



IBM SOA PoT

# C2080 The Enterprise Service Bus

## Technical Overview



## Industry analysts confirm multiple ESB future

### ESB Adoption Trends - Gartner

**“80% of large companies will have ESBs or similar SOA infrastructure products from three or more vendors in 2009. (0.7 probability)”**

**“...half of all large companies will apply a systematic, federated approach to managing their disparate SOA domains and ESBs in 2009. (0.7 probability)”**

– Roy Schulte, Gartner, *“Succeeding With Multiple SOA Service Domains and Disparate ESBs”*, May 2007

### ESB Adoption Trends - Forrester

**“Some of Forrester's most advanced clients got on the ESB bandwagon years ago and today find that they have an embarrassment of riches, with multiple ESBs. This outcome is almost inevitable for larger enterprises; no single ESB today can satisfy all requirements equally well across the whole of a large enterprise.”**

– Larry Fulton, Forrester, *“Shaping Your Middleware Strategy to Benefit from ESBs”*, May 2007

## The Enterprise Service Bus

*An Enterprise Service Bus (ESB) is a flexible connectivity infrastructure for integrating applications and services.*

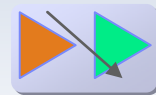
*An ESB performs the following between requestor and service*



**MATCHES & ROUTES** communications between services



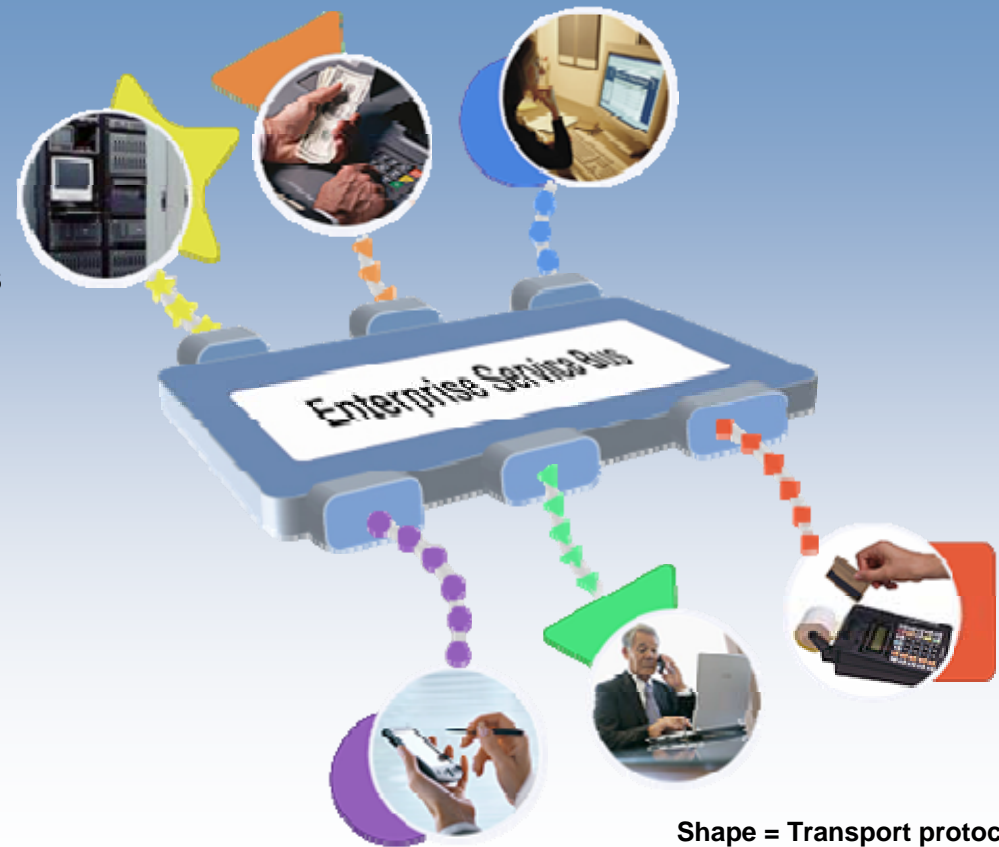
**CONVERTS** between different transport protocols



