



IBM Software Group

WebSphere Business Integration Server Foundation Technical Overview

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@business on demand

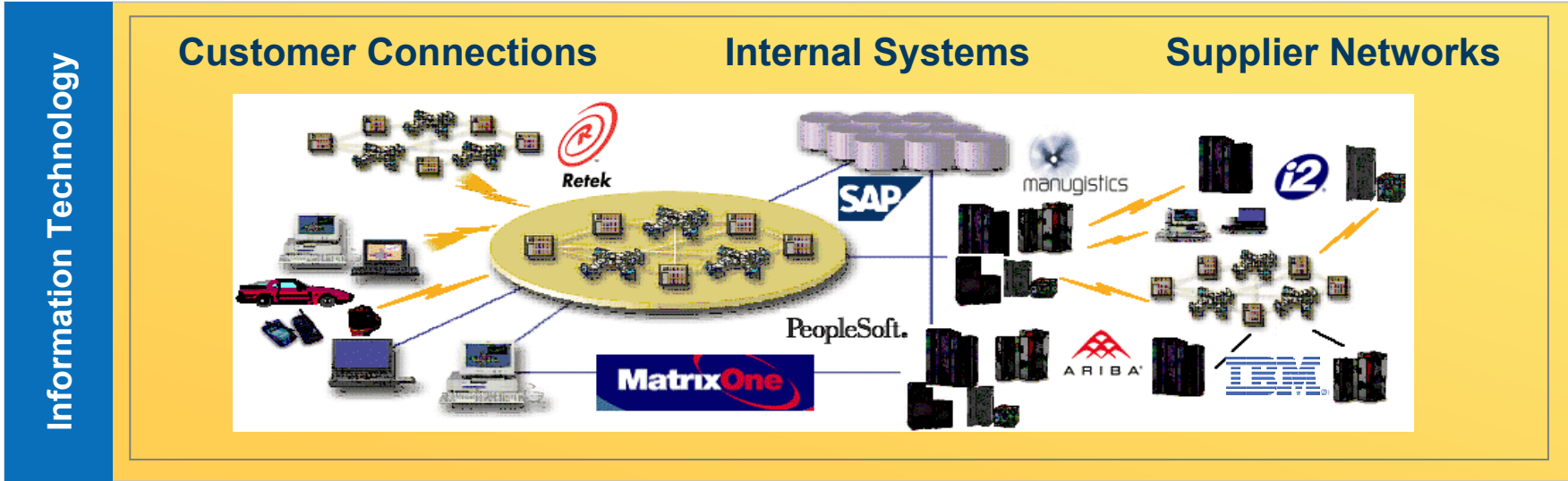
Topics

- Introduction
- Product Overview
- Product Deep Dive
 - ▶ Process Choreography
 - ▶ Business Rules
 - ▶ Adapters
 - ▶ Programming Model Extensions
 - ▶ Common Event Infrastructure
 - ▶ Modeler / Monitor Integration
- Technology Roadmap

