U.S. General Services Administration

Executable EA for GSA's FMLoB: Enabling *Model Based Acquisition*

George Thomas, GSA Enterprise Chief Architect

This Presentation

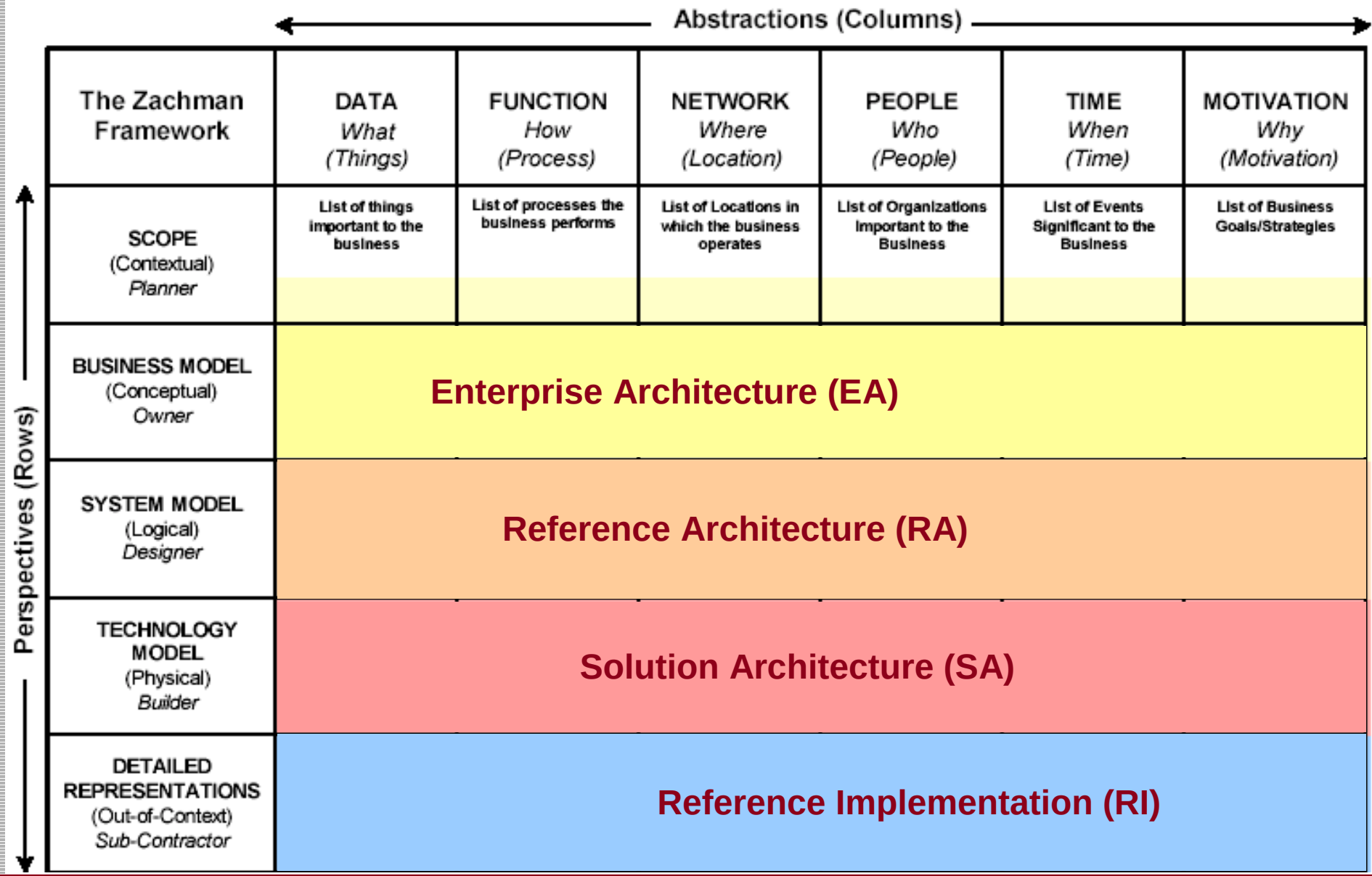
- Executable EA Methodology
  - MDA primer
  - EDOC as SOA DSL
  - Quick comparison with SCA
  - FEA as Federal Enterprise DSL and CRI ‘aspect’
  - Analytical framework for ITPM, Resource Rationalization
- FMEA – FMLoB Case Study
  - EDOC CIM/PIM conventions
  - ADM Mainframe Analysis
  - UML Information, Transaction, Message, Persistence Models
  - Team, Tools, Next Steps
- OSERA
  - Web Service PSM generation (BPEL, WSDL, XSD)
  - Collapse CPIC and SDLC
  - Test driven ‘Service Based Procurement’
  - LoB’s models as Authoritative RA’s, RI for eGov Factory
  - Model Based Acquisition

Part 1 - Executable EA

- Slides 3 to 23

- Executable EA Methodology
  - MDA primer
  - EDOC as SOA DSL
  - Quick comparison with SCA
  - FEA as Federal Enterprise DSL and CRI ‘aspect’
  - Analytical framework for ITPM, Resource Rationalization

MDA and Zachman 'Perspectives'

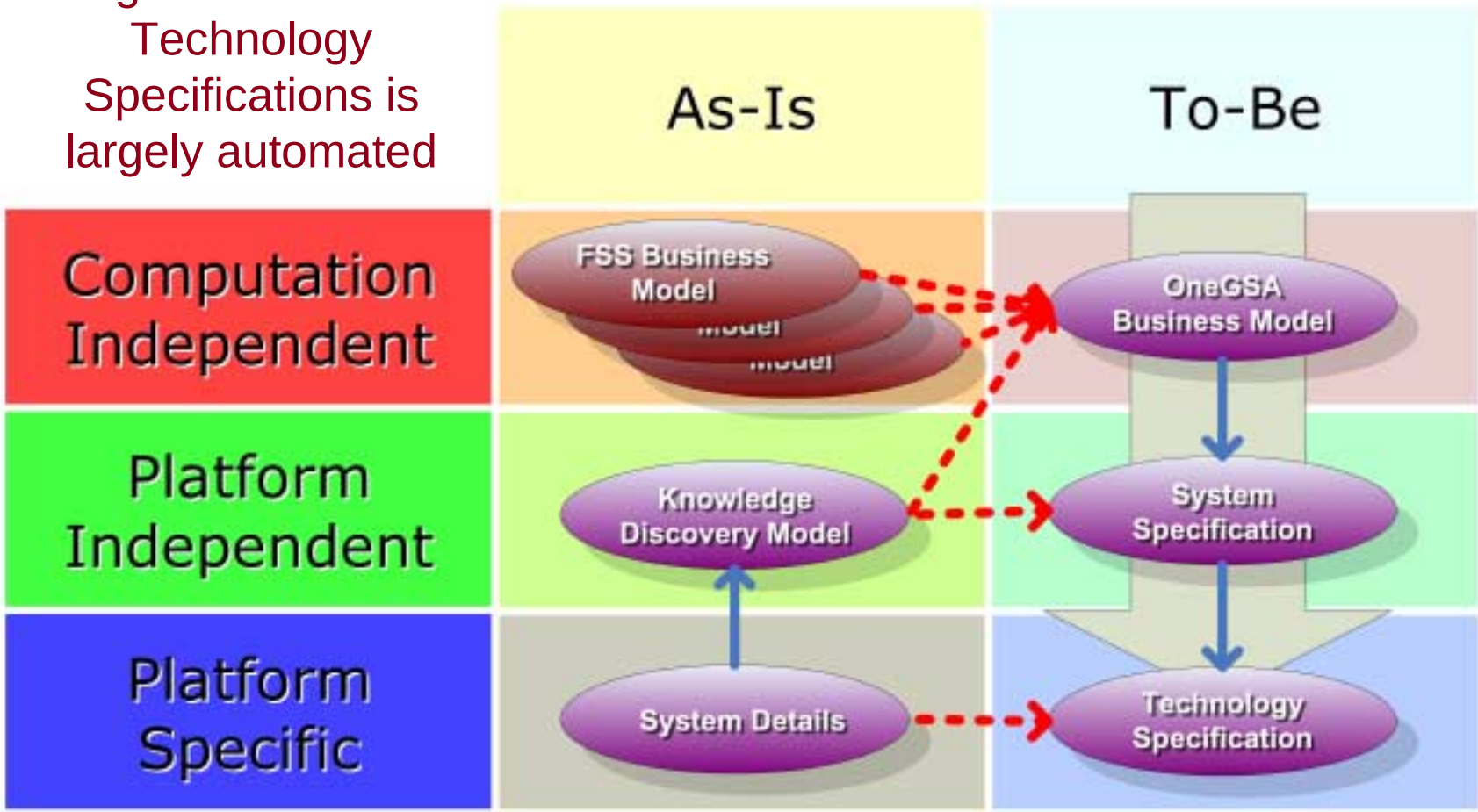


FMEA: MDA Top Down - ADM Bottom Up

Discovery of System Details and generation of Technology Specifications is largely automated

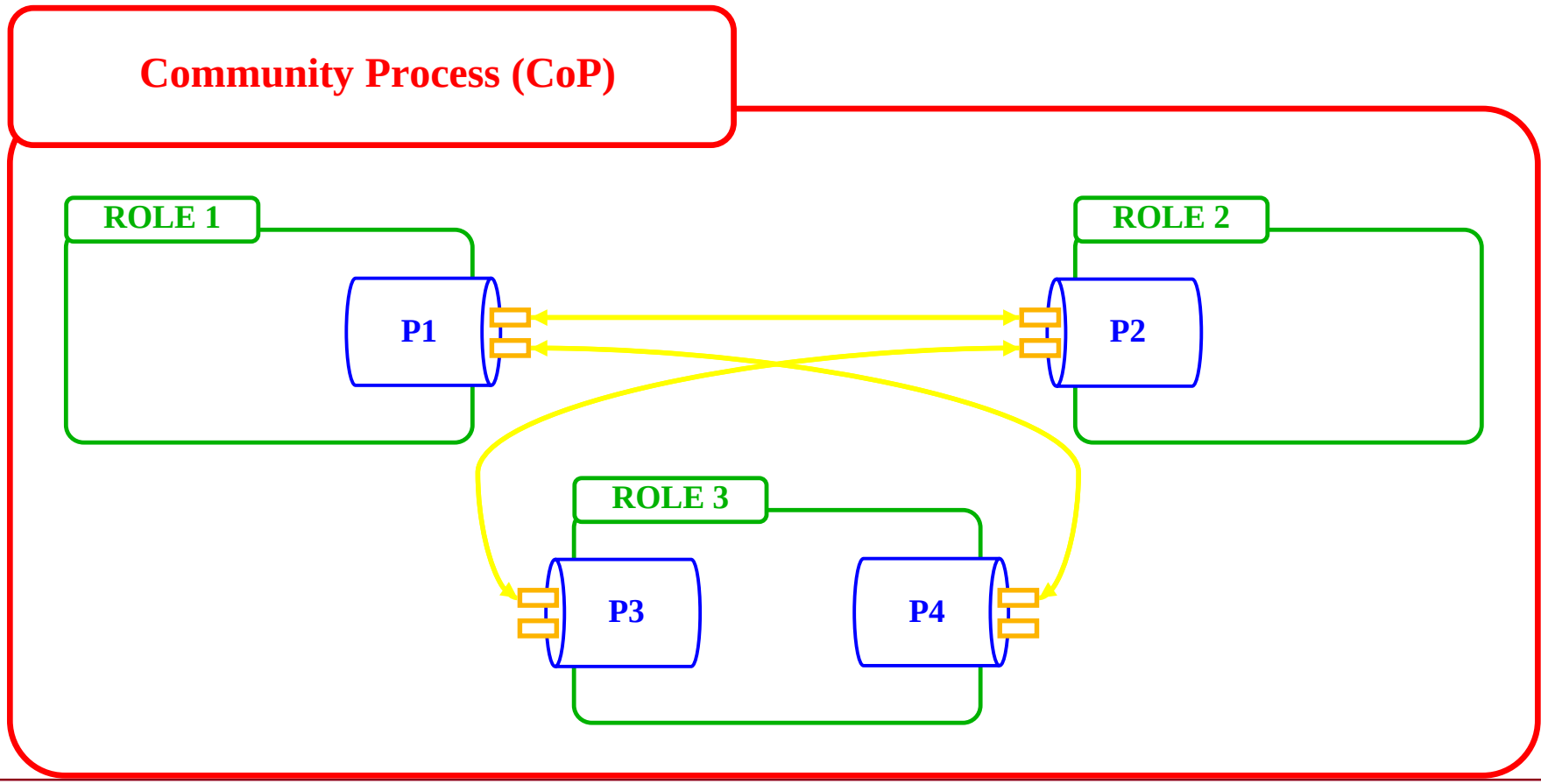
Architecture Driven Modernization (ADM)

Model Driven Architecture (MDA)

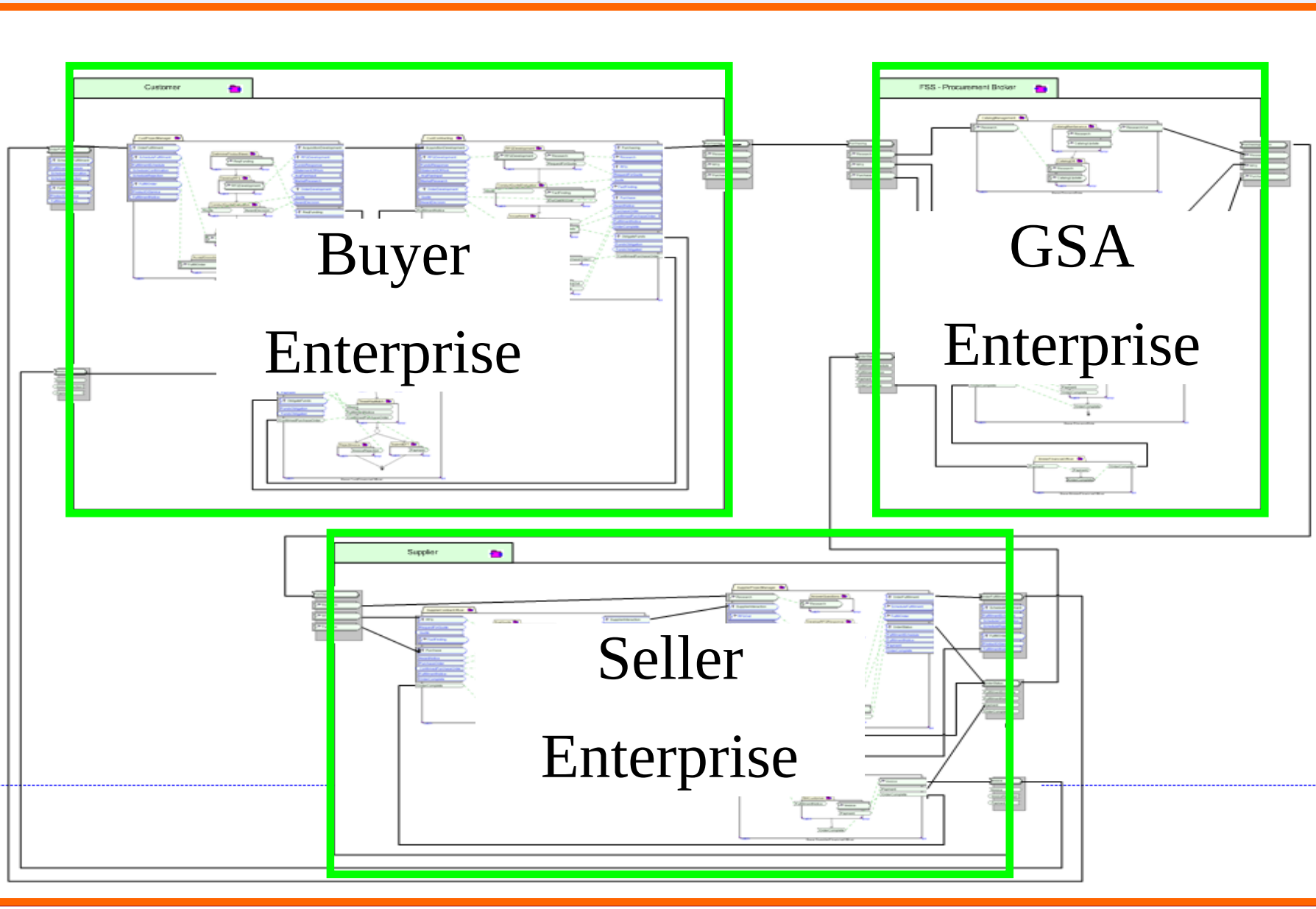


EDOC/ECA/CCA ***CRI*** Grammar - Standard Graphic Notation

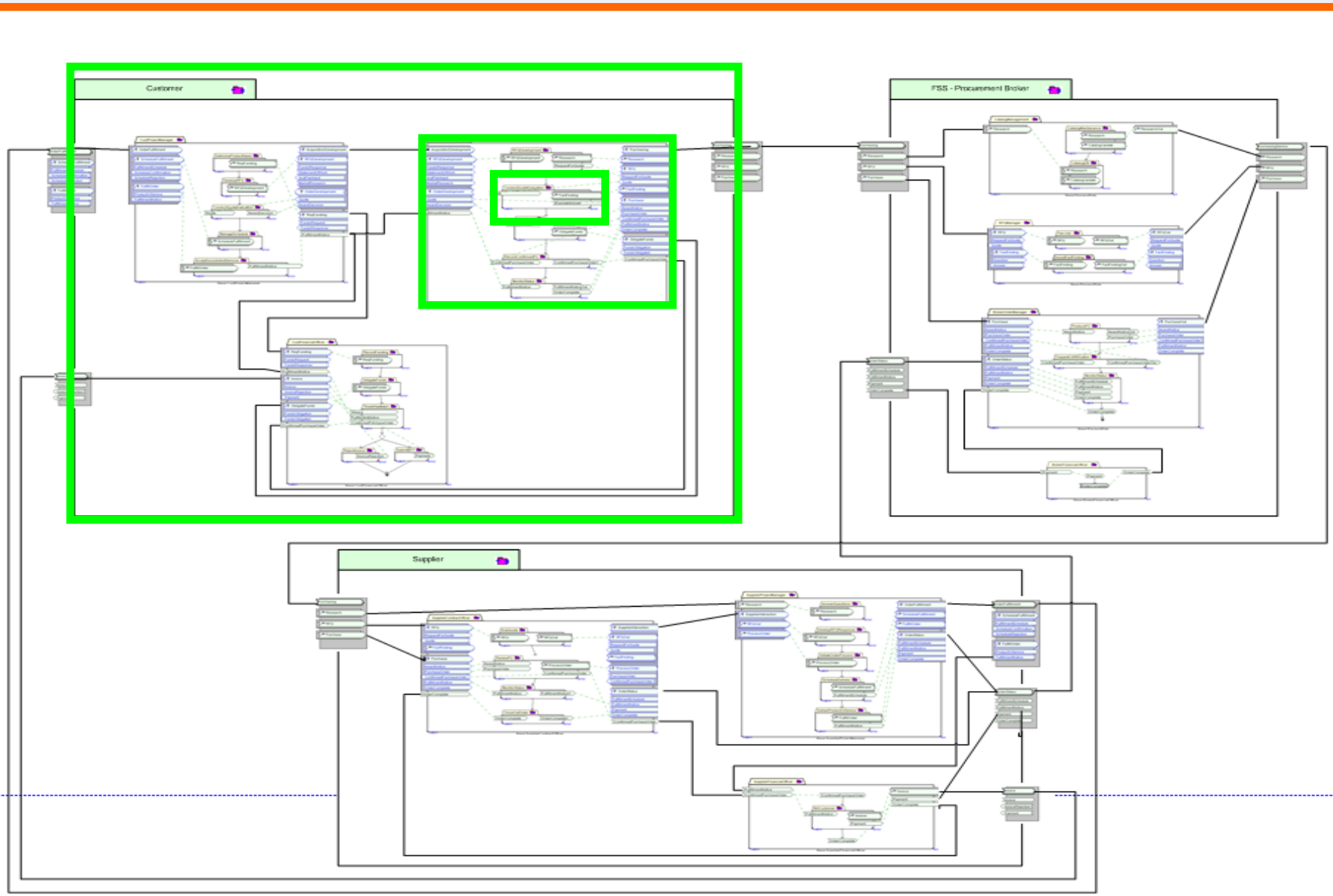
- Recursive decomposition for ‘systems of systems’ modeling
  - Business processes described as a composition of *services*
    - Collaborative Role Interactions (CRI), service choreography
  - Services are realized by (a composition of) components



