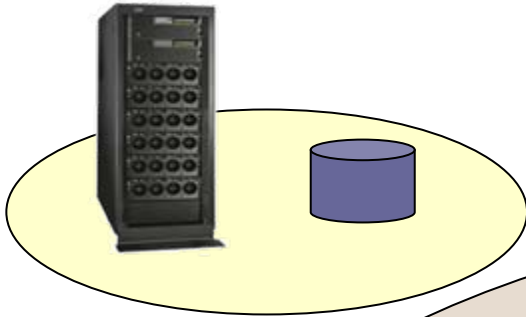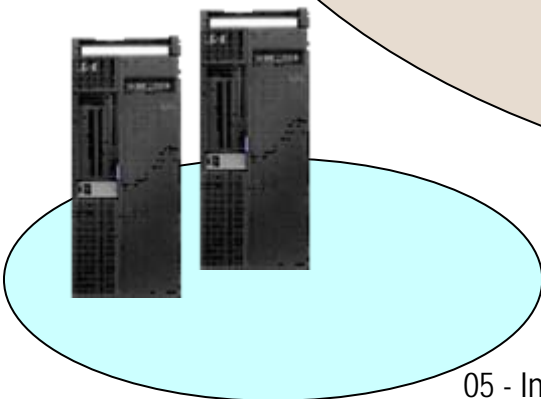# Integrate Your Business With The Most Flexible Messaging And
Enterprise Service Bus Infrastructure

Smart Work Solutions Need To Build On Existing Systems

Smart Work Solutions

1. Build on a Strong Foundation
2. Automate Business Processes
3. Capture Business Expertise
4. Connect Everything with an Intelligent Bus
5. React to Business Events in Real Time

Business Challenge

Our payments business is growing fast, our payments network needs to keep up!

Your payments network is too brittle, making it difficult and costly to improve.

Service Oriented Finance CIO

IBM

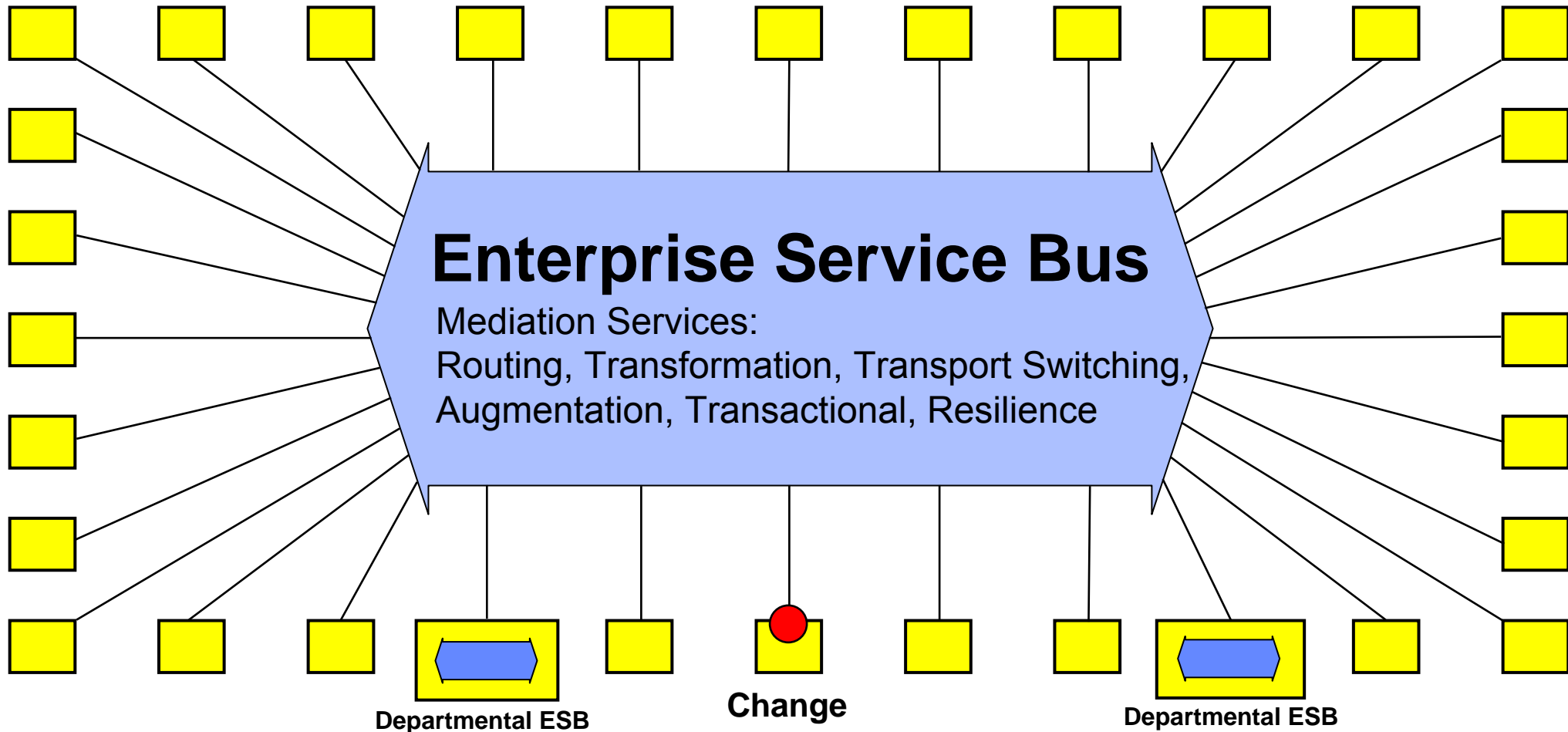# Service Oriented Finance Payment Systems - Connectivity Requirements

- **Extend the reach of the payment network**
  - ▶ Connect to any enterprise resource, using any protocol
  - ▶ Integrate with existing departmental connection solutions
  - ▶ Use existing applications, regardless of data format
- **High performance**
  - ▶ Support increasing demand
- **Transactional**
  - ▶ Maintain data integrity
- **Use service lookups for resilient business operations**
  - ▶ End points are sometimes not available or not responsive
  - ▶ Dynamically select alternatives

Current Service Oriented Finance Payment Network Is Not Flexible

Change

Departmental Enterprise Service Bus

Departmental Enterprise Service Bus
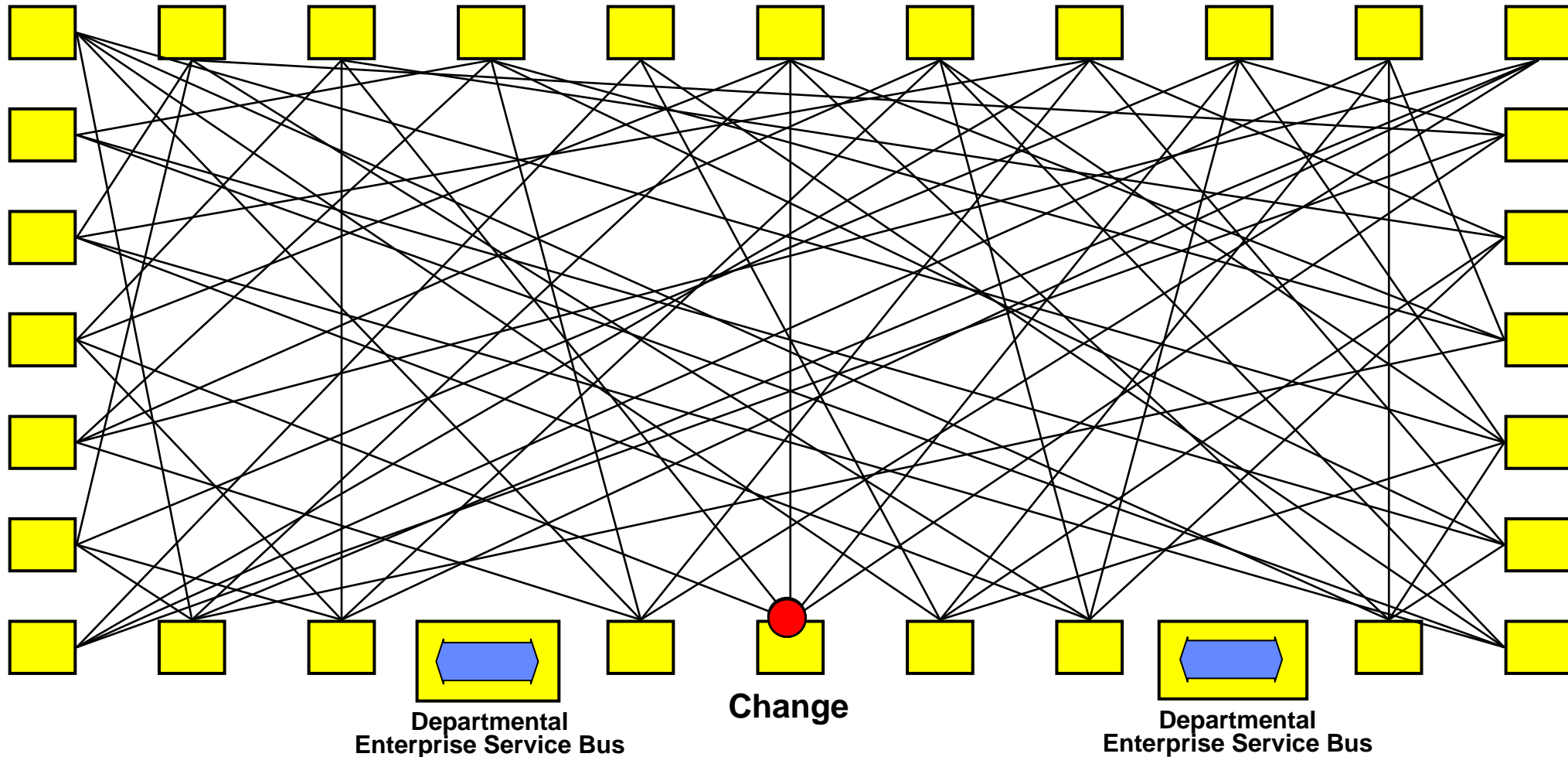
- Many point-to-point connections between applications
- Connectivity logic is coded into applications
- One change requires many other changes
- Existing departmental connection solutions are not integrated

