



IMS Version 11

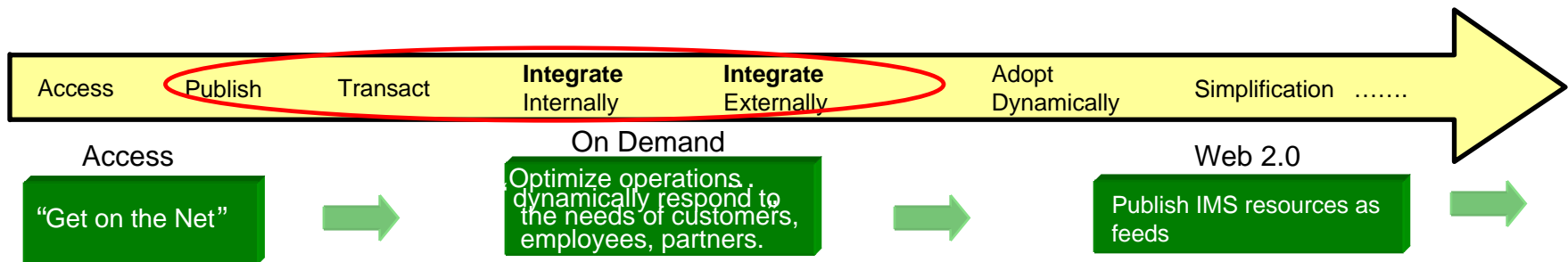
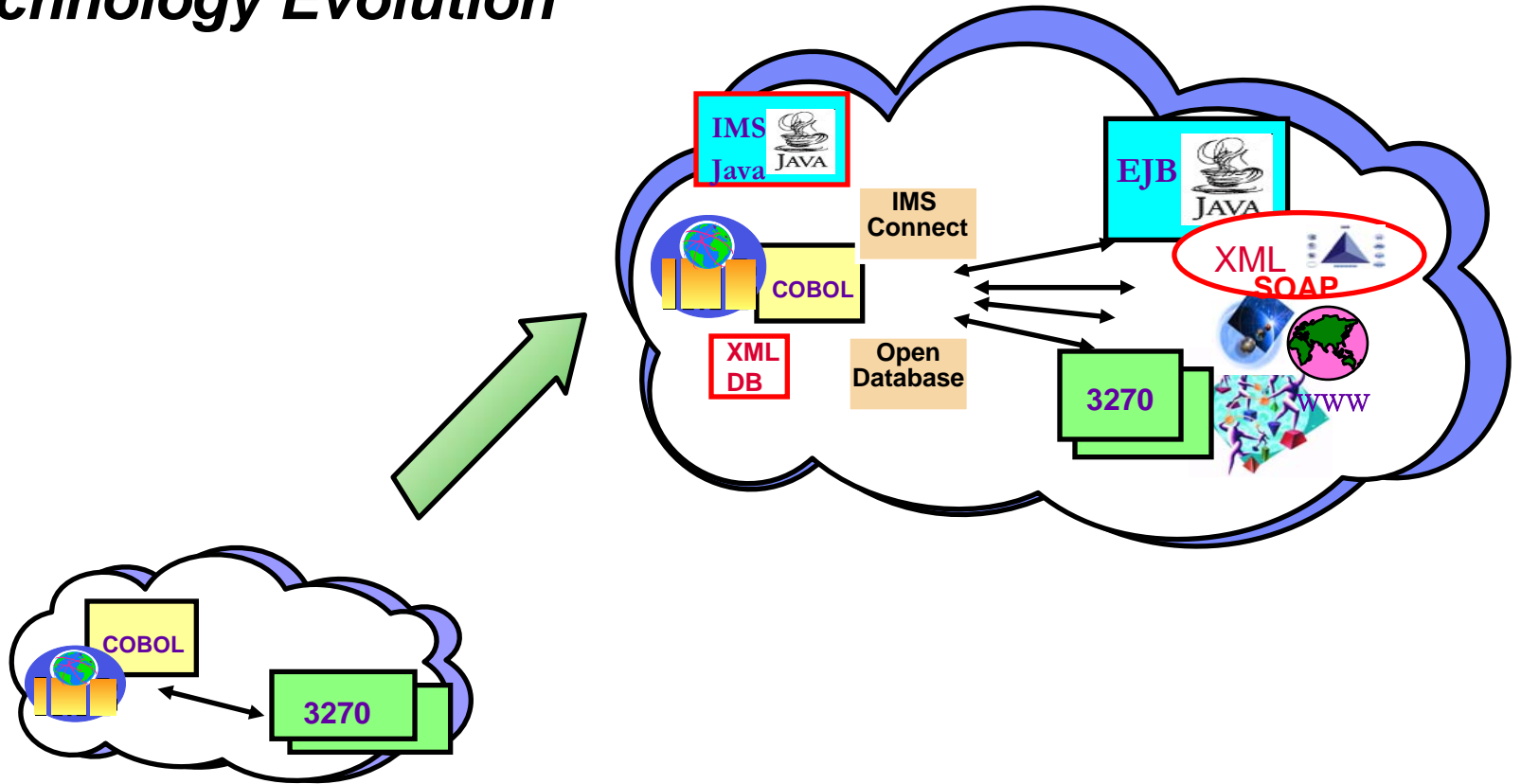
IMS and Mainframes in an SOA World

- Modernizing your IMS Assets

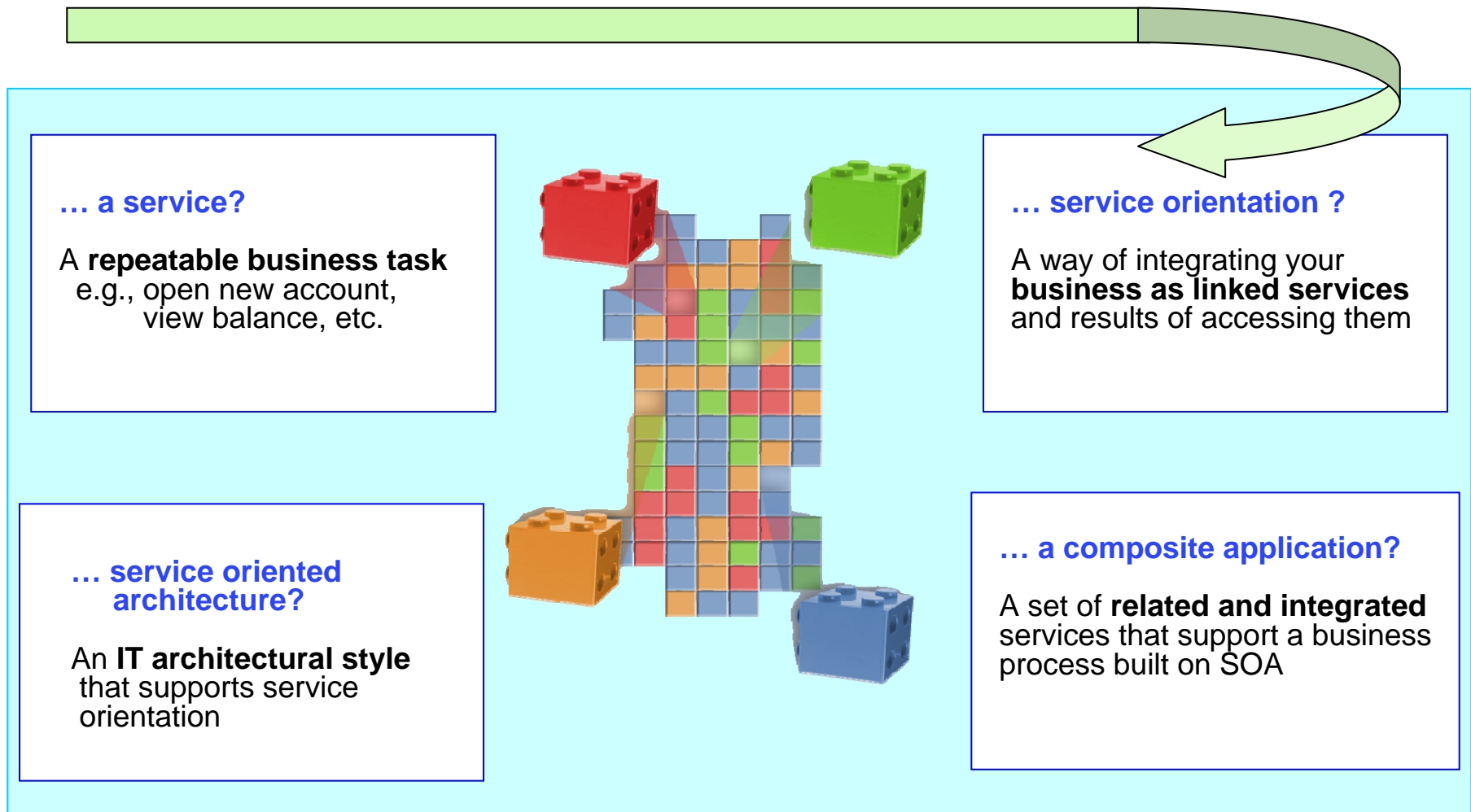
Information Management software



The Technology Evolution



..to Service Oriented Architecture (SOA)



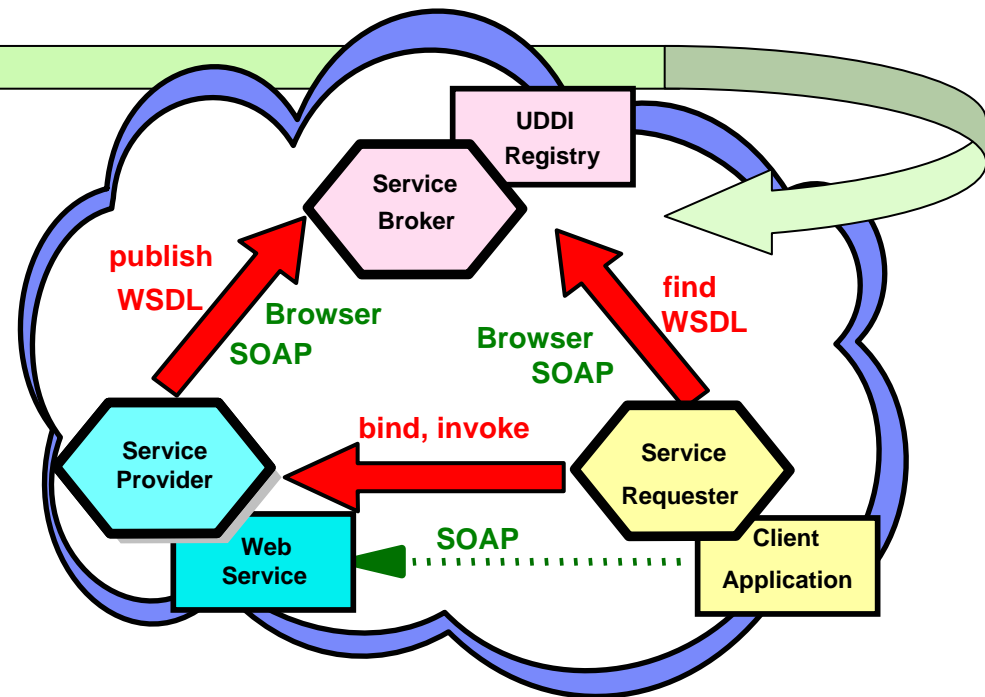
And Web Services

Architecture for

- Application to application
 - Communication
 - Interoperation

Definition:

- Web Services are software components described via WSDL (Web Services Description Language) that are capable of being accessed via standard network protocols such as SOAP over HTTP



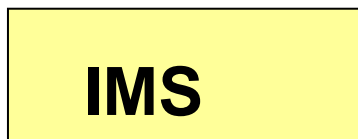
The entire industry is agreeing on one set of standards !!

The Challenge - SOA Enablement

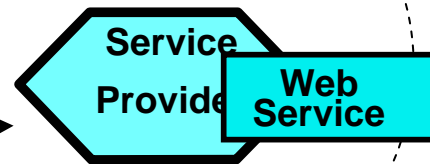
REQUIREMENTS

- Provide access to IMS resources as web services
- Provide access from IMS transactions to web services

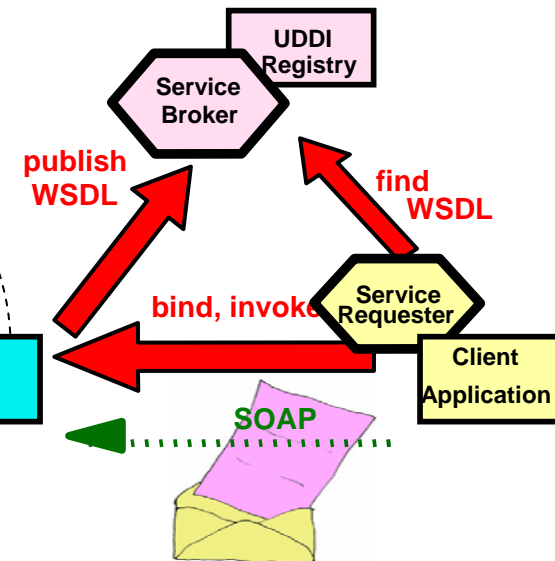
- Figuring out how to access IMS
 - “Exposing” the IMS resources as web services
- Deciding how to create the web service



?

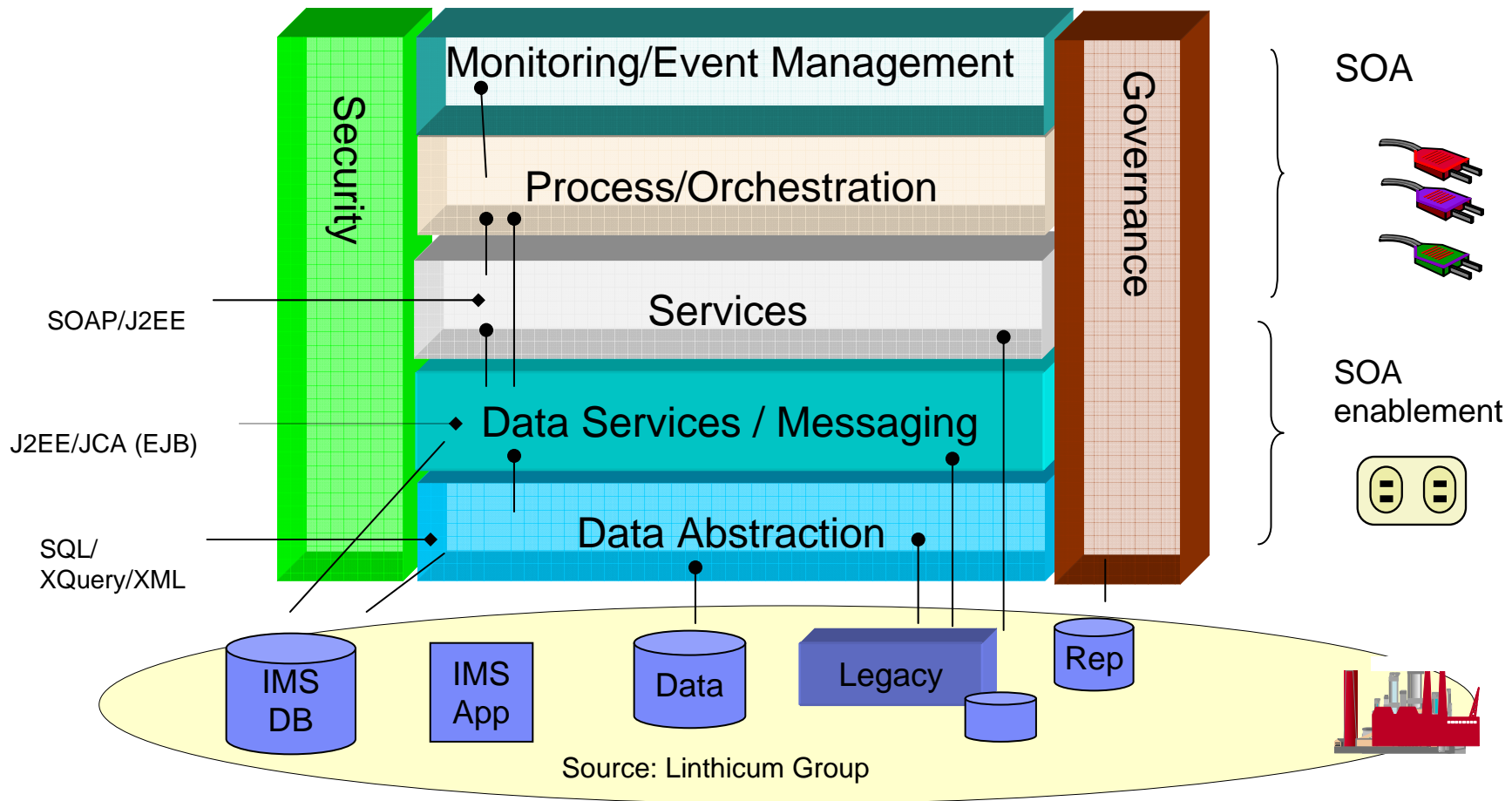


- Figuring how to access web services from IMS

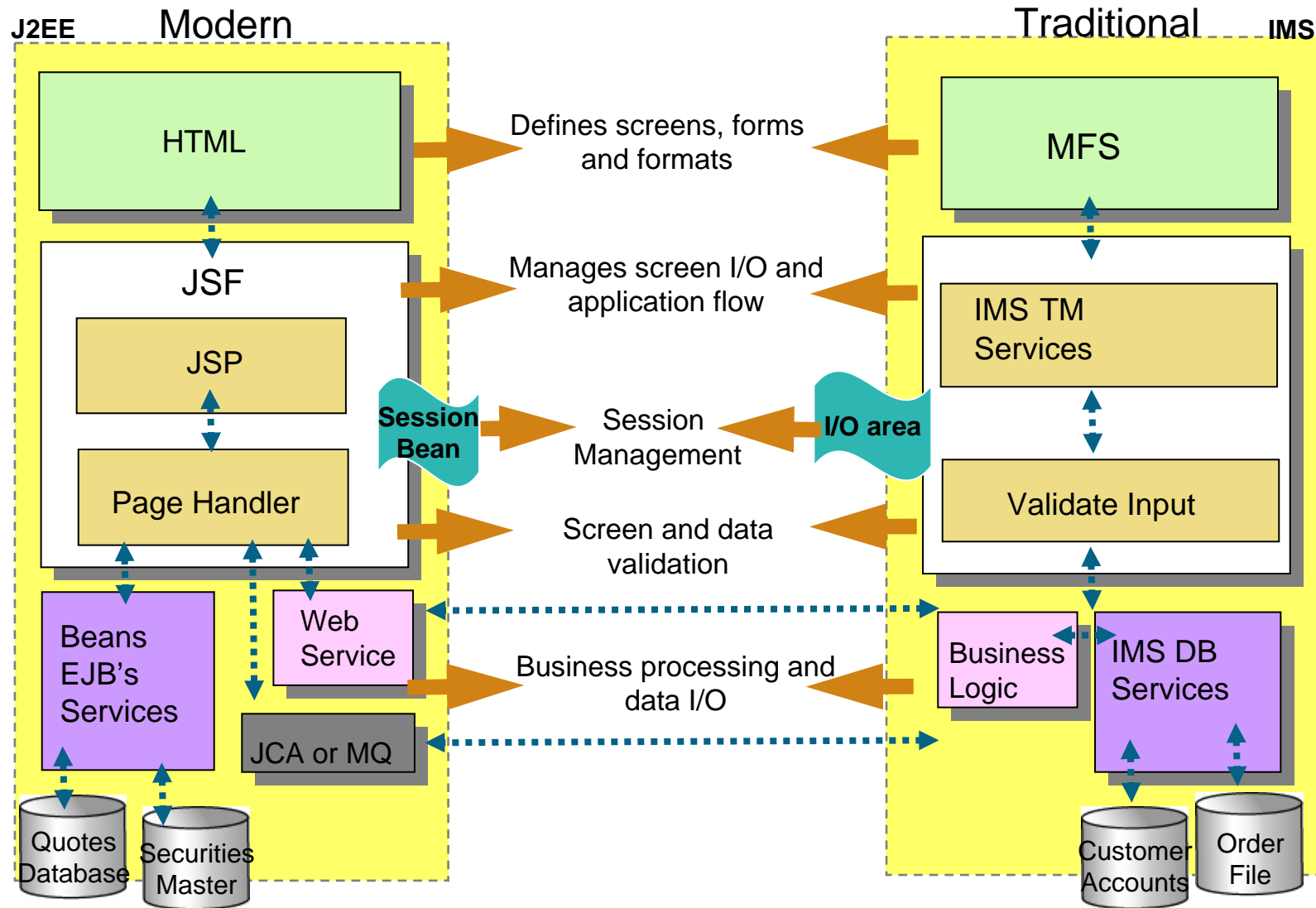


So the IMS Strategy ... Provide SOA *Enablement* Solutions

- Tooling can be used for the SOA higher layers
- Assets projected into the lower layers can be “pulled” higher