**TRANSFORMS** between different data formats

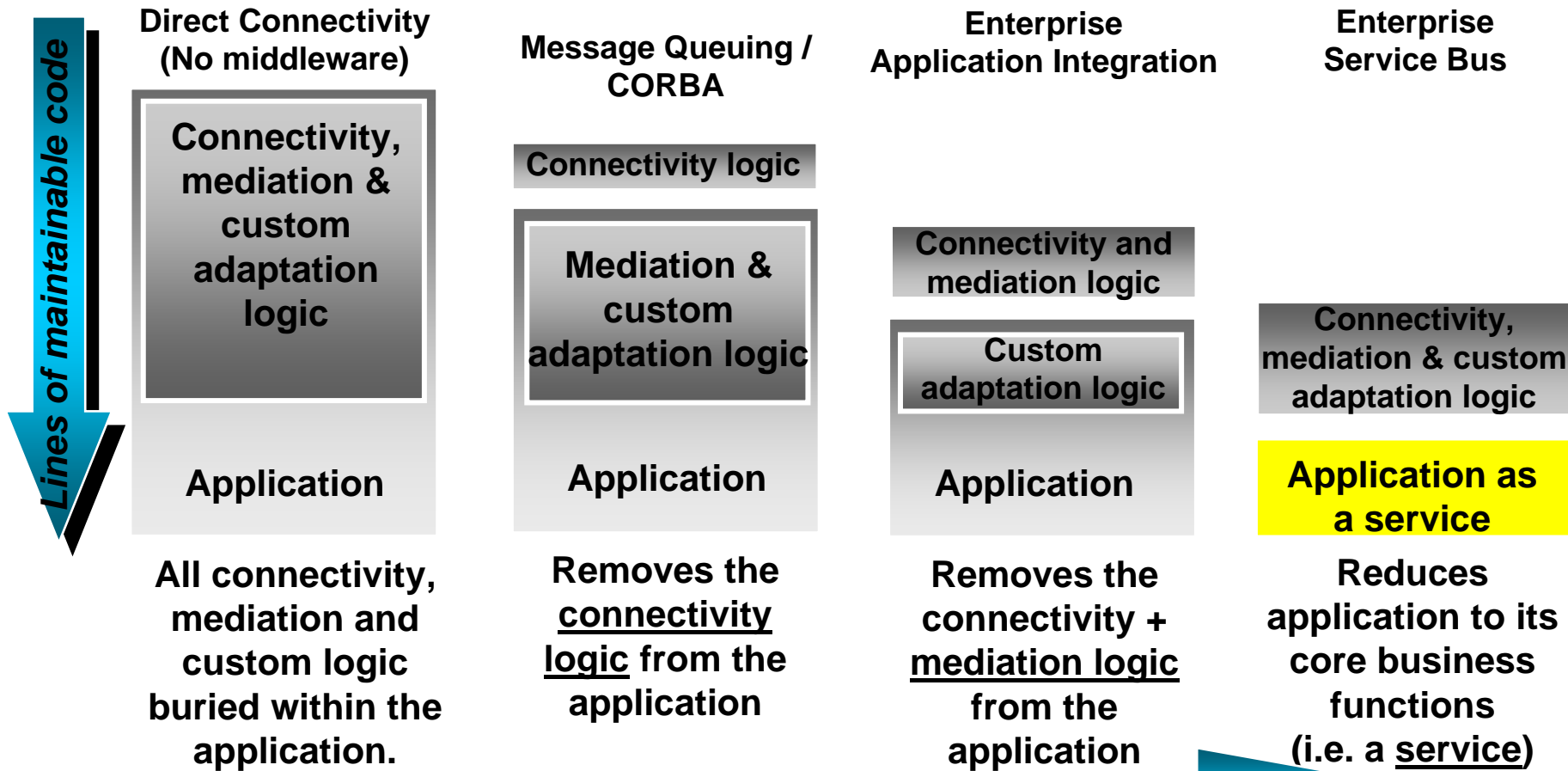


**IDENTIFIES & DISTRIBUTES** business events



Shape = Transport protocol  
Color = Data format

## ESB is the next stage in the technology evolution



**Reduced development and maintenance; increased flexibility and reuse**

## Core Principles of the ESB Architectural Pattern



- **ESB inter-connects requestor and provider**
  - Interactions are decoupled
  - Supports key SOA principle – separation of concerns
- **ESB provides Service Virtualization of**
  - Identity via routing
  - Protocol via conversion
  - Interface via transformation
- **ESB also enables Aspect Oriented Connectivity**
  - Security
  - Management
  - Logging
  - Auditing
  - ...

## Why an ESB to Meet Your Connectivity Needs?

*Flexible Connectivity Infrastructure for Integrating Applications and Services*

- Reduce the number, size, and complexity of interfaces
- Reduces cost and risk involved as business changes and new opportunities arise
- Promotes reuse – Data and business logic more usable, and applications easier to service-enable
- Dynamic real-time, event-driven SOA – replacing unresponsive, batch-updating IT systems

### Leverage the benefits

***Reliable and secure data movement*** – anywhere in the enterprise

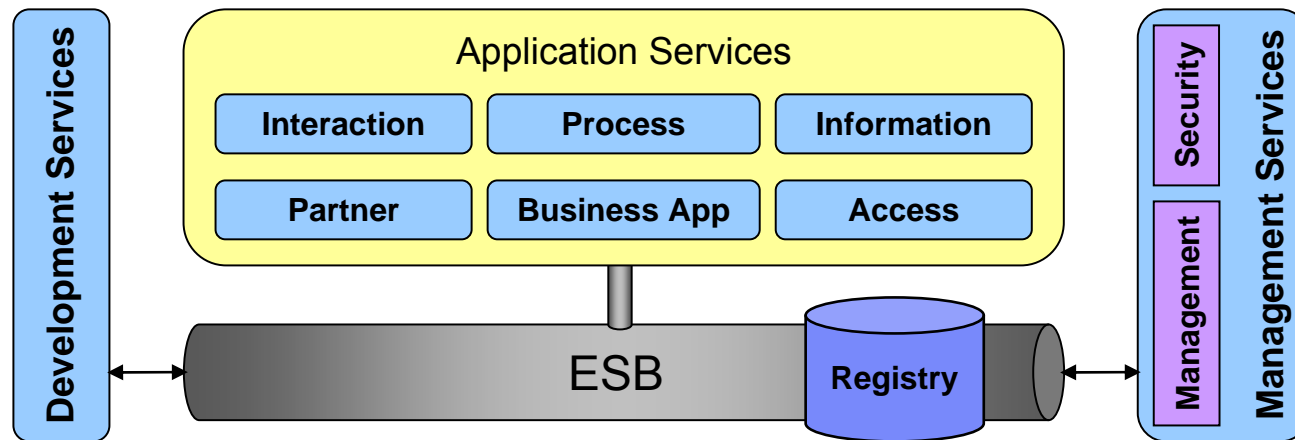
***Application Programmers focused on logic*** – simplified programming tasks

***Dedicated environment*** – Common tooling, management and operational support





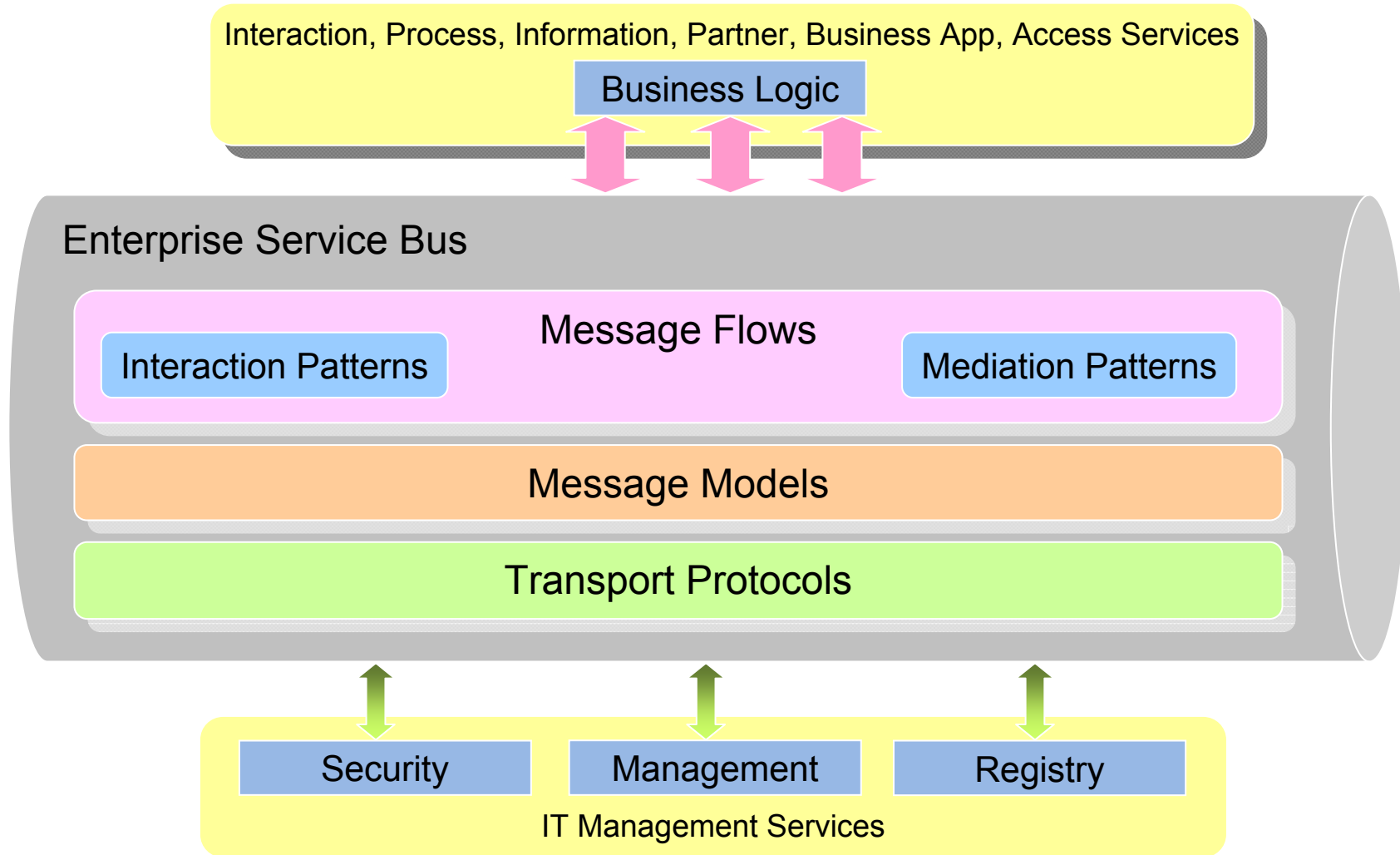
## An ESB-centric view of the Logical Model