Vision For A New, Flexible Service Oriented Finance Payment Network

Enterprise Service Bus

Mediation Services:
Routing, Transformation, Transport Switching,
Augmentation, Transactional, Resilience

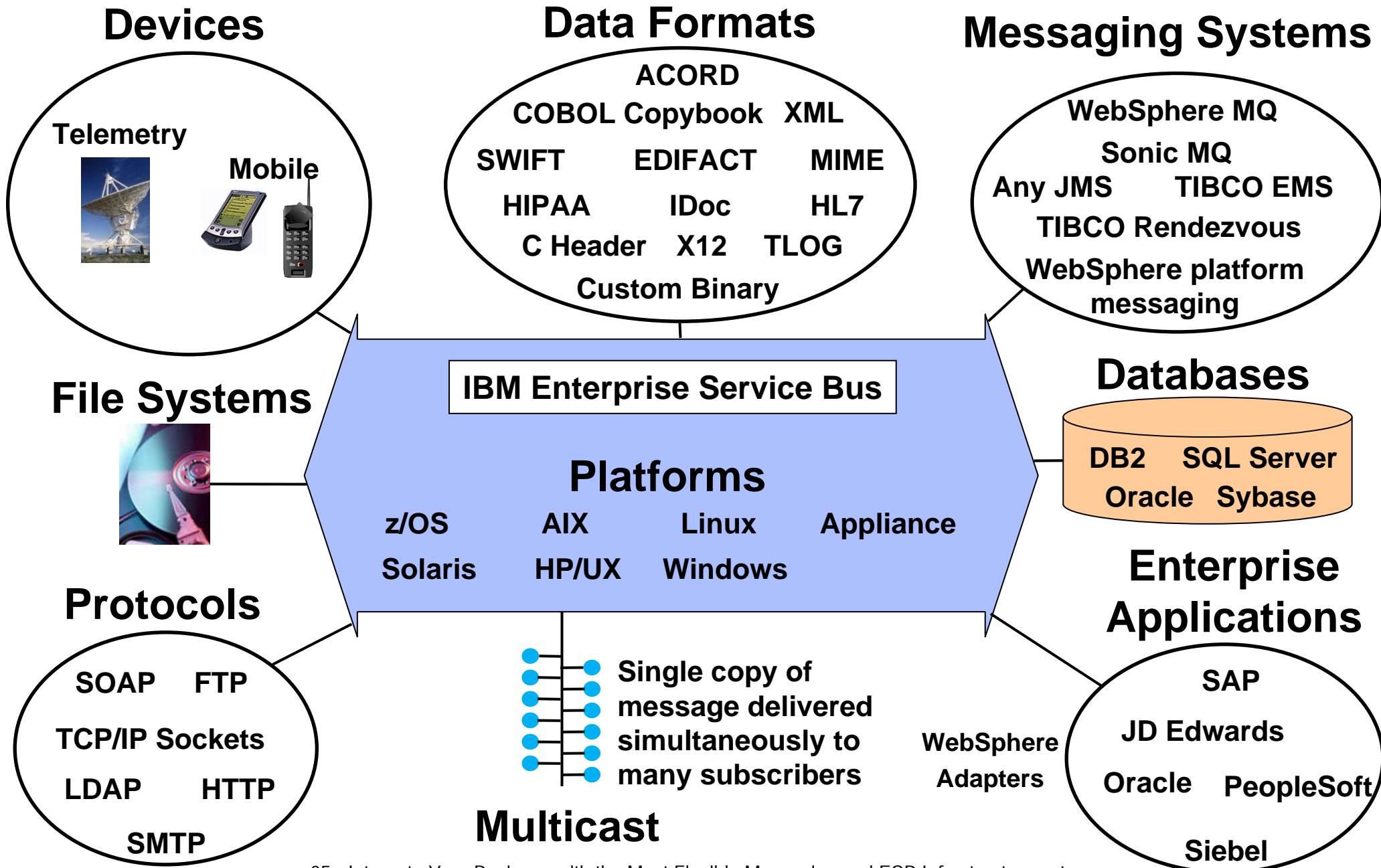**Departmental ESB**   **Change**   **Departmental ESB**

- Connect anything to anything using fewer connections
- Use existing applications
- Fewer changes as requirements change
- Work seamlessly with existing departmental ESB solutions

Implementing An IBM Enterprise Service Bus Depends Upon Your Requirements

Requirements	WebSphere ESB	WebSphere Message Broker	WebSphere DataPower
Speed	Fast	Faster	Fastest
Built on WebSphere Application Server	✓		
Rack-Mountable Appliance			✓
Available on Wide Range of Platforms	✓	✓	
Federates Other ESBs	✓	✓	✓
WebSphere Transformation Extender Option	✓	✓	✓
Transactional Mediation Flows	✓	✓	✓
Dynamic Service Lookup at Run Time	✓	✓	
Adapters for Enterprise Applications	✓	✓	
Database Read/Write	✓	✓	✓
Non-IBM JMS Messaging Systems	✓	✓	✓
TIBCO Rendezvous		✓	
Mobile and Telemetry Devices		✓	
Multicast Output (Native)		✓	✓

