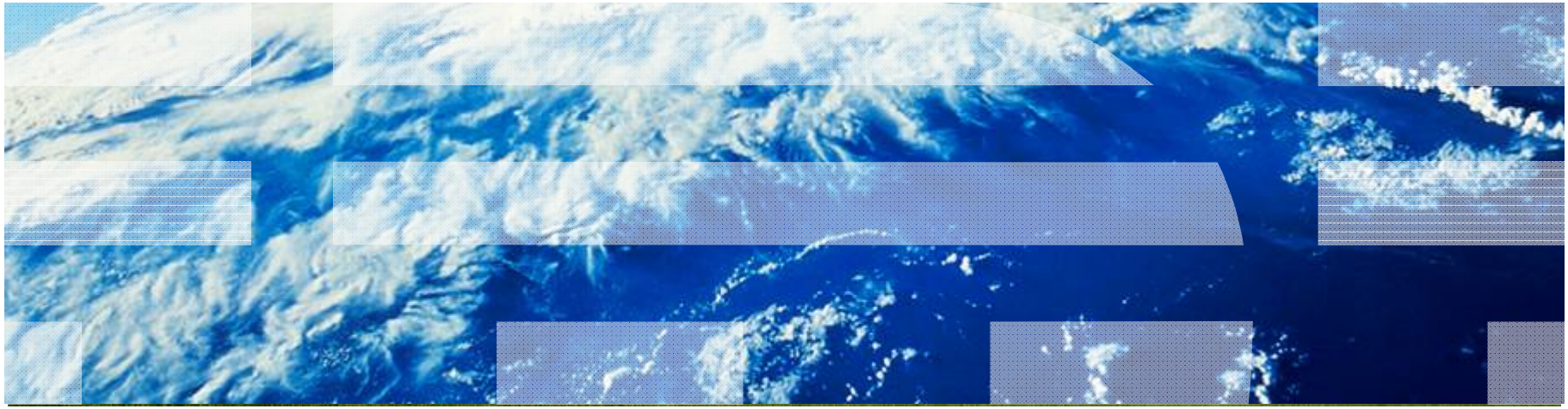
Dr. Hans-Peter Hoidn
Executive IT Architect, IBM Software Group
Global Business Integration "Tiger" Team

IBM

Enterprise IT Architectures

SOA Part 2



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SOA Reference Architecture

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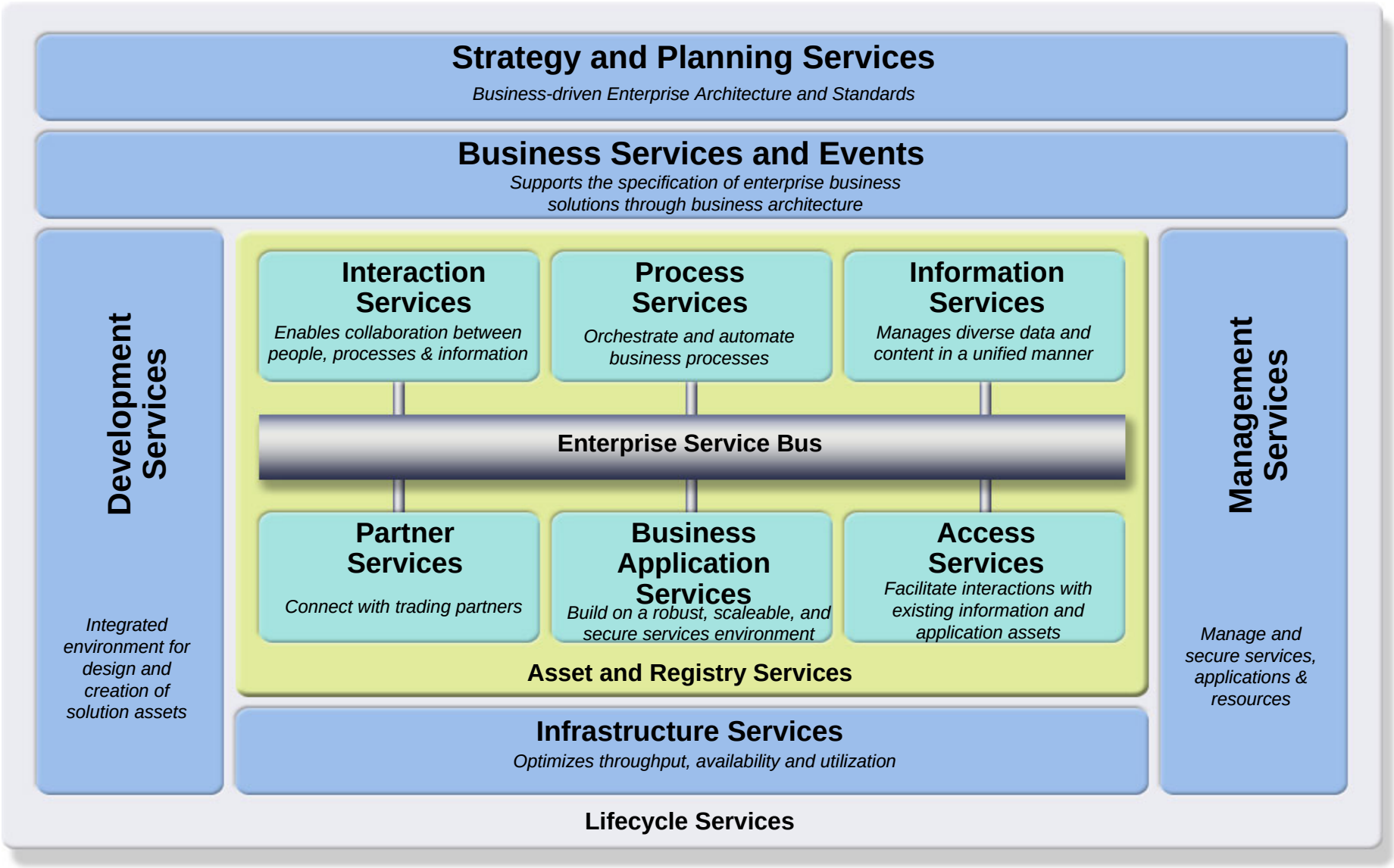
SOA Reference Model



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Interaction Services

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Interaction Services in SOA Reference Architecture

- **People are the drivers of the business – they** interact **with reusable business services using the right information at the right time!**
- **Starting point for SOA - enabling people to interact with *application and information "services"* supporting *business processes*.**
- **Provided by Portals using *Portlets or Widgets*, relying on security for the managing user access**
- **Based on Web Servers, eventually using *AJAX***
- ***Web 2.0***

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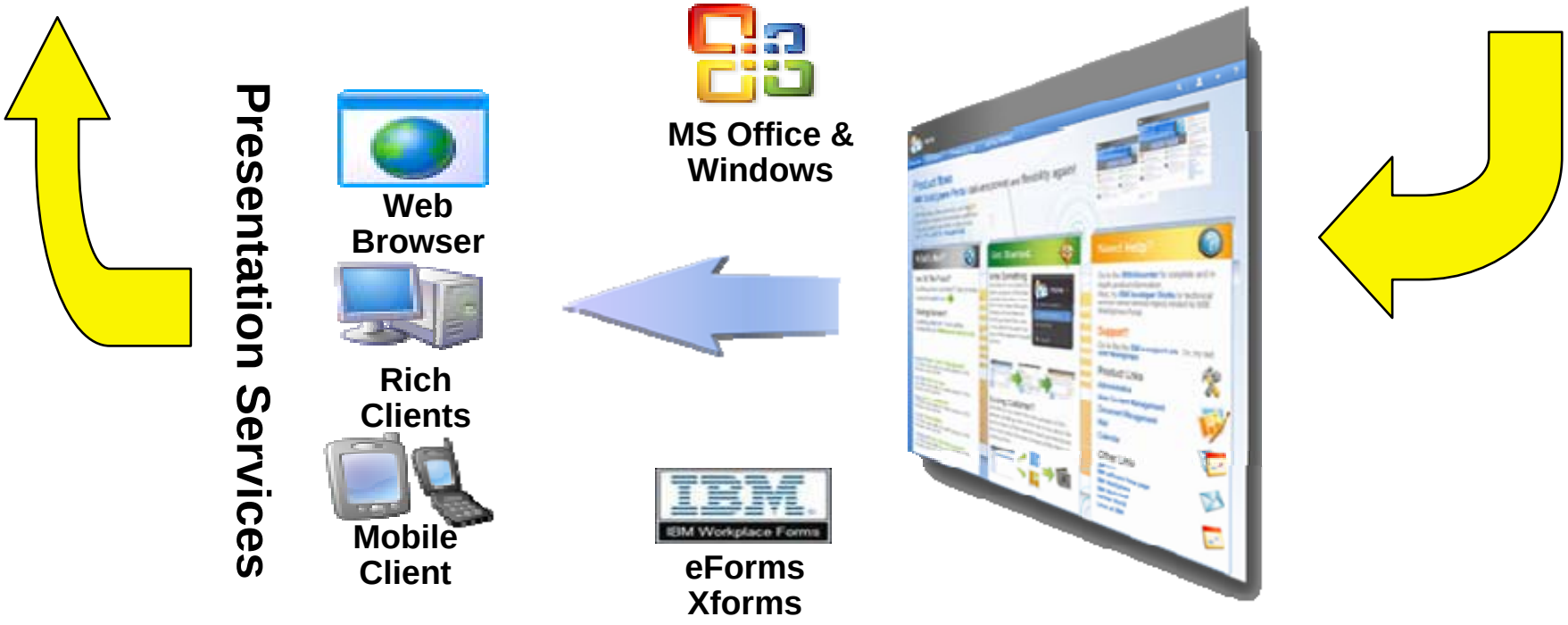
Interaction Services: Exposing SOA End-Users Using Portal As the "Front End" of SOA



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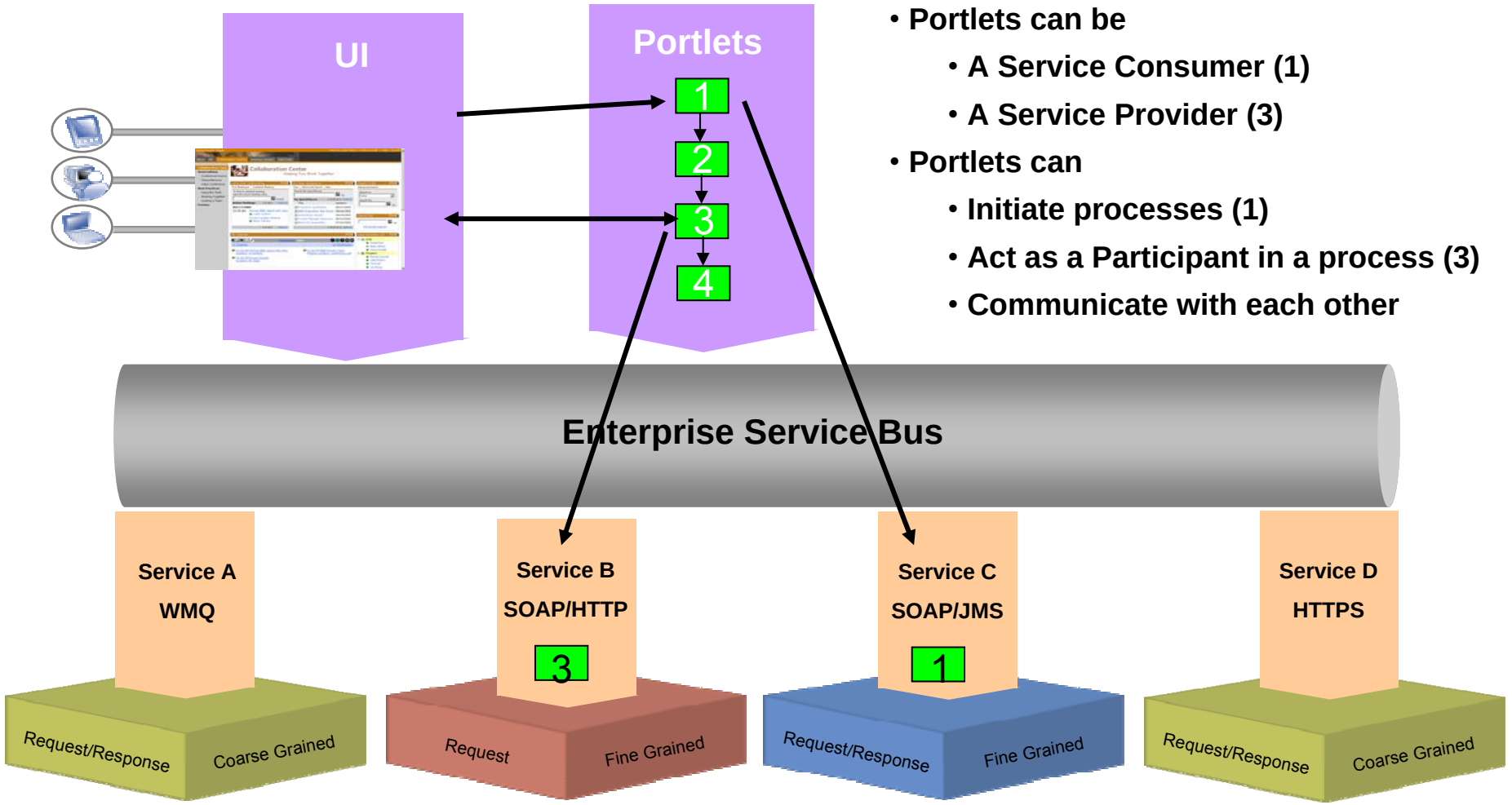
What is an *Interaction Service*?



- Portlets can be
  - A Service Consumer (1)
  - A Service Provider (3)
- Portlets can
  - Initiate processes (1)
  - Act as a Participant in a process (3)
  - Communicate with each other

The Portal Framework Provides Service Aggregation

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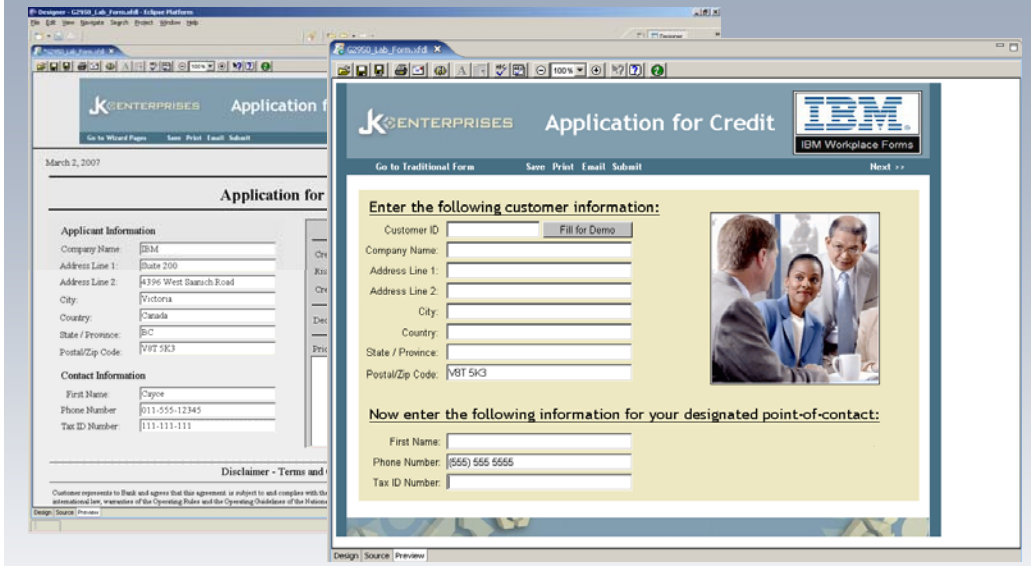
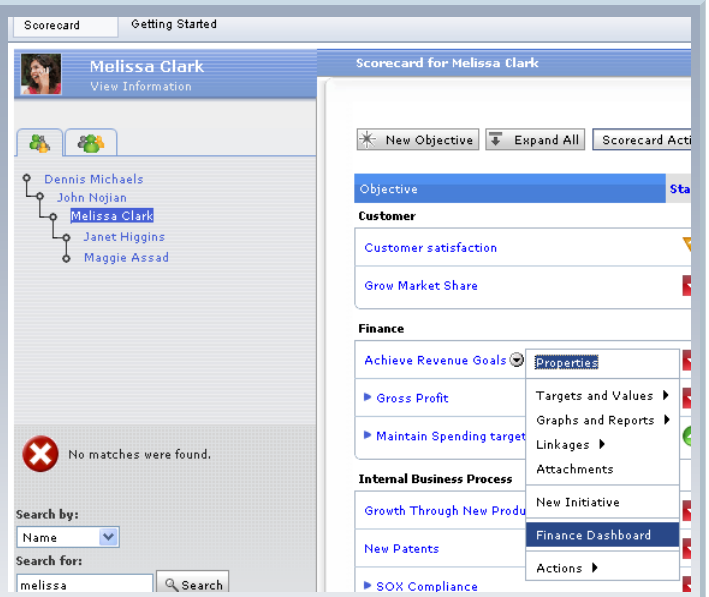
Interaction Services: Building User Interaction Services



Developing and Deploying the "New Account" Application



Building Role-Specific Portlets and Dashboards

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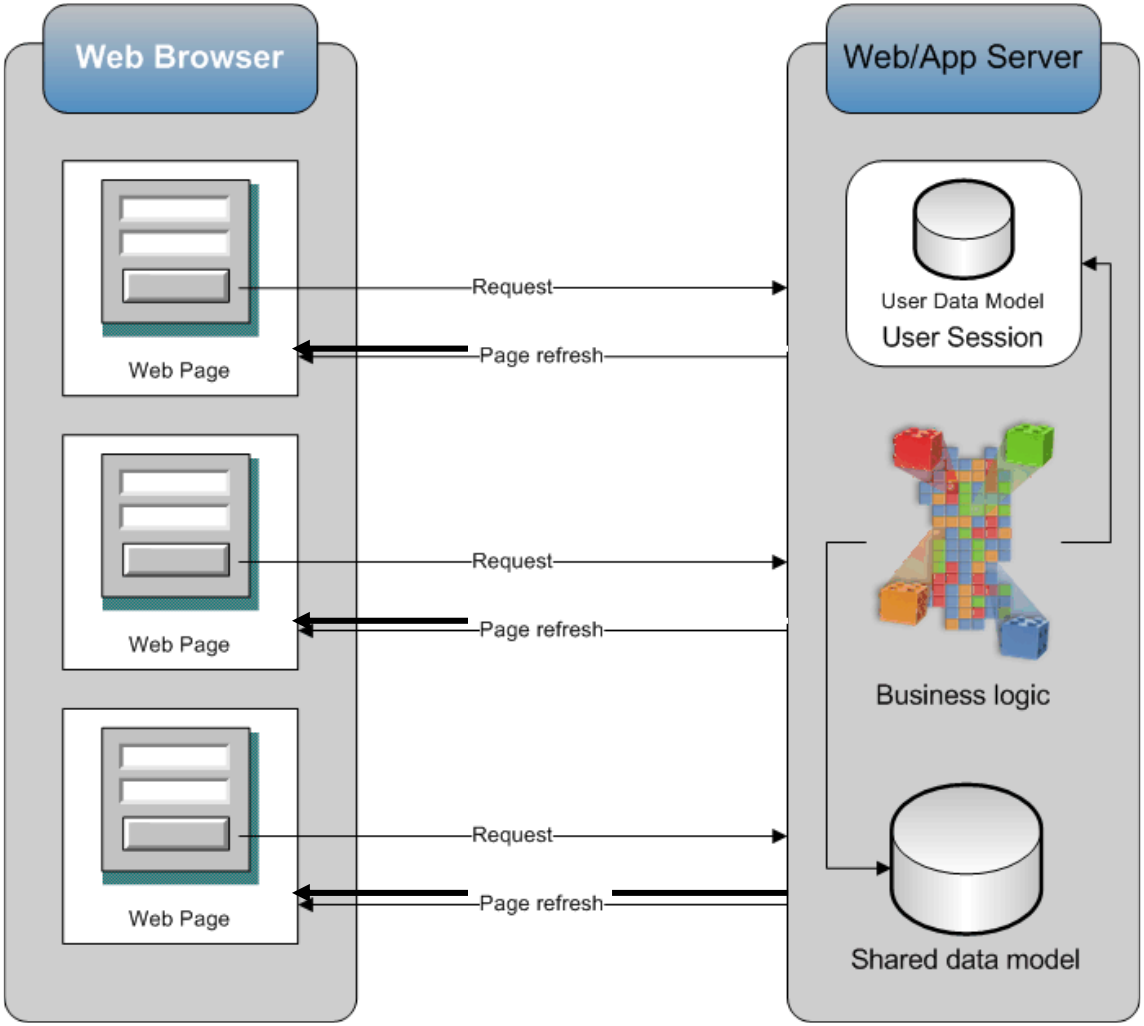
Traditional *Interaction*: Interrupted interaction with request driven processing with static page refresh



