



U.S. General Services Administration

## Executable FEA

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# MDA is the EA Management Umbrella

- An open standards framework for business driven enterprise architecture discipline
- Separates conceptual models from system implementation models and IT infrastructure, enabling organizational and technology change
- Full life-cycle approach to automating systems based on flexible modeling hierarchy
- Homogenizes EA artifacts, facilitating eGov interoperability and component reuse in shared services
- Component granularity as a recursive decomposition or 'drill down' across model abstraction levels (PIM-PSM-code)
- Implementation platform flexibility supporting today's BRM domains, emerging SRM shared services, and tomorrows TRM technologies

# MDA – Models, Metadata and Mappings

## CIM

### Computationally Independent Model

‘Domain’ Model, created by Business Analysts describing business entities, or *things* in relation to Business Drivers and Strategy

## PIM

### Platform Independent Model

‘Logical’ Model, created by Solution Architects specifying structure and behavior of *things* required to achieve Business Strategy desired in Domain

## PSM

### Platform Specific Model

‘Physical’ Model, created by product and platform specialists to accommodate network, software and hardware topologies for Logical integrity

## Software

### IT Infrastructure

‘Runtime’ code implementing the design, generated from MDA models for chosen topology and technologies

# Enterprise Collaboration Architecture (ECA)

- Process orientation is the transformation catalyst for Federal, State and Local (G2B, G2G, and G2C) eGov collaboration and interoperability
  - LOB as a virtual organization, transparently spanning multiple functionally oriented government entities
- ECA is the MDA ‘grammar’, the formal semantic of processes, roles, messages and data components
  - OMG ratified UML Profile for MDA
- ComponentX implements ECA, combining MDA design-time and SOA run-time tools
  - Enables ‘model to integrate’
    - Executable models simulate the evolution and optimization of business process collaborations
    - Target platform ‘profiles’ map PIM to PSM for code generation
  - Supports wide variety of standards based technologies
    - Web Services (WSDL), MOM (JMS), ebXML, others

# GSA EA Practice – Applying MDA and SOA to FEA

## VCA

### Customer Facing Differentiators

Value Chain Analysis discovers the responsibilities and interdependencies of domain processes, formalizing business focus and organizational design to accomplish strategic goals in response to business drivers

## ECA

### Processes, Roles, Messages, Data

Roles and their data driven conversations are specified in the context of business processes, where each role has a collaborative responsibility to fulfill overall community process objectives

## SOA

### Publish, Find, Bind and Execute

Combine components to expose more coarse grained functionality, which are again composed into higher value choreography of components as application 'Services'