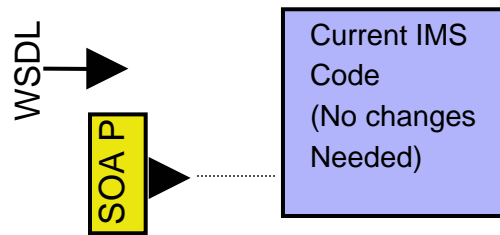


But... It's not really that different



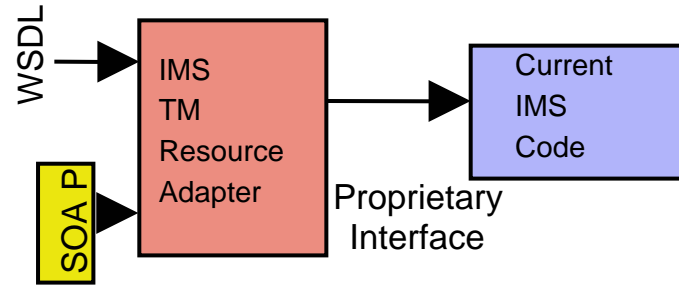
With several patterns for Integration

Native



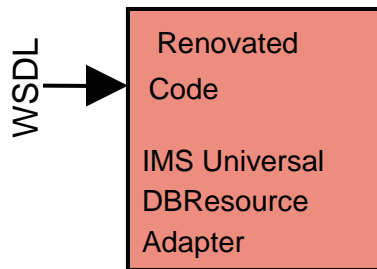
- existing code is already modularized - technology is available to put a native web services interface in front of the native interface

Adapter



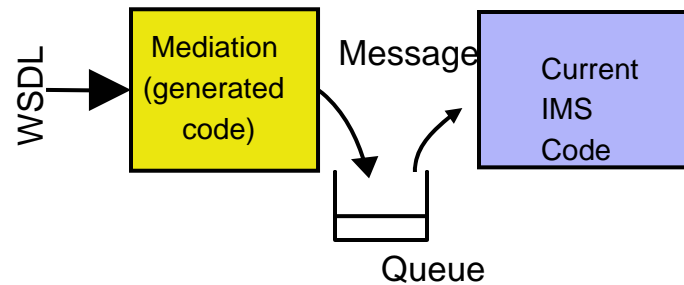
- existing code is already modularized - any changes necessary to expose the desired services are made primarily in the custom adapter with modest to no changes in the IMS application code

Modularized



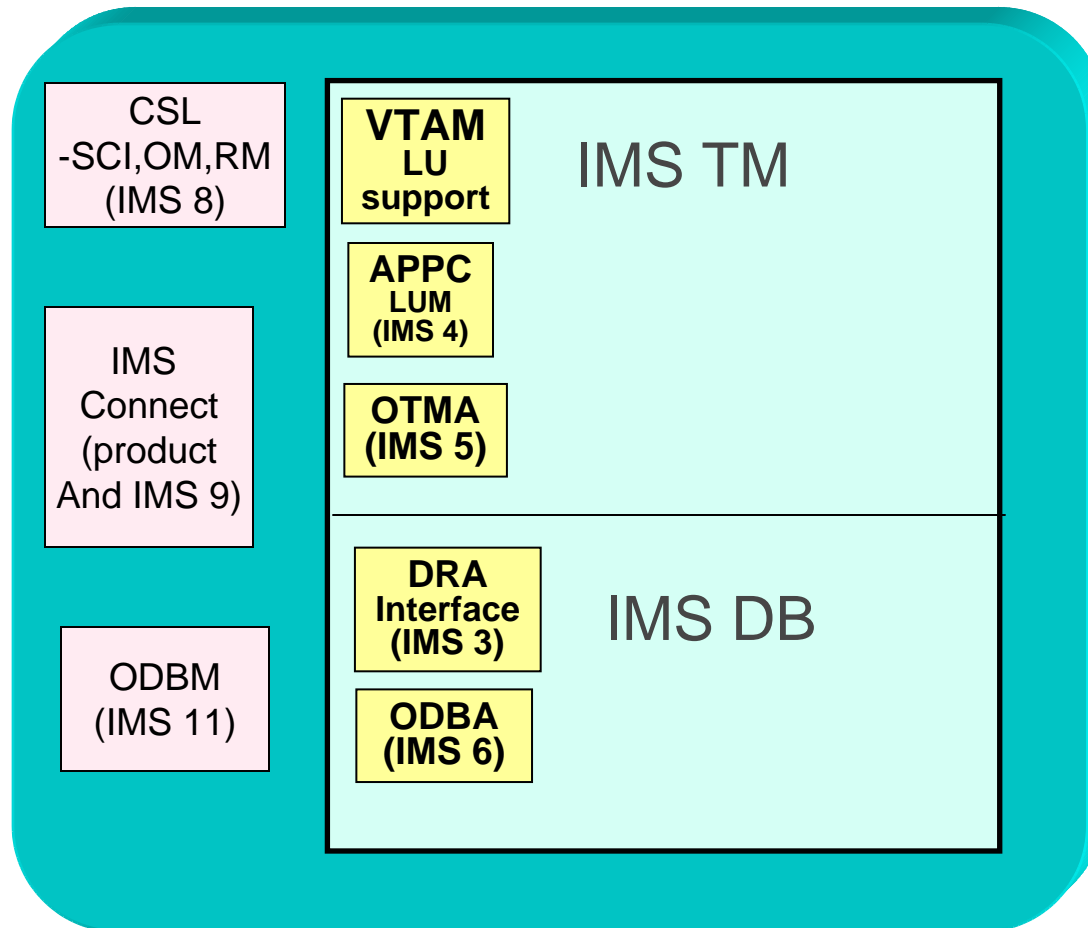
- existing code does not expose the services needed in any accessible fashion and must be renovated to restructure the access to the business rules and data appropriately.

Brokered

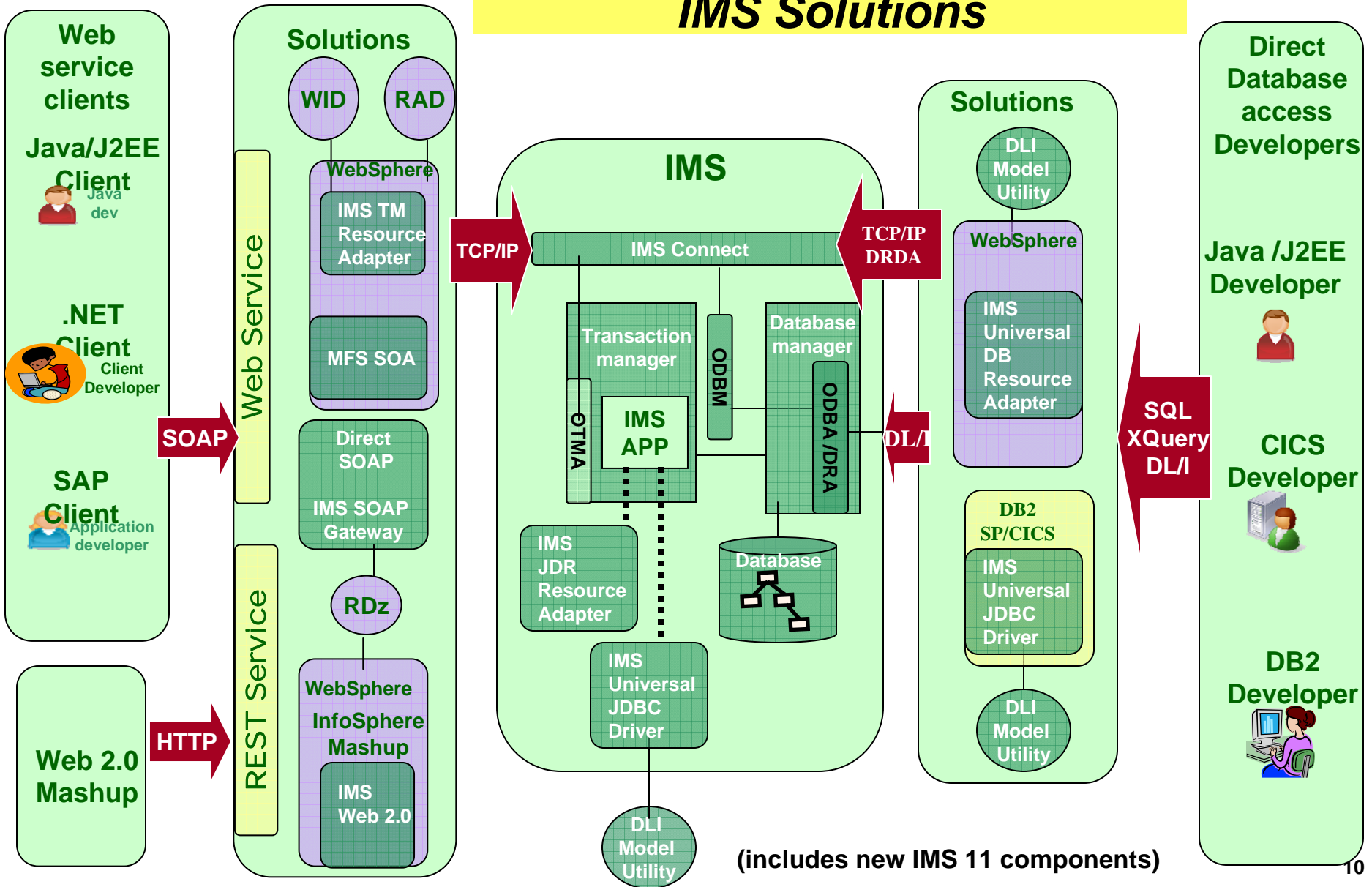


- existing code does not expose the services needed in existing code exposes the desired services as messages when this can be done with modest changes to the existing code. The service can often be created by using generated code in a message broker or ESB.

Using IMS Architecture Foundations as Building Blocks



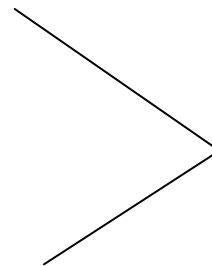
To Provide a variety of new IMS Solutions



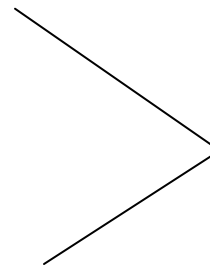
IMS Integration Suite

- IMS TM Resource Adapter
- IMS Web 2.0
- IMS MFS Web Enablement
- IMS SOAP Gateway

- IMS DB Resource Adapter
 - IMS JDBC Connector
- IMS DLIModel utility
- IMS XML DB



**IMS Connect-based solutions
for IMS transaction access**



IMS DB access

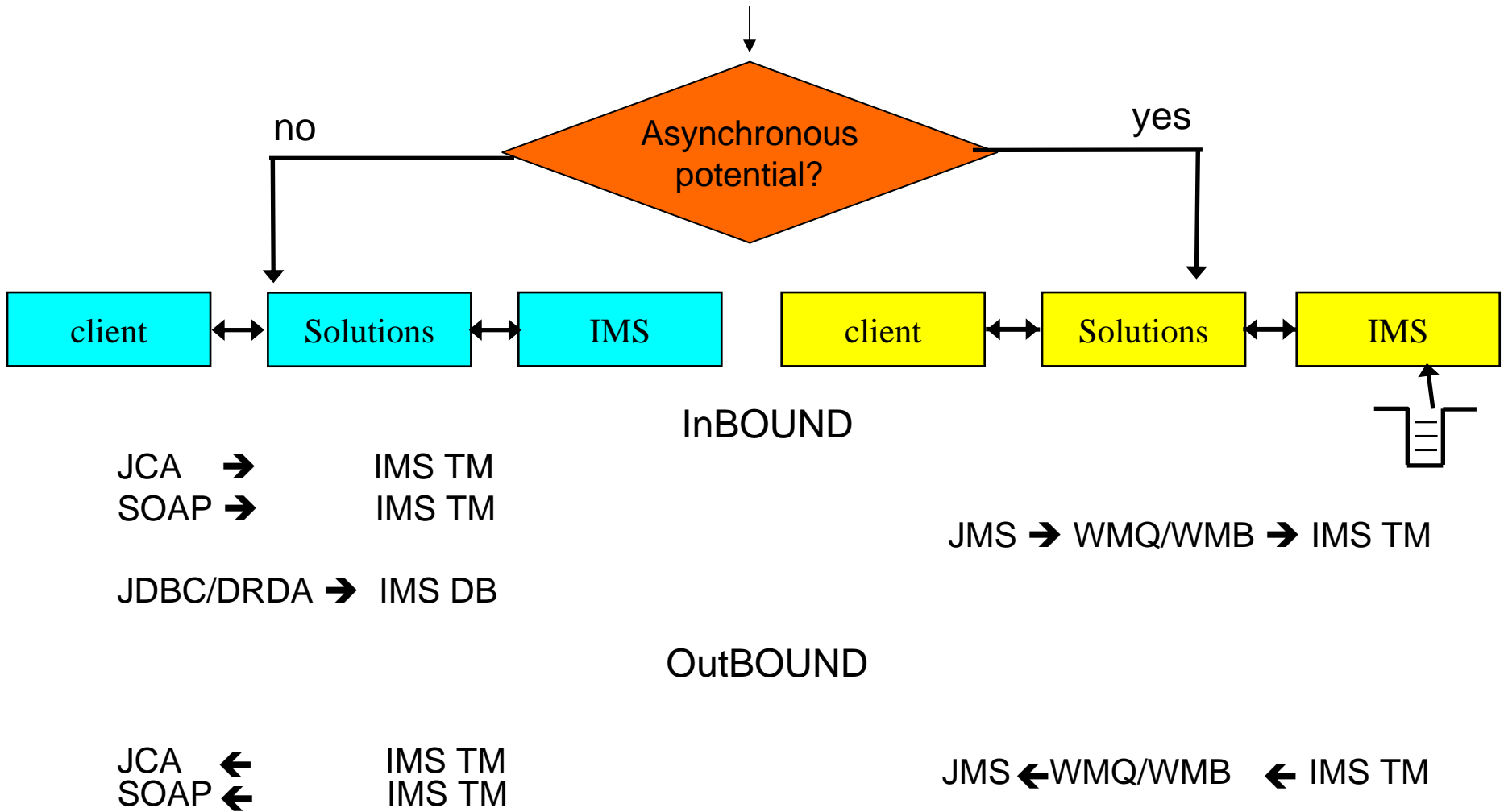
- Open Database Manager (coming in IMS 11)

IMS recognizes a variety of requirements

- **Application requirements**
 - **Access to IMS transactions**
 - *Direct connection model*
 - *Messaging and Queuing model*
 - **Access to IMS data**
 - *Inquiry (read-only), Update, 2PC*
 - *Access across LPARs*
 - *Access from distributed environm*
 - **Access from IMS applications**
 - *To web services*
 - *Applications and data on distributed servers*
 - **Replicating IMS data**



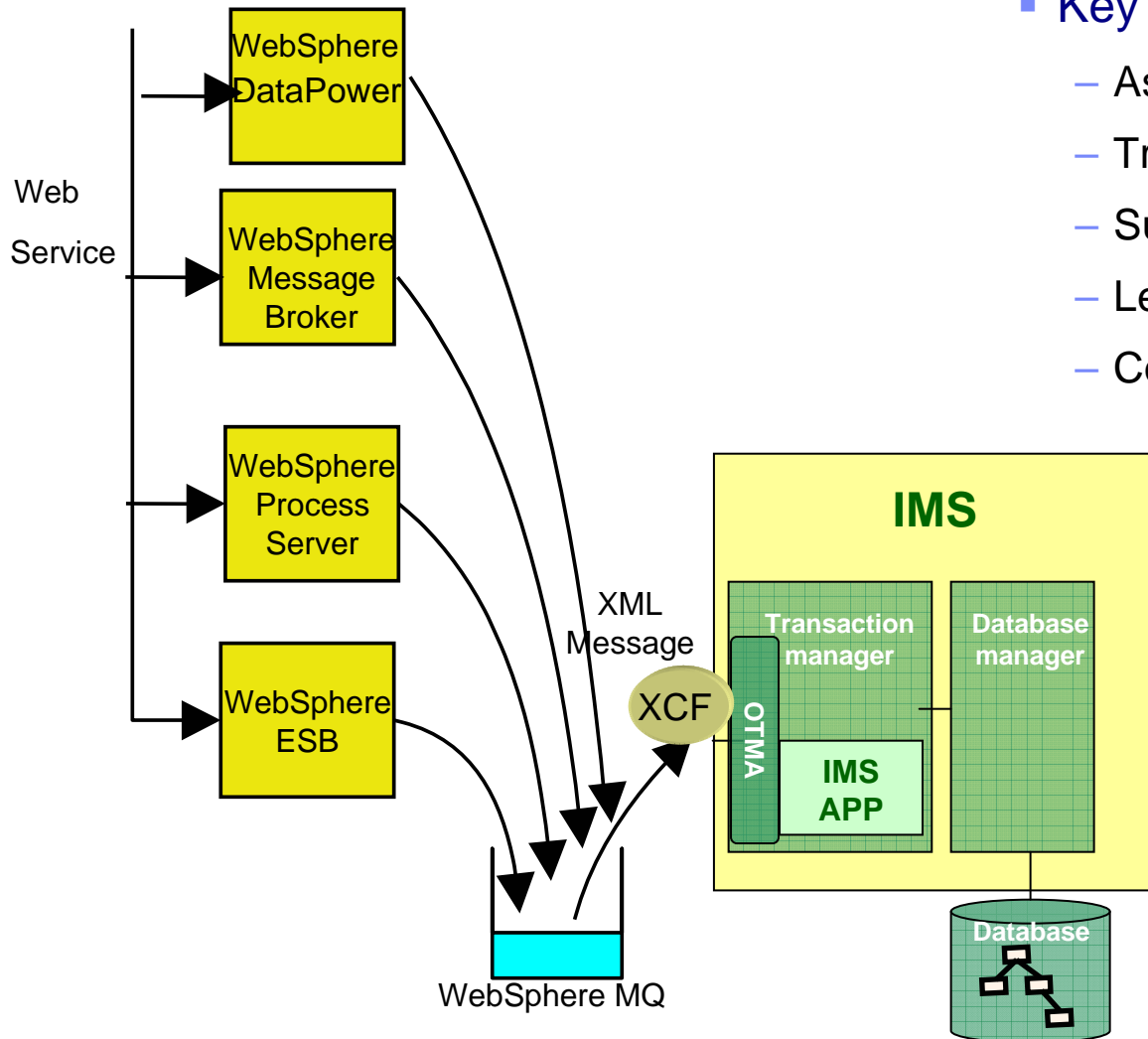
Including Asynchronous/Synchronous Needs