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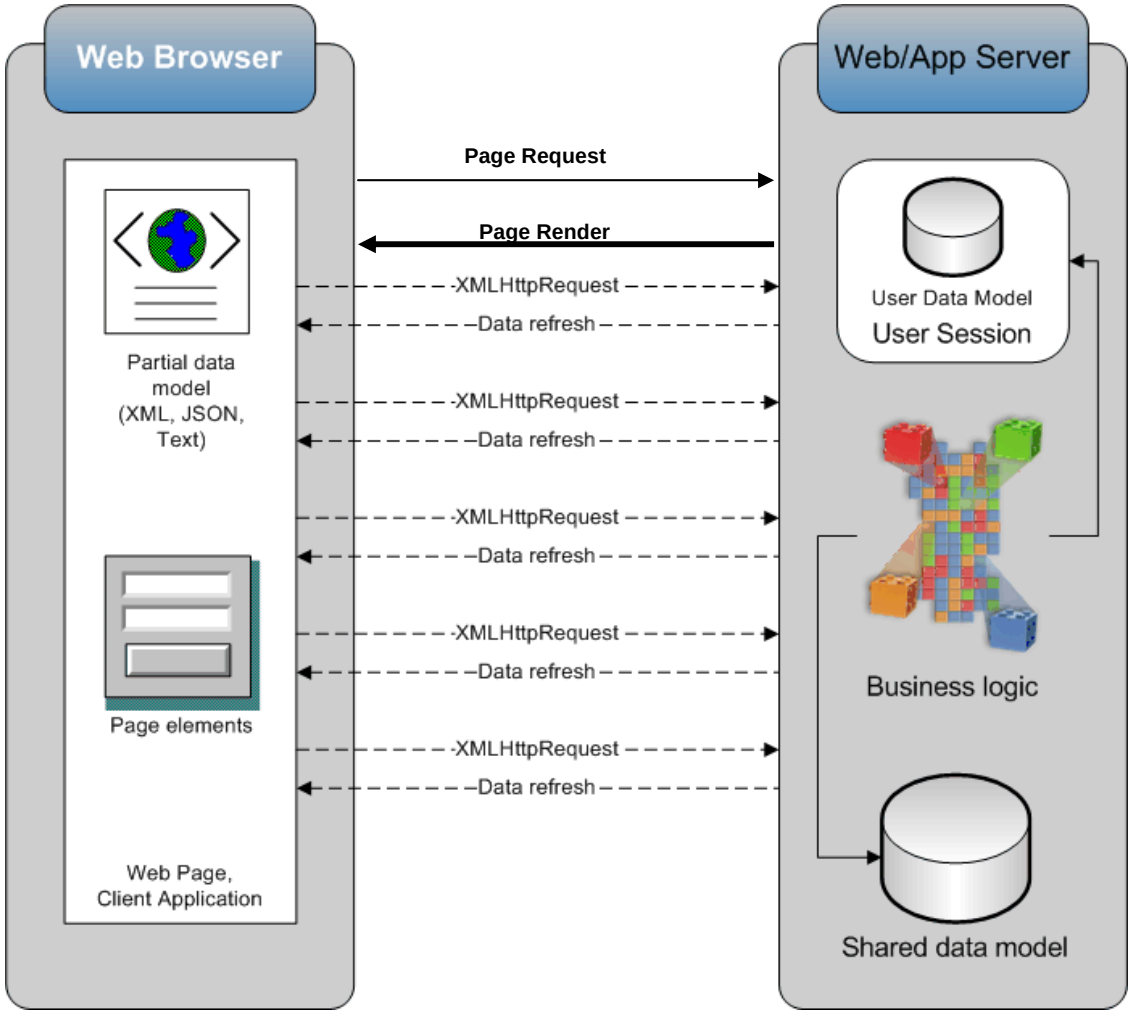
AJAX Web *Interaction*: Continuous user interaction with event driven processing and dynamic content refresh



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Information Services

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Information Services in SOA Reference Architecture

- **Delivering actionable information to people and processes**
- **Connect, enhance and deliver in-context information across diverse operating systems, applications and legacy systems through reusable services**
- **The Information Services enables consistent views and maintenance of data and content, providing a "single view of the truth" to people and processes**

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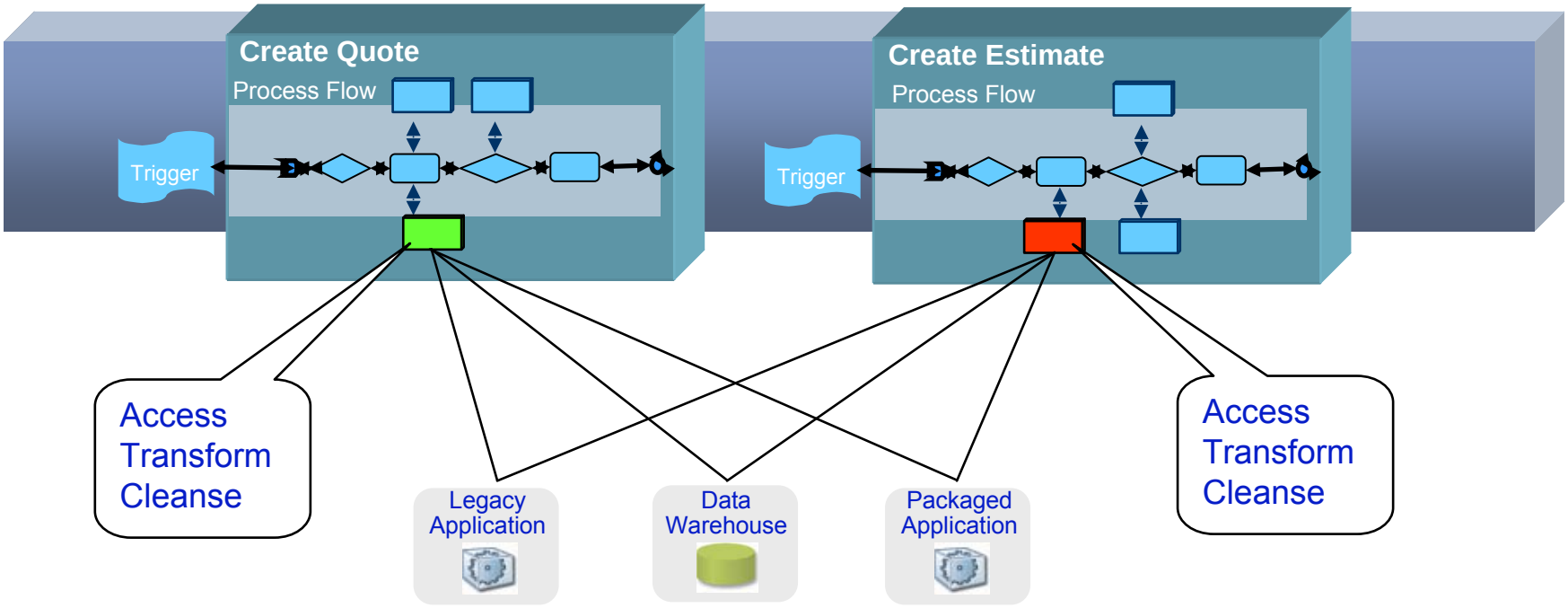
Information Services: Tight coupling causes inconsistent results



- Inconsistent “view” of the data
- Inconsistency in sources and how data is derived
- Inconsistent rules applied to data
- Multiple points of maintenance
- No flexibility to change information sources and formats

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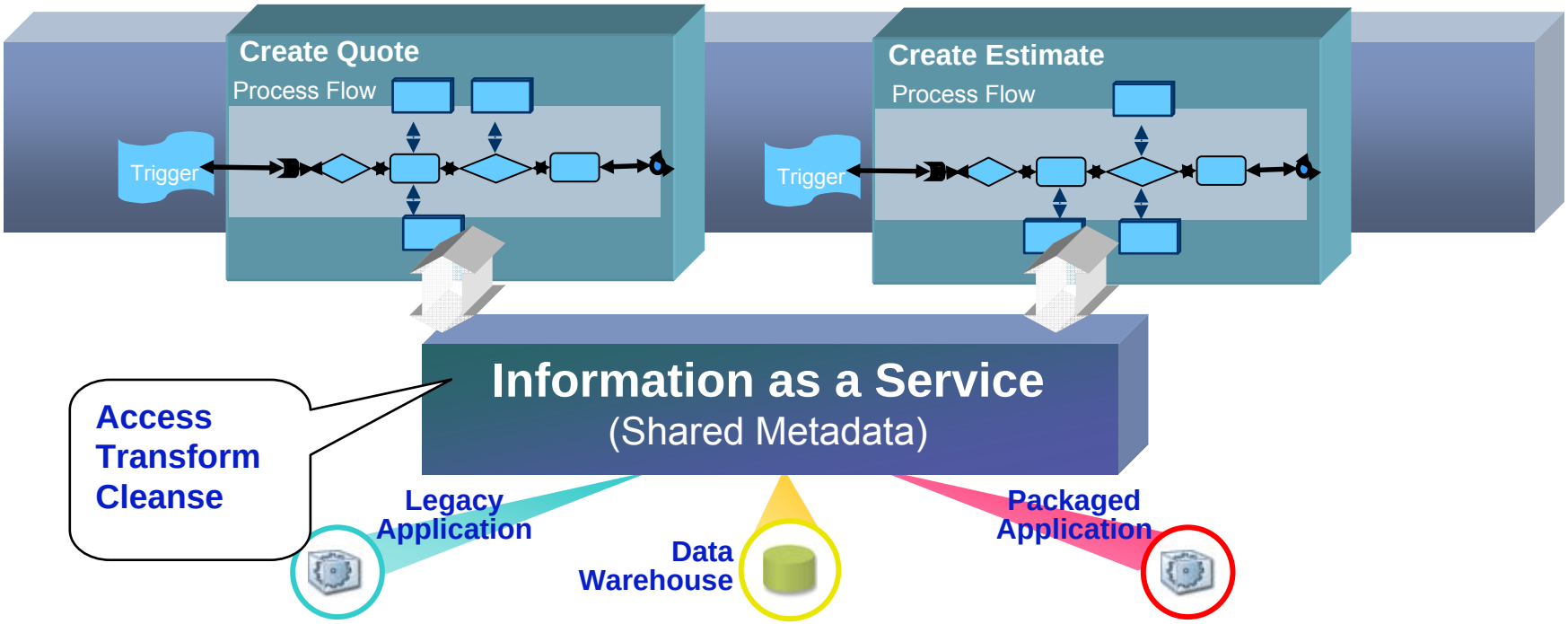
Information Services as Solution



- Consistent packaging of data
- Leverages understanding of metadata relationships
- Applies consistent rules to data
- Centralized control and maintenance
- Flexibility to add and change information sources and formats

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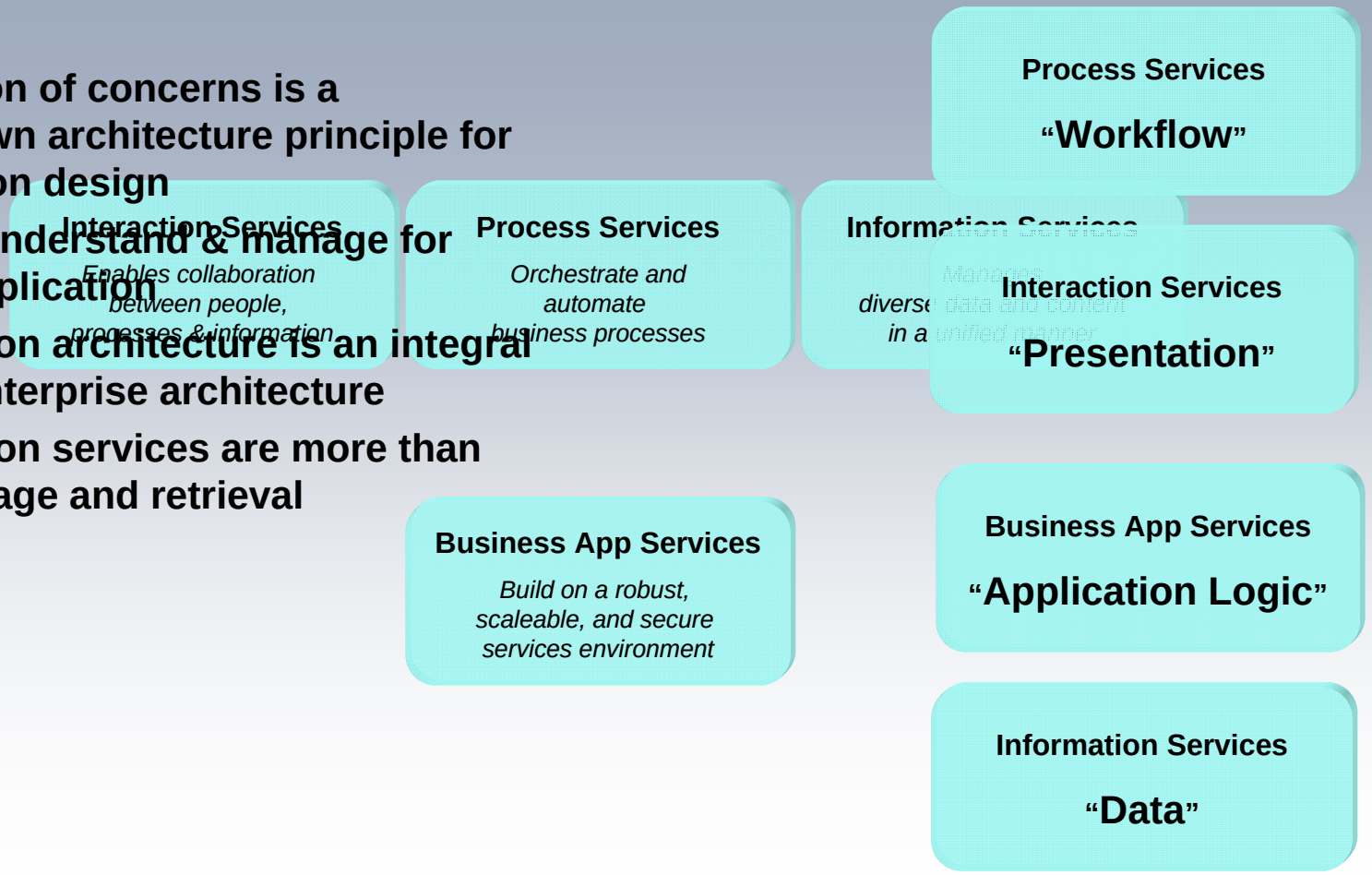
Separation of Concerns exists Even Before SOA…

- **Separation of concerns is a well-known architecture principle for application design**
- **Easy to understand & manage for single application**
- **Information architecture is an integral part of enterprise architecture**
- **Information services are more than data storage and retrieval**



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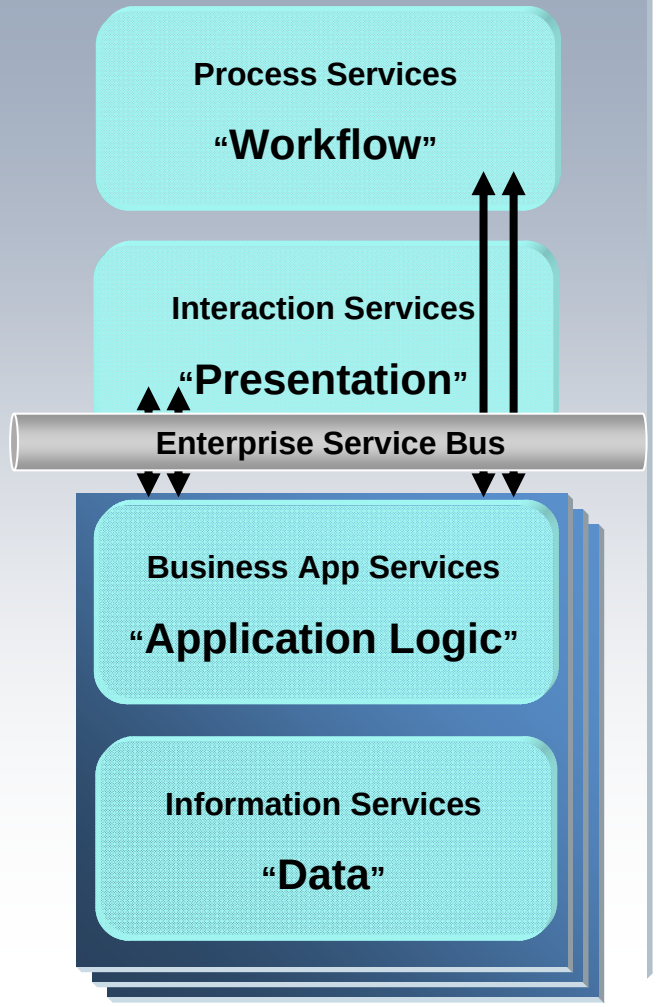
Separations of Concerns Focusing on Exposing Application Services

- **Exposing application logic as services is straight-forward and enabled by tooling**
- **The integration of services focuses on mediation (brokering) and orchestration (workflow) of application logic**