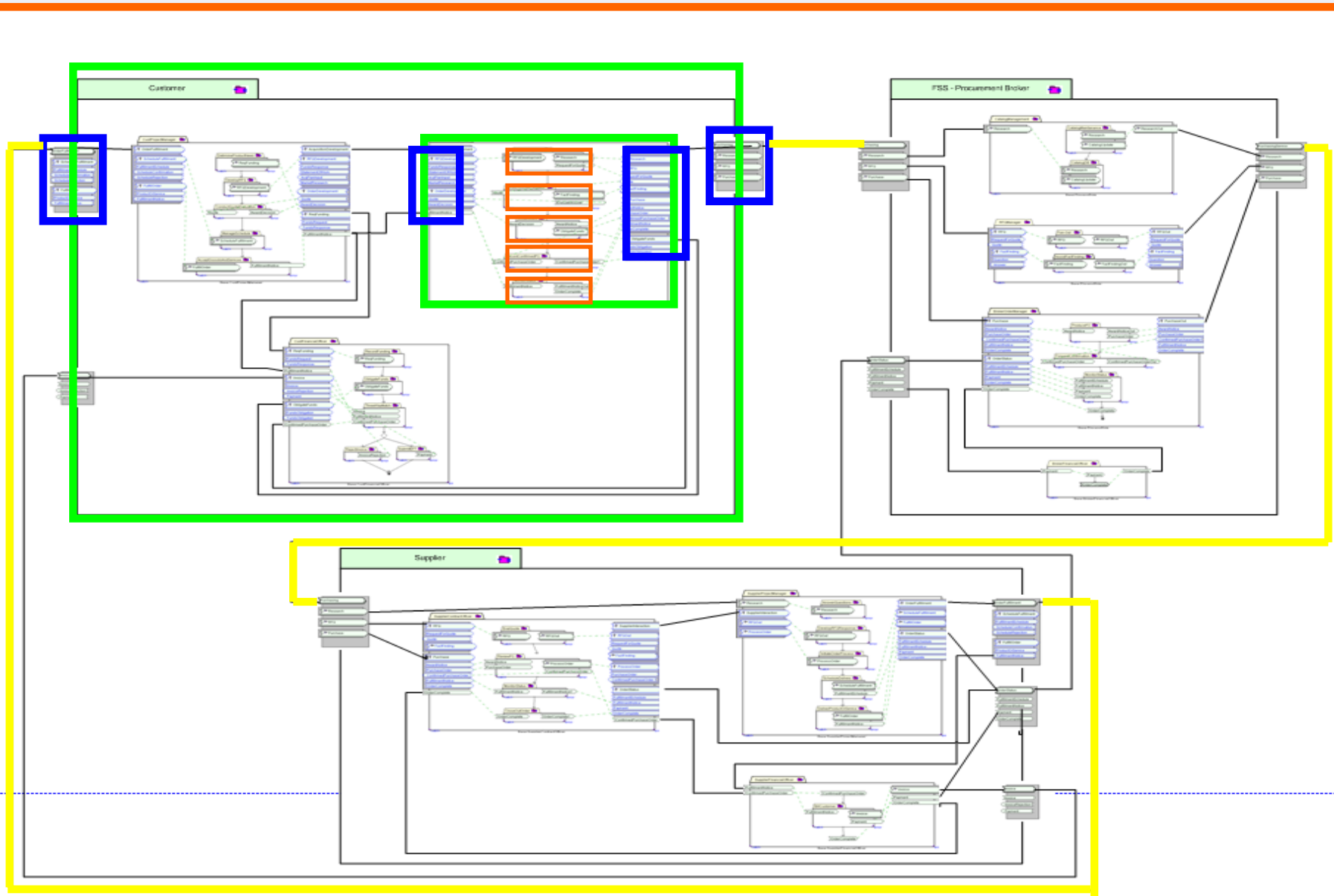
Collaborations Contextualize Roles = Service Providers



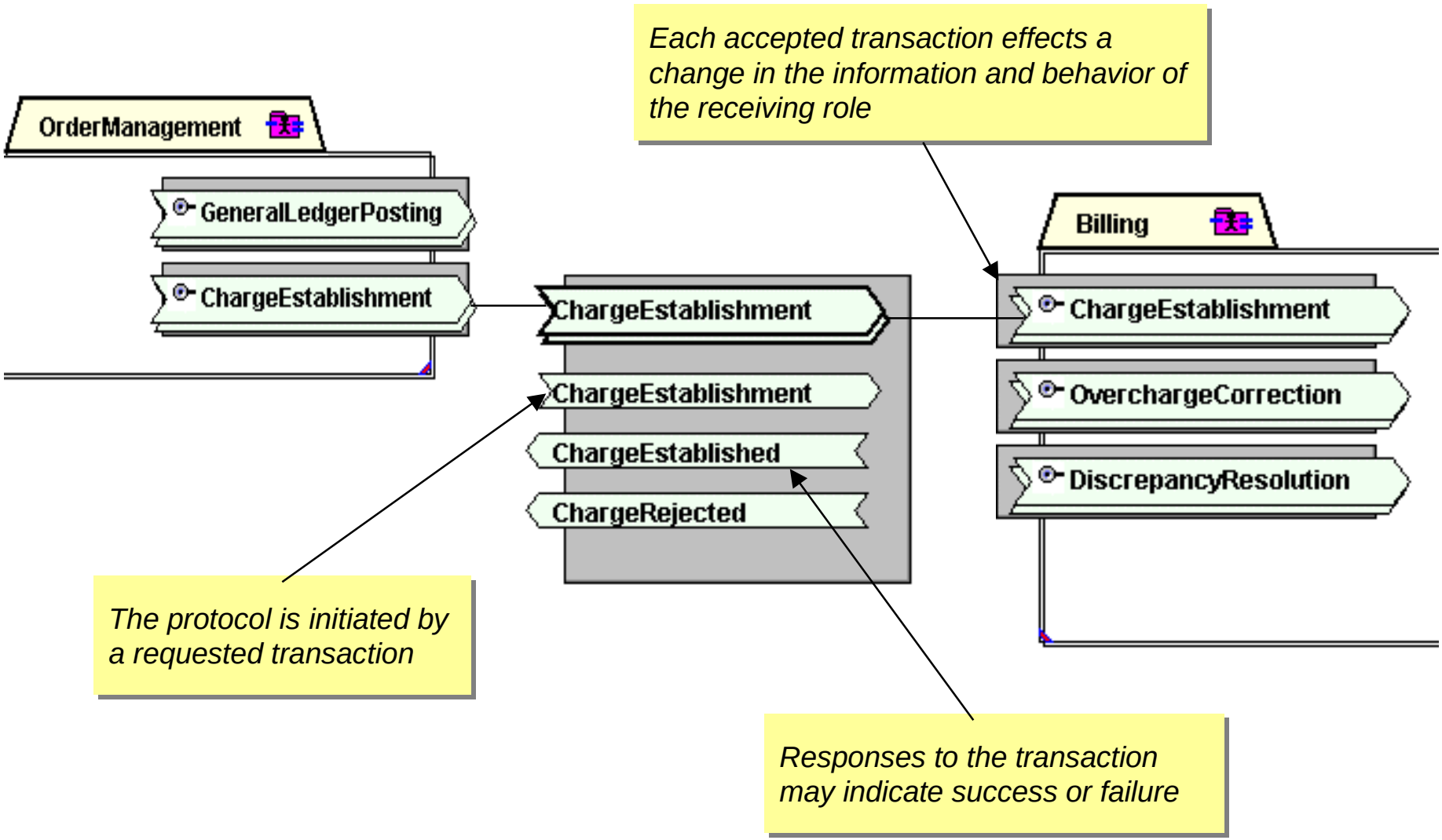
Roles Compose Inner Roles = Service Granularity



Protocols Organize Conversations Choreographed by Roles



CCA Protocol = Interface Specification



Protocol WSDL Representation (PSM/SA, TRM)

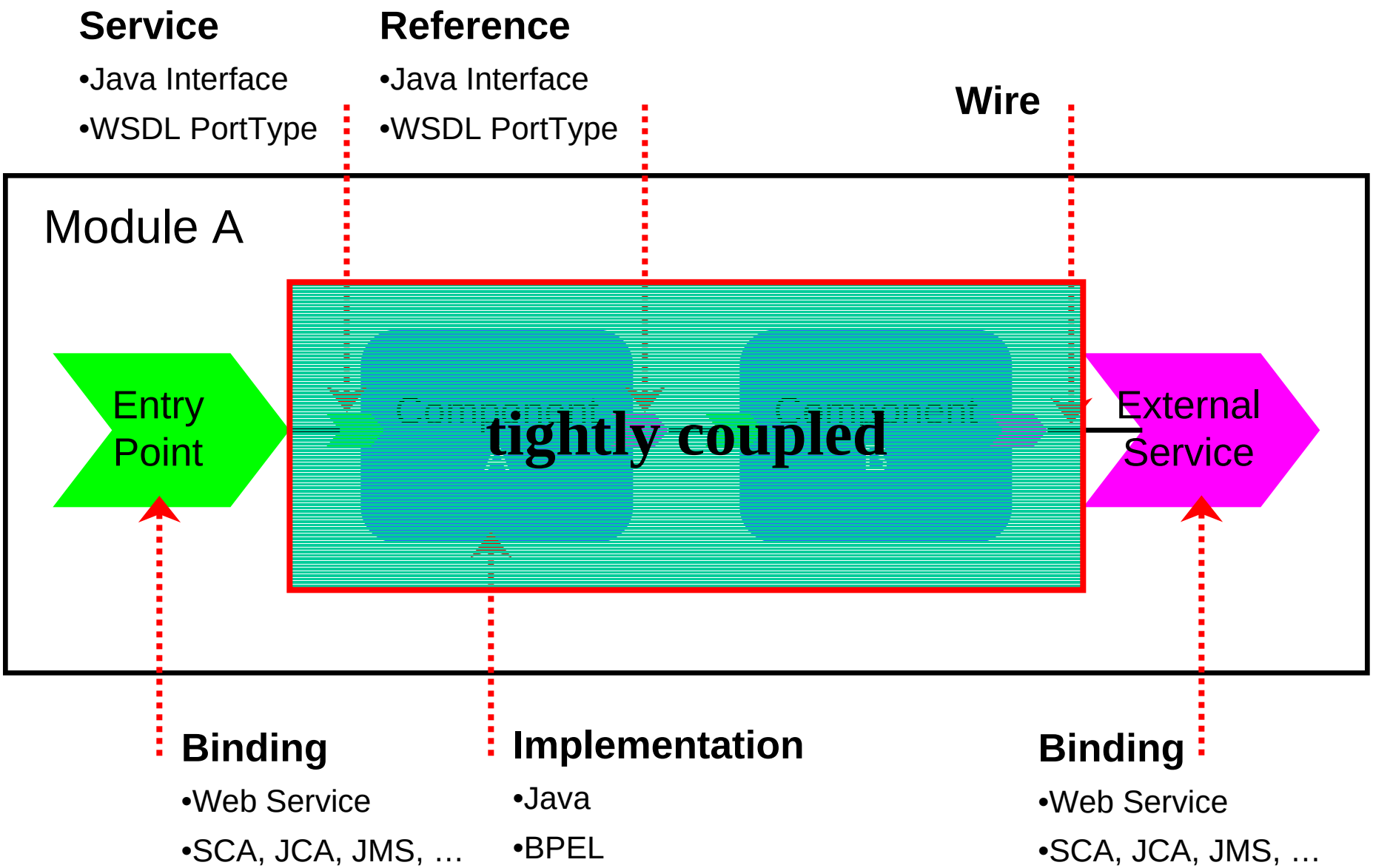
```
<portType name=“ChargeEstablishmentRequestInterface">
      <operation name=“sendChargeEstablishment">
          <input name=“ChargeEstablishment"
             message="tns:ChargeEstablishment" />
      </operation>
</portType>

<portType name=“ChargeEstablishmentResponseInterface">
      <operation name=“sendChargeEstablished">
          <input name=“ChargeEstablished"
             message="tns:ChargeEstablished" />
      </operation>
      <operation name=“sendChargeRejected">
          <input name=“ChargeRejected"
             message="tns:ChargeRejected" />
      </operation>
</portType>
```

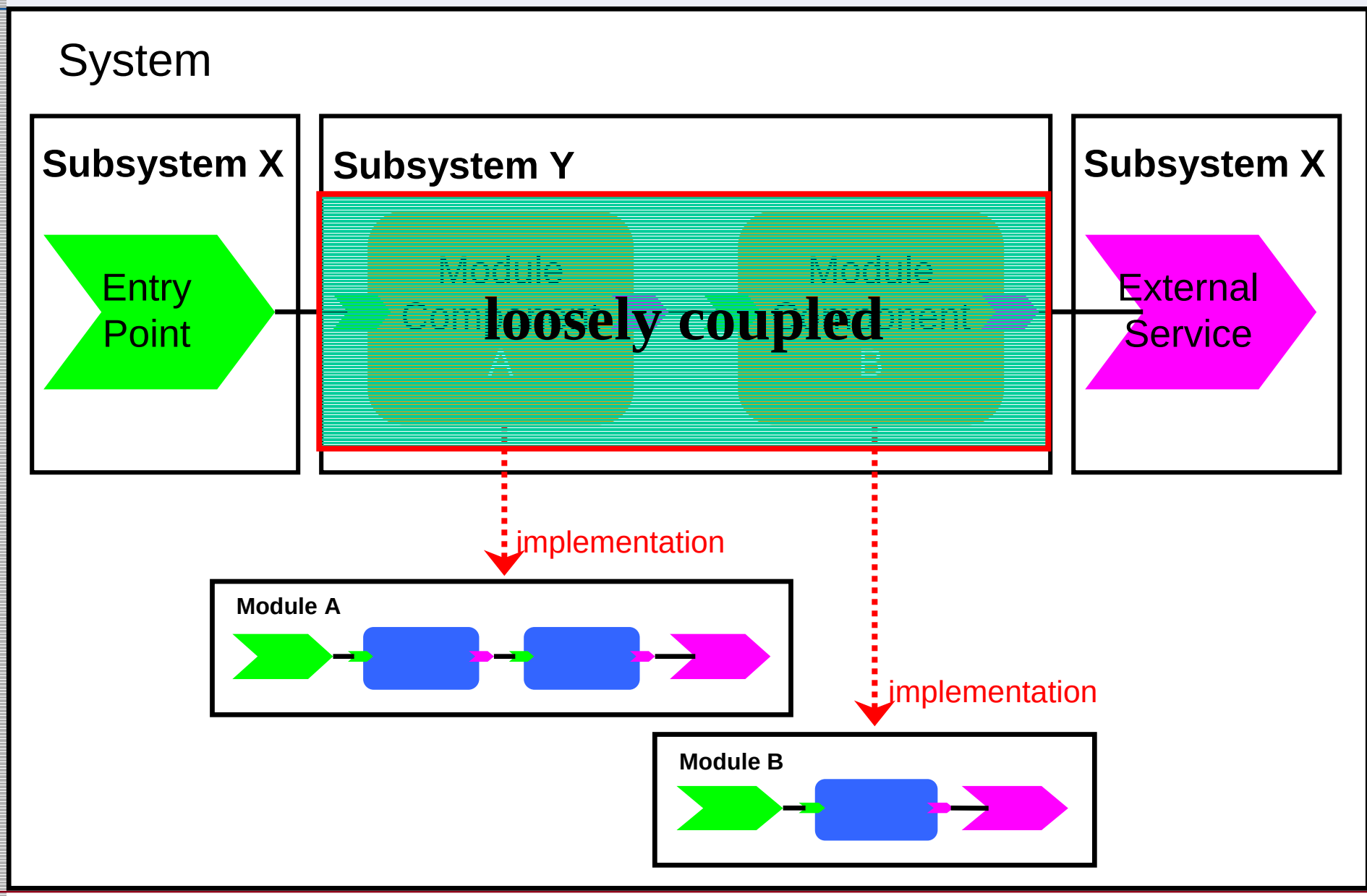
Service Component Architecture (SCA)

- IBM, BEA, Oracle, SAP, IONA, Siebel, Sybase, Sprint
  - ‘SOA is a composition model that connects the functional units of an application, called services, through well-defined interfaces and contracts between these services’
  - ‘SCA is a set of specifications which describe a model for building applications and systems using a Service-Oriented Architecture’
  - ‘SCA divides up the steps in building a service-oriented application into two major parts:
    - The **implementation** of components which provide services and consume other services
    - The **assembly** of sets of components to build business applications, through the **wiring** of service references to services’
- Another example of a SOA DSL
  - Nov ’05 v0.9 specs describe an SCA runtime platform