- Outside ESB
  - Business Logic (Application Services)
    - ESB **does** contain integration logic or connectivity logic
    - Criteria: semantics versus syntax; aspects
- Loosely coupled to ESB
  - Security and Management
    - Policy Decision Point outside the ESB
    - ESB can be Policy Enforcement Point
- Tightly coupled to ESB
  - Service Registry
    - Registry a Policy Decision Point for ESB
    - ESB a Policy Enforcement Point for Registry
    - But, Registry has a broader scope in SOA
- Tooling required for ESB
  - Development
  - Administration
  - Configures ESB via Service Registry

More details at: <http://www.ibm.com/developerworks/library/ar-esbpat1/>

## Expanded View of the Enterprise Service Bus





## Connectivity 1: Internal Connectivity

### Business challenge

- Make real time stock information available between stores and headquarters
- Integrate disparate store systems

### Solution

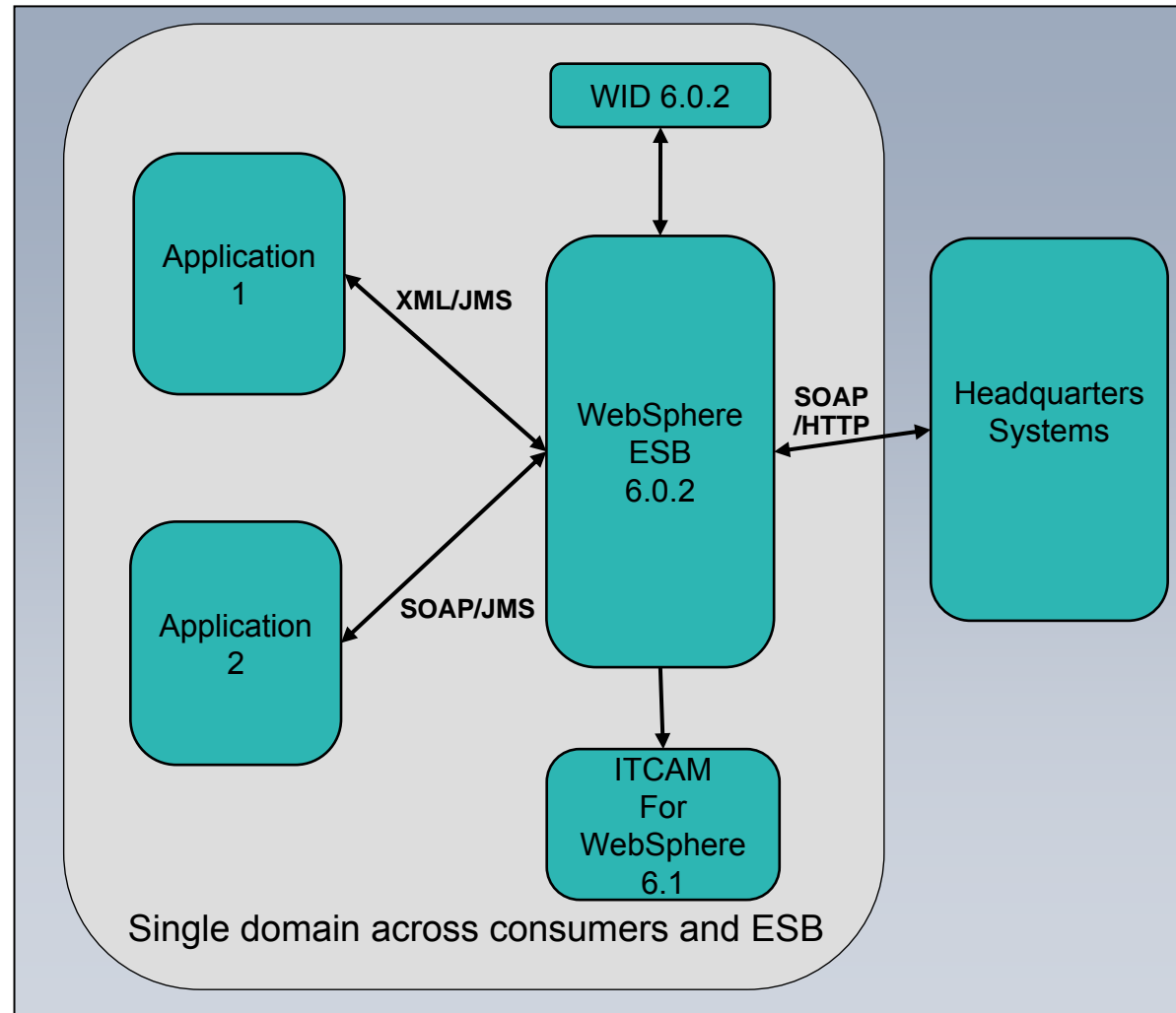
- Create standards based services and connect using an ESB
- Cost sensitive wrt to store systems

### Implementation Details

- Applications communicate using standards based services
- ESB provides protocol and message transformation and routing

### Products

- WebSphere Integration Developer 6.0.2
- WebSphere Enterprise Service Bus 6.0.2
- Tivoli Composite Application Monitor for WebSphere V6.1



