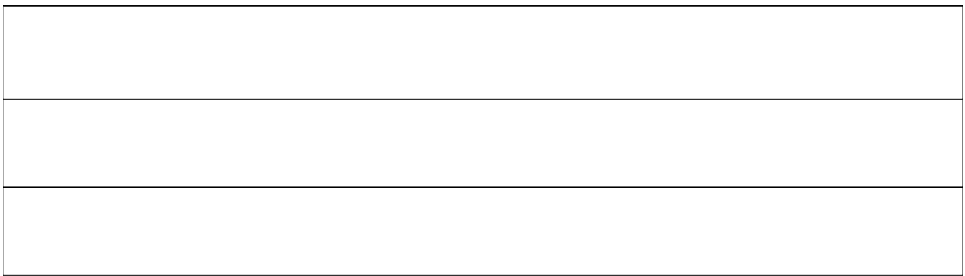




BrainStorm : SOAI 2007 The Practical Guide To Federal SOA, an AIC WIP

George Thomas, GSA Enterprise Chief Architect, FCIOC-AIC
Service Subcommittee Co-chair, OMG GovDTF Steering Committee



This Presentation

<ul style="list-style-type: none">• SOA (today)<ul style="list-style-type: none">- UPMS from OMG, and Model Driven Solutions for SOA- SCA from OSOA- Wrapping and Adapting Legacy Systems • SOI (today)<ul style="list-style-type: none">- JEE and JBI from JCP- Sun's SGF • SOE (ten years out ;-)<ul style="list-style-type: none">- Agency API's and the Federal Target Architecture- Model Based Acquisition and Service Based Procurement- Semantic Interoperability and Software Factories- Orchestrating and Choreographing with the FTA Test Harness- Market Driven, Dynamic Col's

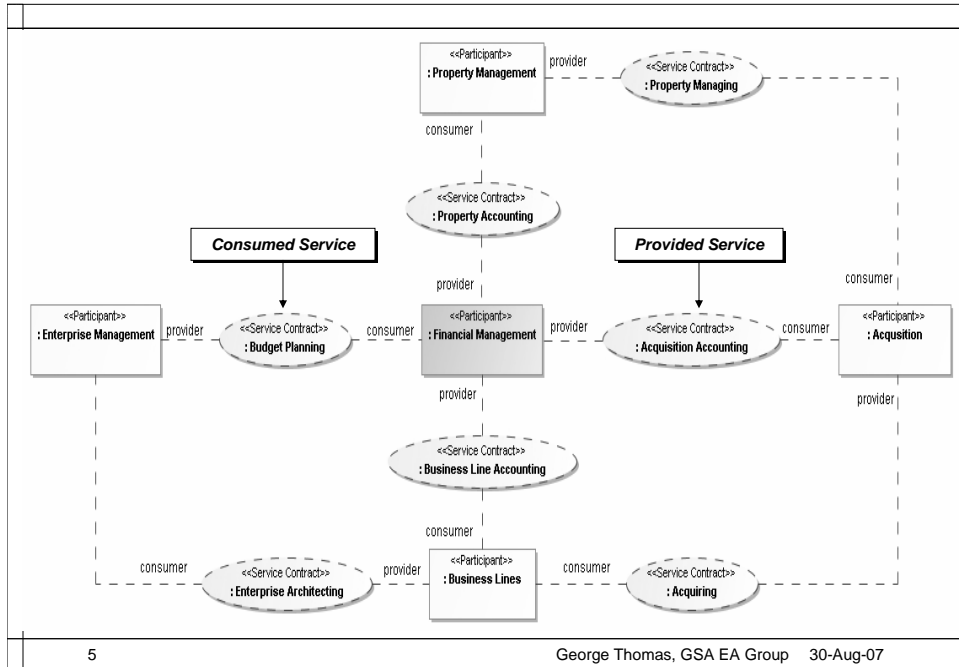
This Presentation

- SOA (today)
 - UPMS from OMG, and Model Driven Solutions for SOA
 - SCA from OSOA
 - Wrapping and Adapting Legacy Systems
- SOI (today)
 - JEE and JBI from JCP
 - Sun's SGF
- SOE (ten years out ;-)
 - Agency API's and the Federal Target Architecture
 - Model Based Acquisition and Service Based Procurement
 - Semantic Interoperability and Software Factories
 - Orchestrating and Choreographing with the FTA Test Harness
 - Market Driven, Dynamic Col's

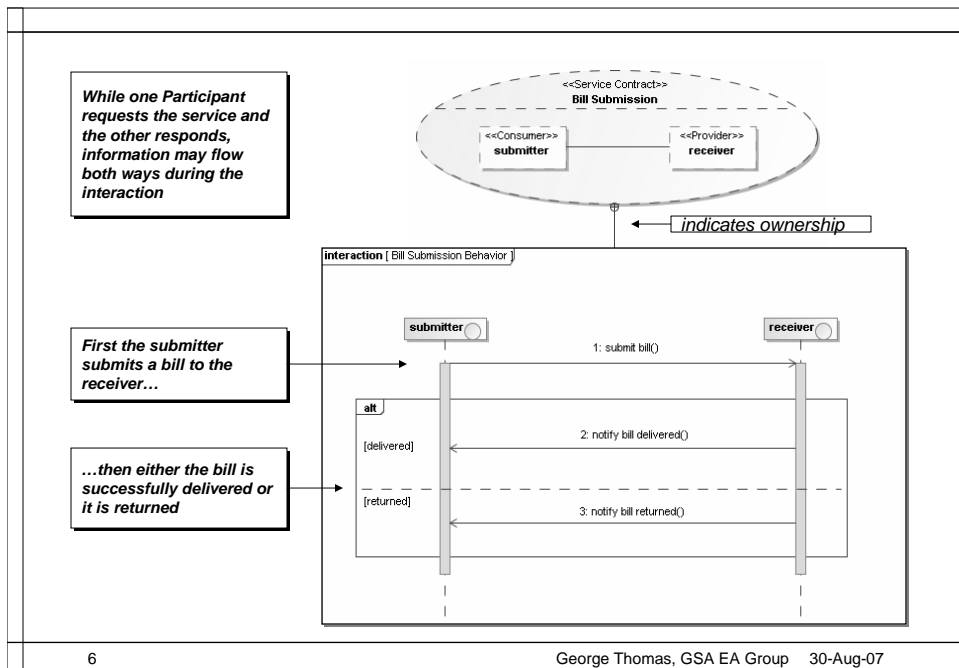
UPMS Fundamental Concepts

- Service Oriented Business Architecture (SOBA) Model
 - SOBA is modeled as a *Collaboration* of enterprise level *Participants* using *Service Contracts*
- Participant
 - A specification of the responsibility to perform specific functions in the context of a business process
- Collaboration
 - A set of two or more participants interacting to carry out a business process to achieve some joint purpose
 - An interaction between participants conforming to a Service Contract is modeled as a *UML Collaboration Use*
- Service Contract
 - A collaboration that defines a conversation in which services are consumed and provided
 - A Service Contract is modeled as a *UML Collaboration*
 - Long running conversations may be specified using an *Owned Behavior*

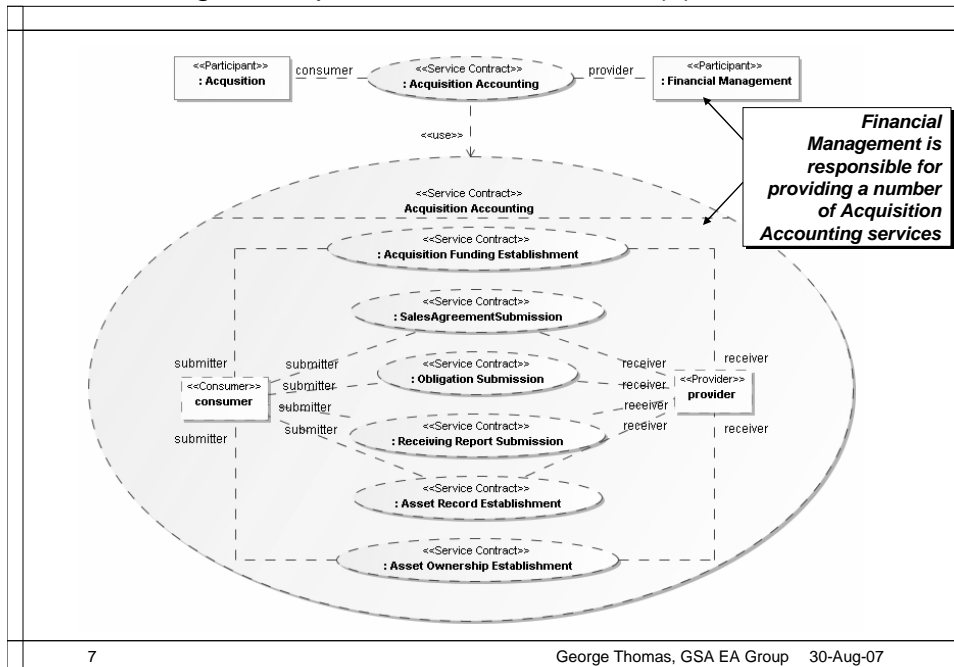
SOBA Participants and Service Contracts



Service Contract Owned Behavior



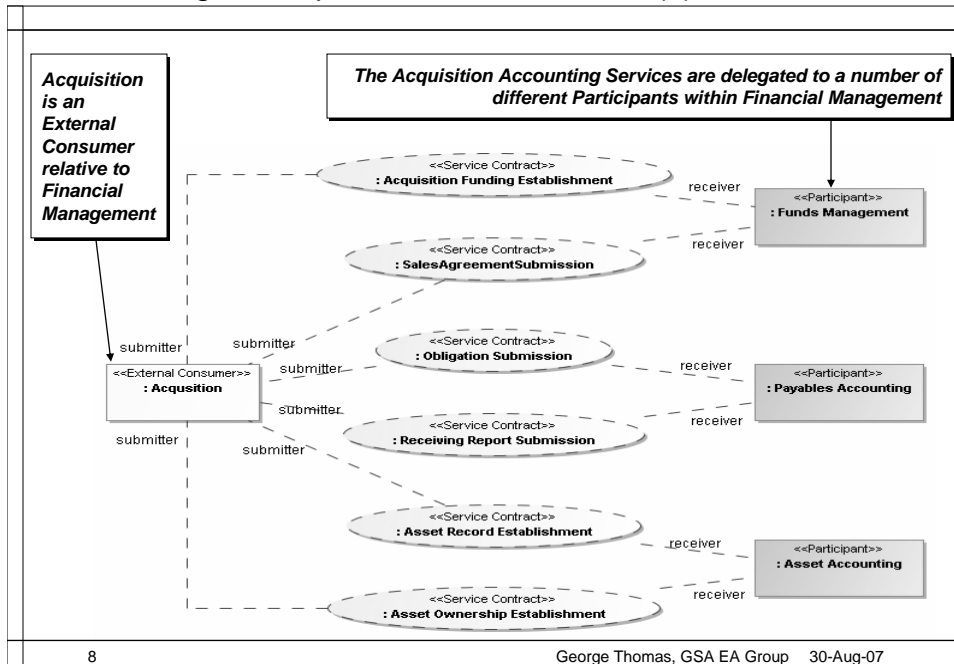
Realizing a Composite Service Contract (1)