IBM Enterprise Service Bus Extends Reach By Connecting To Your Entire Enterprise

Devices

Telemetry

Mobile

Data Formats

ACORD

COBOL Copybook   XML

SWIFT   EDIFACT   MIME

HIPAA   IDoc   HL7

C Header   X12   TLOG

Custom Binary

Messaging Systems

WebSphere MQ

Sonic MQ

Any JMS   TIBCO EMS

TIBCO Rendezvous

WebSphere platform messaging

File Systems

IBM Enterprise Service Bus

Platforms

z/OS   AIX   Linux   Appliance

Solaris   HP/UX   Windows

Databases

DB2   SQL Server

Oracle   Sybase

Protocols

SOAP   FTP

TCP/IP Sockets

LDAP   HTTP

SMTP

Single copy of message delivered simultaneously to many subscribers

Multicast

WebSphere Adapters

Enterprise Applications

SAP

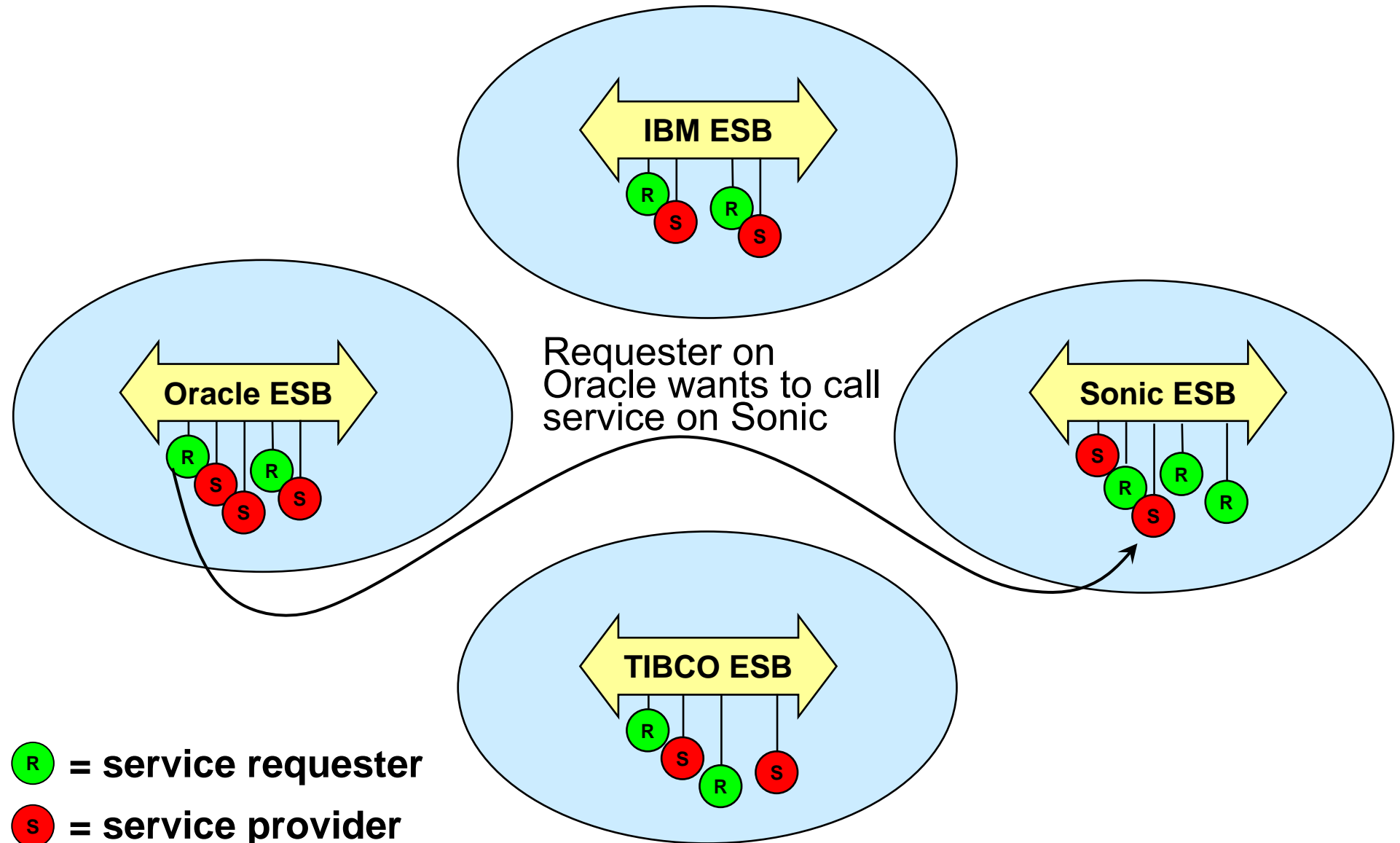JD Edwards

Oracle   PeopleSoft

Siebel

IBM Enterprise Service Bus Connects Anything To Everything

- Oracle Service Bus does not connect to the following:
  - ▶ Telemetry and mobile devices
  - ▶ TIBCO Rendezvous messaging
  - ▶ Database writes (read only)
  - ▶ Oracle adapters (Oracle Applications, Siebel, SAP, PeopleSoft)
  - ▶ LDAP directories
  - ▶ TCP/IP sockets

- Microsoft BizTalk does not connect to the following:
  - ▶ Telemetry and mobile devices
  - ▶ Sonic MQ
  - ▶ IBM WebSphere JMS messaging server
  - ▶ Oracle WebLogic JMS messaging server
  - ▶ LDAP directories
  - ▶ TCP/IP sockets

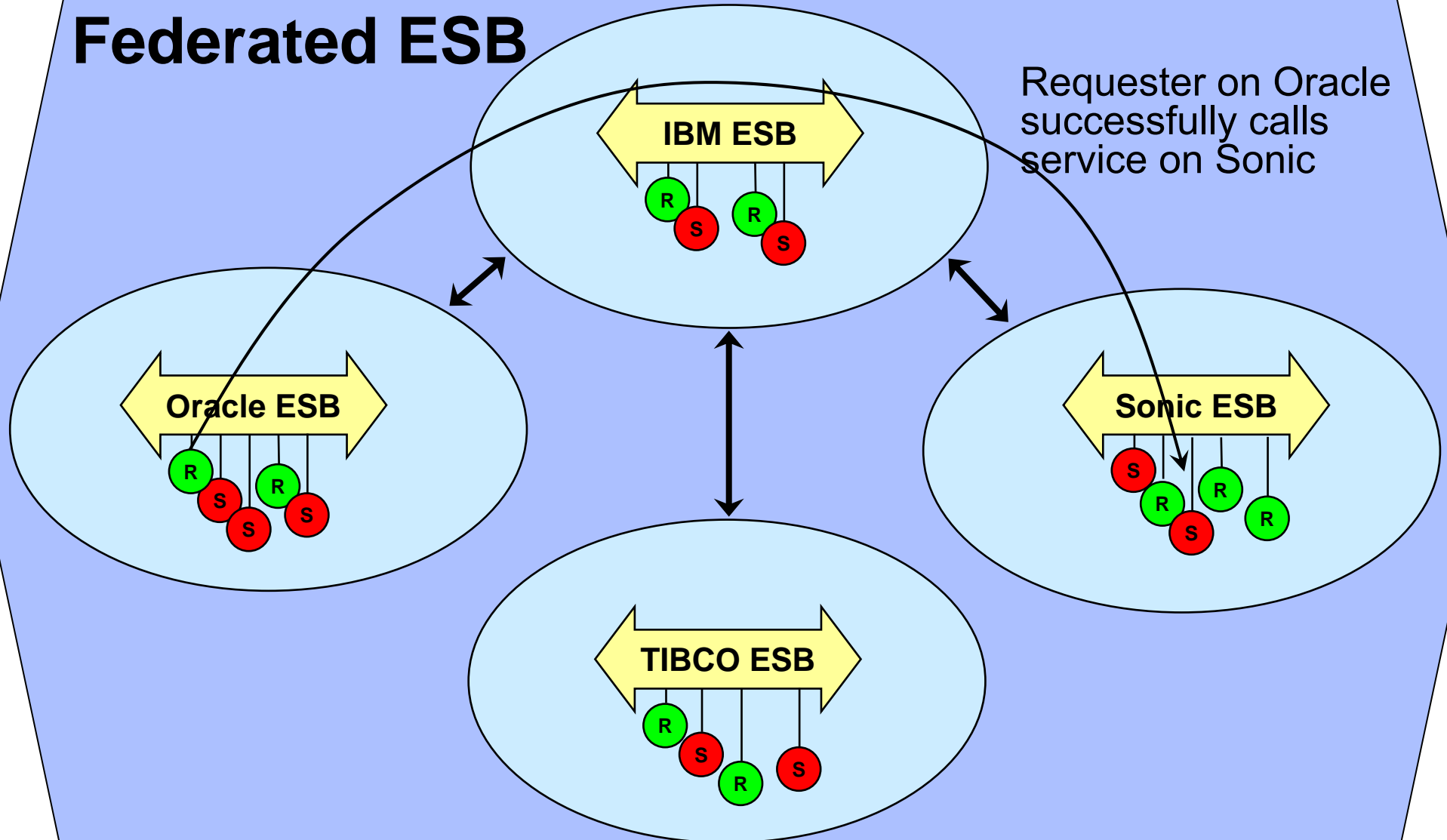# Many Enterprises Have "Islands" With Multiple ESBs Deployed