## Connectivity 2: Gateway

### Business challenge

- Insurance broker needs to easily and securely connect to insurance providers

### Solution

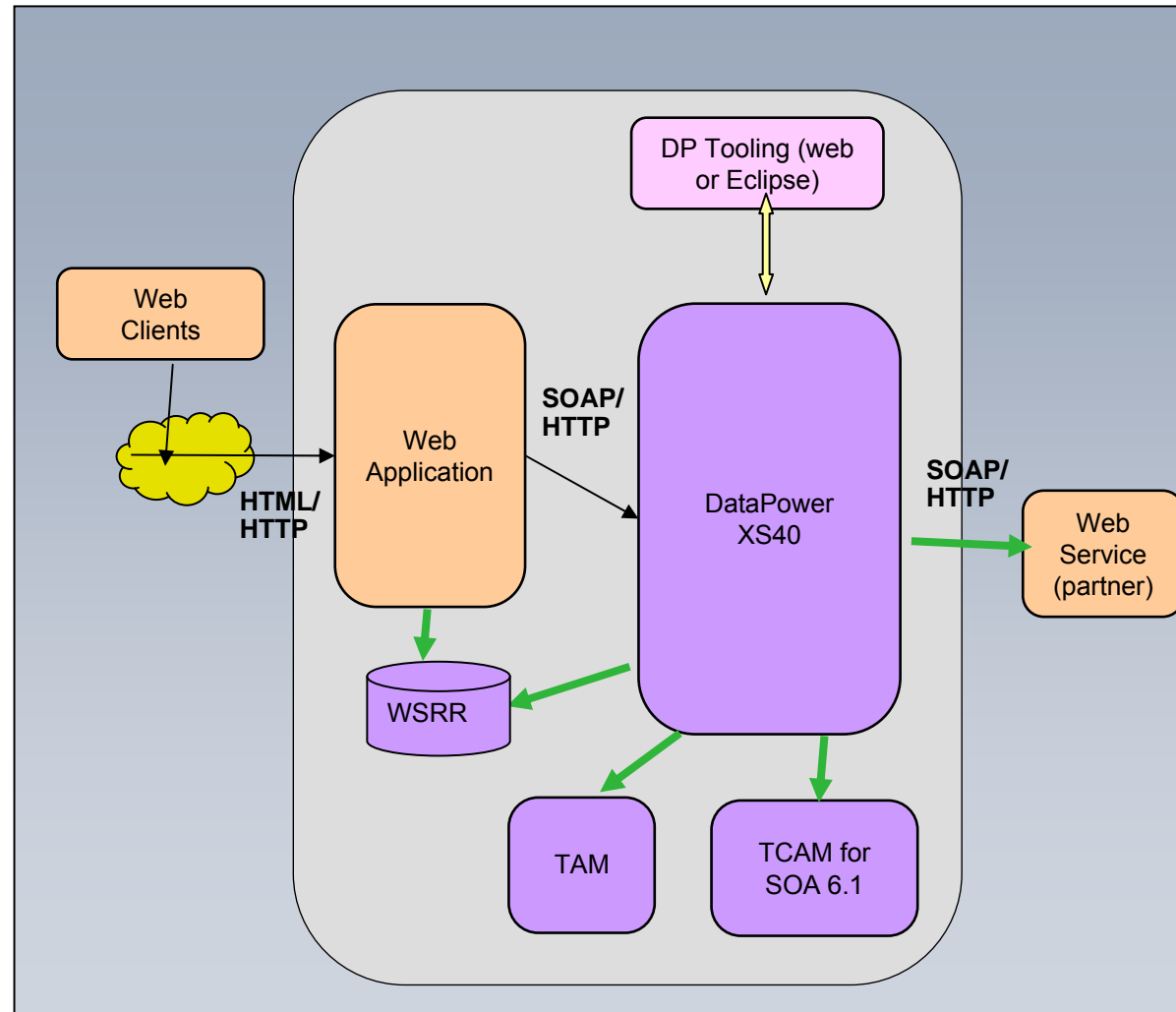
- Use standards based web services for information exchange with partners
- Use a Gateway ESB for security and routing
- Use Registry for partner services information at runtime
- Monitor partner interactions for SLAs

### Implementation Details

- Use SOAP/HTTP
- TAM for authentication info

### Products

- DataPower XS40
- Tivoli Composite Application Monitor for WebSphere V6.1
- Tivoli Access Manager V5.1
- WebSphere Service Registry and Repository 6.0



## Connectivity 3: Expose existing systems to heterogeneous clients

### Business challenge

- Share citizen information anonymously between various government agencies

### Solution

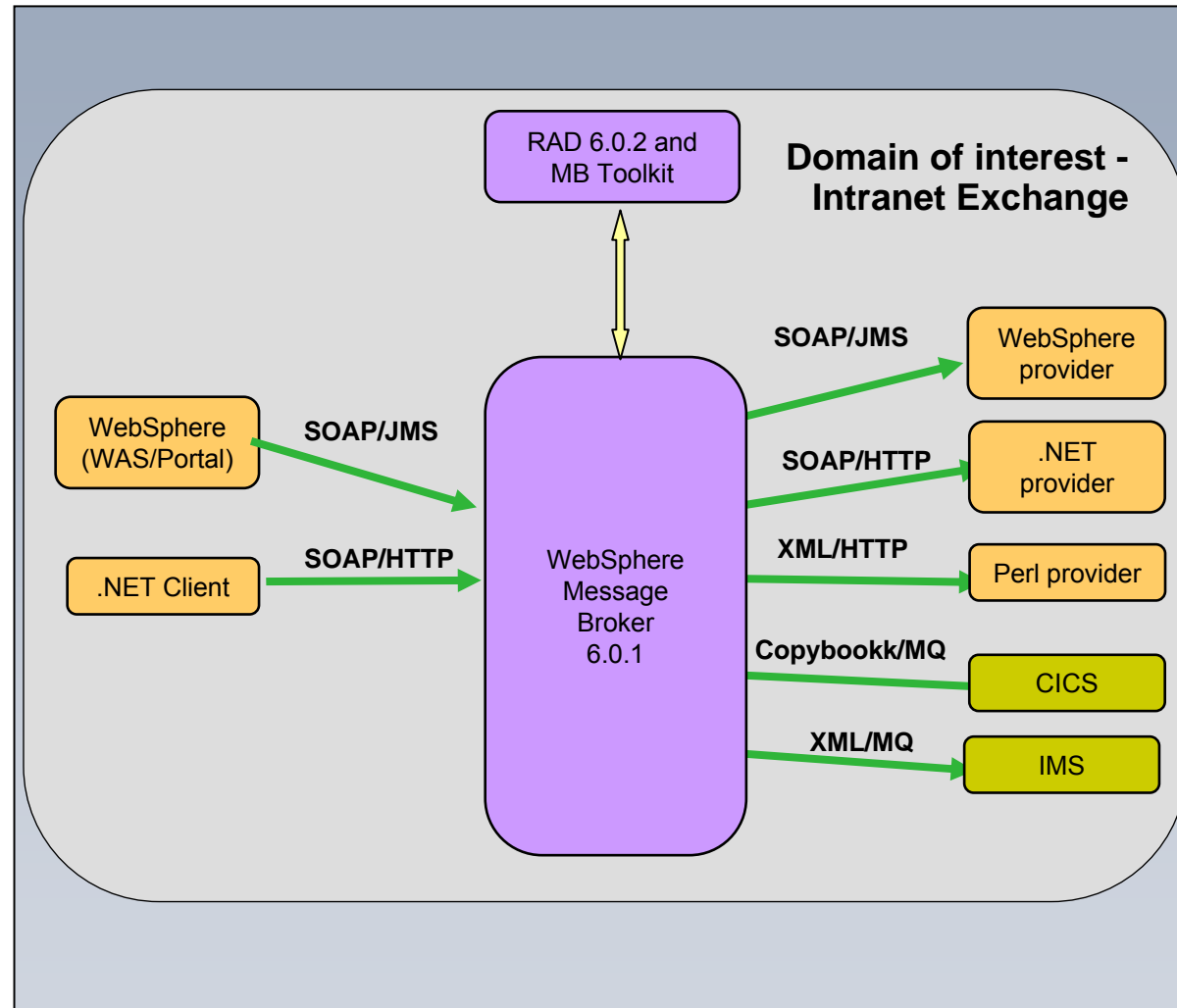
- Adapt messages from backend systems to standards based service definitions using an ESB

### Implementation Details

- The ESB provides a wide variety of protocol and message format transformation and routing capability

### Products

- Rational Application Developer 6.0.2 and Message Broker Toolkit
- WebSphere Message Broker 6.0.1



## Connectivity 4 - Adapting enterprise applications to Web services

### Business challenge

- provide web service access to functionality in SAP R/3 and in the future other EIS systems.