- As a result, data is tightly coupled with the corresponding application logic



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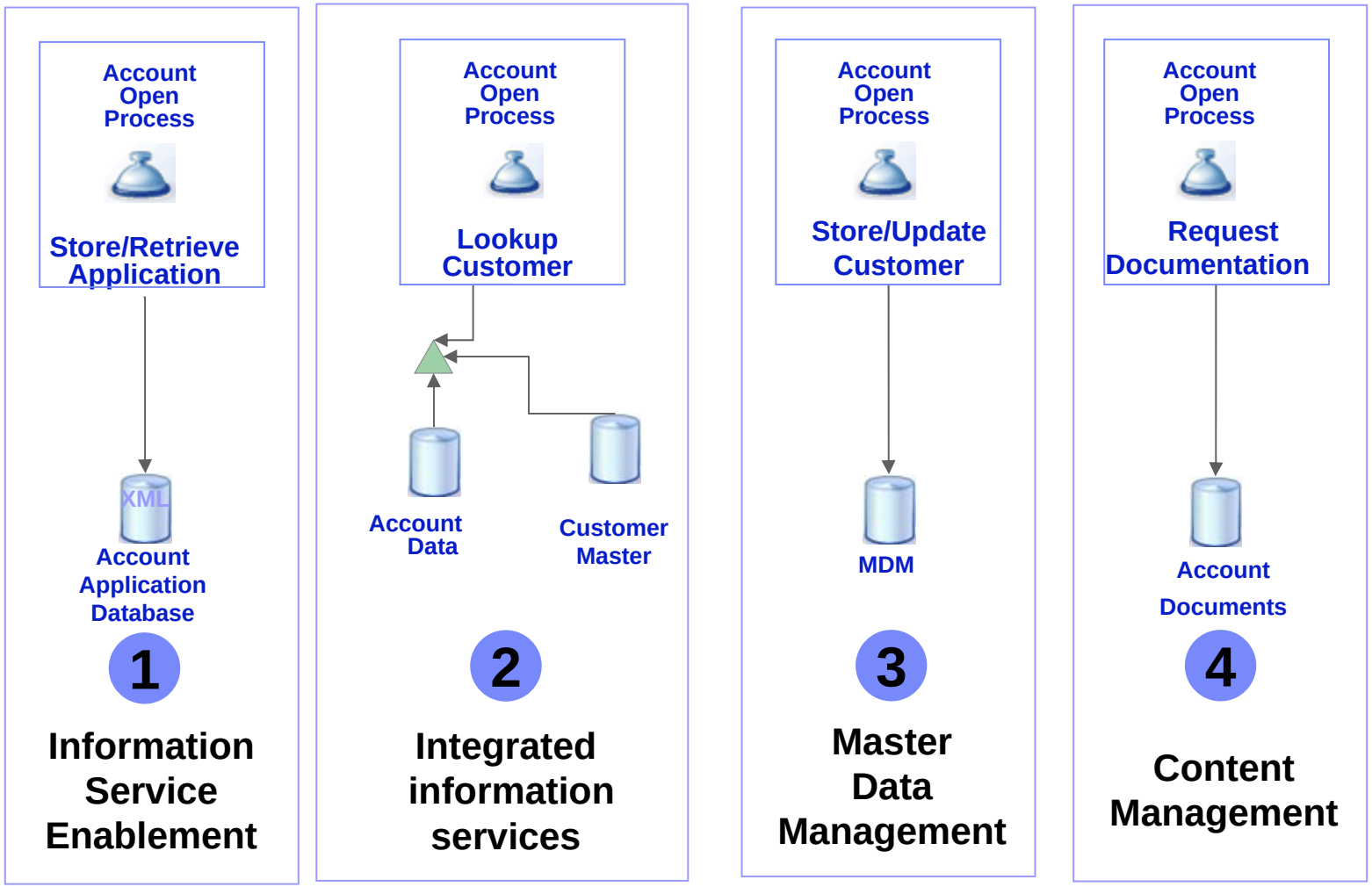
Information Services: Several Patterns



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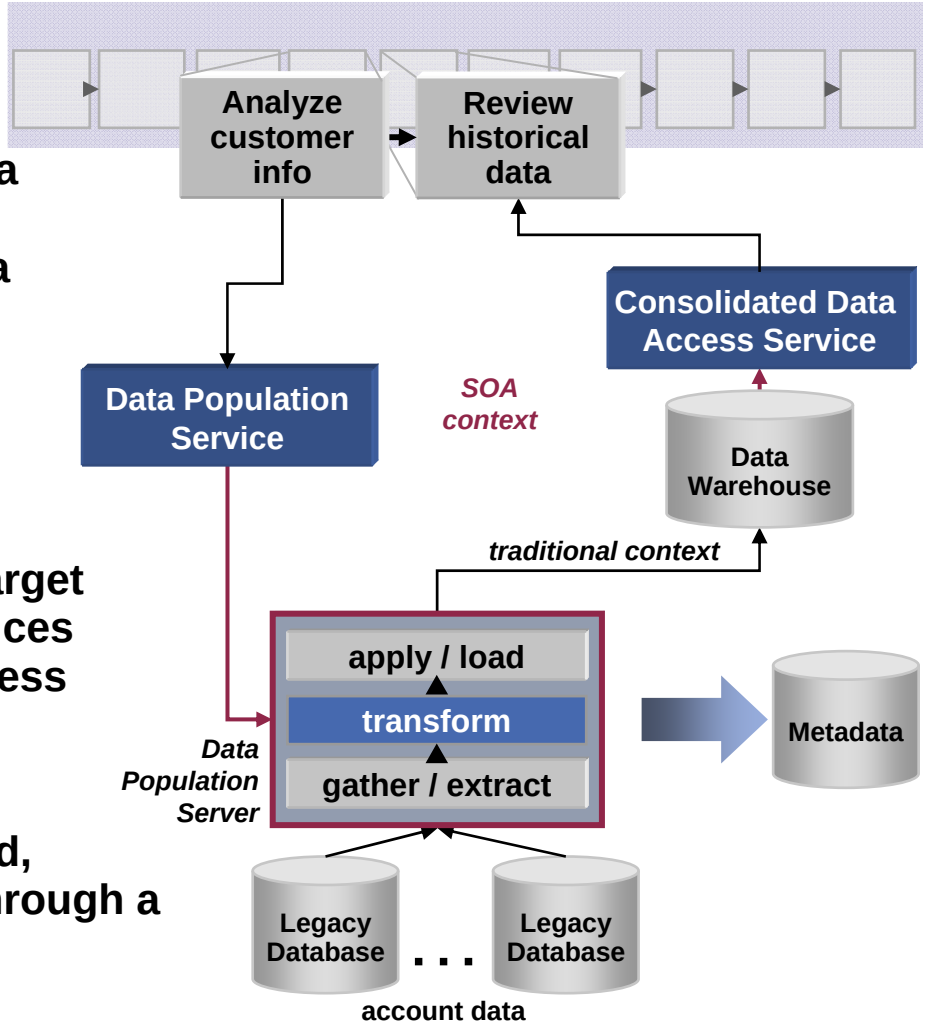
Information Services: Pattern – Transform Your Data
Create Trusted Information from Disparate Sources

- **As-Is Environment**
  - Data resides in disparate sources
  - Manual & redundant integration of data by multiple consumers results in high costs and inconsistent/inaccurate data
  - Slow response time due to large data volume and complex transformations
- **Solution Characteristics**
  - Apply transformations on extracted source data; copy into consolidated target and expose consolidated data as services
  - Invoke population from business process
- **Results**
  - Multiple consumers can access trusted, accurate and integrated information through a service
  - Data availability aligned with business process



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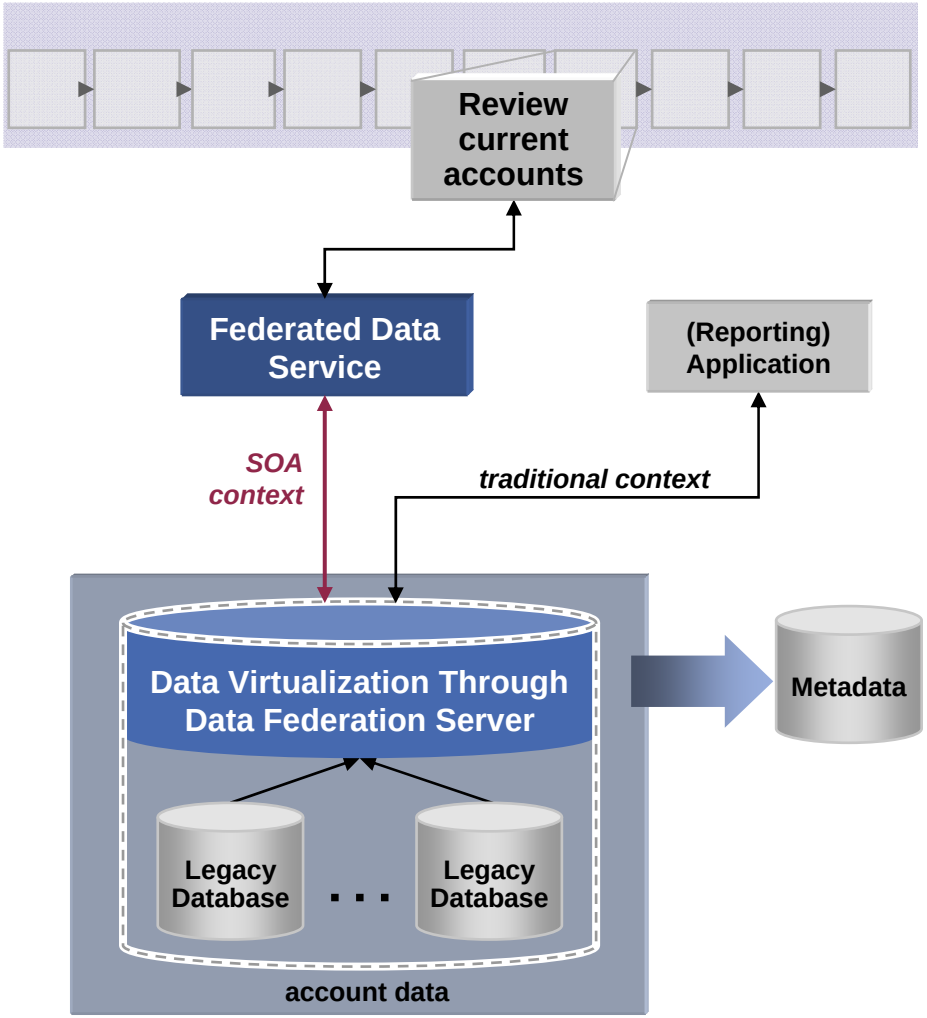
Information Services: Pattern – Deliver Your Data *Virtualized Through Services*

- **As-Is Environment**
  - Data resides in disparate sources
  - Manual & redundant integration of data by multiple consumers results in high costs and inconsistent/inaccurate data
  - Slow response time due to inefficient real-time access
- **Solution Characteristics**
  - On demand integration instead of redundant data
  - Transparent & optimized access to distributed, heterogeneous sources
- **Results**
  - Real-time access to distributed information, fast response time
  - Scalable approach for adding more data sources



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ESB (Enterprise Service Bus)

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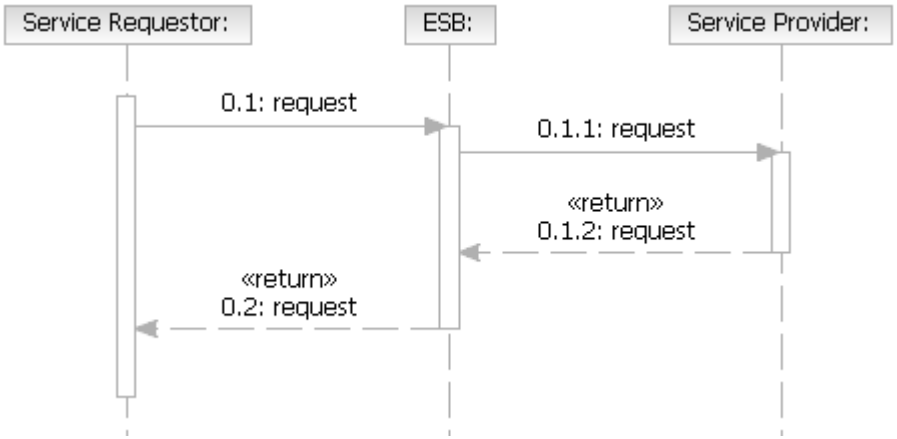
ESB (Enterprise Service Bus) – Service Virtualization

- **ESB acts as an intermediary (proxy) between requestor and provider**



- **ESB provides *service virtualization* of**
  - ***Location and identity***
  - ***Interaction protocol***
  - ***Interface***
- **Interactions are *decoupled*, supporting *separation of concerns***

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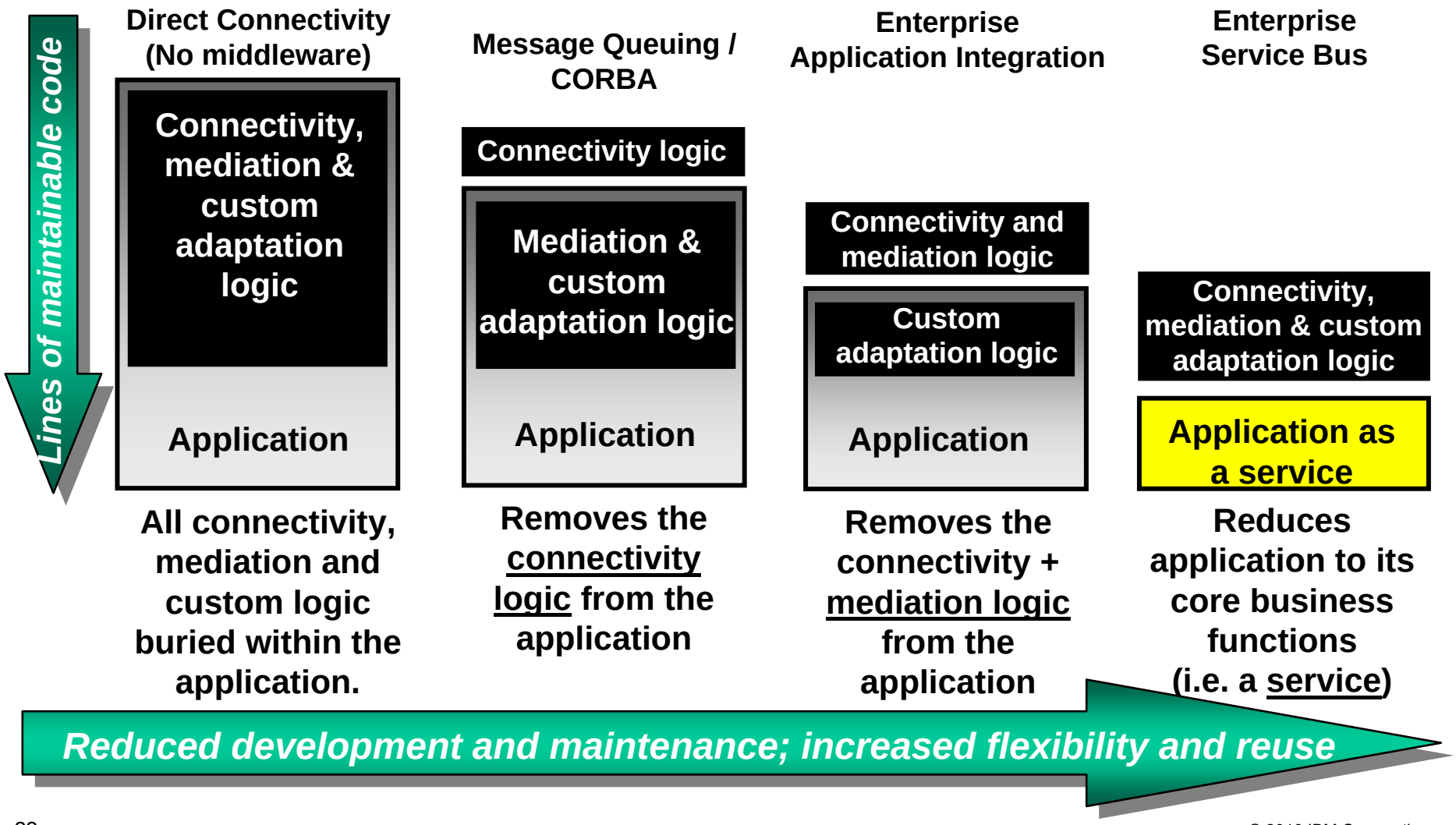
ESB is today's technology



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ESB (Enterprise Service Bus) – Definition and Purpose

- **An Enterprise Service Bus (ESB) is an architectural pattern defining a flexible connectivity infrastructure for integrating applications and services.**

- **The architecture pattern is a guiding principle to enable the integration and federation of multiple service bus instantiations.**

- **An ESB performs:**
  - **Routing messages between services**
  - **Converting transport protocols between requestor and service – managing multiple protocols**
  - **Transforming message content between requestor and service**
  - **Handling business events from disparate sources**

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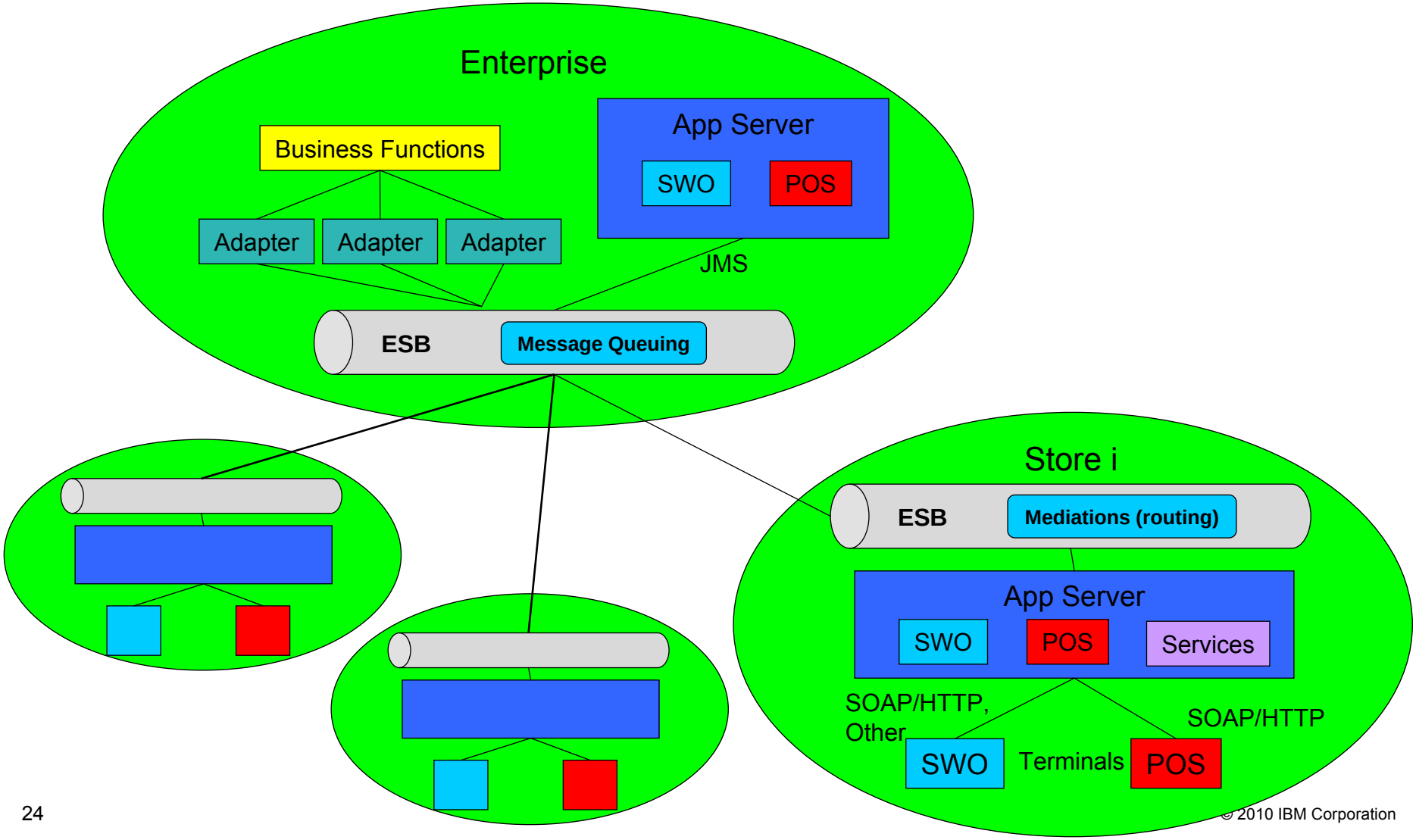
ESB Pattern in Action – Retail Scenario



