



# Considerations for selecting an ESB



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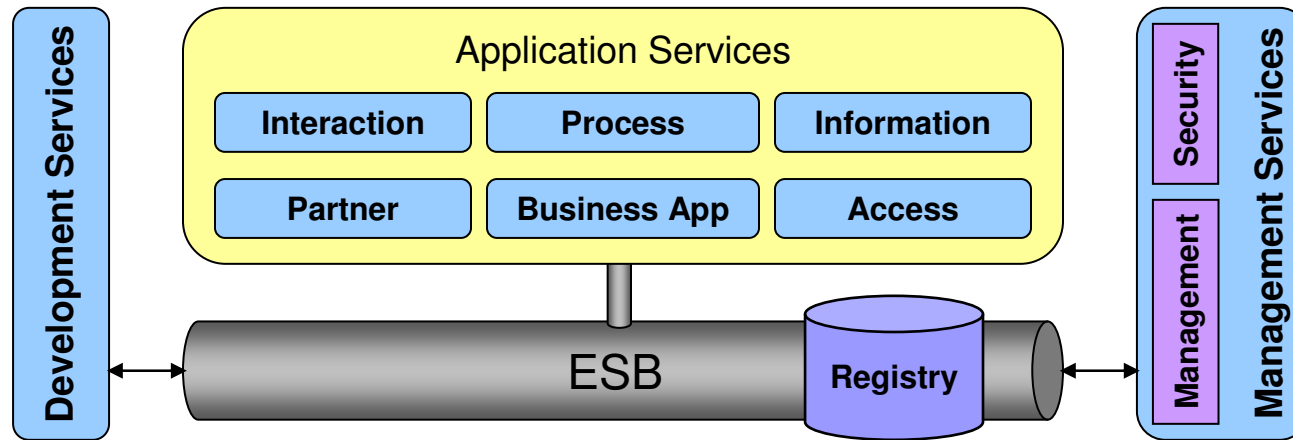
# Agenda

- Examine Federated ESB
- Discuss Some Criteria for ESB Choice
- Examine Some Case Studies



SOA: Unlock business value.  
→ New software and services.

# An ESB-centric view of the SOA Foundation Logical Model



## ■ Outside ESB

- Business Logic (Application Services)
  - ESB contains connectivity logic
  - Criteria: semantics versus syntax

## ■ 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
- Configure ESB via Service Registry

Described in <http://www-128.ibm.com/developerworks/architecture/library/ar-esbpat1/>

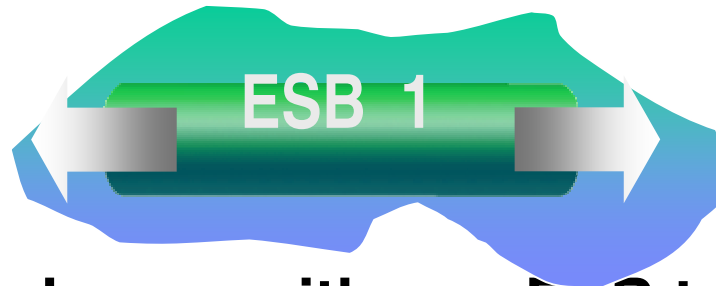
## ESB Governance

- **ESB can be a Governance/Policy Enforcement Point**
  - Particularly in combination with a service registry and repository
- **Business, IT, EA, SOA Governance have significant impact on ESB Architecture**
  - Ownership and funding
  - Frequently leads to ESB Federation due to differing requirements, service exposure, and management of buses for individual business units
  - Responsibility to adapting to the bus
  - Adoption of common standards and technologies such as logging, security, management (compliance)
  - Policies for reuse and sharing of services

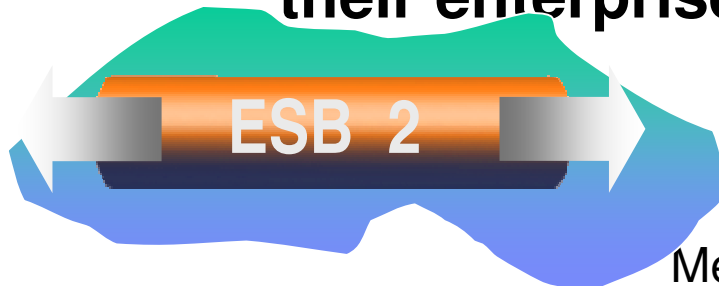
*CIOs need a way to set global “policy” for their companies but still allow LOBs to make their own decisions.*