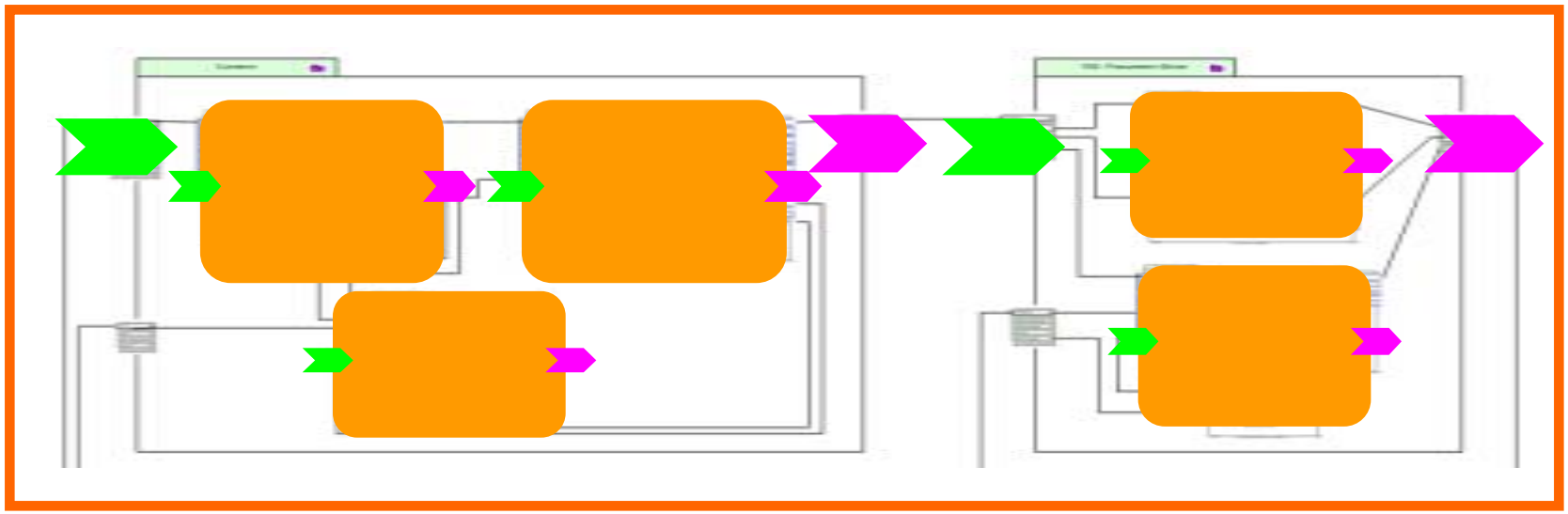
SCA - Module Assembly Diagram

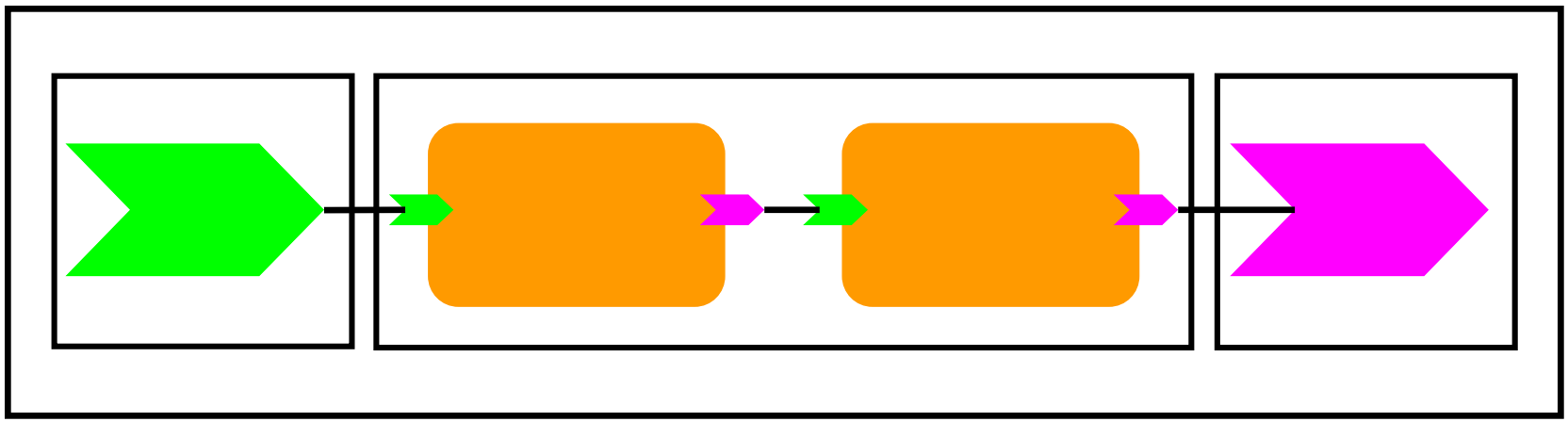


SCA - System Assembly Diagram



eGov SOA System of Systems, Quick CCA-SCA Comparison





FEA as CCA Aspect = PRM Line of Sight

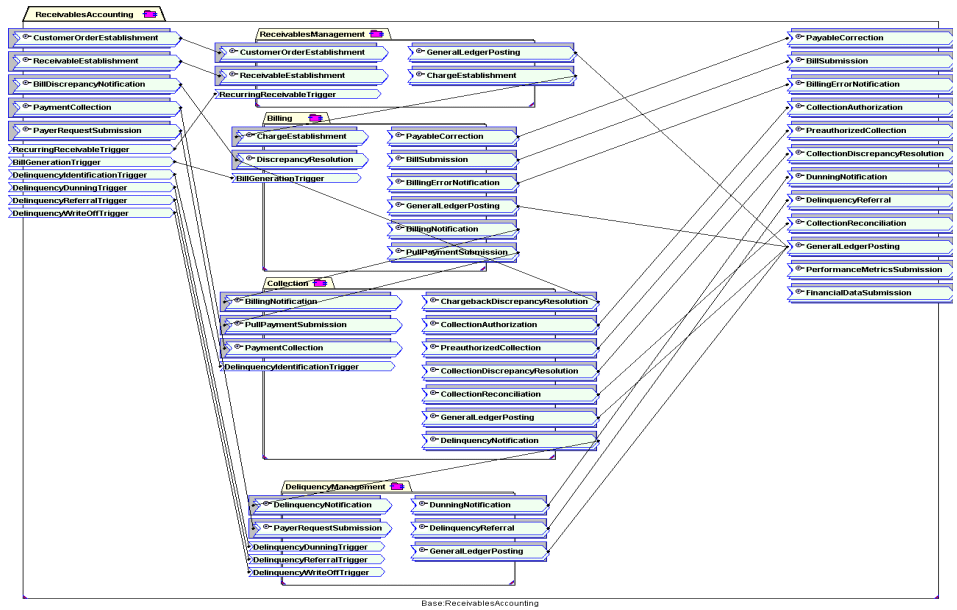
FEA Aspects of PRM Metrics, BRM/SRM classifications, and DRM schema definitions are associated with and applied directly to ***Business*** model elements

BRM

SRM

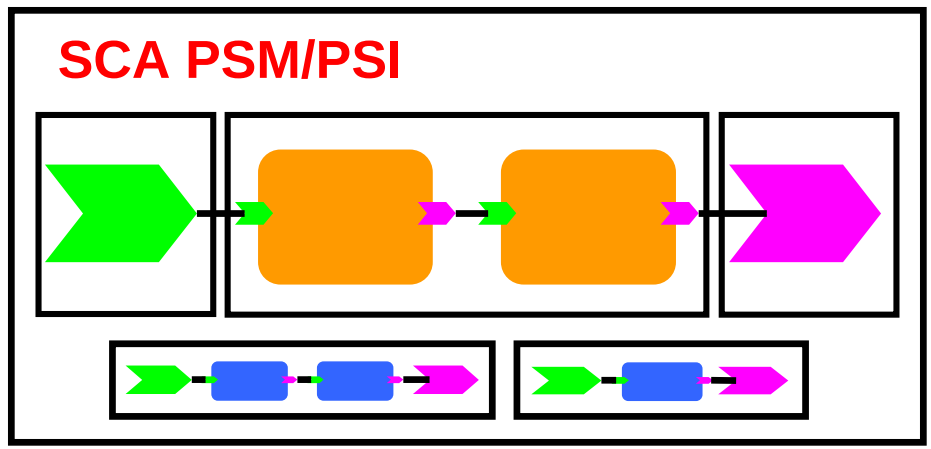
DRM

PRM

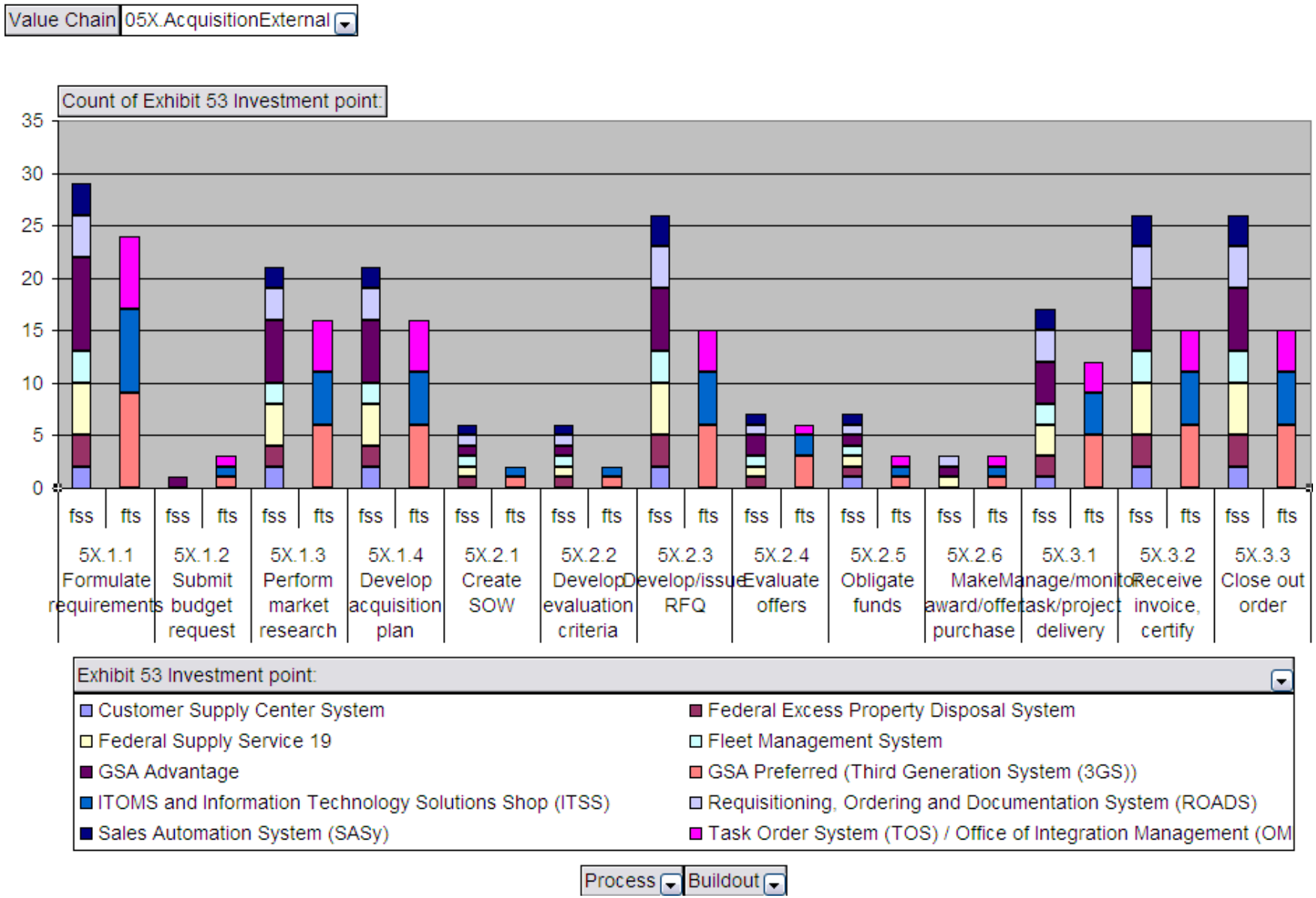


Elaborated ***Platform*** model elements inherit these annotations, adding further PRM and TRM annotations as a model is transformed and deployed to a J2EE Server

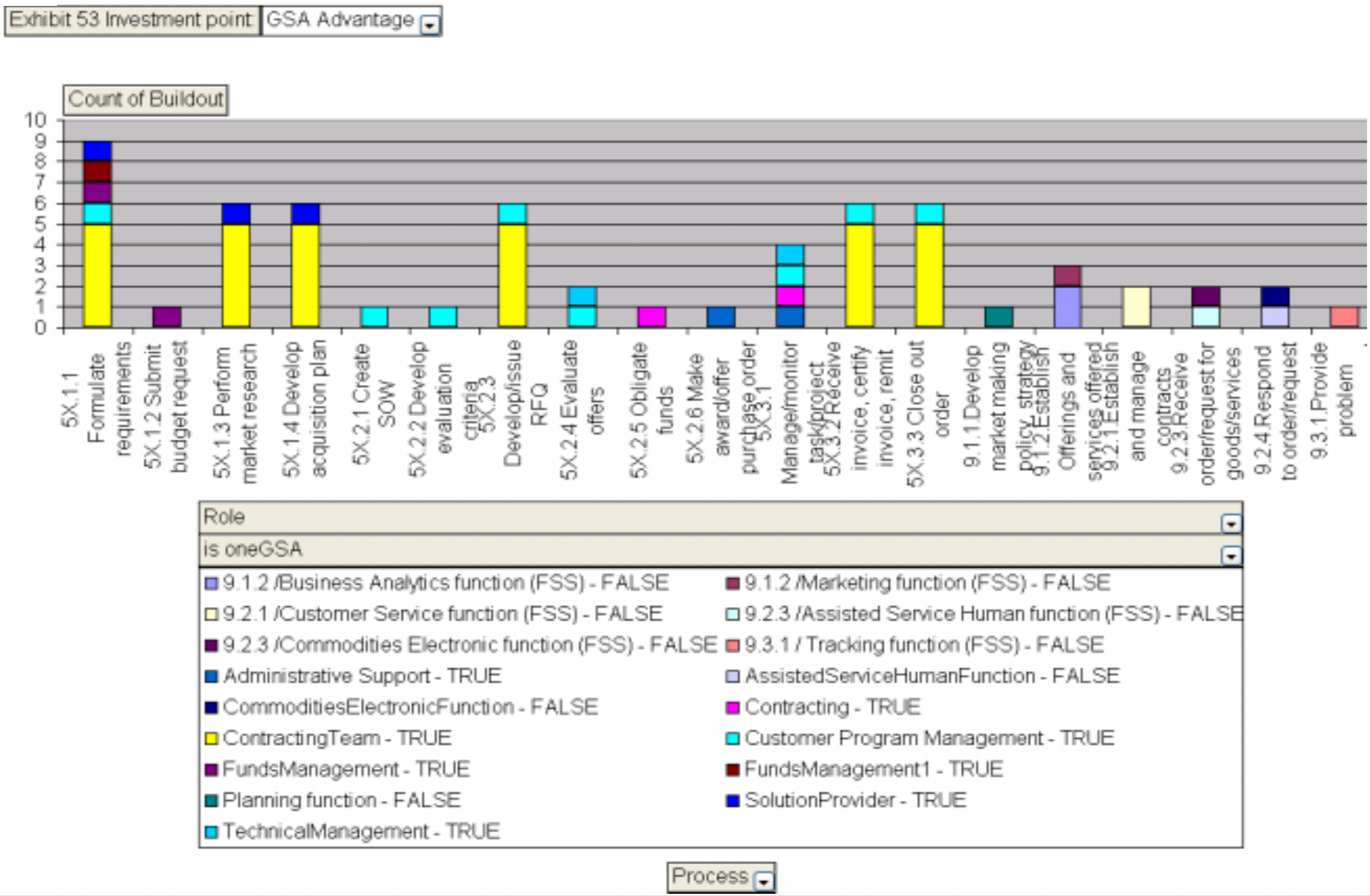
TRM



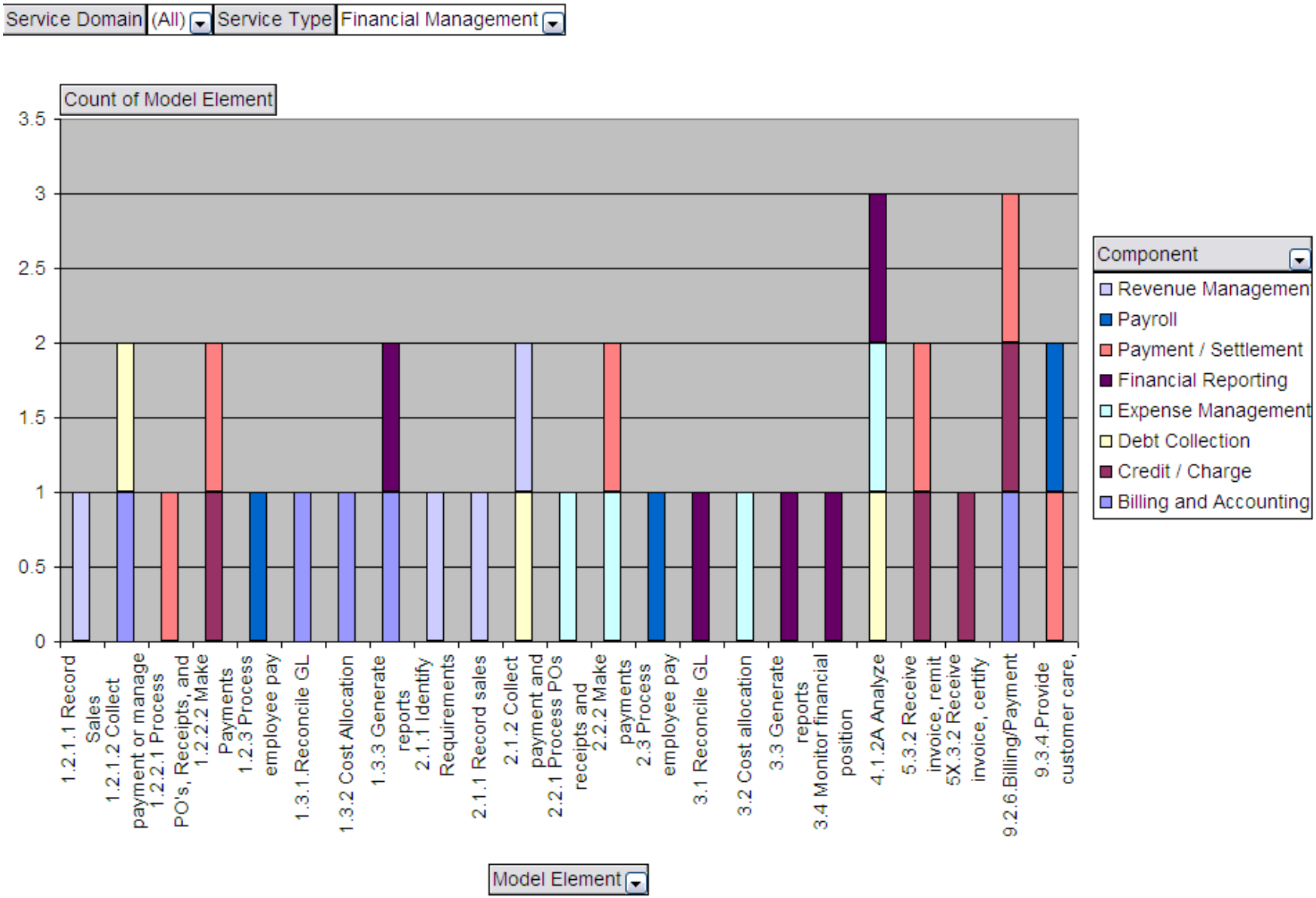
ITPM - Business Process, FSS/FTS, Exhibit 53