7

George Thomas, GSA EA Group 30-Aug-07

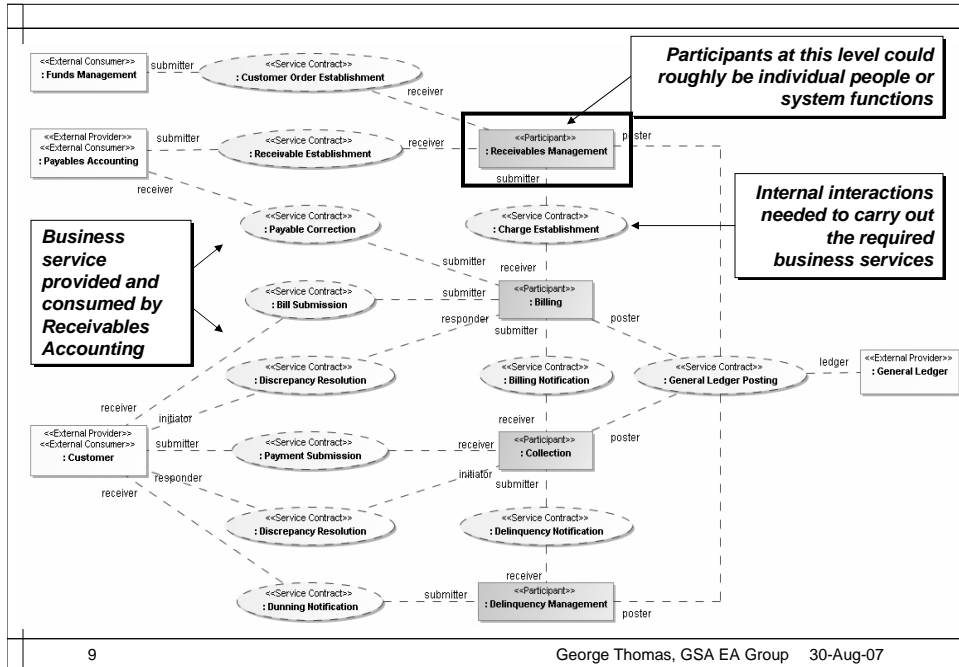
Realizing a Composite Service Contract (2)



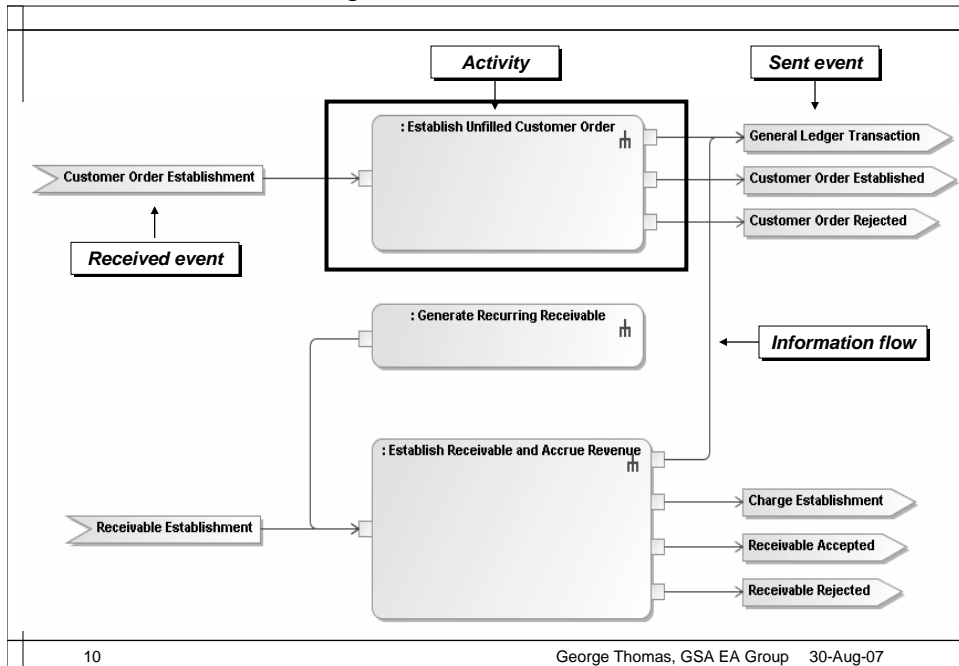
8

George Thomas, GSA EA Group 30-Aug-07

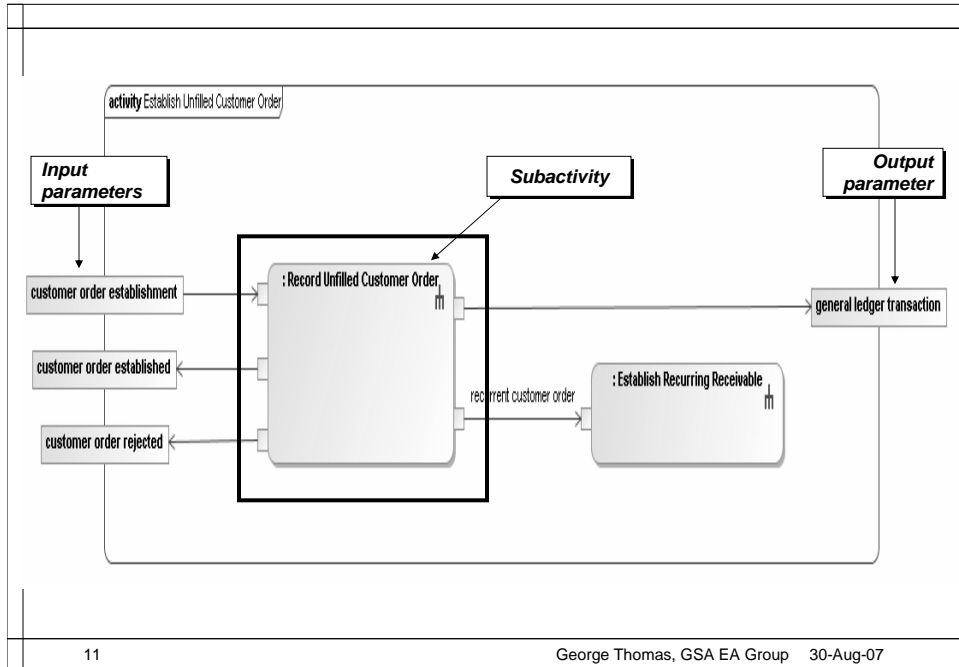
Receivables Accounting SOBA



Receivables Management Activities



Establish Unfilled Customer Order Subactivities

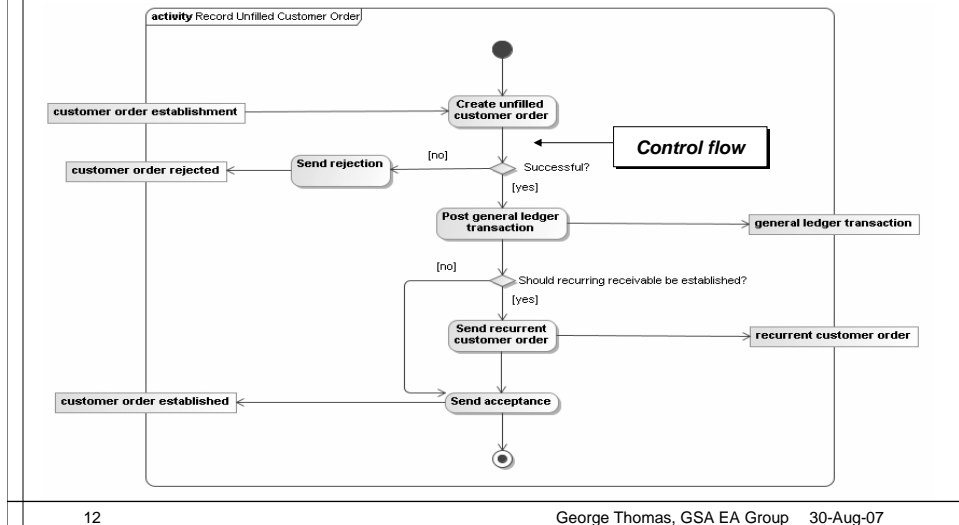


11

George Thomas, GSA EA Group 30-Aug-07

Record Unfilled Customer Order Behavior

- Can be specified using basic *UML Activity Diagrams*
 - Or use BPMN (not part of UPMS) for BPMS (from left to right!)