## New Era of ESBs

*Multiple factors are driving the reality for multiple ESBs*



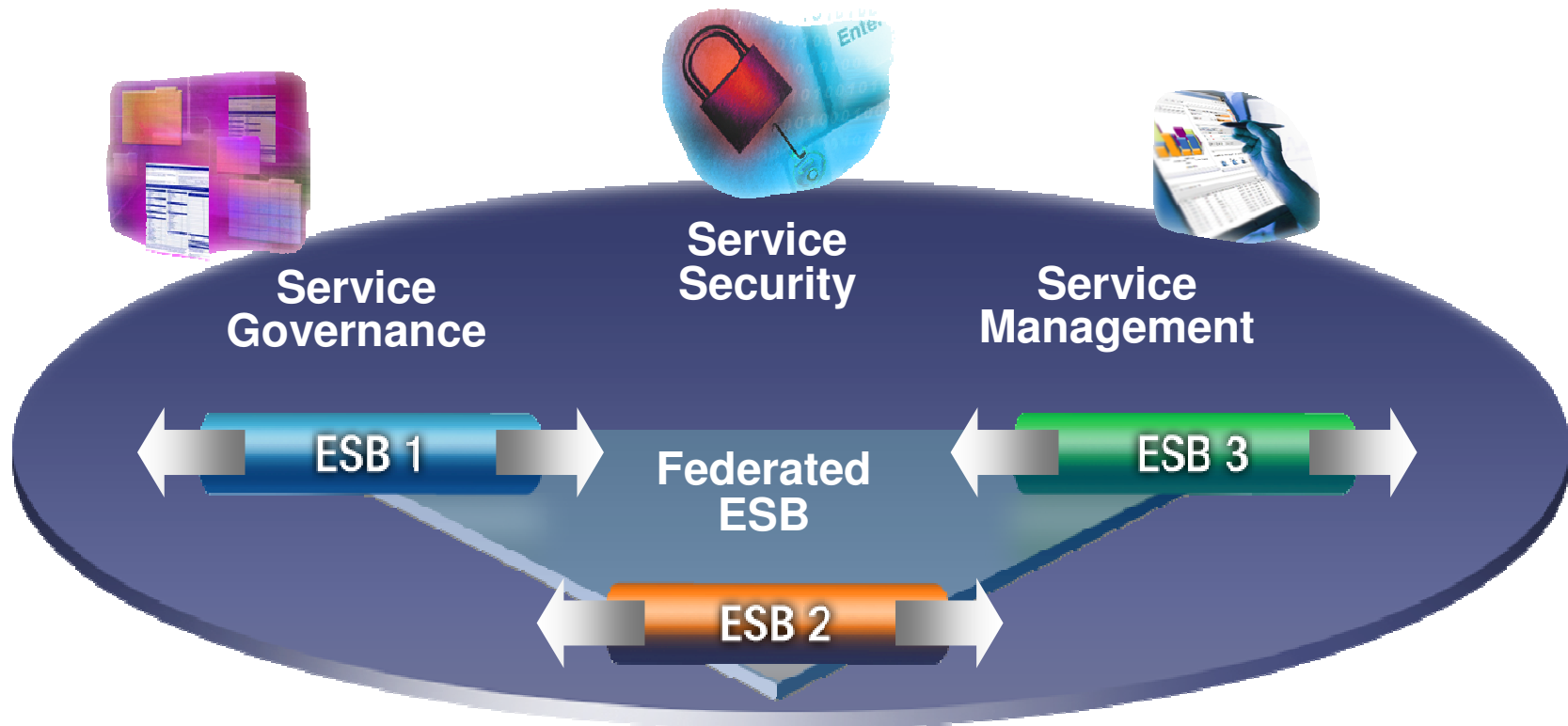
**Companies began with one ESB to manage their enterprise**



Mergers and Acquisitions, local autonomy, and distributed geographies develop additional ESBs



# An Emerging Solution is a Federated ESB *Which Can Link Together Multiple, Disparate Domains*



*A Federated ESB is an enterprise-spanning connectivity infrastructure of multiple ESBs working together to extend service reuse across as well as within domains.*

# Product Selection Criteria

This work is always evolving  
as we learn new requirements from our clients

Increasingly the answer is not one product, but multiple  
products and technologies  
working together



## Key Criteria for ESB selection

- **Requirements for Communication Protocols and Interaction Patterns**
  - Communication Protocols
  - Interaction Patterns
  - Relationship to QoS at the ESB endpoints
- **Requirements for Message Models and Meta-Models**
  - Meta-models
  - Message Models
  - Additional capabilities
- **Requirements for Mediations – Service Virtualization**
  - Conversion
  - Message Transformation
  - Routing (basic to complex)
  - Routing standards
  - Timeout, Retry, and Failover
  - Service versioning
- **Requirements for Mediations – Aspect Oriented Connectivity**
  - Management integration
  - Security integration
  - Logging, monitoring, auditing integration

# Key Criteria for ESB selection

- **Requirements for Qualities of Services**

- Transaction coordination
- Reliable/assured delivery
- Performance, Scalability, Reliability, Availability

- **Additional Requirements**

- Custom mediation capability
- Shared programming model with other SOA components/products
- Development tooling capabilities and affinity to current tools
- Configuration and administration tooling capabilities
- Affinity to IT environment (e.g. J2EE application server)
- Server platform support
- Match to current skills and requirements to build skills
- Ease of integration with
- Product maturity and corporate approval
- Price and total cost of ownership

- **Consider your deployment platform early - Think z!**

- Do you require significant integration with z/OS assets (e.g. DB2, IMS, CICS, MQ)?
  - Both, z/OS and Linux on System z, leverage classic z strengths and gain application performance advantage (e.g. via Hypersockets)
- Do you have to meet stringent service level agreements despite unpredictable workloads?
- Does downtime mean significant business cost?
- Do you require high resiliency and rapid disaster recovery? Are your tools, policies and procedures z centric?