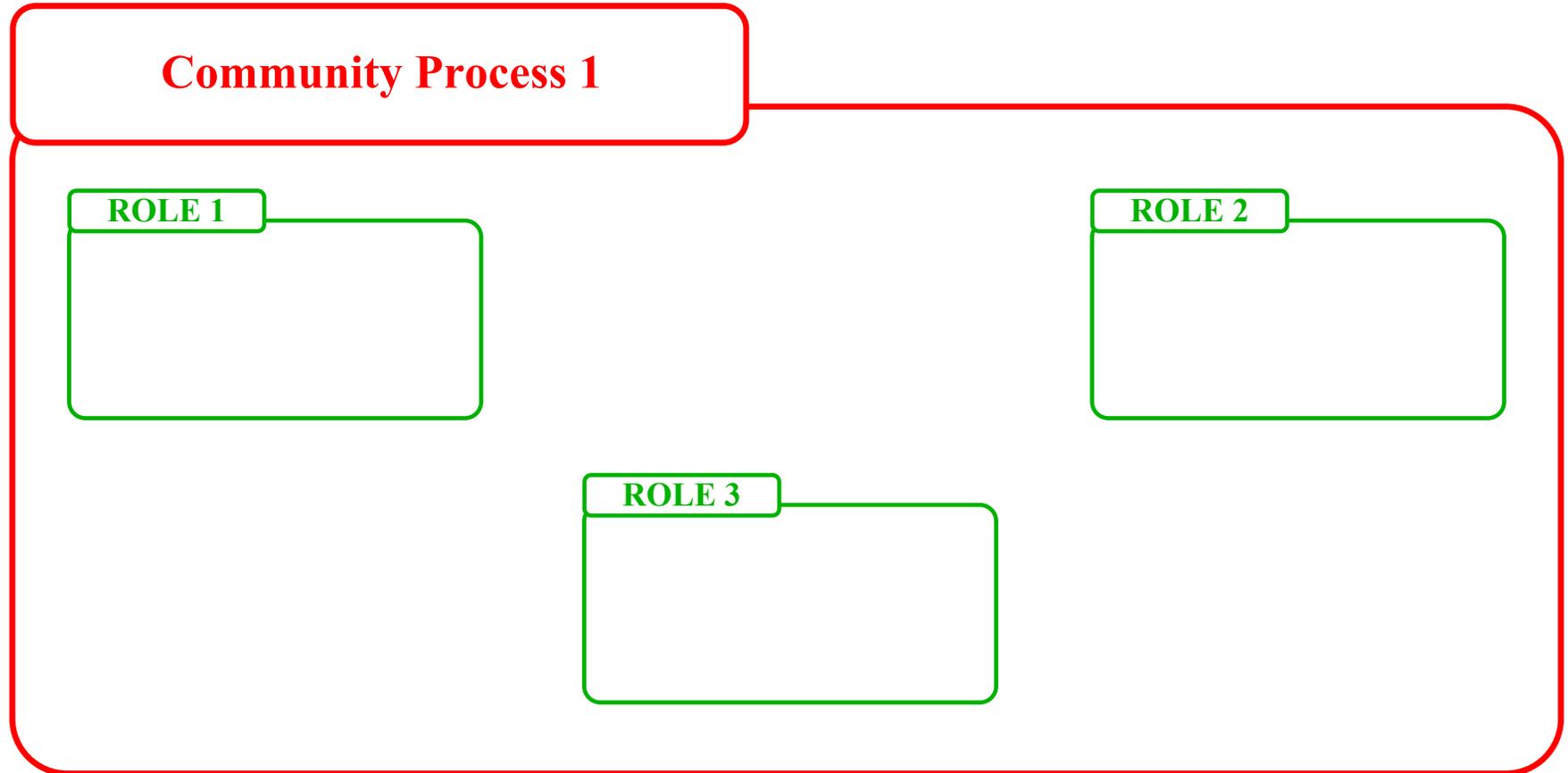
## CBA

### Design By Contract

Discreet object oriented functionality based on inheritance, encapsulation and polymorphism, packaged as interface driven 'Components'