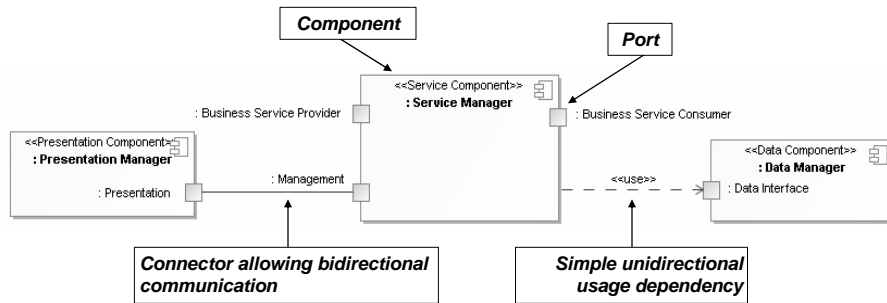


12

George Thomas, GSA EA Group 30-Aug-07

From SOBA to Reference Architecture

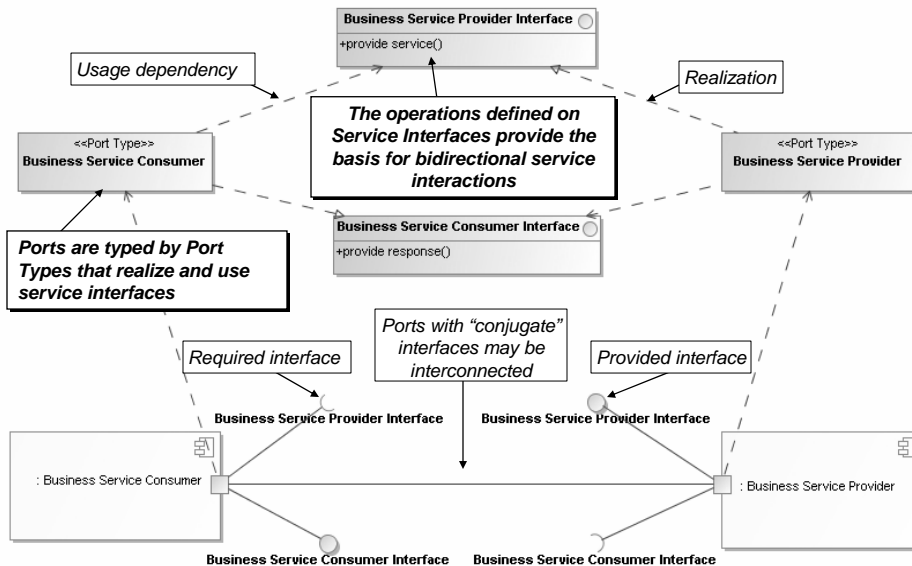
- The Service Components that implement the SOBA are modeled using *UML Components*
 - Presentation Components provide user access to application services
 - Service Components provide transactional implementation of application services
 - Data Components persist data between application transactions



13

George Thomas, GSA EA Group 30-Aug-07

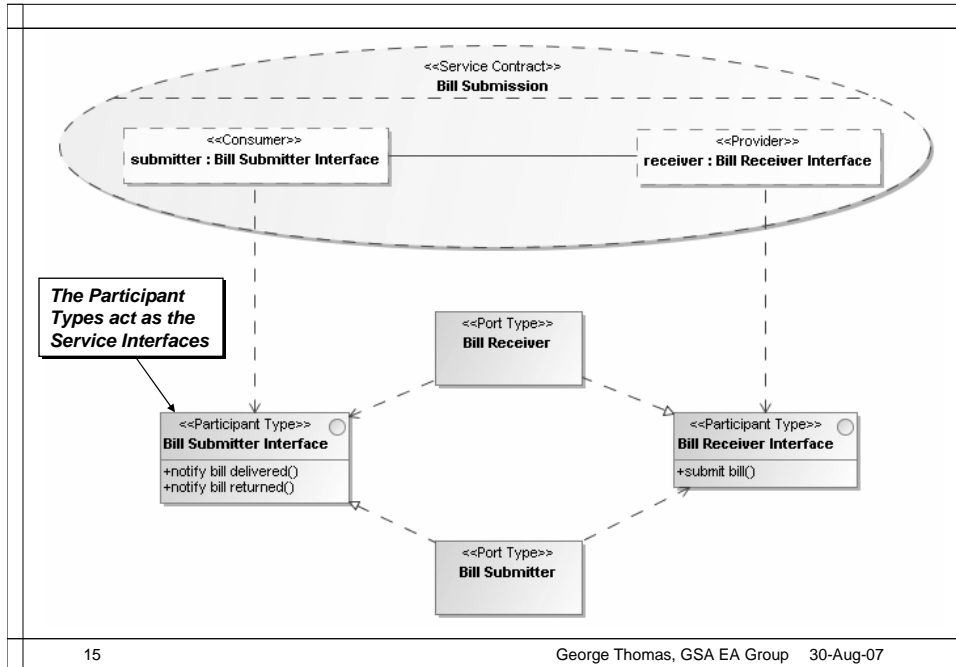
Provided and Required Interfaces



14

George Thomas, GSA EA Group 30-Aug-07

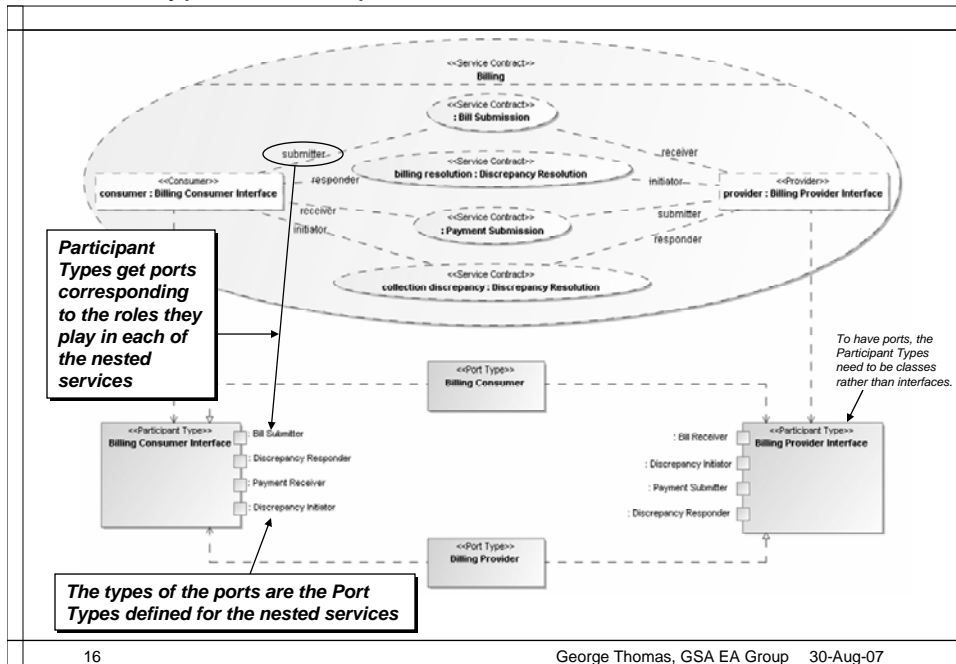
Port Types from Service Contracts



15

George Thomas, GSA EA Group 30-Aug-07

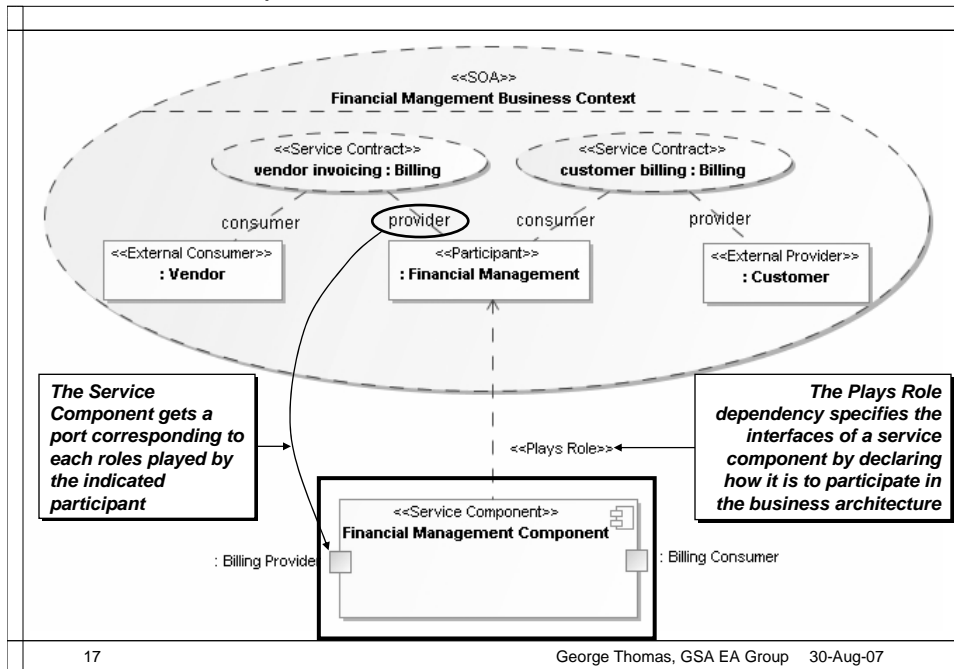
Port Types for Composite Service Contracts