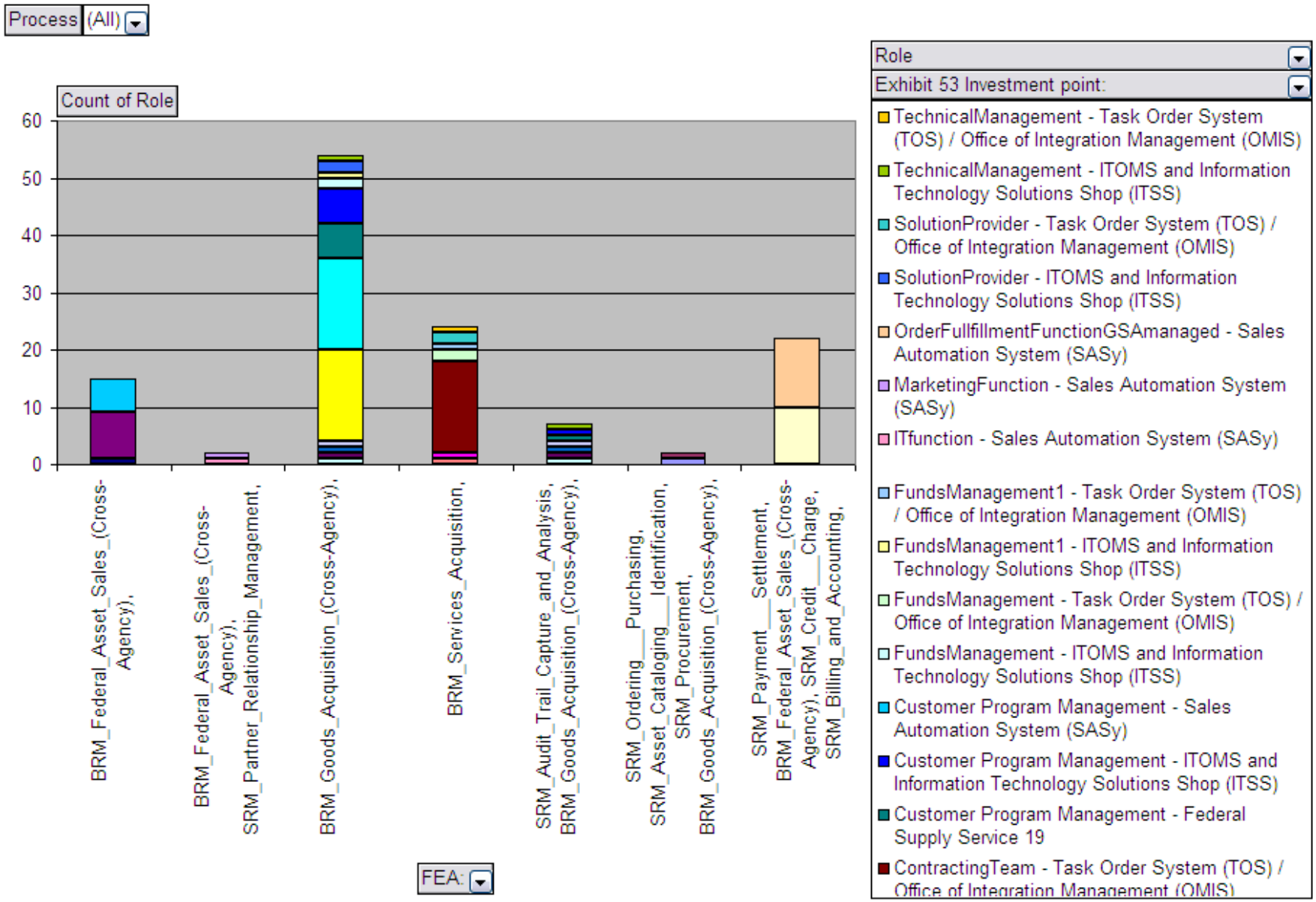
ITPM - GSA Advantage, Business Processes, Roles



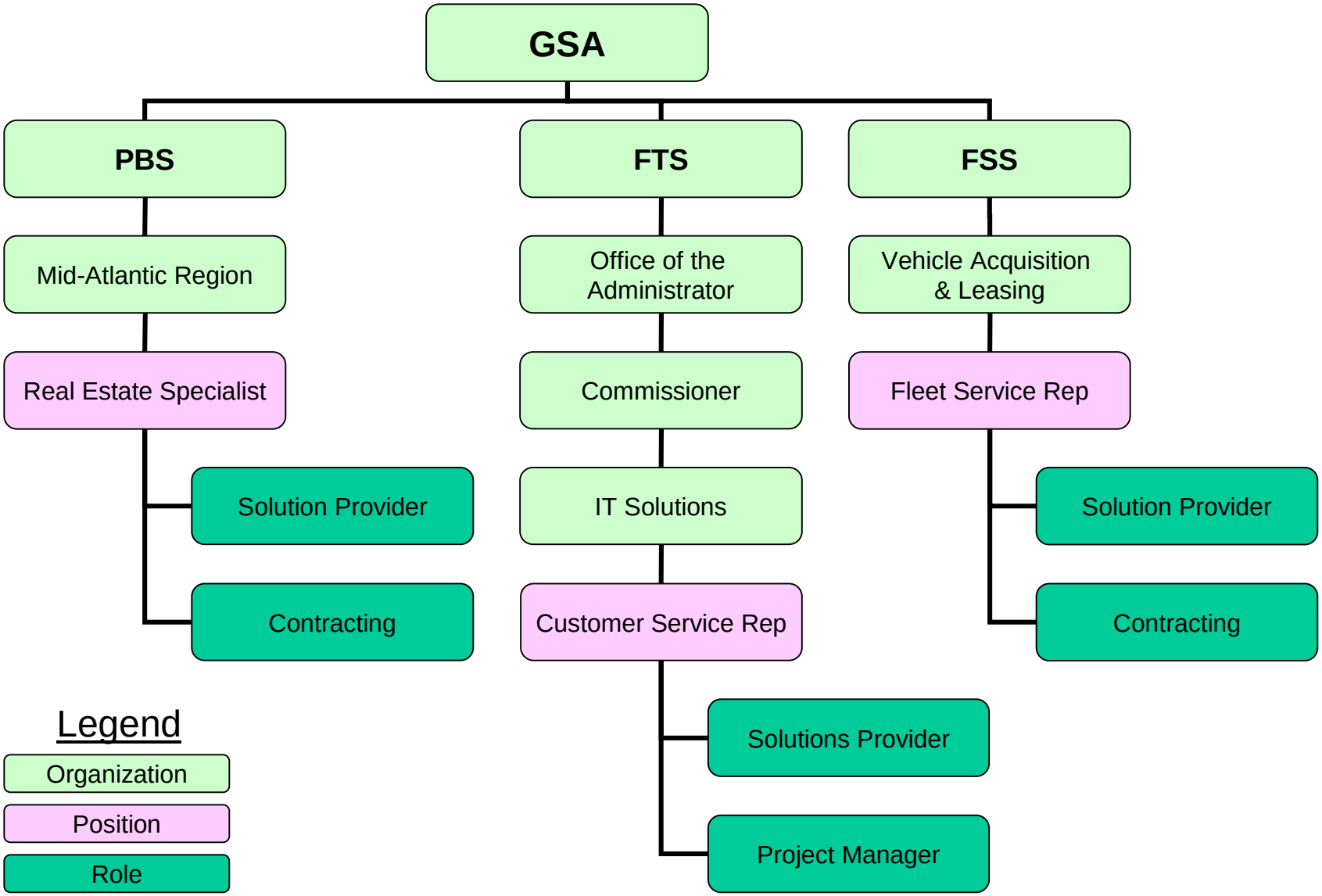
ITPM - SRM Financial Management, Business Processes



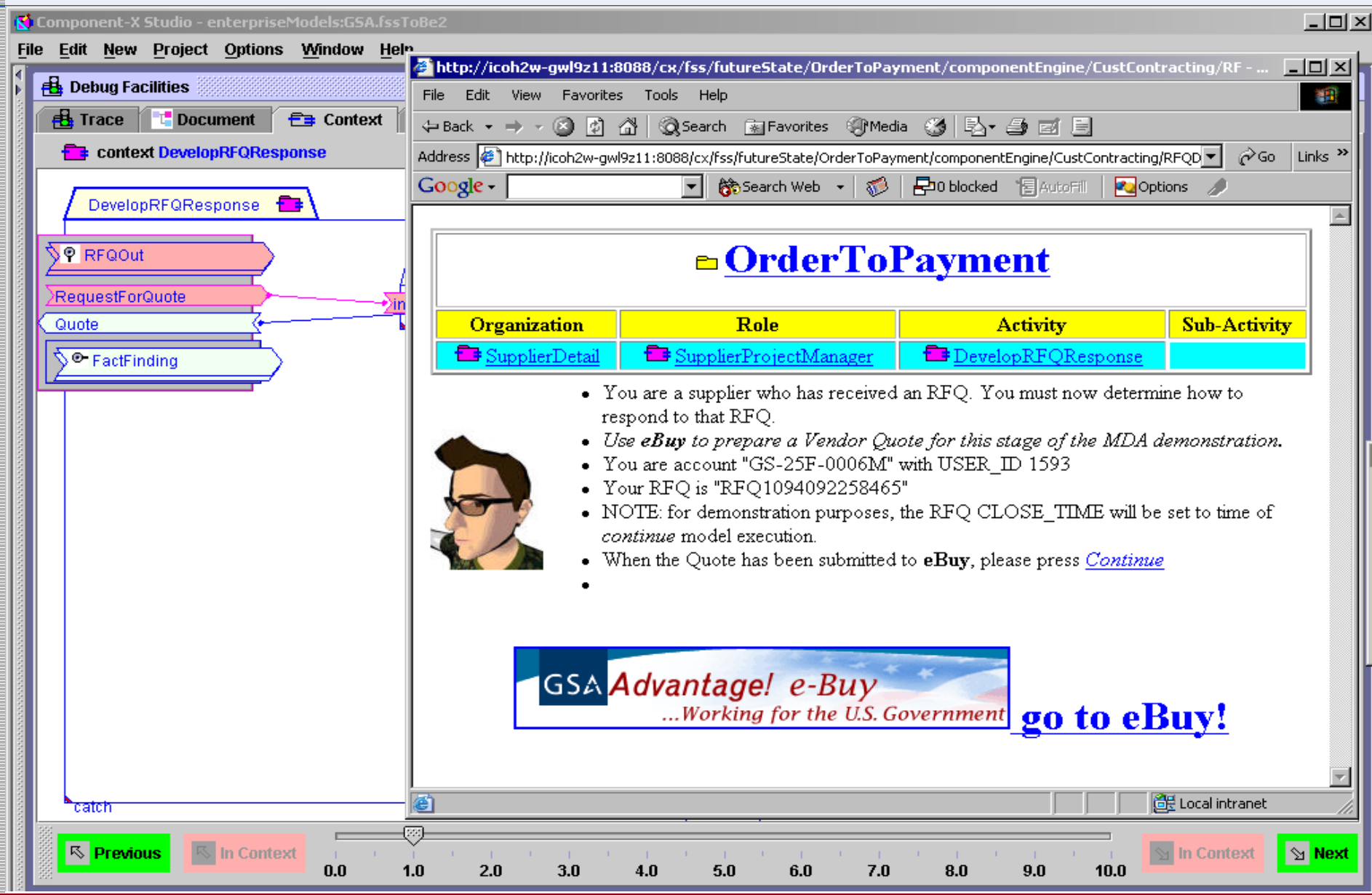
ITPM - Business Process, Roles, Exhibit 53, FEA (all)



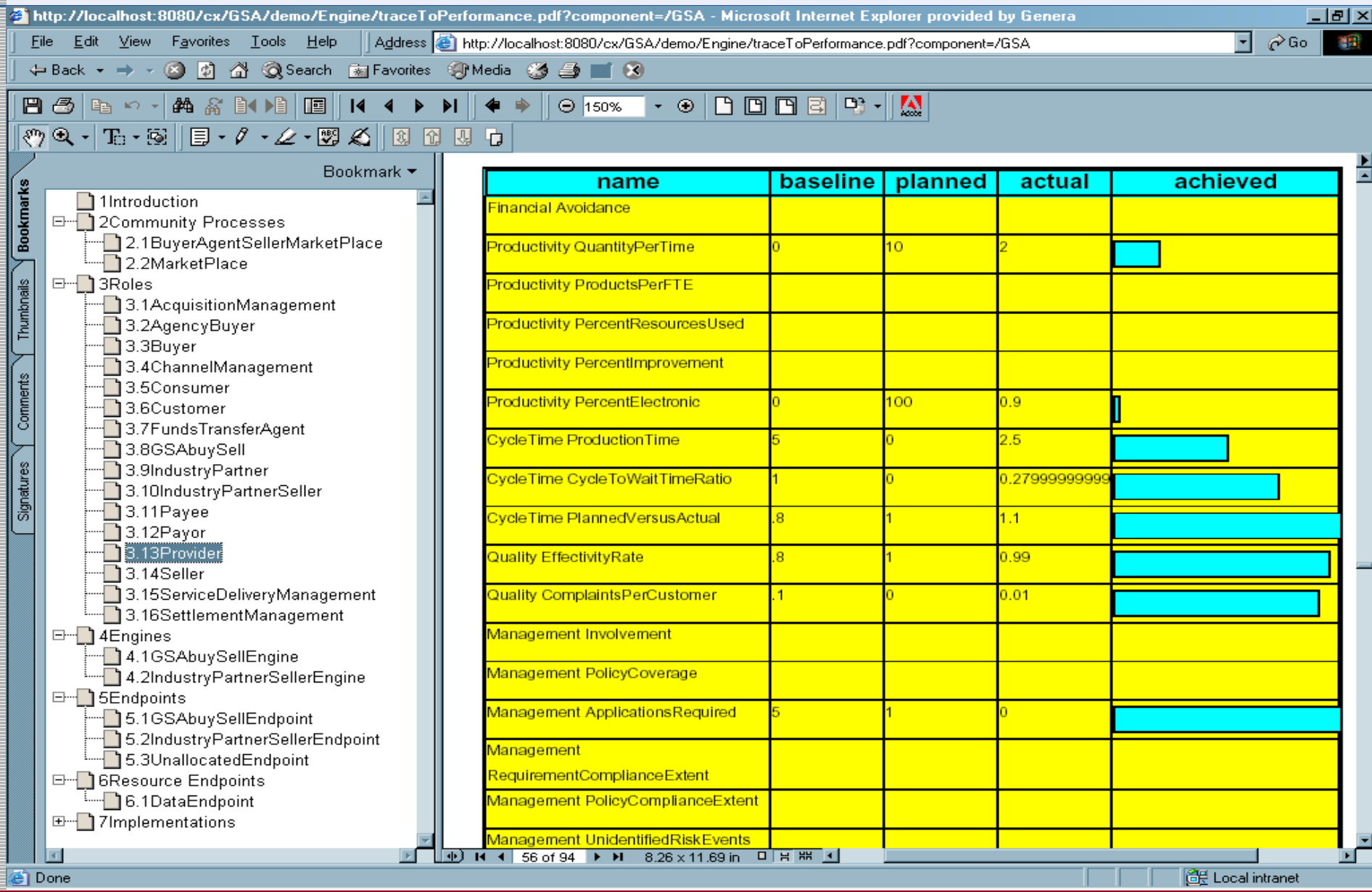
Org Design – Flexible Role/Service Composition and Reuse



To-Be BP Interoperates with As-Is Service Component



PRM Line of Sight for Activity Based Costing



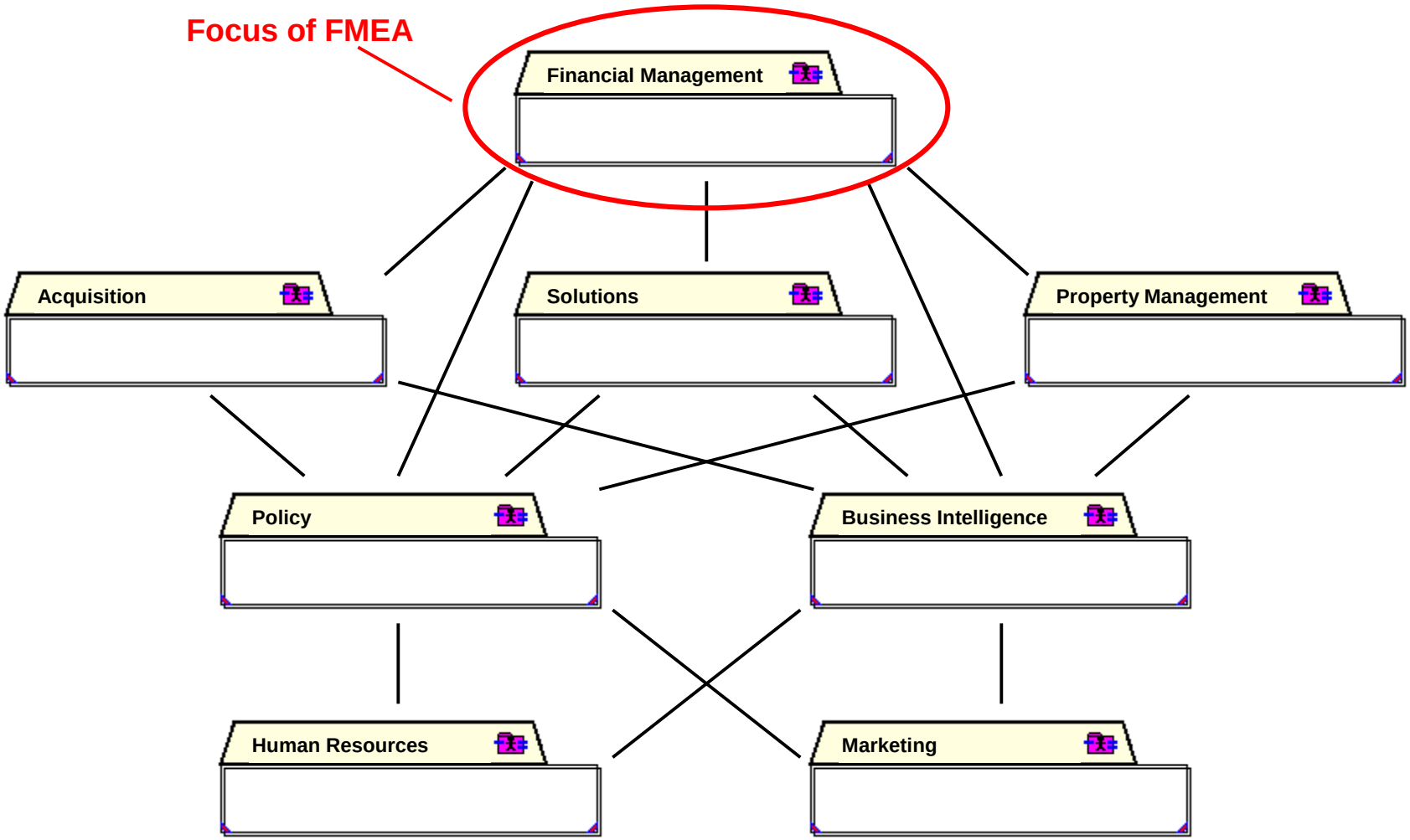
name	baseline	planned	actual	achieved
Financial Avoidance				
Productivity QuantityPerTime	0	10	2	
Productivity ProductsPerFTE				
Productivity PercentResourcesUsed				
Productivity PercentImprovement				
Productivity PercentElectronic	0	100	0.9	
CycleTime ProductionTime	5	0	2.5	
CycleTime CycleToWaitTimeRatio	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				