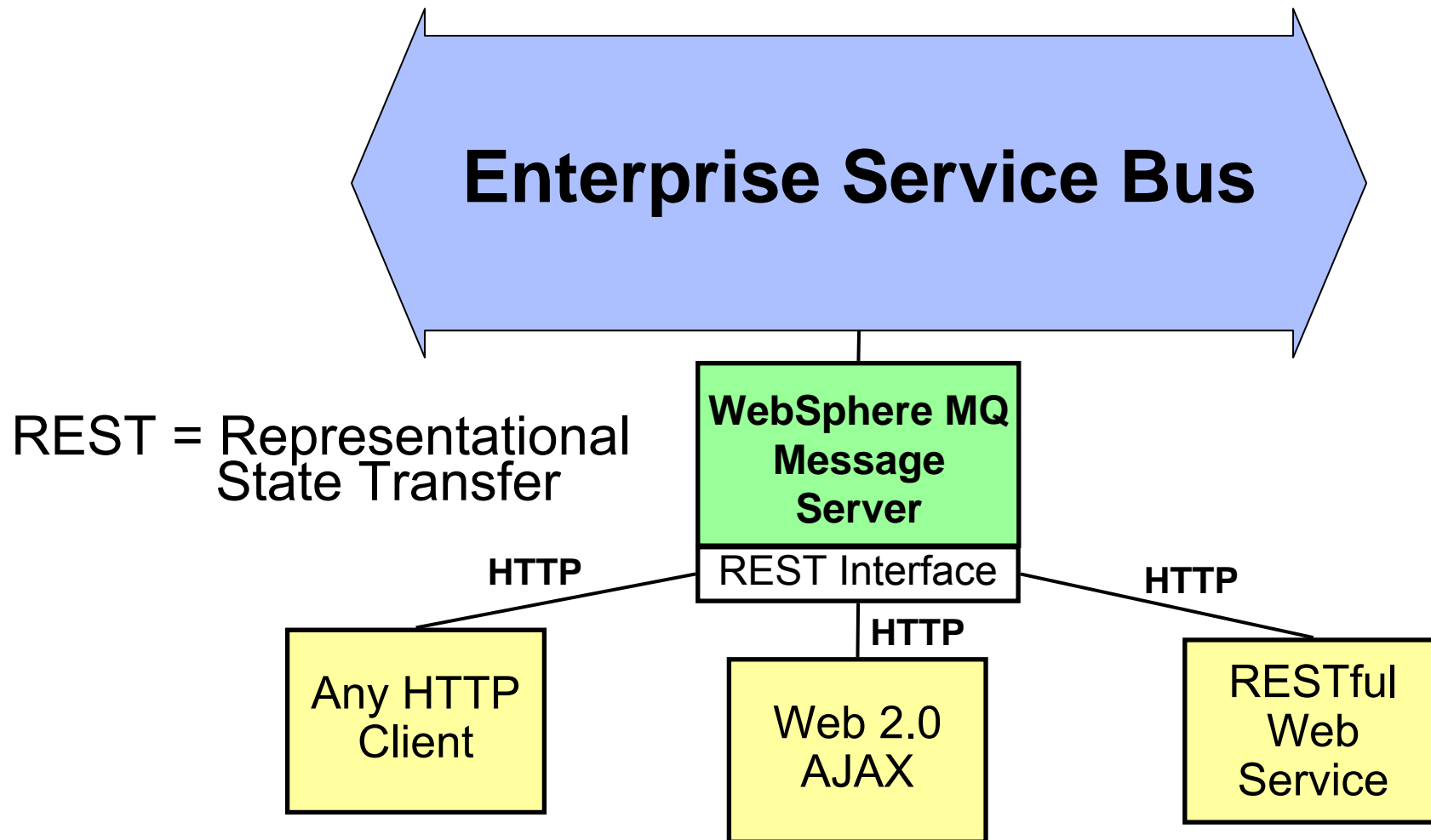Requesters cannot easily call service providers on other ESB islands

IBM ESB

Oracle ESB

Requester on Oracle wants to call service on Sonic

Sonic ESB

TIBCO ESB

R = service requester

S = service provider

IBM Extends Reach By Federating Multiple ESBs Into A Single, Logical ESB

Provides any-to-any connectivity between ESB islands

Federated ESB

IBM ESB

Requester on Oracle successfully calls service on Sonic

Oracle ESB

Sonic ESB

TIBCO ESB

Browsers Can Access The Enterprise Service Bus Via WebSphere MQ REST Interfaces

Enterprise Service Bus

WebSphere MQ Message Server

REST = Representational State Transfer

REST Interface

HTTP

HTTP

HTTP

Any HTTP Client

Web 2.0 AJAX

RESTful Web Service

- No client software other than a browser is needed

- Supports both point-to-point and publish/subscribe messaging

- Oracle and Microsoft messaging do not have a REST interface

DEMO: Asynchronous Messaging Using WebSphere MQ REST Interface

Point-to-point Messaging

Publish/Subscribe Messaging
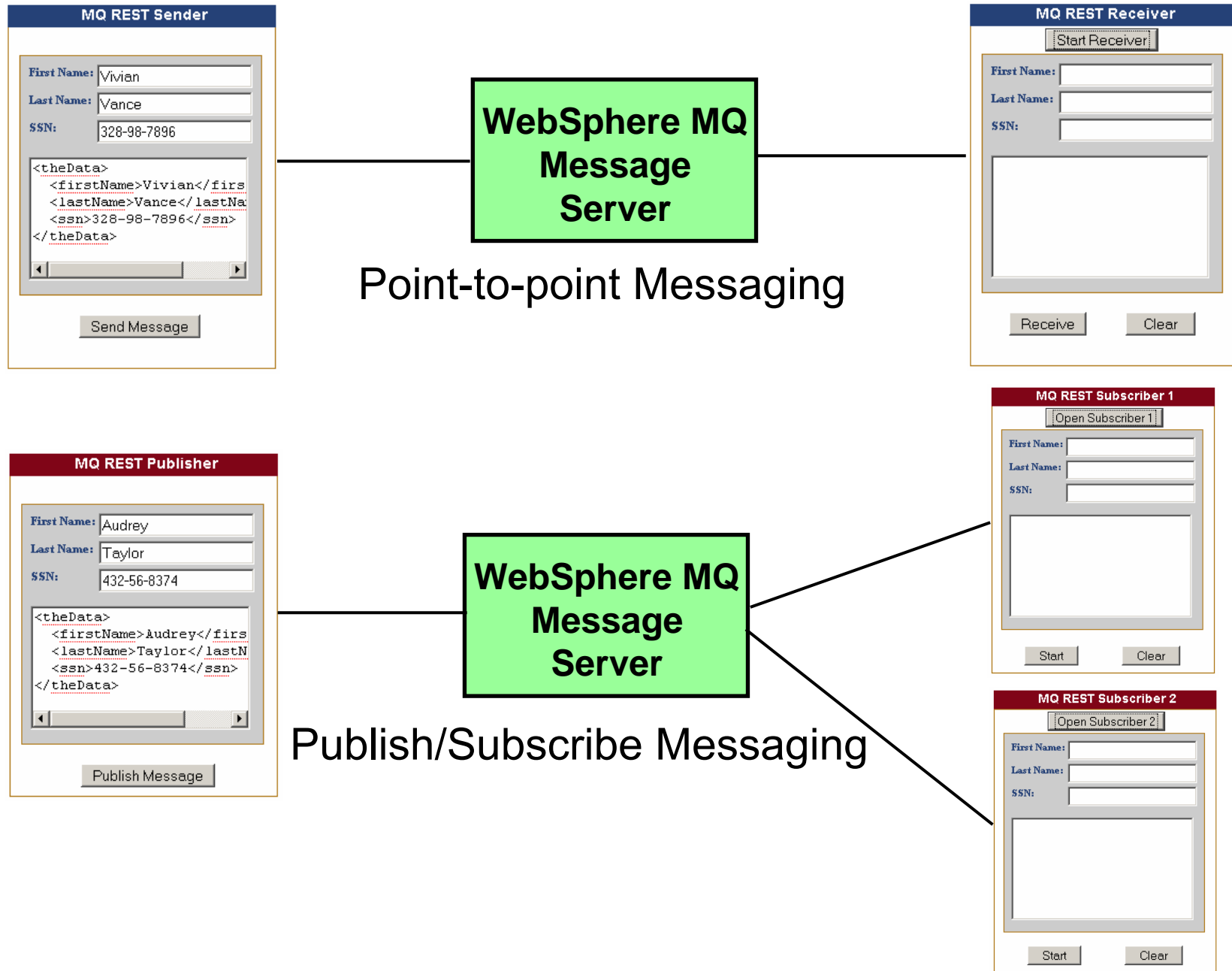
Eclipse Development Tool Makes Creating ESB Mediation Services Easy

Extensive palette for building mediation services

- Graphical canvas for mediation flow design
- Drag & drop objects from palette
- Common tooling platform for IBM

Disconnected development allows you to work anywhere

Transformation Mediation Service

Example: Transform XML to Automated Clearing House format

Sender

XML Format

XML
<amount>
56.83
</amount>

Enterprise Service Bus

Data Transformation

Receiver

Binary Format
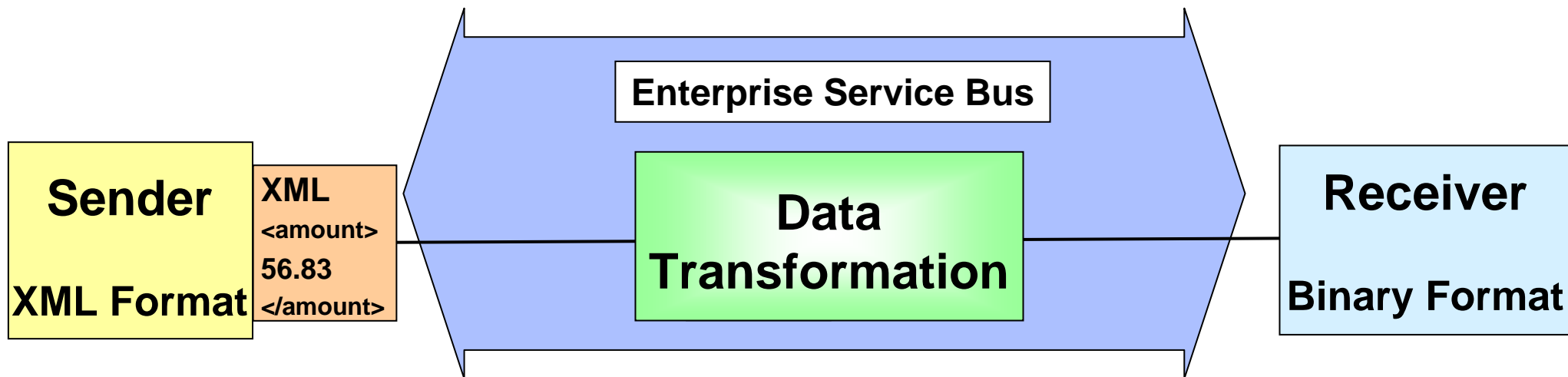
- Transform message format into any other format
- No changes to existing sender or receiver applications
- Transformations are centralized and re-usable