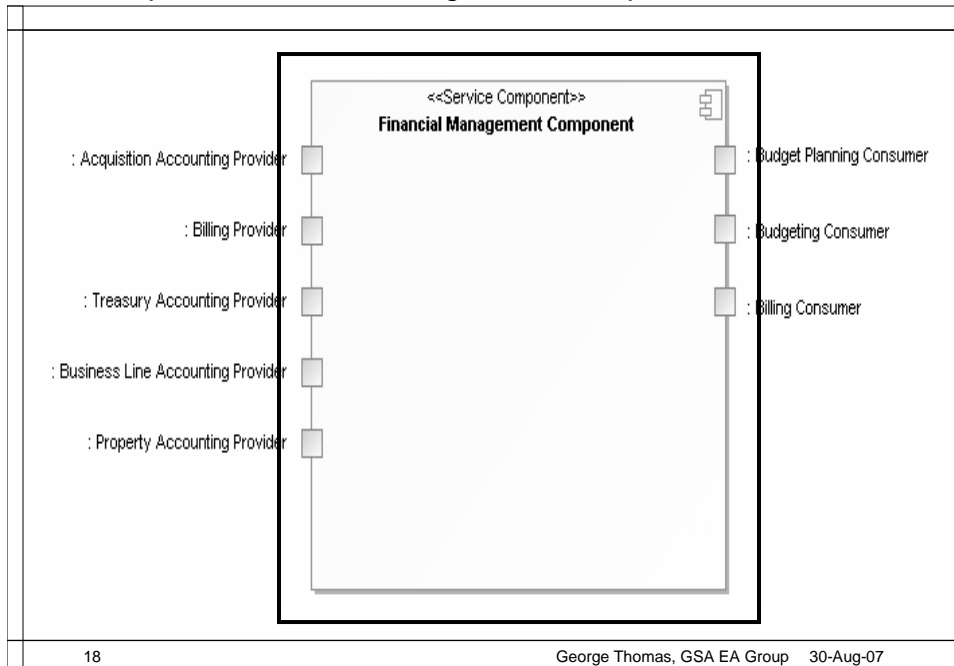
16

George Thomas, GSA EA Group 30-Aug-07

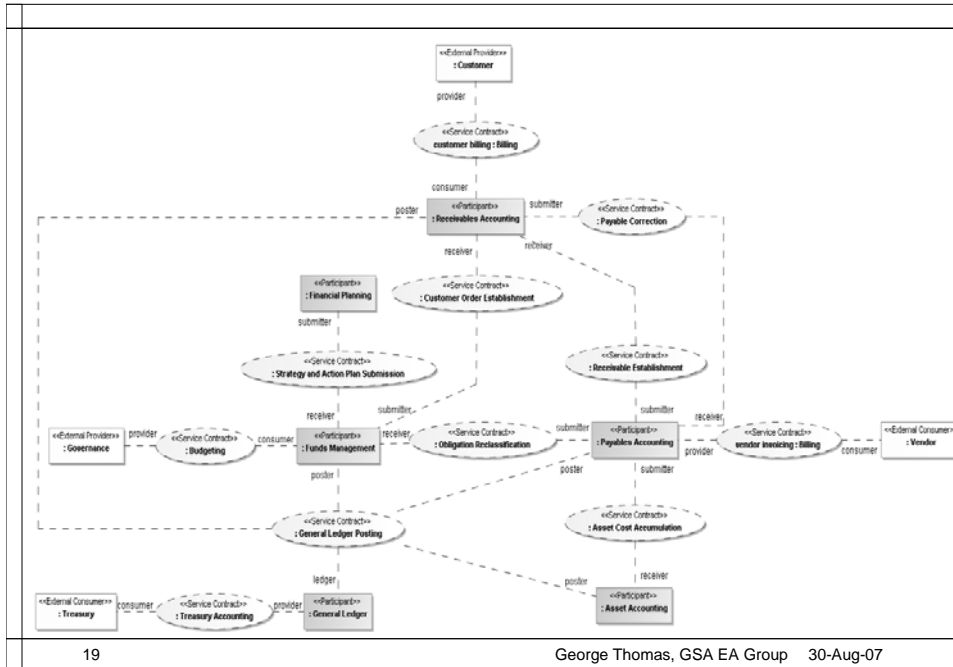
Service Components from Service Architectures



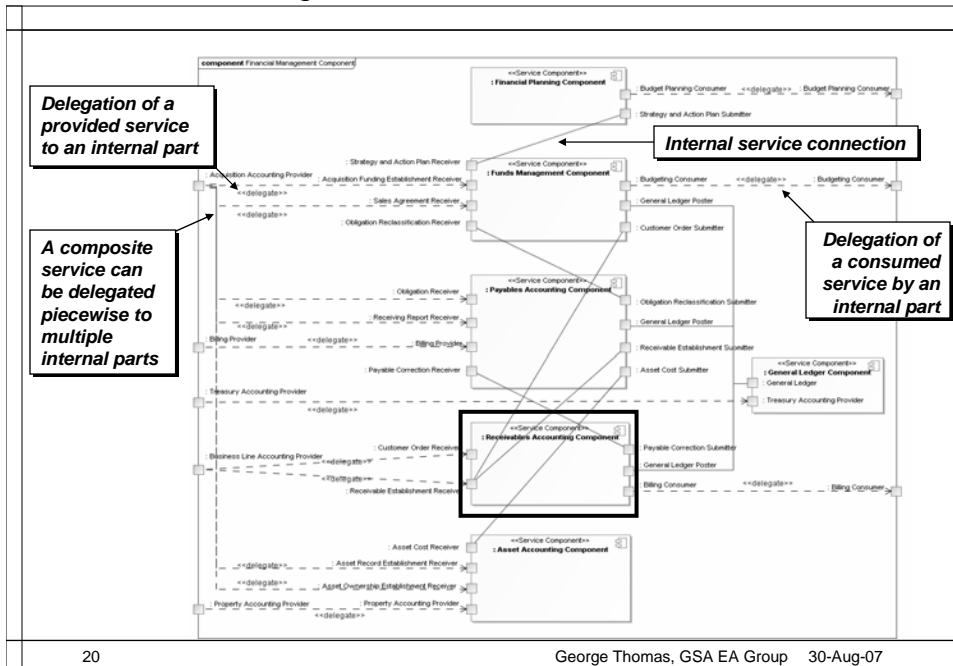
Complete Financial Management Component



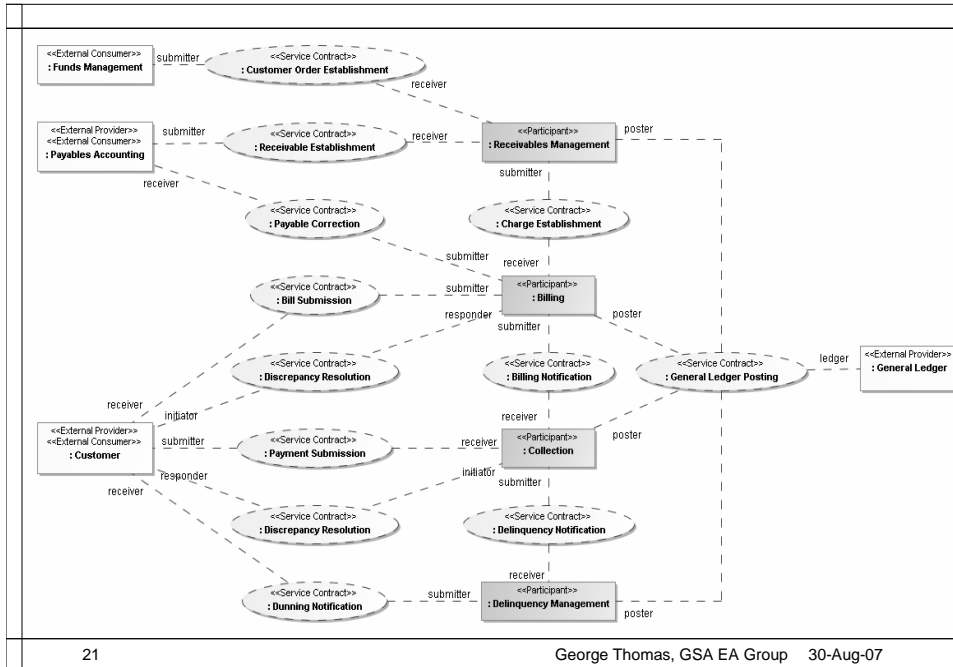
Financial Management Business Architecture



Financial Management Reference Architecture



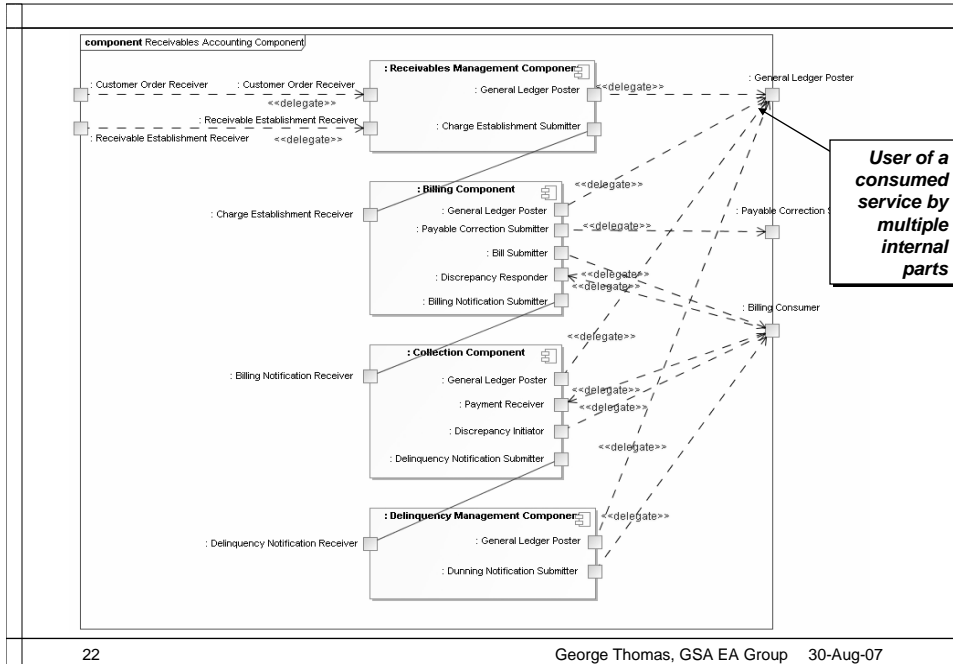
Receivables Accounting Business Architecture