Asynchronous: WebSphere MQ Solutions

Key attributes

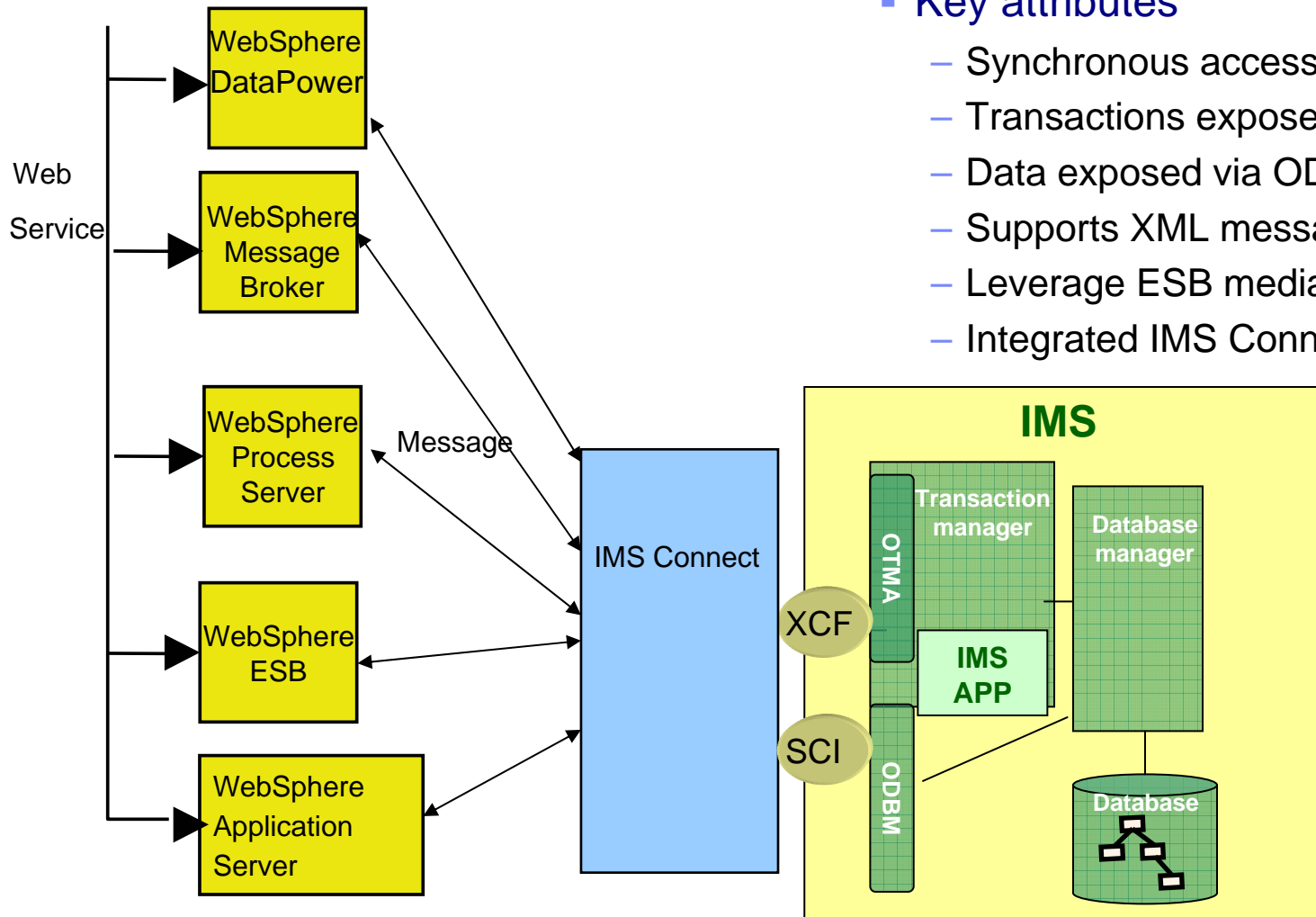
- Asynchronous access
- Transactions exposed via MQ
- Supports XML message format
- Leverage ESB mediation
- Compensating Transactions



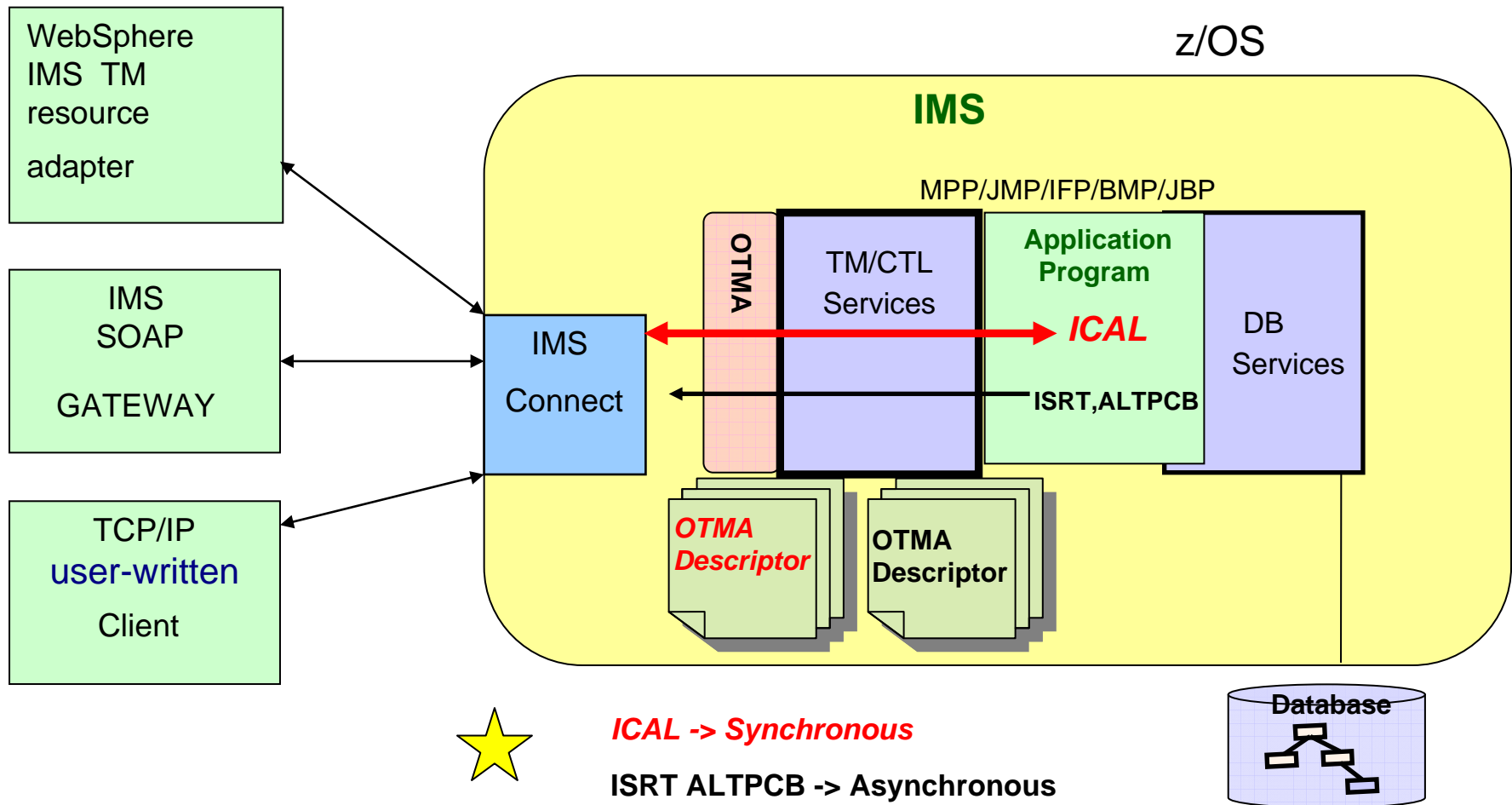
Synchronous: WebSphere with IMS Connect

- Key attributes

- Synchronous access
- Transactions exposed via OTMA
- Data exposed via ODBM
- Supports XML message format
- Leverage ESB mediation
- Integrated IMS Connect



And even ... IMS Callout



ICAL -> Synchronous

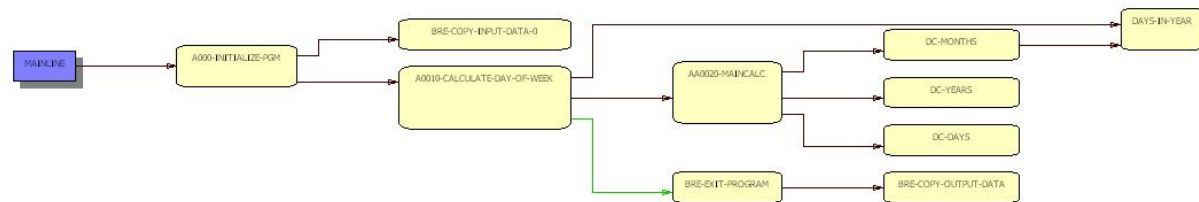
ISRT ALTPCB -> Asynchronous

So ... What do you need to consider for Integration?

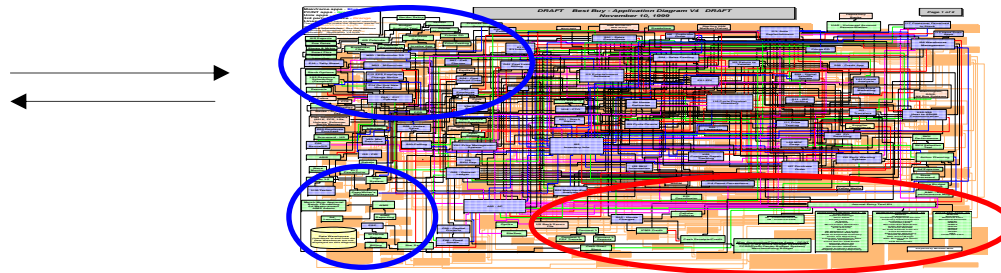
- First step – Understand your applications
 - Although SOA talks about “REUSE”,
 - Should your IMS transactions actually be reused as they are?
 - Do they need to be optimized for new access patterns?
 - “REUSE” can apply to applications and technology
 - E.g., Cobol, PL/I, Assembler, Fortran, ... DL/I calls
 - “RENOVATION”
 - Take what works and make it better
 - IMS also supports new technology (Java, JDBC) and interoperability (Java and Cobol)

Applications ...

- Understand your applications ...
 - Some are easily reused and called as part of an SOA architecture scenario
 - If so, then determining which communication access solution is the next step



- On the other hand, other applications are more complex, if so



Can your application architecture support potentially large increases in througput volumes ?

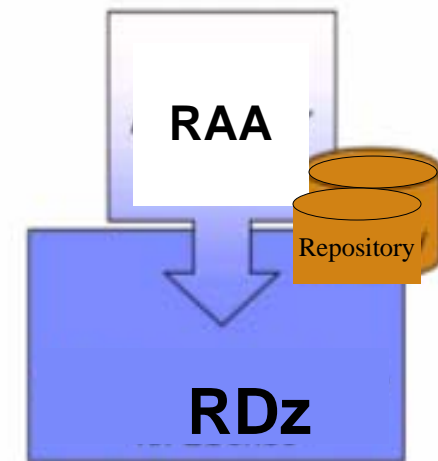
Applications ...

- A possibility A set of toolkits are available to help you

IBM Enterprise Modernization Solutions		
Enterprise Modernization	If you need to...	...IBM Software can help
Asset Modernization	<ul style="list-style-type: none"> ✓Discover and gain control over application assets and their dependencies ✓Extract business rules currently imbedded in code ✓Identify key assets and restructure for reuse in SOA ✓Reduce cost and time of on-going application maintenance ✓Manage and govern the design, development and consumption of software assets and services ✓Identify all assets that could be affected by proposed changes 	<p>IBM Rational Asset Analyzer – helps IT personnel with the discovery and analysis (DNA) of existing enterprise applications. Understand and gain intellectual control over your application relationships and structures.</p> <p>IBM Rational Transformation Workbench - helps accelerate strategic and tactical modernization initiatives by allowing development team to quickly transform existing assets and discover reusable business logic for creating services.</p> <p>IBM Rational Asset Manager – helps improve productivity and software delivery through asset reuse with a solution that enables you to create, modify, govern, and locate any type of development assets, including SOA and systems development assets.</p> <p>IBM WebSphere Service Registry and Repository – helps you achieve tangible business value from your service-oriented architecture (SOA) by enabling better management and governance of your services.</p>

Analysis and Transformation

- IBM Enterprise Modernization solutions
 - Analyze source in WDz/RDz local and remote z/OS projects
 - Programs - including JCL, DDLs, PSB and DBD files, and IDMS schemas
 - Create a repository to use for analysis
 - Determine resolution patterns of dynamic calls
 - to programs, files, screens, etc.



- Mechanism for synchronizing the sources for analysis to assist with changes for ongoing maintenance and enhancement

IBM Enterprise Modernization Solutions

The screenshot displays the IBM IMS development environment with several key components:

- Repository Browser (top left):** Shows a project tree for 'ORDRENT1' with various file relationships like 'Defines Program', 'Calls Program Entry Point', etc.
- Code Editor (top center):** Displays COBOL code for 'ORDRENT1.ccp'. A blue highlight covers the 'EXEC SENDSUB' block. The code includes sections for '1400-SEND-ORDER-MAP', 'IF SET-ATTRIBUTES', and 'IF SEND-ERASE'.
- Logic flow (top right):** A flowchart showing the execution path for the 'IF SET-ATTRIBUTES' section, with decision points and actions like '1410-SET-AT...', '1420-RESET-...', and 'CONTINUE'.
- Context (bottom left):** An outline view showing the program's structure, with 'EXEC CICS' and 'SEND MAP('ORDMAP1')' highlighted.
- Control flow (bottom right):** A Callie diagram showing the control flow between modules: '0000-ENTER-ORDERS' calls '3000-SEND-TOTAL-LINE', '2000-PROCESS-POST-ORDER', and '2100-WRITE-INVOICE-RECORD', which all then call '1400-SEND-ORDER-MAP'.

Yellow callout boxes label these areas: 'Relationships' (top left), 'Context' (bottom left), 'Logic flow' (top right), and 'Control flow' (bottom right).

Next Step

- **Communication Access**
 - How to get to IMS resources
 - How to deal with errors
 - Understand what your IMS applications are doing
 - Program- to-program switches
 - Multiple IOPCB and ALTPCB messages resulting from one inbound request
 - Conversational transaction processing
- **Understand what IMS provides**

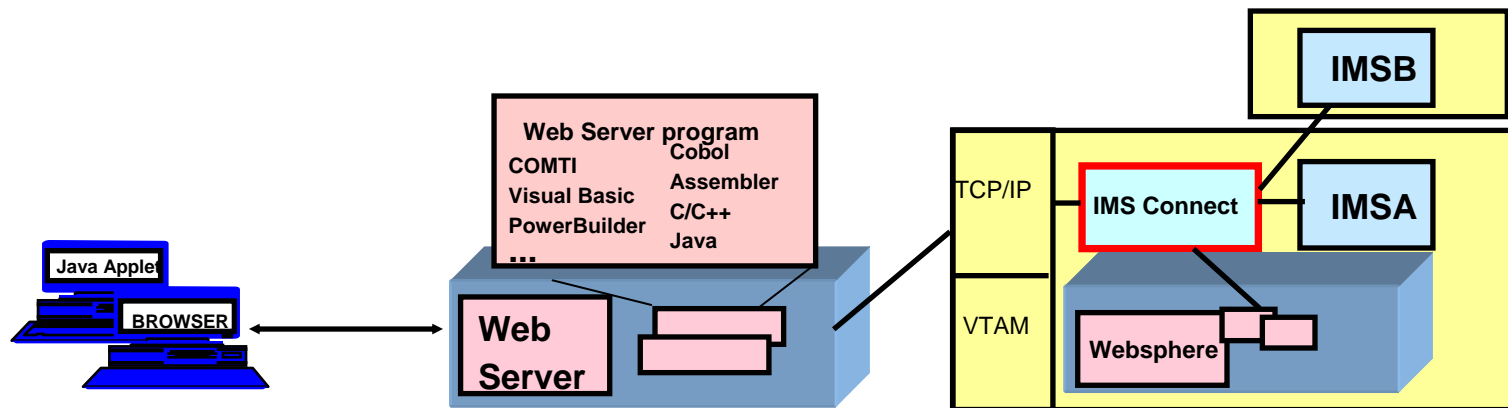
IMS TM Solutions

OTMA (Open Transaction Manager Access)

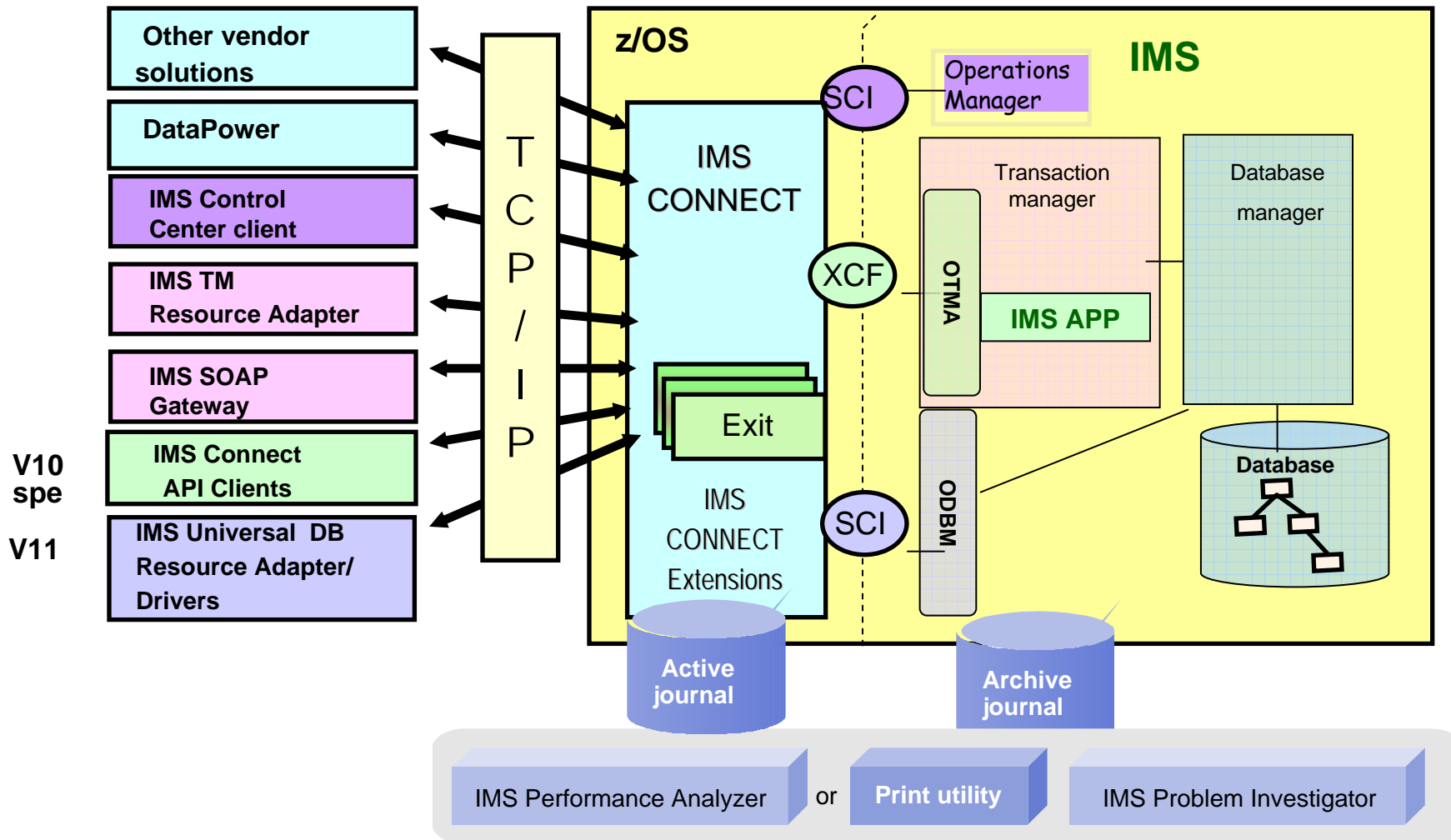
- Supports XCF connectivity to other System z applications
- IMS 10 updates (SPEs) and IMS 11 enhancements provide
 - Greater consistency for Shared Queues environments
 - Error message handling and ALTPCB processing
 - Same functionality in back-end and front-end
 - Reduced processing costs and CPU cycles
 - Message Level transaction expiration function and discarding of stale input OTMA messages prior to processing
 - Increased OTMA resiliency
 - Early detection and ability to address possible OTMA resource problems
 - Resource monitoring with heartbeat and action messages
 - CMO ACK timeout for hung TPIPEs
 - Improved usability and consistency in maintaining OTMA environment
 - OTMA descriptor refresh with type-2 commands

IMS Connect

- Strategic architecture base for IMS connectivity solutions
 - Leverages OTMA support in IMS
- Benefits and Value
 - Supports TCP/IP sockets access to IMS transactions and commands
 - Provides a general purpose and structured interface
 - Provides a strategic base for new connection technologies