Horizontal Integration is the New Challenge



Bridging the gap between business transformation and IT



Elements of an Effective Integration Architecture

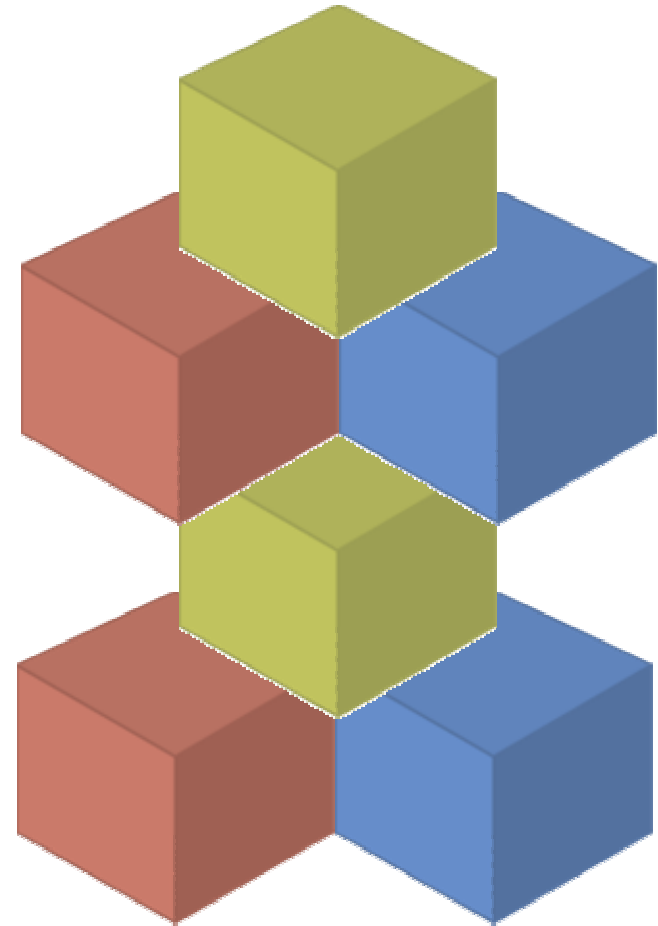
- Well-defined Interfaces and defined set of protocols:
 - ▶ Implements & enforces the “Separation of Concerns”

- Service Oriented Architecture (SOA)
 - ▶ Integrate People, Process, and Information
 - ▶ Applications should be treated as components

“You start with Web services and you start with good solid object-oriented architectures. Why? Because the fundamentals of engineering like good abstractions, good separation of concerns never go out of style. Just because we have yet another set of protocols does not mean those things get thrown away [Grady Booch, InfoWorld 02/04].”

What is a Service Oriented Architecture?

- An **approach** for **building** distributed systems that deliver application functionality as **services** to either end-user applications or other services
- It defines :
 - ▶ An architecture that leverages **open standards** to represent software **assets as services**.
 - ▶ Provides a **standard way of representing and interacting** with software assets
 - ▶ Individual software assets become **building blocks** that **can be reused** in developing other applications
 - ▶ **Shifts focus to application assembly** rather than implementation details
 - ▶ Used internally to **create new applications out of existing components**
 - ▶ Used externally to **integrate with applications outside of the enterprise**



SOA is key for Process Integration

Why Service Oriented Architecture?

- A Service Oriented Architecture enables **flexible** connectivity of applications or resources by
 - ▶ Representing every application or resource as a **service** with a **standardized interface**
 - ▶ Enabling them to **exchange structured information** (messages, documents, 'business objects')
 - ▶ Mediating the message exchange through an **Enterprise Service Bus**
- This flexibility enables new and existing applications to be easily and quickly combined to address changing business needs.
 - ▶ The ability to easily combine/choreograph applications allows IT services to more readily reflect business processes
- The SOA infrastructure is also used to facilitate the management of business performance and quality of service

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IBM WebSphere Business Integration Server Foundation V5.1

IBM delivers a next generation integration platform for building, deploying, and choreographing Web services to form composite applications within a service oriented architecture.

IT Needs

WBI Server Foundation

“I want to quickly build and deploy flexible systems that are closely aligned with my business imperatives”

Increase business flexibility by leveraging a service oriented architecture to build modular applications that are designed to adapt quickly to change

“I want to decrease the complexity, risk, and cost of integration”