WebSphere Transformation Extender Makes Creating Data Transformations Even Easier

COPYBOOK

```
01        TP-API-CB.
03        TP-AGAPI-CB.
05        TP-AGAPI-REQUEST          PIC X(40).
    88        TP-AGAPI-INITIALIZE-REQUEST
                    VALUE 'INITIALIZE-MAPPING'.
    88        TP-AGAPI-PERFORM-MAPPING
                    VALUE 'PERFORM-MAPPING'.
    88        TP-AGAPI-FINISH-MAPPING
                    VALUE 'FINISH-MAPPING'.
05        TP-AGAPI-VERSION          PIC X(04).
    88        TP-AGAPI-VERSION-VALID      VALUES ARE '0100' '0200'.
    88        TP-AGAPI-VERSION-0100      VALUE    '0100'.
    88        TP-AGAPI-VERSION-0200      VALUE    '0200'.
05        TP-AGAPI-RESPONSE.
    10        TP-AGAPI-RESPONSE-CODE      PIC 9(04) COMP.
    88        TP-AGAPI-ALL-OKAY        VALUE 0.
    88        TP-AGAPI-REQUEST-ERROR      VALUE 1.
    88        TP-AGAPI-INITIALIZE-ERROR    VALUE 2.
    88        TP-AGAPI-MAP-ERROR        VALUE 3.
    88        TP-AGAPI-FINISH-ERROR      VALUE 4.
    88        TP-AGAPI-UNKNOWN-LOOP-ID      VALUE 5.
    88        TP-AGAPI-NO-ALGORITHM      VALUE 6.
    88        TP-AGAPI-NO-PARTNER        VALUES  7 15.
    88        TP-AGAPI-NO-APPLICATION      VALUE 8.
    88        TP-AGAPI-ALGORITHM-IO-ERROR VALUE 9.
    88        TP-AGAPI-FATAL-GATEWAY-ERROR VALUE 10.
    88        TP-AGAPI-GATEWAY-WRITE-ERROR  VALUE 11.
    88        TP-AGAPI-PARTNER-IO-ERROR    VALUE 12.
    88        TP-AGAPI-BAD-VERSION      VALUE 13.
    88        TP-AGAPI-BAD-NUMERIC-TYPE    VALUE 14.
    88        TP-AGAPI-NO-ALIAS        VALUE 15.
    88        TP-AGAPI-ACCESS-ERROR      VALUE 16.
    10        TP-AGAPI-RESPONSE-MESSAGE  PIC X(80).
05        TP-AGAPI-APPLICATION-ID    PIC X(10).
03
01
```

PROPRIETARY

```
DUNS 0123
F046000INV        for 2
months      120799
12   718-339-1700I43989D-2
120799999-b
003000010000
DUNS 4445        P55590
120799499QR
000004004000
```

CASH RECONCILATION

```
10029847 - $100,000,000.00
13948589 - $679,495,094.98
13950967 - $588,345,058.00
13950968 - $000,000,000.00
14001321 - $098,957,038.12

AAA: HT4459
AAA: B33566
AAA: C4058G
AAB: 948409
AAB: 874931
```

TABLE

Make	Model	PKG	Extended_Features
Ford	Prefect	34890	2984782q, 93847920, 3438084
Ford	Prefect	34890	2984782q, 93847920, 3438084
Ford	Prefect	34890	2984782q, 93847920, 3438084
Ford	Prefect	34890	2984782q, 93847920, 3438084
Ford	Prefect	34890	2984782q, 93847920, 3438084

DDA Application Updates

```
<MSG 19934749>
   <ACCT BAL RPT>
     <ACCTNUM><"14001321">
<ENDBALANCE><" $098,957,038.12">
<DEBIT><"103048382$394,394.00">
<DEBIT><"103048383$001,293.65">
<CREDIT><"987463921$928,943.67">
   </ACCTNUM>

</MSG>
```

BINARY

```
0001111001001001101001 0
1001001001001001000001 1
1101010010101011001001 0
1001001001001001010010
1001001010101010100010 0
1110001010001001001001
0010010010010010010001 0
0101010010001001010010
0100100111000101001 0101
0101010101001001001001
0010001001001001000010
1010101000100101000100 1
0100101010010101010010 1
0110010100000000000111 1
1001001001010111001001 0
0101010100101010110111 1
```

- Takes any kinds of data from their native formats
- Transforms the data into any desired format
- No coding required for the data map
- Maps can be tested independent of the mediation flow
- Integrates with IBM ESB offerings
- Excellent for advanced transformation maps

WebSphere Transformation Extender Vertical Product Packs Provide Industry Standard Formats

Financial Services

SWIFTNet FIN
SWIFTNet Funds
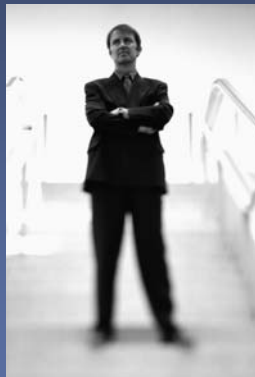SEPA
FIX
NACHA
ACORD

Health Care

HIPAA
NCPDP
HL7
Services Solutions
- HealthCare Hub
- Payment Processing
- Clearing House Processing

EDI

X12
EDIFACT
TRADACOMS
ODETTE
EANCOM

Enterprise Applications

SAP
PeopleSoft
Siebel

IBM Leads In ESB Data Transformation

- Built-in graphical mapping tools for typical data transformation requirements

- Optional WebSphere Transformation Extender add-on
  - ▶ For advanced data transformation requirements
  - ▶ Industry Packs provide **16 standard industry data formats**
  - ▶ Plugs into IBM ESB Eclipse design tool

- Oracle provides only basic data transformation
  - ▶ Must use either external XQuery tool or self-built XSLT files
  - ▶ Only SWIFT, FIX, and SEPA industry data formats

- Microsoft provides only basic data transformation
  - ▶ Simple graphical mapping tool, not appropriate for advanced transformations
  - ▶ Only SWIFT, RosettaNet, HL7, and HIPAA industry data formats

ESB Performance Is An Important Consideration

We process a lot of payments every hour. How well does your ESB perform?

We offer the fastest ESB in the industry. This allows you to process more payments on the same hardware compared to other ESB offerings.

