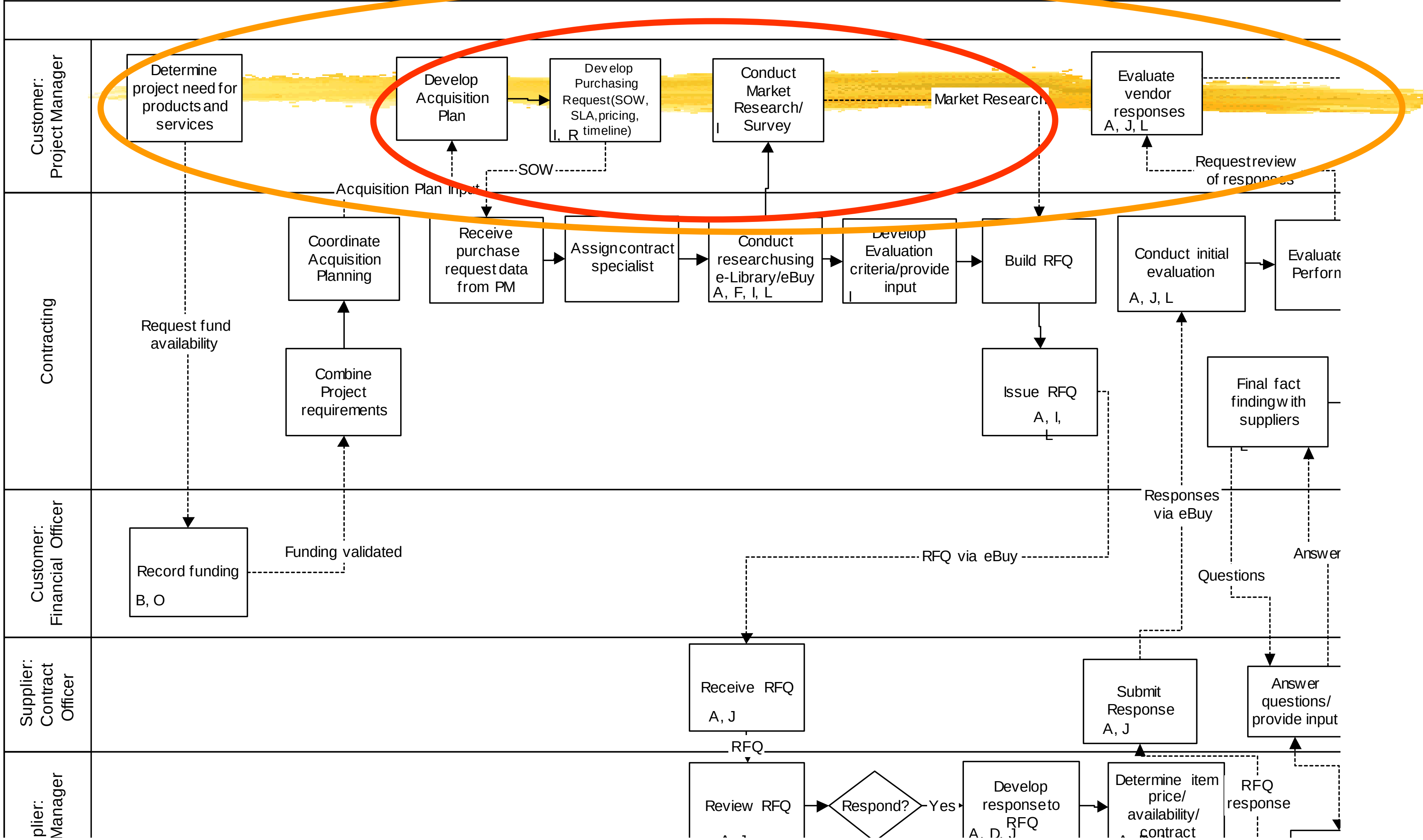
Simplified View - Level of detail is optional

Drilling Down into Customer Detail



Process Steps

Order to Payment (Future State) - Involves only Purchases via Schedules



Customer: Project Manager

Determine project need for products and services

Develop Acquisition Plan

Develop Purchasing Request(SOW, SLA, pricing, timeline)
I, R

Conduct Market Research/ Survey
I

Market Research

Evaluate vendor responses
A, J, L

Request review of responses

SOW

Acquisition Plan Input

Contracting

Coordinate Acquisition Planning

Receive purchase request data from PM

Assign contract specialist

Conduct researchusing e-Library/eBuy
A, F, I, L

Develop Evaluation criteria/provide input
I

Build RFQ

Conduct initial evaluation
A, J, L

Evaluate Perform

Request fund availability

Combine Project requirements

Issue RFQ
A, I, L

Final fact findingwith suppliers

Customer: Financial Officer

Record funding
B, O

Funding validated

RFQ via eBuy

Responses via eBuy

Questions

Answer

Supplier: Contract Officer

Receive RFQ
A, J

Submit Response
A, J

Answer questions/ provide input

RFQ

plier: Manager

Review RFQ
A, J

Respond?

Yes

Develop responseto RFQ
A, D, J

Determine item price/ availability/ contract
A

RFQ response

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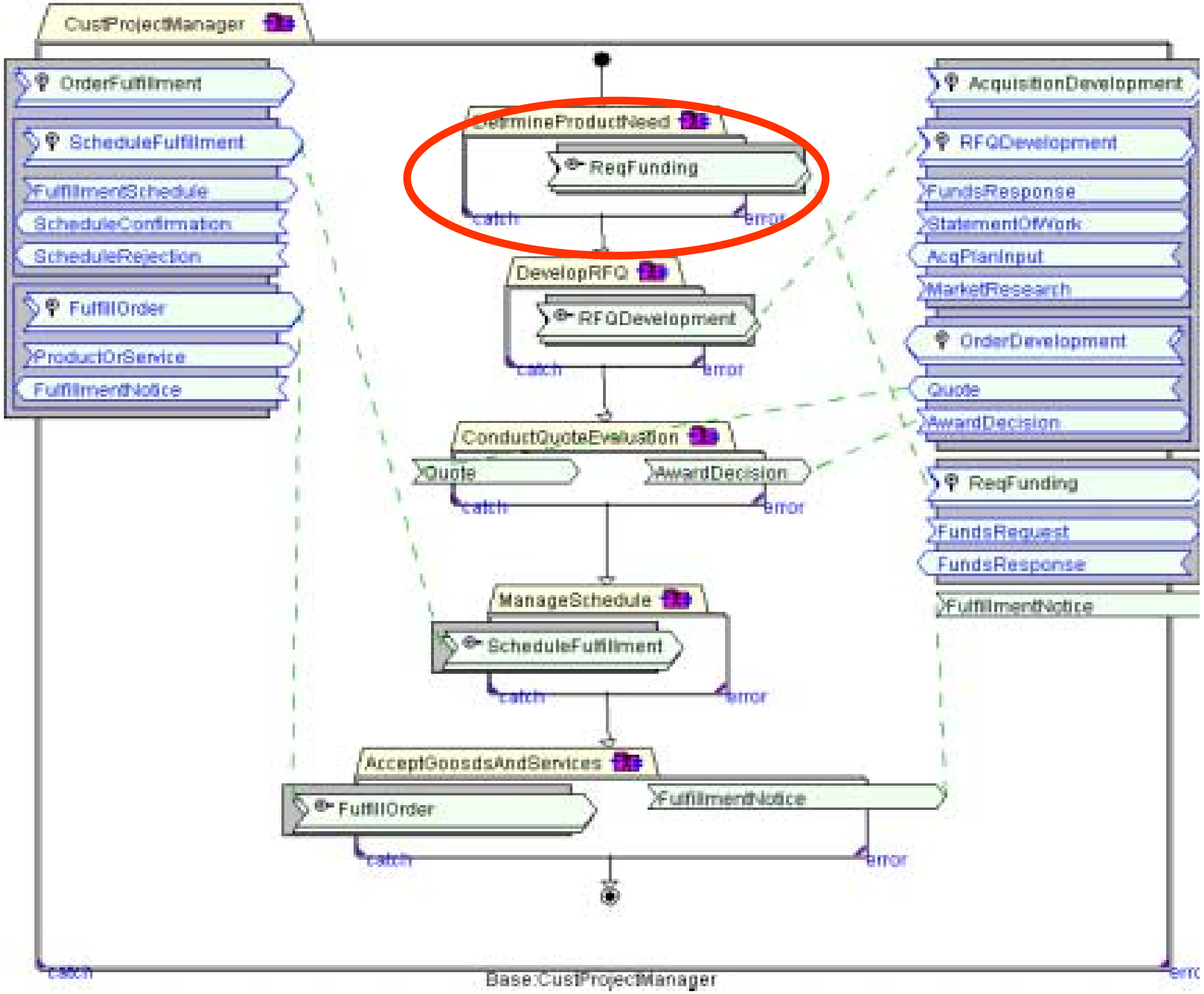
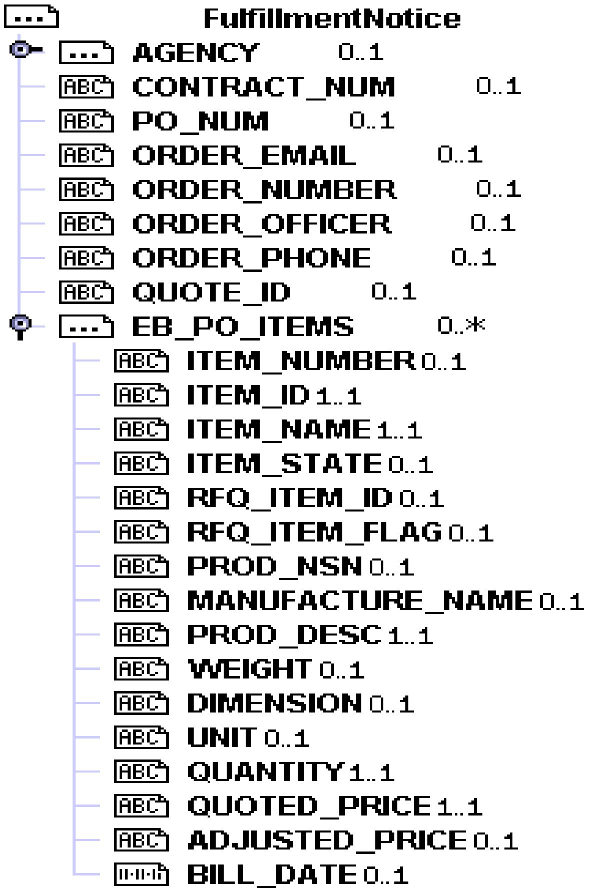
Choreography of Process