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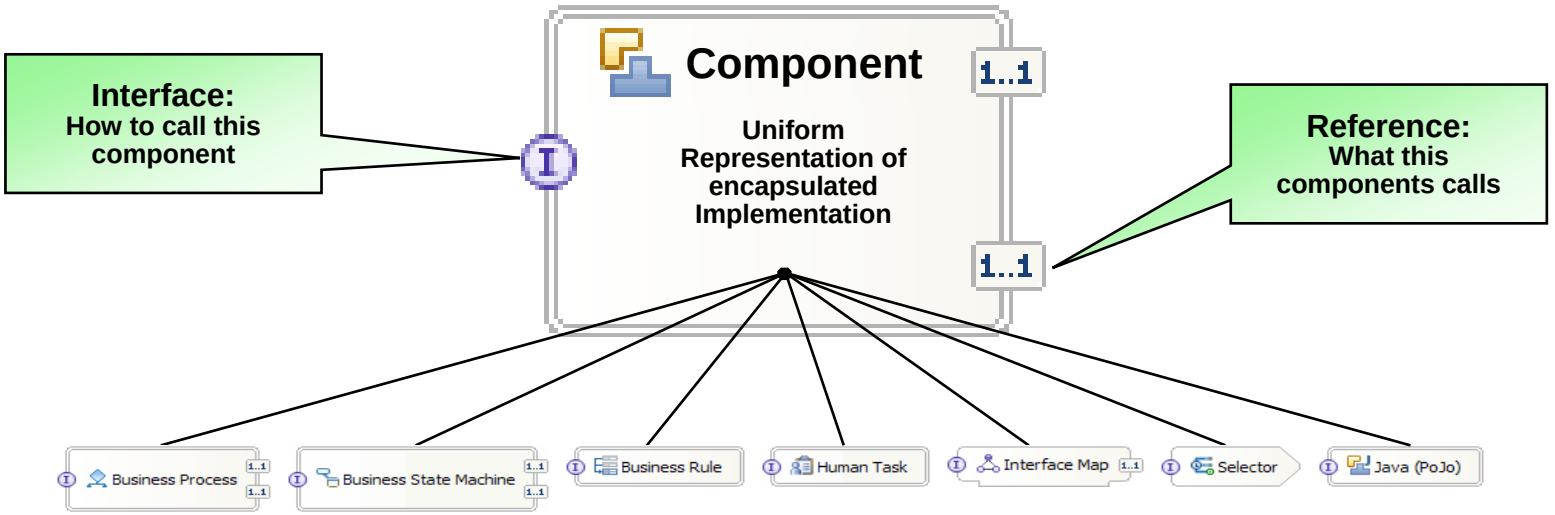
Standard SCA (Service Component Architecture) for Common Invocation

IBM, along with BEA, Oracle, SAP, IONA, Siebel and Sybase have announced the new specifications for SCA



Encapsulate components for reuse

All components (e.g., services, rules, human interactions) are represented consistently and invoked identically

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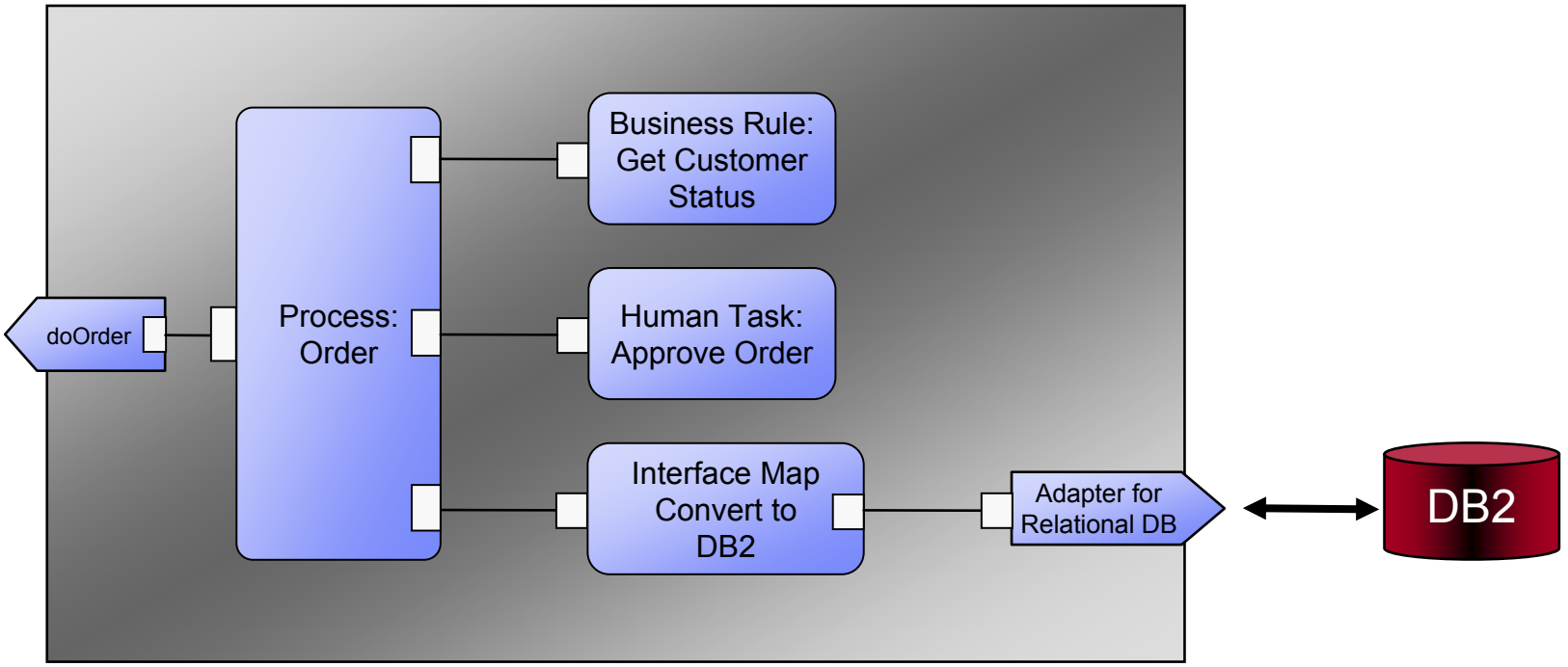
Standard SCA (Service Component Architecture) – Component Assembly



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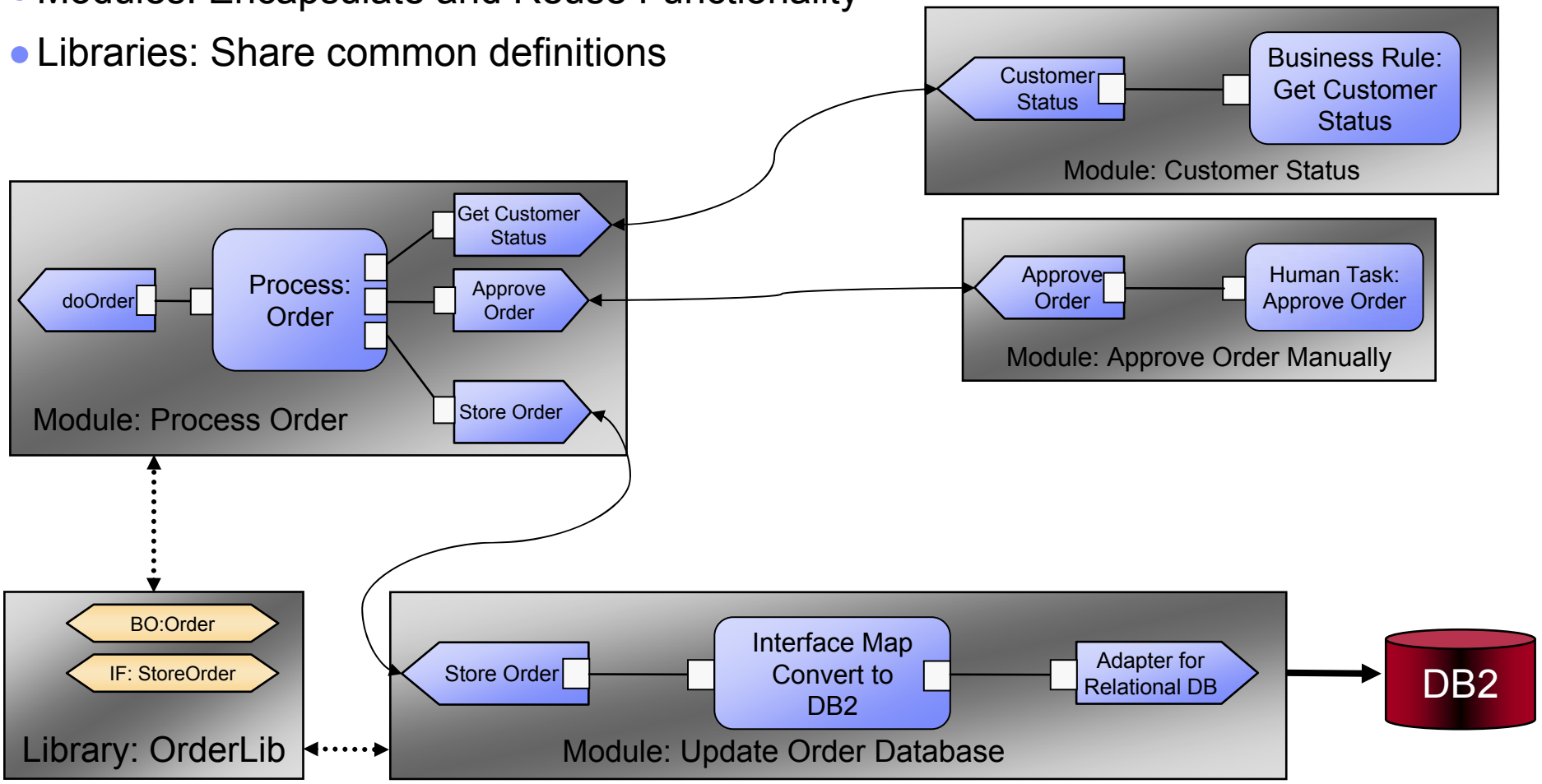
SCA (Service Component Architecture) – Example Part 1

- Modules: Encapsulate and Reuse Functionality
- Libraries: Share common definitions



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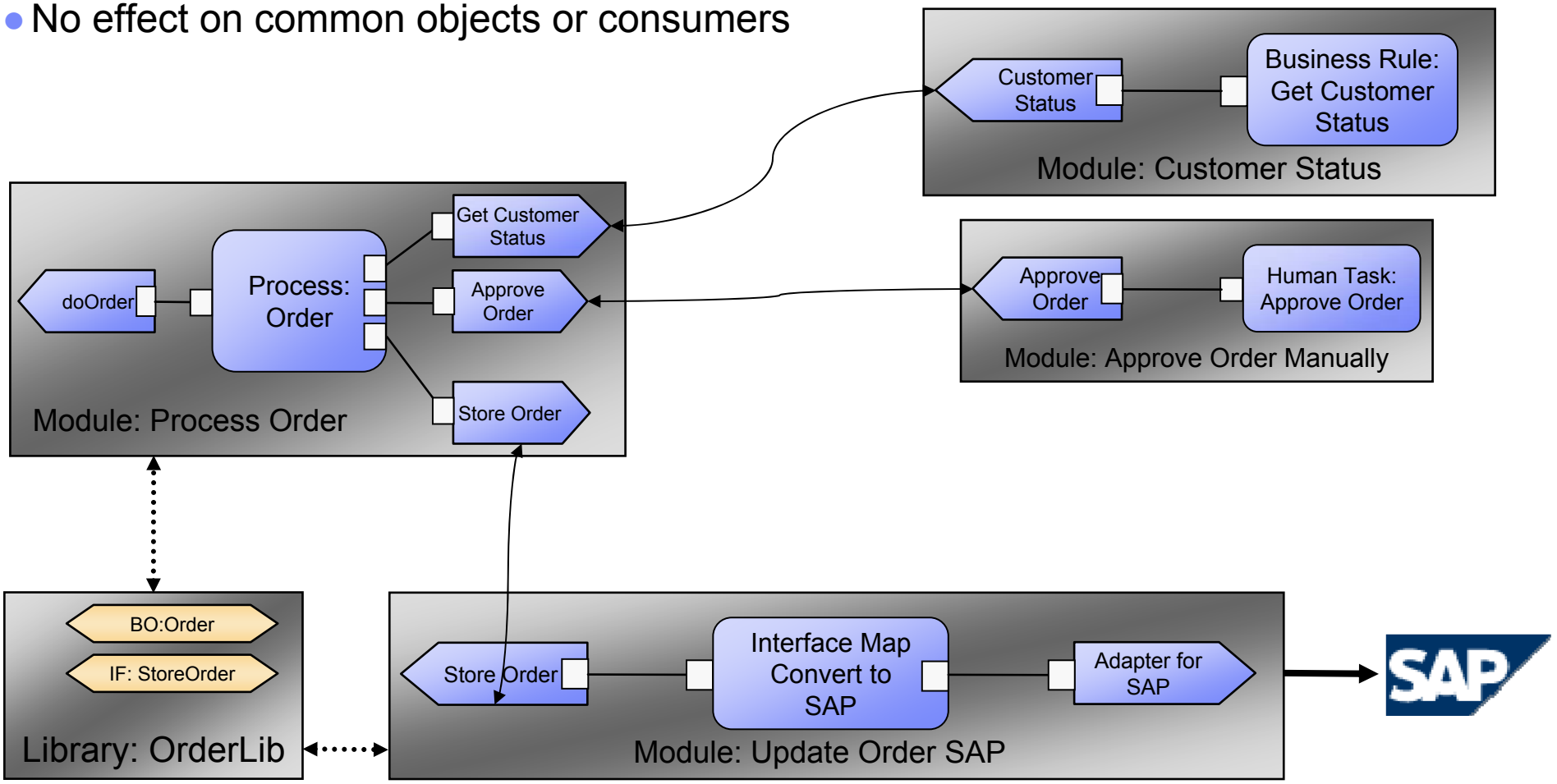
SCA (Service Component Architecture) – Example Part 2

- Store Order in SAP instead of DB2
- No effect on common objects or consumers



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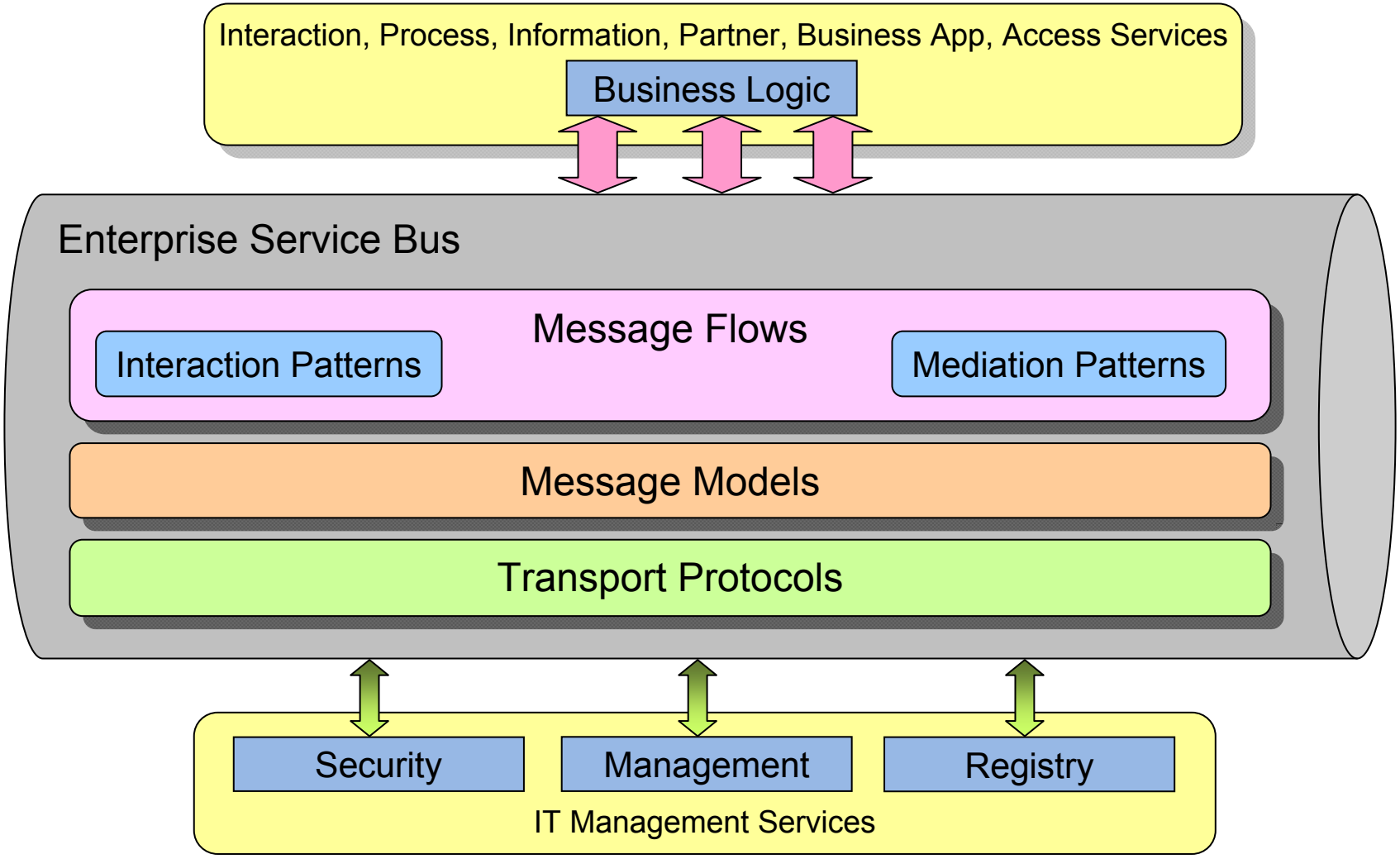
Expanded View of the Enterprise Service Bus