Service Oriented Finance CIO

IBM

A Transactional ESB Connection Assures Data Integrity

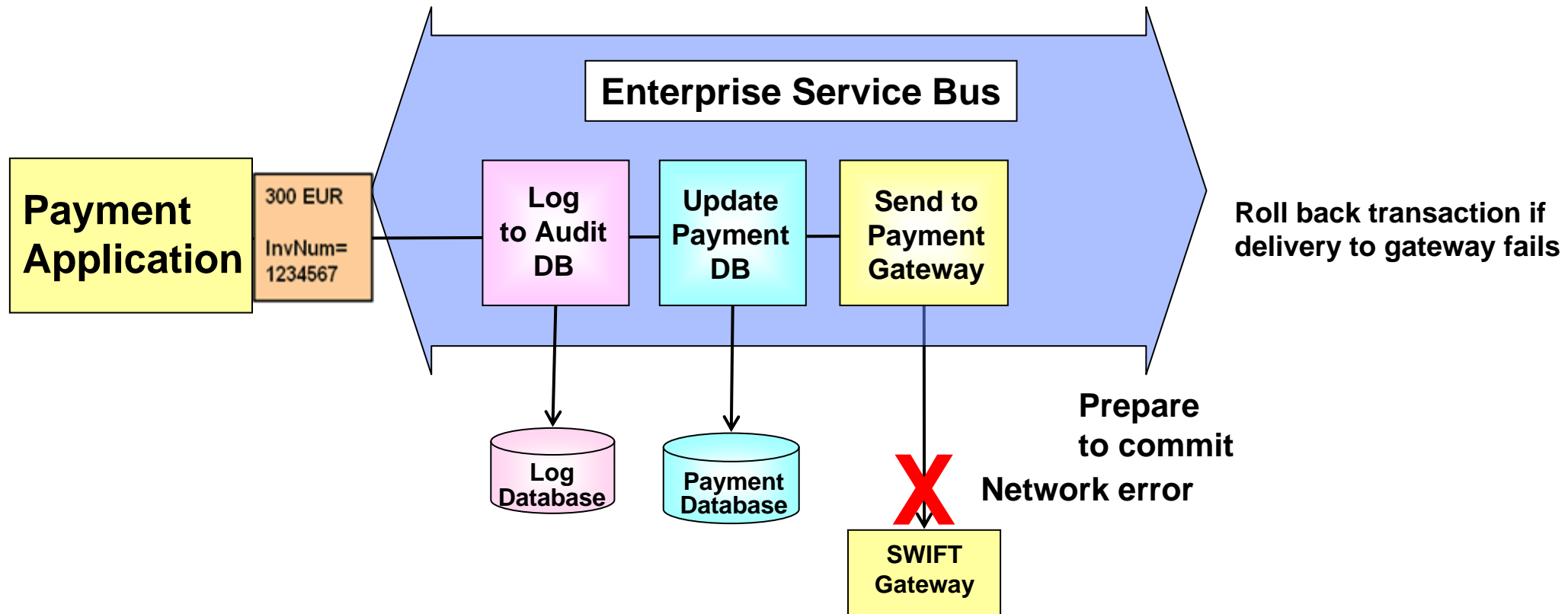Our payments are logged for audit purposes.

Our logs must be accurate!

Our ESB can execute mediation flows as distributed transactions. This assures data integrity.

Service Oriented Finance CIO

IBM

Transactional ESB Mediation Flow Assures Data Integrity

- All updates are either committed or rolled back within a single transaction
  - Including database and messaging operations
- Oracle Service Bus does not support transactional mediation flows
- Oracle Service Bus does not update databases
- Microsoft BizTalk transactional scope does not include end points

Service Lookups Ensure Resilient Operation

Our payments network must have resiliency in the event of service outages.

Our ESB can dynamically route payments based on information about each end point.

Service Oriented Finance CIO

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Service Lookup Dynamically Routes Messages To Registered End Point Services

Route payment to best payment gateway receiver

Receiver 1

IBM Enterprise Service Bus

Sender

Payment = $75.34

Service Lookup

Receiver 2

Query: $75.34

Return: address of best Receiver service (Receiver 2)

SOA Service Registry

Lookup best Receiver service for payment amount
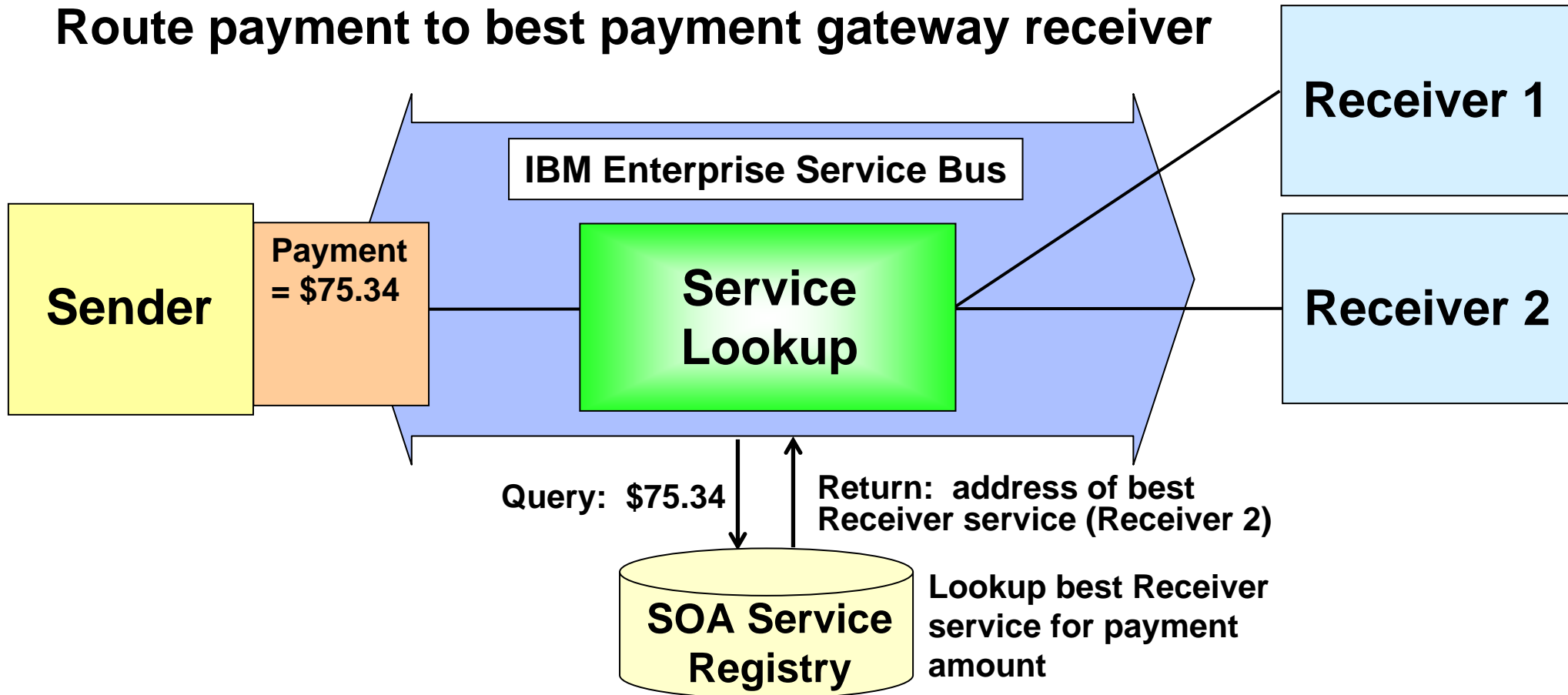
- Payments are not routed to fixed end point destinations

- ESB dynamically selects the best end point service by comparing message content with information about registered end point services

- Fewer mediation design changes are needed as end points change

# WebSphere Service Registry And Repository (WSRR) Is The IBM SOA Registry

WSRR provides five capabilities for managing your end point services

Enable service re-use

Publish

Publish completed services to a common registry

Find

Find services based on search criteria

Enrich

Enables selection of services based on service metadata

Manage

Service classification and versioning

Govern

Govern transitions in service life cycle
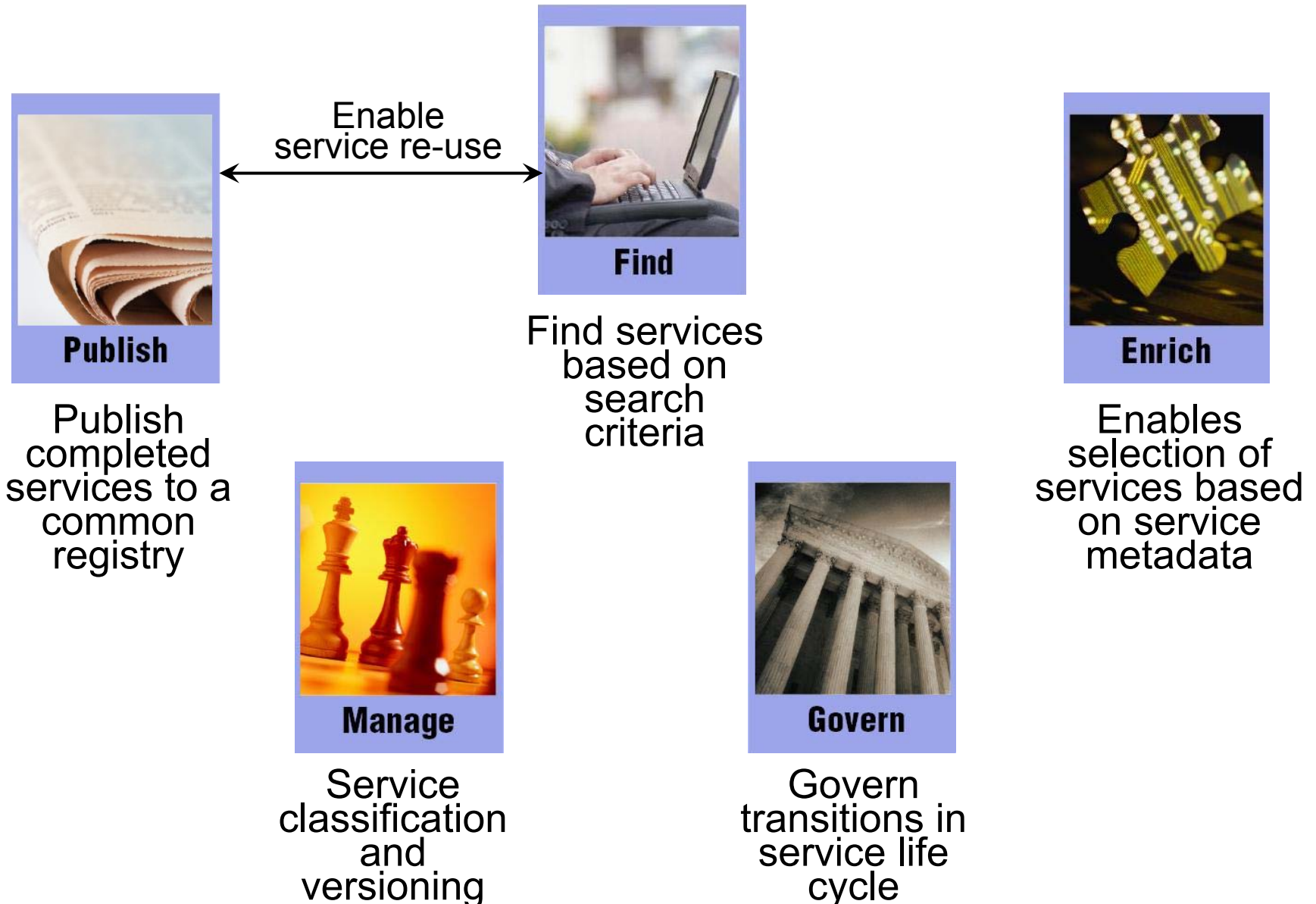
IBM Enterprise Service Bus Integrates With WebSphere Service Registry And Repository