### Solution

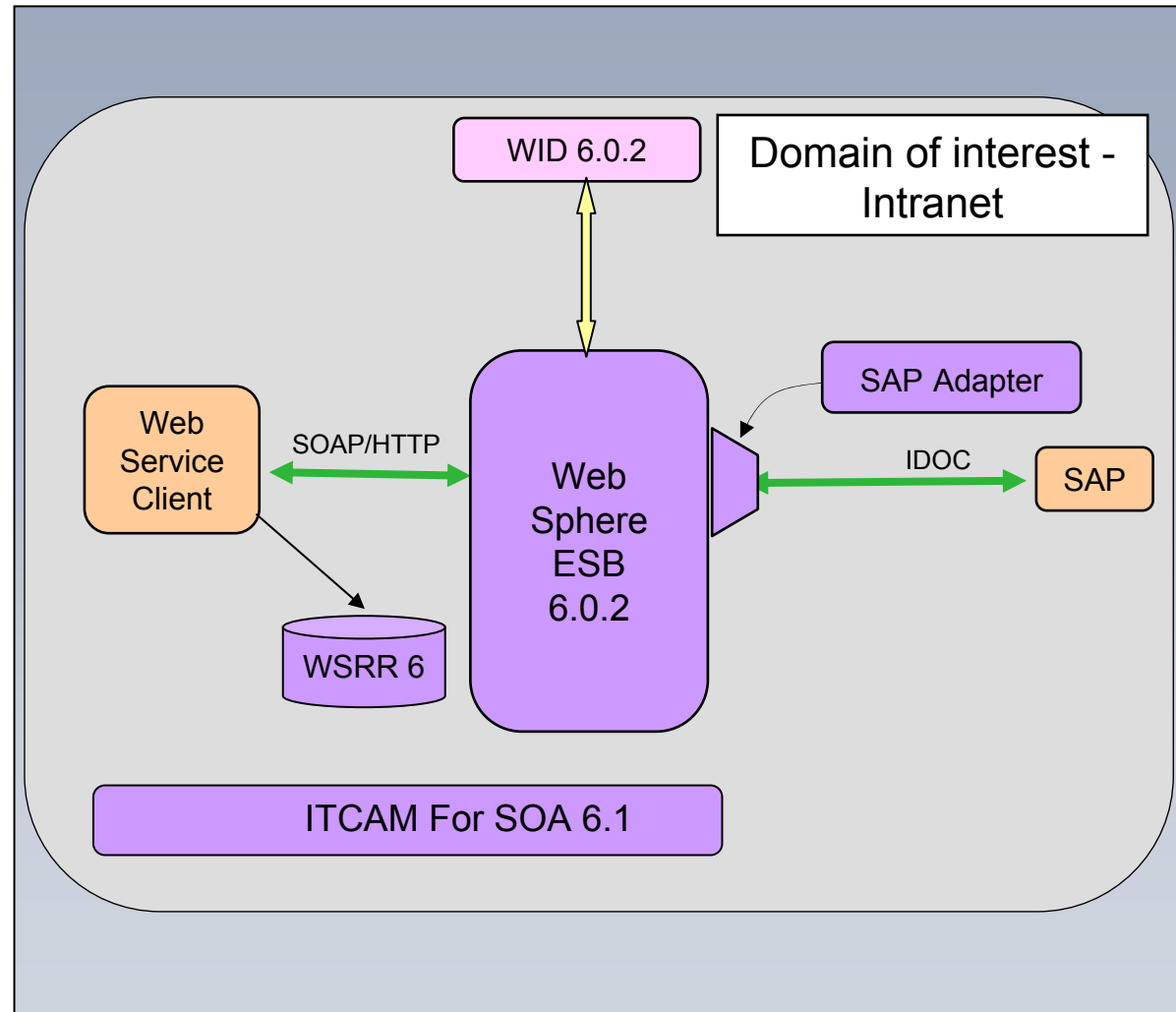
- Adapt between SAP system and web services using an ESB.

### Implementation Details

- The SAP adapter provides access to SAP as a BO. WebSphere ESB converts the message format and exposes services as SOAP/HTTP.
- Clients lookup the service endpoints of the ESB in WSRR.

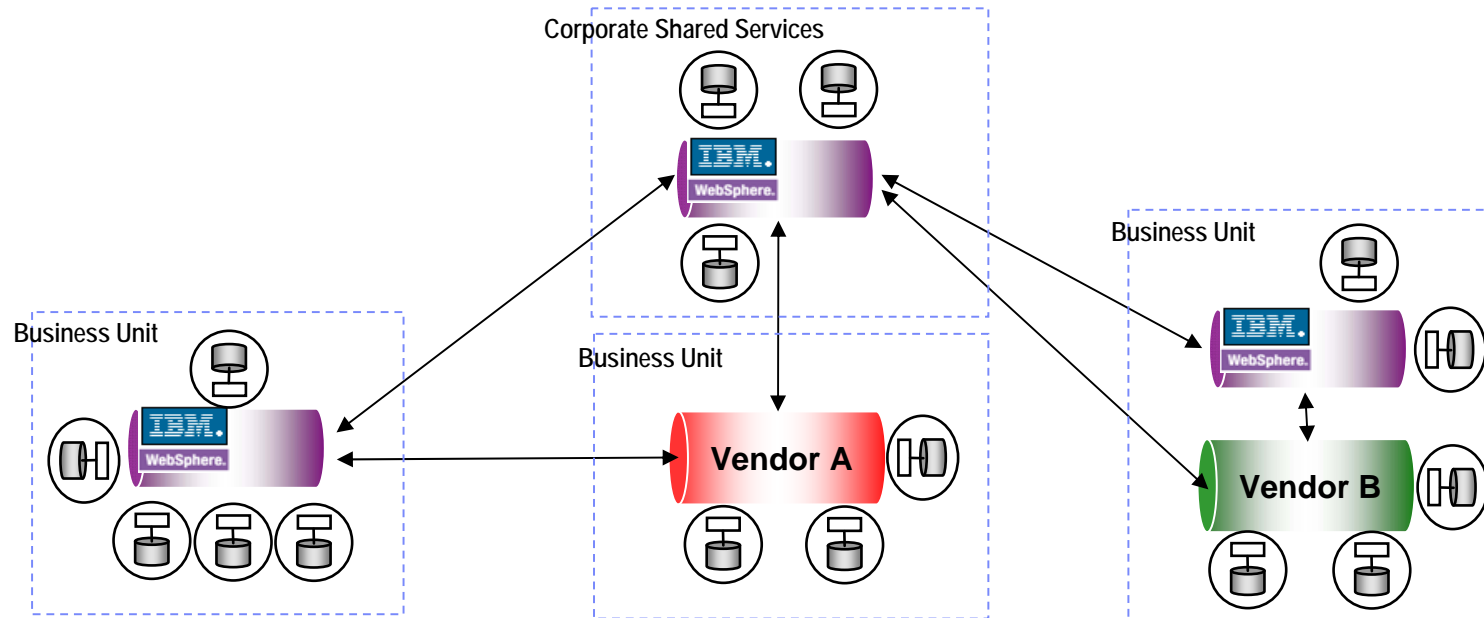
### Products

- WebSphere Integration Developer 6.0.2
- WebSphere Enterprise Service Bus 6.0.2
- Tivoli Composite Application Monitor for WebSphere V6.1
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## Federated ESB Topology Patterns