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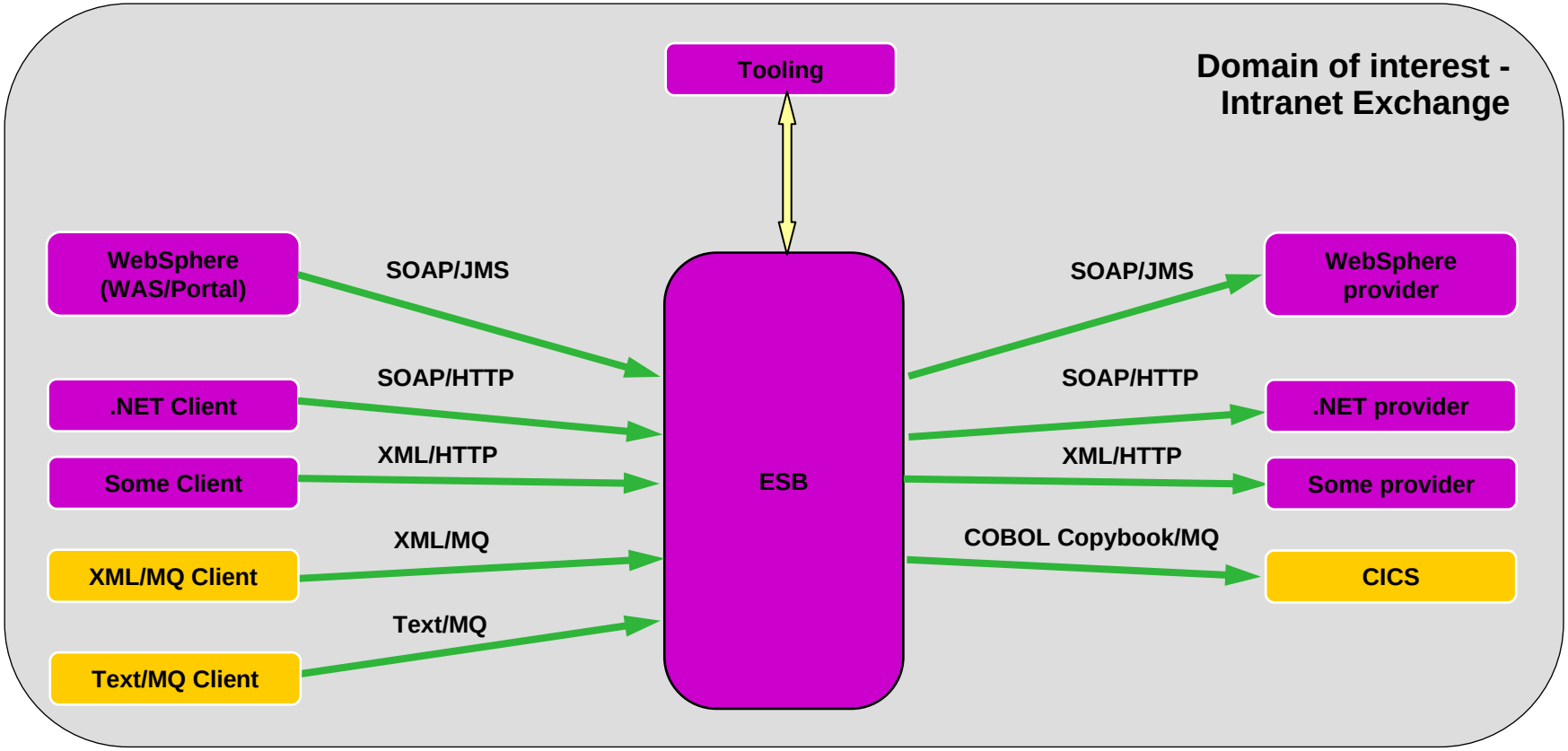
ESB – Multi-protocol Exchange – Intermediary decoupling heterogeneous consumers and suppliers



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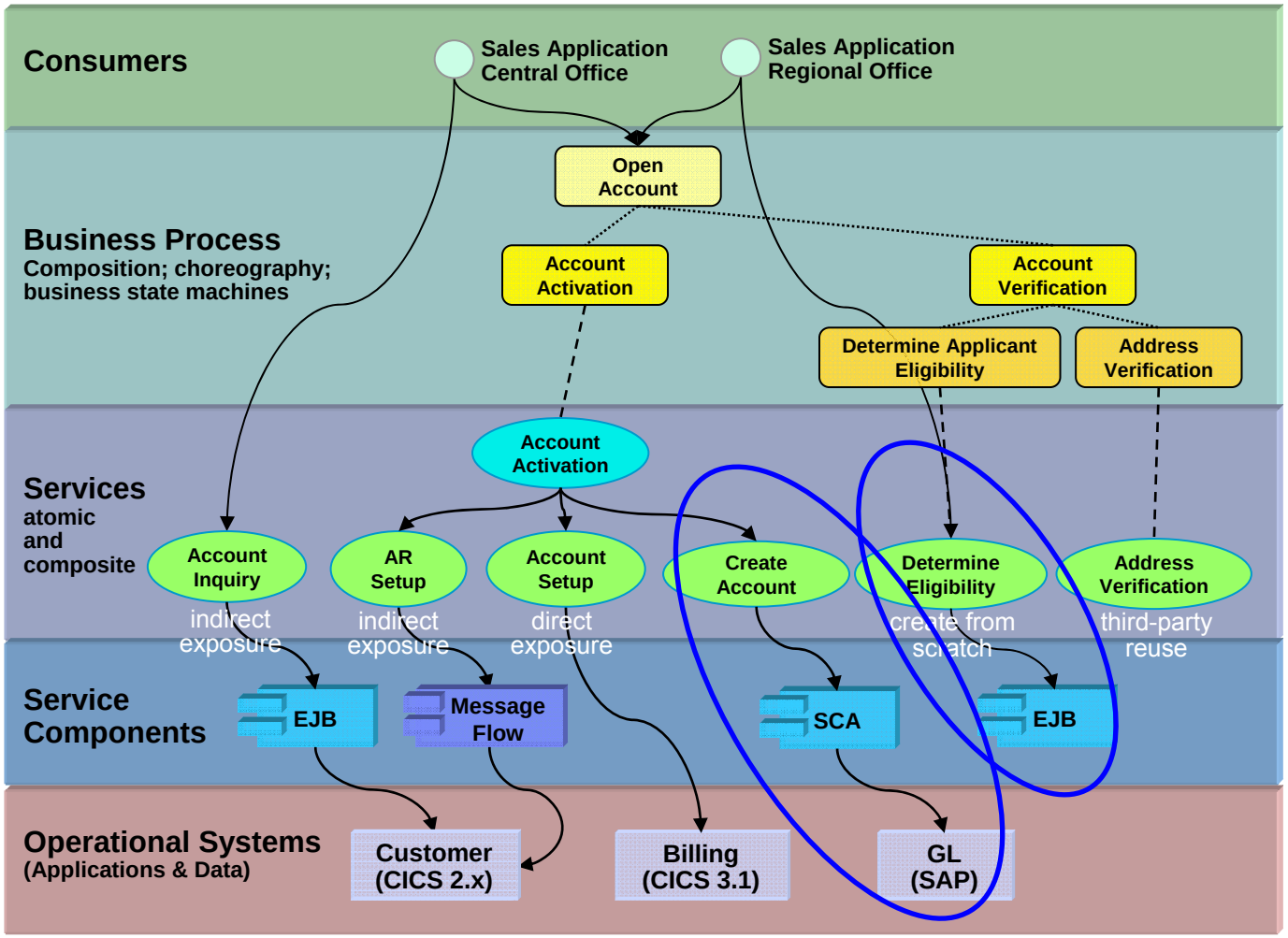
Example of ESB use



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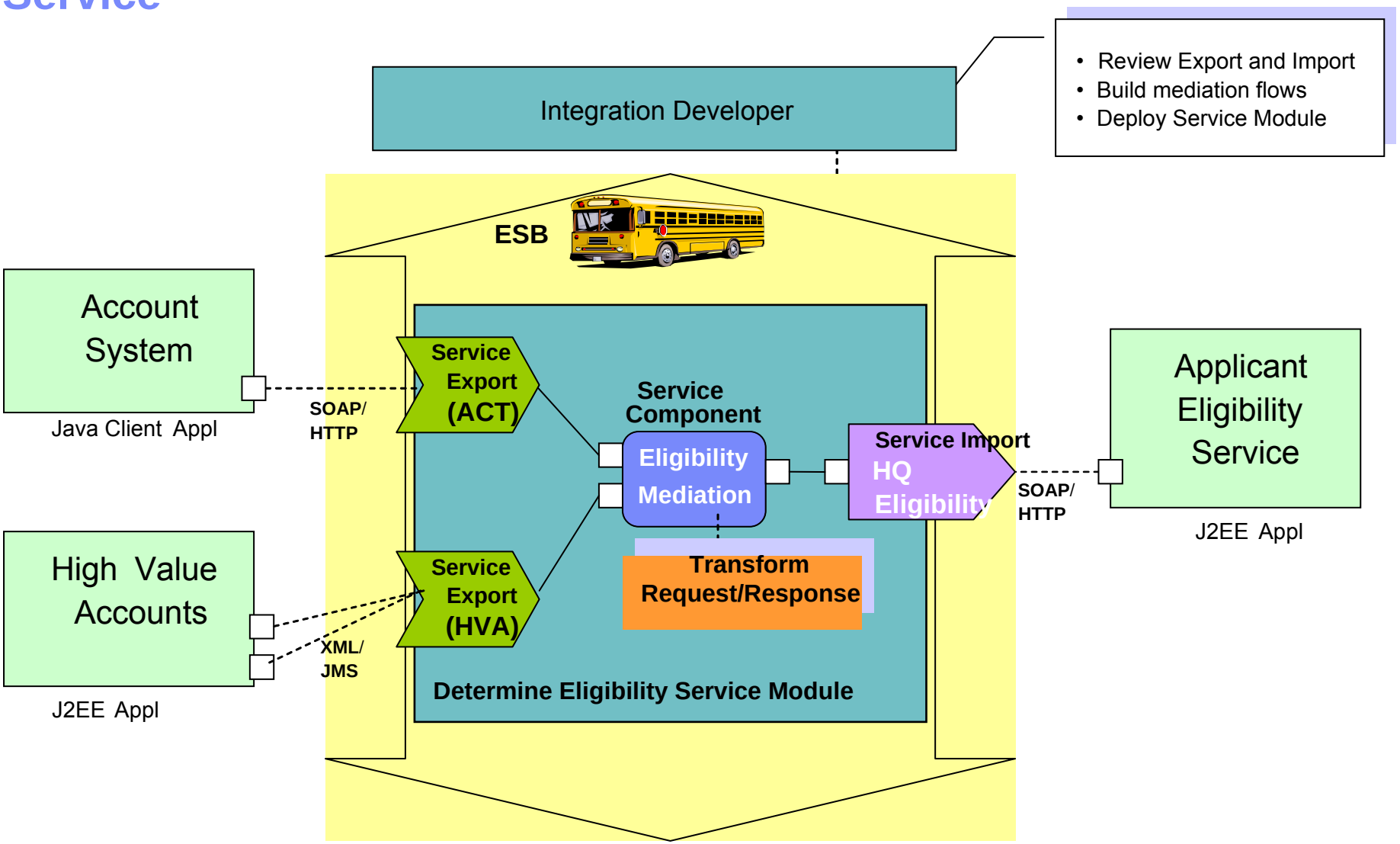
Example A of ESB use: Multiple Channel Access to Backend Service



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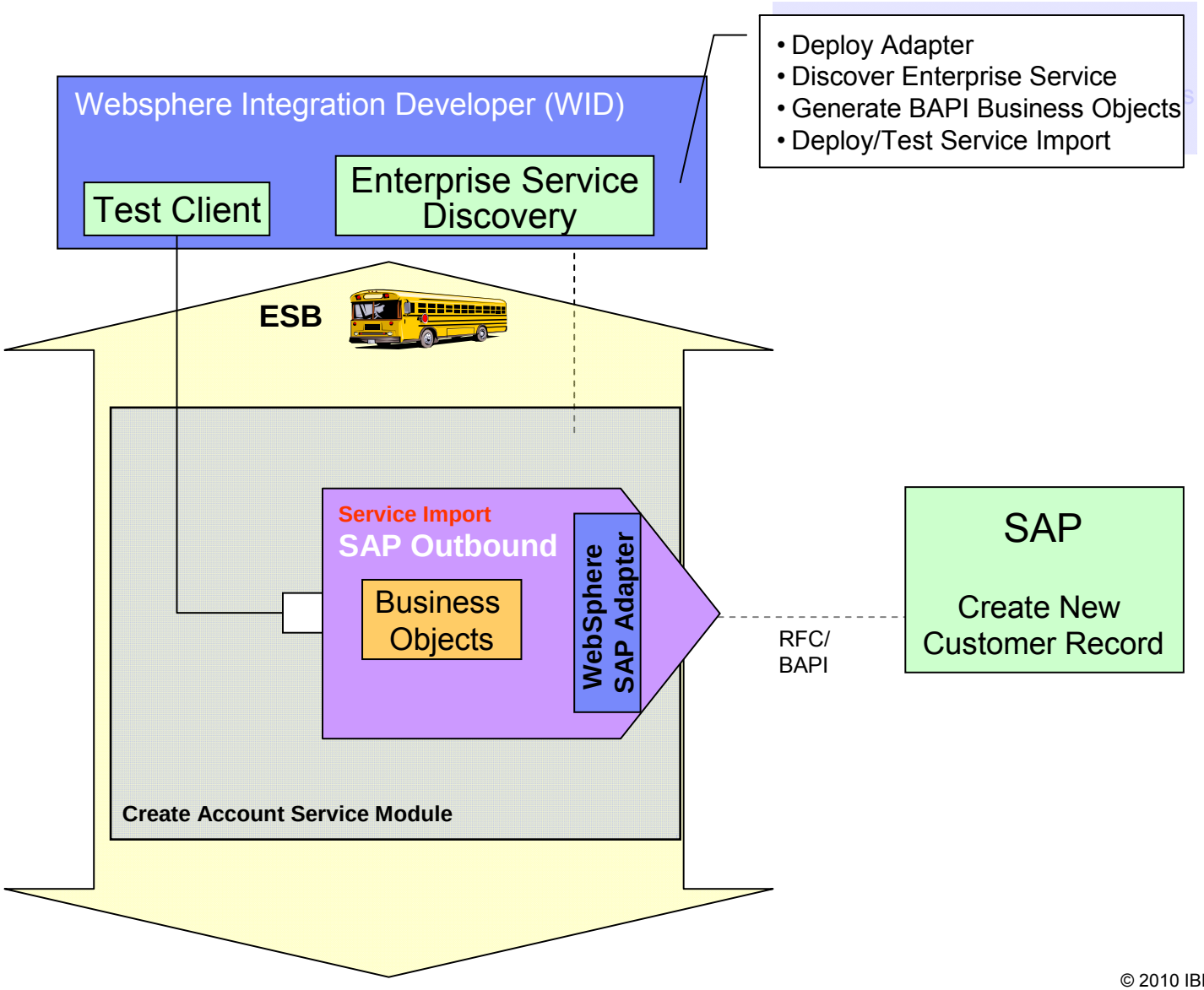
Example B of ESB Use: Create SAP Service



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BPM (Business Process Management)

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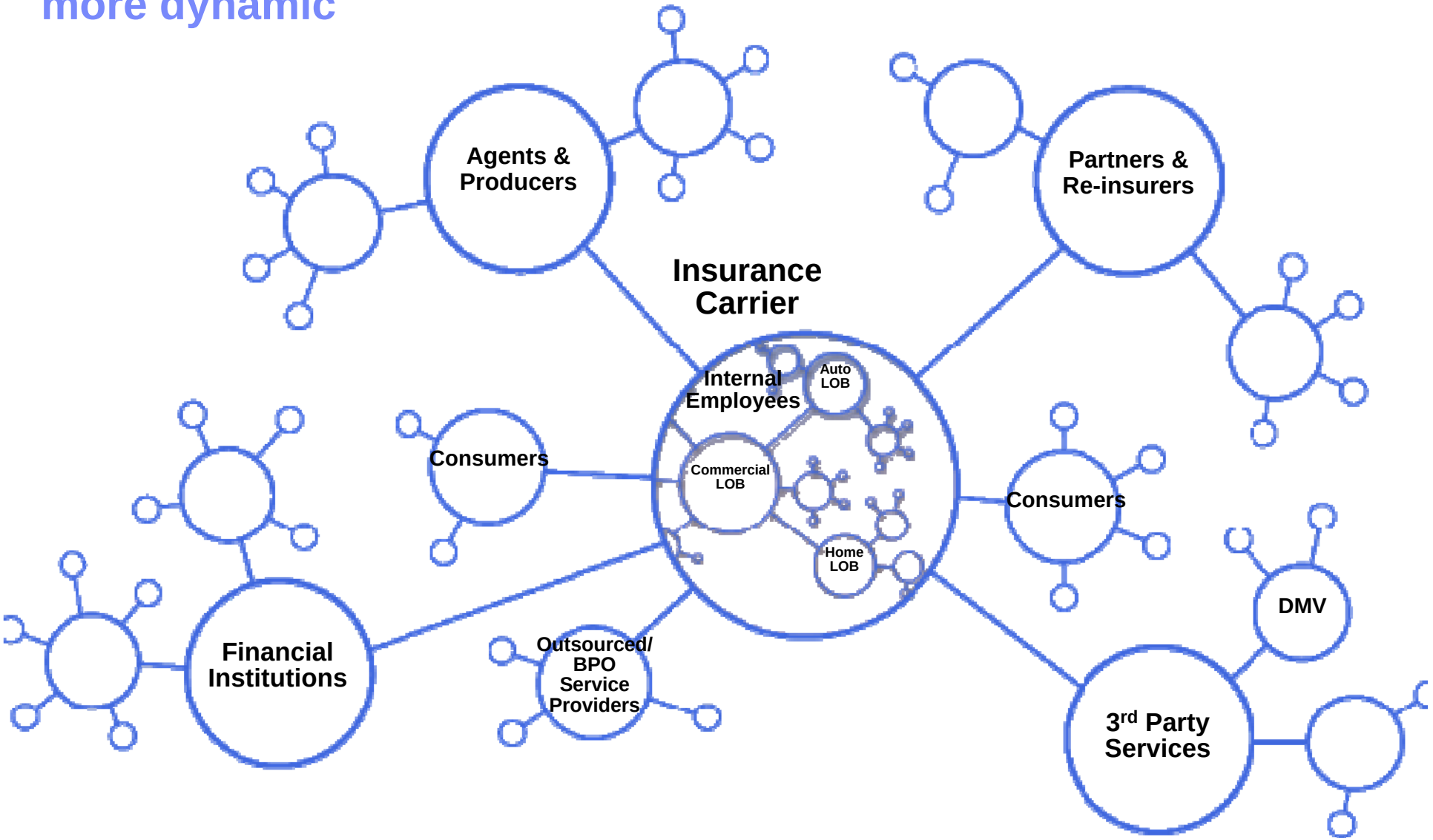
Our business networks…are becoming broader…and much more dynamic



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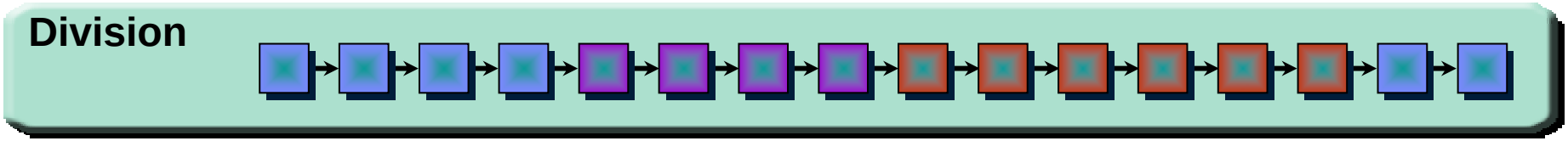
Where We Are Heading – Start