21

George Thomas, GSA EA Group 30-Aug-07

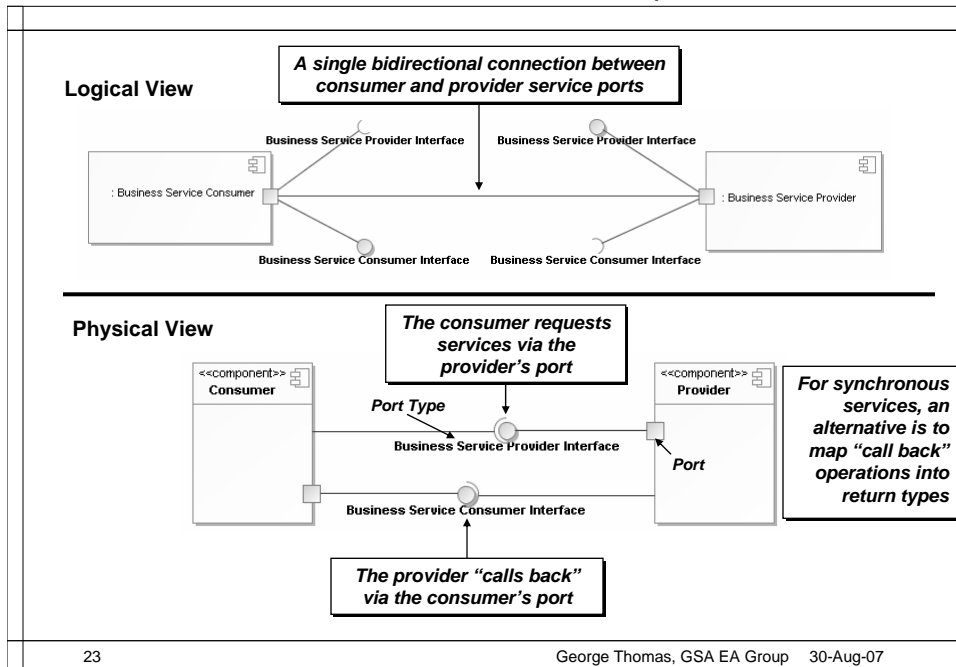
Receivables Accounting Reference Architecture



22

George Thomas, GSA EA Group 30-Aug-07

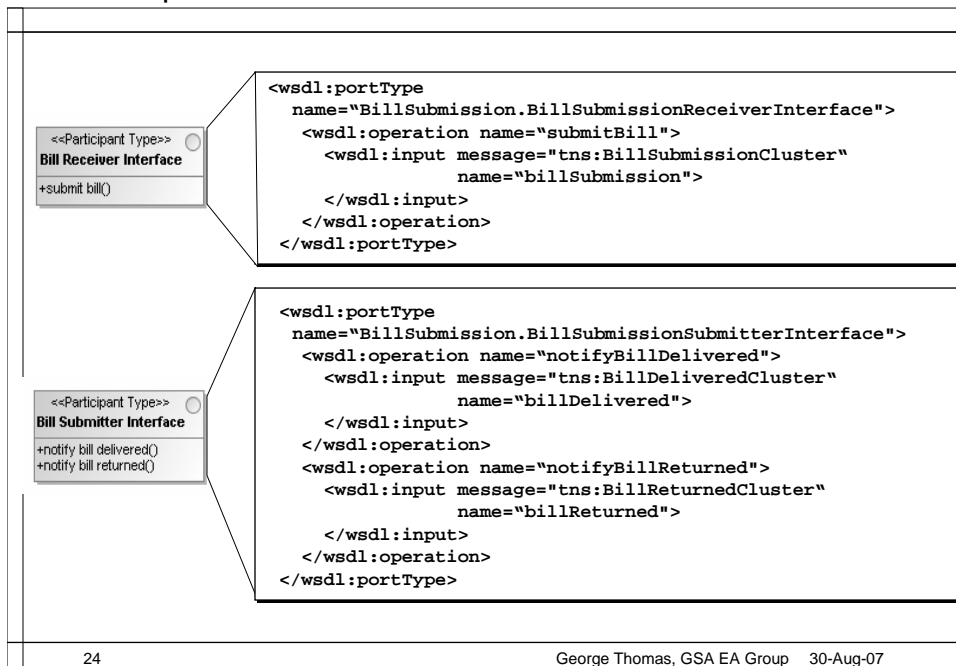
From Service Models to Web Service Implementations