Modeling Collaboration Documents

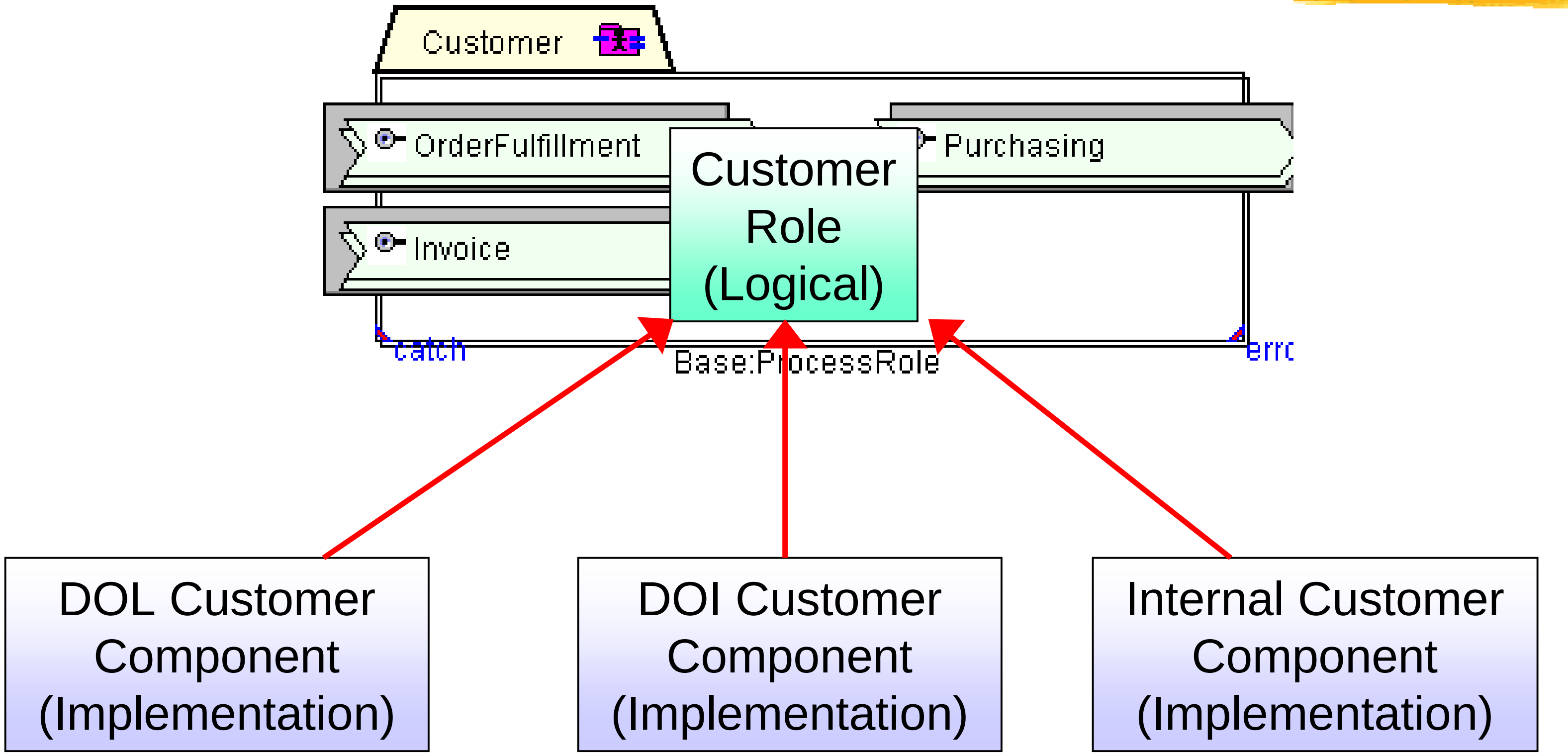
- Fill in details of the documents
- Focus on business information - not technology
- Collaboration - Not an information model
- May be derived from existing sources
  - This was reverse engineered from database
- Helps in creating technology mappings - E.G. Web Services
- Includes
  - Composition
  - Type
  - Cardinality



FulfillmentNotice

- AGENCY 0..1
- CONTRACT_NUM 0..1
- PO_NUM 0..1
- ORDER_EMAIL 0..1
- ORDER_NUMBER 0..1
- ORDER_OFFICER 0..1
- ORDER_PHONE 0..1
- QUOTE_ID 0..1
- EB_PO_ITEMS 0..*
  - ITEM_NUMBER 0..1
  - ITEM_ID 1..1
  - ITEM_NAME 1..1
  - ITEM_STATE 0..1
  - RFQ_ITEM_ID 0..1
  - RFQ_ITEM_FLAG 0..1
  - PROD_NSN 0..1
  - MANUFACTURE_NAME 0..1
  - PROD_DESC 1..1
  - WEIGHT 0..1
  - DIMENSION 0..1
  - UNIT 0..1
  - QUANTITY 1..1
  - QUOTED_PRICE 1..1
  - ADJUSTED_PRICE 0..1
  - BILL_DATE 0..1

Dealing with Variation
Multiple Implementations of a Role



Customer Role (Logical)

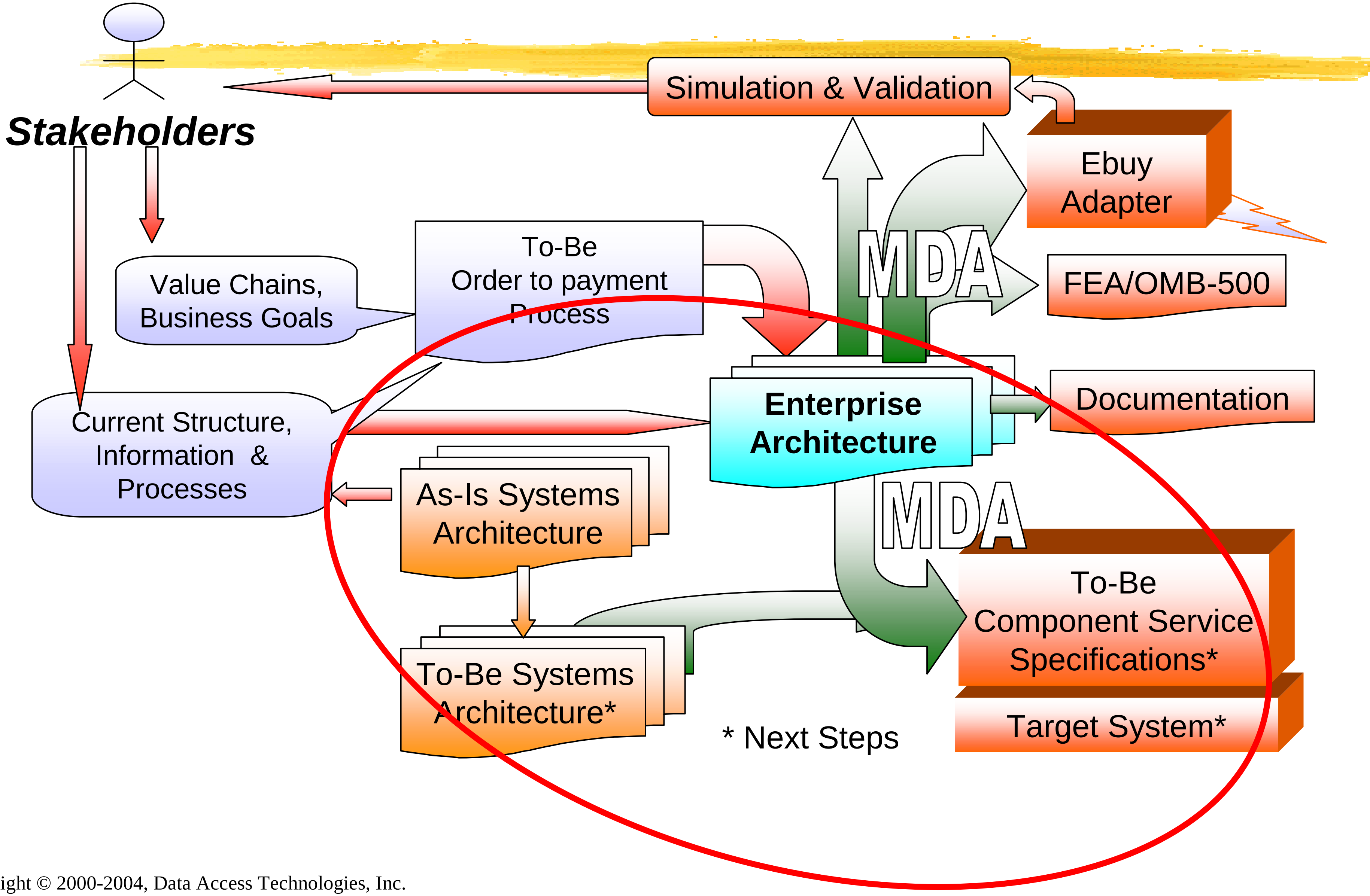
DOL Customer Component (Implementation)

DOI Customer Component (Implementation)