Continuing to Evolve

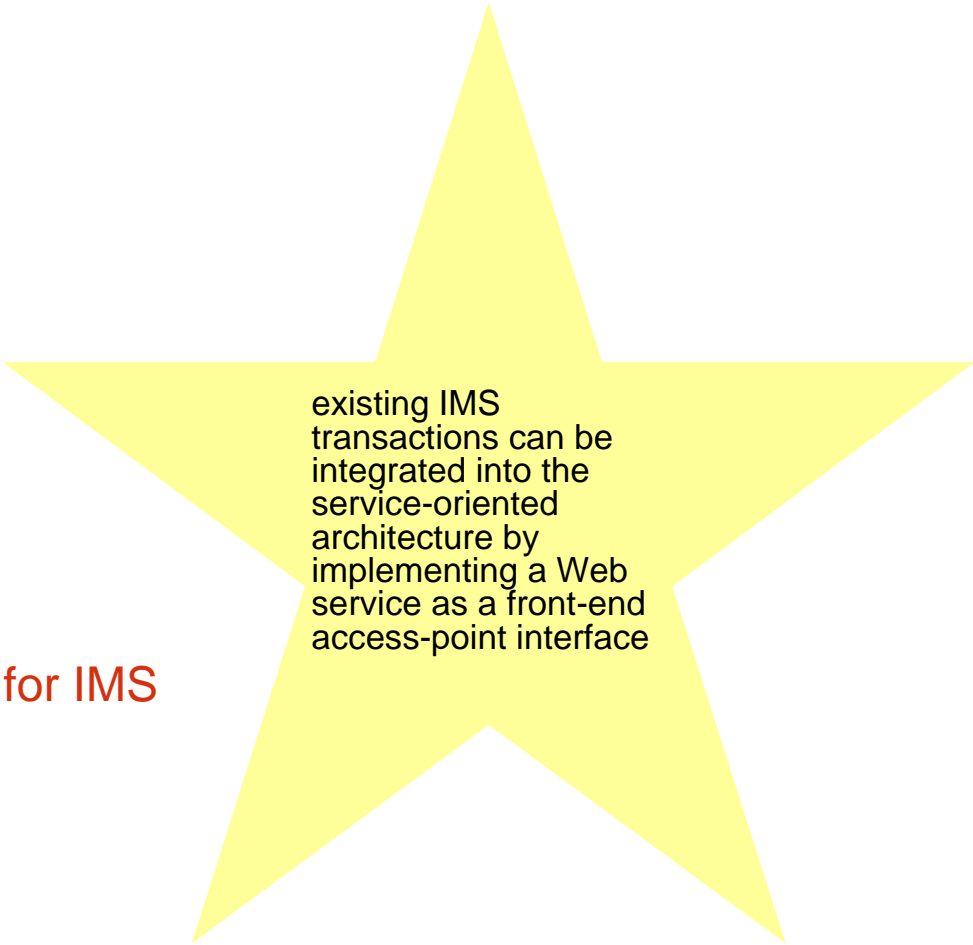


IMS Connect Enhancements

- **IMS 10 updates (SPEs) and IMS 11 enhancements**
 - System reliability, manageability and performance
 - Automatic re-establishment of connectivity to TCP/IP after a network failure
 - Configuration level overrides to control environmental conditions such as message timeouts, TCP/IP stack settings, error conditions, etc.
 - Enhanced diagnostic information including the addition of warning messages
 - Improved hashing technique for client ids
 - Usability
 - Support for the modification of input messages from TCP/IP before they are submitted to IMS Connect
 - Assistance to RYO application developers with the new IMS Connect API
 - Serviceability
 - Alternative recorder trace capability to eliminate the previous issues with dataset full conditions and the resulting loss of diagnostic data

IMS Connect Solutions

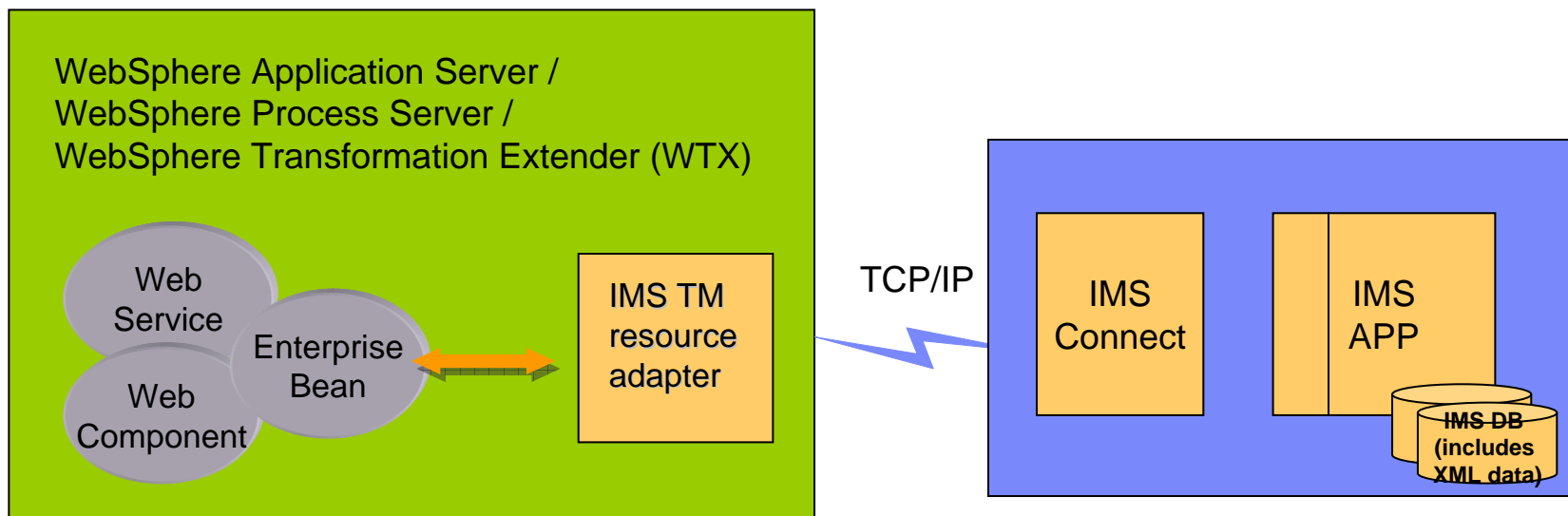
- IMS Connect provides the IMS interface for TCP/IP solutions
 - IMS Integration Suite
 - IMS TM Resource Adapter
 - IMS Web 2.0
 - IMS SOAP Gateway
 - IMS MFS Web Support
 - Write your own clients
 - IMS Connect API
 - Socket calls
 - V11 Open Database Support
 - IBM solutions, e.g., DataPower client for IMS
 - Other Vendor solutions



existing IMS transactions can be integrated into the service-oriented architecture by implementing a Web service as a front-end access-point interface

IMS Connect Solutions – for JEE Environments

- **IMS TM Resource Adapter**
 - WebSphere-based, Java Connector Architecture (JCA/J2C) Resource Adapter that allows external systems to access IMS Connect
 - Enable J2EE application, Web Service, SCA, SOA Composite application/Choreographed service (BPEL process) to access existing IMS transactions



IMS Connect Solutions – for JEE Environments ...

■ IMS TM Resource Adapter

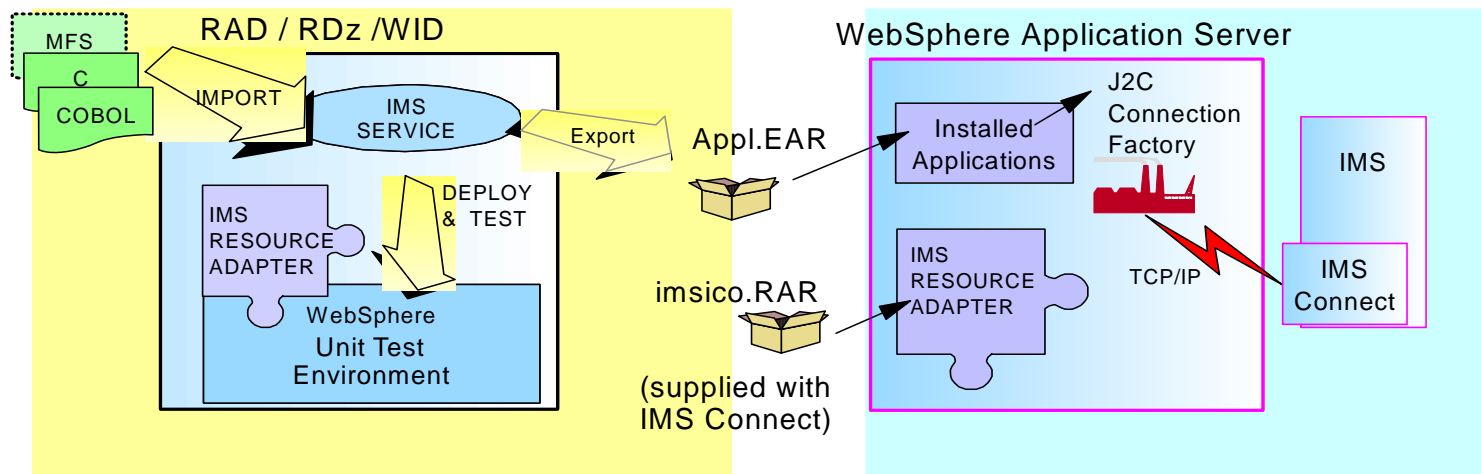
- Supports rapid development/deployment of Java applications to access IMS

- *Development component*

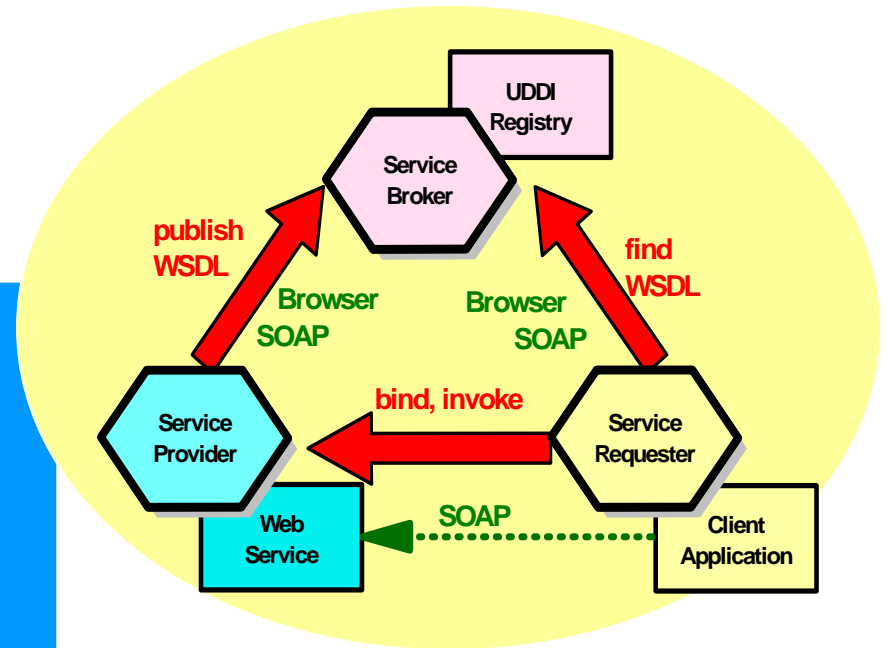
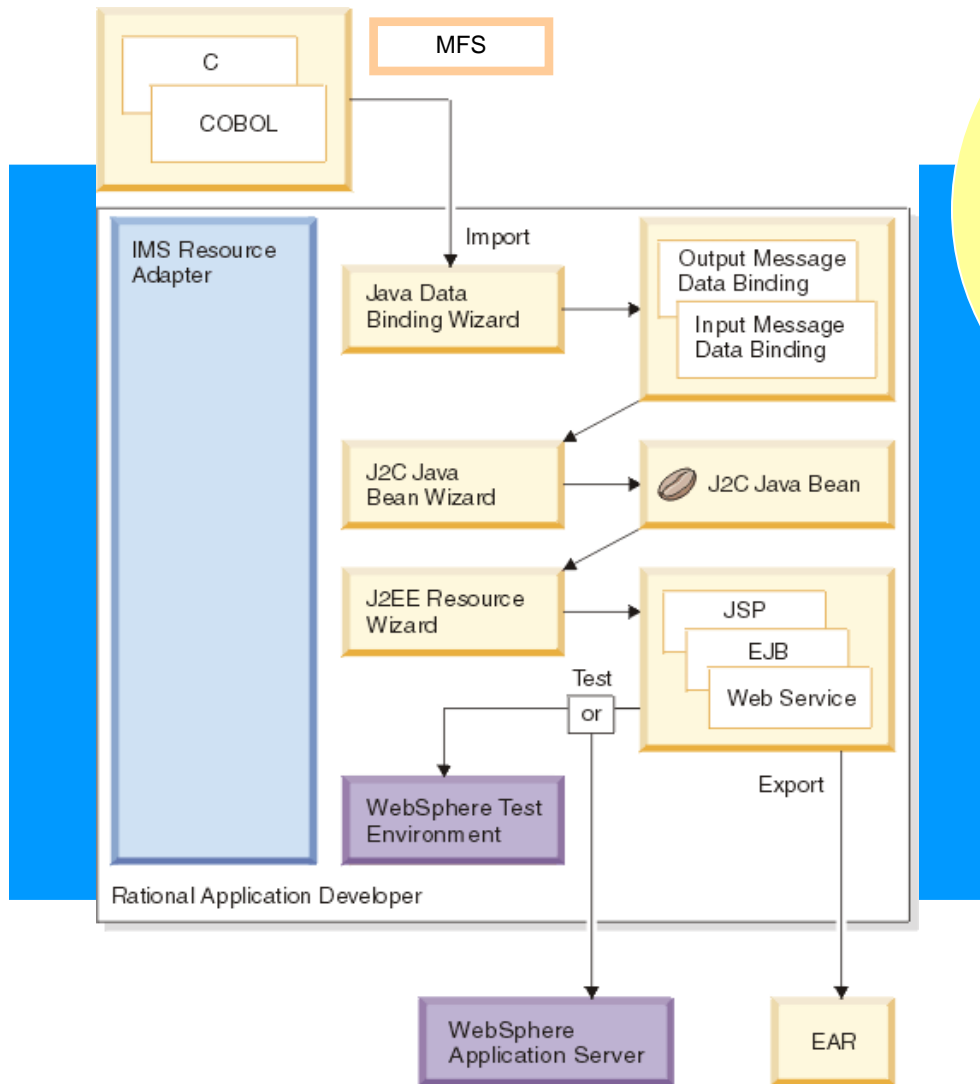
- Delivered with Rational Application Developer (RAD), Rational Developer for z (RDz), WID (WebSphere Integration Developer)

- *Runtime component*

- Must be installed into an application server, e.g., WebSphere



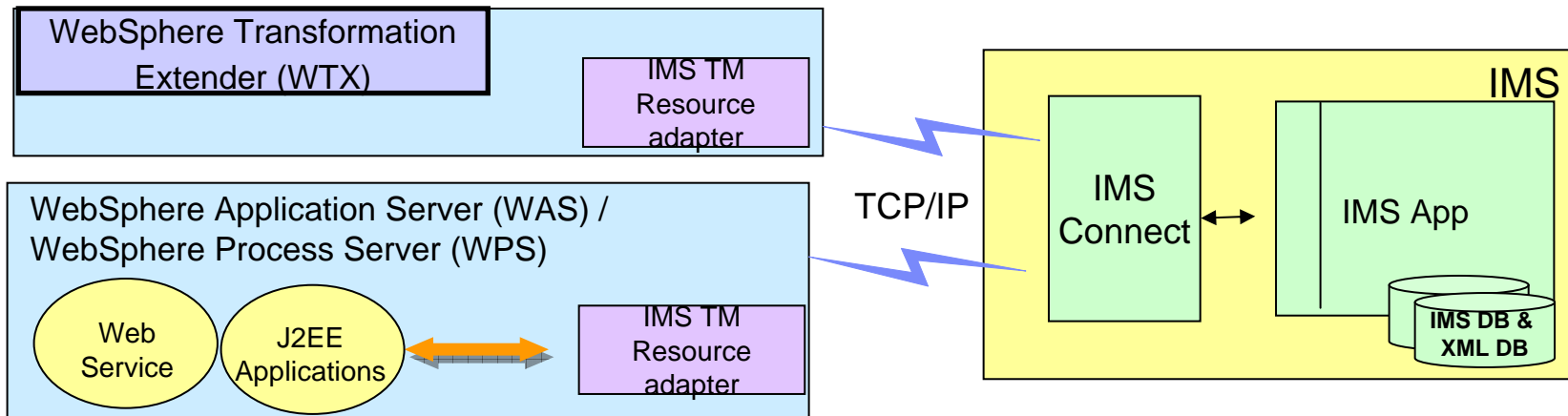
RAD, RDz, WID...



IMS TM RA Enhancements

- **IMS TM RA 10.2**
 - Socket reconnect
 - Automatic reconnection of state connections when IMS Connect is recycled
 - Send-only reroute
 - Leverages OTMA/IMS Connect capability for CM0 support for an alternate destination
 - Generated Client ID
 - Minimizes duplicate client condition
 - Support for asynchronous and synchronous callout
 - WTX support
 - Web 2.0 support

WTX Support for complex data formats





- WTX runs stand-alone or deployed on other WebSphere products
 - Microsoft™ Windows™, AIX®, z/OS Batch, z/OS IMS™, z/OS UNIX® System Services, Red Hat and SUSE Linux™, Solaris, and HP-UX
- Provides standards compliance access to IMS transactions
 - SEPA (XML format requirement for European banks), X-12, EDIFACT (cross industry), HIPAA (health care), HL7, SWIFT (financial services), NCPDP
- Supports complex data formats on distributed platforms

WTX Support for complex data formats ...