# ECA in ComponentX – Business Process Orientation

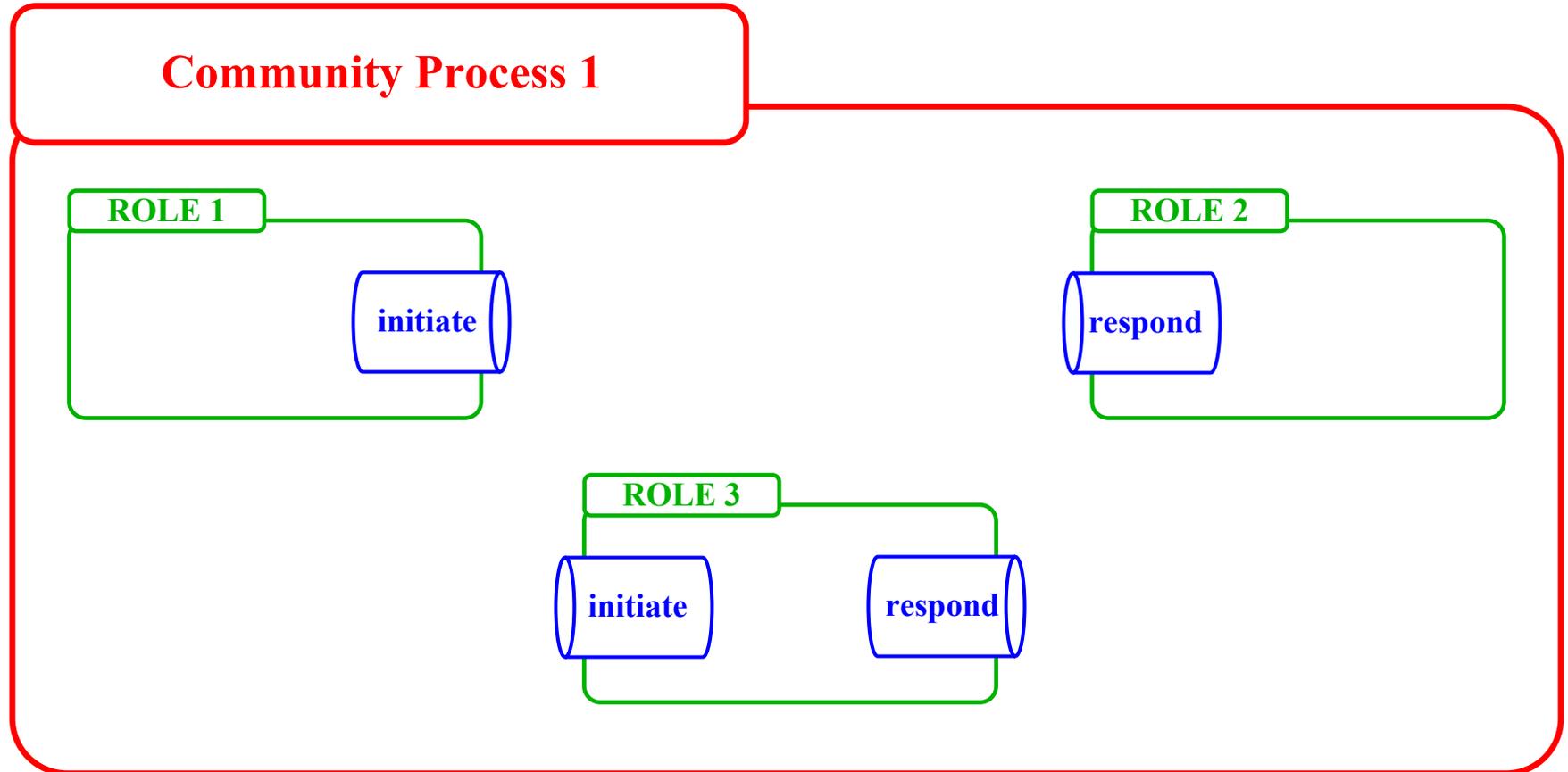
- **Community Processes** organize **Roles** with a shared objective
- **Roles** *choreograph* activities on behalf of **CP** goals