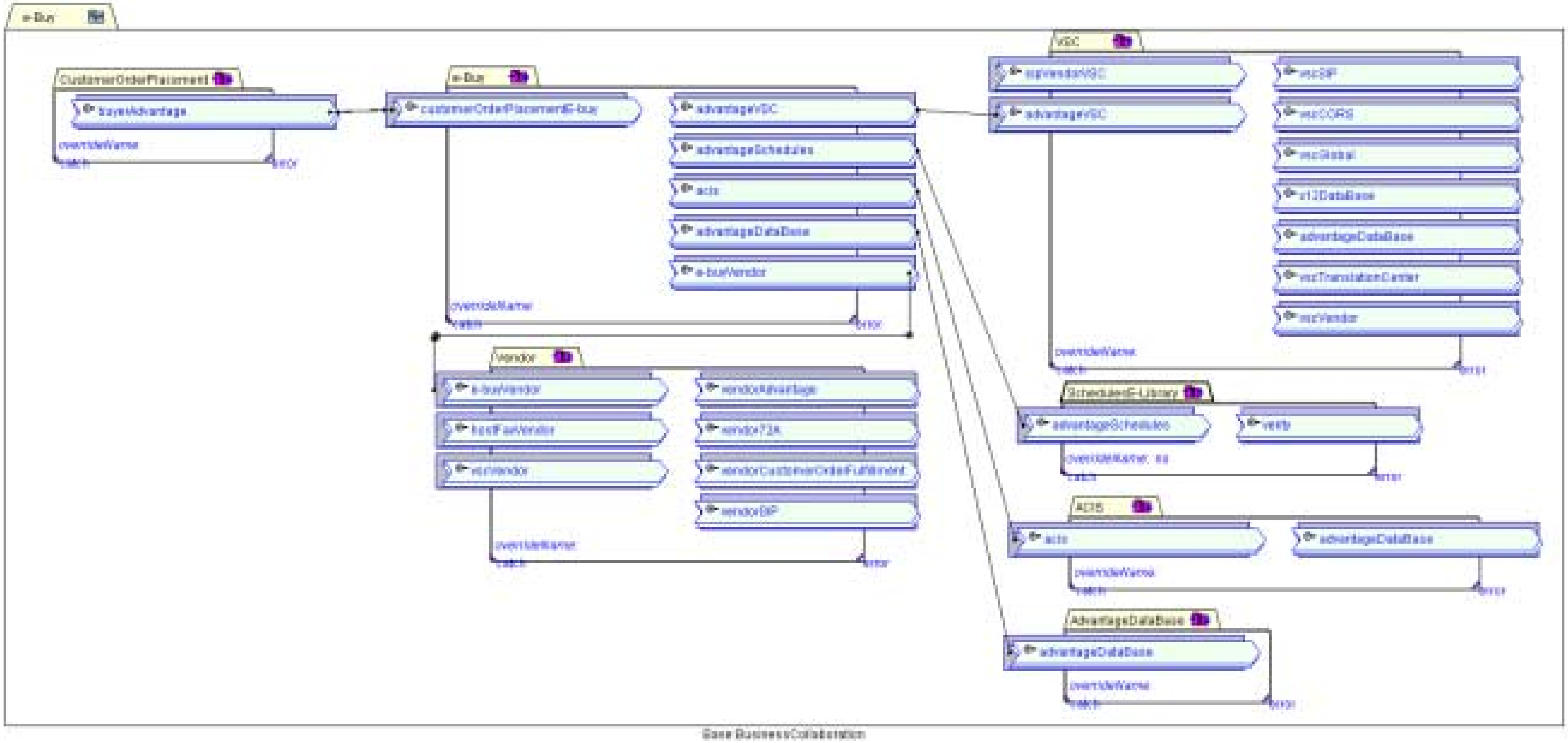
Internal Customer Component (Implementation)

The “Inside” can change as long as the external “contract” is satisfied

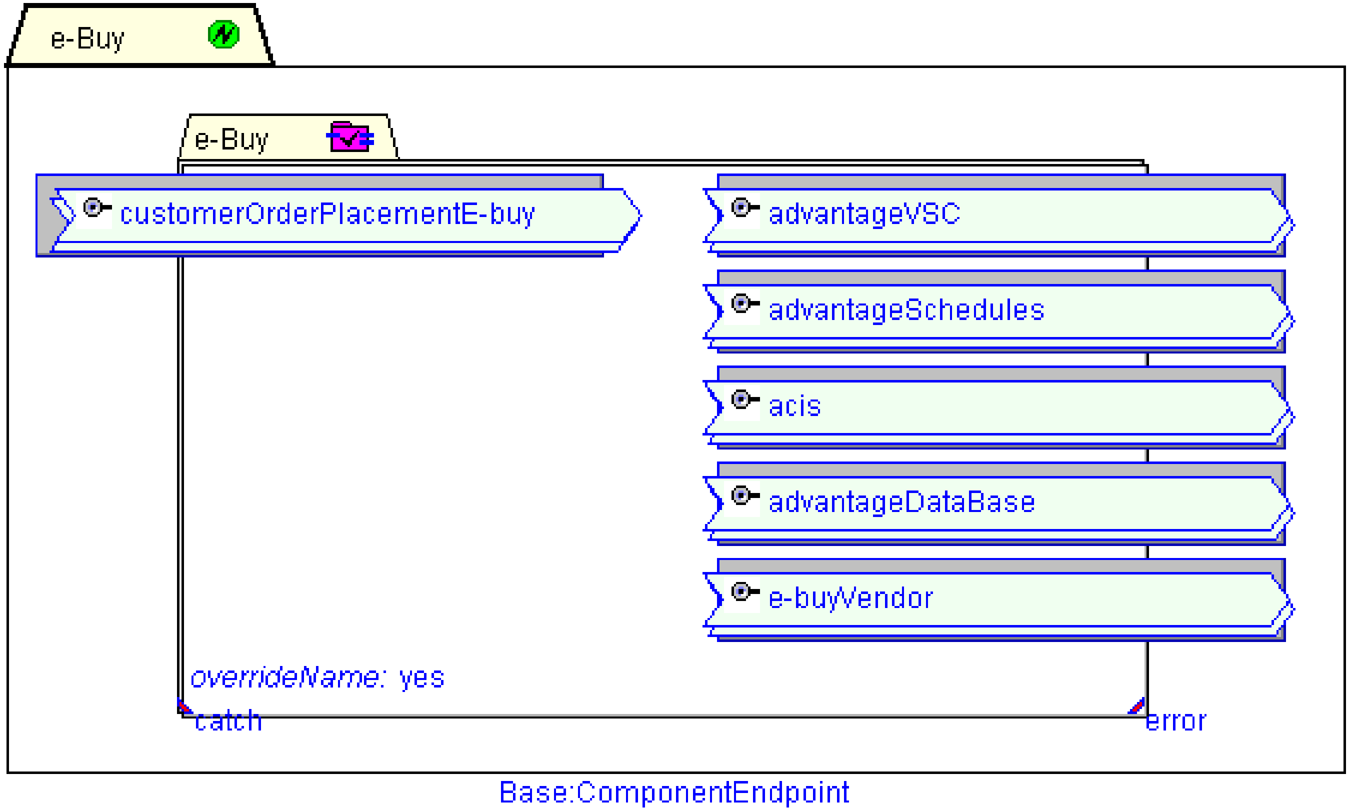
Technology Mapping


Stakeholders
Simulation & Validation
Ebuy Adapter
Value Chains, Business Goals
To-Be Order to payment Process
MDA
FEA/OMB-500
Current Structure, Information & Processes
Enterprise Architecture
Documentation
As-Is Systems Architecture
MDA
To-Be Component Service Specifications*
To-Be Systems Architecture*
Target System*
* Next Steps