- **WTX access to IMS transactions via IMS TM RA support**
 - Send/Receive
 - Send only
 - Retrieving asynchronous output
 - Non-conversational and conversational transactions
 - Single segment and Multi-segment output

- **Software requirements**
 - IMS and IMS Connect Version 10 or later
 - IMS TM Resource Adapter Version 10.2
 - WTX 8.2.0.2

And In support of Web 2.0

- A second-generation of web communities and hosted services
 - Supports a transition from websites containing isolated information to interlinked environments
 - The idea is that the web itself is a computing platform
 - Addresses the continued goal of simplification
 - Based on Representational State Transfer – REST publishing protocol
 - Emerging style for interacting with web services using feeds
 - XML documents containing lists of related information composed of a number of items, known as "entries", each with an extensible set of attached metadata (<http://www.ietf.org/rfc/rfc4287.txt>)
 - Allow programs to check for updates published on a web site
-
-  – Atom is an XML-based format and an application-level protocol for publishing and editing Web resources (AtomEnabled.ORG)
-
-  – RSS is a web feed format used to publish frequently updated works, e.g. blog entries, news headlines, audio, and video – in a standardized format

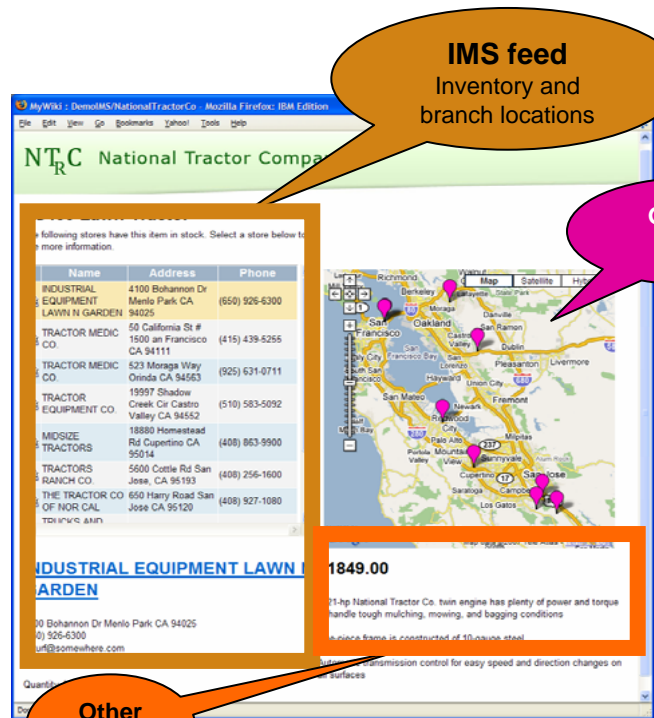
IMS Web 2.0

- **IMS Web 2.0 is a plugin to the InfoSphere MashupHub V1.0**
 - Includes the ability to:
 - Transform IMS assets into RESTful services (XML, ATOM, or RSS feeds) that can consume or be consumed by other Web 2.0 services
 - Compose “widgets” / HTML segments into a composite User Interface (UI) or an application template
 - Bind services (data or function) to the composite UI

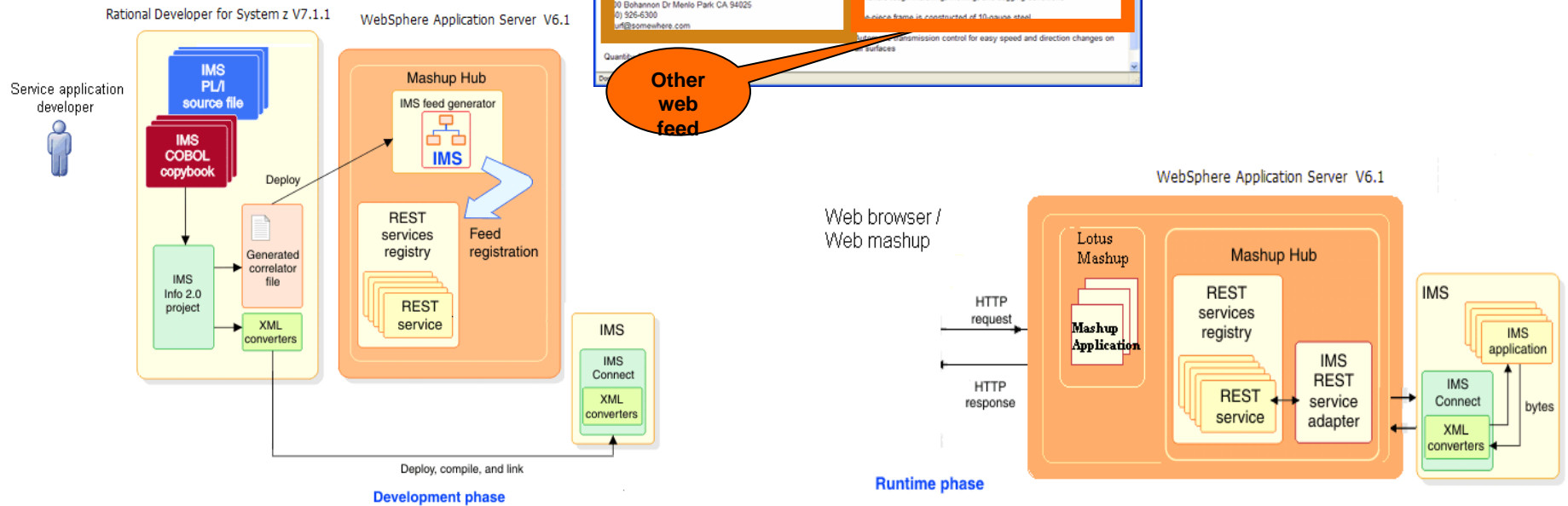
- **IBM Mashup Center includes two components:**
 - **InfoSphere MashupHub** for creating, storing, transforming and remixing feeds, and for sharing with the Web 2.0 community.
 - **Lotus® Mashups** for rapidly assembling a variety of personal, enterprise, and Web content onto a Web page or into an application.

IMS Web 2.0 ...

Extends the IMS investment by converting an IMS asset into an IMS RESTful service, which has the ability to consume and be consumed by other Web 2.0 services.



- Supports the rapid remix and mashup of data to extend business logic without the need to write a single line of code.

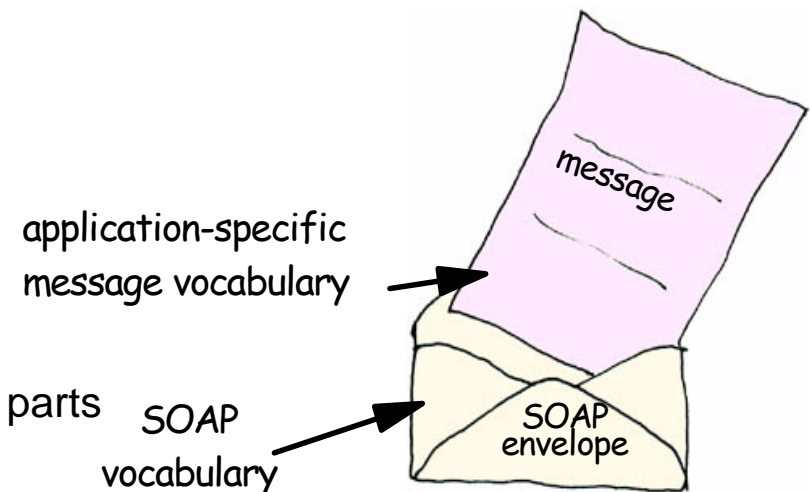


IMS Connect Solutions – For non-JEE Environments

The IMS SOAP Gateway

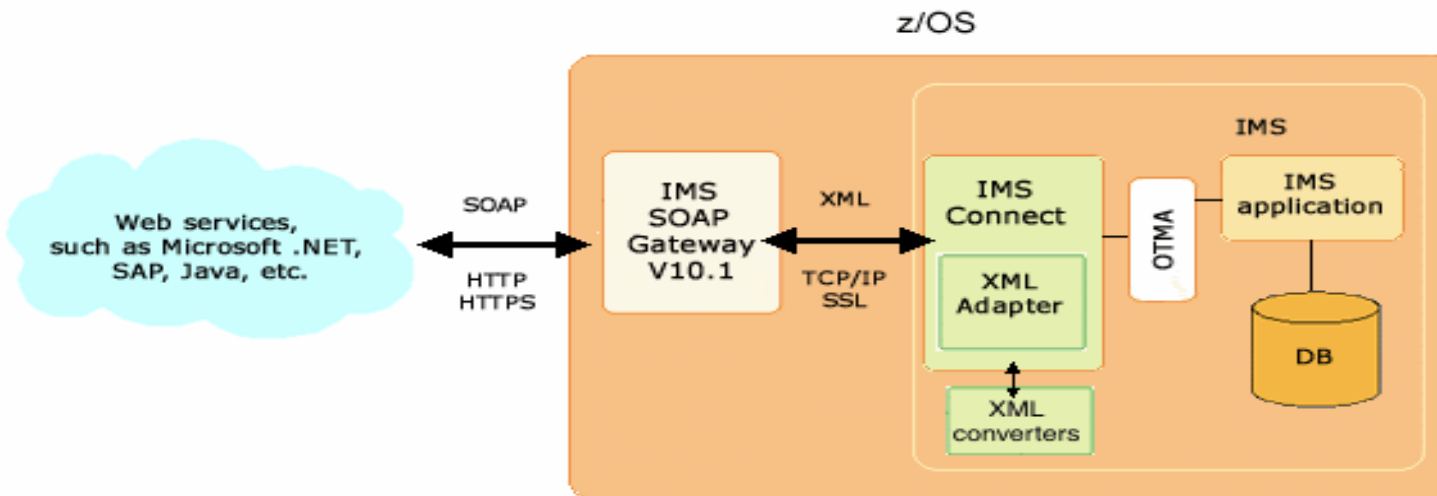
- SOAP (Simple Object Access Protocol)
 - An XML lightweight messaging protocol
- Request and Response messages
 - Request invokes a method on a remote object
 - Response returns result of running the method
- SOAP defines an "envelope"
 - "envelope" wraps the message itself
 - message is a different vocabulary
 - namespace prefix is used to distinguish the two parts

a standardized way of using XML to define both a message and the target application

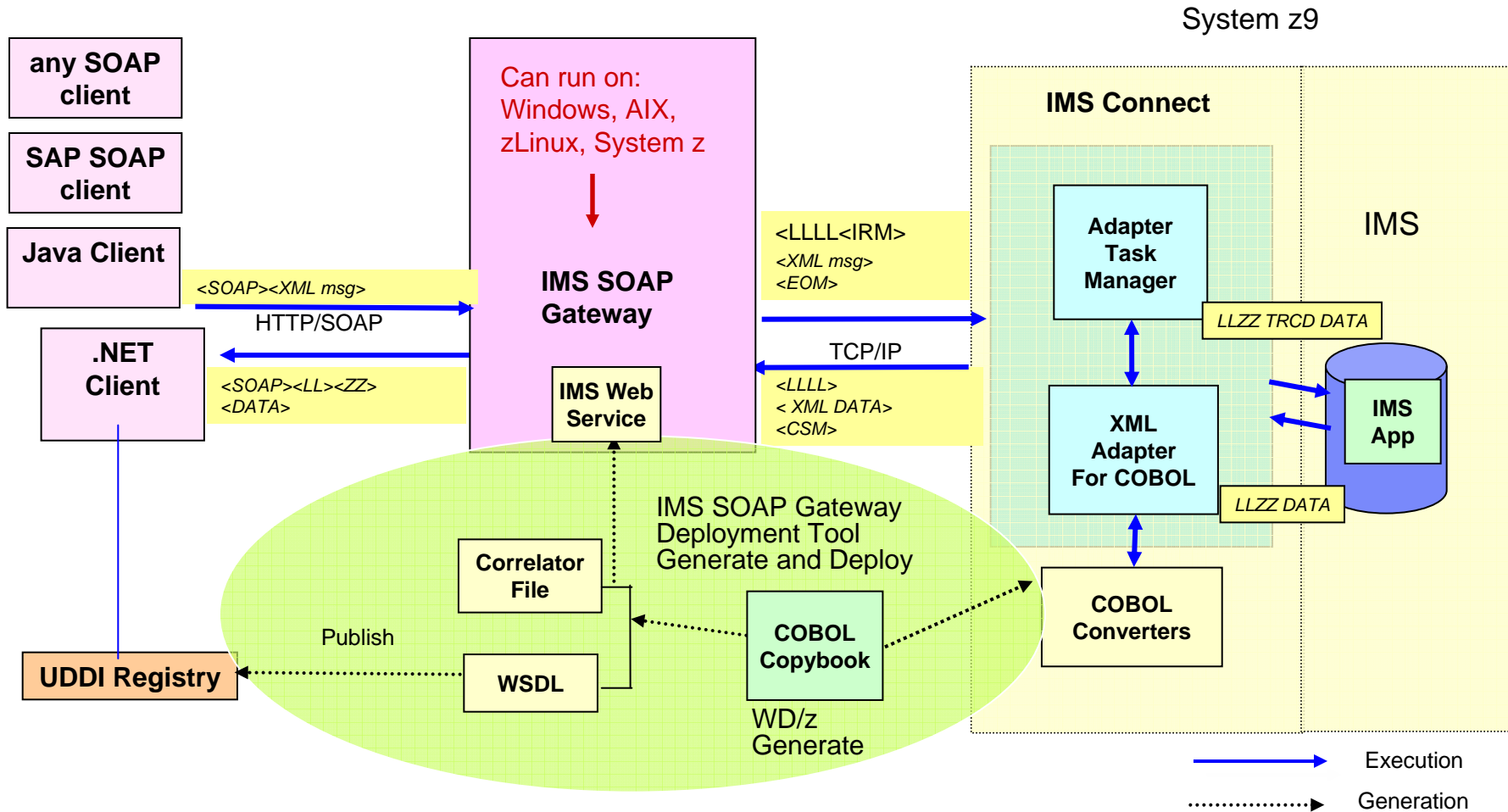


IMS SOAP Gateway

- A direct Web Service solution for IMS
 - Provides light-weight web service support
 - No need for a JEE server (e.g. WebSphere Application Server)
 - Integrates IMS assets into SOA using Web Service and SOAP interface
 - Provides XML transformation in IMS Connect
 - Handles XML data with no change in IMS application
 - Supports industry web service standards
 - HTTP(S), SSL, SOAP 1.1, WSDL 1.1, WS-I BP 1.0



End to End



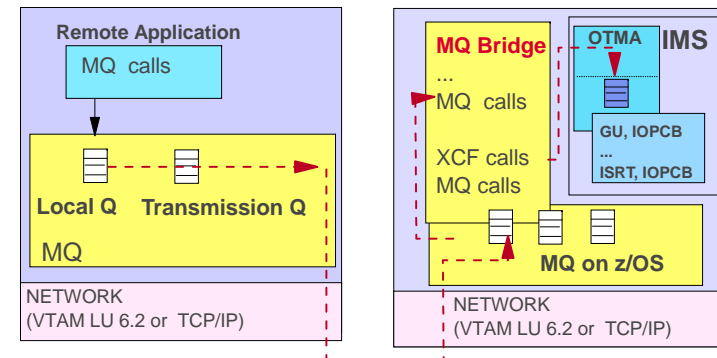
IMS Soap Gateway Enhancements

- **IMS 10 SPE for multi-segment support**
 - Prerequisites
 - IMS Connect 10 SPE APAR PK69366
 - IMS SOAP Gateway 10.2
 - Tooling - Rational Developer for System z 7.5

- **IMS 11 WS-Security**
 - Supports sending WS-Security header for authentication to IMS SOAP Gateway for access to IMS applications

IMS Support for Messaging and Queuing

- Messaging and Queuing Model (transactions)
 - Characteristics
 - Processing occurs whether or not a connection is made
 - Assured delivery of messages (inbound/outbound) when components and/or network are available



– Support

- *WebSphere MQ (MQSeries)*
 - Remote program is not sensitive to the network type
 - MQ provides its own high-level standard API
 - Same applications can be deployed on TCP/IP or SNA
 - Supports the use of MQ API
 - Supports the use of JMS (Java Message Service) API
 - Messaging standard that allows application components based on J2EE to create, send, receive, and read messages

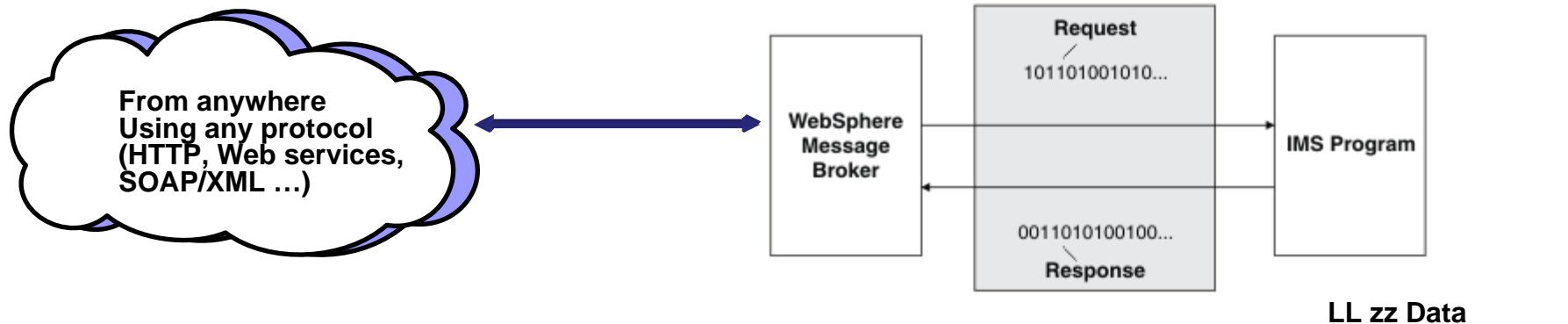
WebSphere MQ ...



Transformation, Routing and Data Integration

- Includes all Event Broker functionality
- Content and table-drive routing capabilities
- Powerful engine for message/data transformation and integration
- XSLT engine for XML transformation
- Message filtering and message warehousing
- Web services (HTTP/SOAP) protocol support

- Websphere Message Broker WMB 6.1.0.3
 - Supports a new IMS node



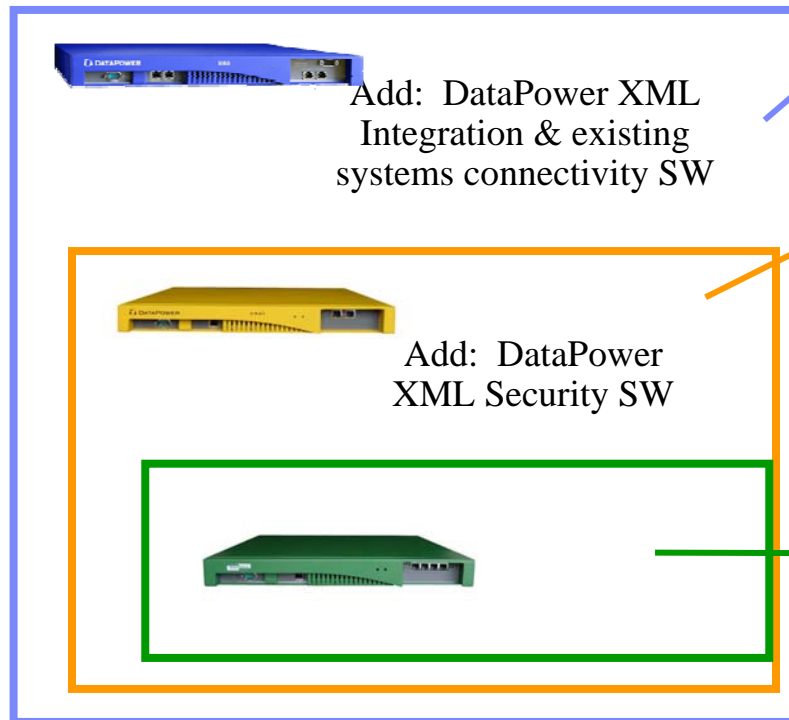
And then there is DataPower

- XML is the foundation of SOA, but brings new challenges:
 - Scalability: XML is bandwidth, CPU and memory intensive
 - Performance: some XML apps literally grind to a halt
 - Security: connecting systems never before connected
 - Security: clear text over HTTP with no inherent security
 - Standards are still in flux

- **An IBM solution: DataPower SOA Appliances**
 - Purpose-built hardware to address these challenges
 - Simplify, accelerate and help secure XML Web services for SOA

DataPower ...

DataPower products offer customers significant performance, ease of use, and packaging advantages for managing rapidly growing XML-based data



■ XI50 Integration Appliance

- Expands support to non-XML solutions
- Advanced architecture
- Integrated message-level security



■ XS40 XML Security Gateway

- Security, agility and performance
- Device can off-load application security software
- Performs XML Web services security functions (parse, filter, validate schema, encrypt/decrypt, signatures, access control, and more)



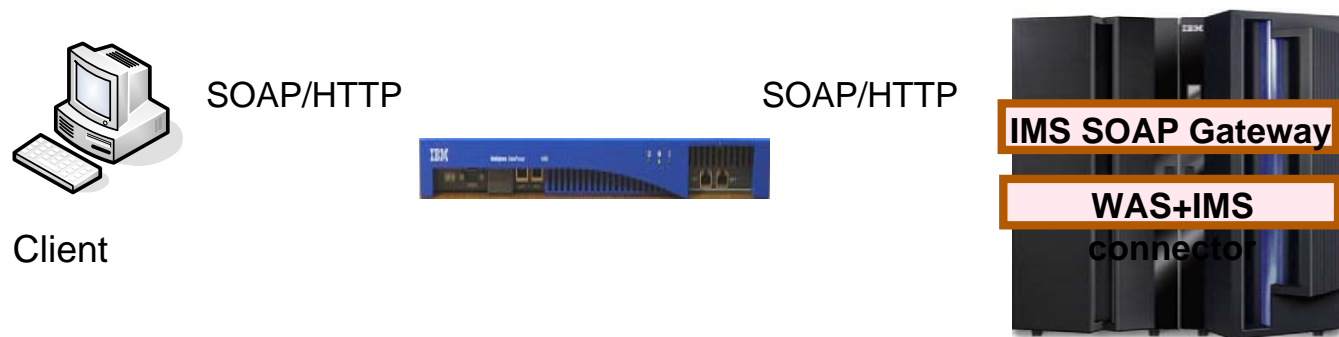
■ XA35 XML Accelerator

- Offloads overtaxed servers by processing XML, XSD, XPath and XSLT at wire speed
- SW provides significant performance improvements over WebSphere solutions
- HW + SW provides enterprise-class performance



DataPower ...