# Decision Guide - When to use each product

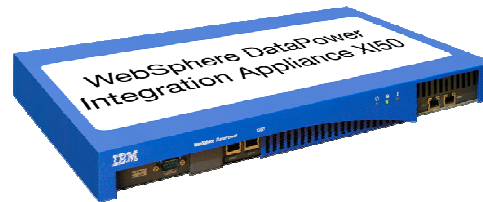
# ESB offerings from IBM WebSphere

*Each delivers a common set of ESB capabilities*



## ESB offerings from IBM WebSphere

- Mediations to enable common patterns
- Transformation of common data formats
- Connectivity via common protocols



- Leading web services standards
- First class interoperability between ESB products
- Mission-critical qualities of service

## Simplified Decision Guide – When to use WebSphere ESB?

- **You use WebSphere Application Server**
  - Your team has skills with WAS Administration and Java coding
- **You are now or planning on developing business process using WebSphere Process Server**
  - WebSphere ESB and WPS have common tooling, programming model, and runtime
- **You are integrating with ISV business applications hosted on WAS or 3rd party solutions which extend and support WAS**
- **You are focused on standards based interactions using XML, SOAP, and WS\***
- **You want to mediate between Web services and existing systems using JMS and WebSphere JCA Adapters**
- **Reliability and extensive transactional support are key requirements**
- **You want to minimize your server investment by co-hosting WebSphere services and ESB in one application server**

*\*\*Support for industry standard formats can be achieved via the use of either WebSphere Adapters or WebSphere Transformation Extender.*

## Simplified Decision Guide – When to use WebSphere Message Broker?

- **You are currently using WebSphere MQ or WebSphere Message Broker**
  - Leverage existing WMB skills, while migrating to 6.1
- **You have extensive heterogeneous infrastructures, including both standard and non-standards-based applications, protocols, and data formats**
  - You have extensive MQ skills and infrastructure
  - You are using Industry formats such as SWIFT, EDI, HL7
  - You are integrating core z assets (e.g. connecting to CICS COBOL applications)
- **You are connecting to Web services using SOAP, and optionally WS-Security, WS-Addressing and Attachments**
- **You are implementing more complex messaging and integration patterns**
  - Examples include event processing, complex transaction processing
- **You need extensive pre-built mediation support**
- **You have non-XML or complex transformation needs**
- **Reliability and extensive transactional support are key requirements**
- **You need high performance with horizontal and vertical scaling**

# Simplified Decision Guide - When to use DataPower XI50?

- **Ease of use is a pre-dominant consideration**
  - Simple experience of drop-in installation and admin-based configuration with no or minimal development required
- **You are transforming between XML-and-XML or XML-and-any other format**
- **You are using XML-based or WS-Security extensively**
- **Your interaction patterns are relatively simple**
- **You require use of advanced Web services standards**
- **Your mediation requirements are met by the existing DP mediations and minimal extensibility is needed**
- **You need to minimize message latency when adding an ESB layer**
- **You are doing extensive XML processing combined with high performance requirements**
- **Your ESB must be in production very quickly**

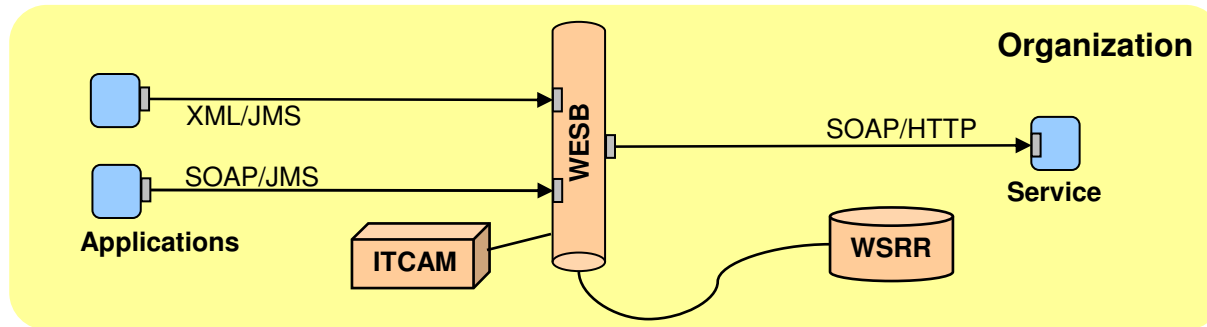
**Note: When using an ESB Gateway pattern, use DataPower XS40**

- All XML interaction with 3<sup>rd</sup> parties should go through XS40 for XML threat protection