23

George Thomas, GSA EA Group 30-Aug-07

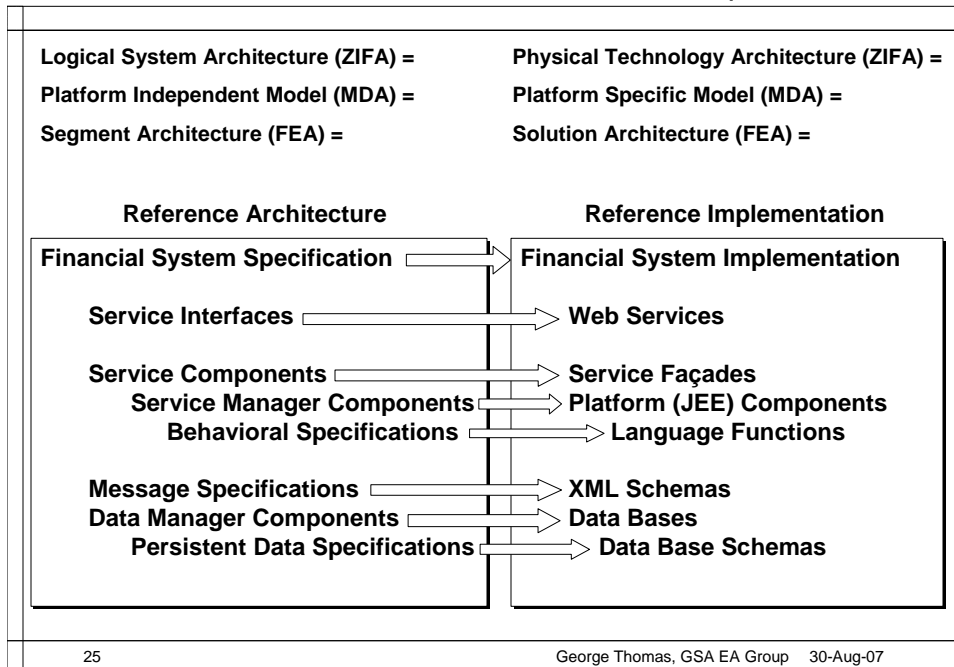
Example Web Services Generation



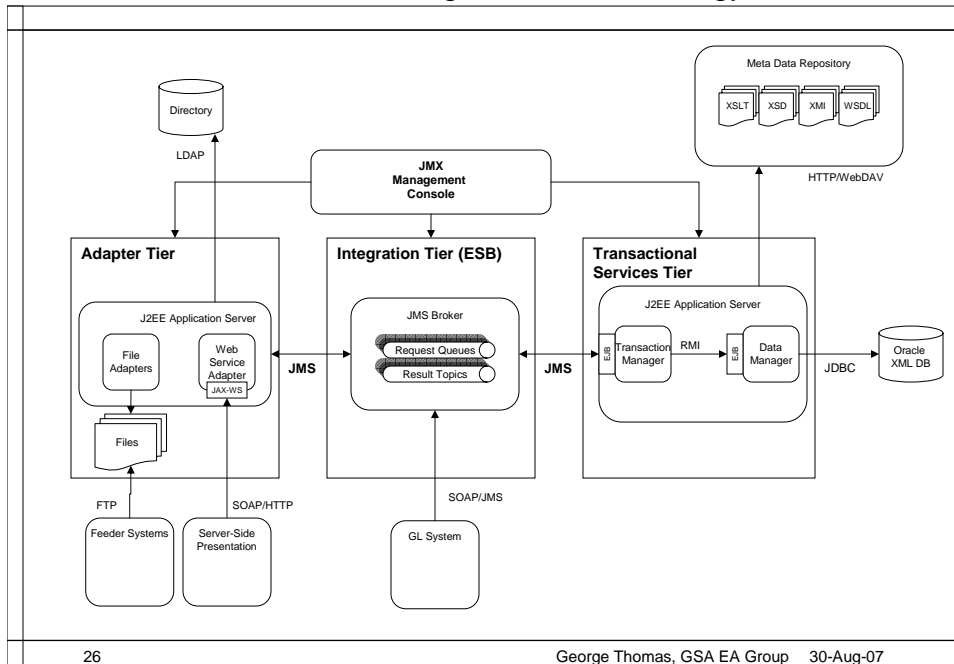
24

George Thomas, GSA EA Group 30-Aug-07

From Reference Architecture to Reference Implementation

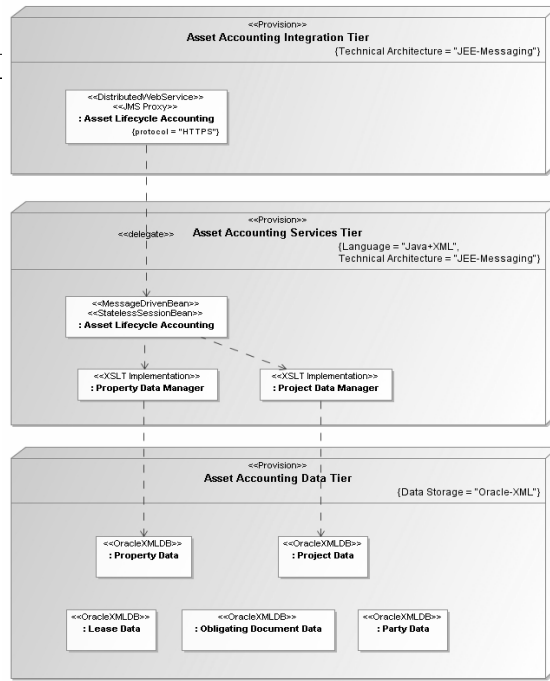


Solution Architecture, Target J2EE Technology Platform



Software Factories

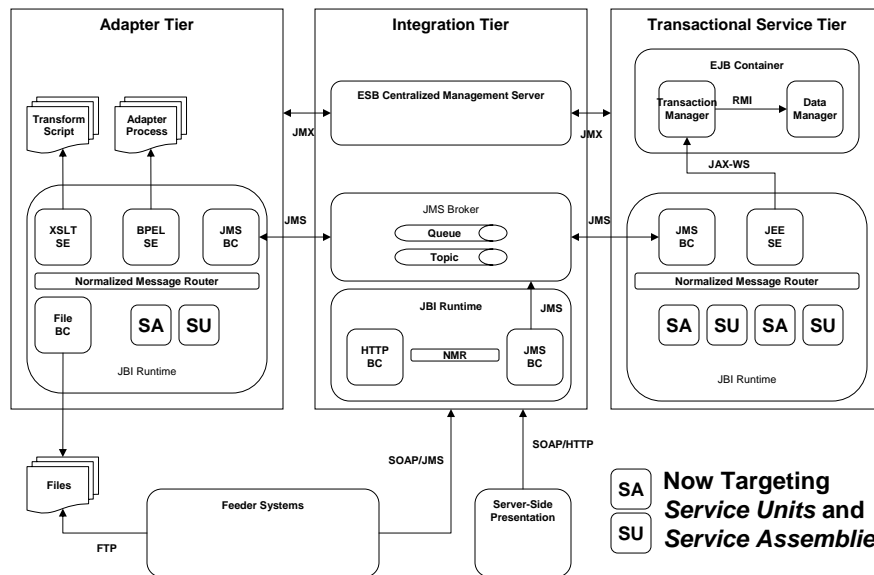
- Markup
 - Tags used to generate the code for the target platform
- UML Profile
 - Standard extension mechanism
 - <<stereotypes>> and {tagged="values"}
- <<Provision>>
 - To tiers;
 - Integration
 - Services
 - Data
 - J2EE platform
 - MDB, SSB, etc.



27

George Thomas, GSA EA Group 30-Aug-07

Same Source (PIM) For New JEE/JBI SA Target (PSM)



28

George Thomas, GSA EA Group 30-Aug-07

This Presentation

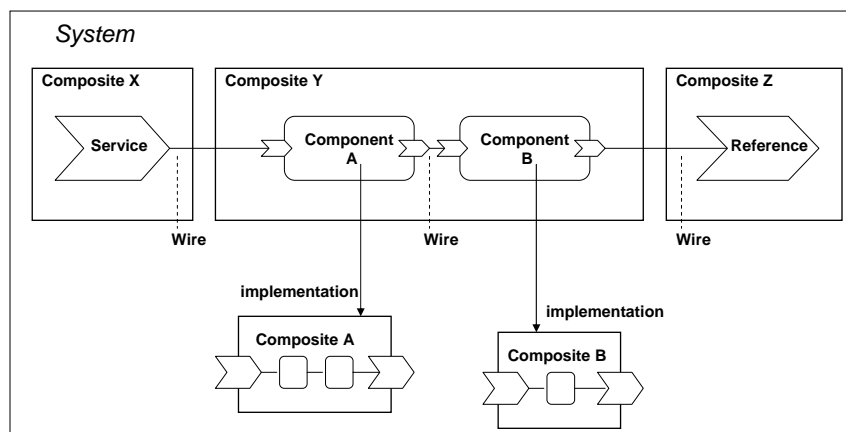
- SOA (today)
 - UPMS from OMG, and Model Driven Solutions for SOA
 - SCA from OSOA
 - Wrapping and Adapting Legacy Systems
- SOI (today)
 - JEE and JBI from JCP
 - Sun's SGF
- SOE (ten years out ;-)
 - Agency API's and the Federal Target Architecture
 - Model Based Acquisition and Service Based Procurement
 - Semantic Interoperability and Software Factories
 - Orchestrating and Choreographing with the FTA Test Harness
 - Market Driven, Dynamic Col's

29

George Thomas, GSA EA Group 30-Aug-07

SCA Business System

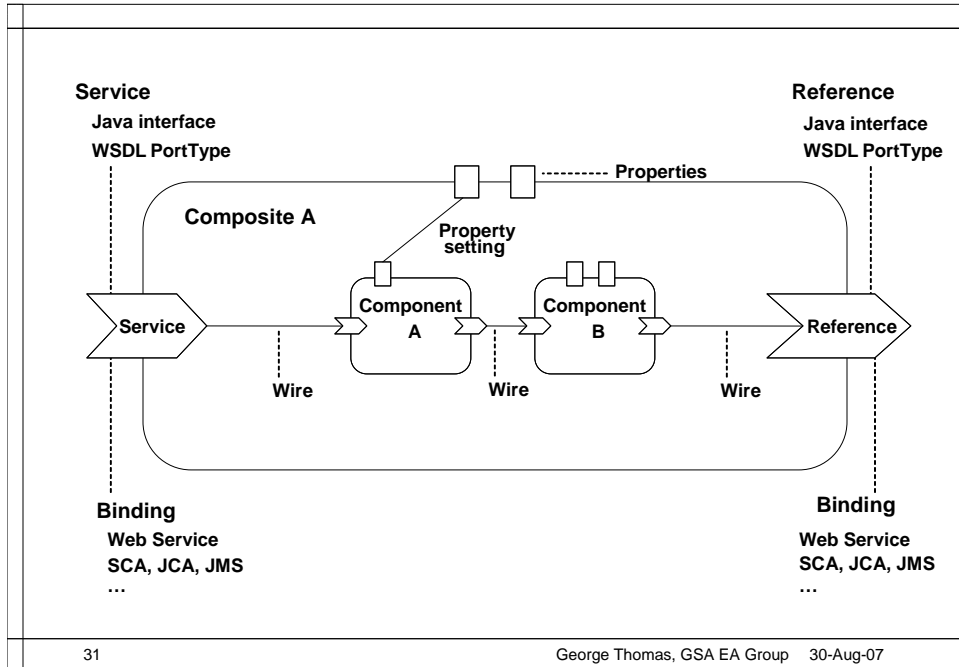
- Services, References, and Wires
 - Composites implemented by components
 - Components implemented by composites



30

George Thomas, GSA EA Group 30-Aug-07

SCA Composite Graphic Notation

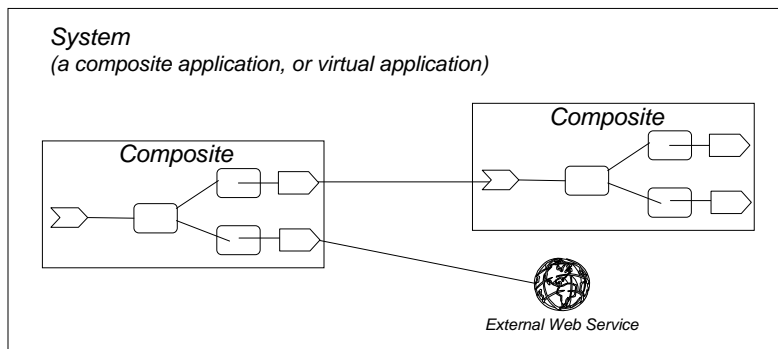


31

George Thomas, GSA EA Group 30-Aug-07

SCA Service Assembly Model

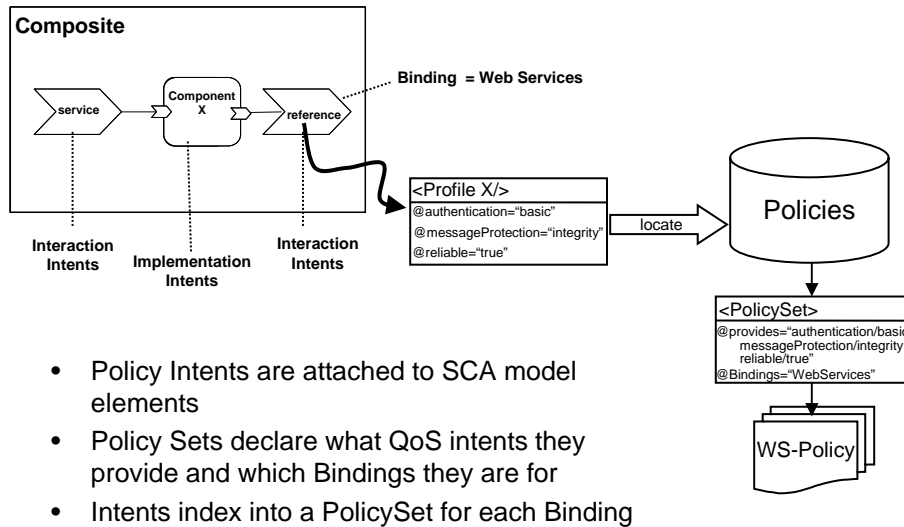
- Tight coupling
 - Composites (a deployment unit)
 - Programming 'in the small'
- Loose coupling
 - Systems (a composite applications)
 - Programming 'in the large'



32

George Thomas, GSA EA Group 30-Aug-07

SCA Policies, Profiles and QoS



33

George Thomas, GSA EA Group 30-Aug-07

SCA Policies, Profiles and QoS

- Framework consists of
 - SCA policy intent
 - Each represent a single abstract QoS intent
 - SCA Profile
 - Aggregates a set of abstract, cross-domain, QoS intents to represent an overall QoS
 - SCA Policy Sets
 - Represents a collection of concrete policies to realize an abstract QoS intent
 - WS-Policy
 - A syntax for concrete policies in policy sets (others possible)
- Interaction policies affect the contract between a service requestor and a service provider
- Implementation policies affect the contract between a component and its container

34

George Thomas, GSA EA Group 30-Aug-07

This Presentation

- SOA (today)
 - UPMS from OMG, and Model Driven Solutions for SOA
 - SCA from OSOA
 - Wrapping and Adapting Legacy Systems

- SOI (today)
 - JEE and JBI from JCP
 - Sun's SGF

- SOE (ten years out ;-))
 - Agency API's and the Federal Target Architecture
 - Model Based Acquisition and Service Based Procurement
 - Semantic Interoperability and Software Factories
 - Orchestrating and Choreographing with the FTA Test Harness
 - Market Driven, Dynamic Col's