Part 2 - FMLoB

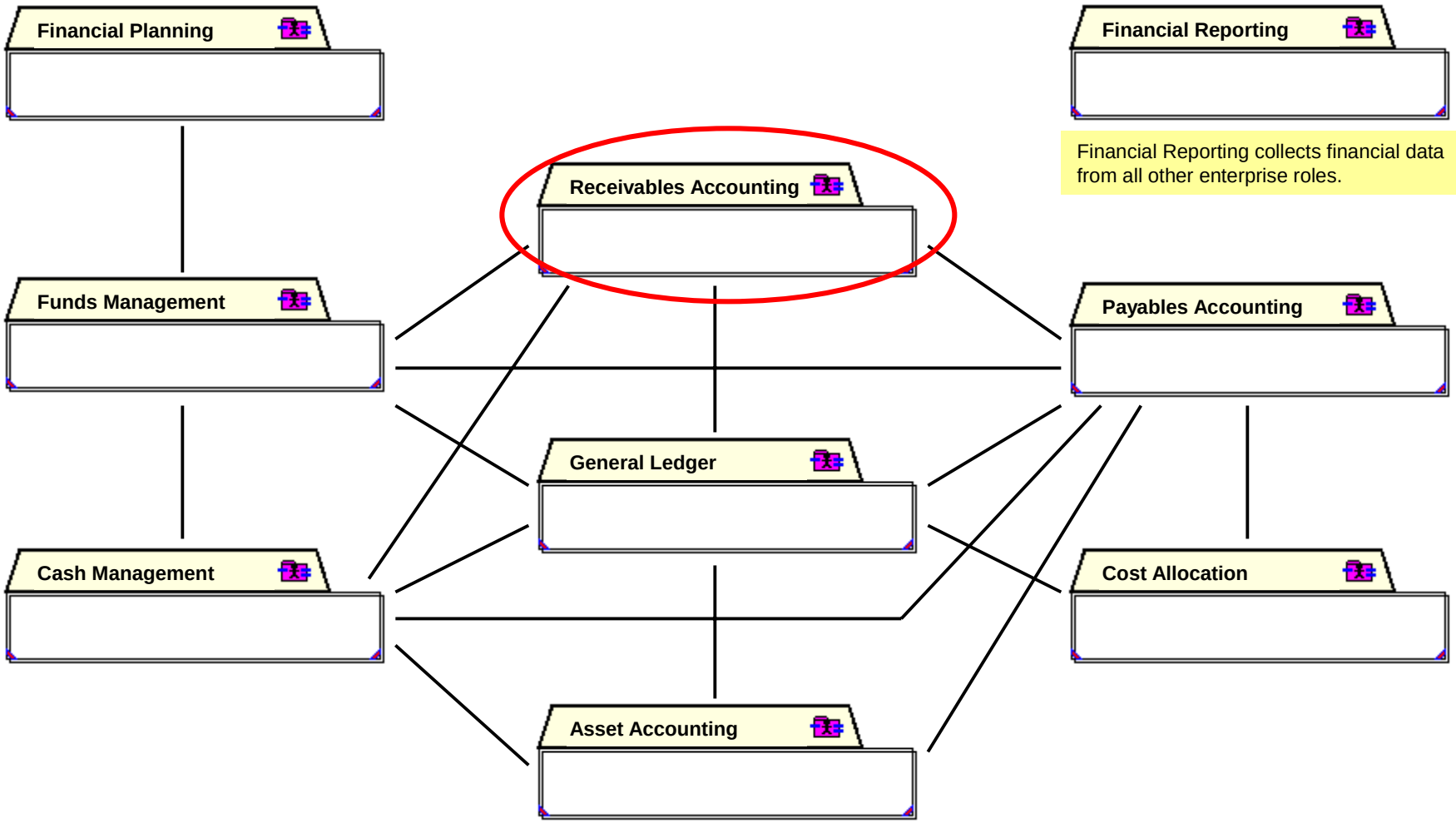
- Slides 24 to 45

- FMEA – FMLoB Case Study
  - EDOC CIM/PIM conventions
  - ADM Mainframe Analysis
  - UML Information, Transaction, Message, Persistence Models
  - Team, Tools, Next Steps

CIM: “One GSA” Disciplines



CIM: Financial Management Enterprise Roles



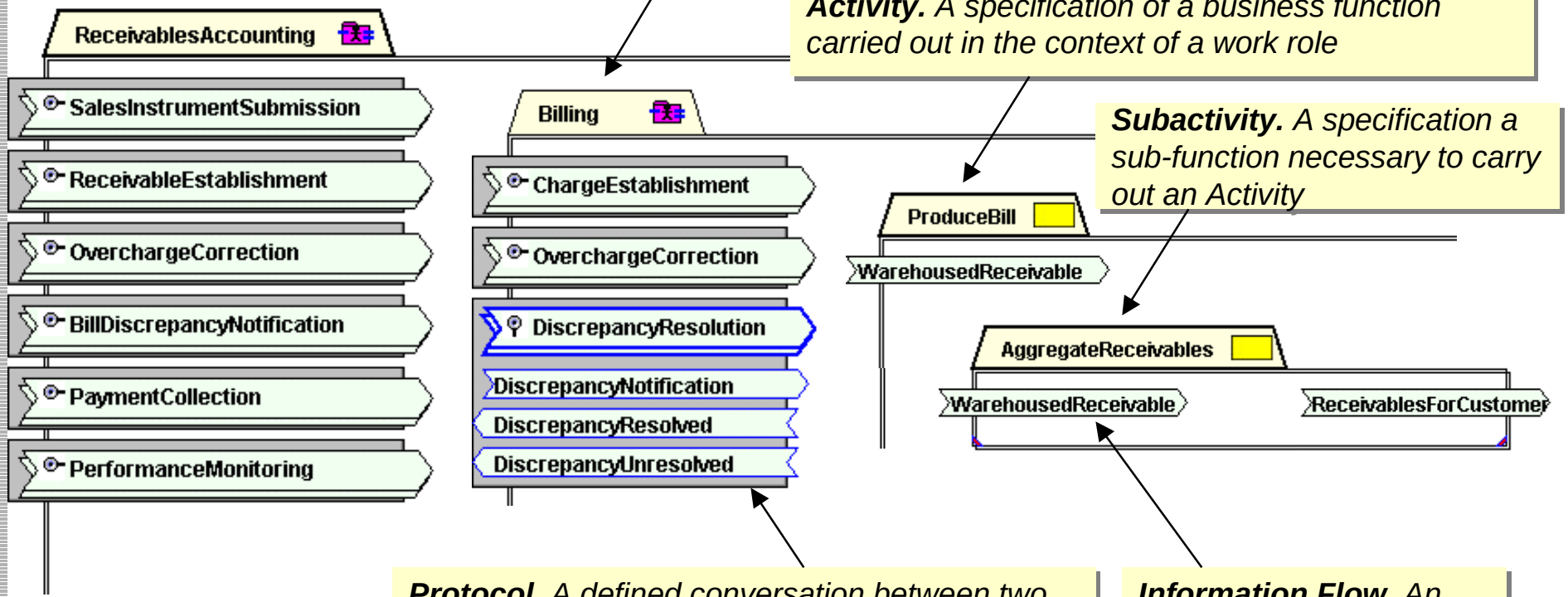
GSA's FMLoB: CIM Decomposition Conventions

Enterprise Role. *A major area of functional responsibility within the discipline of financial management*

Work Role. *A role responsible for a specific functional area within an enterprise role, such as might be assigned to a single worker and supported by an IT system*

Activity. *A specification of a business function carried out in the context of a work role*

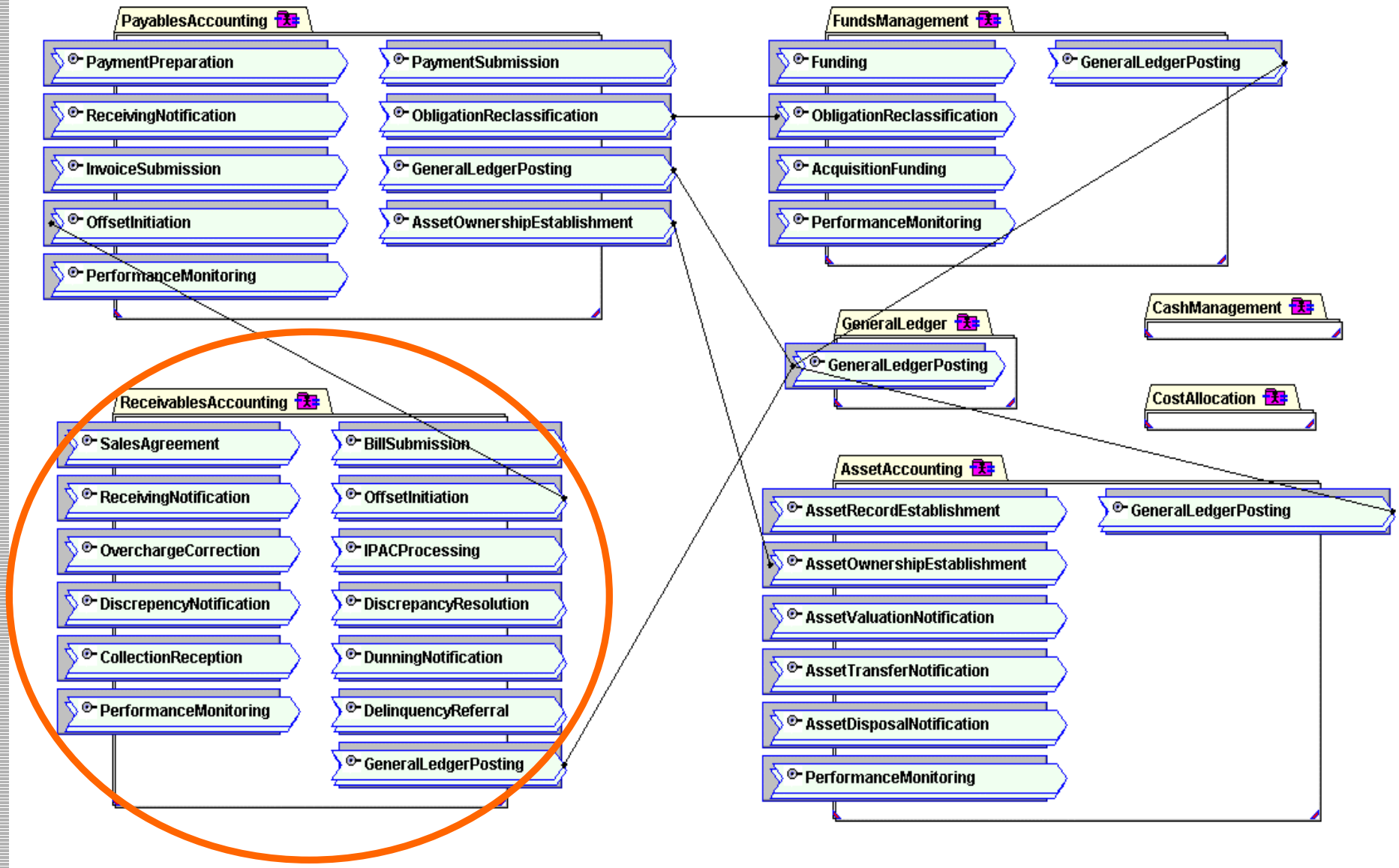
Subactivity. *A specification a sub-function necessary to carry out an Activity*



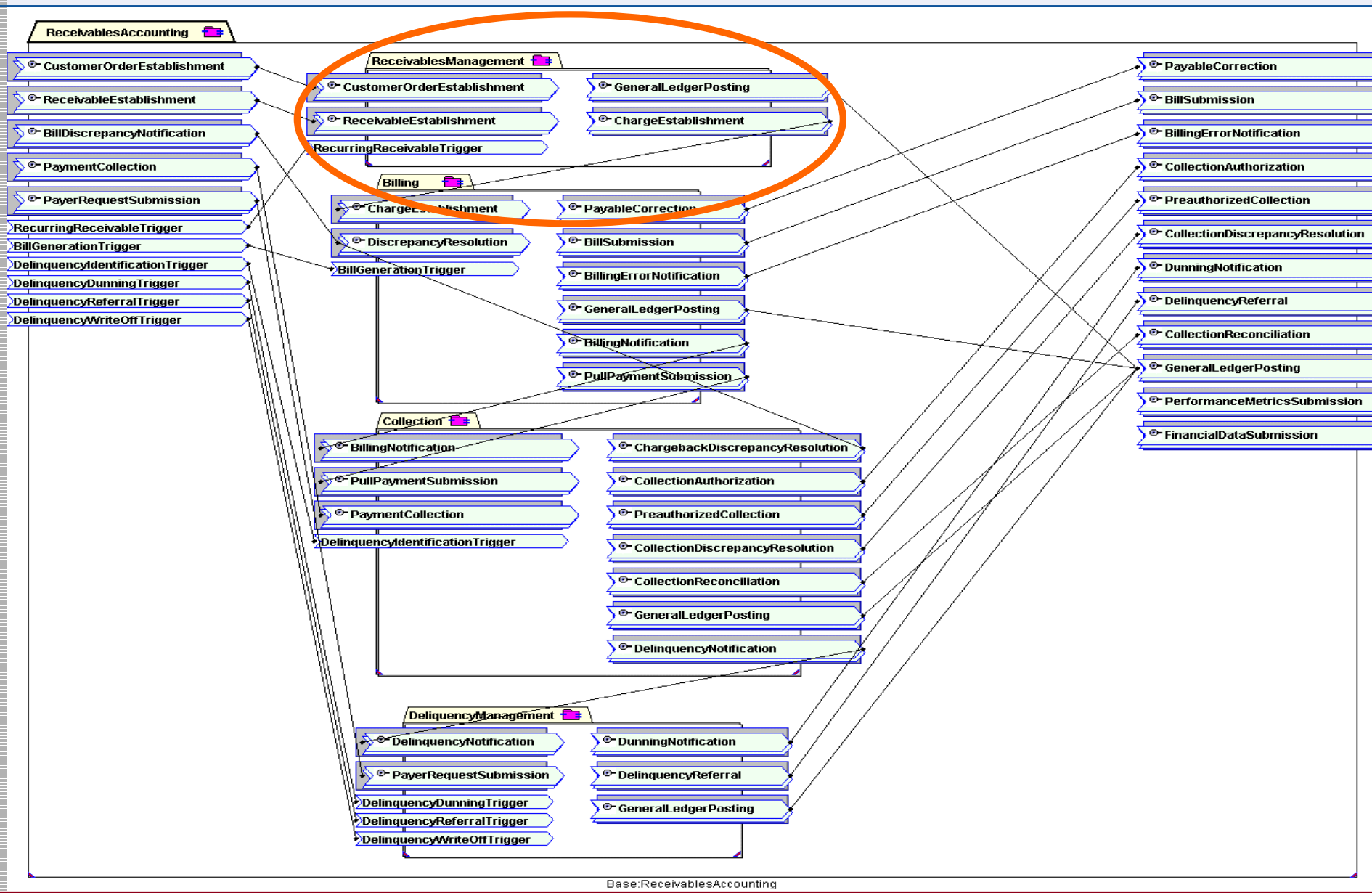
Protocol. *A defined conversation between two roles that may be extended over time. One role initiates and the other responds to the protocol, but information may flow both ways across the protocol*

Information Flow. *An individual flow of information across a protocol or into or out of an Activity or Subactivity*

CIM: FMLoB Enterprise Roles

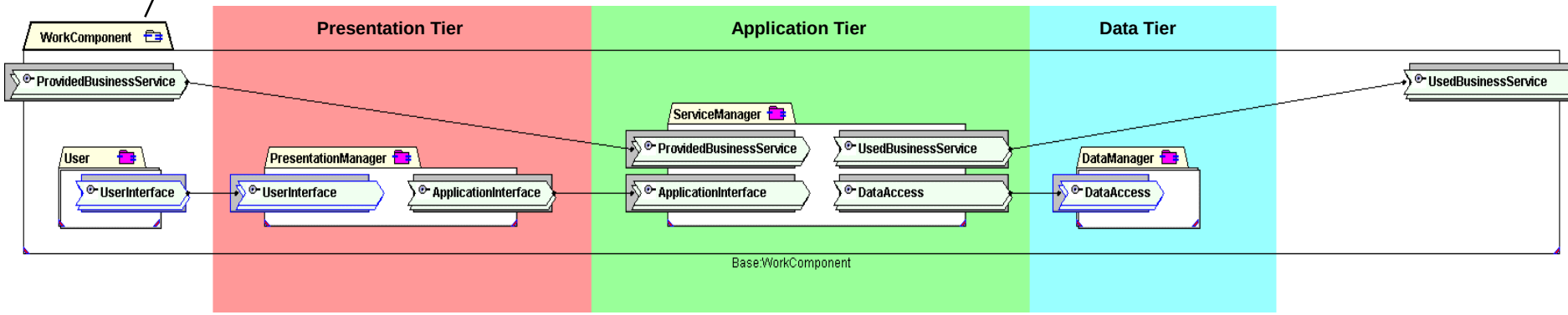


CIM: Enterprise Role Composes Work Roles



PIM/PSM: Service-Oriented Component Architecture

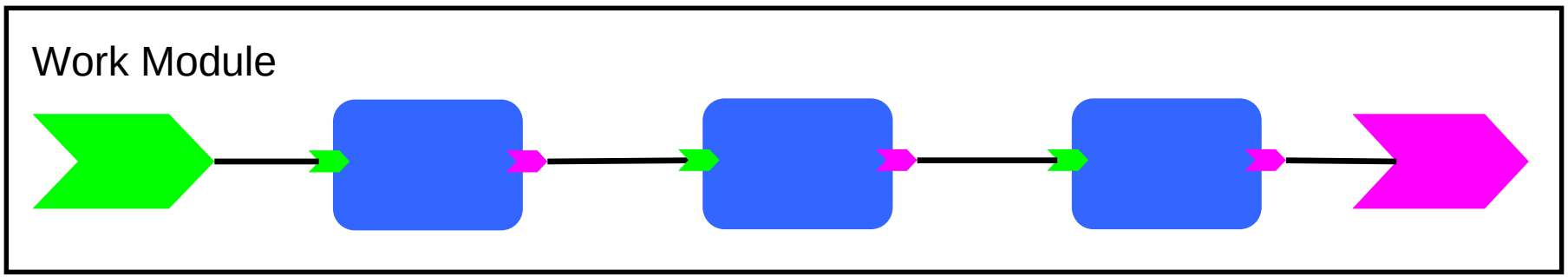
Each Work Component in the PIM implements a Work Role from the CIM



Presentation Manager components provide user access to application services

Service Manager components provide transactional implementation of application services defined in the CIM