# Generic ESB Case Studies



# Internal Connectivity



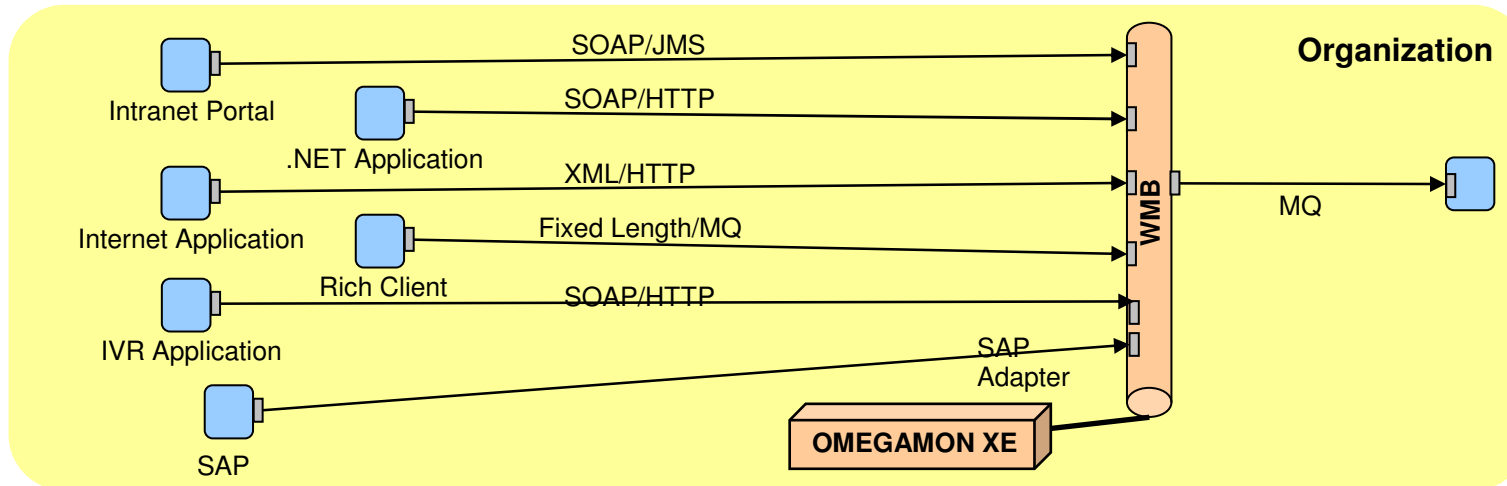
## ■ Goals

- Applications need to access a service with different interface/protocol
  - Mediation desired to 'standardize' service requests while leaving applications unchanged
- Flexible Control of service access
- Management and monitoring of environment

## ■ Solution

- WebSphere ESB matches skill set and cost targets
- ITCAM for SOA monitors runtime environment
- WSRR enables dynamic metadata-driven routing global to enterprise

## Multi-Channel Access



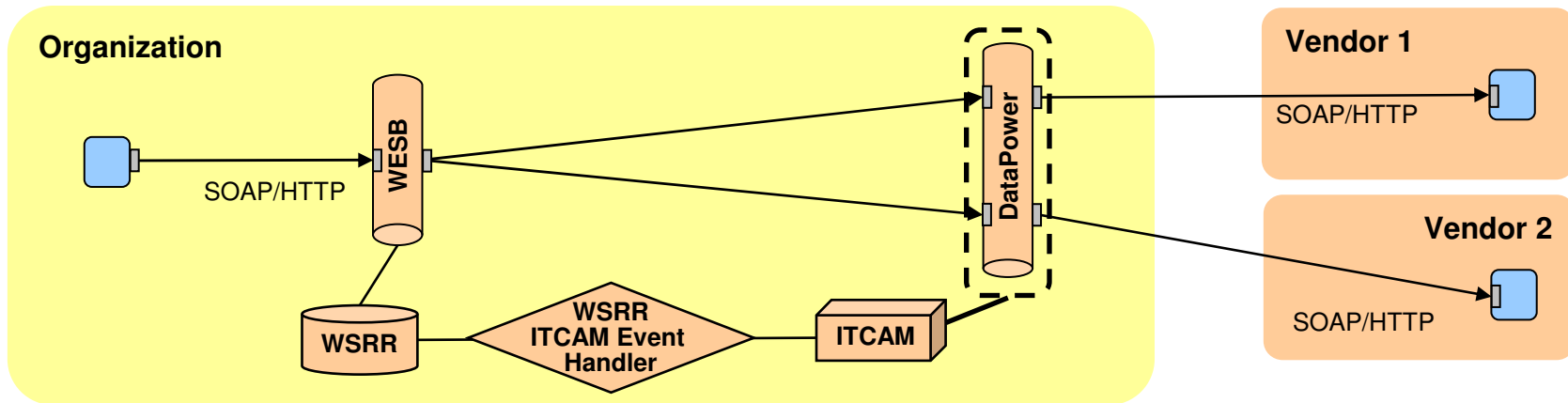
### ■ Goals

- Common service(s) for heterogeneous channels
  - High capacity and flexibility
- Management and monitoring of Solution

### ■ Solution

- WebSphere Message Broker matches skill set and capacity targets
- OMEGAMON XE monitors runtime environment

# Business value driven availability



## Goals

- Engage different business partners to serve different constituencies
- Secure interactions with external business partners
- Flexible Control of service access
  - Access based on availability and cost
- Monitoring of business partner response

## Solution

- WebSphere ESB matches skill set and cost targets
- WebSphere DataPower XS40 or XI50 for Service Proxy, XML firewall and Web Services Security
- ITCAM for SOA 6.1 monitors vendor response time via WDP
- WSRR enables dynamic metadata-driven routing
- WSRR ITCAM for SOA Event Handler SA04 reflects ITCAM metrics in WSRR meta-data