Nouns are used to name **CP** and **Roles**

# ECA in ComponentX – Role Responsibilities

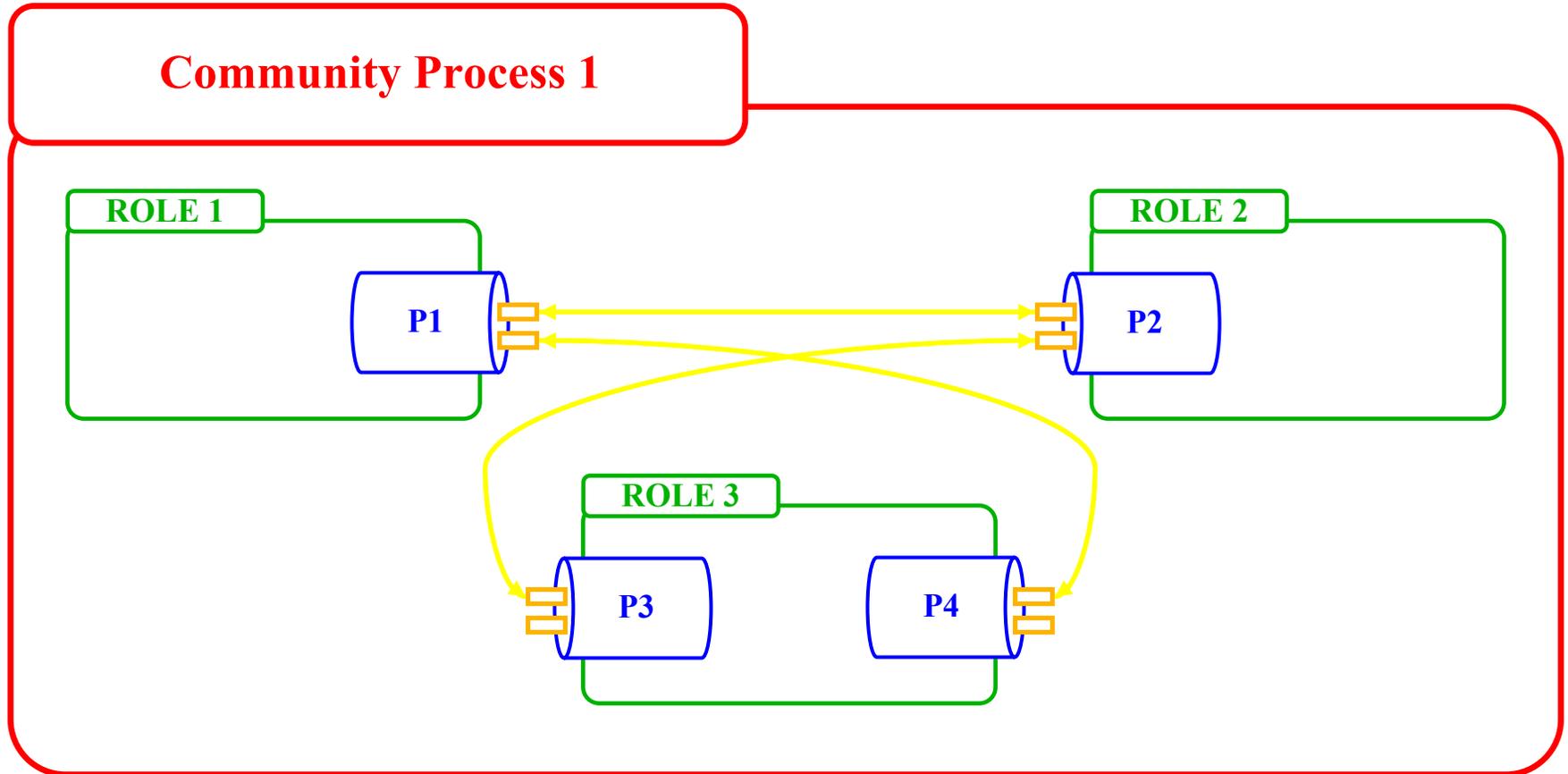
- Roles initiate or respond to a collaboration Protocol
- A Protocol describes two-way Role conversations