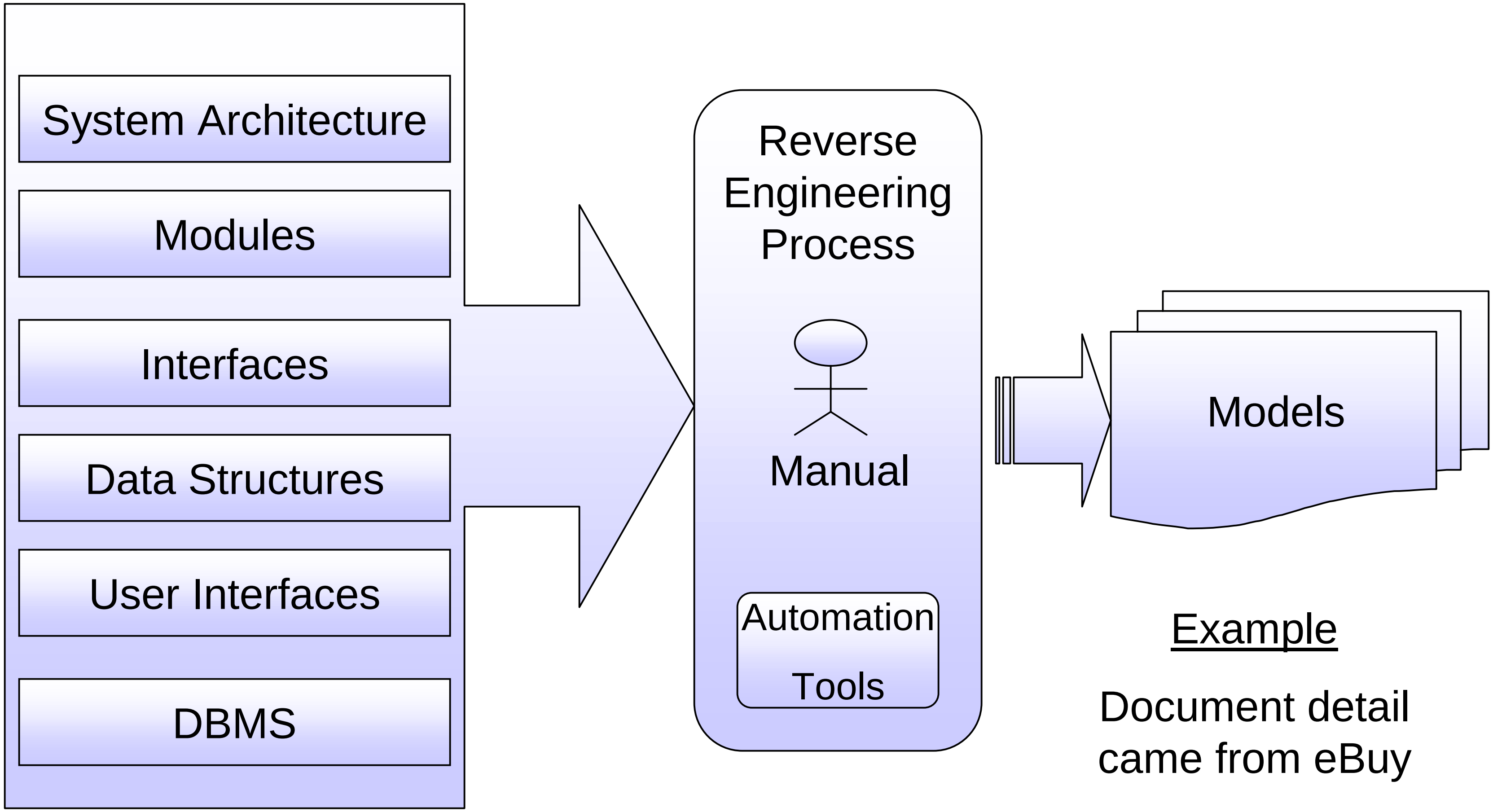
Systems Architecture



Systems Architecture - Zoom



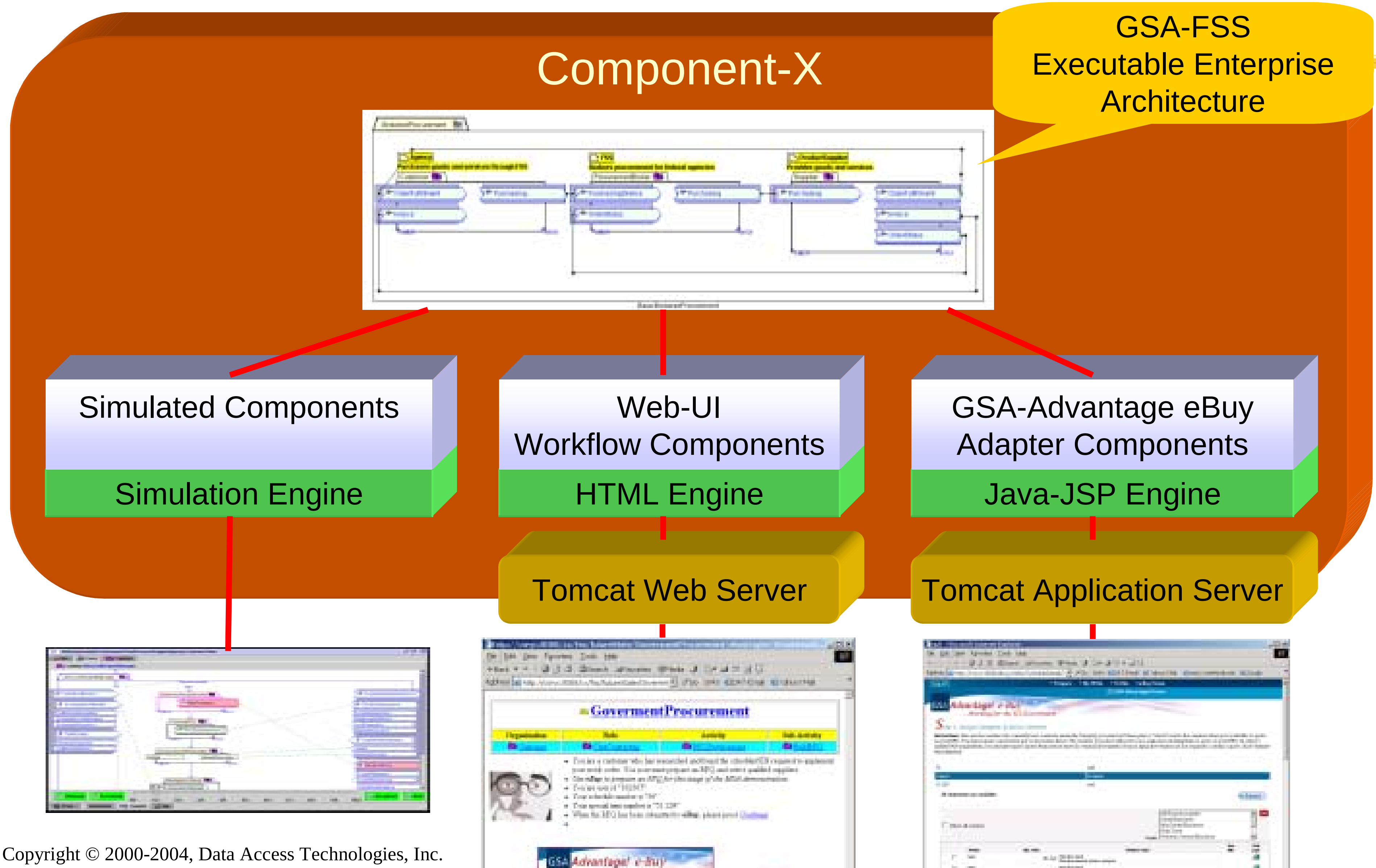
Reverse Engineering



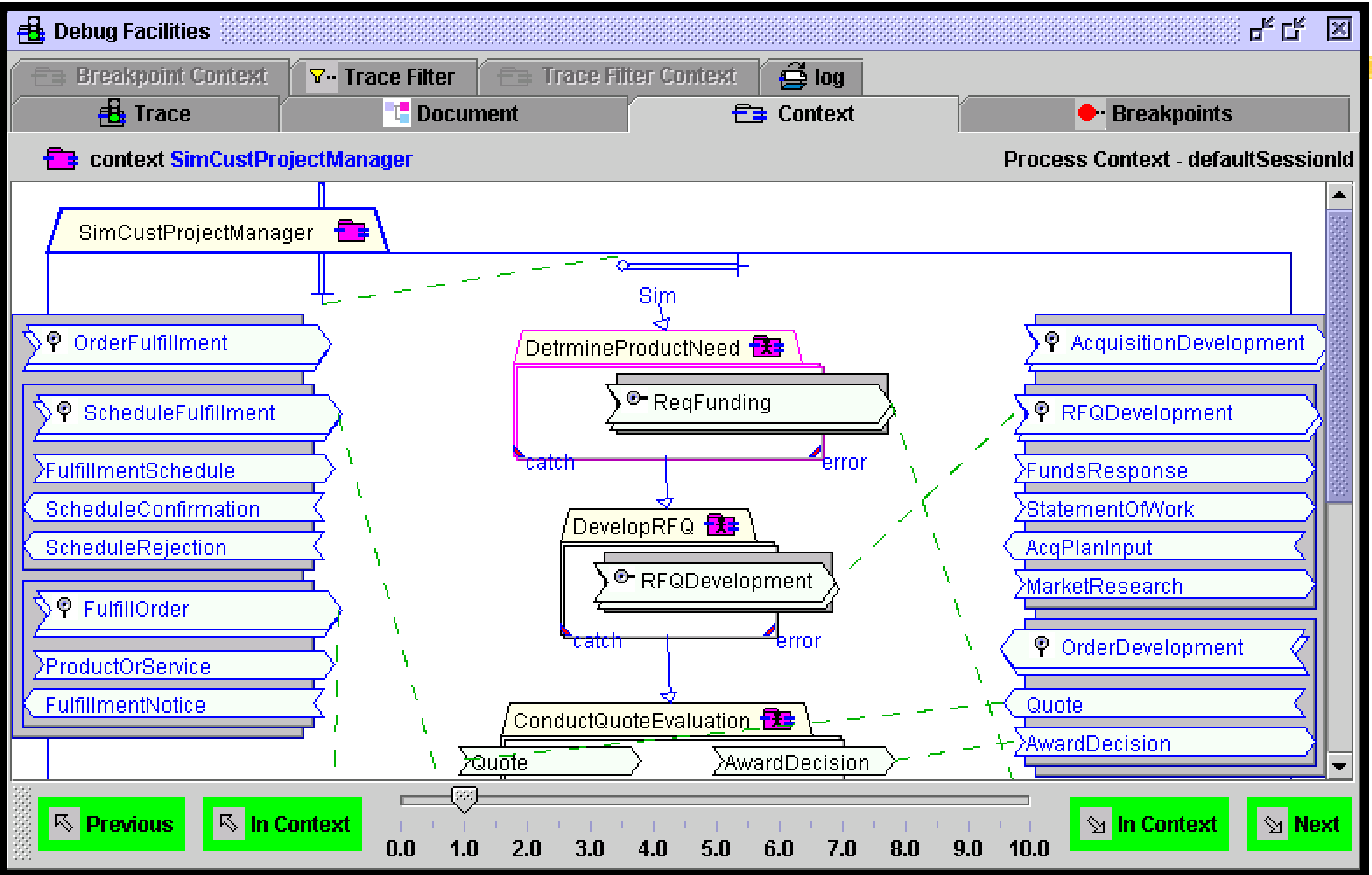
<u>Example</u>

Document detail came from eBuy

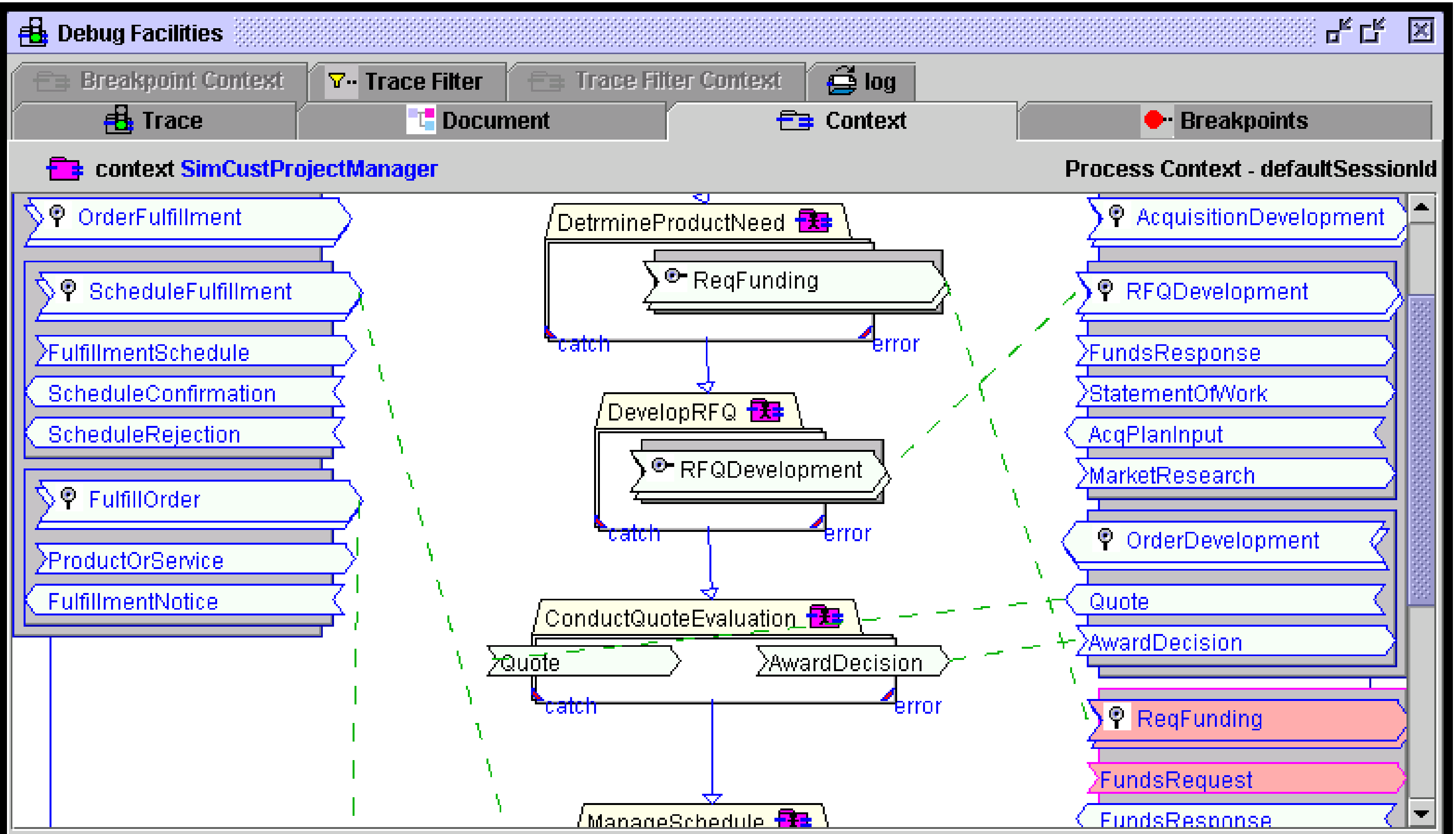
GSA-FSS MDA Pilot Executable



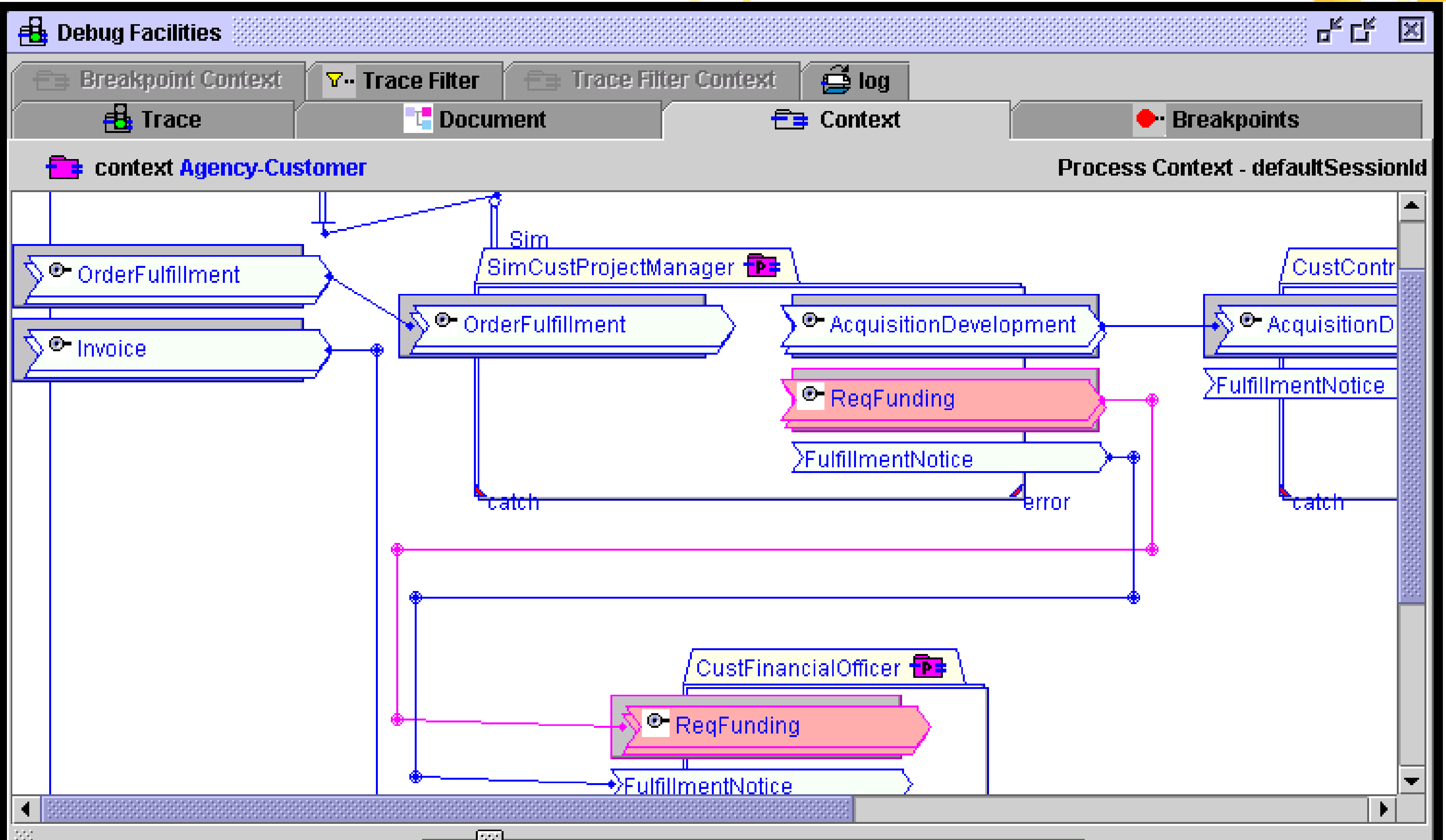