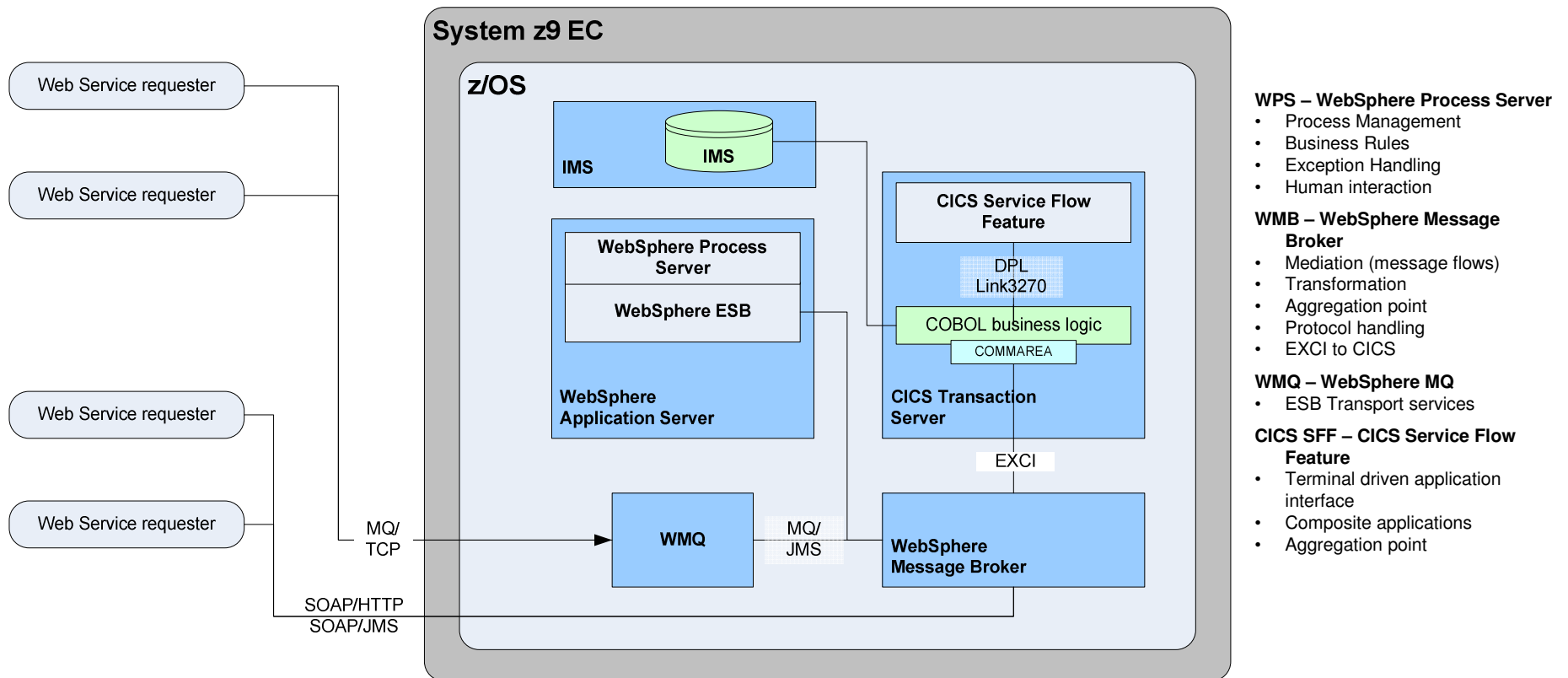
## Scenario – New process choreography function, replacement of in-house ESB

### ■ **Real customer engagement**

- Two aggregation points in the current system
  - ABC application is a WebLogic application that acts as an input channel for clients that use RMI.
    - RMI requirement was later eliminated...
  - DEFG application is a CICS application that acts as a router and aggregation point for back end CICS applications.
- Between ABC and DEFG is a WebSphere MQ network. (This made sense when the back end application was owned by another company)
- Existing architecture is unnecessarily complex, given the merged-configuration with the 2<sup>nd</sup> company
- Primary business & I/T objectives behind project:
  - **Reduce cost and complexity**
  - Provide **functionality for process choreography** for future business process applications