Case Study: Procure to Pay Process

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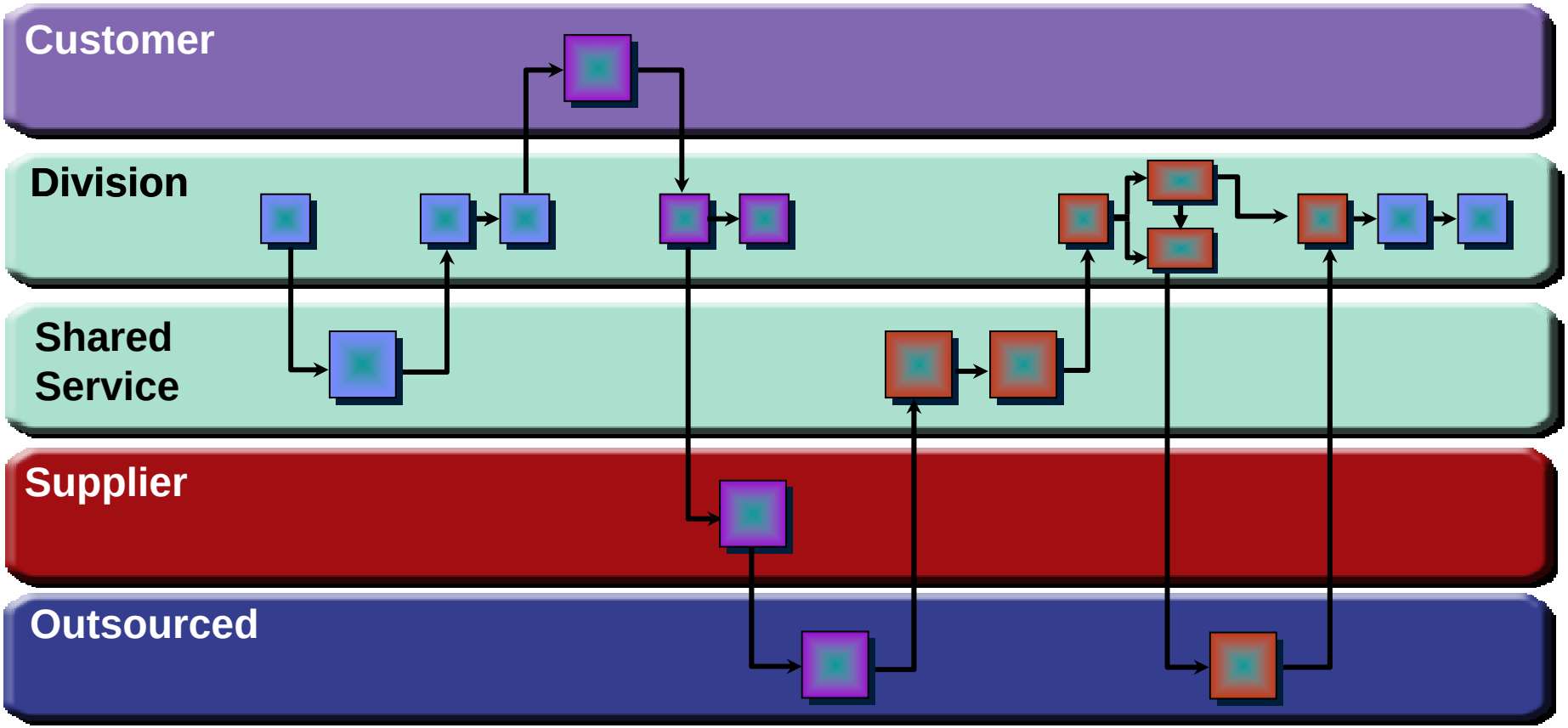
Where We Are Heading – Goal



Case Study: Procure to Pay Process

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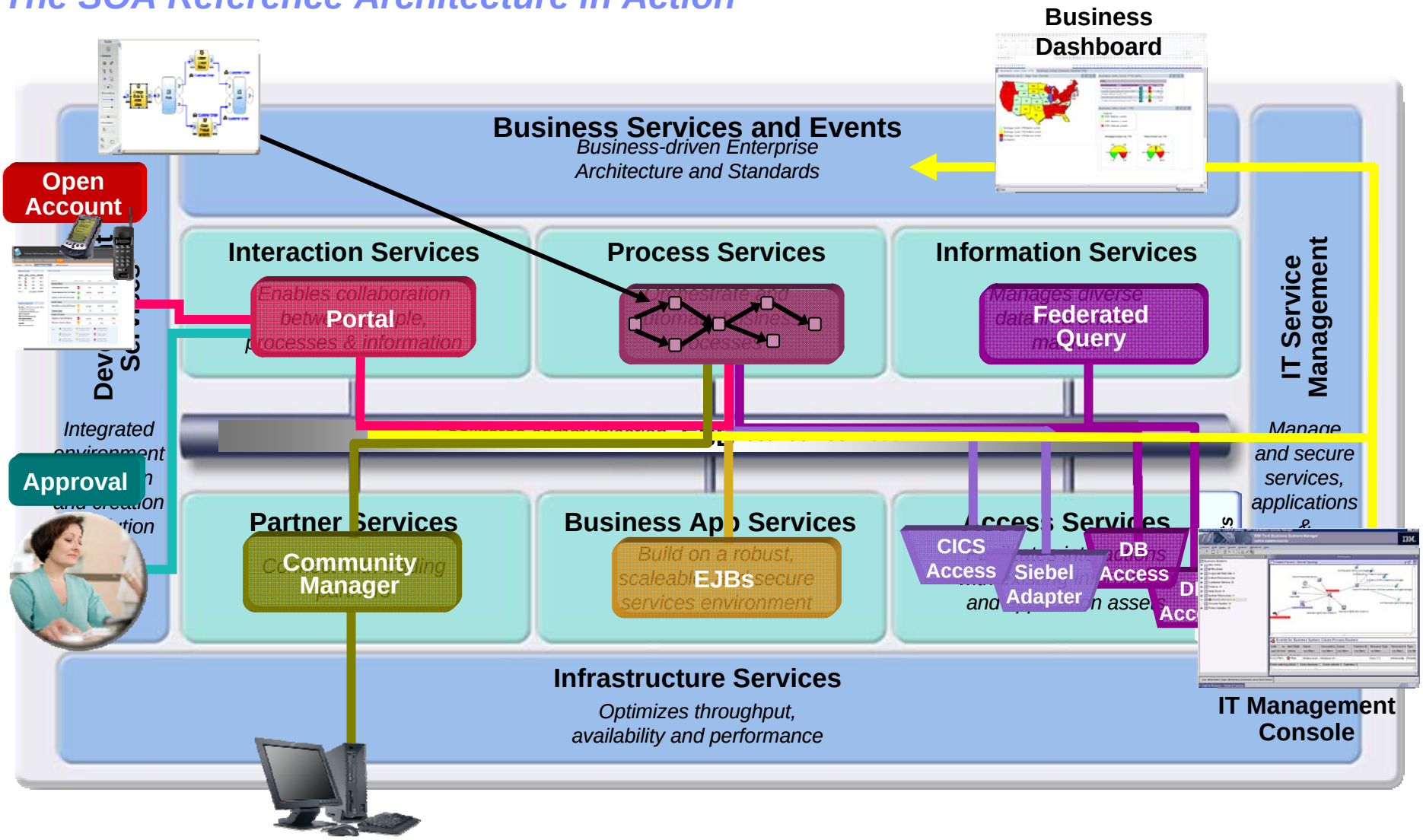
Separation of Concerns: Example "Open Account" Process

The SOA Reference Architecture in Action



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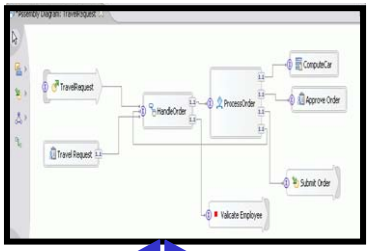
Process Services: Managing Your Business Processes

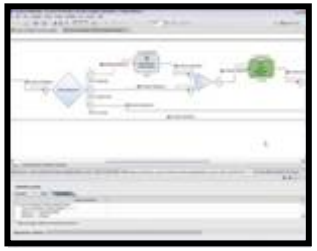
Process Assembling

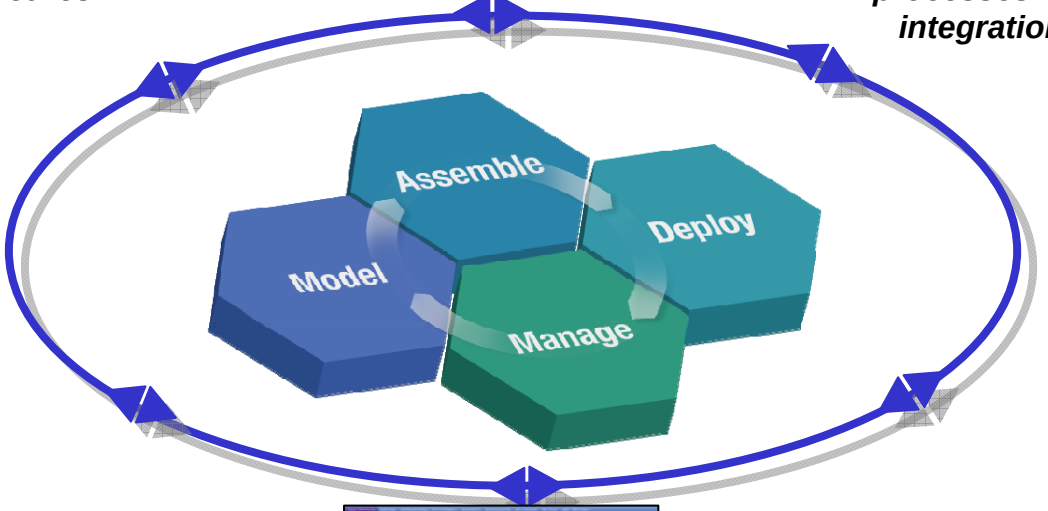


Clean hand-off from IT with Business Models, Metrics

Constructs for dynamic and adaptive business processes based on an integration platform

Business Process Modeling





Process Server

Feedback for continuous improvement

Real time management of business processes

Business Process Monitor

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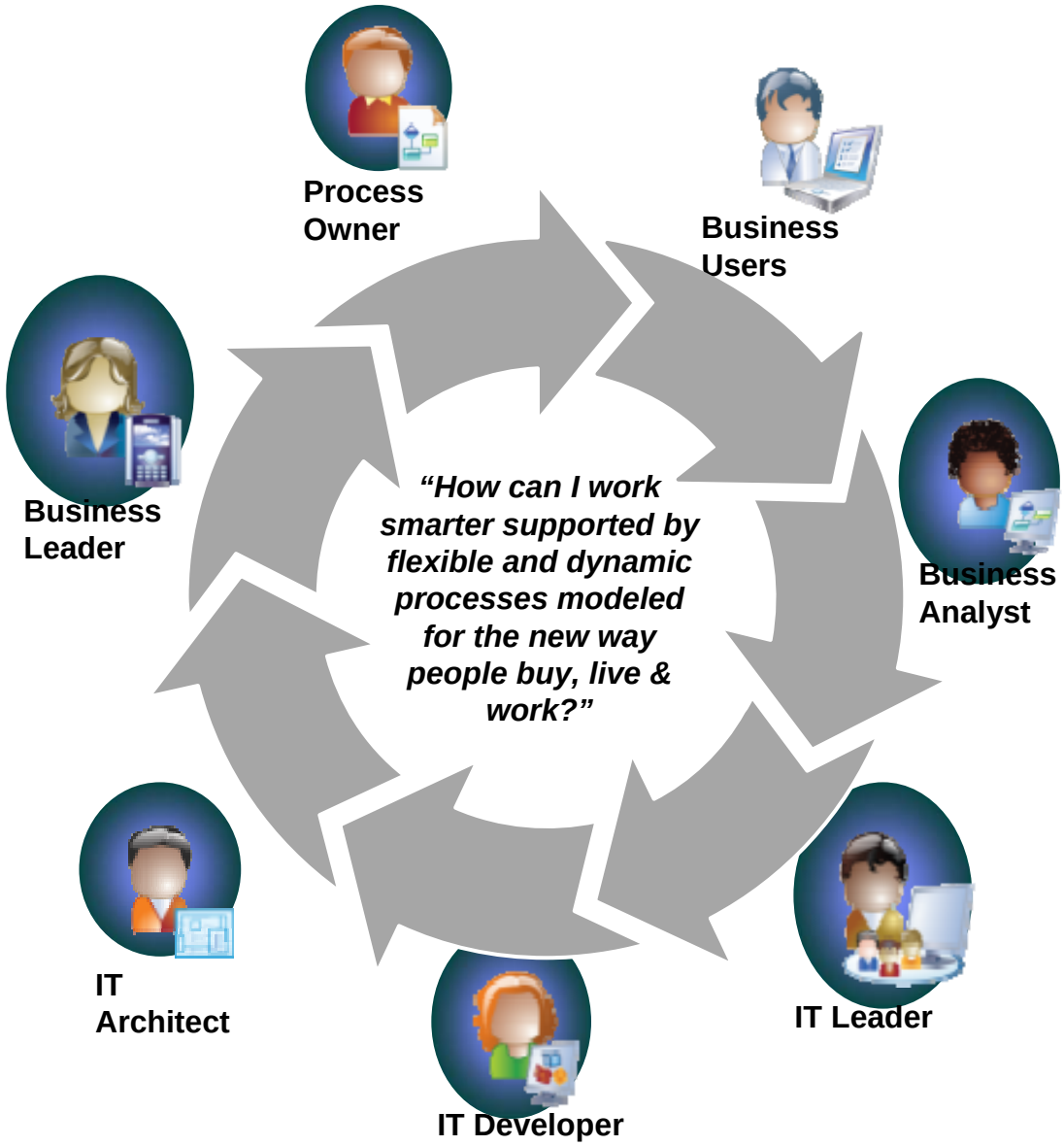
Business Process Management is a team sport …



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Key Roles in BPM

Business Leader

Responsible for Overall Business Performance, Compliance, and Governance

Business Professional

Manage business performance and decides on strategic and tactical needs for a specific area of responsibility

Business Analyst

Interprets business professional and business leader requests and documents them into process models

Process Analyst

Specialized business analyst that concentrates on the simulation & analysis of processes in their business environments and their interactions

IT Leader

A Business Leader responsible for delivering technology solutions that enable the business

IT Analyst

Interprets business analyst inputs/requirements in the context of IT capabilities, works with team on IT-based Business Process improvement

IT Architect

Defines basic operational imperatives in the provision of IT services with a focus on resiliency, reuse, and adaptability

IT Developer

Follow's IT Architectural principles to create 'building' blocks for the construction of applications

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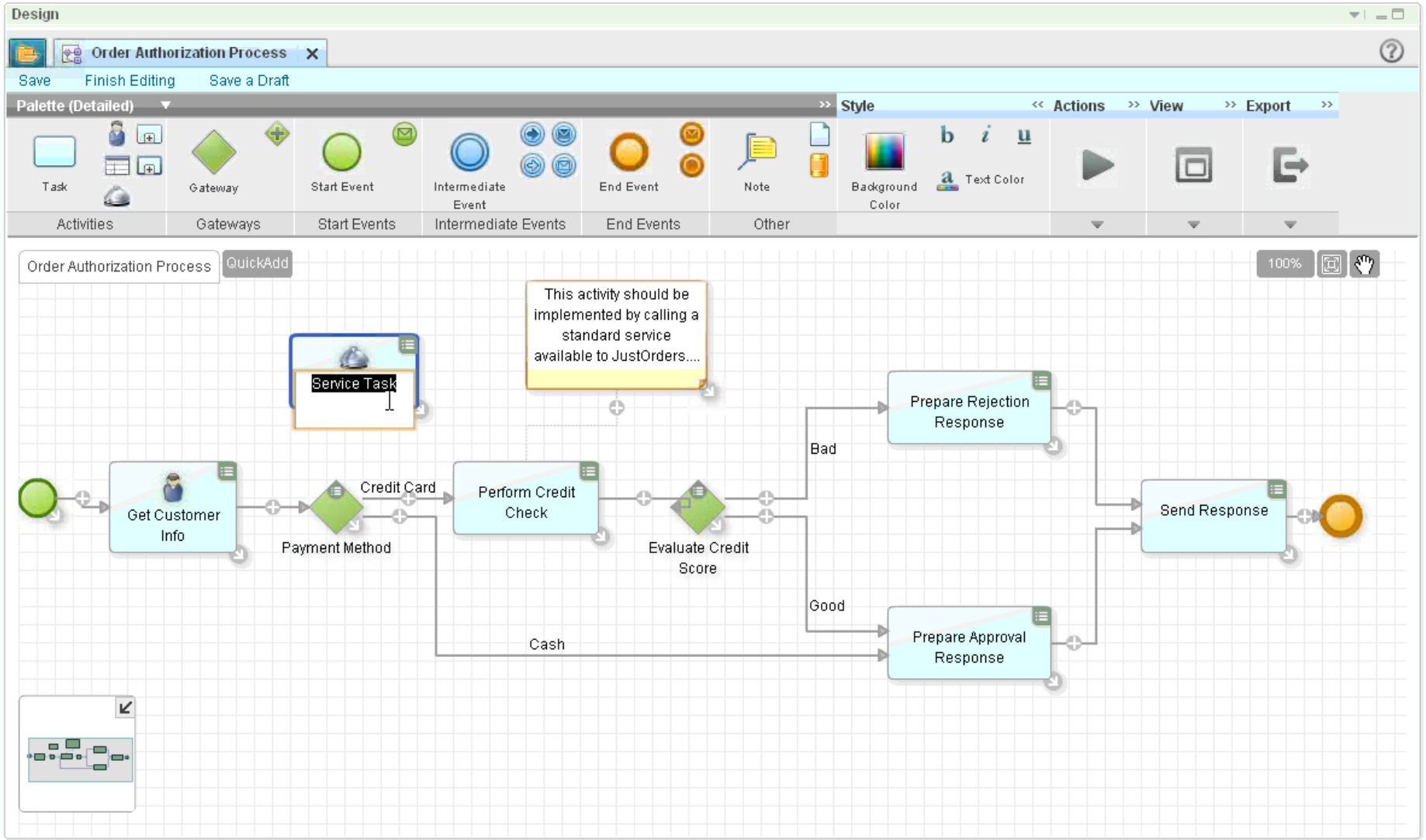
Modeling a Business Process – Tasks, Flows, Organization, … Standard is BPMN (Business Process Modeling Notation)

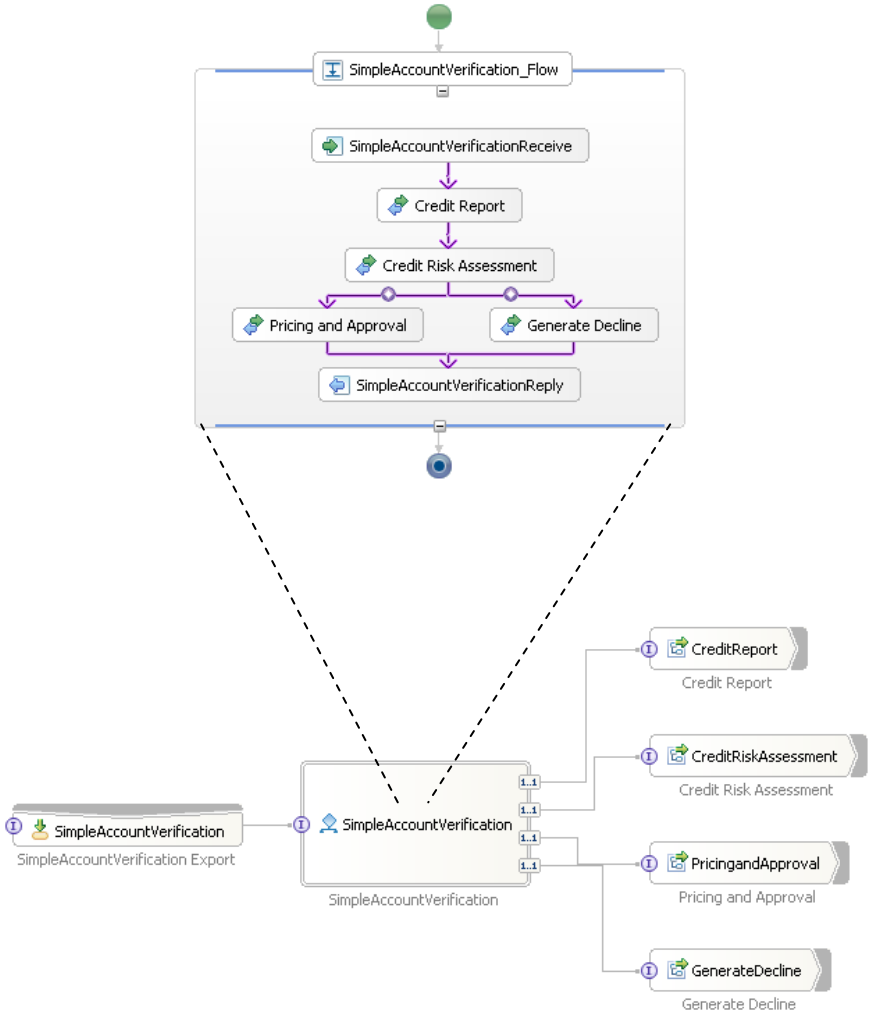


Process Services: Business Process – Assemble and Deploy for Execution

- **Assemble a Business Process Model**
  - **Import the Process Model Modeling**
  - **Graphical Notation for BPEL (Business Process Execution Language)**