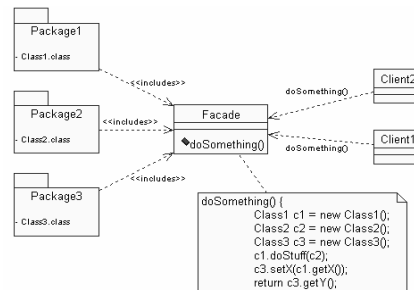
35

George Thomas, GSA EA Group 30-Aug-07

Wrapping Legacy - Adapter and Façade Patterns

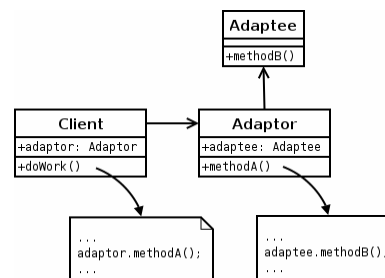
- A *façade* provides a simplified interface to a large body of software to;

- Reduce dependencies of software consumers
 - by wrapping a collection of APIs with a single API



- An *adapter* is used when we must respect an existing Service Interface that is;

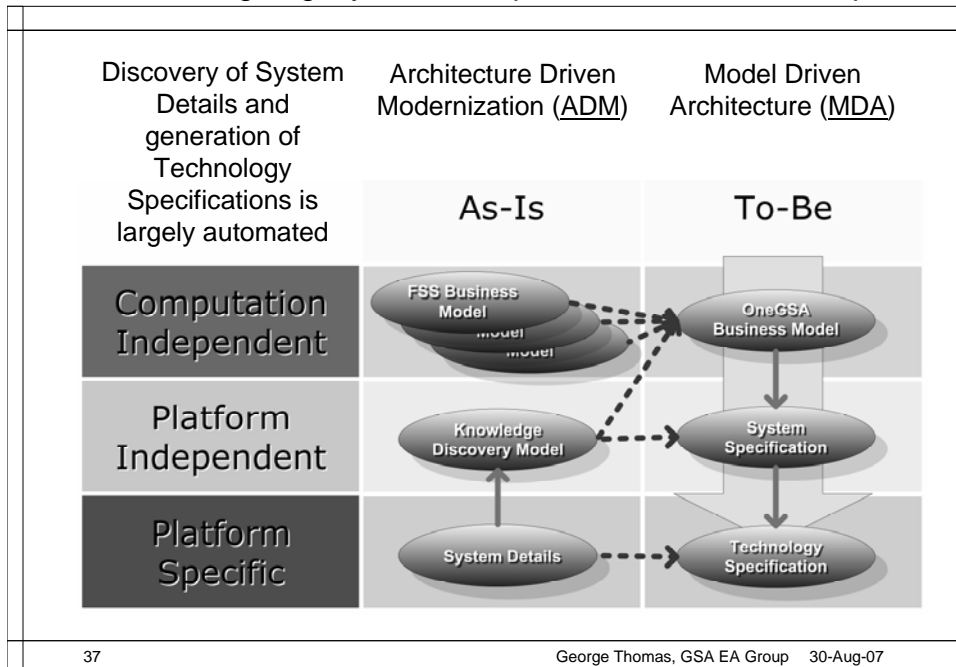
- Incompatible with another existing Service Component Interface
 - by wrapping the new Adaptor interface around the existing Service Component interface



36

George Thomas, GSA EA Group 30-Aug-07

Modernizing Legacy - MDA Top Down, ADM Bottom Up



37

George Thomas, GSA EA Group 30-Aug-07

This Presentation

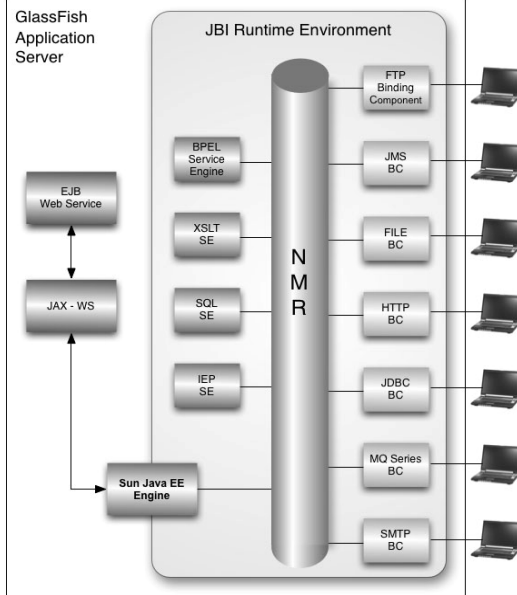
- SOA (today)
 - UPMS from OMG, and Model Driven Solutions for SOA
 - SCA from OSOA
 - Wrapping and Adapting Legacy Systems
- SOI (today)
 - JEE and JBI from JCP
 - Sun's SGF
- SOE (ten years out ;-)
 - Agency API's and the Federal Target Architecture
 - Model Based Acquisition and Service Based Procurement
 - Semantic Interoperability and Software Factories
 - Orchestrating and Choreographing with the FTA Test Harness
 - Market Driven, Dynamic Col's

38

George Thomas, GSA EA Group 30-Aug-07

JEE5 – now with JBI!

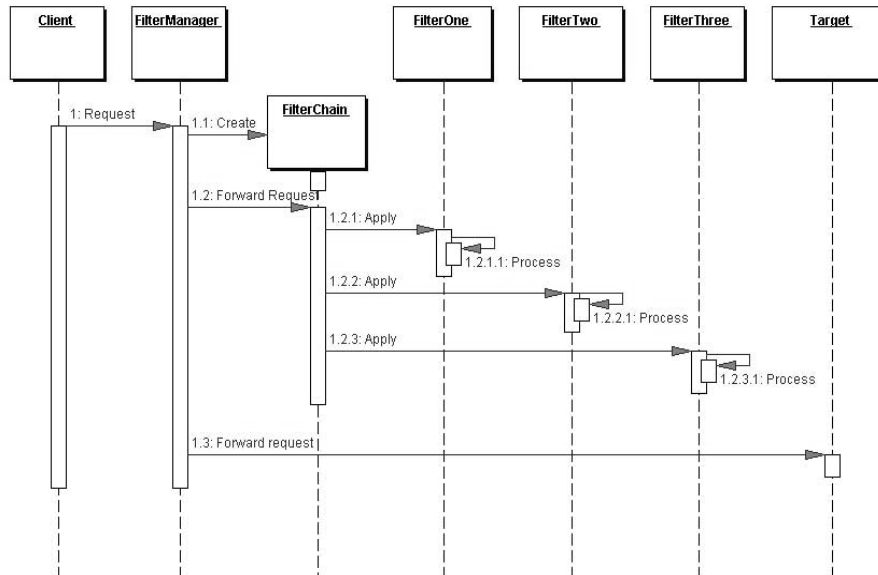
- Java EE service units
 - Using Java EE service units, end users can deploy and manage a composite application as a single entity; a JBI service assembly
- Transaction support
 - Enables Java EE web services and JBI services to participate in a single transaction
 - For example, a BPEL process can call an EJB that updates a database, all in the same transaction
- Security support
 - This feature enables separate JBI components to make use of a single authentication mechanism
 - In practice, a user signs on once, and the JBI system propagates the security credentials to the various JBI components as needed
- Cluster support
 - Deploy a Java EE service unit to an application server cluster
 - When the JBI service assembly is deployed to the cluster, the Java EE service units are also deployed to each server instance in the cluster



39

George Thomas, GSA EA Group 30-Aug-07

Aspect Oriented Policy - Intercepting Filter Pattern

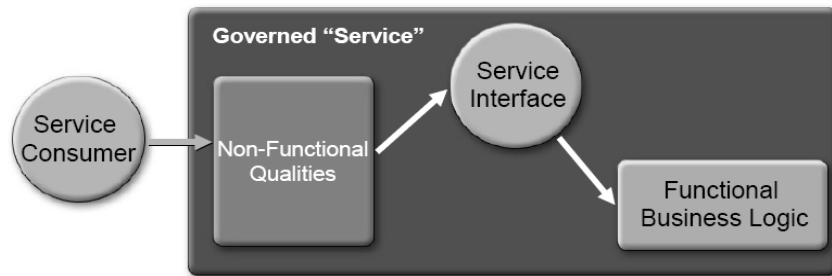


40

George Thomas, GSA EA Group 30-Aug-07

A Governed Service

- Includes Non-Functional Requirements (NFR) as Policy Attachments
 - QoS, 'ilities', Security, Privacy
 - Generic, or Industry specific
- Published in UDDI, pointed to by WSDL
 - Service Façade should abstract the FBL
- Contract governance independent of Service governance!
 - Aspect decorations change but the Int/Impl doesn't

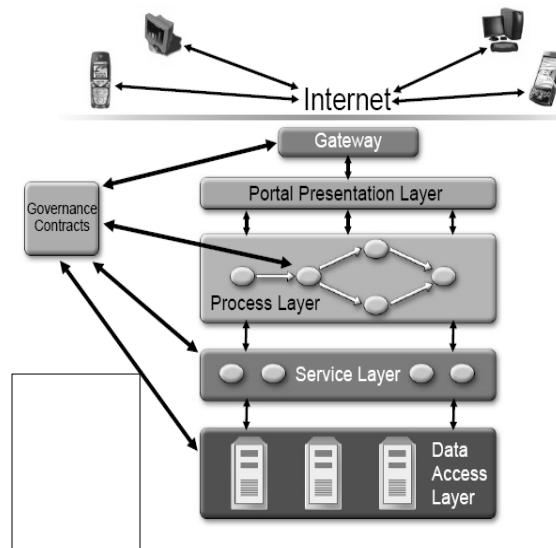


41

George Thomas, GSA EA Group 30-Aug-07

Layered Governance Contracts

- Service gateway model
 - Relegate governance to edge devices
- Service governance intermediaries
 - Vary the granularity of governance contracts
 - Apply governance at multiple enforcement points in the architecture