Initiating Activity



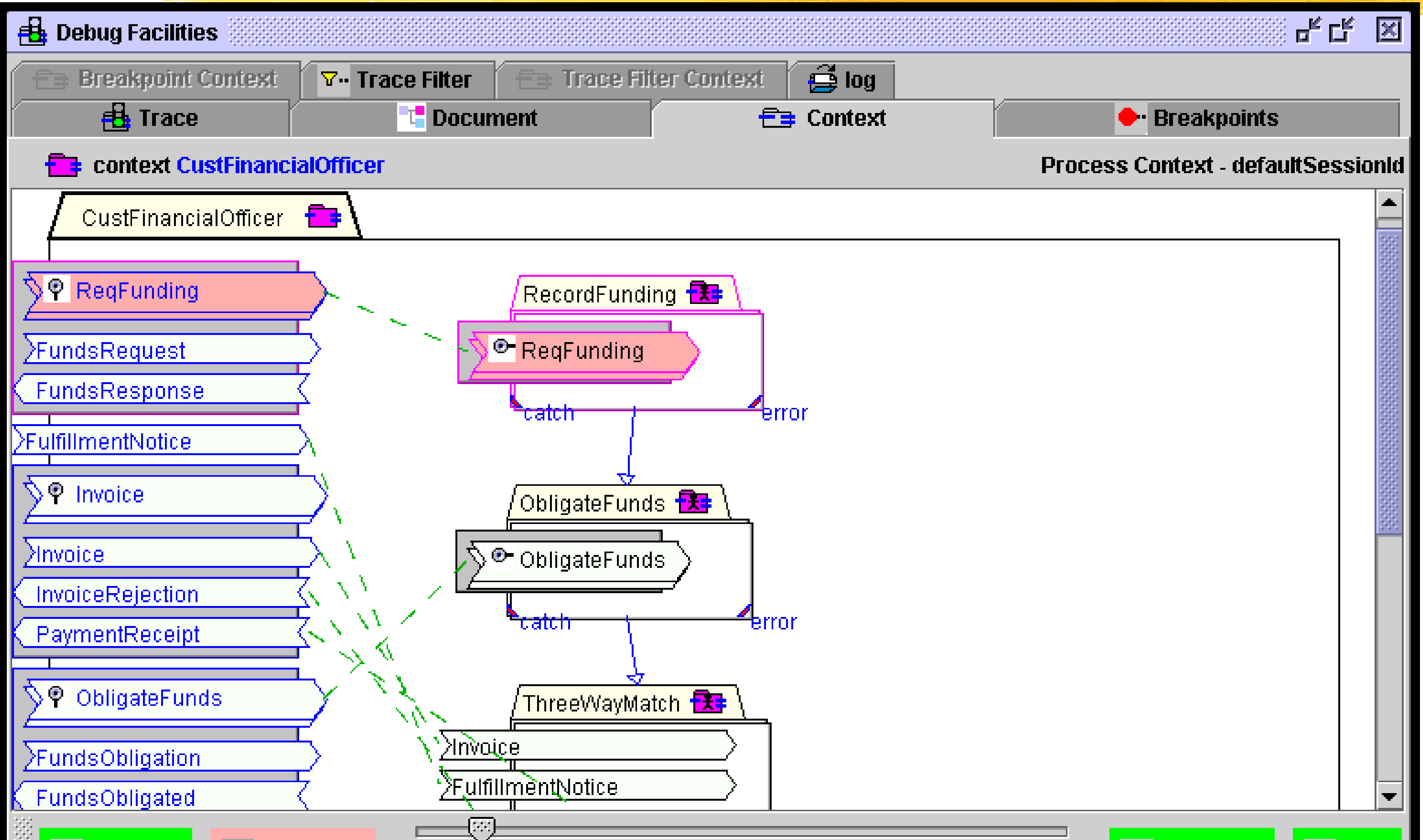
Activity interacting externaly



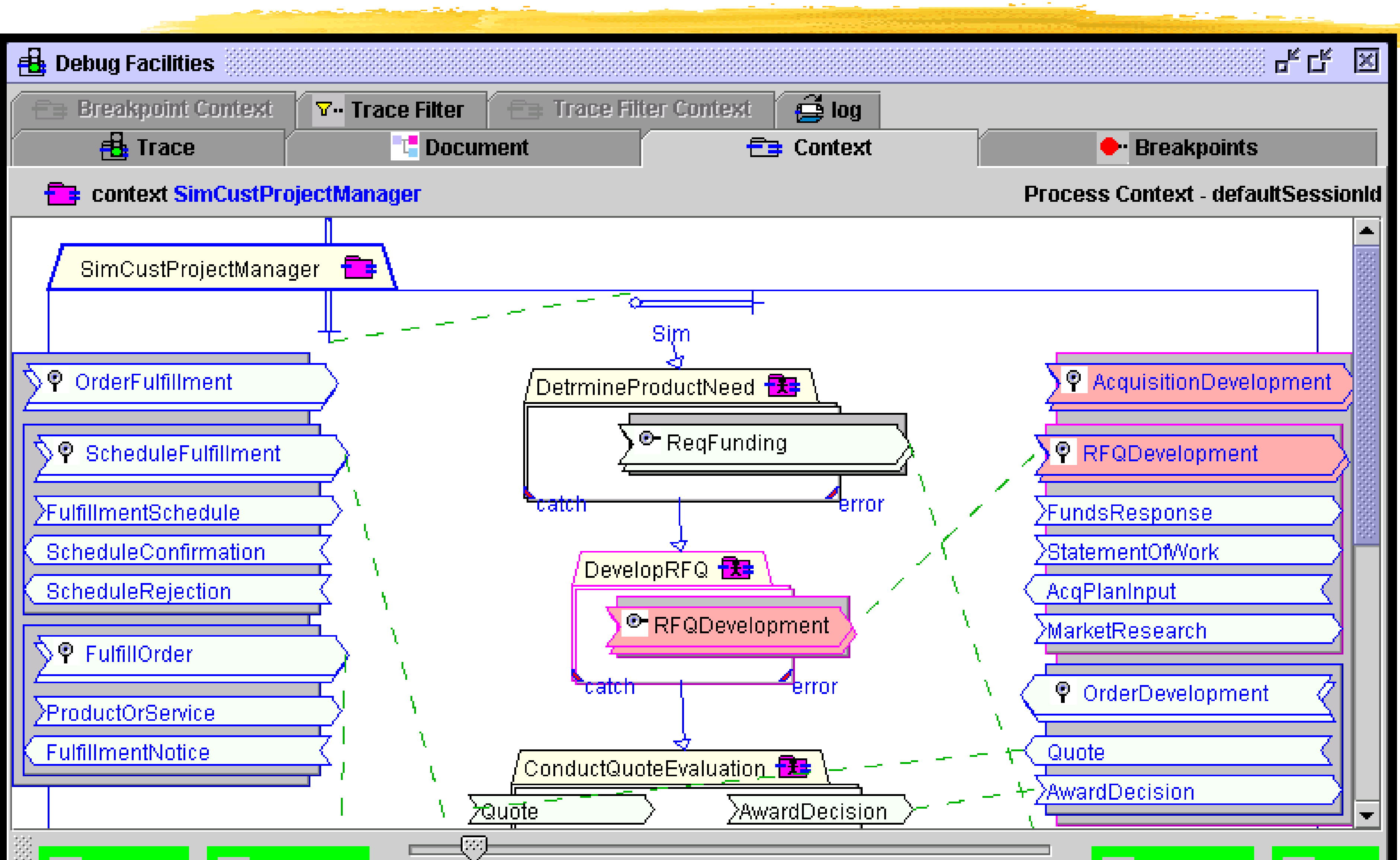
… With financial officer



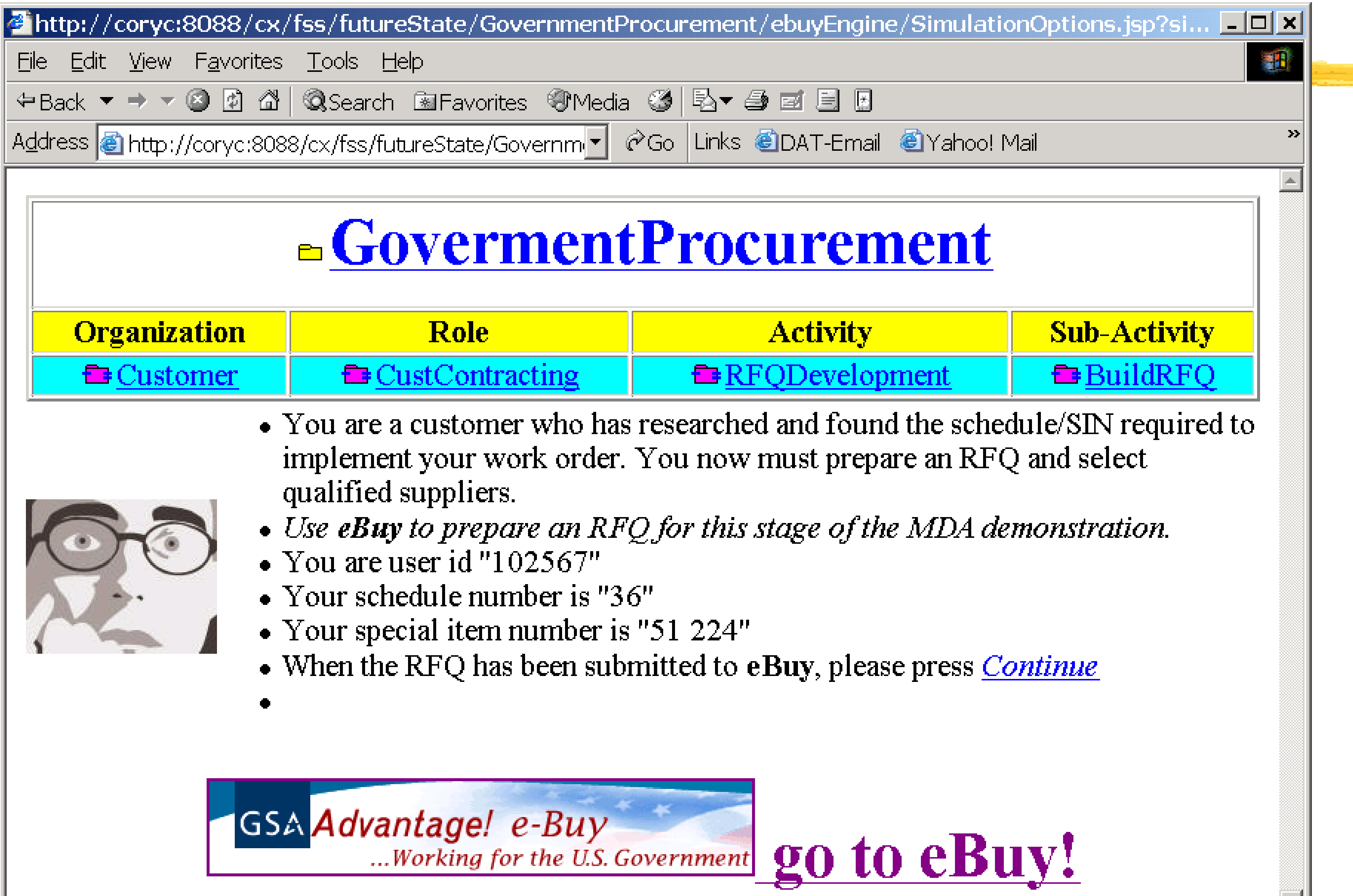
Who records the funding



And the process returns to the PM



Web-UI components implement workflow