- **Assembling**
  - **Apply the building-block approach**
  - **Integrate services provided by service components**

Role: Integration Developer



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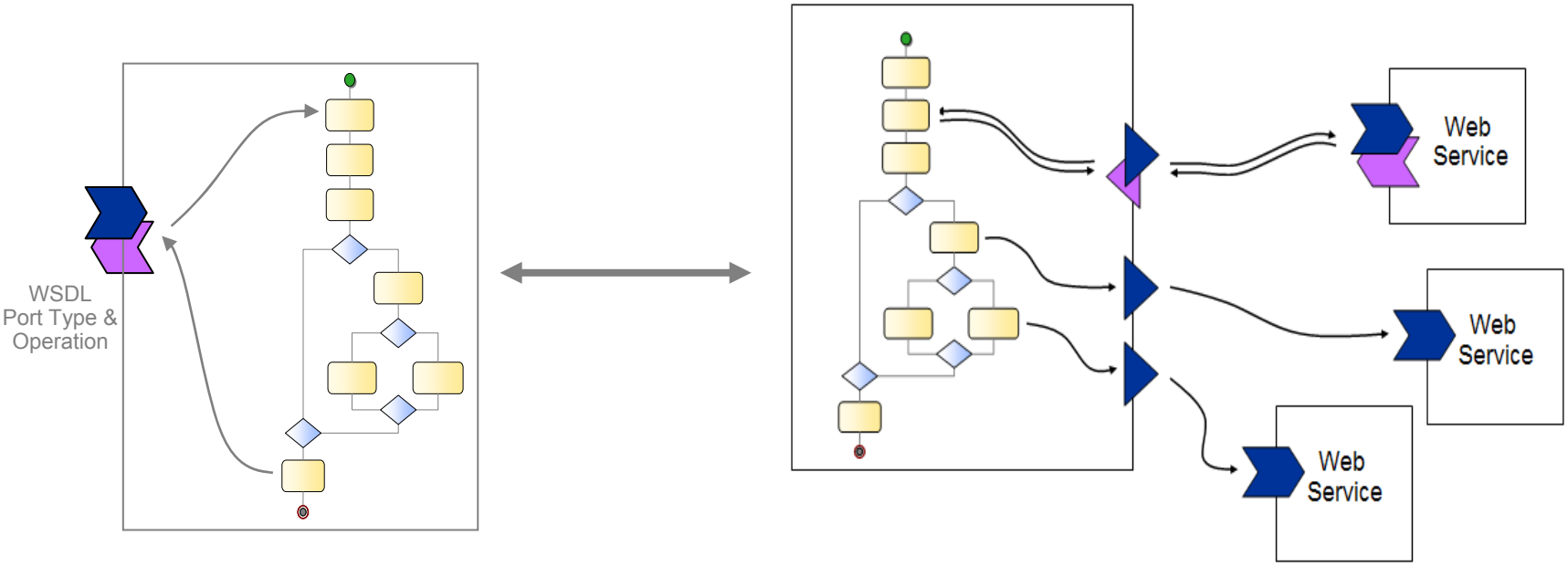
What is BPEL (Business Process Execution Language)

- **Use the specification of a Business process**
- **Assemble the process and (web) services**

As Web Services **Orchestrating Web services**



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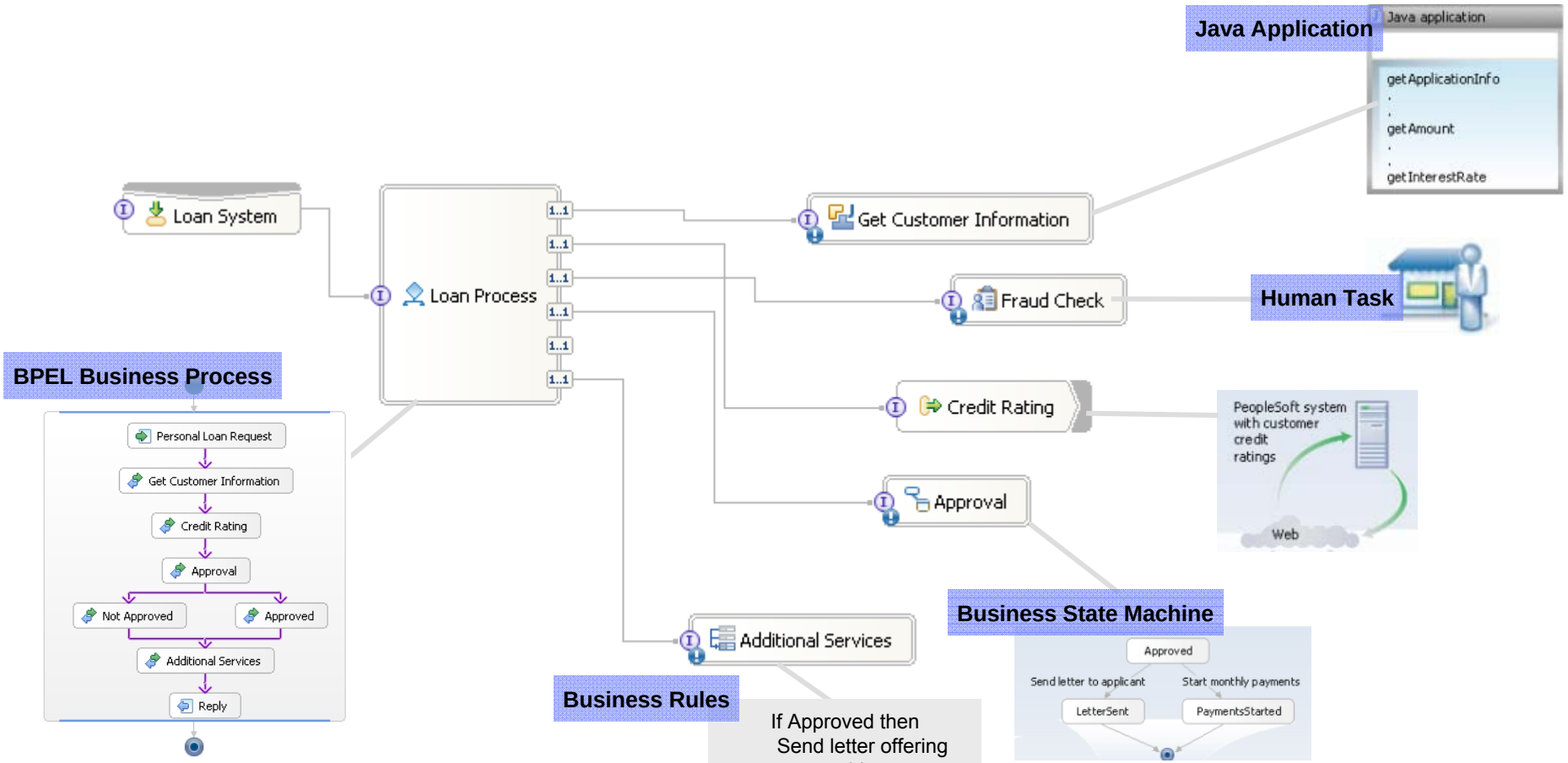
Common Invocation Model



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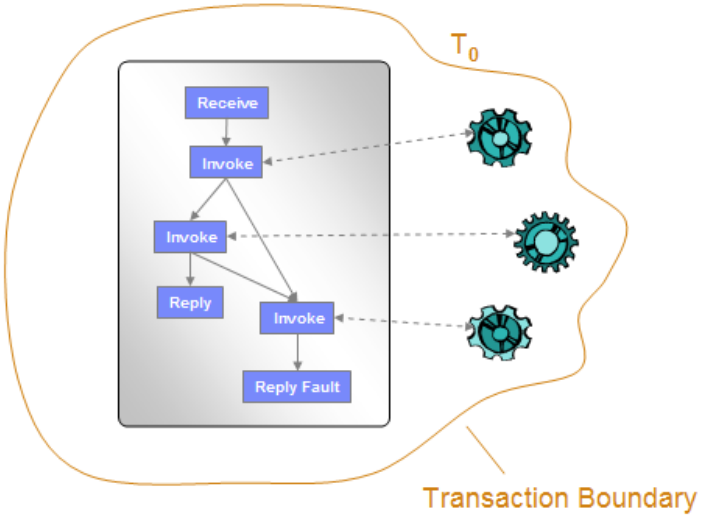
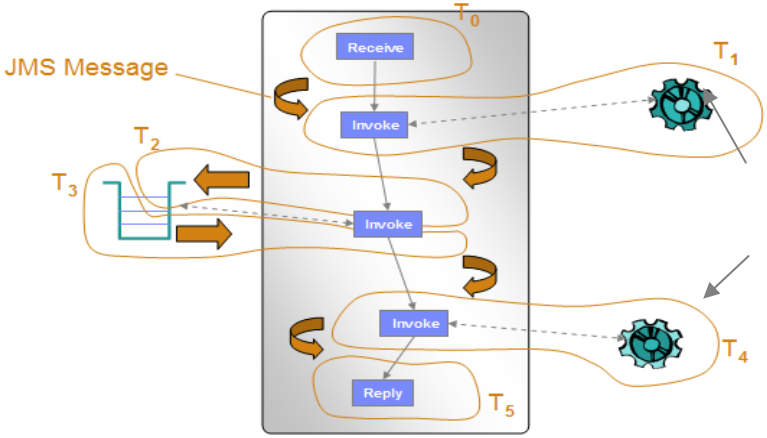
WS-BPEL Business Process: Microflows and Macroflows





Microflows
One Transaction

Macroflows
Multiple Transactions
And compensation transactions

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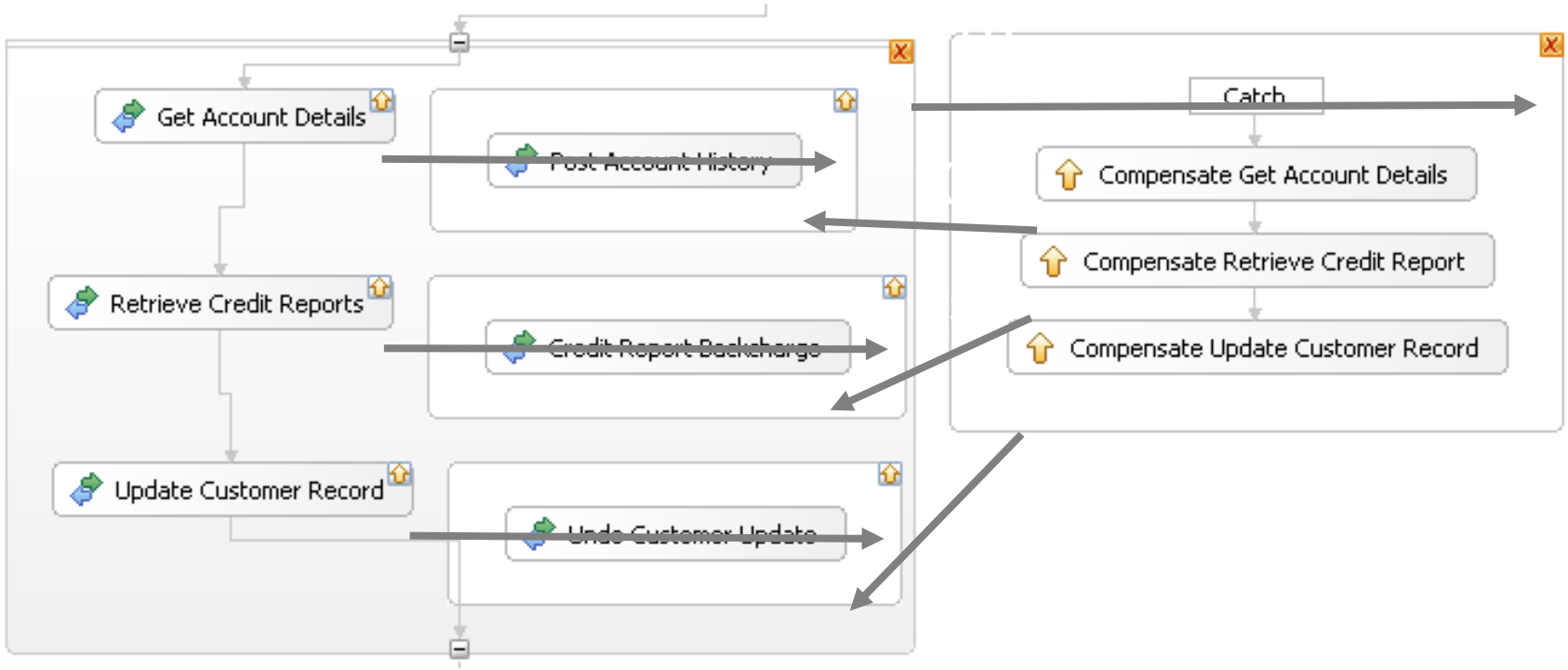
BPEL Business Process: Compensation



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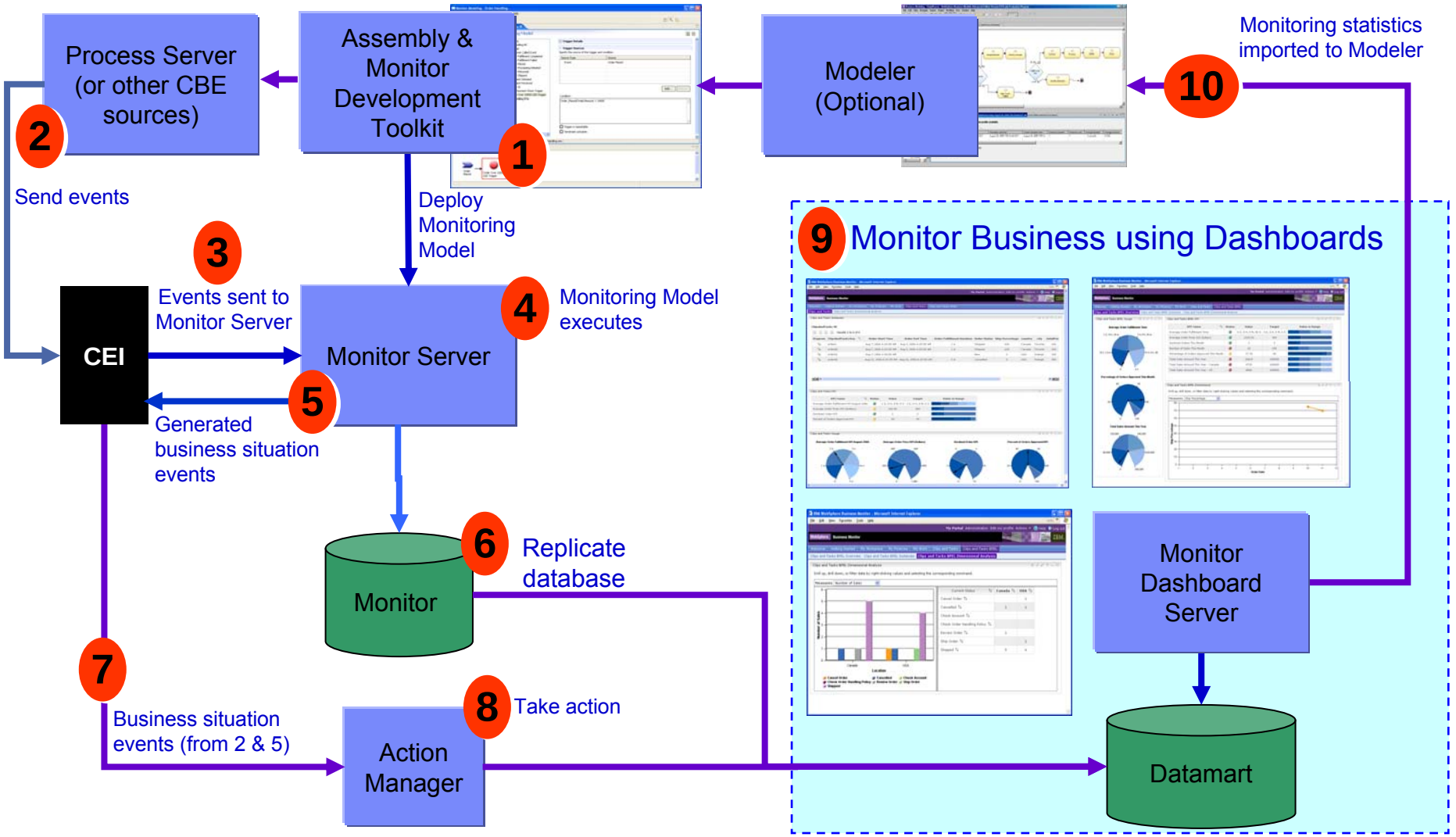
Logical Architecture for Business Activity Monitoring



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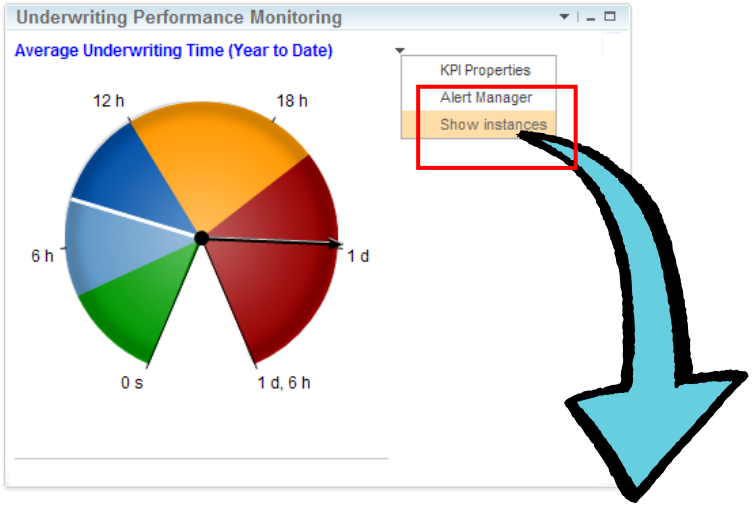
Monitoring Example: Drill to Instances



- Improved identification of the source of business problems through dynamic drill down from aggregate data to individual instances contributing to the problem – *KPIs to Instances*