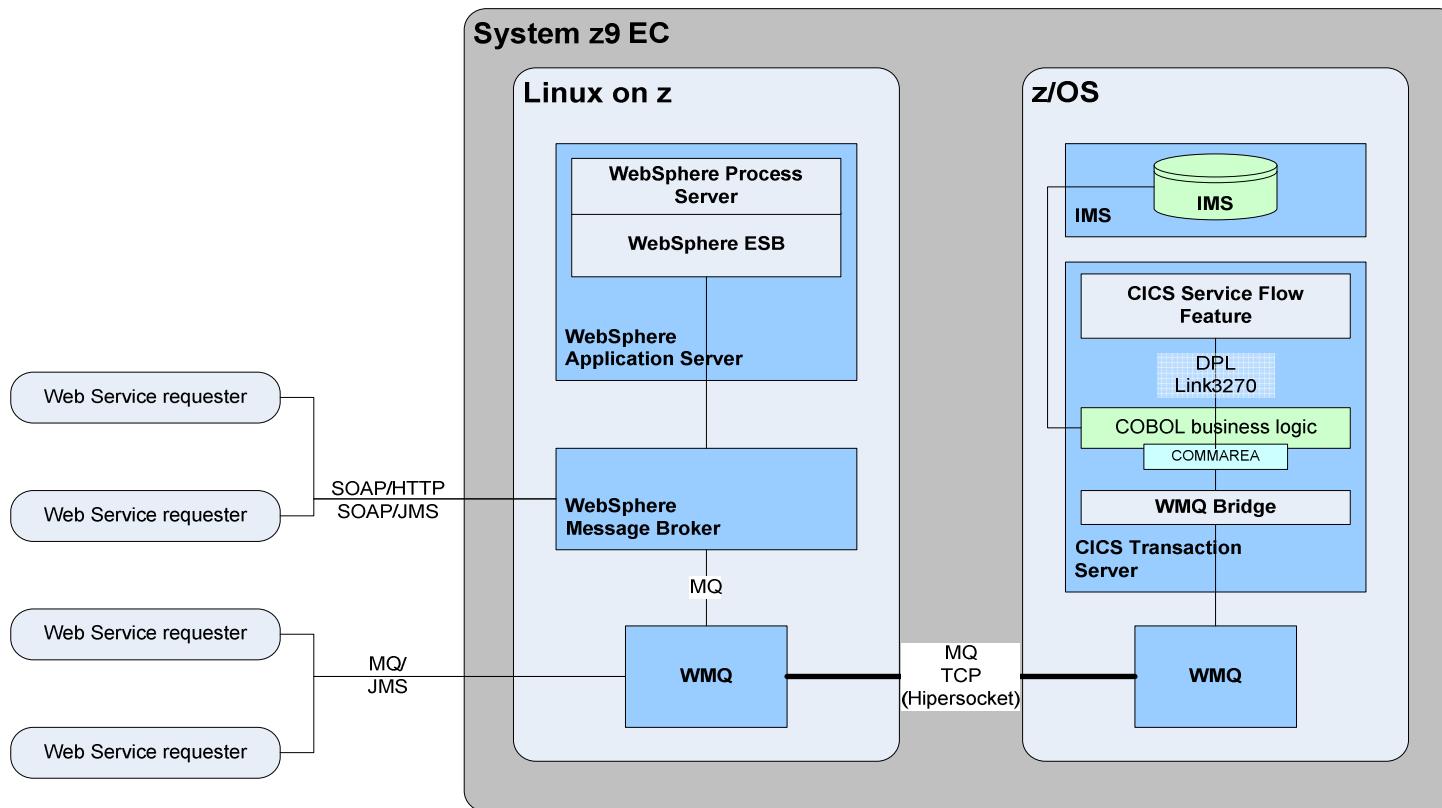
# Business Process Management Process Choreography – Topology 1

- Entire configuration on z/OS



# Business Process Management Process Choreography – Topology 2

- WMB as primary ESB on Linux on System z



#### WPS – WebSphere Process Server

- Process Management
- Business Rules
- Exception Handling
- Human interaction

#### WMB – WebSphere Message Broker

- Mediation (message flows)
- Transformation
- Aggregation point
- Protocol handling

#### WMQ – WebSphere MQ

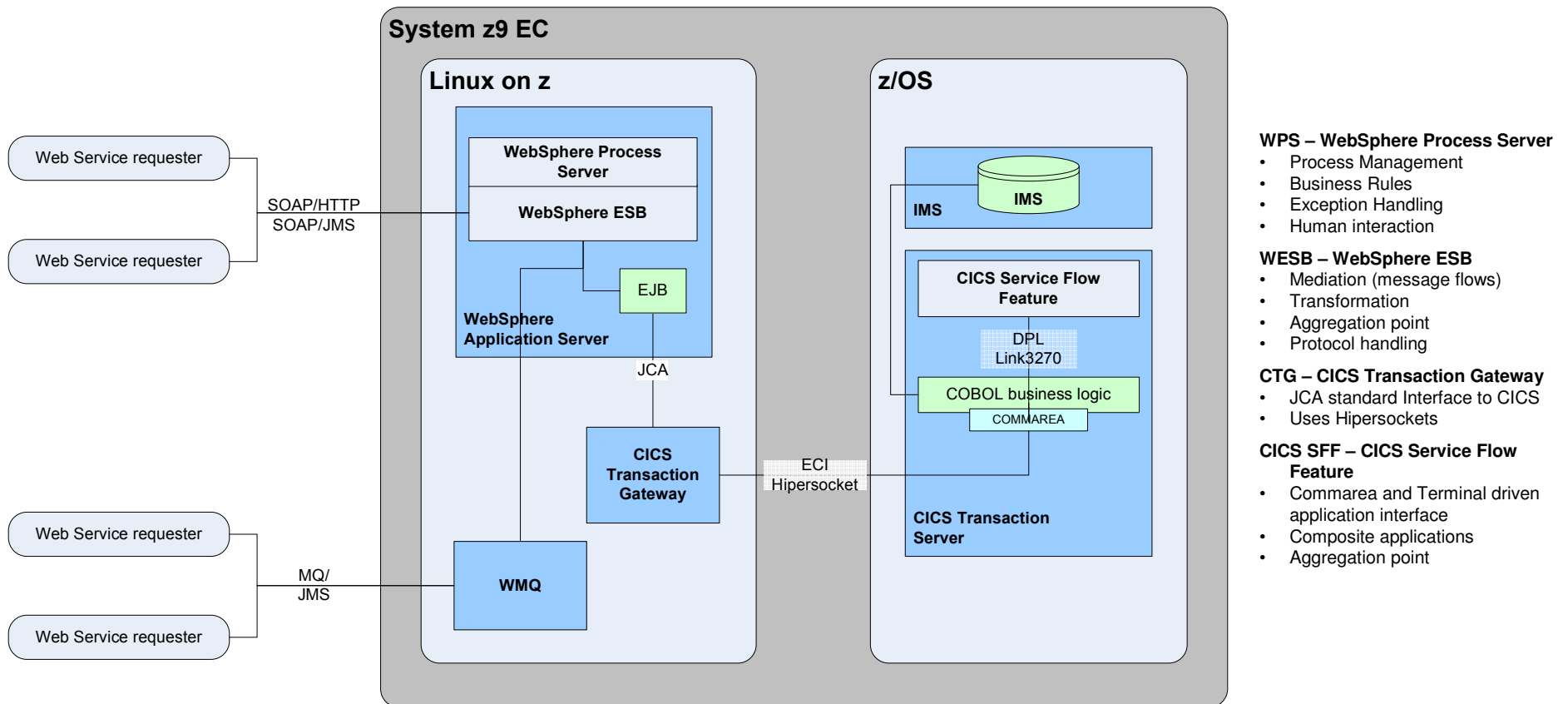
- ESB Transport services
- Uses Hipersockets
- Uses CICS / MQ Bridge