*A single enterprise-wide ESB is rarely attainable – most businesses will have multiple ESBs across business units*

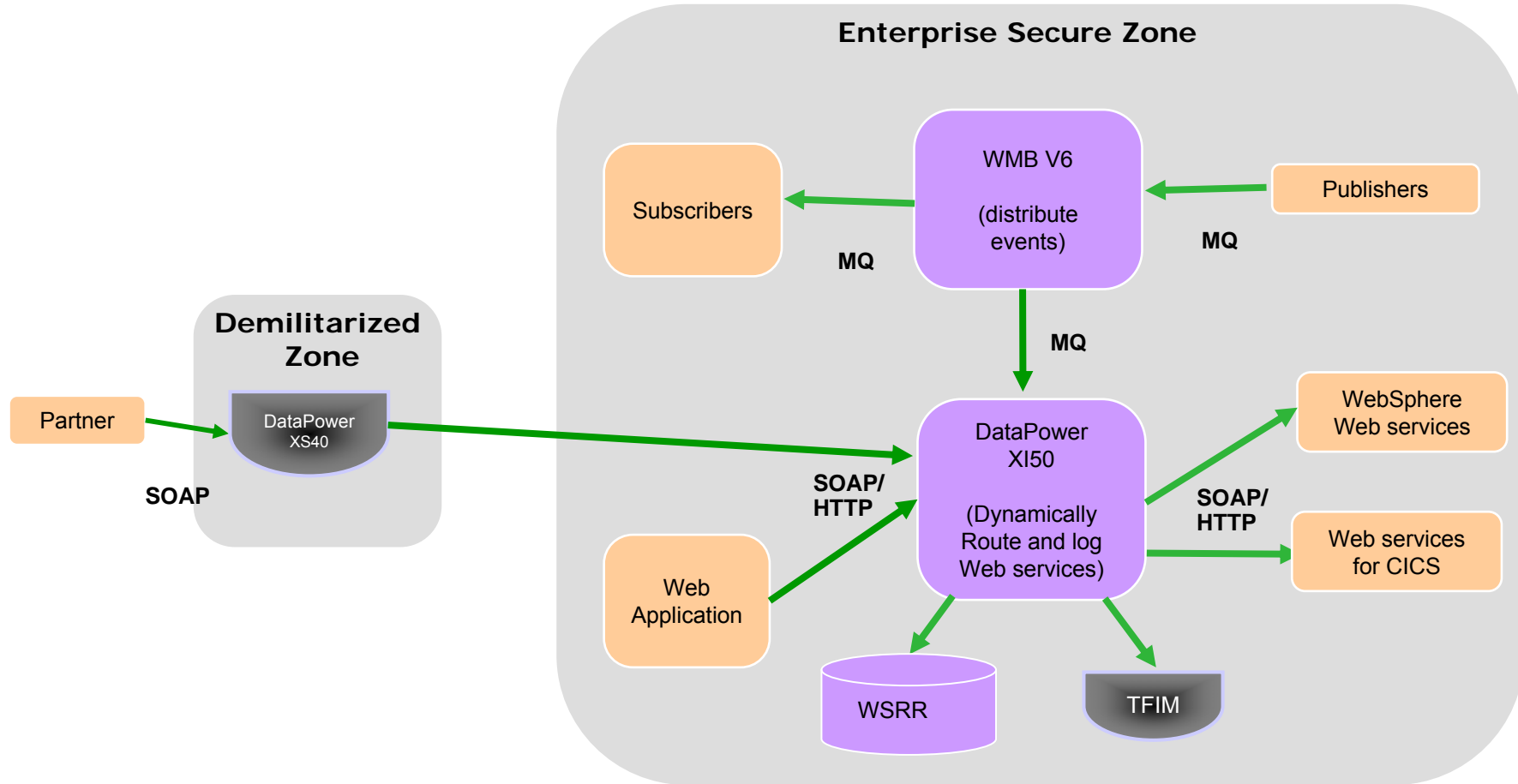


**WebSphere Services Registry and Repository**

**Tivoli Composite Application Management for SOA**

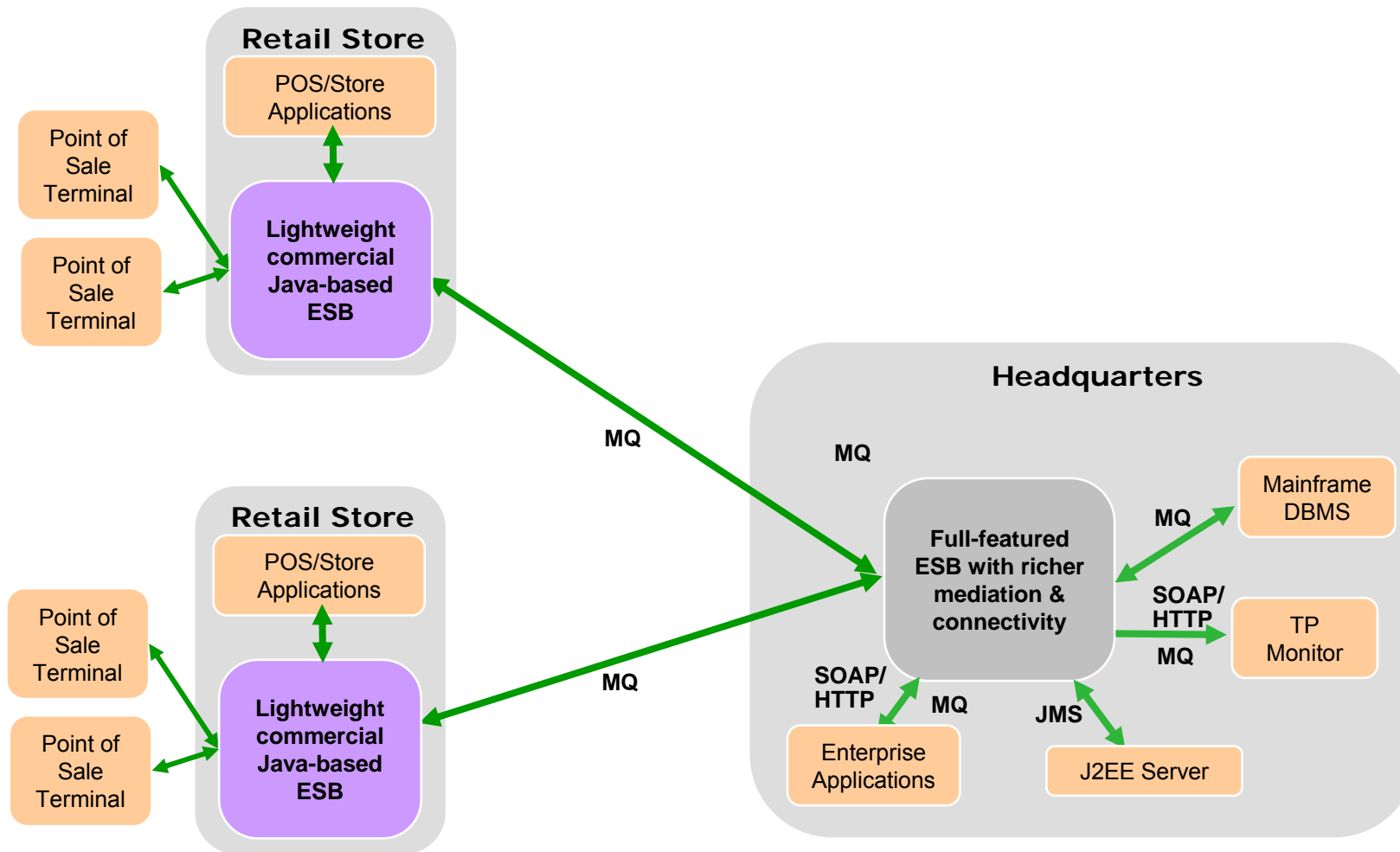
**Federated Security**

# Example of Federated ESB (I)

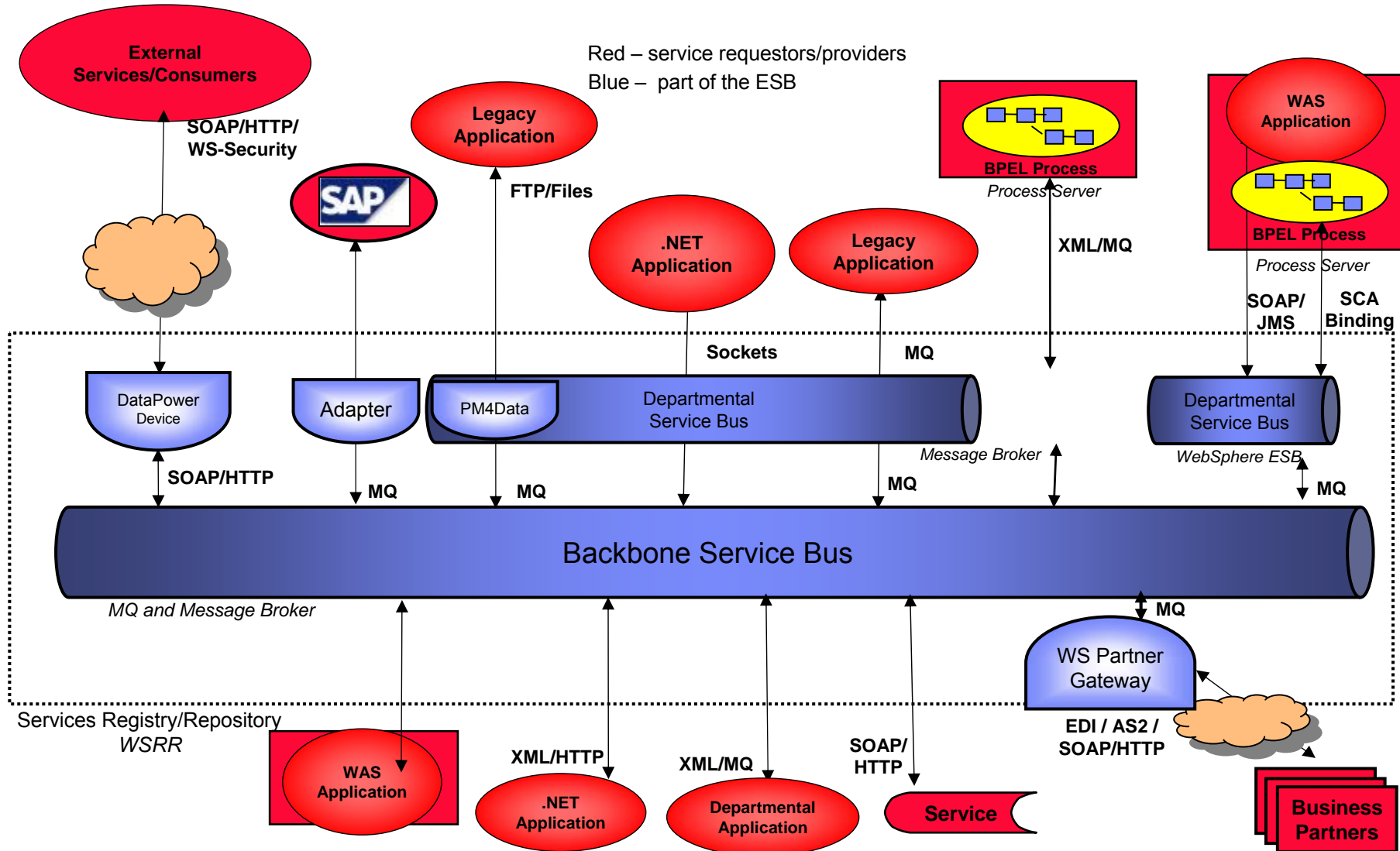




## Example of Federated ESB (II)



# Example of Federated ESB (III)

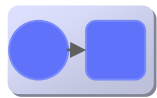


## WebSphere ESB - *Built on WebSphere Application Server for an integrated SOA platform*

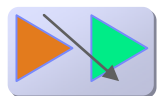
- Integrates seamlessly with the WebSphere platform
- Delivers business-critical qualities of service
- Easily extends to WebSphere Process Server
- Integrated solution for both service mediation and service hosting



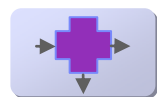
Delivers leadership in SOA standards for service composition, and leverages the embedded messaging and web services WebSphere Application Server engine



Integrates everything with WebSphere Adapters for enterprise applications, the breadth of the WebSphere ecosystem, and support for standard protocols



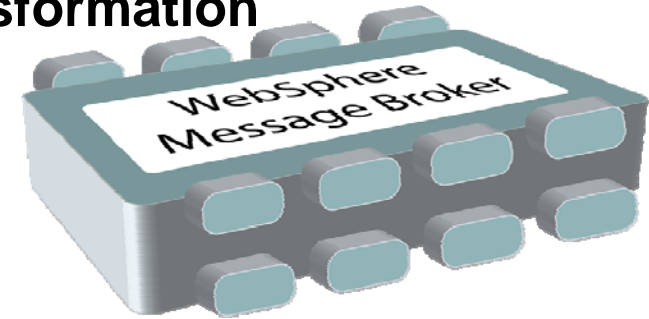
Optimized for standard XML and web services formats, with basic support for other common formats