- For IMS, DataPower XI50 provides:

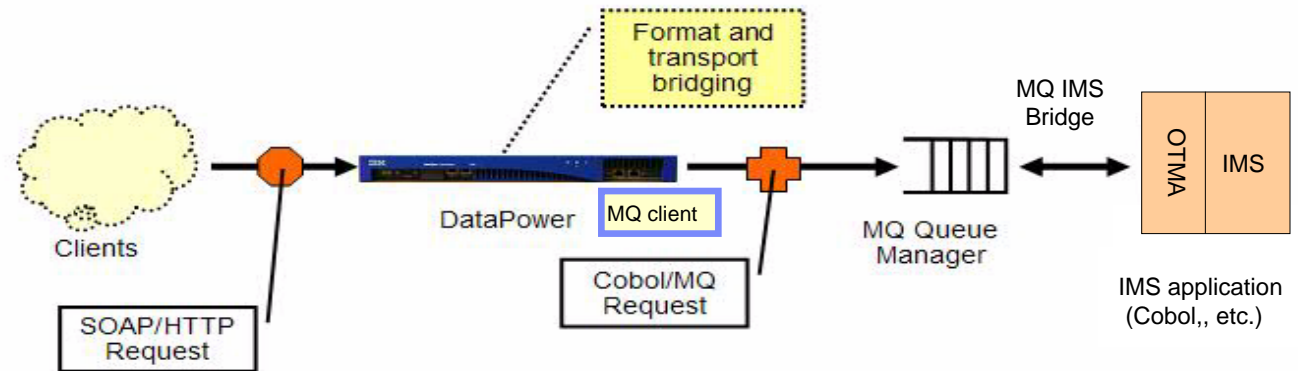


- Content-based Message Routing
- Protocol Bridging (HTTP, MQ, JMS, FTP, etc.)
- XML/SOAP Firewall
- Data Validation
- Field Level Security
- XML Web Services Access Control/AAA
- Web Services Management

DataPower Solutions

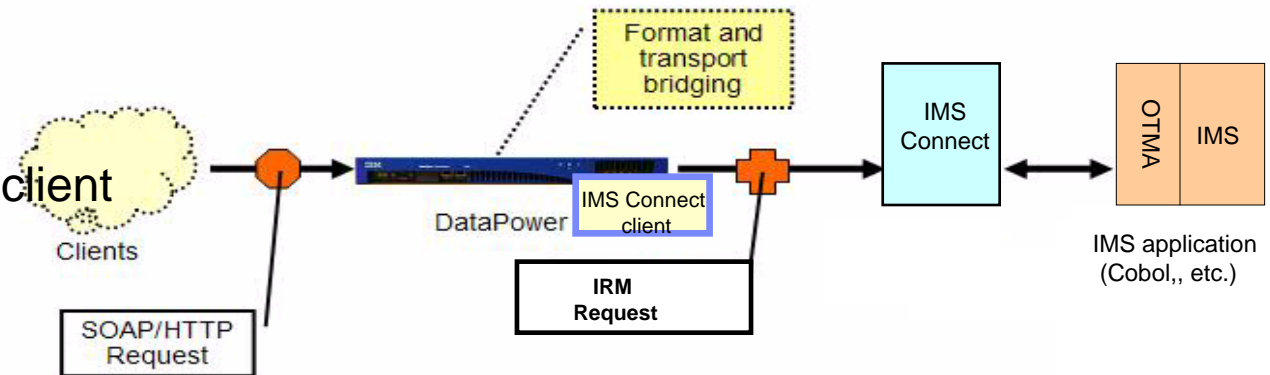
- Support for IMS

- An MQ client



- An IMS Connect client

DataPower 3.6.1



IMS Applications - Outbound Access

Accessing Other Environments

- IMS applications can “explicitly” code communication interface calls
 - TCP/IP sockets support
 - Standard sockets api - C, Java
 - Extended sockets api - Assembler, Cobol, PL/I
 - APPC calls
 - CPIC interface or MVS interface

- IMS Java application capabilities
 - Standard Java classes
 - HTTP, etc.?

- New IMS 10 capabilities
 - Asynchronous callout
 - Synchronous callout

Callout Support with IMS 10

- **Asynchronous Callout**

- Allows IMS transactions to access a service outside IMS
- The IMS application does not wait for a reply
 - Any replies invoke a new instance of a transaction

- **Synchronous Callout**

- New IMS 10 SPE
- Allows IMS transactions to access a service outside IMS ***and*** wait for a reply within the same unit of work

Review – IMS 10 Asynchronous Callout

■ Implementation

- IMS V10 Connect Resume TPIPE with Alternate Clientid
- IMS V10 OTMA Resume TPIPE Security
- IMS V10 OTMA Destination Routing Descriptors

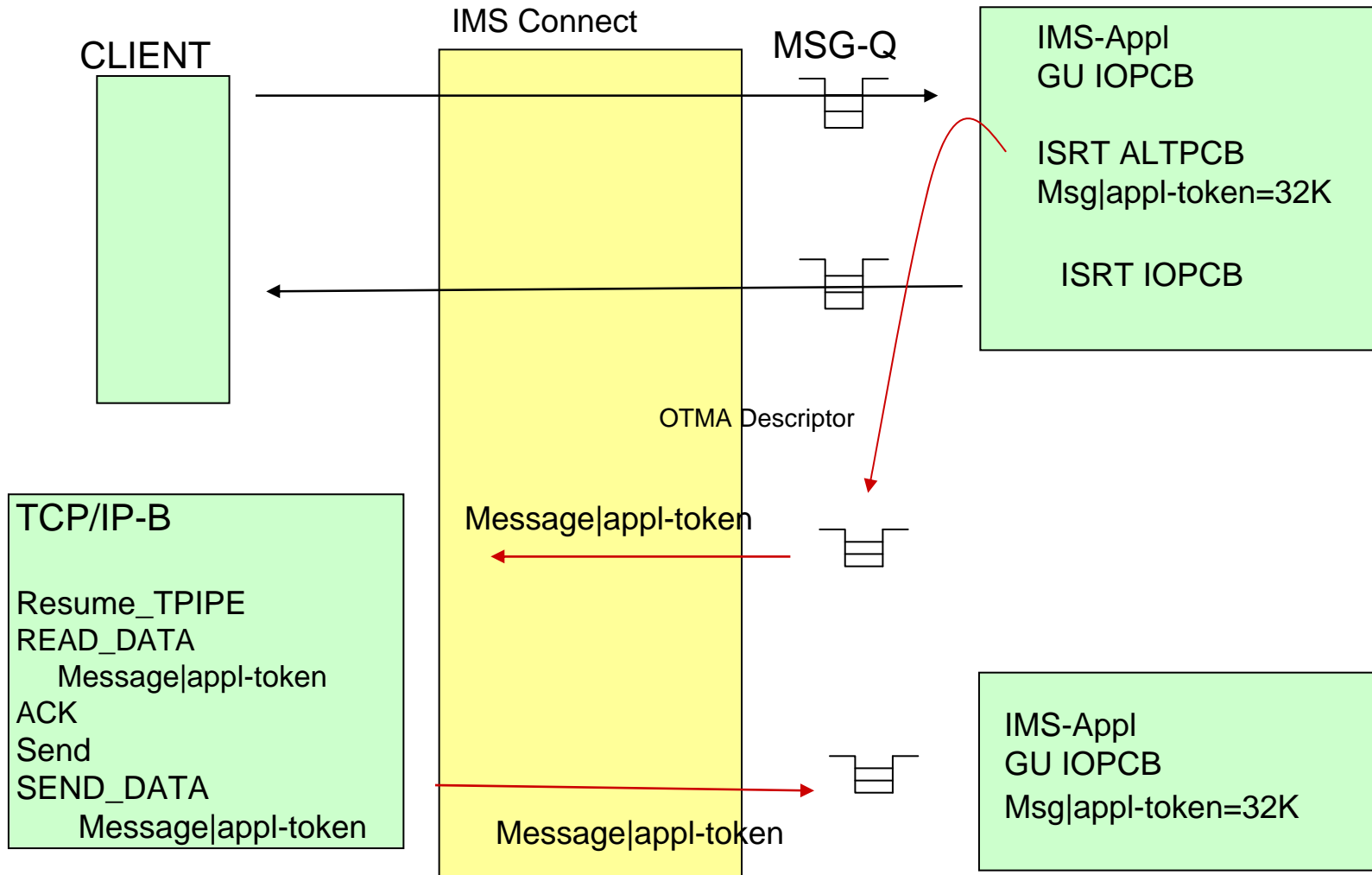
■ Migration

- No impact to existing IMS Application
 - ISRT ALTPCB
 - the OTMA Destination Routing Descriptor provides destination information

■ Benefits

- Provides ability for IMS application to access a Web Service
 - IMS application does not have to change

Review - IMS 10 Asynchronous Callout



Synchronous Callout Request

■ Capability

- IMS applications can invoke external applications and synchronously receive a response in the same IMS transaction instance

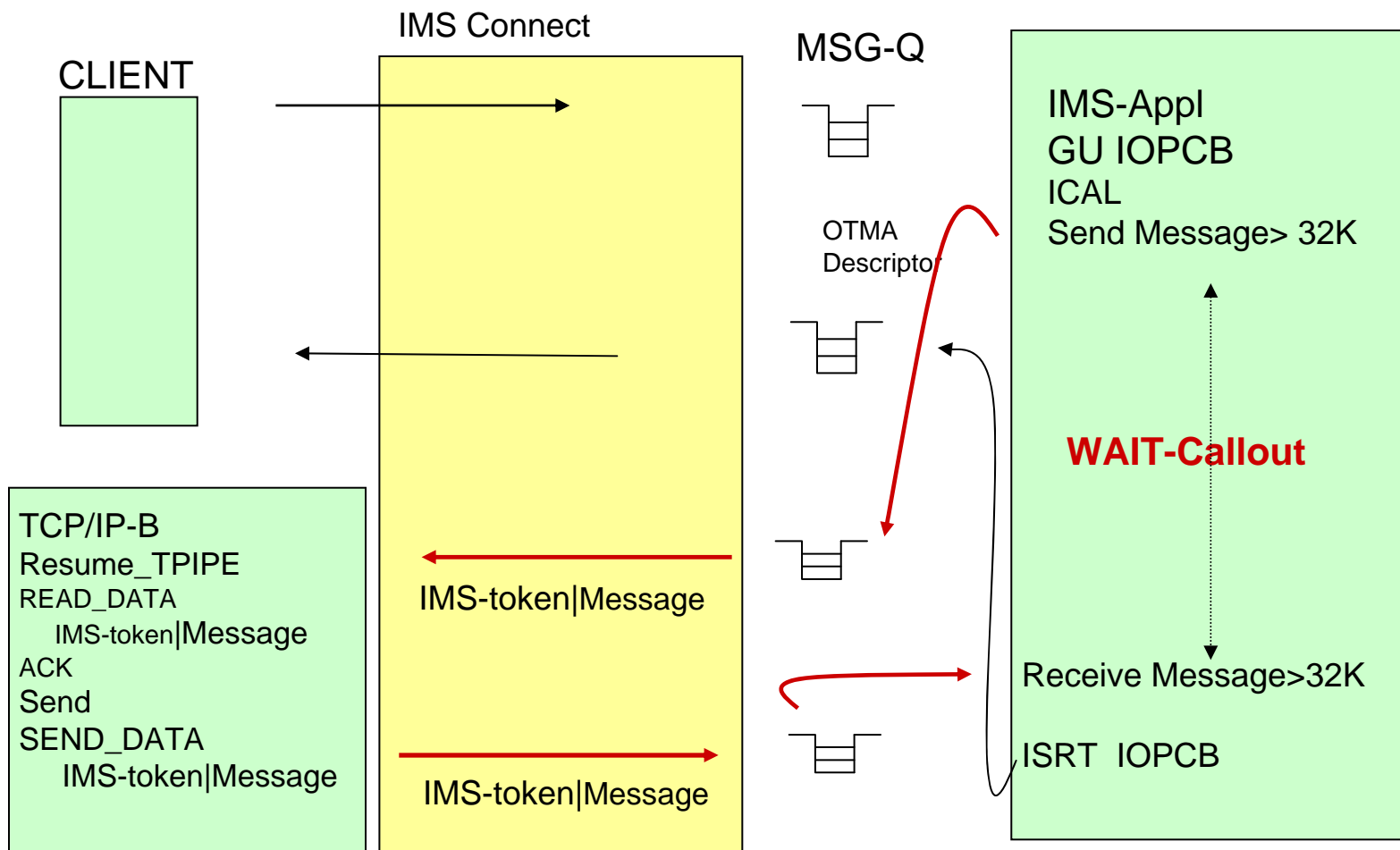
- ICAL new AIBTDLI call
 - Allows the IMS application to send a request and wait for a reply

- Timeout capability
 - Optional user specified timeout value in the DLI call to control the time for synchronous callout processing
 - Can terminate the request and free the dependent region

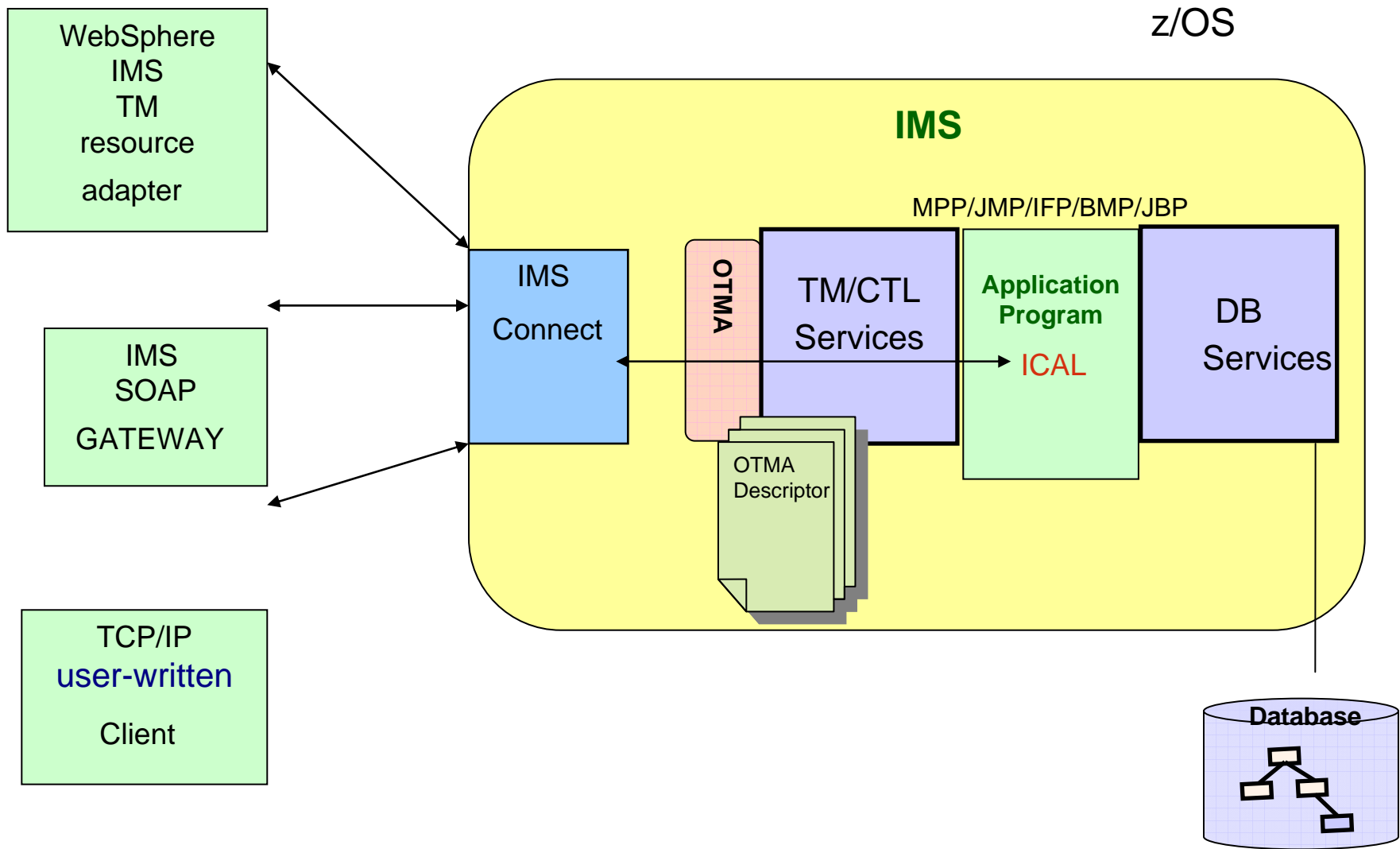
- Relieves the 32K segmentation limitation
 - IMS Connect and OTMA handle buffer and segmentation internally

IMS 10 Synchronous Callout SPE

IMS-token(CORTKN) - correlate response message to callout request message



IMS Synchronous Callout Overall Picture



ICAL AIBTDLI Interface

Call AIBTDLI USING ICAL,aib,REQ_area,RESP_area

- ICAL is new DL/I call verb
 - SENDRECV is the new subfunction
- REQ_area is the Request data area for sending data
- RESP_area is the Response data area for returned data
 - REQ and RESP messages are not recoverable
 - req-area and resp-area do not specify LLZZ, data can be > 32K

Prerequisites

■ Software requirements

- IMS and IMS Connect Version 10
 - PK70078, PK70330 ,PK73224 - Precondition
 - PK71135 ,PK74168 – Activation
 - PK75209 for IMS Java dependent regions ICAL support

- For synchronous callout to J2EE application/Web Service in WebSphere Application Server (WAS):
 - IMS TM Resource Adapter Version 10.3*
 - WAS 6.0* for callout to EJB
 - WAS 6.1* for callout to MDB

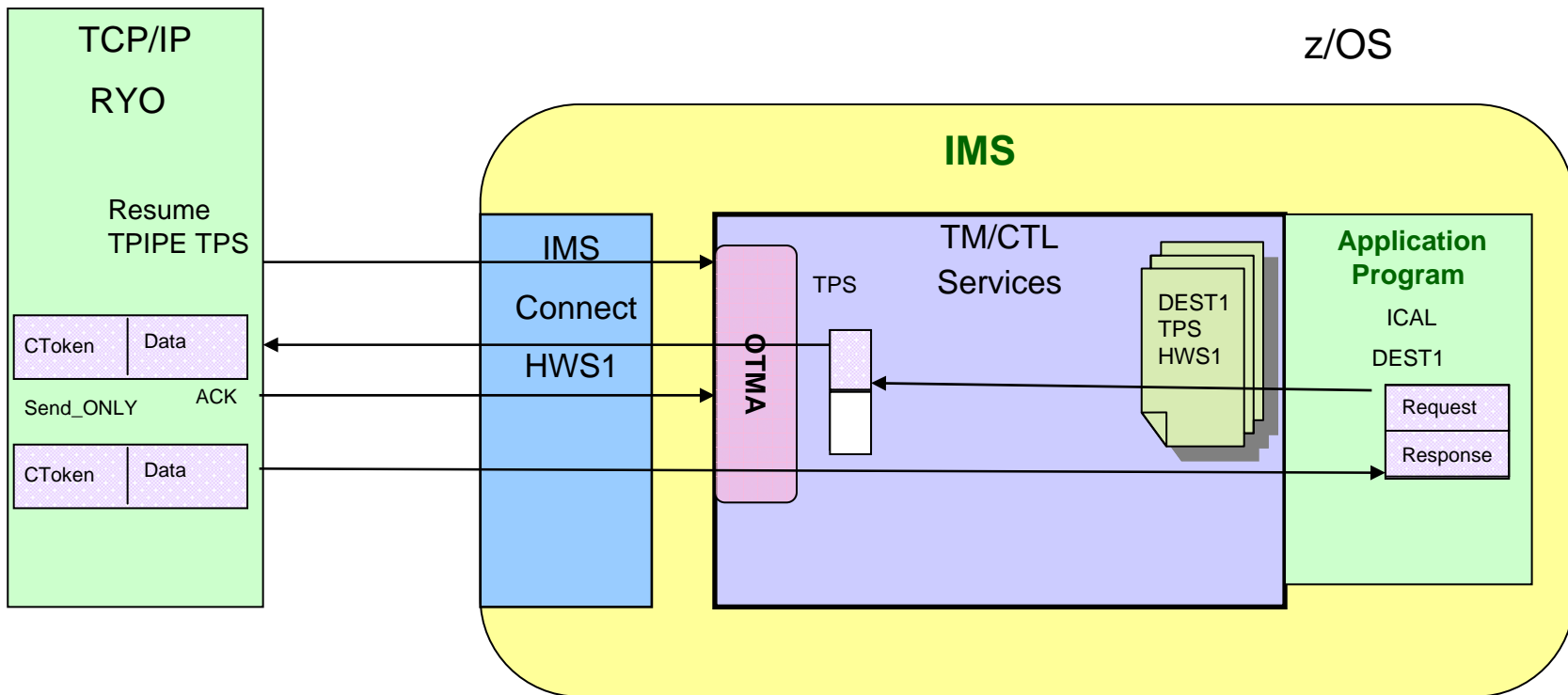
- For synchronous callout to Web Service using IMS SOAP Gateway:
 - IMS SOAP Gateway Version 10.1.1

Prerequisites ...