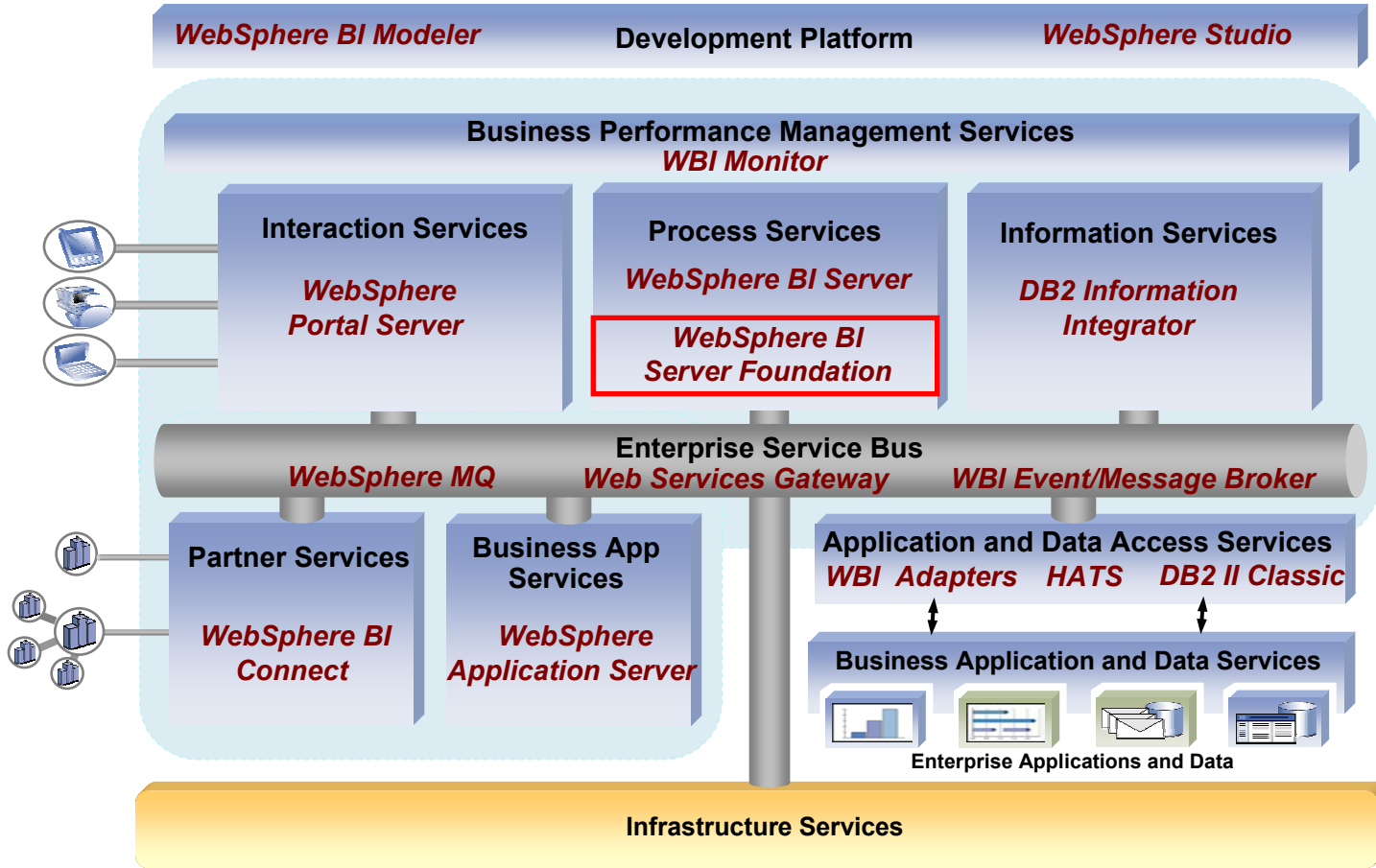
Minimize development costs and maximize the return on your infrastructure investments by developing applications using industry supported open standards

“I want to accelerate my entire application development process, so that applications get delivered on time, within budget, and with the functionality my business requires”

Increase developer productivity by building composite applications using a highly integrated development environment with specialized integration functionality