Data Manager components persist data between application transactions



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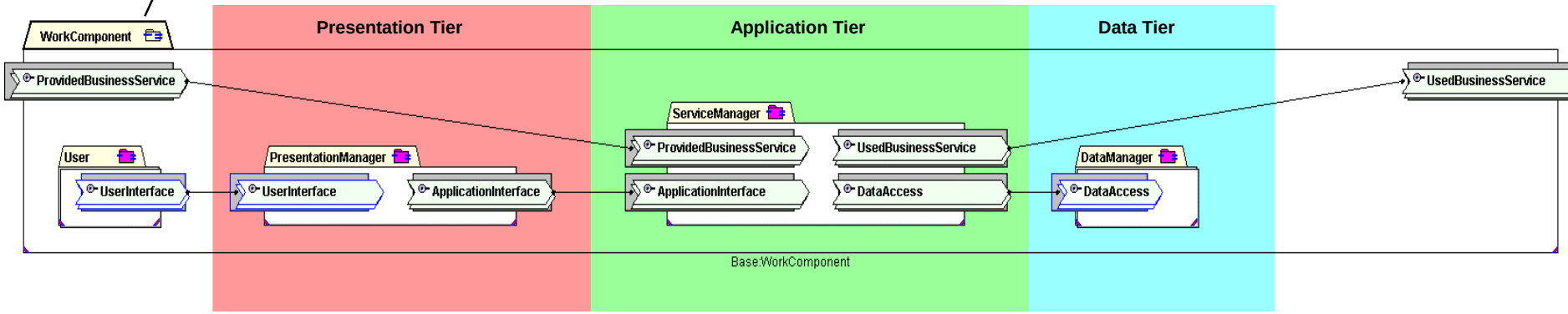

Presentation Manager components provide user access to application services

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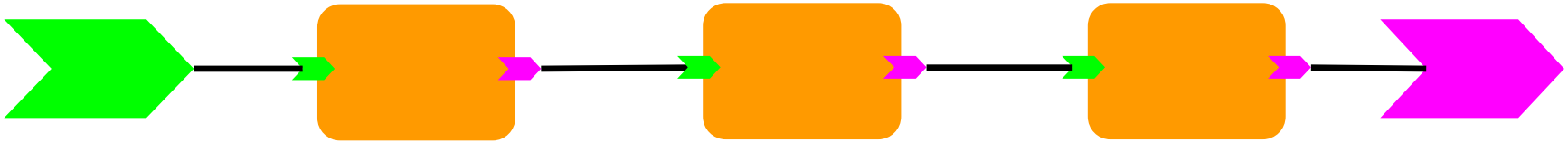
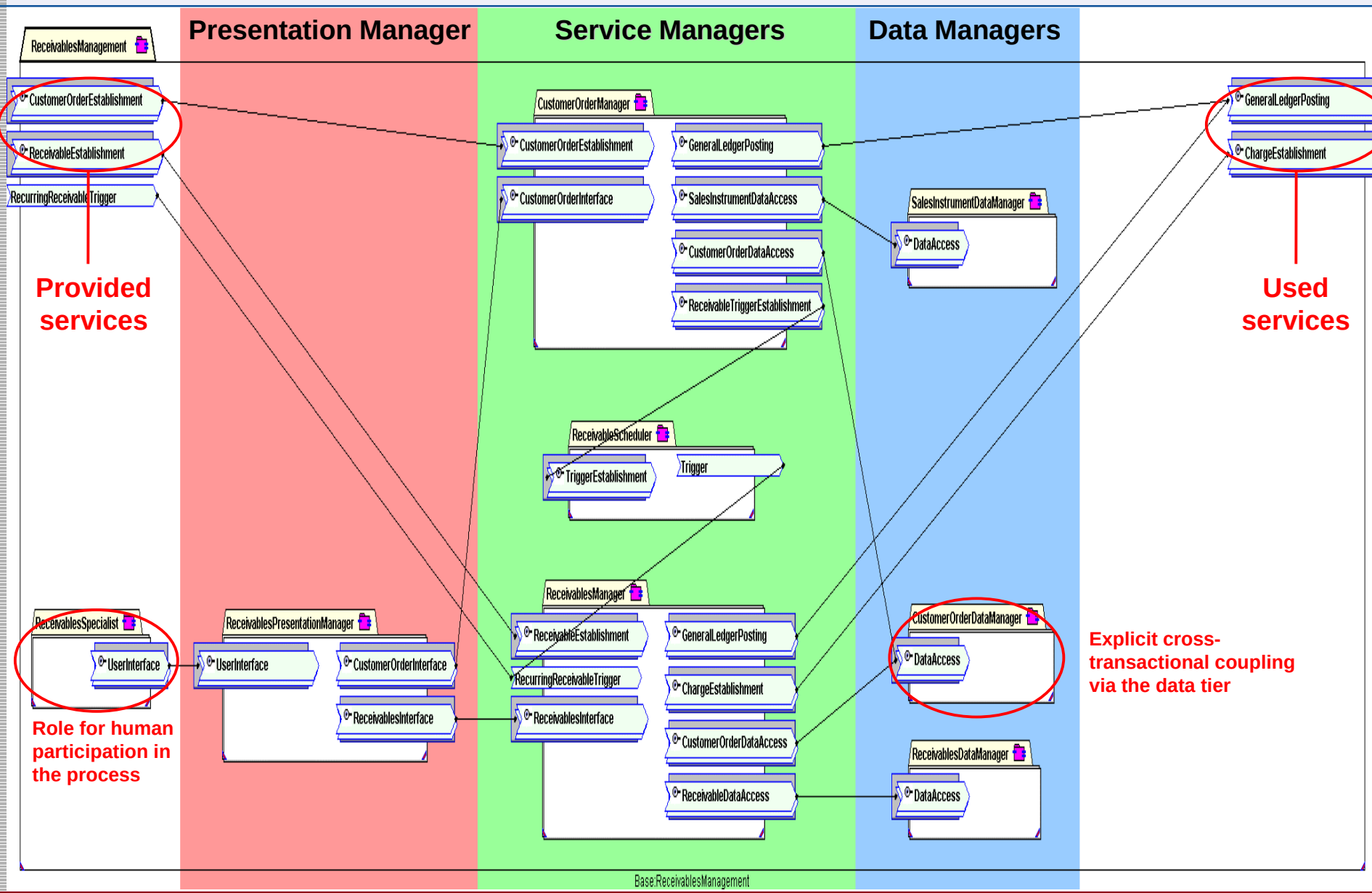
System Assembly

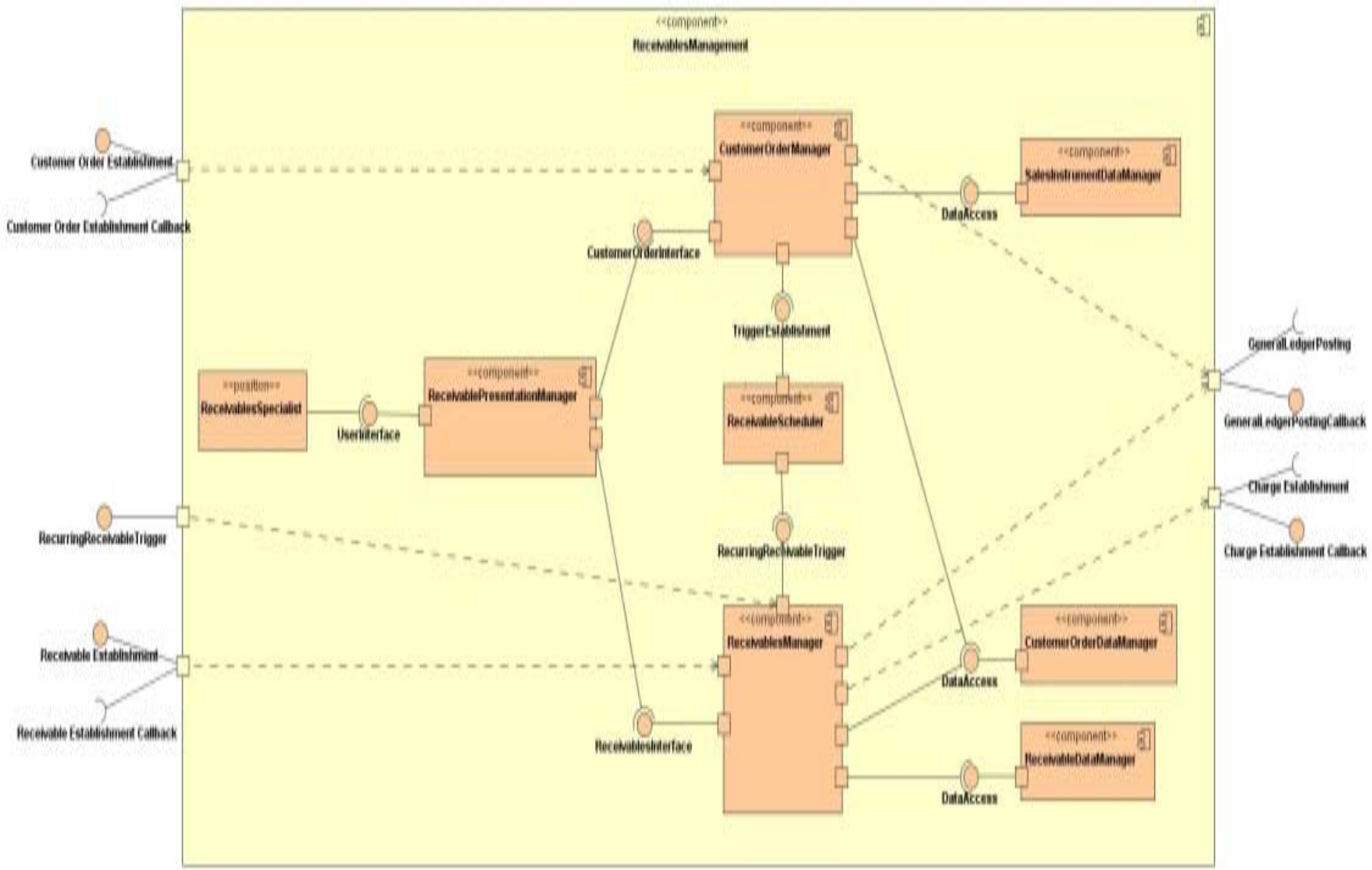
Subsystem



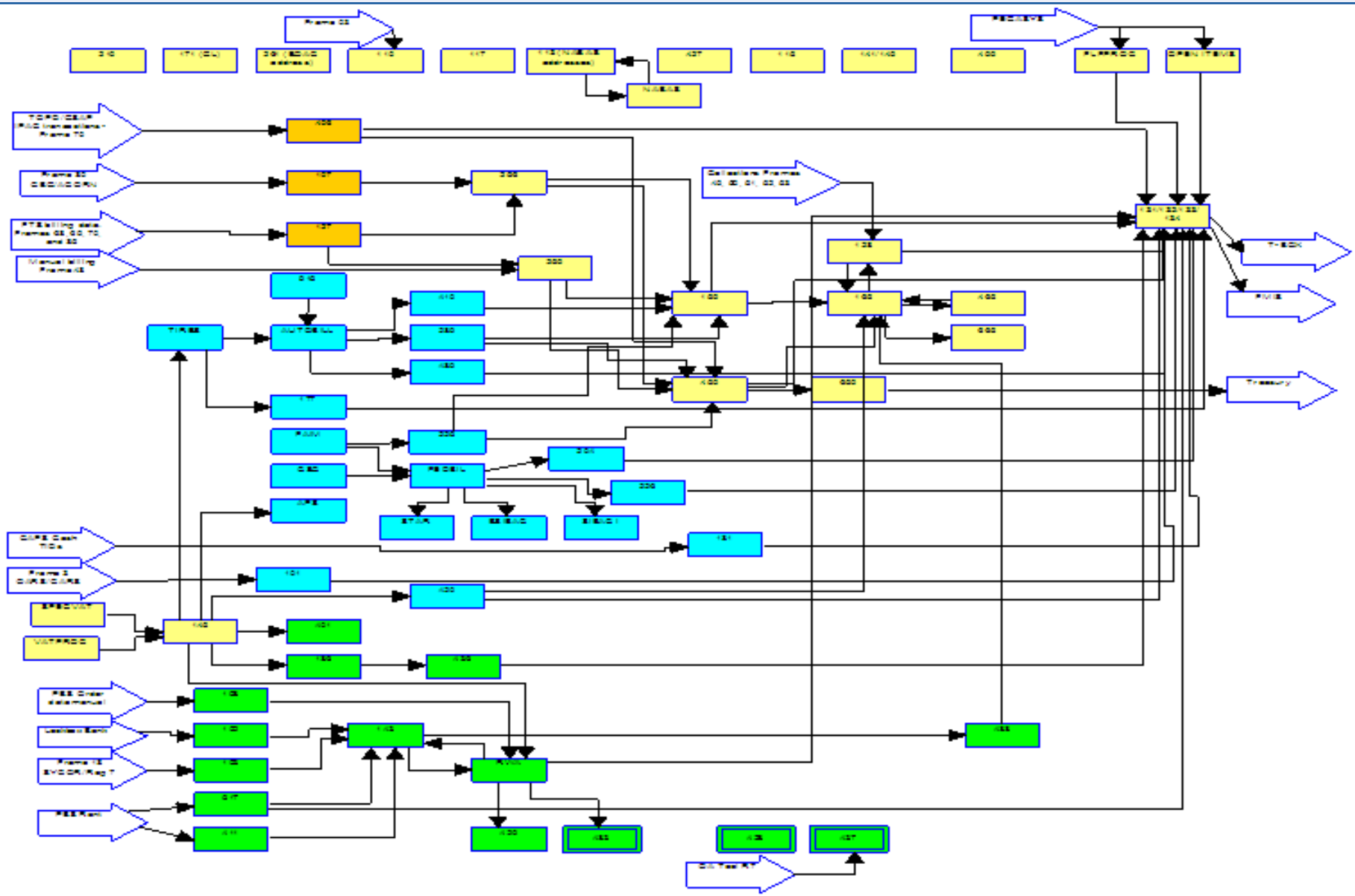
PIM: Receivables Management Work Role



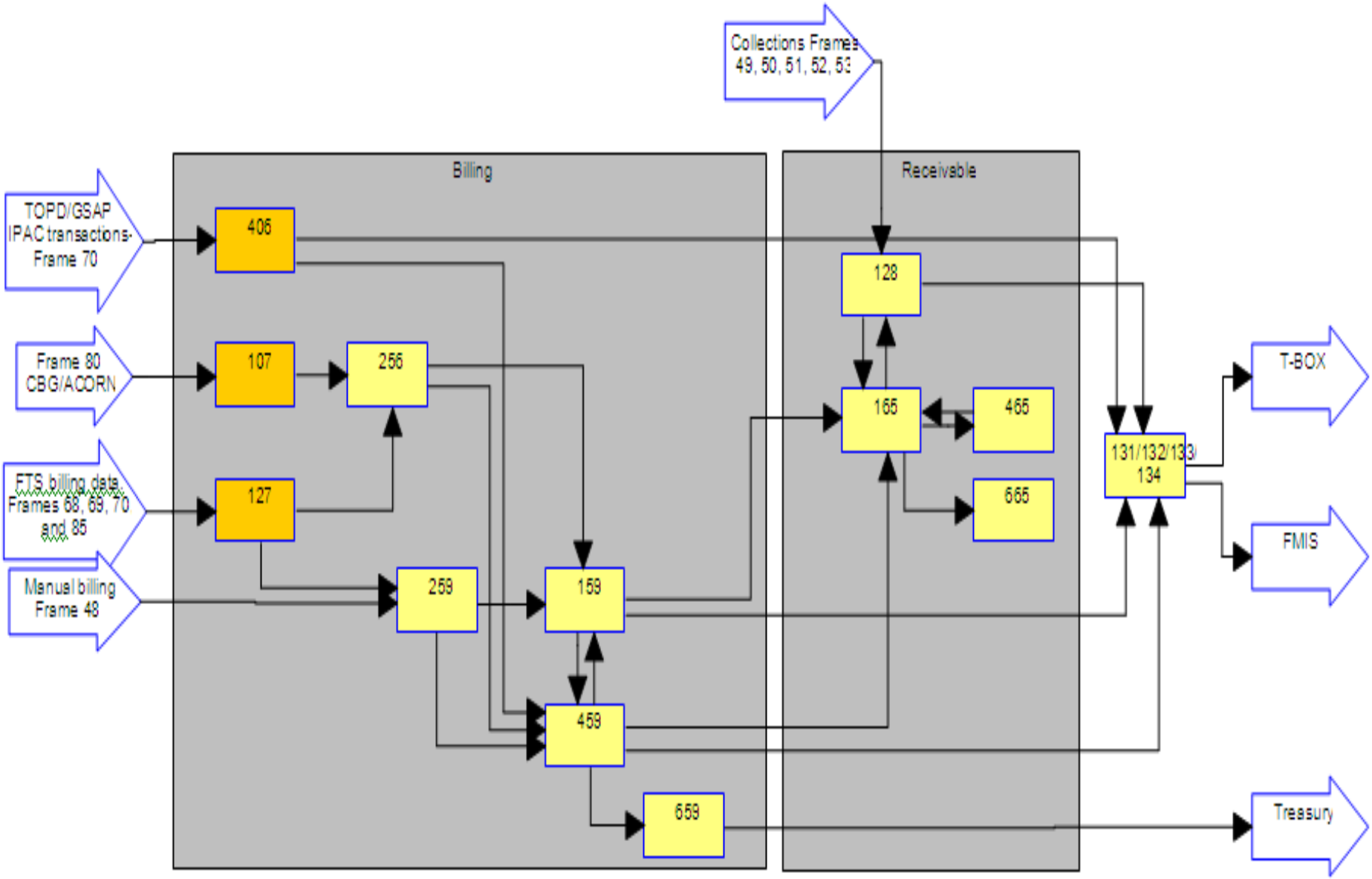
UML2 Receivables Management Composite Component