- **Tooling**
 - For synchronous callout to J2EE application/Web Service in WAS
 - Rational Application Developer (RAD) V7.007 or later
 - V7.5 is recommended
 - IMS TM RA ifix 10.3
 - WebSphere Integration Developer (WID) V6.1* or later
 - MDB generation requirement to RAD/WID
 - For synchronous callout to Web Service using IMS SOAP Gateway
 - Rational Developer for System z (RDz) 7.1.1* or later

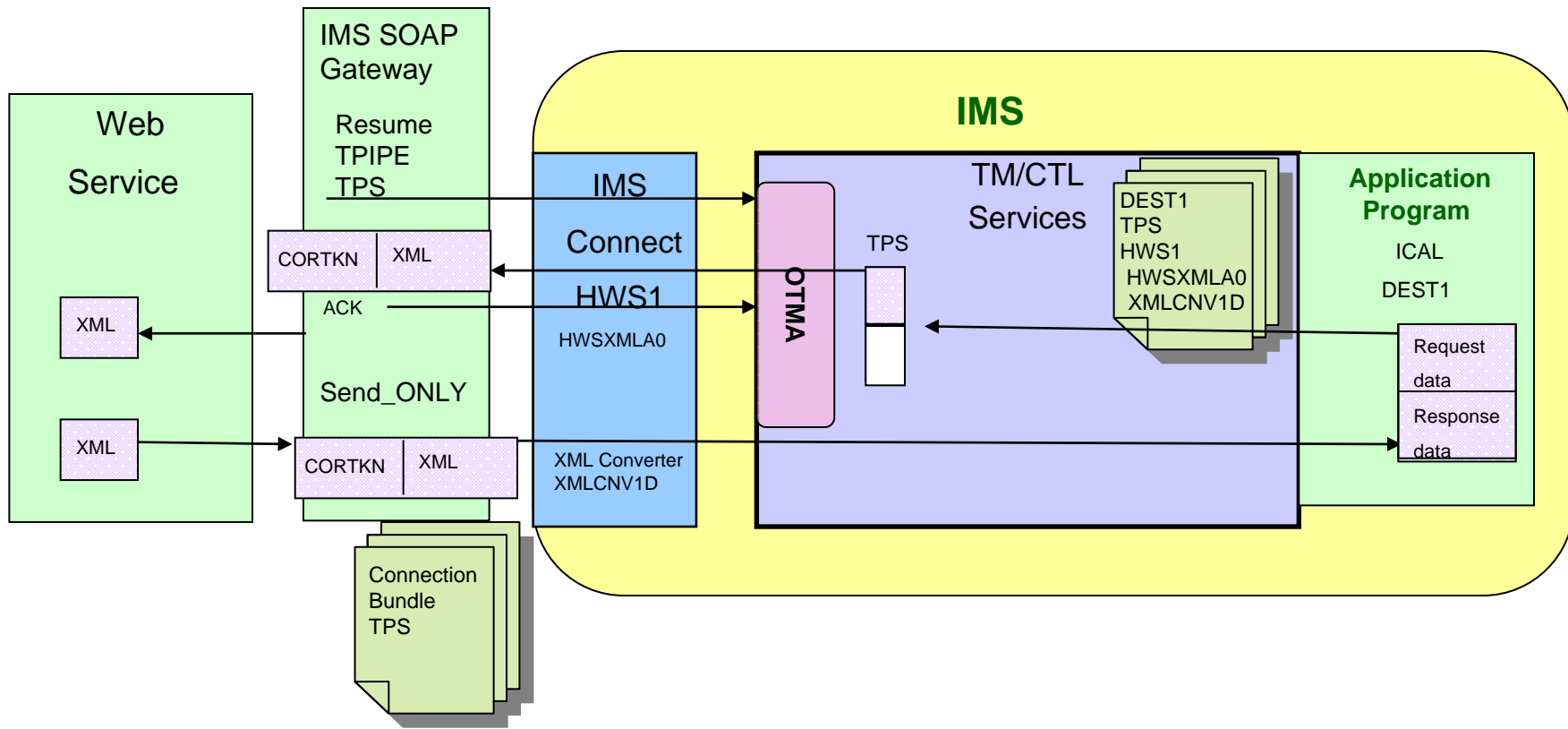
- **The first phase of the synchronous callout does not support:**
 - Shared Queues where FE and BE are different systems
 - Two phase commit (distributed sync point)

IMS Synchronous Callout - RYO



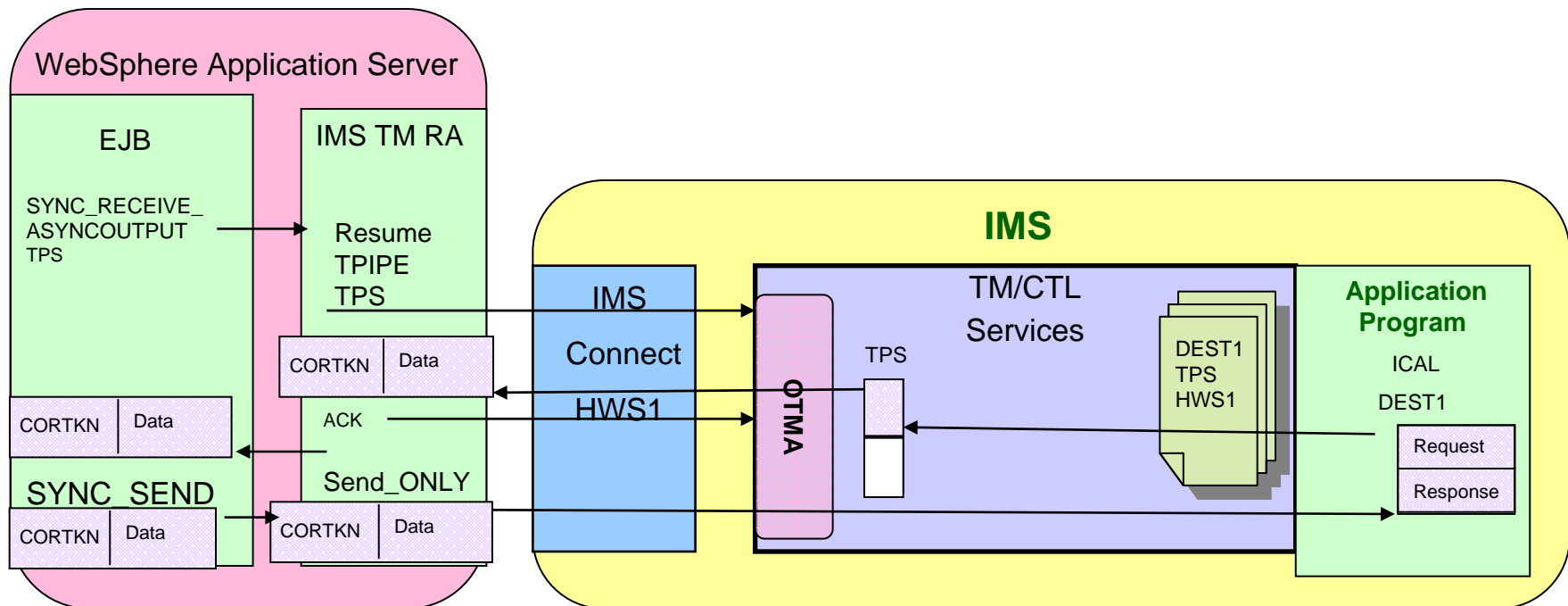
IMS Synchronous Callout – IMS SOAP Gateway

- IMS SOAP Gateway provides built-in functionality to listen for a callout request and invoke Web service providers
 - Support for concurrent processing provided by built-in threading mechanism



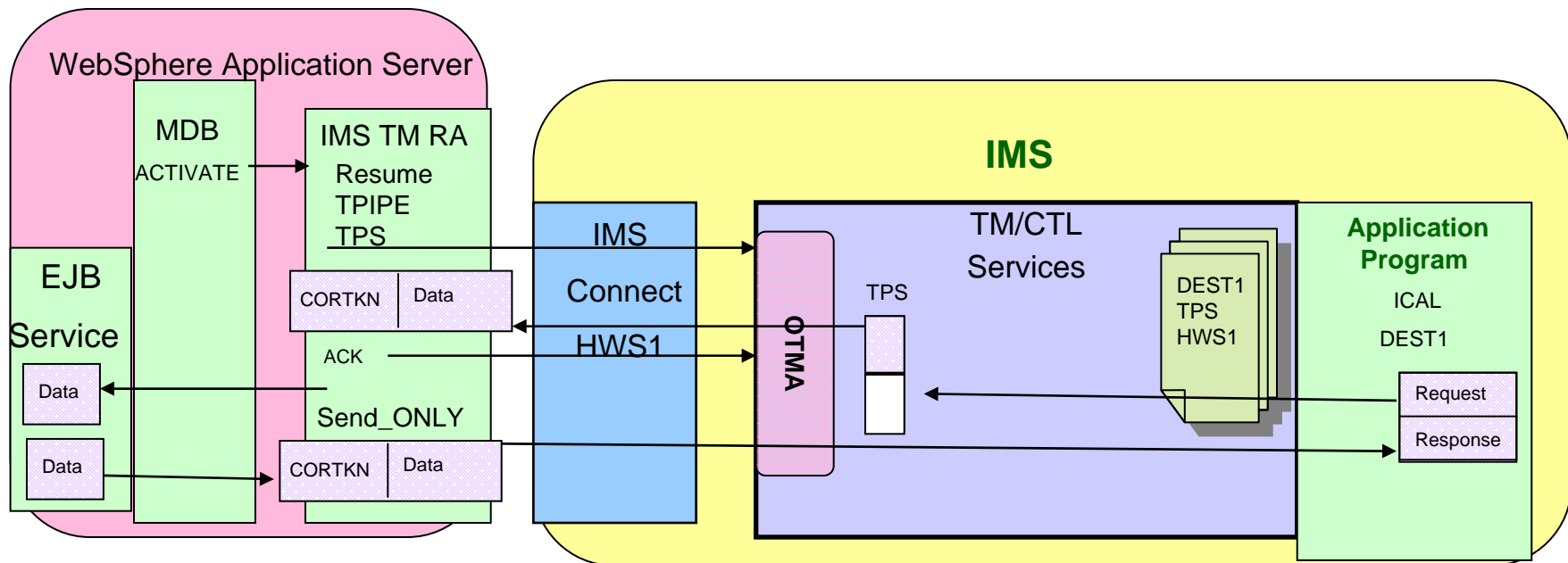
IMS Synchronous Callout – IMS TM RA - EJB

- EJB can be coded to use IMS TM Resource Adapter's Resume TPIPE and Send-Only function



IMS Synchronous Callout – IMS TM RA -MDB

- MDB can be deployed to listen to callout requests using IMS TM RA JCA 1.5 Inbound support
 - IMS TM Resource Adapter internally
 - Implements Resume TPIPE and Send-Only protocols and manages correlation token on behalf of the MDB
 - Implements JCA 1.5 Work management contract to provide concurrent processing



IMS 10 SPE – Synchronous Callout

- Benefits
 - Position IMS as both a client and a server
 - Integrate IMS with other server and applications
 - Remove application managed message correlation
 - Removes 32K message segment restriction

IMS DB Solutions

Application Requirement – Access to Data

- Direct Connection (database)

- Characteristics

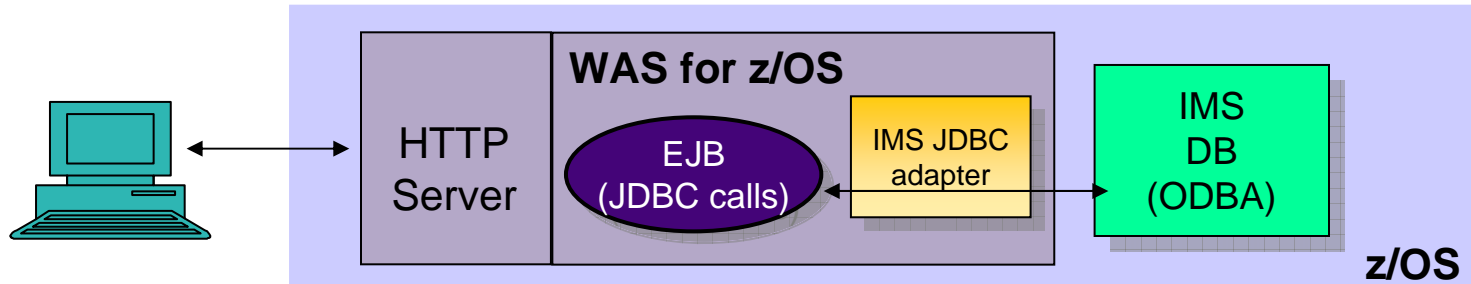
- Access to data without invoking an IMS transaction

- ODBA interface (Open DataBase Access)

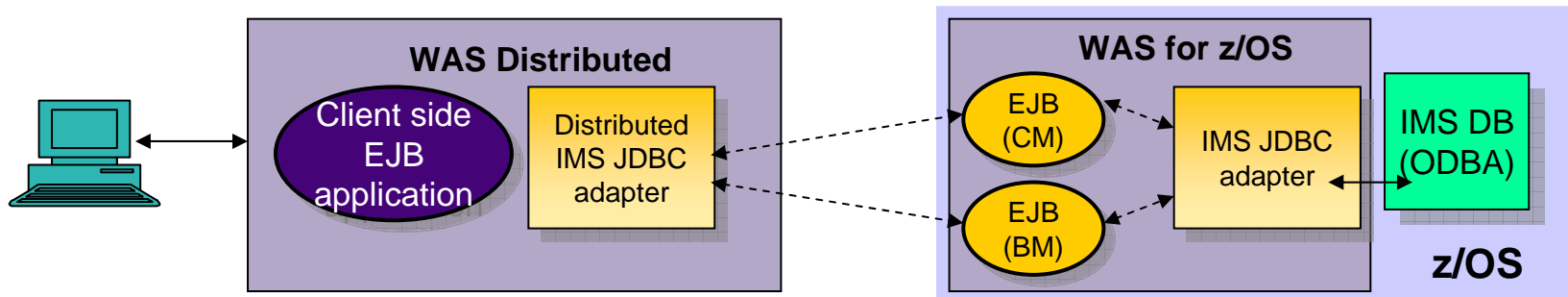
- Programs that issue database calls must reside on the same MVS as IMS

IMS Solutions

- JDBC access to IMS DB (delivered by IMS)
 - WebSphere z/OS and IMS Java support



- Support with IMS V9 – IMS Java Remote Data Services

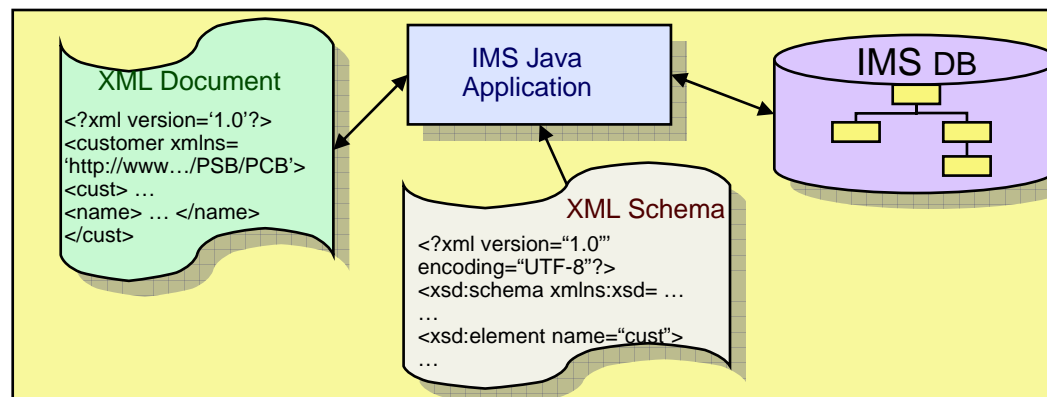


CM: container managed (supports global transaction semantics)

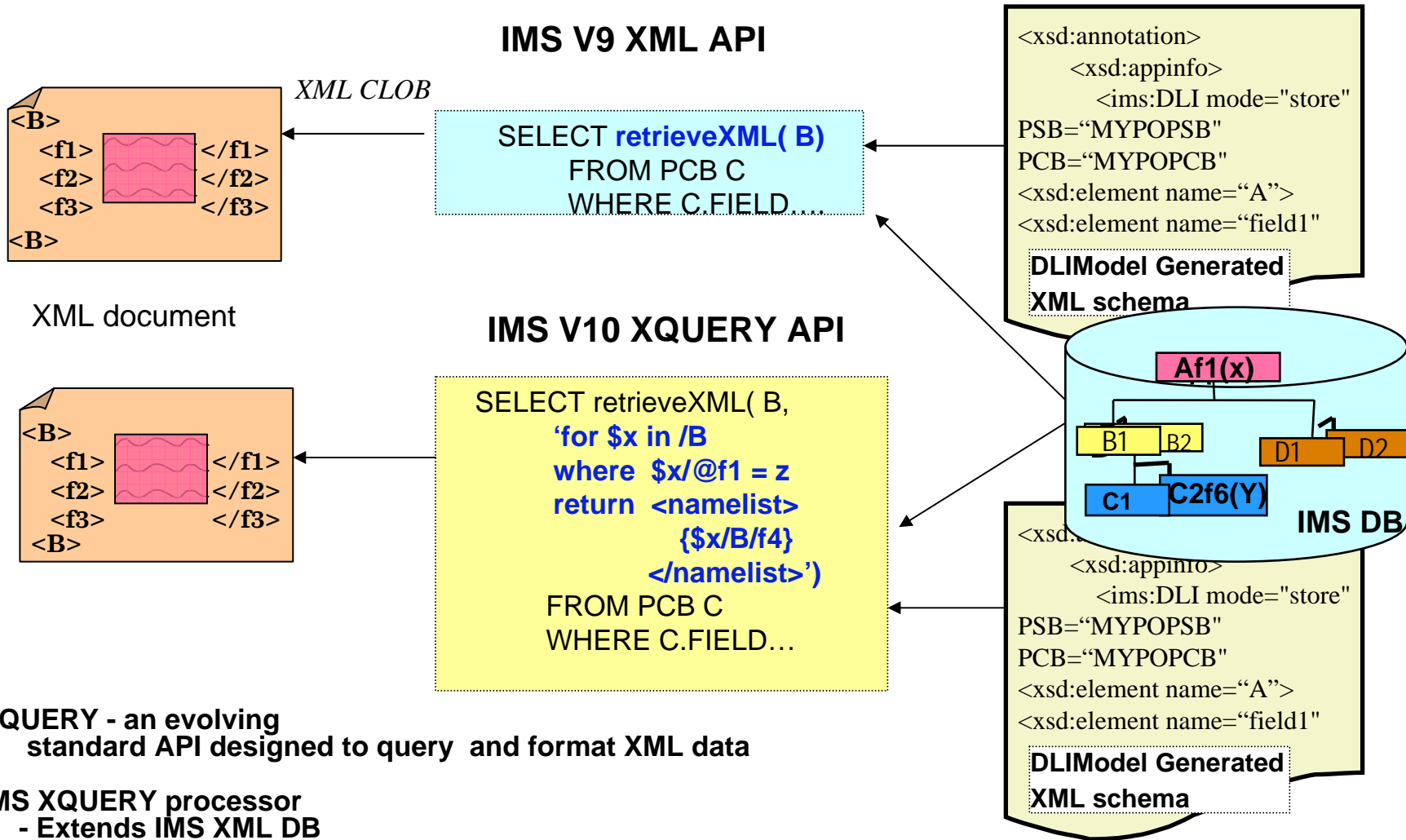
BM: bean managed (supports local transaction semantics)

... And XML DB

- Storage and retrieval of XML documents in IMS databases
 - Composition of XML documents from existing IMS databases
 - Creation of IMS segments from XML documents (decomposition)
 - Intact storage of XML documents (without decomposition)
 - Tooling assistance to define metadata for mappings
 - IMS Java application programming support
- Benefits
 - Easy exchange of data between IMS databases and XML documents
 - Existing IMS databases may be used to create XML documents
 - Existing applications are unaffected