Business Integration Reference Architecture

IBM Software Offerings



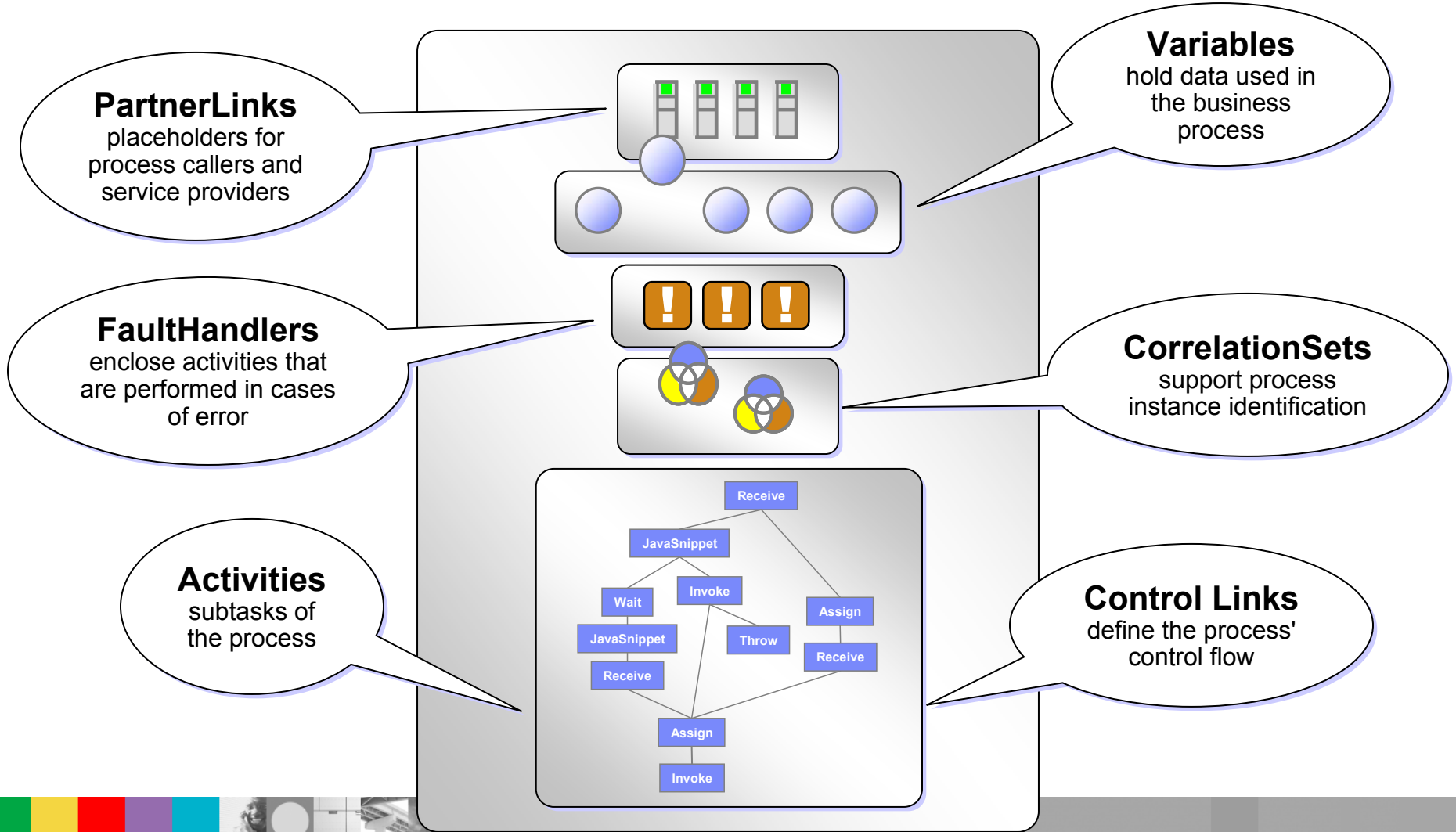
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Process Choreography