#### CICS SFF – CICS Service Flow Feature

- Terminal driven application interface
- Composite applications
- Aggregation point

# Business Process Management Process Choreography – Topology 3

- WESB as primary ESB on Linux on System z



# Architectural Decisions - Details

<b>Number</b>	<b>ARD-002</b>
<b>Issue or Problem</b>	Given that a commercially available ESB will replace both the ABC (currently implemented in WebLogic on Sun Solaris) and DEFG (currently implemented in CICS on z/OS), <b>what is the best platform for the new ESB and process choreography?</b>
<b>Assumptions</b>	A commercially available ESB/process engine will replace existing in-house applications.
<b>Alternatives</b>	<ul style="list-style-type: none"> <li>• z/OS</li> <li>• Linux for System z</li> <li>• UNIX (AIX or Solaris)</li> </ul>
<b>Decision</b>	<b>Host ESB/Process Management on Linux for System z.</b>
<b>Rationale</b>	<ul style="list-style-type: none"> <li>▪ This option has the best trade off between high performance and low cost. By using the Hipersocket channels between the Linux for System z system and the z/OS system that hosts the CICS applications, the network latency is significantly less than that of a full network hop.</li> <li>▪ By using Linux for System z as the ESB host, the cost is also reduced since this runs on the Integrated Facility for Linux (IFL) specialty processors. There are no additional chargeable MIPS to run the ESB on Linux for System z.</li> </ul>
<b>Implications</b>	Linux for System z systems running on IFLs will need to be defined if not done already. The hipersocket channel connections also need to be defined.



# Architectural Decisions - Details

<b>Number</b>	<b>ARD-003</b>
<b>Issue or Problem</b>	<b>Which commercially available ESB should be used for this environment?</b>
<b>Assumptions</b>	See ARD-001 and ARD-002.
<b>Alternatives</b>	<ul style="list-style-type: none"> <li>• Use WebSphere ESB</li> <li>• Use WebSphere Message Broker</li> <li>• Use CICS Web Services directly</li> </ul>
<b>Decision</b>	<b>Use the WebSphere Message Broker as the ESB.</b>
<b>Rationale</b>	<ul style="list-style-type: none"> <li>▪ The WebSphere Message Broker provides a full function ESB that is high performing and robust. It is supported in both the Linux for System z and z/OS environments. It can be hosted on Linux for System z to control the MIPS growth on z/OS.</li> <li>▪ The WebSphere ESB does not have the throughput capability of WMB. It is more heavy weight as a Java application. Given the requirement to support 900 transactions per second, the ability for WESB to support those volumes without many instances of it is questionable.</li> <li>▪ Using CICS Web Services directly from the clients seems like an attractive alternative. However, the overhead of sending individual requests as web services to CICS will cause this alternative to be the mostly costly. All of the unpacking of the SOAP and XML will be done on the general purpose processors which will significantly raise the chargeable MIPS.</li> </ul>
<b>Implications</b>	A decision will have to be made about the connectivity options from WMB to CICS.