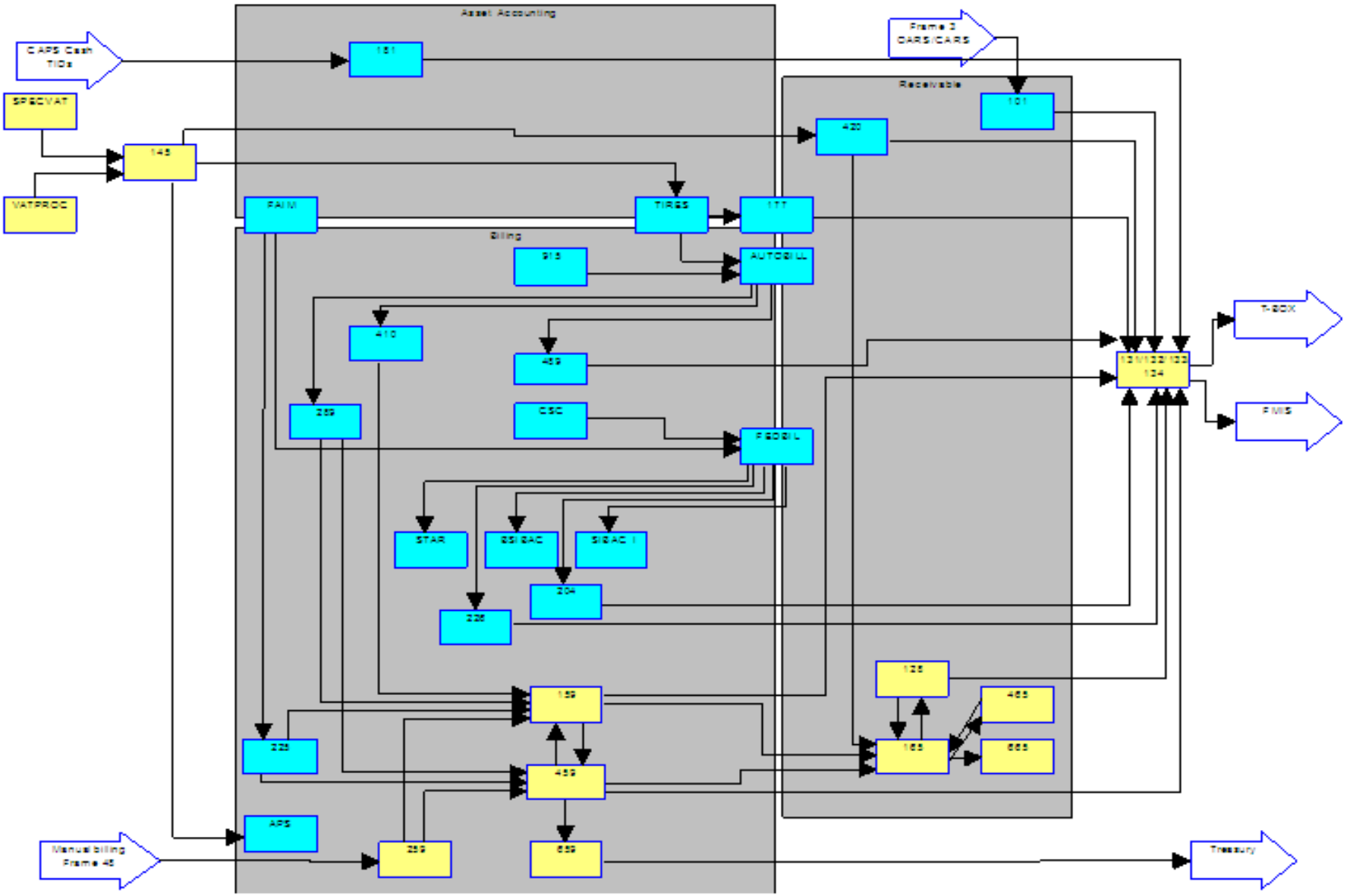
ADM - Flow of NEAR Modules



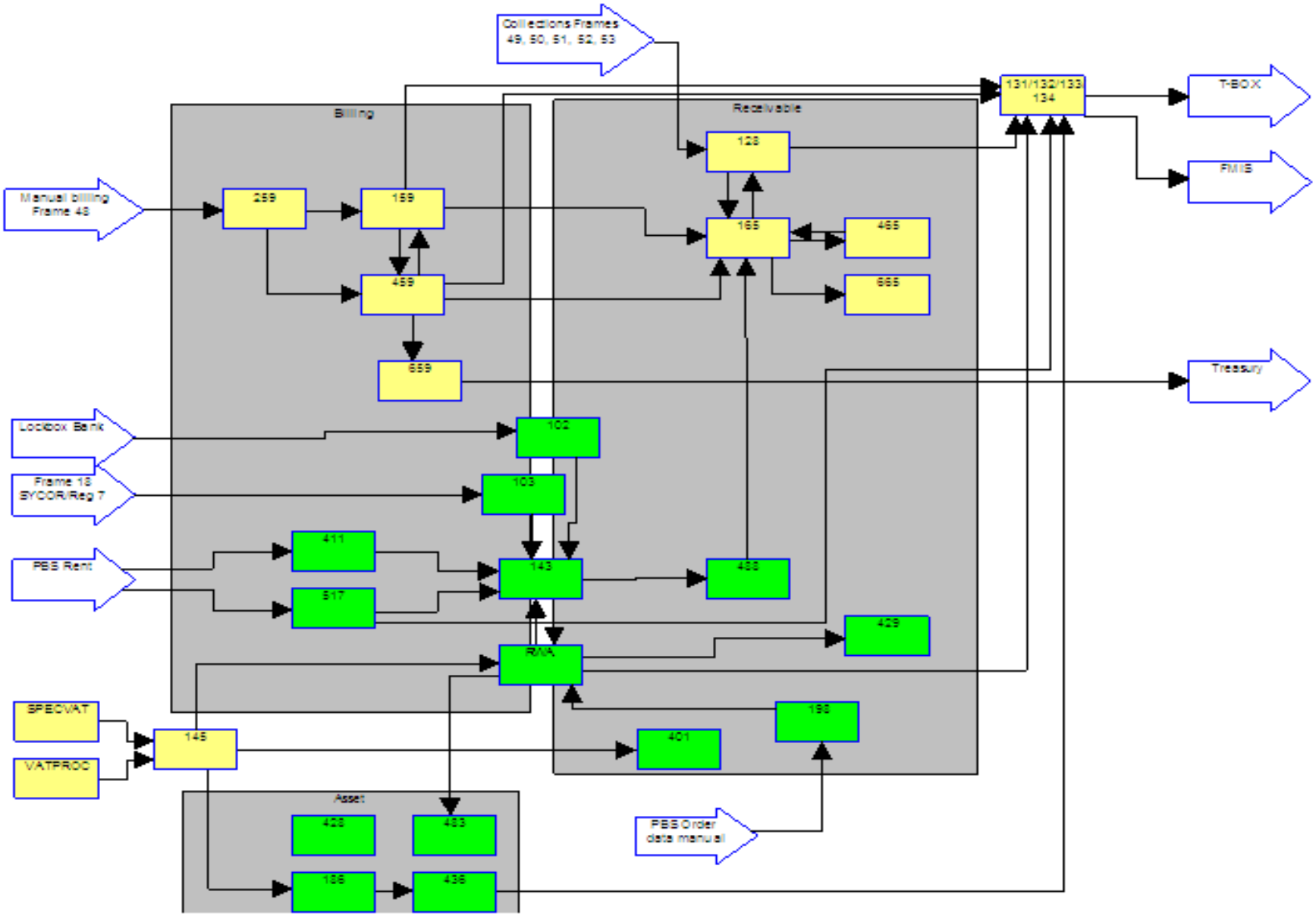
ADM - FTS Module Flows, with Process Mapping



ADM - FSS Module Flows, with Process Mapping



ADM - PBS Module Flows, with Process Mapping



Record Unfilled Customer Order - Requirements

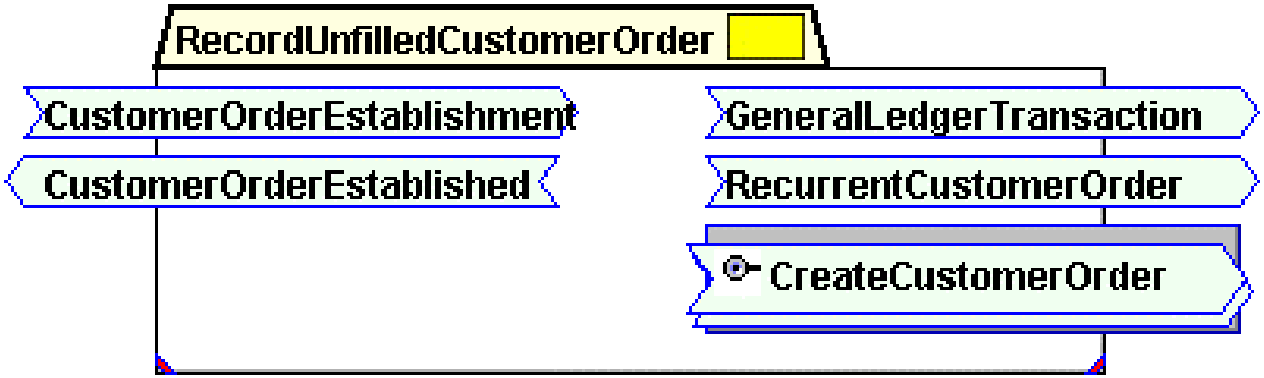
- ADM enabled identification and analysis of 86 modules, 728 programs and 342 copybooks (735,000 loc)
- Tools offer query, reporting, sorting capabilities useful for extracting business rules
  - ~3 FTE person months - 636 business rules extracted
  - Only used this analysis technique on a COBOL mainframe slated for deprecation, other parsers available

Description: Record a new unfilled customer order, as established via a specific sales instrument.
Generate general ledger transactions to increase Unfilled Customer Orders and decrease Anticipated Reimbursements.

Requirement

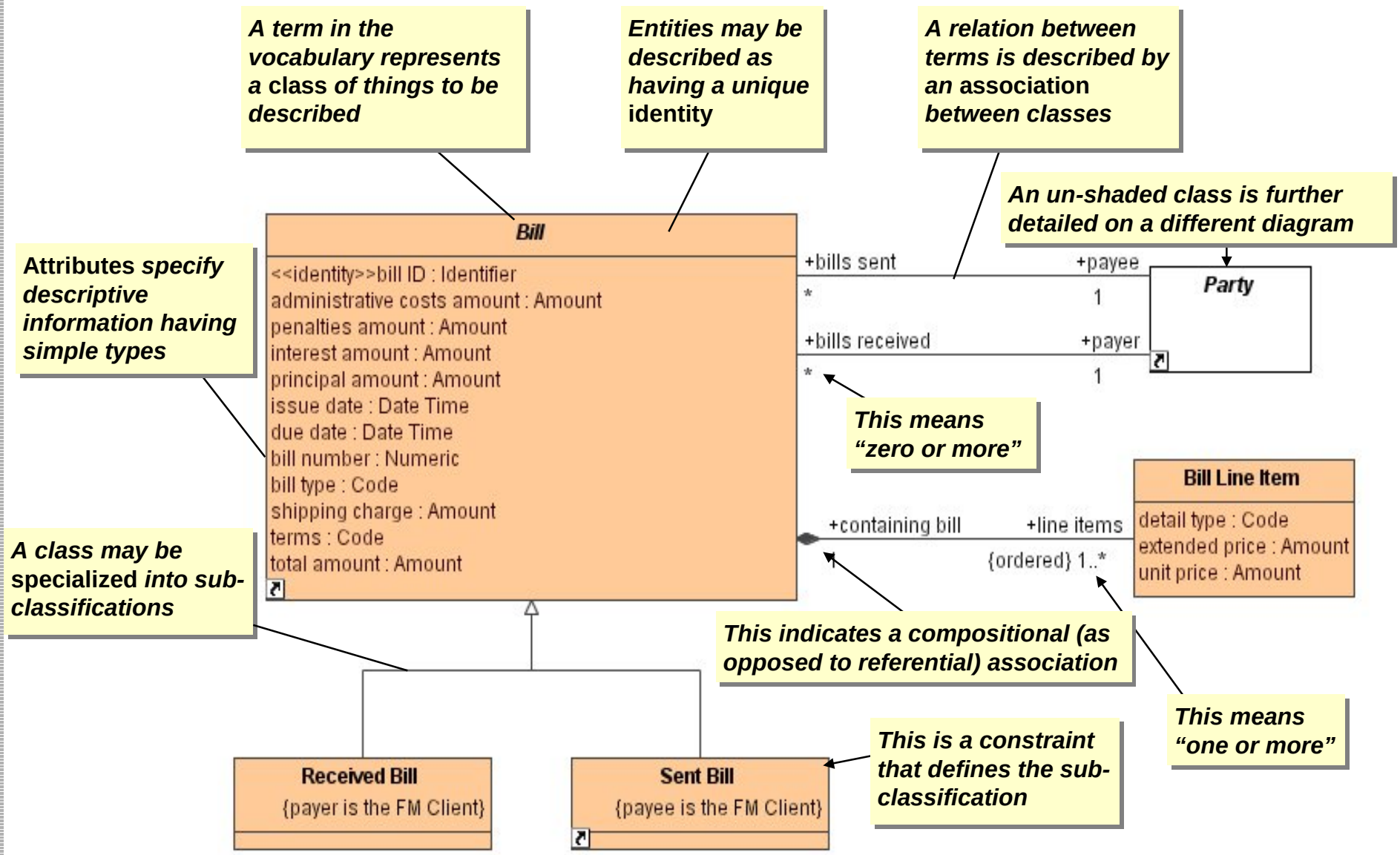
RMA-03	Reimbursable agreement information. Capture and accumulate reimbursable agreement information that includes the following: * Billing limit * Billing terms * Customer order amount * Amount obligated * Amount expended * Advances collected * Advances applied to earned revenue * Remaining balance on advances * Amount earned * Amount billed * Accounts receivable * Collections on receivables. Enable access to reimbursable agreement information by customer ID number, reimbursable agreement number, project, or fund.	JFMIP Core Requirements 2005

Record Unfilled Customer Order - Functional Spec

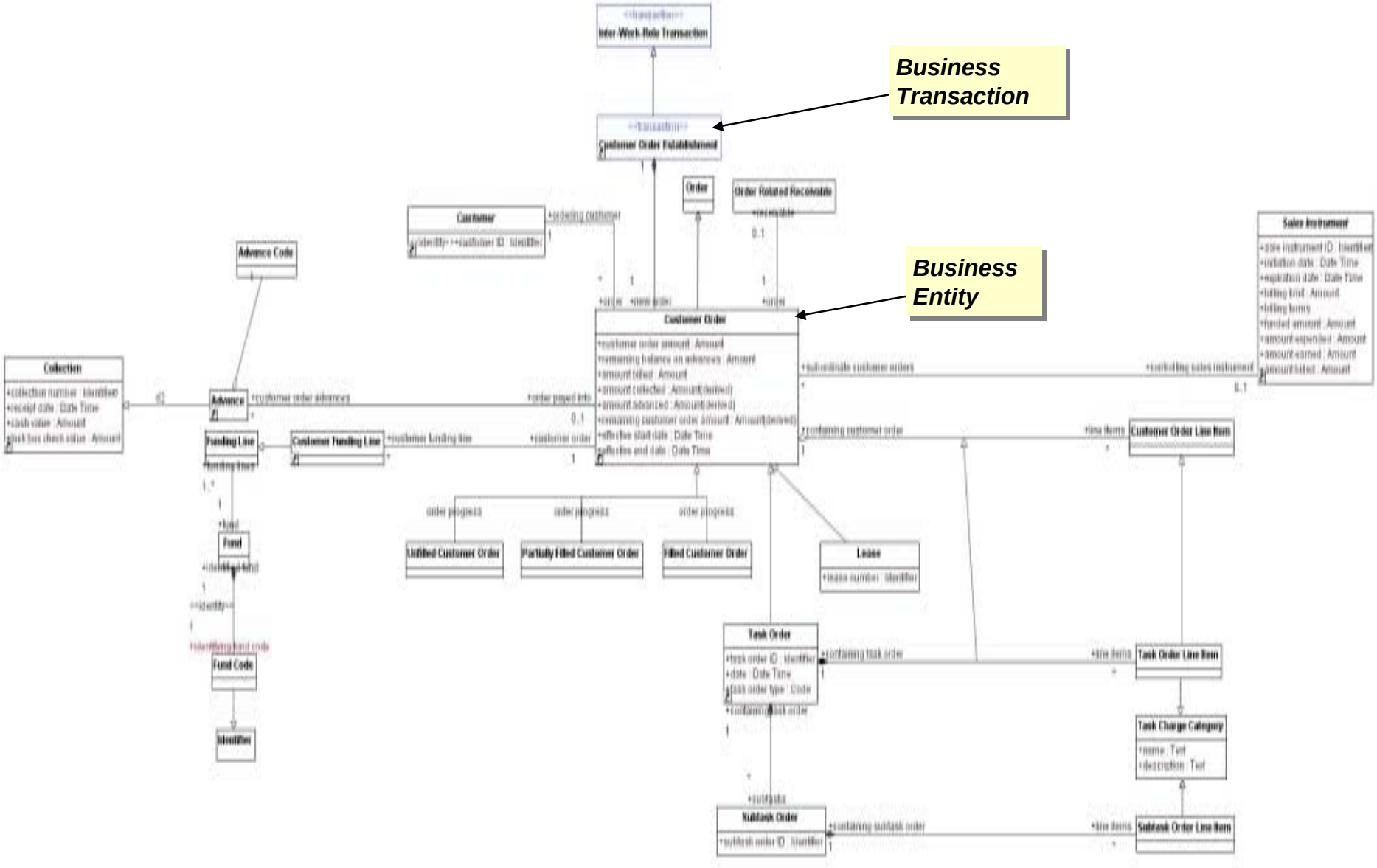


1. **Receive** CustomerOrderEstablishment
2. **Let** newOrder = CreateCustomerOrder(CustomerOrderEstablishment.newOrder).data
3. **Send** GeneralLedgerTransaction to increase Unfilled Customer Orders and decrease Anticipated Reimbursements
4. **Send** newOrder as RecurrentCustomerOrder (**Note**: EstablishRecurringReceivables will check if there are actually any creation triggers.)
5. **Send** CustomerOrderEstablished