Instances

Export ... Search for: Reset

Diagram	Loan ID	Loan Type	Size of Loan	Rate	Status	Loan Document MC	Associate ID	Credit Check Duration	Underwriting Duration
	11000	Jumbo	525,000	5.375	Completed		Tim Copner	12 h, 0 m, 0 s	1 d, 1 h, 0 m, 0 s
	18000	Conforming	10,000	5.875	Processing		Steve Haskey	4 h, 0 m, 0 s	18 h, 0 m, 0 s
	21000	Conforming	200,000	5.5	Rescinded		Paul Lyon	8 h, 0 m, 0 s	1 d, 0 h, 0 m, 0 s
	6000	Conforming	200,000	6	Processing		Paul Lyon	16 h, 0 m, 0 s	22 h, 0 m, 0 s
	1000	Conforming	350,000	6.125	Completed		Jane Parsons	9 h, 0 m, 0 s	1 d, 3 h, 0 m, 0 s
	8000	Conforming	200,000	6	Processing		Paul Lyon	16 h, 0 m, 0 s	22 h, 0 m, 0 s
	7000	Conforming	200,000	5.5	Rescinded		Paul Lyon	8 h, 0 m, 0 s	1 d, 0 h, 0 m, 0 s
	14000	Conforming	350,000	6.125	Completed		Jane Parsons	9 h, 0 m, 0 s	1 d, 3 h, 0 m, 0 s
	15000	Conforming	350,000	6.25	Completed		Jane Parsons	2 h, 0 m, 0 s	1 d, 4 h, 0 m, 0 s
	23000	Jumbo	525,000	5.375	Completed		Tim Copner	12 h, 0 m, 0 s	1 d, 1 h, 0 m, 0 s

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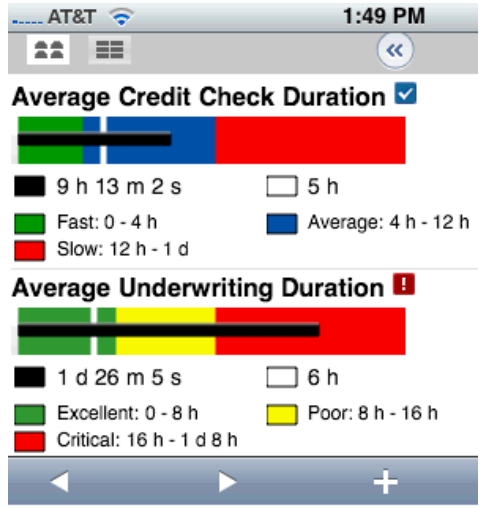
Experience Monitor through your iPhone



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Software Engineering for SOA

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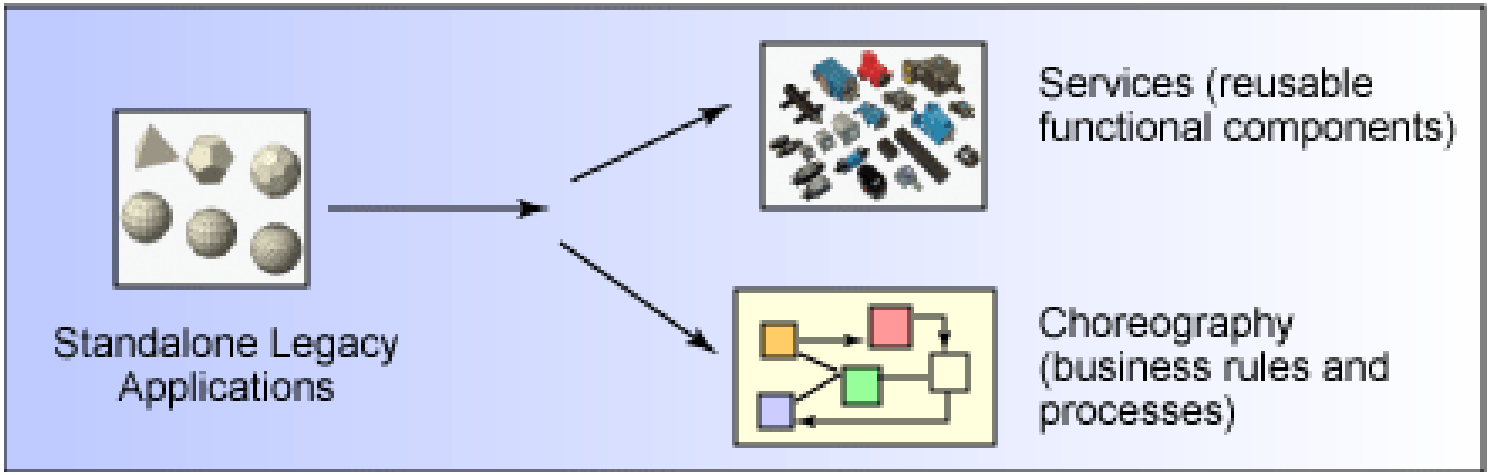
Enablement of Business Integration

- **Business and IT are no longer separate tracks**
- **Choreography of services**
  - **The sequencing, selection, and execution of operations**



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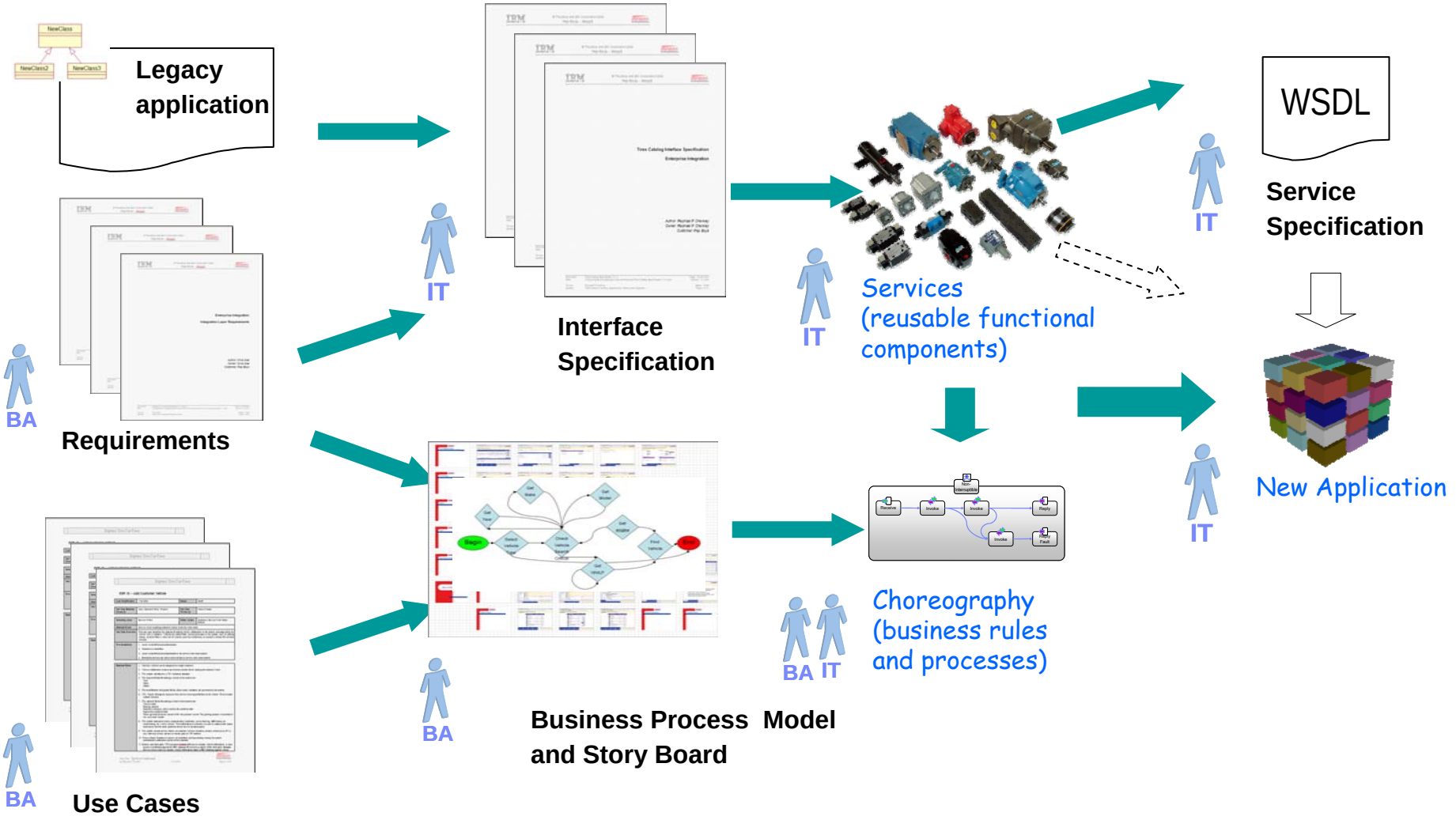
BDD Overview (including Legacy Applications)



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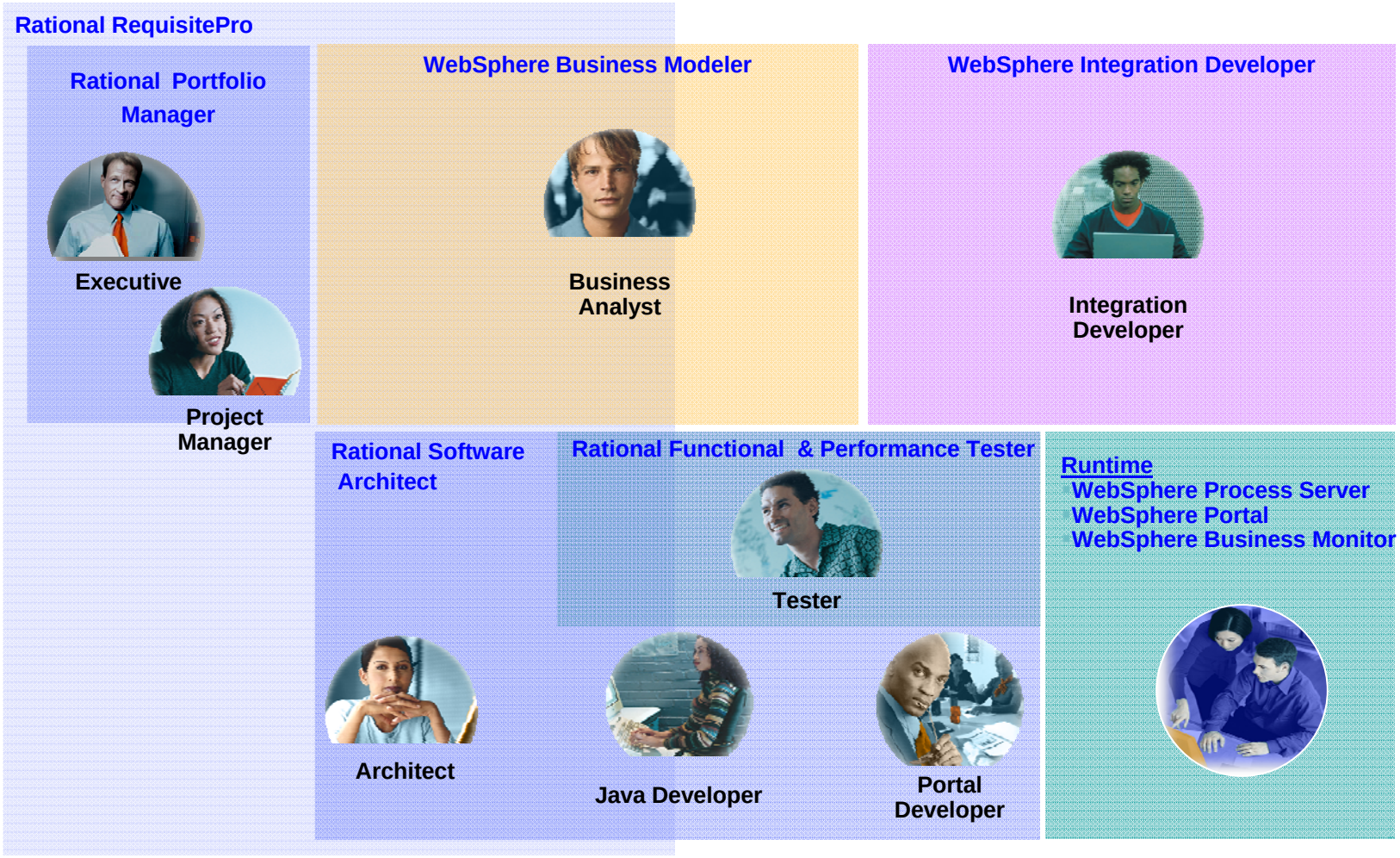
Areas for Business Driven Development



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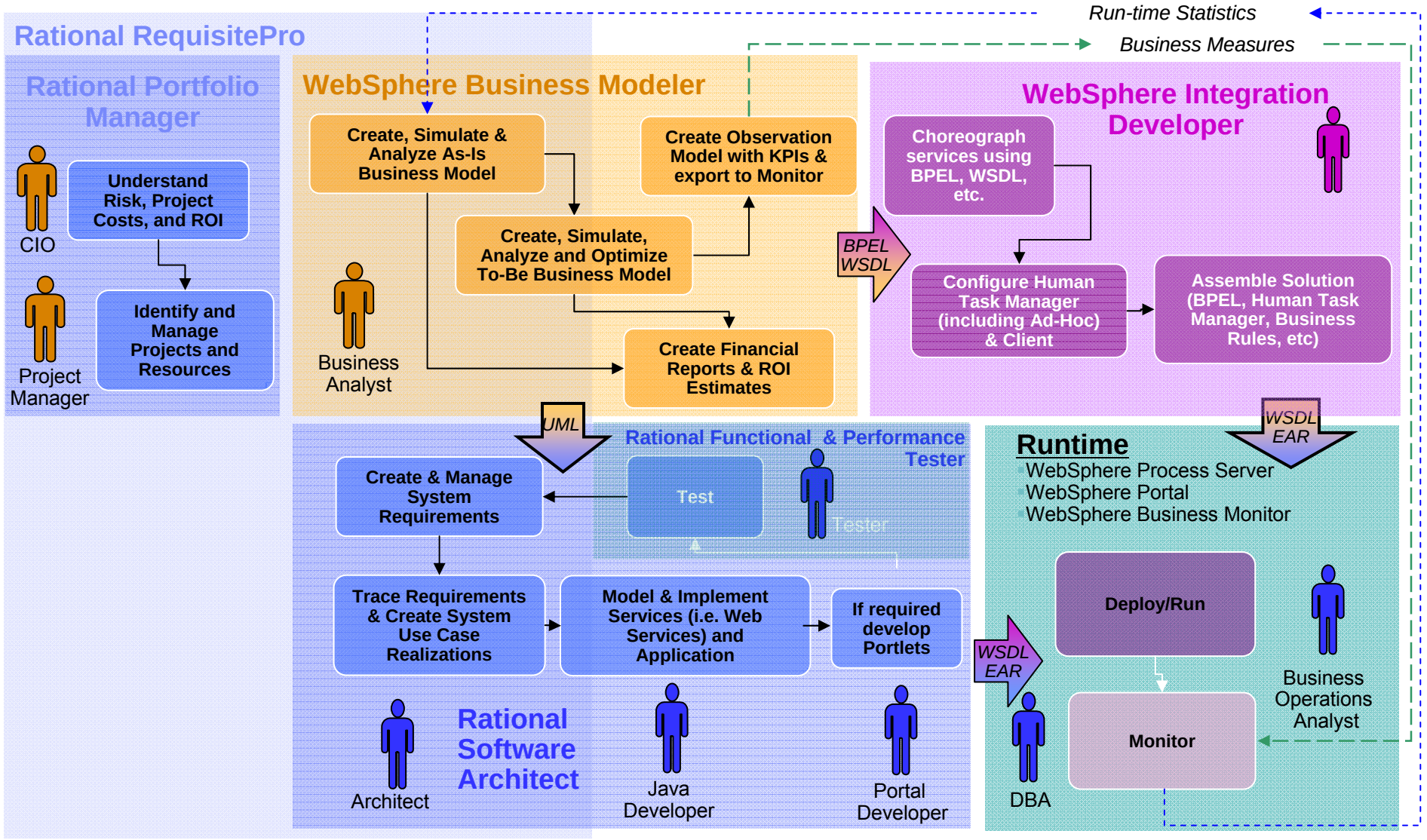
Big Picture of BDD for SOA



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Home Work (Possible Solution)

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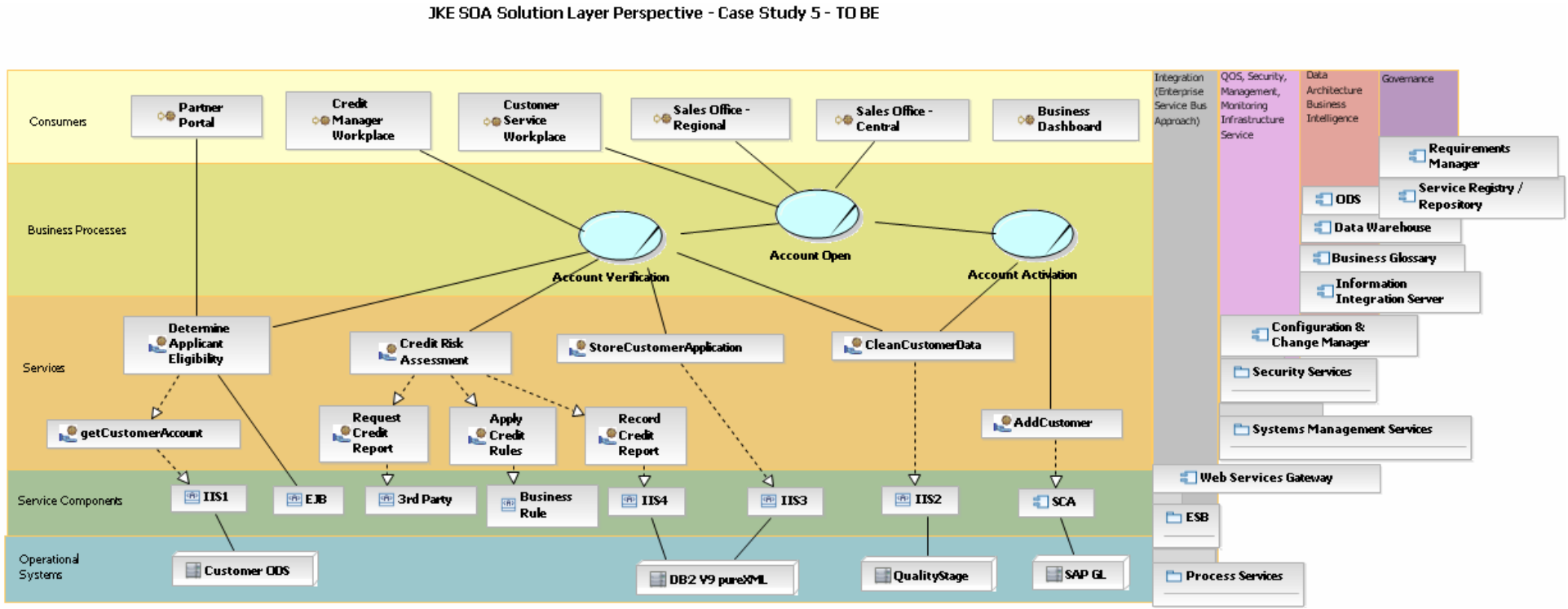
SOA Solution Layer Perspective – possible Solution



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