## Architectural Decisions - Details

<b>Number</b>	<b>ARD-004</b>
<b>Issue or Problem</b>	The Enterprise Service Bus must access the existing CICS applications for the business logic. There are multiple ways to do this. <b>Which is the most appropriate connection method?</b>
<b>Assumptions</b>	The existing CICS applications are Commarea based applications. The ESB that will be used is WMB.
<b>Alternatives</b>	<ul style="list-style-type: none"> <li>• Send CICS an HTTP request and let the CICS Web Support handle it.</li> <li>• Send CICS a SOAP/XML request and let the CICS Web Services support handle it.</li> <li>• Send a WebSphere MQ message to the CICS MQ Bridge.</li> <li>• Use the CICS Transaction Gateway.</li> </ul>
<b>Decision</b>	<b>Send a WebSphere MQ message to the CICS MQ Bridge.</b>
<b>Rationale</b>	<ul style="list-style-type: none"> <li>▪ The WebSphere MQ option will provide an asynchronous or pseudo-synchronous option for access to the CICS applications. It is faster than using a web service request because the payload does not have to be converted to Commarea format. It gives you the option of using persistent messaging for those requests that might need it.</li> <li>▪ The CICS Web Support would only handle synchronous requests coming from the ESB.</li> <li>▪ Using the CICS Web Services support would require that all communication between the ESB and CICS be SOAP/XML. This would add unnecessary overhead to the CICS path. This overhead would be on the general purpose processors and would result in increased chargeable MIPS.</li> <li>▪ The CICS Transaction Gateway is not supported from the selected ESB (WebSphere Message Broker).</li> </ul>
<b>Implications</b>	WebSphere MQ servers will have to reside on both the Linux for System z and z/OS servers.

# Architectural Decisions - Details

<b>Number</b>	<b>ARD-005</b>
<b>Issue or Problem</b>	<b>Access to CICS terminal based applications needs to be provided. How?</b>
<b>Assumptions</b>	The requests for CICS terminal based applications would all flow through the ESB.
<b>Alternatives</b>	<ul style="list-style-type: none"> <li>• Use CICS Service Flow Feature</li> <li>• Use Host Access Transformation Services</li> <li>• Use Link3270 directly</li> </ul>
<b>Decision</b>	<b>Use CICS Service Flow Feature to access terminal based CICS applications.</b>
<b>Rationale</b>	<ul style="list-style-type: none"> <li>▪ The CICS Service Flow Feature is tightly coupled with CICS so there is less environment switching to get to CICS applications. It has the capability of also handling composite applications made up of more than one CICS application call. It can handle both Commarea and terminal based CICS applications.</li> <li>▪ Host Access Transformation Services (HATS) is a J2EE application that communicates with CICS via TN3270. This would require set up and is more complex than just using CICS SFF. It also adds another layer between the ESB and the CICS applications for the J2EE server.</li> <li>▪ Link3270 could solve directly accessing a single 3270 based application, but the CICS SFF would give you more capability in addition to the 3270 access. Since CICS SFF is a no charge feature, you will get more capability at no additional cost.</li> </ul>
<b>Implications</b>	CICS SFF is a no charge feature on CICS TS V3.1 that must be ordered. Also, the WebSphere Developer for System z tooling is used to generate the CICS service flows.

## Resources

- New! Redpaper - IBM Connectivity Reviewer's Guide  
<http://www.redbooks.ibm.com/redpapers/pdfs/redp4434.pdf>
- ESB Portfolio Trifold.  
[ftp://ftp.software.ibm.com/software/websphere/integration/wbimessag ebroker/esb\\_trifold\\_0103A.pdf](ftp://ftp.software.ibm.com/software/websphere/integration/wbimessag ebroker/esb_trifold_0103A.pdf)
- Which ESB on System z? Selection Guidelines for WebSphere Message Broker, WESB and DataPower XI50 - July 30 <http://www-306.ibm.com/software/os/systemz/telecon/30jul/>
- Teleconference: z/OS and Linux for System z: Selecting the best SOA platform for you - July 9 <http://www-306.ibm.com/software/os/systemz/telecon/9jul/>
- Teleconference: Strategic options for extending CICS to an SOA <http://www-306.ibm.com/software/os/systemz/telecon/23apr/>
- System z software working in harmony for the SOA enterprise of today and tomorrow. How WebSphere, DB2, CICS, IMS and WebSphere MQ interoperate  
[ftp://ftp.software.ibm.com/software/htp/cics/tserver/v32/library/WSW14020-USEN-00\\_systemz\\_harmony\\_0324A.pdf](ftp://ftp.software.ibm.com/software/htp/cics/tserver/v32/library/WSW14020-USEN-00_systemz_harmony_0324A.pdf)

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YOU



# Top Questions for ESB Product Selection

## ... vary for each company

- Does it support for my messaging backbone (ex. MQ, Tibco RV)?
- How easy is it to integrate my EIS and legacy systems (ex. Adapter to SAP, CICS)?
- To what degree does it support my models and metamodels (ex. HL7)?
- Does it support WS\* standards which are needed immediately? On it's roadmap?
- How many of my mediation requirements are fulfilled by pre-built mediations?
- Can it meet all the functional requirements, given custom mediation and extensibility capabilities?
- Can it meet my throughput and latency requirements? In combination with assured delivery?
- Does it meet my transaction and reliability requirements?
- To what degree does it support my security and monitoring infrastructure?
- Is an SOA Appliance an option?
- How well does it match the skills of my organization? What is the skill gap?
- What is the software license cost? For development, for initial production, to scale up as demand grows?