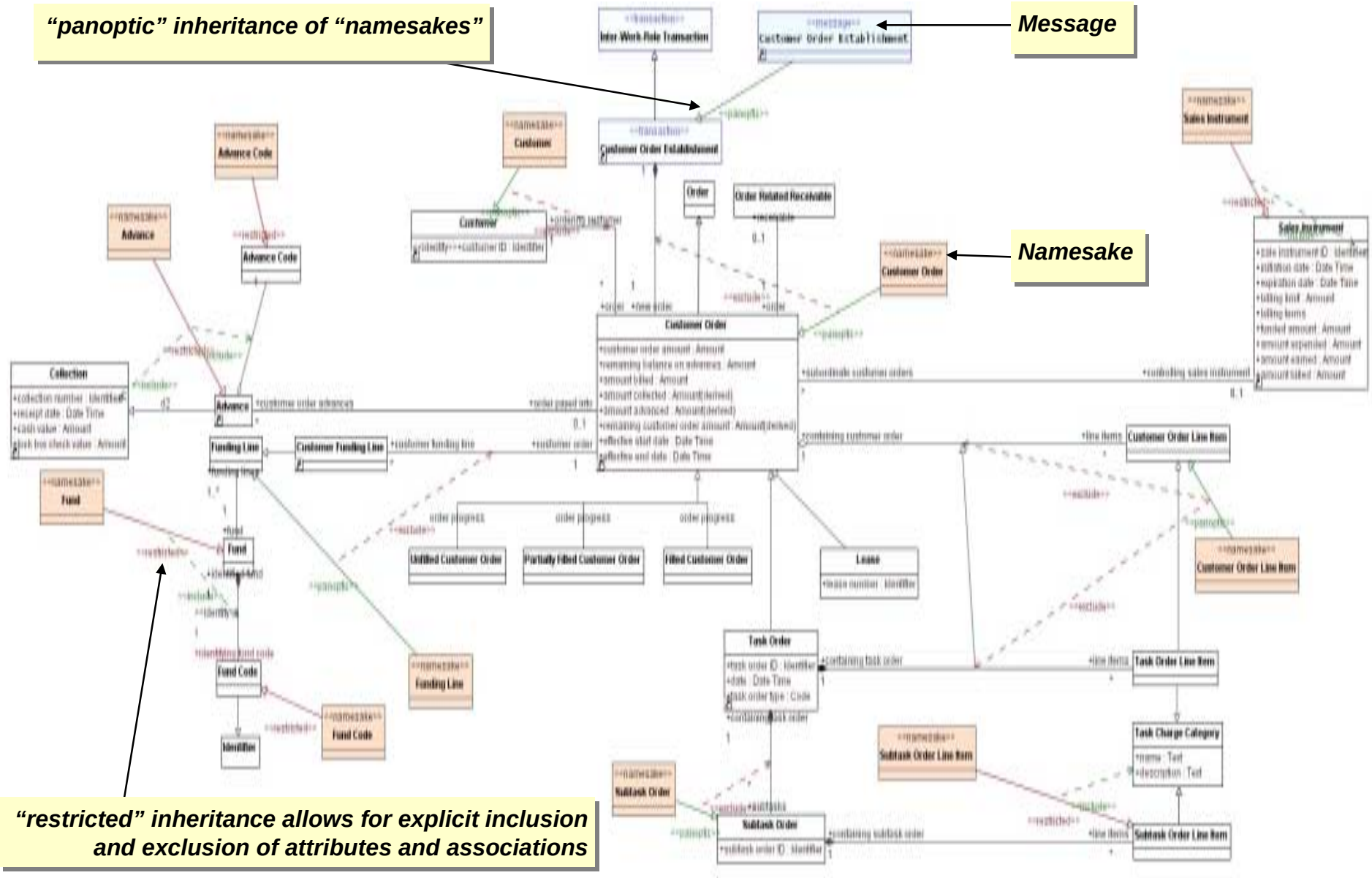
Information Model Example - UML Primer



Business Information, Business Transaction Model



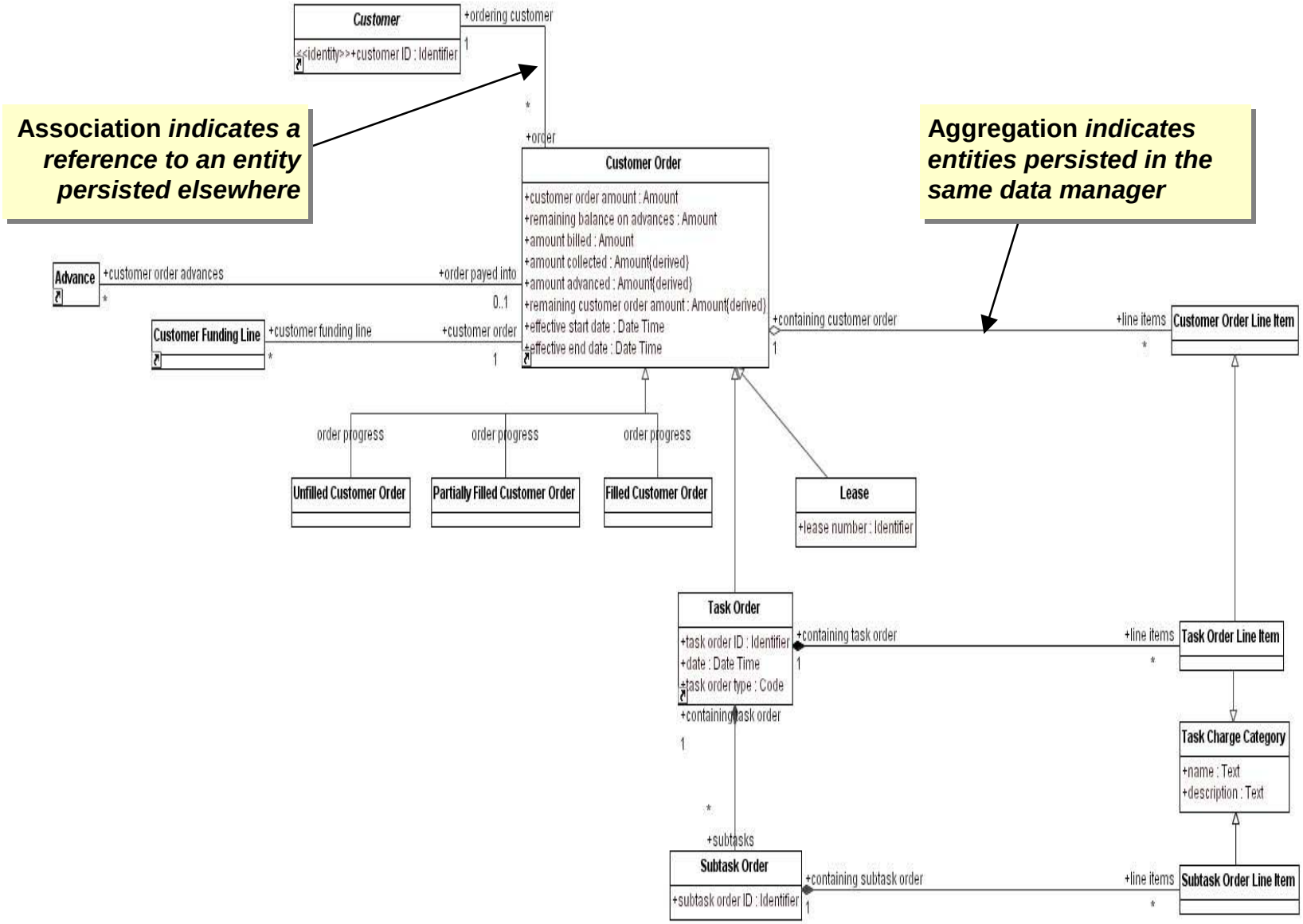
Business Transaction Message Model



Business Transaction Message in XML for CIM/CRI

```
<CustomerOrderEstablishment>
    <Inter-Work-RoleTransaction>
        <inter-work-roleTransactionID> … </inter-work-
  roleTransactionID>
        …
    </Inter-Work-RoleTransaction>
    <newOrder>
        <orderingCustomer>
            <customerID> … </customerID>
        </orderingCustomer>
        <controllingSalesInstrument>
            <salesInstrumentId> … </salesInstrumentId>
        </controllingSalesInstrument>
        <customerOrderAmount> … </customerOrderAmount>
        …
        <lineItems>
            …
        </lineItems>
    </newOrder>
</CustomerOrderEstablishment>
```

Persistence Model



FMEA - FMLoB Thanks

- GSA OCFO
  - Driving GSA toward shared services
- LMI
  - Task Lead
  - FM domain (JFMIP-FSIO) specialists
- Data Access Technologies
  - MDA (EDOC, UML) specialists
  - One GSA EA and ComponentX specialists
- Tactical Strategy Group
  - ADM Transformation specialists
- ASG
  - Becubic and additional support!

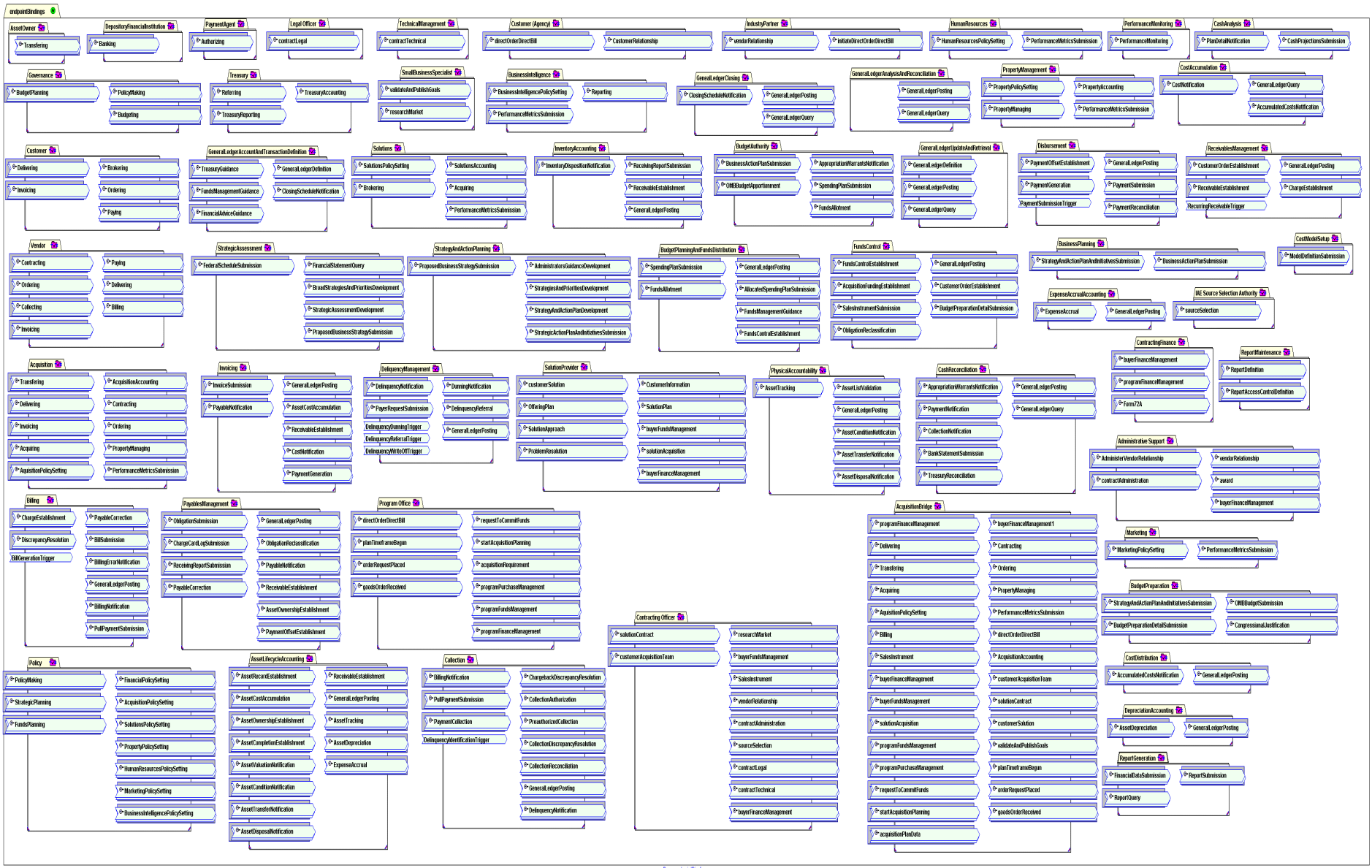
- CFOC FSIO
- OMB FM

Part 3 - OSERA

- Slides 46 to 51

- OSERA
  - Web Service PSM generation (BPEL, WSDL, XSD)
  - Collapse CPIC and SDLC
  - Test driven ‘Service Based Procurement’
  - LoB’s models as Authoritative RA’s, RI for eGov Factory
  - Model Based Acquisition

OSERA - BPEL Work Roles for Acquisition and FMLoB



FMEA PSM: Generated BPEL/WSDL/XSD

```
<wsdl:portType name="ReceivableEstablishment.ReceivableEstablishment">
  <wsdl:operation name="ReceivableEstablishment">
      <wsdl:input name="ReceivableEstablishment“ message="tns:ReceivableEstablishmentPanopticInheritanceCluster">
</wsdl:input>
  </wsdl:operation>
</wsdl:portType>
```

```
<wsdl:message name="ReceivableEstablishmentPanopticInheritanceCluster">
  <wsdl:part name="ReceivableEstablishmentPanopticInheritanceCluster"
type="Receivable_Establishment:ReceivableEstablishmentPanopticInheritanceClusterType">
  </wsdl:part> <wsdl:part name="correlationId" type="xsd:string"/>
</wsdl:message>
```

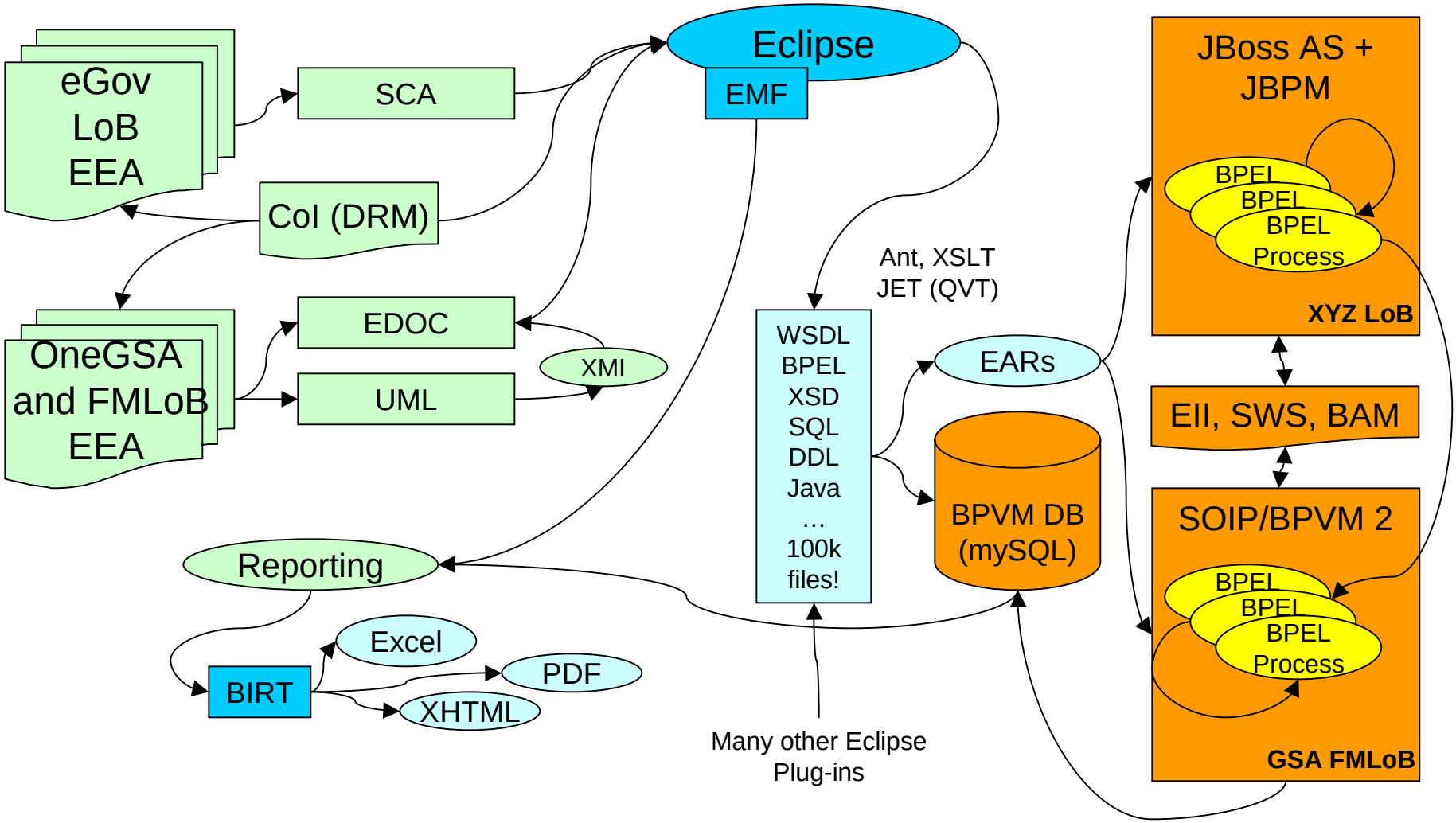
```
<plt:partnerLinkType name="ReceivableEstablishment">
  <plt:role name="PayablesManagement" portType="tns:ReceivableEstablishment.ReceivableEstablishmentCallback"/>
  <plt:role name="ReceivablesManagement“ portType="tns:ReceivableEstablishment.ReceivableEstablishment"/>
</plt:partnerLinkType>
```

```
<wsdl:types>
  <xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"
targetNamespace="platform:/resource/fmea.process/model/Receivable_Establishment.xsd“
xmlns="http://www.w3.org/2001/XMLSchema">
      <xsd:include schemaLocation="Receivable_Establishment.xsd"/>
  </xsd:schema>
</wsdl:types>
```

```
<xsd:complexType name="ReceivableEstablishmentType">
  <xsd:sequence> {…}
    <xsd:element minOccurs="1" maxOccurs="1" name="Inter-Work-RoleTransaction"
      type="BusinessTransactions:Inter-Work-RoleTransactionType"/>
    <xsd:element minOccurs="1" maxOccurs="1" name="Inter-Enterprise-RoleTransaction"
      type="FinancialManagement:Inter-Enterprise-RoleTransactionType"/> {…}
  </xsd:sequence>
</xsd:complexType>
```

EEA Models, IME/MDM, Code, SOIP/BPVM, Reports/Alerts

- OSERA generates, deploys and executes EEA models



OSERA Managed Platform: EEA Tools and Techniques

- Aggregating, enhancing and integrating existing FOSS for EA
  - Eclipse, JBoss
  - NetBeans, GlassFish
  - Platform and tool agnostic
    - Fusion, .NET
- Model to Integrate, ‘collapse CPIC and SDLC’
  - IME, MDM, SOIP, BPVM, ESB
  - Integrated design and runtime tools
  - EDOC to BPEL example
- Semantic Interoperability, ‘end modeling fatigue’
  - Integrating structured and knowledge representations
  - MDA (MOF, EDOC, BPDM, SBVR, UML2, KDM, GASTM, …)
  - RDF/S, OWL-DL (others)
- Infrastructure Services
  - UDDI/ebXML Registry/Repository
  - Semantic stores and services, Policy Engine
  - Portal, Content Mgmt, SCM, Project Tracking, Listserves, Wiki

OSERA Managed Program: Model Based Acquisition

- Test driven service based procurement
  - CIOC AIC/IAC ‘SCBA’ whitepaper, v3.5
  - Service and component interaction testing (DoD NCES JITC)
- Federal-wide ITPM, ‘Resource Rationalization’
  - Combined LoB domain models are ‘RA authoritative sources’
  - Horizontal and vertical government alignment using OS-RA’s
- OSERA as ‘eGov Factory’
  - A RI for designing and *executing* LoB (OS-RA) interoperability
    - ‘TCK’ for standards (WS-I, OASIS, OMG, NIST, other) compliance
  - EEA enables FTA sequencing
- Federal Target Architecture
  - Persistent SOA/ESB enables *progression* testing
  - LoB scenarios as DBC and UAT proof
  - Leading indicators of citizen-centrism, PRM LoS
    - To-be procured service interacts with as-is services
  - Resource rationalization moves from cathedral to bazaar

Summary

- Executable EA
  - GSA shared service target using MDA standards as SOA DSL
  - Consistent with Industry direction
  - Open standards based model simulations drive SME validation and stakeholder concensus
  - FEA Reference Model integration
  - ITPM framework, IT and Organizational Resource Rationalization
- FMEA and FMLoB
  - MDA (EDOC/UML) modeling conventions
  - ADM enables target traceability for mainframe sunset
  - XML Message assembly of business transactions
  - FSIO and OMB wip
- OSERA
  - FMLoB Model to Integrate from EA to Web Services
  - Platform goals and objectives
  - Model Based Acquisition

Thank You

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