- Design Time

  ▶ Find published end point services in WSRR

    − Search WSRR from within ESB design tool

    − Import service documents (WSDL, XSD, etc.) into design tool

  ▶ Publish ESB mediations as services to WSRR

- Run Time

  ▶ Connection from ESB run time engine to WSRR

  ▶ Lookup information about an individual end point service

  ▶ Query service metadata for all matching end point services

  ▶ Receives end point information for matching services

  ▶ Query results can be cached for higher throughput

- Oracle Service Bus and Oracle Service Registry are not integrated at run time

- Microsoft BizTalk does not integrate with any UDDI registry at run time

DEMO: Dynamic, Flexible Routing And Transformation Of Payments Using Service Lookup
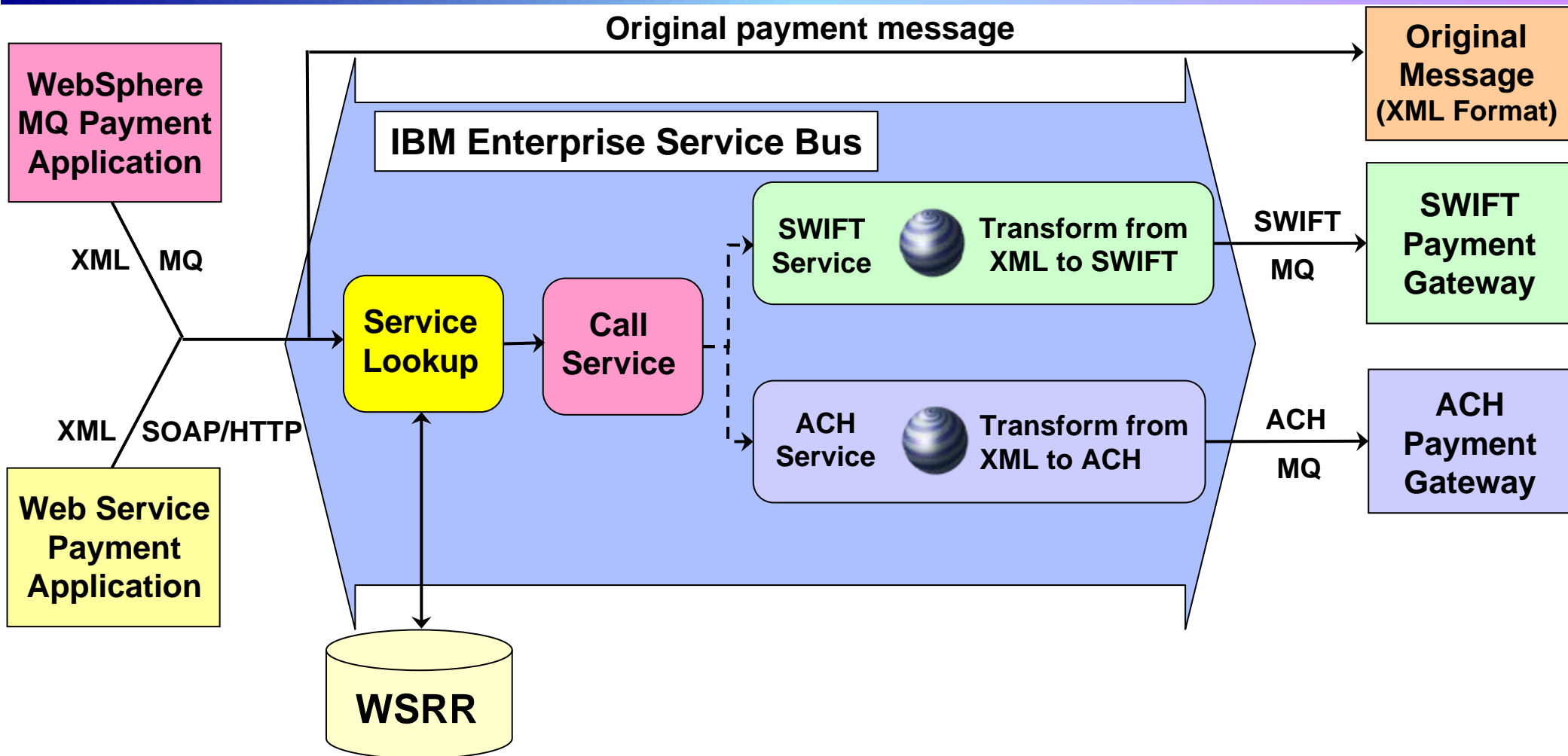
- Payments are dynamically routed to end point services by comparing payment amount to payment limits stored in WSRR service metadata
- Transformation from XML to SWIFT and ACH formats using WebSphere TX maps
- Payments are processed exactly the same for both a WebSphere MQ payment application and web service payment application

Adding Or Removing An End Point Requires Minimal Changes

Example: Add a SEPA payment gateway end point
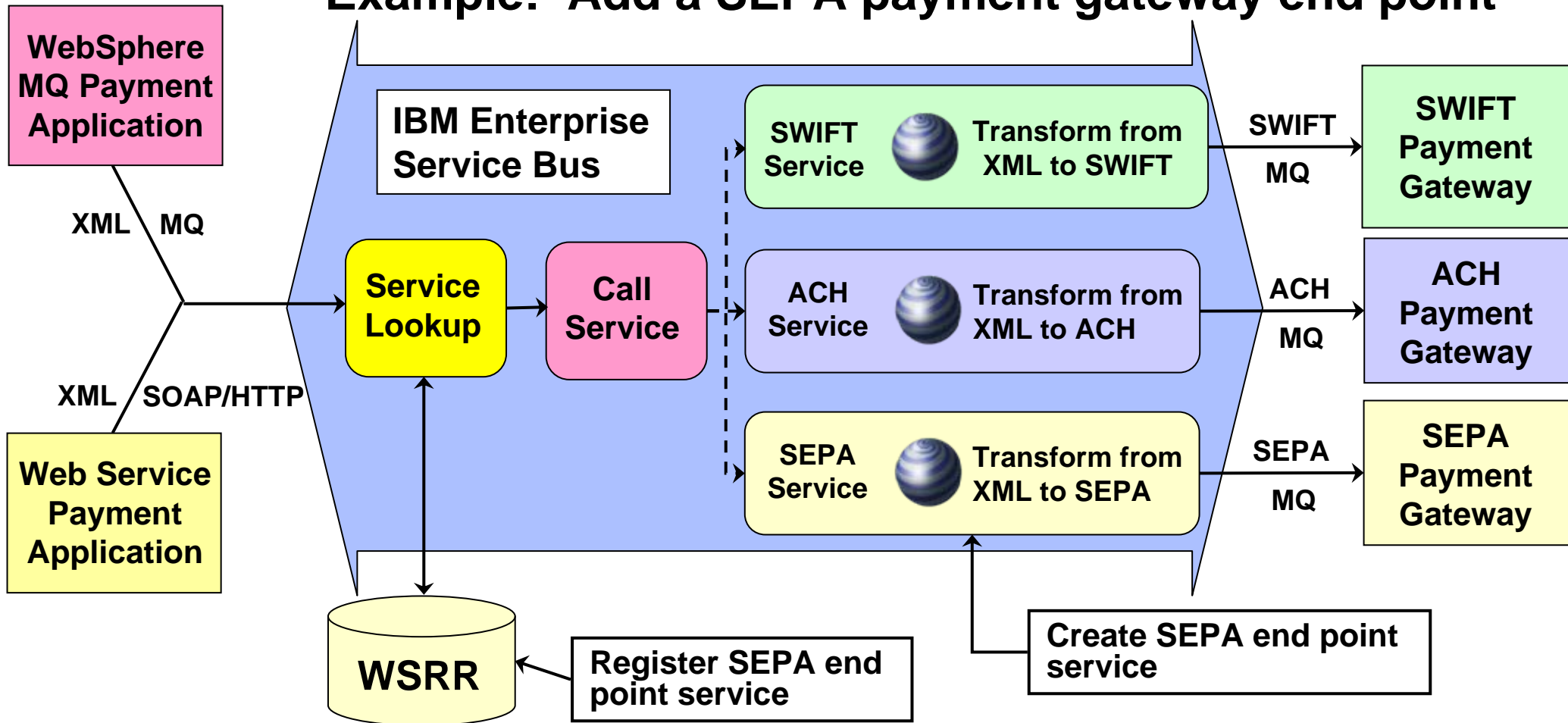
- Adding an end point only requires a new end point service
- Removing an end point requires no design changes
- Neither Microsoft nor Oracle have dynamic service lookup