Verbs and 'actionObject' phrases are used to name Protocols

# ECA in ComponentX – Role Conversations

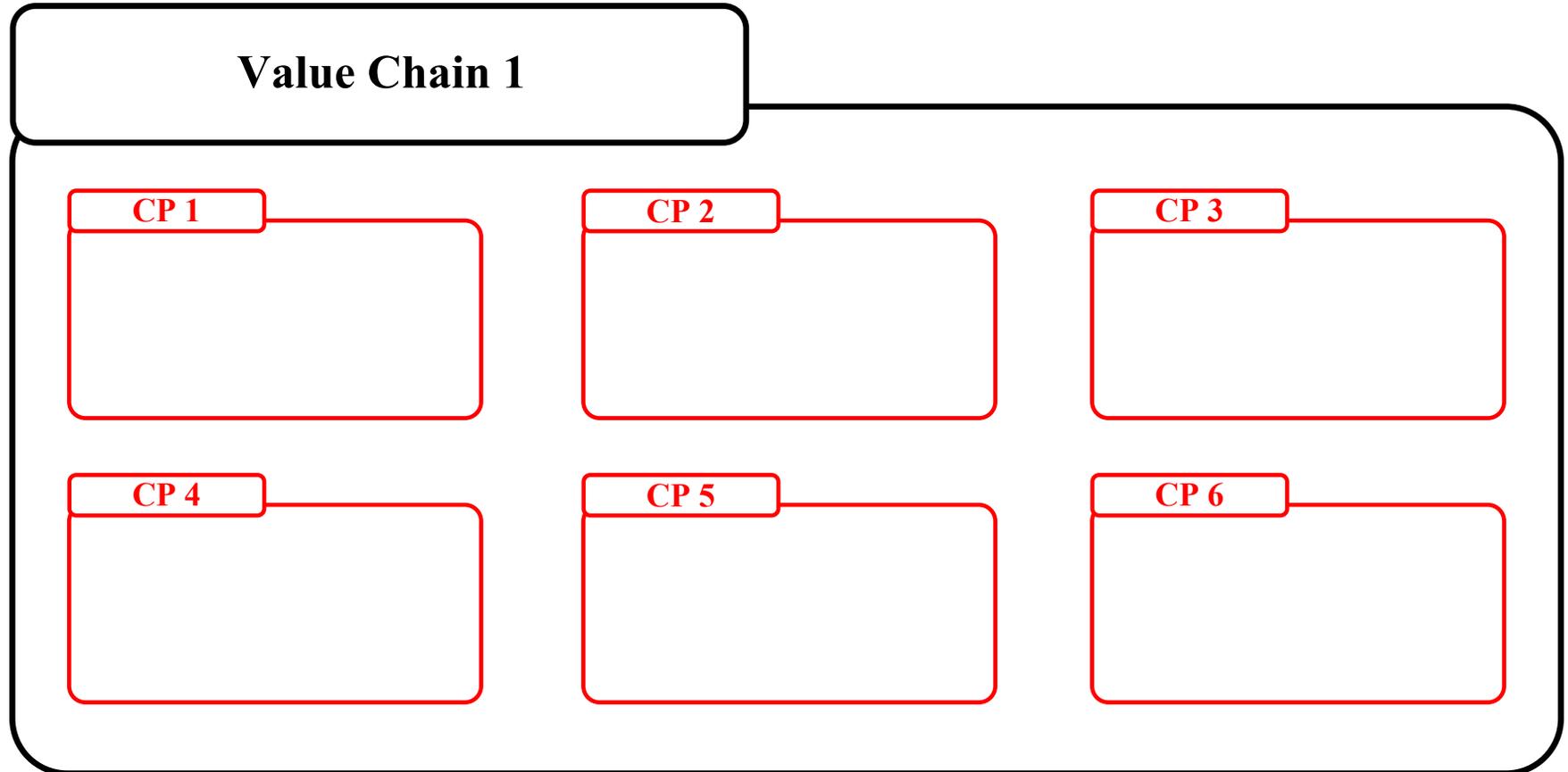
- Protocols choreograph **Ports** and can nest sub-protocols
- **Data typed messages** flow over **Ports**



Names are descriptive of action context and data content

# Value Chain Visualization

- The **CP** graphic depiction can be conceptually extended
- A **Value Chain** packages a set of **Community Processes**



ComponentX provides this organization, but not this VC-UI

# ComponentX – Structure of an FEA Compliant Project

- ❏ ProjectName (Enterprise, LOB or VC name)
  - 📁 FEA Compliant Architecture
    - 📁 Reference Models - *Aspects of the entire FEA*
      - 📁 PRM, BRM, SRM, TRM, DRM *applied to*
    - 📁 *ECA semantic formalism* (grammar)
      - 📁          
  - 📁 Business Abstraction(s) – Platform Independent Models (PIM)
    - 📁 Community Processes containing  Roles whose  Protocols (contracts) have  Ports (message names) used to exchange  Data types (message payload schemas)
  - 📁 Technical Implementation(s) – Platform Specific Models (PSM)
    - 📁 Endpoints containing  Implementation Proxies are  *adapted* to (configured for)  Engines that encapsulate  Components (as Actors playing Roles) and external  Proxy Roles
  - 📁 Service, Data, Utility and Pattern components - implementation reuse
    -  eGov Service Components
    -  Data Types from the DRM Interoperability Schema Repository
    -  UI, XML/XSL, DB, PDF, etc

# Operational FEA using ECA Grammar

FEA Aspects of PRM Metrics, BRM/SRM classifications, and DRM schema definitions are associated with and applied directly to *PIM* elements