- Process Choreographer: BPEL based Runtime Engine
 - ▶ Runtime components that support execution of processes
 - ▶ Runs in the WebSphere runtime exploiting Clustering, Security, Admin, etc.
- Multi-style Process Support
 - ▶ Non-interruptible (1-transactional) and interruptible (multi-transactional) Processes supported
- Compensation Support
 - ▶ Runtime components that support compensation (undo of committed work) for processes.
- Human Interaction Support
 - ▶ Runtime components that allow people to interact with processes e.g. via a Web Browser based user interface to presents work items and processes

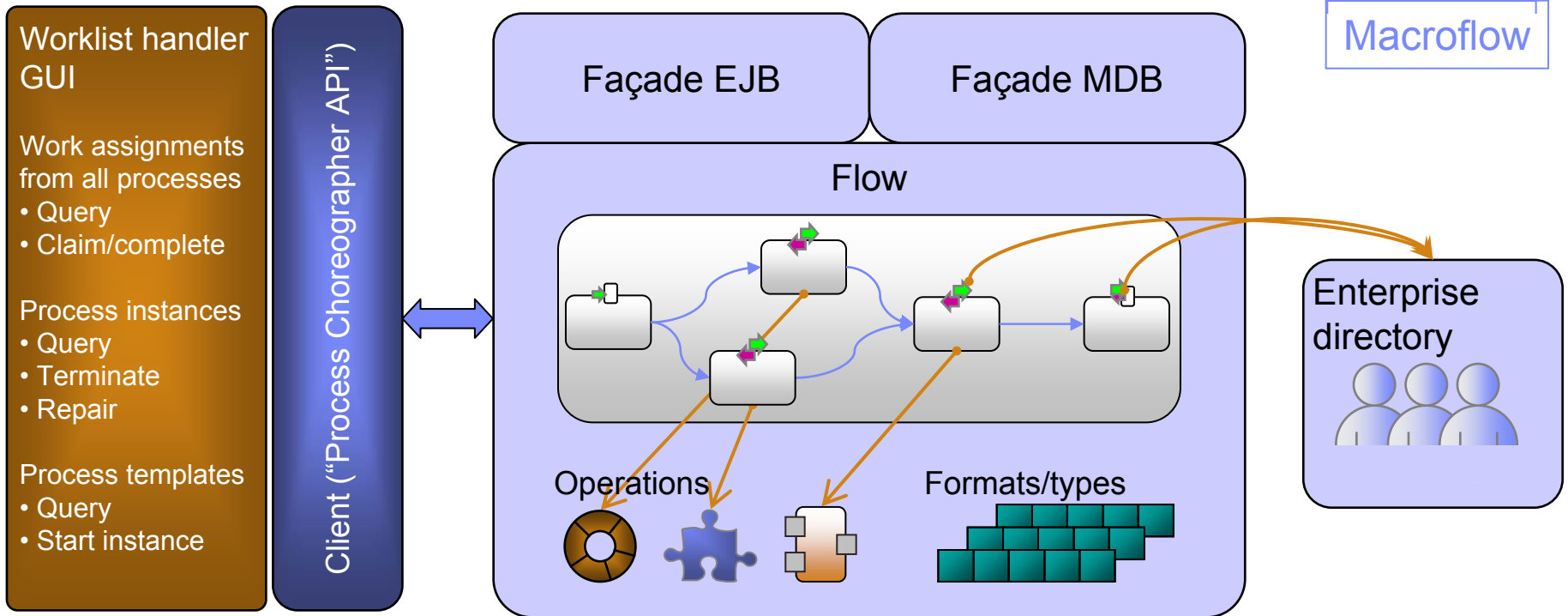
Elements of a BPEL Business Process