http://coryc:8088/cx/fss/futureState/GovernmentProcurement/ebuyEngine/SimulationOptions.jsp?si...
File Edit View Favorites Tools Help
Back
Search
Favorites
Media
Address
http://coryc:8088/cx/fss/futureState/Governm
Go
Links
DAT-Email
Yahoo! Mail

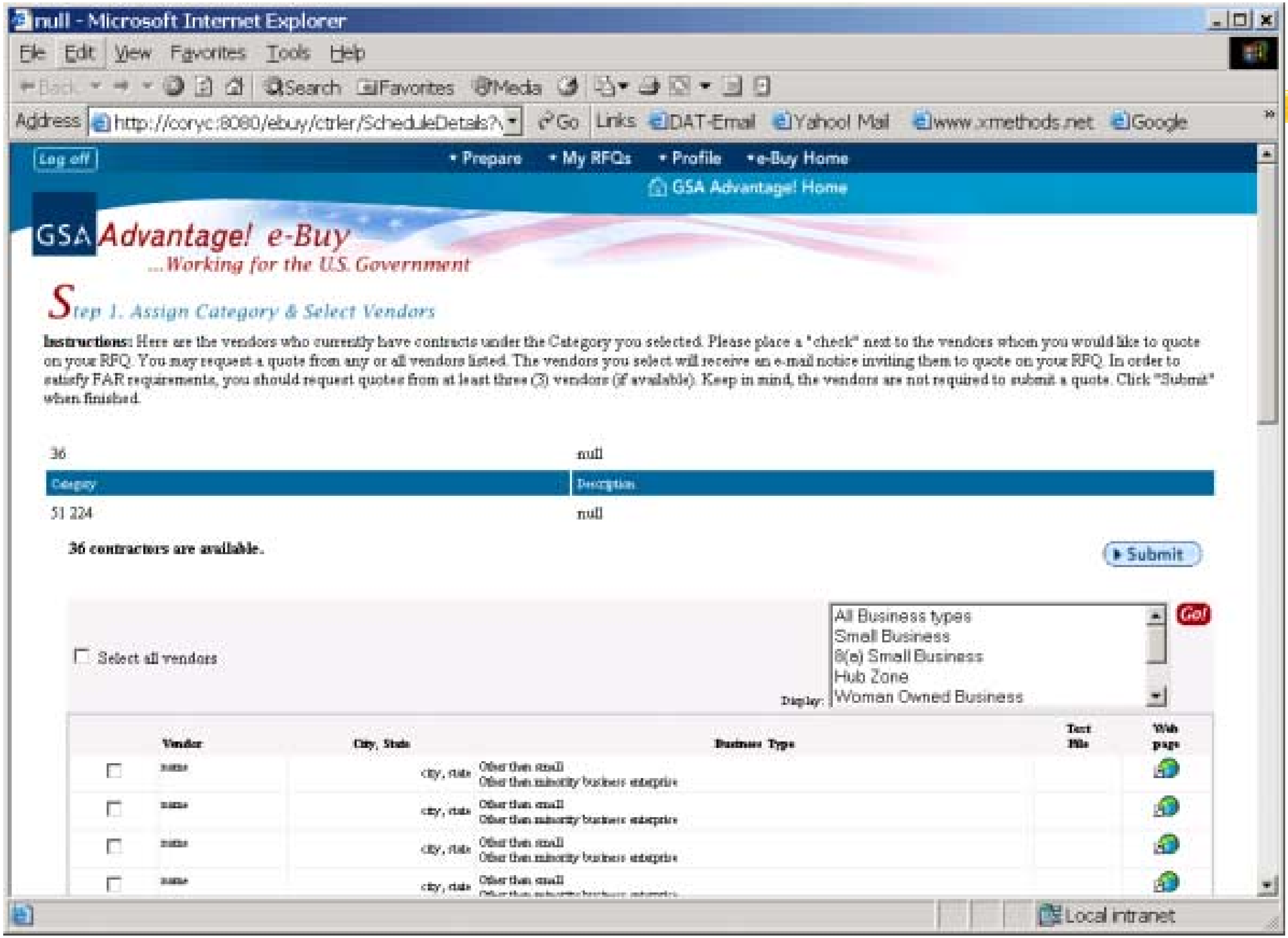
GovermentProcurement

Organization	Role	Activity	Sub-Activity
Customer	CustContracting	RFQDevelopment	BuildRFQ