**PRM**

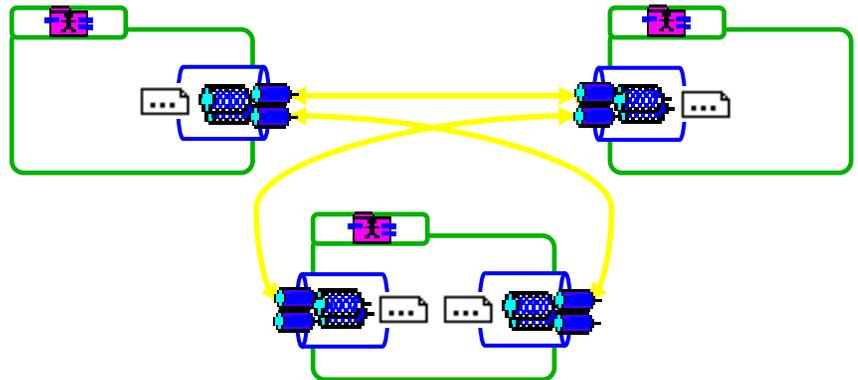
*PSM* elements inherit these annotations, adding further PRM and TRM annotations - e.g. CP1 is executed on a .NET or J2EE (CBA) Server

**BRM**

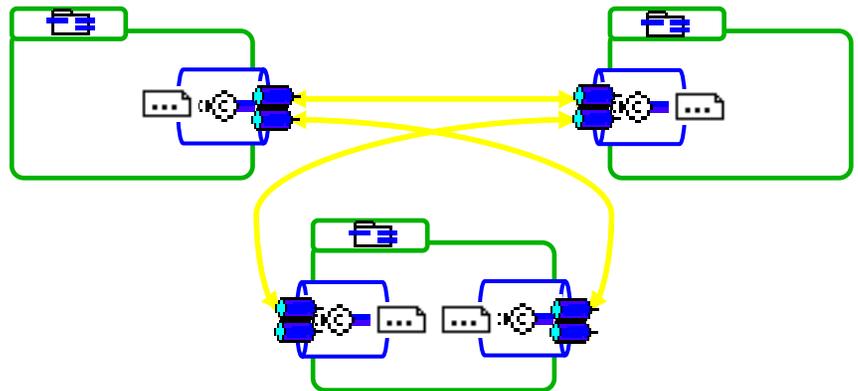
**SRM**

**DRM**

 **CP1 PIM**



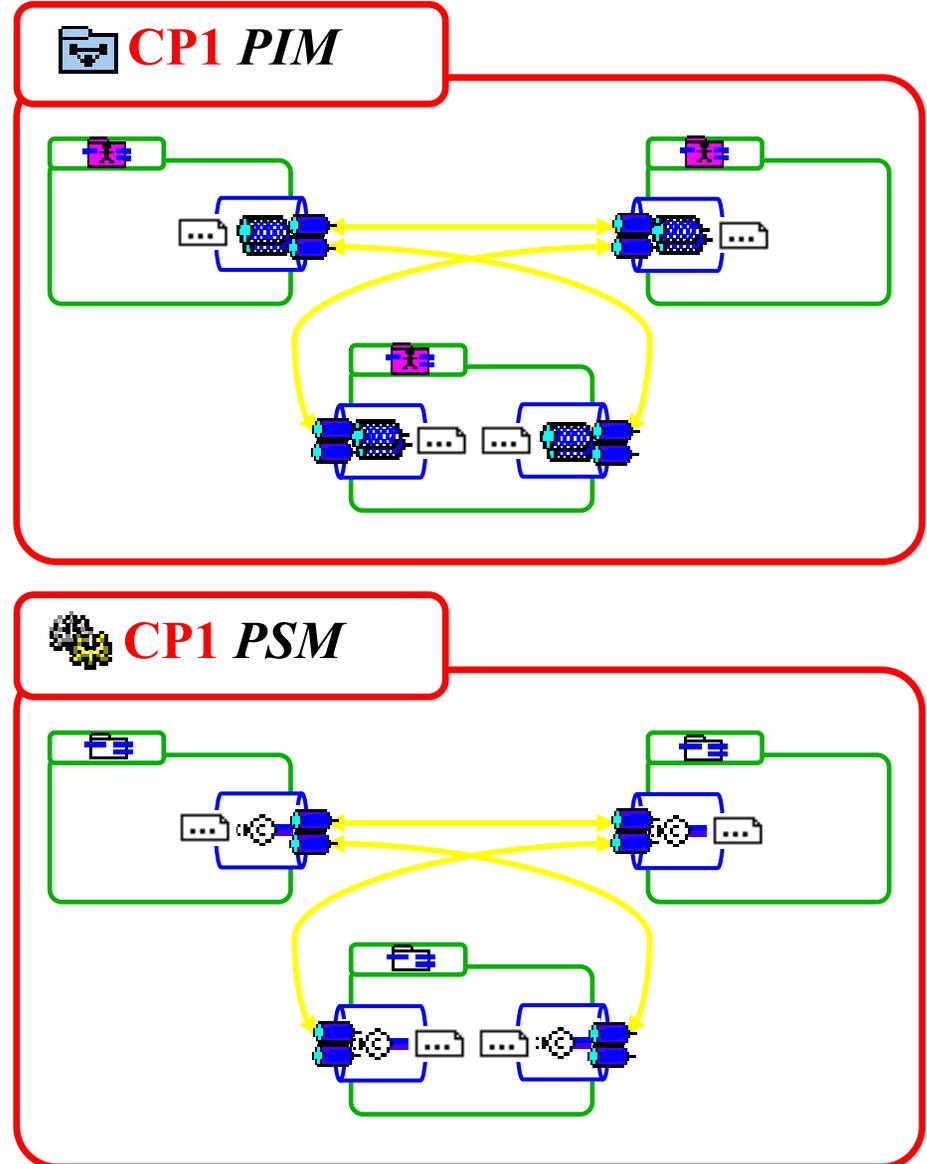
 **CP1 PSM**



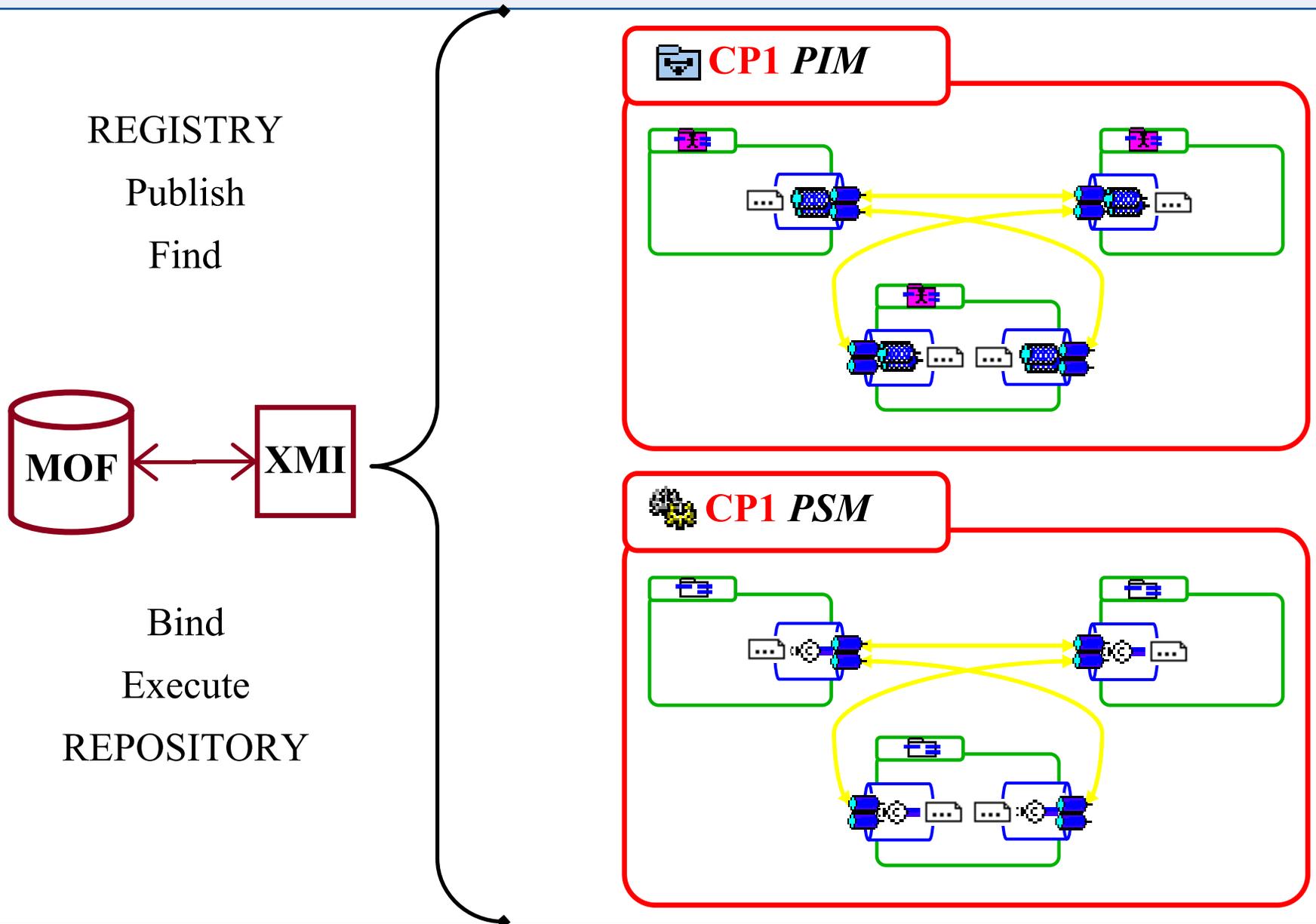
**TRM**

# ComponentX – ECA/MDA Modeling from PIM to PSM

- The *ECA Platform Independent Model* describes **Roles** in a **Community Process** – they get *implemented* by people and machines as **Components** in the *Platform Specific Model*
- The **Protocols** that define the business *contracts* between **Roles** become **Component interfaces**, adapted for the **Engine** (for example WS-\* or ebXML, JMS or MSMQ)



# PIM/PSM as Knowledge Base and Shared Service



# What Executable FEA Accomplishes

- Alignment of IT business case, requirements capture, systems design/development and existing infrastructure with CPIC knowledge management