XML DB and XQUERY

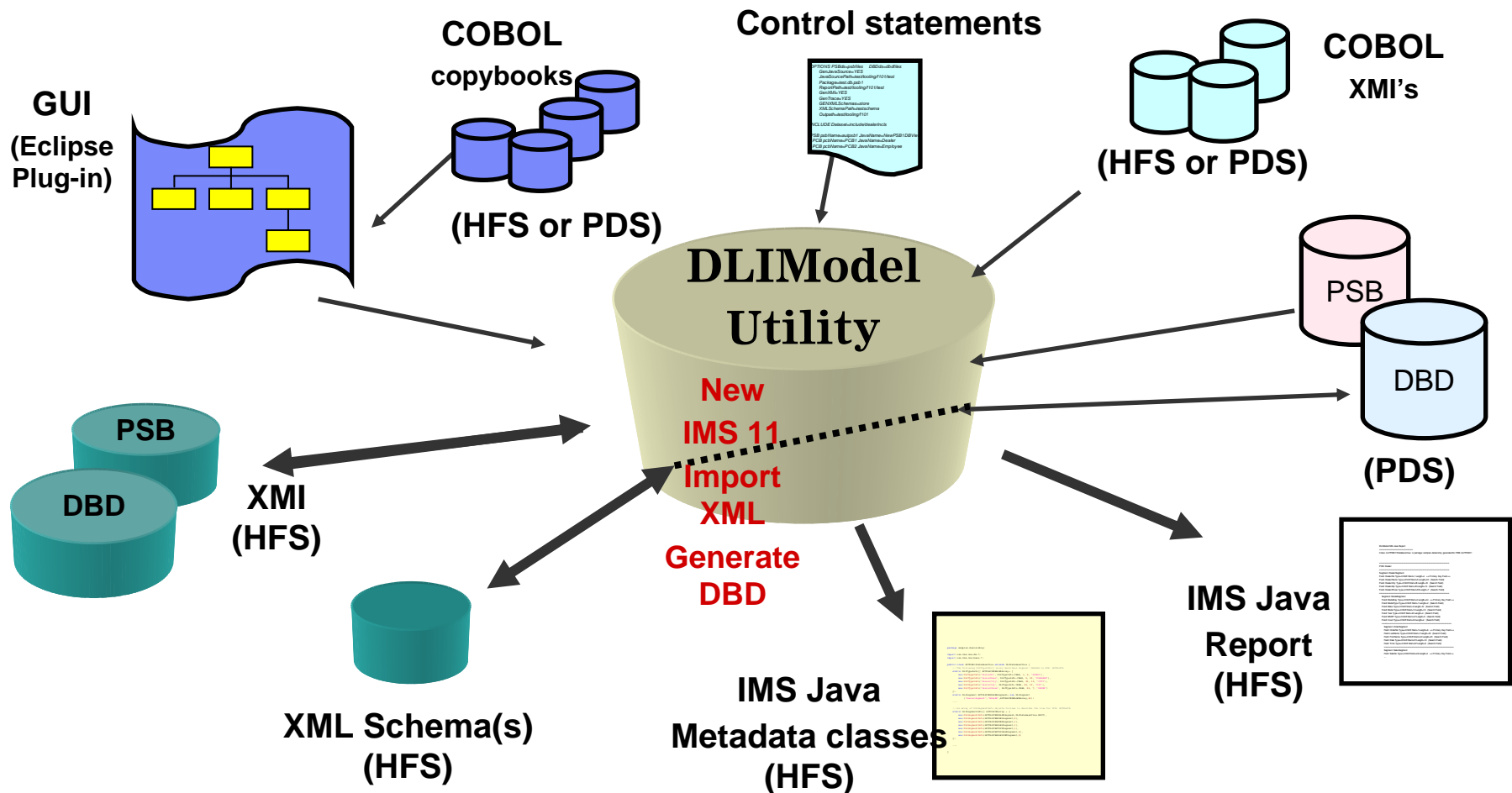


XQUERY - an evolving standard API designed to query and format XML data

- IMS XQUERY processor**
- Extends IMS XML DB
 - Uses XML schemas generated by DLIModel

DLIModel Utility

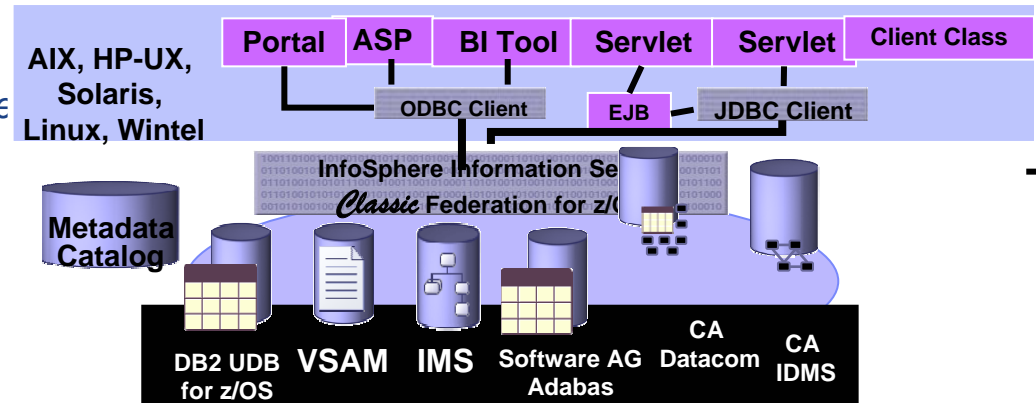
- Generates the DB metadata and XML Schema



Other IBM Solutions

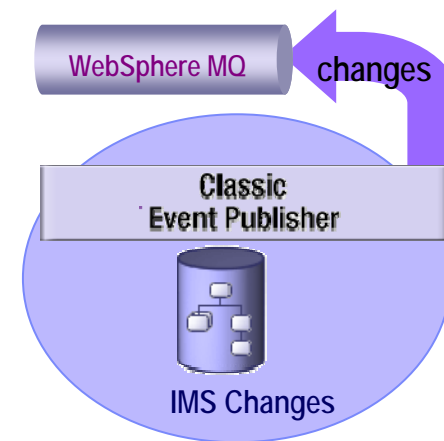
InfoSphere Classic Federation

- Integrates access to a variety of resource (IMS, DB2, VSAM...)
- ODBC, JDBC access to IMS data
 - Support for access to IMS resources includes:
 - Read and update access to IMS DB using JDBC and ODBC



Classic Event Publisher for IMS

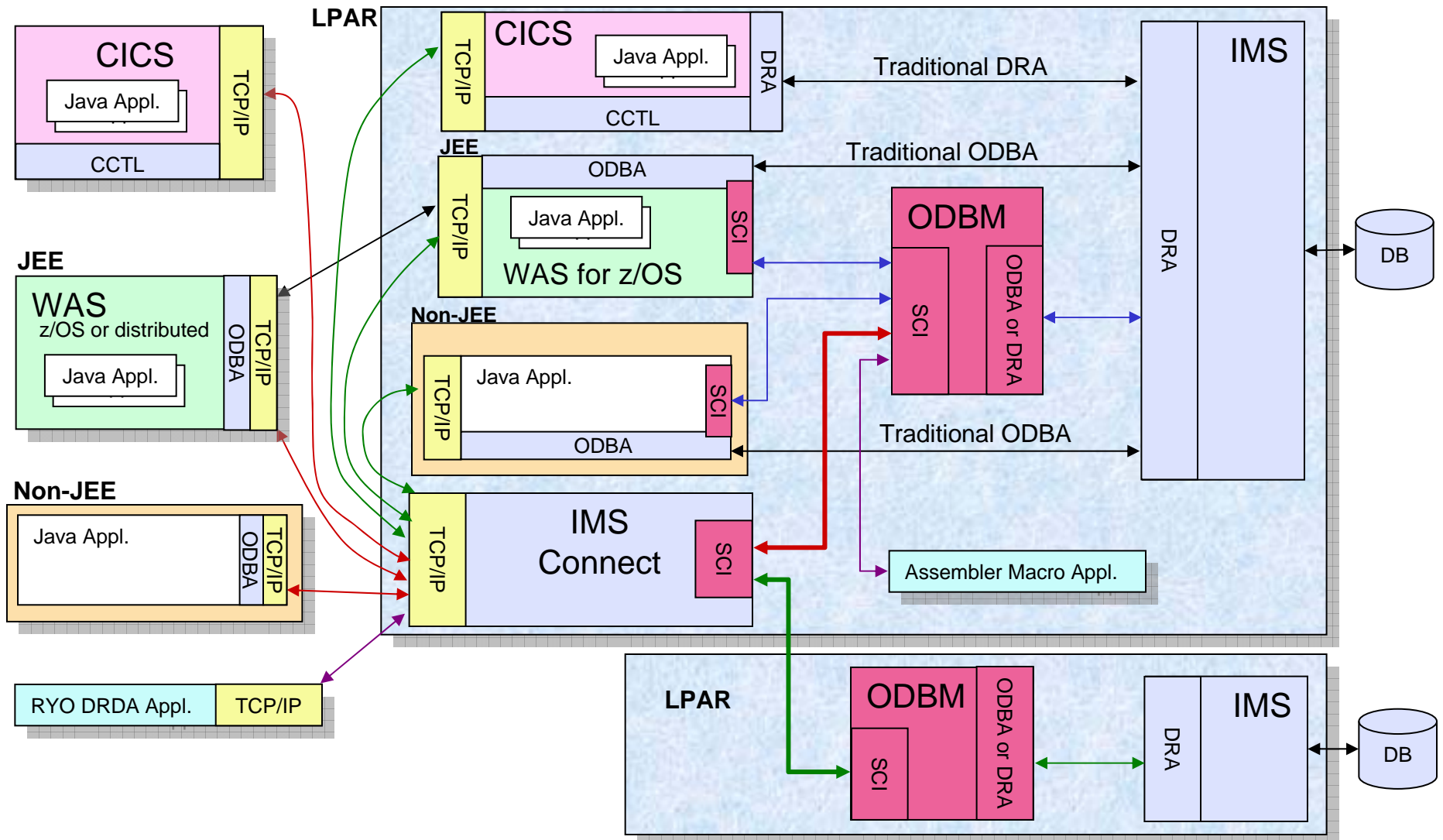
- Leverages the IMS Data Capture architecture
 - Captures changes made to IMS files using an IMS logger exit
 - Captured changes are reformatted into a relational data format
 - The relational format data is packaged as a self-describing XML message
 - The XML messages are published to WebSphere MQ



Open Database -- Coming in IMS 11

- **Open Database Capabilities**
 - Supports open-standards for connectivity to online IMS databases
 - Across z/OS LPARs
 - Direct access from distributed platforms
 - Provides an environment that manages access to online IMS databases
 - Provides Open Database APIs
 - Ease application development access to IMS databases

Open Database



Open Database

- Open Database consists of three components:
 - Open Database API and the Universal Drivers
 - IMS Connect
 - Open Database Manager (ODBM)

Open Database API and Universal Drivers

- Set of java class libraries that provide access to IMS data directly from z/OS and distributed environments
 - Standards-based approach
 - Java Connector Architecture JCA 1.5
 - JDBC, SQL
 - DRDA specification and DDM commands
 - Connectivity
 - Type 2 Connectivity
 - Client issuing the DB call is on the same LPAR as IMS
 - Type 4 Connectivity
 - Client issuing the DB call is on a different LPAR than IMS or in a distributed TCP/IP environment
 - Windows XP, Vista, zLinux, z/OS
 - WebSphere Application Server
 - Standalone Java Standard Edition

Open Database API and Universal Drivers...

- Three categories of Universal drivers
 - Universal DB resource adapter (for JEE environments)
 - JCA 1.5 compliant resource adapter
 - Universal JDBC driver (for non-JEE and JEE environments)
 - Driver which implements JDBC 3.0
 - Universal DLI driver
 - Java API for making calls with DLI/I programming semantics

Universal Drivers

- Today
 - Classic JDBC drivers
- Moving towards



Example using Phonebook PCB

```
select * from phonebook
```

```
update phonebook set firstname='JOHN'  
where lastname='LAST1'
```



Universal Drivers ...

The screenshot shows the Universal JDBC web interface in a browser window. The interface is divided into several sections:

- Database:** A tree view on the left showing a hierarchy of databases. The selected database is `jdbc:ims://ec01007.svl.ibm.com:5555/IMS1`, and the selected table is `PCB01.PHONEBOOK`.
- Table Definition [PCB01.PHONEBOOK]:** A table showing the schema of the selected table.

Column Name	Type	Size	isPrimaryKey
EXTENSION	CHAR	10	false
FIRSTNAME	CHAR	10	false
LASTNAME	CHAR	10	true
- SQL [jdbc:ims://ec01007.svl.ibm.com:5555/IMS1/class://ims.db.catalogs.DFSIVP1DatabaseView]:** A text area containing the SQL query: `select * from phonebook`. Below the text area is an **Execute** button.
- Results:** A table showing the results of the executed query.

EXTENSION	FIRSTNAME	LASTNAME
8-111-1111	Kyle	LAST1
8-111-2222	FIRST2	LAST2
8-111-3333	FIRST3	LAST3

Universal Drivers ...

The screenshot shows the Universal JDBC web interface in a Windows Internet Explorer browser. The address bar shows the URL: `C:\suzie99\jms java support\kyle\universal jdbc demo\universal_jdbc_viewlet_swf.html`. The browser title is "Universal JDBC".

The interface is divided into several sections:

- Database:** A tree view on the left showing a hierarchy of databases. The selected database is `jdbc:ims://ec01007.svl.ibm.com:5555/I`. Other visible databases include `PCB01.BILLING`, `PCB01.DOCTOR`, `PCB01.HOSPITAL`, `PCB01.ILLNESS`, `PCB01.PATIENT`, `PCB01.PAYMENTS`, `PCB01.TREATMNT`, `PCB01.WARD`, `PCB02.PHONEBOOK`, `PCB03.PARTROOT`, `PCB03.STANINFO`, `jdbc:ims://ec01007.svl.ibm.com:5555/I` (expanded), `PCB01.PHONEBOOK`, `jdbc:ims://ec01007.svl.ibm.com:5555/I` (expanded), `jdbc:db2://9.30.20.214:50000/sample`, and `jdbc:db2://9.30.20.214:50000/hospital` (expanded) with sub-items `PCB01.HOSPITAL`, `PCB01.PATIENT`, `PCB01.WARD`, `SYSTOOLS.ALT OBJ_INFO`, `SYSTOOLS.DB2LOOK_INFO`, `SYSTOOLS.HMON_ATM_INFO`, and `SYSTOOLS.HMON_COLLECTION`.
- Table Definition:** A table with columns: **Column Name**, **Type**, **Size**, and **isPrimaryKey**. It is currently empty.
- SQL [jdbc:ims://ec01007.svl.ibm.com:5555/IMS1/class://ims.db.catalogs.BMP255DatabaseView]:** A text area containing the query: `SELECT HOSPNAME as HospitalName, PATNAME AS Patient FROM PCB01.HOSPITAL, PCB01.PATIENT WHERE hospital_hospc`. Below the text area is an **Execute** button.
- Results:** A table showing the output of the query:

HOSPITALNAME	PATIENT
ALEXANDRIA	BOB DAVIS
ALEXANDRIA	KEVIN HITE
ALEXANDRIA	MARIA QUERALES

Universal Drivers ...

The screenshot shows the Universal JDBC web interface in a browser window. The interface is divided into several sections:

- Database:** A tree view on the left showing a hierarchy of databases. The selected database is `jdbc:db2://9.30.20.214:50000/hospital`.
- Table Definition:** A table with columns: **Column Name**, **Type**, **Size**, and **isPrimaryKey**. It is currently empty.
- SQL [jdbc:db2://9.30.20.214:50000/hospital]:** A text area containing the query: `SELECT HOSPNAME as HospitalName, PATNAME AS Patient FROM PCB01.HOSPITAL, PCB01.PATIENT WHERE hospital_hospc`
- Execute:** A button to run the query.
- Results:** A table showing the output of the query.

HOSPITALNAME	PATIENT
ALEXANDRIA	BOB DAVIS
ALEXANDRIA	MAURICIO ADAMES
ALEXANDRIA	MARIA QUERALES

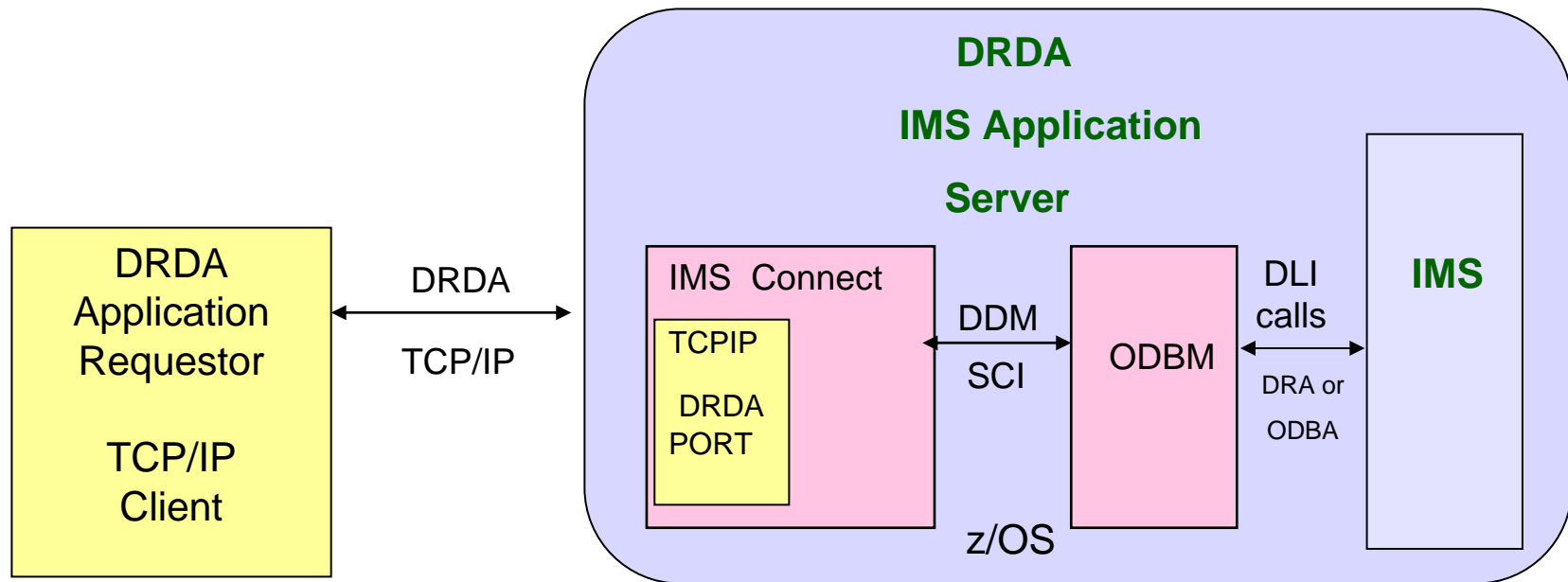
IMS Connect --- a DRDA Server

- **IMS Connect has a new role**
 - Provides server support for DRDA requests sent across a TCP/IP network to IMS
 - Distributed Relational Database Architecture (DRDA)
 - Set of protocols and functions for client and database servers connectivity
 - Communication protocol
 - Two-Phase commit protocol
 - Security
 - Distributed Data Management (DDM)
 - Provides the command and reply structure for accessing databases
 - ODBM translates the DDM database requests into DL/I calls

Open Database Manager (ODBM)

- **New address space**
 - Interprets DRDA/DDM requests to DL/I calls
 - Allowing IMS DB access as a standards-based data server
 - Opens access to online IMS database resources
 - Across LPAR boundaries
 - Across Network boundaries
 - Protects IMS control regions from the unexpected termination of the application program
 - Reduces U113 abends
 - Supports the use of RRS if needed (two-phase commit)
 - Alternatively, provides a non-RRS environment

ODBM IMS Connect DRDA Router



Open Database

- **Benefits**

- Enables new application design frameworks and patterns
 - Based on open standards
- Provides TCP/IP access to IMS database resources
- Facilitate access to IMS databases using IMS-provided universals drivers

Summary

- **And.... once again, the message:**

- **IMS continues to be a premier server**
 - Architected interfaces support standard access from the web

- **New interfaces, products and tools from a variety of vendors provide access to IMS transactions and data**