Integration With Service Monitoring Assures That Only Responsive End Points Are Called

Example: Multiple SWIFT payment gateway end points
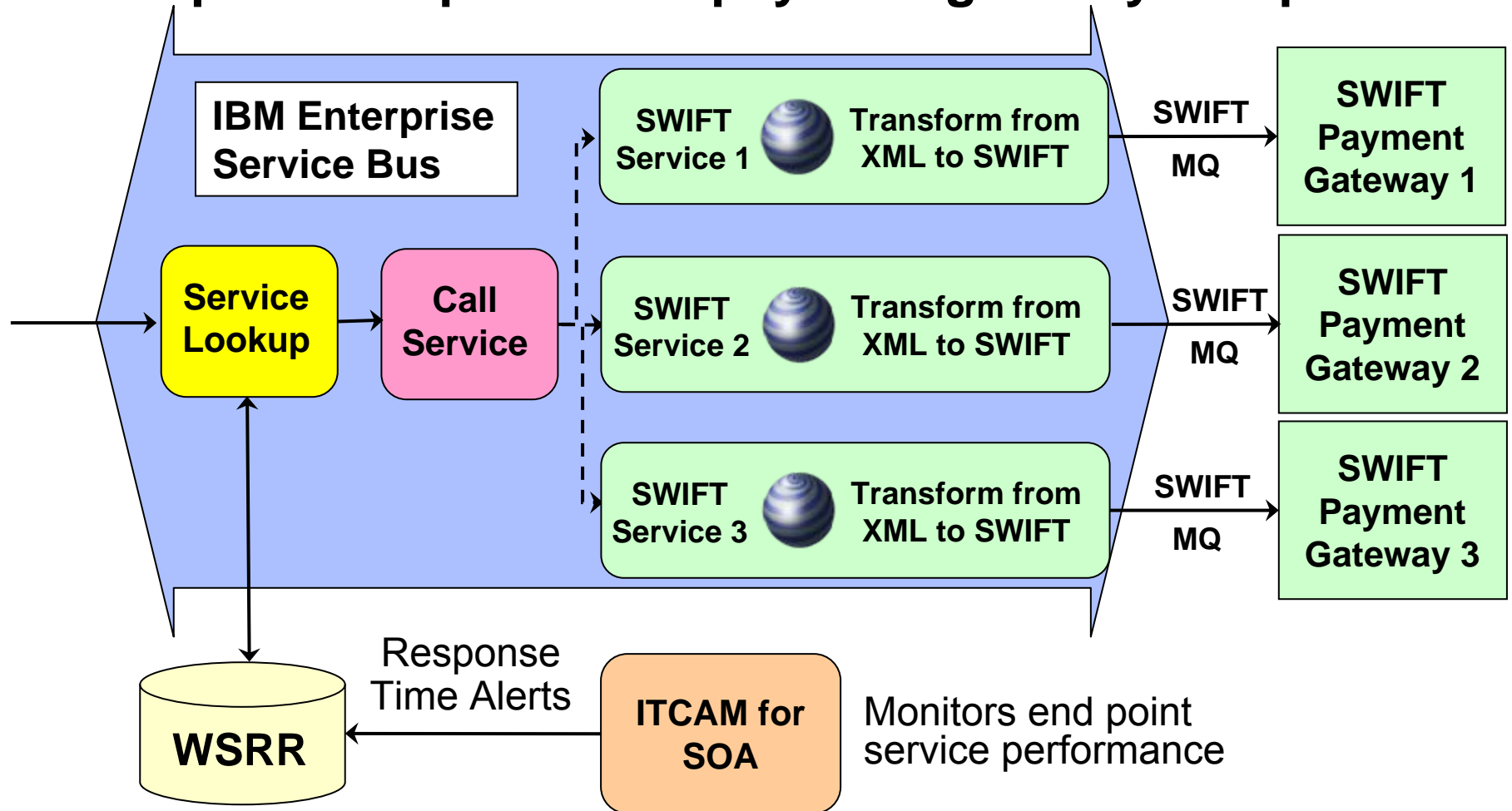
- Service Lookup only returns responsive end point services
- Can use other WSRR service metadata to select from multiple returns
- Oracle and Microsoft do not have monitoring integration with ESB

Use Response Time Alert Information In WSRR To Improve Throughput

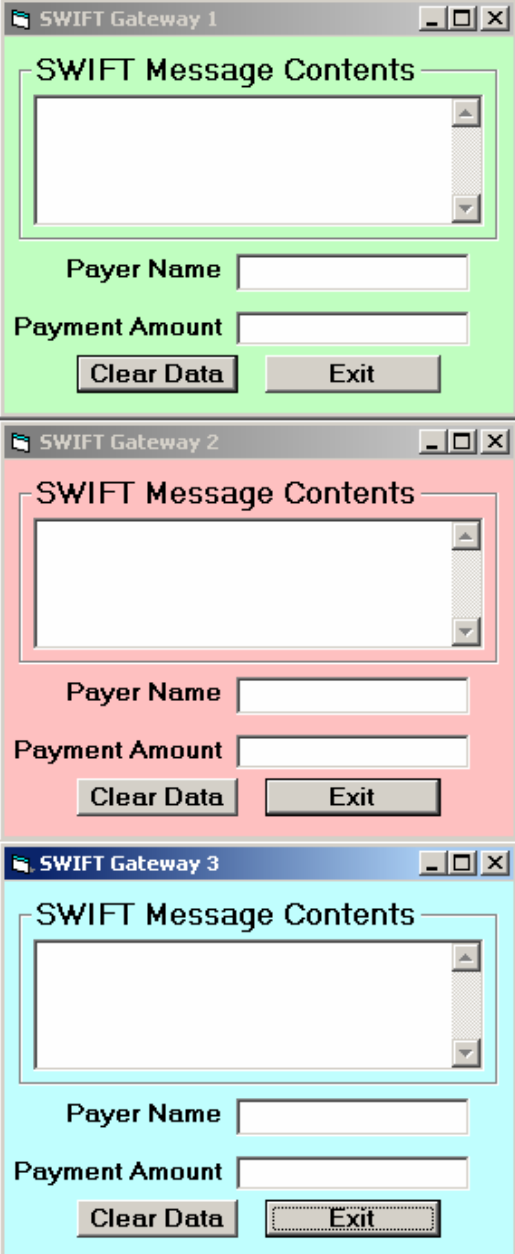| End Point	Response Time Alert Information in WSRR	Priority	Service Lookup
SWIFT Service 1	Response Time Critical 15.87 sec. response time	1	Not Returned
SWIFT Service 2	None	2	Returned
SWIFT Service 3	None	3	Returned

- Only SWIFT Service 2 and SWIFT Service 3 end point services are returned

- Mediation flow design can then select which end point service to call
  - ▶ Example: select end point with highest priority

DEMO: Service Lookup Based On Response Time Alerts

- Route payments only to end point services without response time alerts from ITCAM for SOA monitoring
- If multiple end point services are returned, select service with highest priority (lowest priority number)
- An end point can be added or deleted without changing the ESB mediation flow design

IBM Provides Superior Connectivity Solutions For Smarter Planet Solutions

- Reach

- Performance

- Transactional

- Resiliency