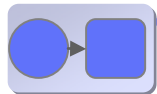
Provides business visibility with embedded event engine for Business Activity Monitoring solutions

## WebSphere Message Broker - Built for universal connectivity and transformation in heterogeneous IT environments

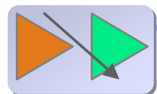
- **Delivers universal connectivity and transformation**
- **Provides a flexible solution to address a wide range of requirements**
- **Optimized to accommodate any IT environment**
- **Offers unique quality of service and connectivity on z/OS**



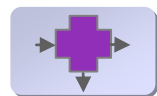
Exploits the unparalleled reach and reliability of the WebSphere MQ enterprise messaging backbone



Integrates everything through standard protocols, WebSphere Adapters for enterprise applications, and specialized connectivity options



Enables transformation between a wide range of data formats, including XML, legacy, and industry standards, and custom formats



Optimized for high-volume processing and rapid time to value for complex mediation requirements with a robust set of pre-built mediation function

## WebSphere DataPower Integration Appliance XI50

*Purpose-built hardware ESB for simplified deployment and hardened security*

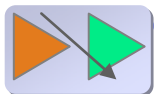
- **Redefines the boundaries of middleware with specialized hardware**
- **Many functions integrated into a single device**
- **Simplified deployment and ongoing management**



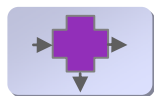
Secures services on the network with sophisticated web services access control, policy enforcement, message filtering, and field-level encryption



Optimized to bridge between leading standard protocols at wirespeed, including web services, messaging, files, and database access

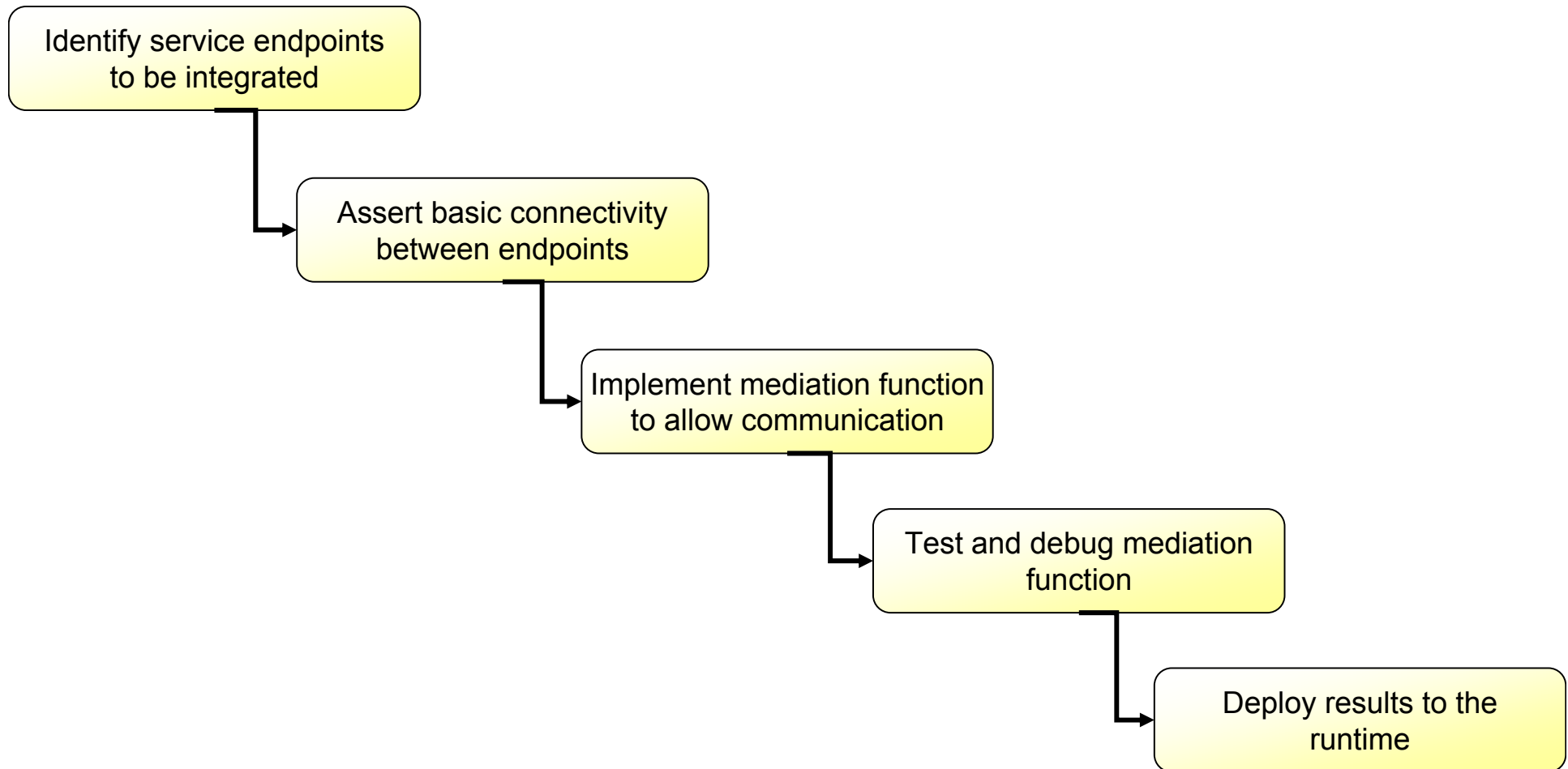


Enables transformation between a wide range of data formats, including XML, legacy, and industry standards, and custom formats



Captures and emits events to facilitate web services management and enable business visibility in Business Activity Monitoring solutions

## Typical Integration Developer Task Flow







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## Introduction to Labs 11 & 12

(C2110)

**Add New Service Providers  
with the ESB**



10 July, 2008

SOA Proof of Technology

## Objectives – Lab 11

- **Ensure success through governance**
- **Promote standards and reuse**
  - **All we do in this lab is to Load WSDLs of approved external Credit Report services to the WebSphere Service Registry and Repository**

**Role: Architect or Project Manager  
Using WSRR**

## Objectives – Lab 12

- **Provide a layer between services for loose-coupling and flexibility**
- **Use an ESB between service consumers and providers between BPEL process and Credit Report web services**

**Role: Integration Developer  
Using WID, WESB**

## What are we going to do in the Lab?

- **Import the Credit Report Web Services project**
- **Import WSDLs from WebSphere Service Registry and Repository**
- **Create a Mediation Module**
- **Implement the Mediation Flow**
- **Define the Routing Logic to the external Equinox Credit Report Service**
- **Complete the CreditReportServiceRouter assembly diagram**
- **Re-assemble the SimpleAccountVerification to use the CreditReportServiceRouter**
- **Retest the SimpleAccountVerification Process**

# Labs 11 & 12

## 45 Minutes

# Enjoy the Lab