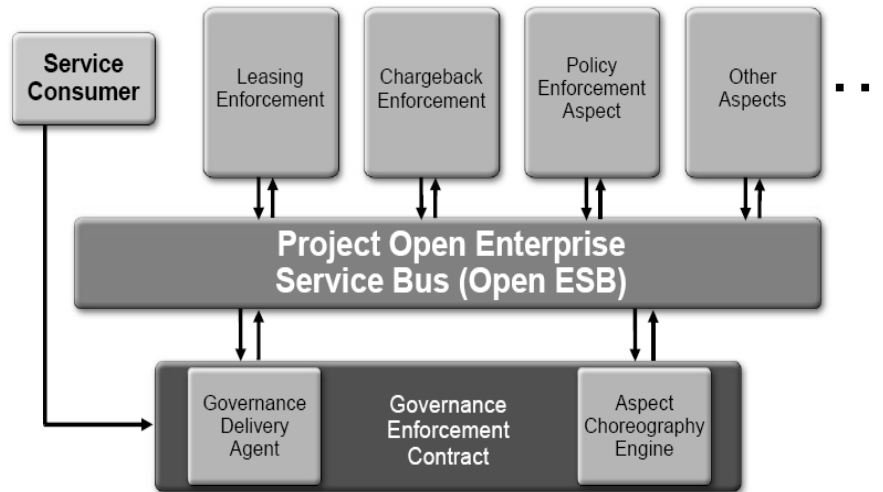


42

George Thomas, GSA EA Group 30-Aug-07

Dynamic Policy Model

- Aspects, Aspect Groups
 - Aspect Engine (a JBI SE) applies the appropriate 'Policy Pipeline'



43

George Thomas, GSA EA Group 30-Aug-07

This Presentation

- SOA (today)
 - UPMS from OMG, and Model Driven Solutions for SOA
 - SCA from OSOA
 - Wrapping and Adapting Legacy
- SOI (today)
 - JEE and JBI from JCP
 - Sun's SGF
- SOE (ten years out ;-)
 - Agency API's and the Federal Target Architecture
 - Model Based Acquisition and Service Based Procurement
 - Semantic Interoperability and Software Factories
 - Orchestrating and Choreographing with the FTA Test Harness
 - Market Driven, Dynamic Col's

44

George Thomas, GSA EA Group 30-Aug-07

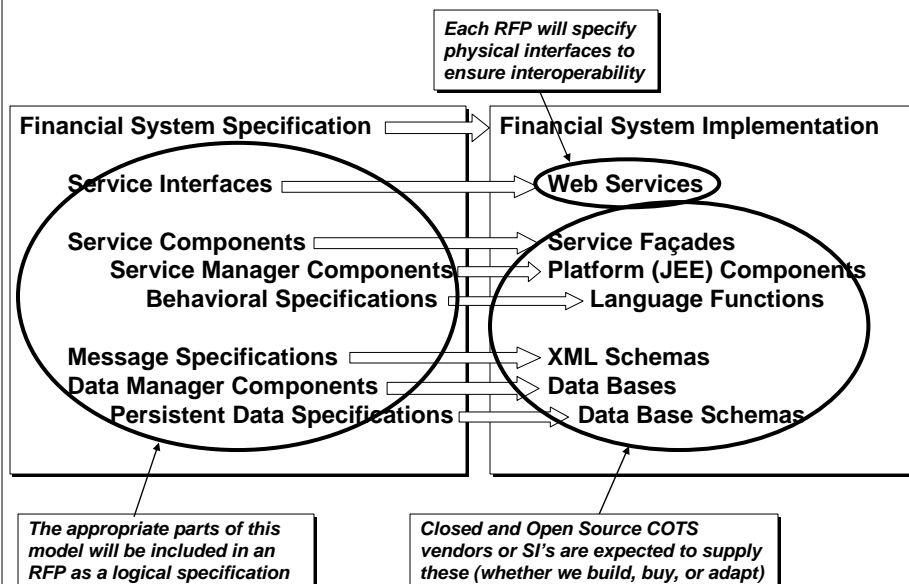
Agency API's -> FTA -> Emergent G2G/G2B/G2C Mashups

- www.ProgrammableAgency.gov
 - Ala <http://www.programmableweb.com>
 - NFR and QoS Policy Attachments and Pipelines
 - Result is the Federal Target Architecture (FTA) and Sequence Plan
 - Apply Performance Based Contracting to Service Choreographies
 - Apply Competitive Sourcing to Service Orchestrations
- Changes IT Procurement, a public/private '*design by contract* with America'
 - Public owns and manages Service Specifications, an *Authoritative Reference Architecture (ARA)* of Public Services
 - Fed LoB and eGov SSP's/CoE's manage ARA's in external Standards Organizations (ala FEA-PMO FTF and RMS in OMG!)
 - Private product or service applied, results in (configured instance of) Service implementations, a *Reference Implementation (RI)*
 - Open Source ARA/RI 'test compatibility kits' as FTA test harness, hosted by IOI LoB SSP's
 - Business and Technical Policies
 - Service contracts and governance policies move from machine parseable (XML syntax based) to machine interpretable (Semantic technology based) expressions

45

George Thomas, GSA EA Group 30-Aug-07

Model Based Acquisition, Service Based Procurement



46

George Thomas, GSA EA Group 30-Aug-07

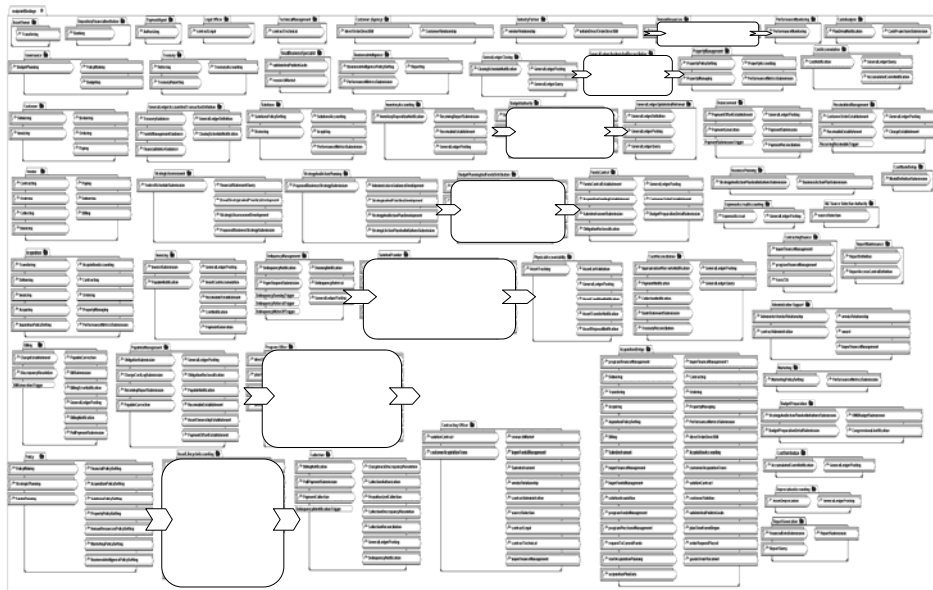
Semantic Interoperability and Software Factories

- Design time semantics
 - Languages, Specifications and Policies grounded in logical formalisms
 - Examples;
 - Concepts and Synonyms
 - SCA Policy Intents/Sets - SGF Policy Aspects/Groups
 - Conflated concepts, and Polysemy
 - 'Service Component' - FEA SRM, UPMS, SCA, ...
- Runtime semantics
 - Recommenders
 - Automating Capability and Requirements matching, suggesting Service Contracts between Providers and Consumers
 - Ratings
 - Monitoring and reporting on Service Contract SLA's (Policies)
- Software Factories leverage Semantics
 - Further enhancing the utility of today's MDA (MDD/MDE) and BPMS techniques

47

George Thomas, GSA EA Group 30-Aug-07

Orchestrating and Choreographing w/the FTA Test Harness

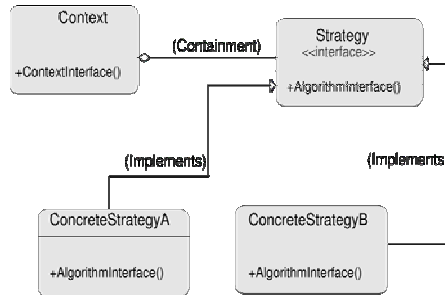


48

George Thomas, GSA EA Group 30-Aug-07

Market Driven, Dynamic Col's

- The strategy pattern is useful for;
 - Situations where it is necessary to dynamically swap application algorithms
 - For dynamic Service Compositions
 - Lets algorithms (orchestrations, choreographies) vary independently from Consumers (end users)
- New Service Provider?
 - Chosen based on Recommender or Rating
 - Continuous Improvement = Competitive Differentiation
- Enabled by semantically grounded governed services
 - Ala Sun's SGF for example...



49

George Thomas, GSA EA Group 30-Aug-07

References

- SOA
 - UPMS from OMG, and Model Driven Solutions for SOA
 - <http://soa.omg.org/>
 - http://colab.cim3.net/file/work/SOACoP/2007_05_0102/ESeidewitz05022007.ppt
 - SCA from OSOA
 - <http://osoa.org>
 - Wrapping and Adapting Legacy
 - Strategy and Façade patterns (Wikipedia)
 - Architecture Driven Modernization (ADM) at OMG
- SOI
 - Java Business Integration
 - <http://java.sun.com/integration/>
 - http://java.sun.com/developer/technicalArticles/J2EE/sunjavaee_engine/
 - Service Governance Framework
 - <http://developers.sun.com/learning/javaonline/j1sessn.jsp?sessn=TS-8440&yr=2007&track=7>
- SOE
 - Agency API's and the Federal Target Architecture
 - See <http://www.programmableweb.com/>

50

George Thomas, GSA EA Group 30-Aug-07

Thank You!

- Contact me:
 - George Thomas
 - General Services Administration
 - Office of the Chief Information Officer
 - Enterprise Chief Architect
 - Federal CIO Council
 - Architecture and Infrastructure Committee
 - Services Subcommittee co-chair
 - Object Management Group
 - Government Domain Task Force
 - Steering committee
 - g.thomas@gsa.gov
 - 202.219.1979