- You are a customer who has researched and found the schedule/SIN required to implement your work order. You now must prepare an RFQ and select qualified suppliers.
- *Use **eBuy** to prepare an RFQ for this stage of the MDA demonstration.*
- You are user id "102567"
- Your schedule number is "36"
- Your special item number is "51 224"
- When the RFQ has been submitted to **eBuy**, please press *Continue*
-

go to eBuy!

Integration with eBuy application


null - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://coryc:8080/ebuy/ctrler/ScheduleDetails?\ Go
Links DAT-Email Yahoo! Mail www.xmethods.net Google
Log off
• Prepare • My RFQs • Profile • e-Buy Home
GSA Advantage! Home
GSA Advantage! e-Buy
...Working for the U.S. Government
Local intranet

Step 1. Assign Category & Select Vendors

Instructions: Here are the vendors who currently have contracts under the Category you selected. Please place a "check" next to the vendors whom you would like to quote on your RFQ. You may request a quote from any or all vendors listed. The vendors you select will receive an e-mail notice inviting them to quote on your RFQ. In order to satisfy FAR requirements, you should request quotes from at least three (3) vendors (if available). Keep in mind, the vendors are not required to submit a quote. Click "Submit" when finished.

36	null
Category	Description
51 224	null

36 contractors are available.

▸ Submit

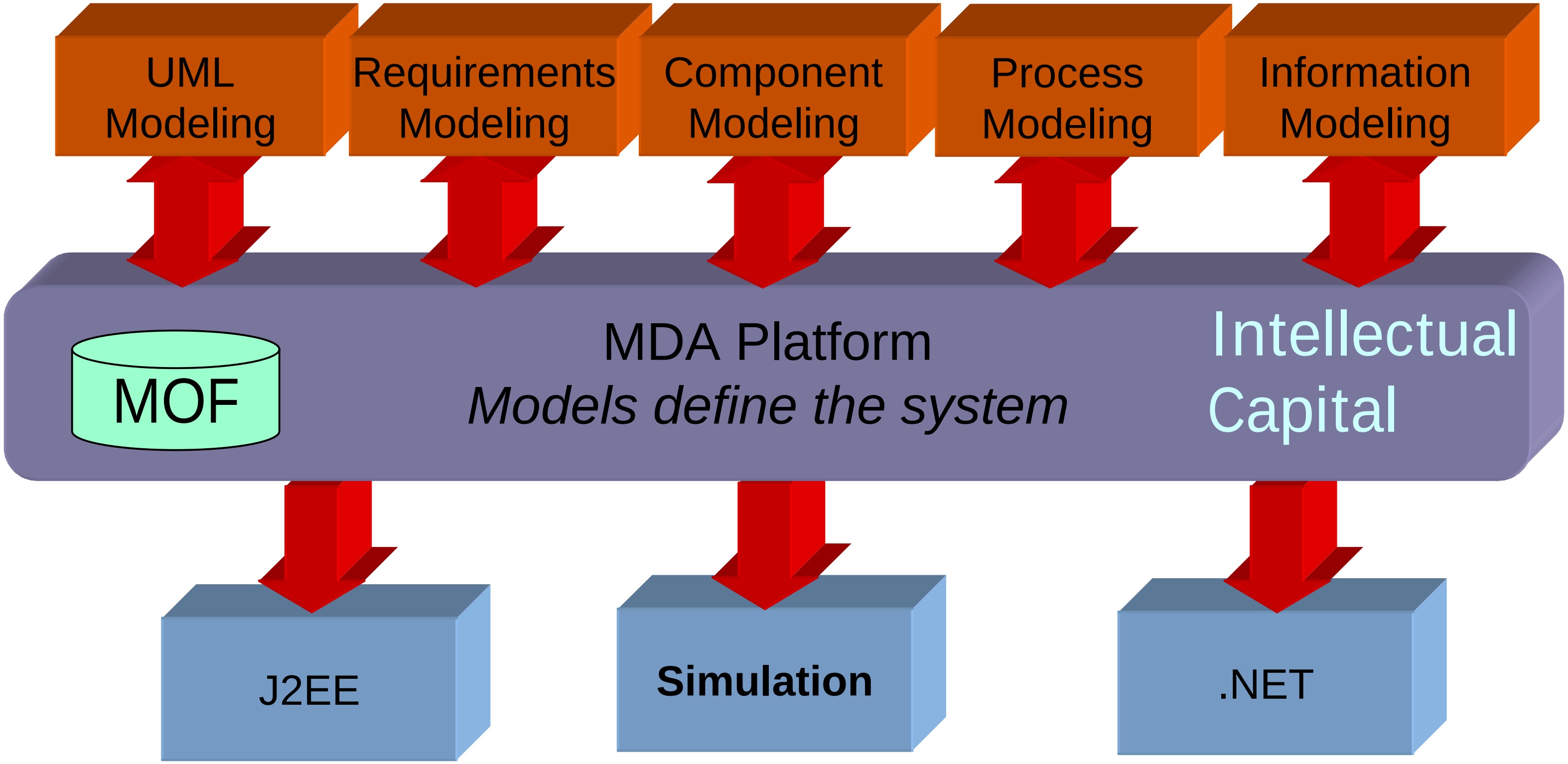
□ Select all vendors

Display: All Business types
Small Business
8(a) Small Business
Hub Zone
Woman Owned Business

Go!

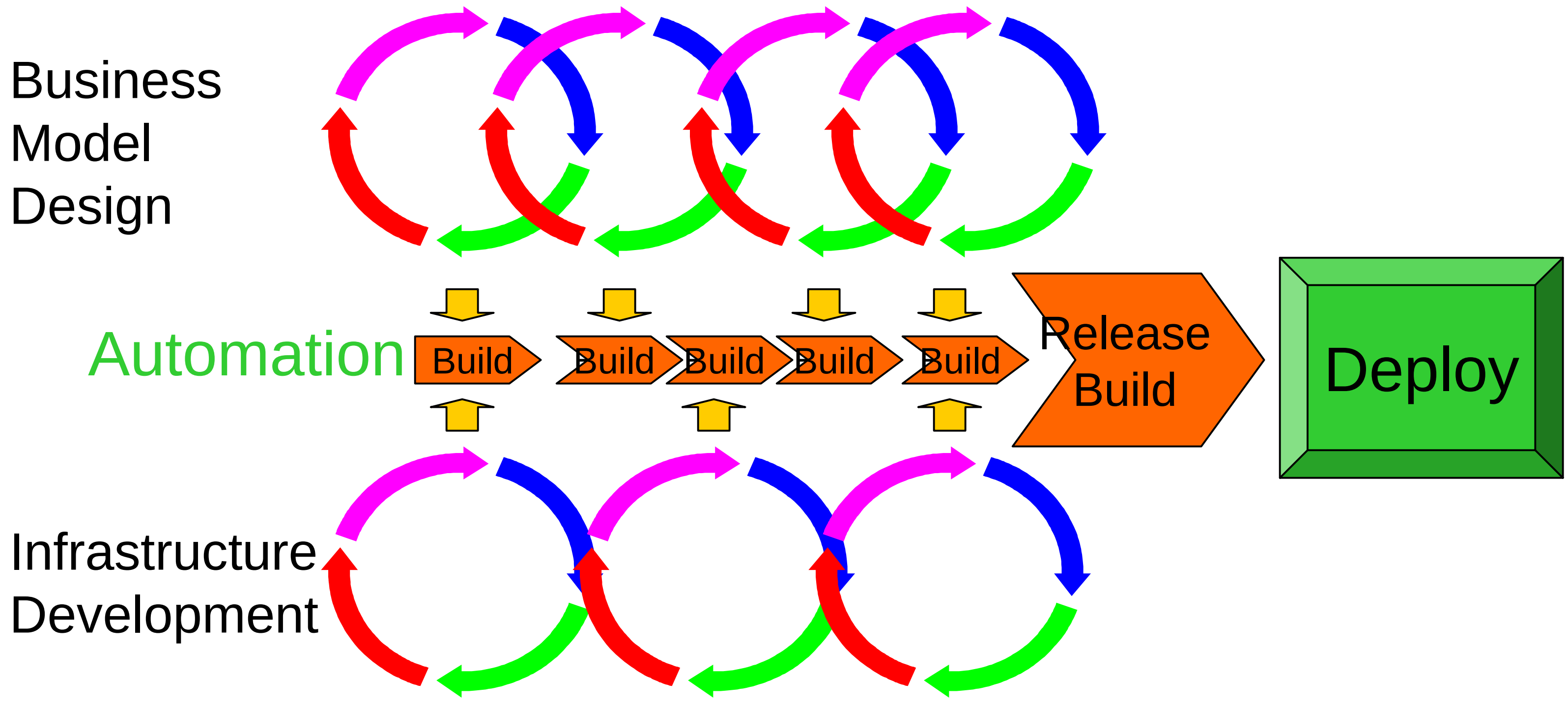
	Vendor	City, State	Business Type	Text File	Web page
□	name	city, state	Other than small Other than minority business enterprise		🌐
□	name	city, state	Other than small Other than minority business enterprise		🌐
□	name	city, state	Other than small Other than minority business enterprise		🌐
□	name	city, state	Other than small		🌐