  - FEA driven XMI syndication to Registry/Repository
- EA Maturity as trace-ability side effect
  - *Explicit linkage* of representations to/from implementations
- Collapses the CPIC and SDLC cycles
  - Significantly reducing resource burden – ‘JIT’ 300 generation
- Leading indicator metric analysis - prior to procurement or development effort
  - PRM ‘line of sight’ from model simulation trace
- Open Standards based EA abstraction homogeneity
  - The end of modeling fatigue and paper tiger extinction!
- Agile, business driven IT management

# CIO Scenario – Information becomes Knowledge

- An ERD by itself is *just information* about an operational data store...
- An ERD - accompanied by a SQL query - executed by a specific component - implemented on a specific technology platform - performing an activity of a specific role – in the context of a specific business process – is *KNOWLEDGE*
  - This suggests the evolution of what populates the DRM as an ‘interoperability data model’
- Provides an unprecedented level of precision and *actionable* awareness of dependencies for business and IT stakeholders alike
- The model is the knowledge base and the configuration management system

# GSA EA Leadership

- GSA has proven Executable FEA using ECA as implemented by ComponentX
  - ‘PortMan POC’, completed 8/03
- We continue to demonstrate and evangelize the application of MDA/SOA technologies in service to Executable FEA
  - GSA POC now an FSS EA Pilot - results end of 4/04
- Executable FEA is the GSA EA modernization mission of our practice, to achieve our *One GSA EA* vision
  - ‘VCA+MDA on SOA = One GSA EA’
- Considerable validation of our work and support for our approach in the contractor community
- *These same principles are proposed as a driver for overall EA success and maturity across Fed/State/Local government interoperability scenarios*