Integration of Intellectual Capital



Integration of infrastructure

Iterative Development



Business Model Design

Automation

Build

Build

Build

Build

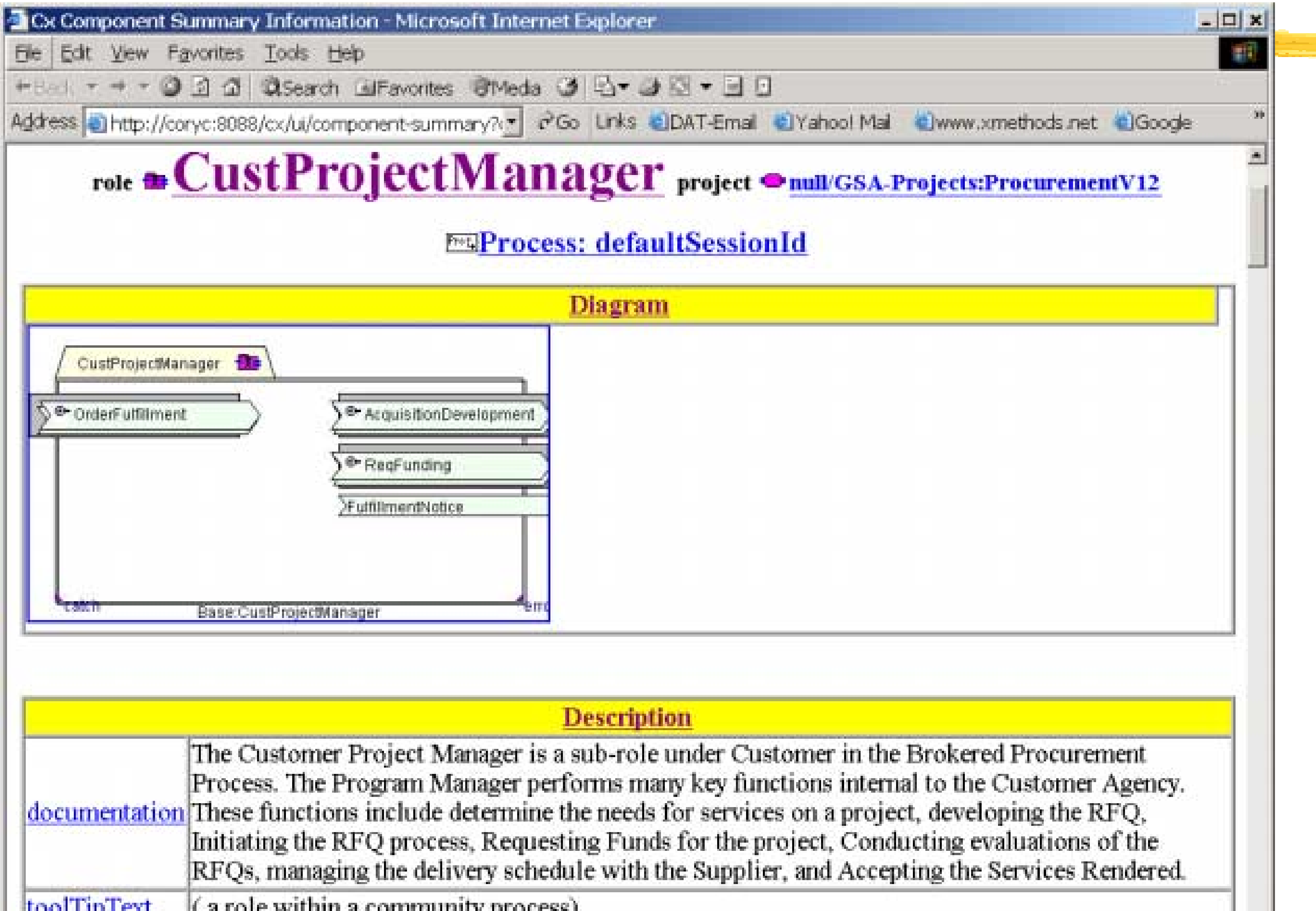
Build

Release Build

Deploy

Infrastructure Development

Generated Documentation


Cx Component Summary Information - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://coryc:8088/cx/ui/component-summary?c
Go Links DAT-Email Yahoo! Mail www.xmethods.net Google

role CustProjectManager project null/GSA-Projects:ProcurementV12

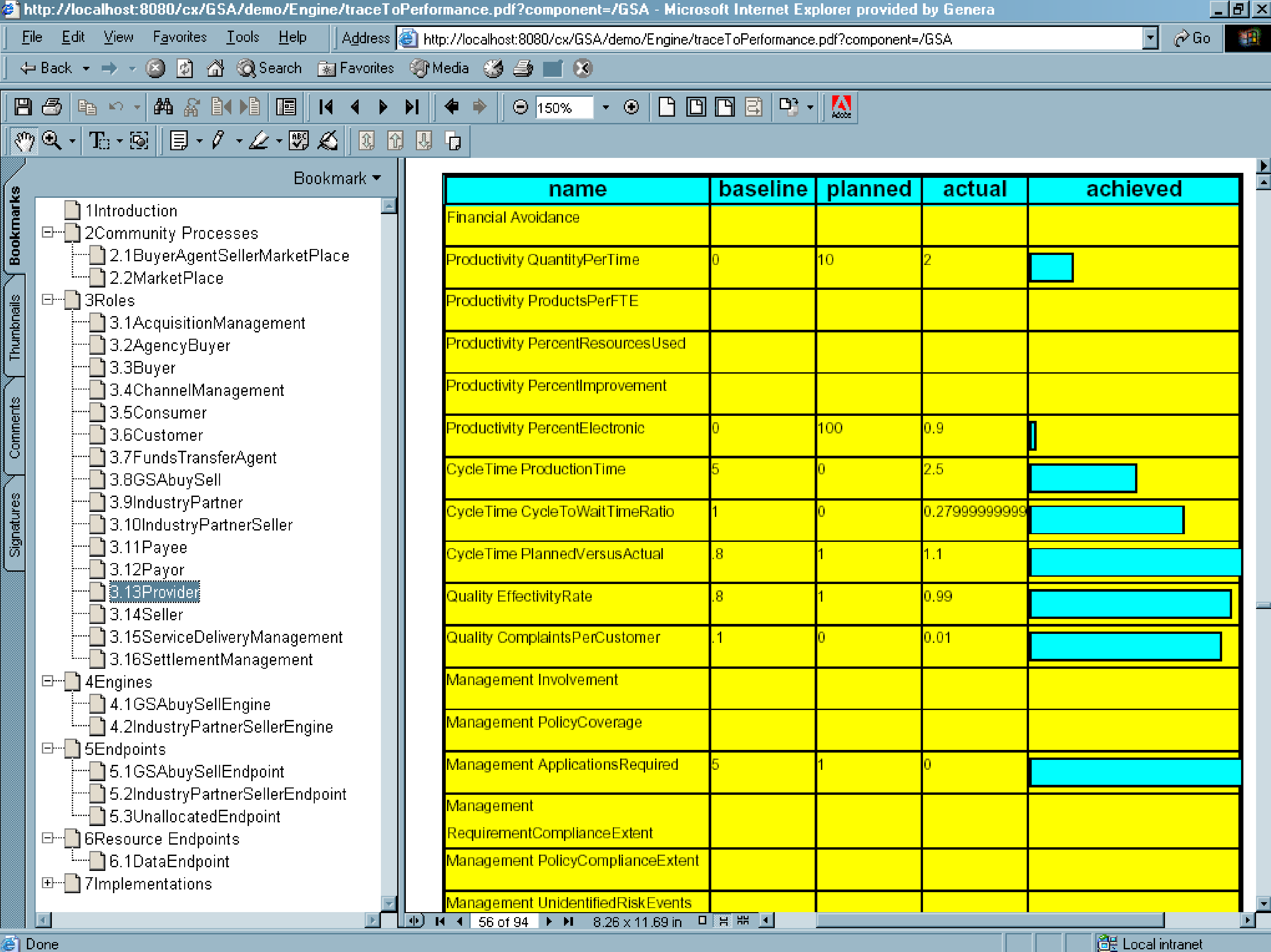
Process: defaultSessionId

Diagram

CustProjectManager
OrderFulfillment
AcquisitionDevelopment
ReqFunding
FulfillmentNotice
catch
Base:CustProjectManager
erro

Description

documentation	The Customer Project Manager is a sub-role under Customer in the Brokered Procurement Process. The Program Manager performs many key functions internal to the Customer Agency. These functions include determine the needs for services on a project, developing the RFQ, Initiating the RFQ process, Requesting Funds for the project, Conducting evaluations of the RFQs, managing the delivery schedule with the Supplier, and Accepting the Services Rendered.
toolTipText	(a role within a community process)



name	baseline	planned	actual	achieved
Financial Avoidance				
Productivity QuantityPerTime	0	10	2	▬
Productivity ProductsPerFTE				
Productivity PercentResourcesUsed				
Productivity PercentImprovement				
Productivity PercentElectronic	0	100	0.9	▬
CycleTime ProductionTime	5	0	2.5	▬
CycleTime CycleToWaitTimeRatio	1	0	0.27999999999	▬
CycleTime PlannedVersusActual	.8	1	1.1	▬
Quality EffectivityRate	.8	1	0.99	▬
Quality ComplaintsPerCustomer	.1	0	0.01	▬
Management Involvement				
Management PolicyCoverage				
Management ApplicationsRequired	5	1	0	▬
Management RequirementComplianceExtent				
Management PolicyComplianceExtent				
Management UnidentifiedRiskEvents				

Net effect

- Using these open standards and automated techniques we can;
  - Bring together enterprise architecture, simulation and solutions architectures
  - Achieve the strategic advantage of an open and flexible enterprise
  - Produce and/or integrate these systems FASTER and CHEAPER than could be done with legacy techniques
  - Provide a lasting asset that will outlive the technology of the day
- Integration of modeling, simulation and executable systems