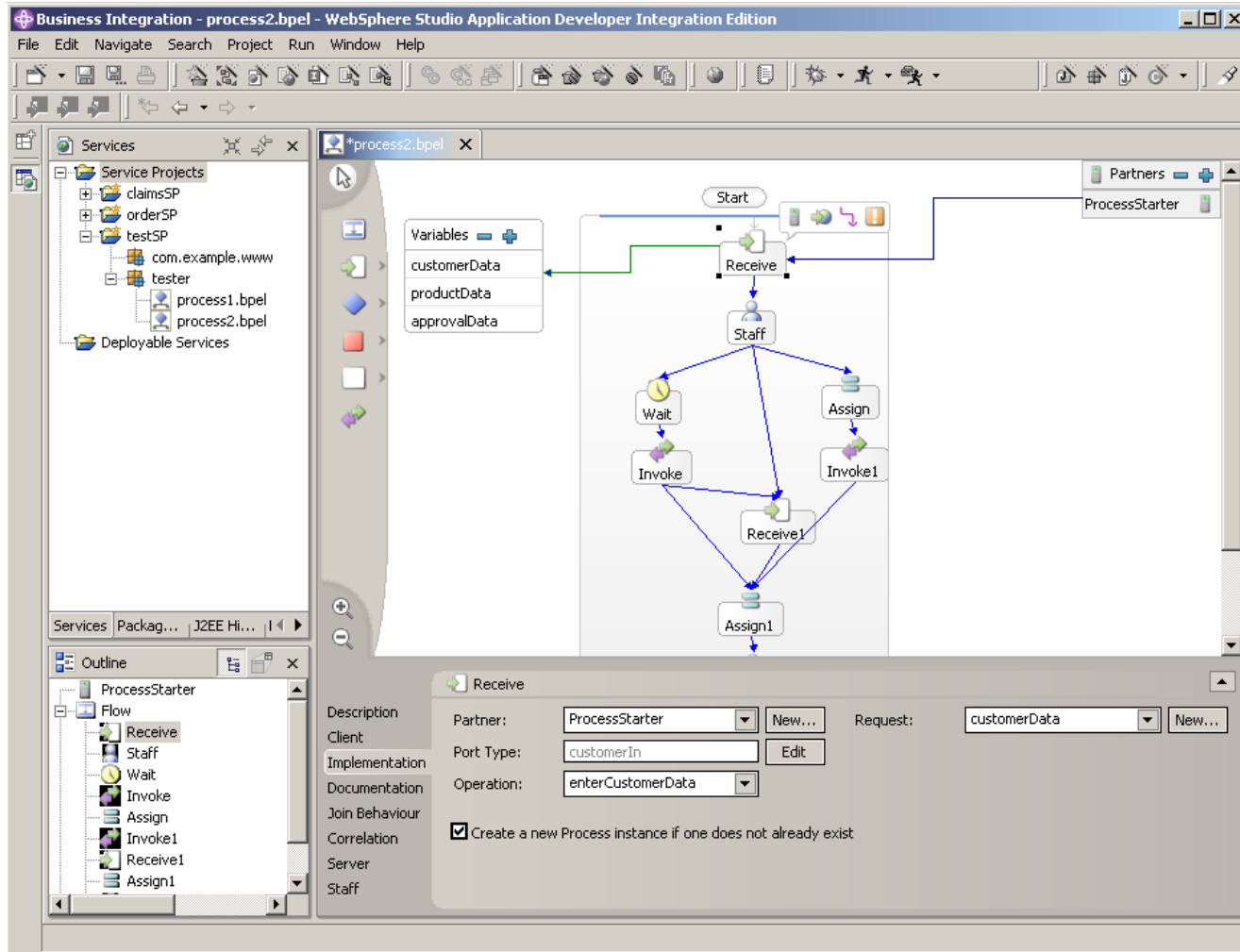
Process Choreography Support

- BPEL process format portable
- Multiple Process Inputs
 - Process waits for all initiating Process Inputs before Process starts navigating
- Event handling: “receive before wait”
 - Events Messages for not yet navigated Process Events are not discarded
- Extended expiration functionality and dynamic timeout for most activity types
- Correlation Sets based on Business Data
 - Process Instance ID might not be sufficient due to multiple conversations at the same time.
- Important Staff Features
 - Transfer Workitem
 - Create/Delete Workitem

Programming Model for WBI Server Foundation 5.1



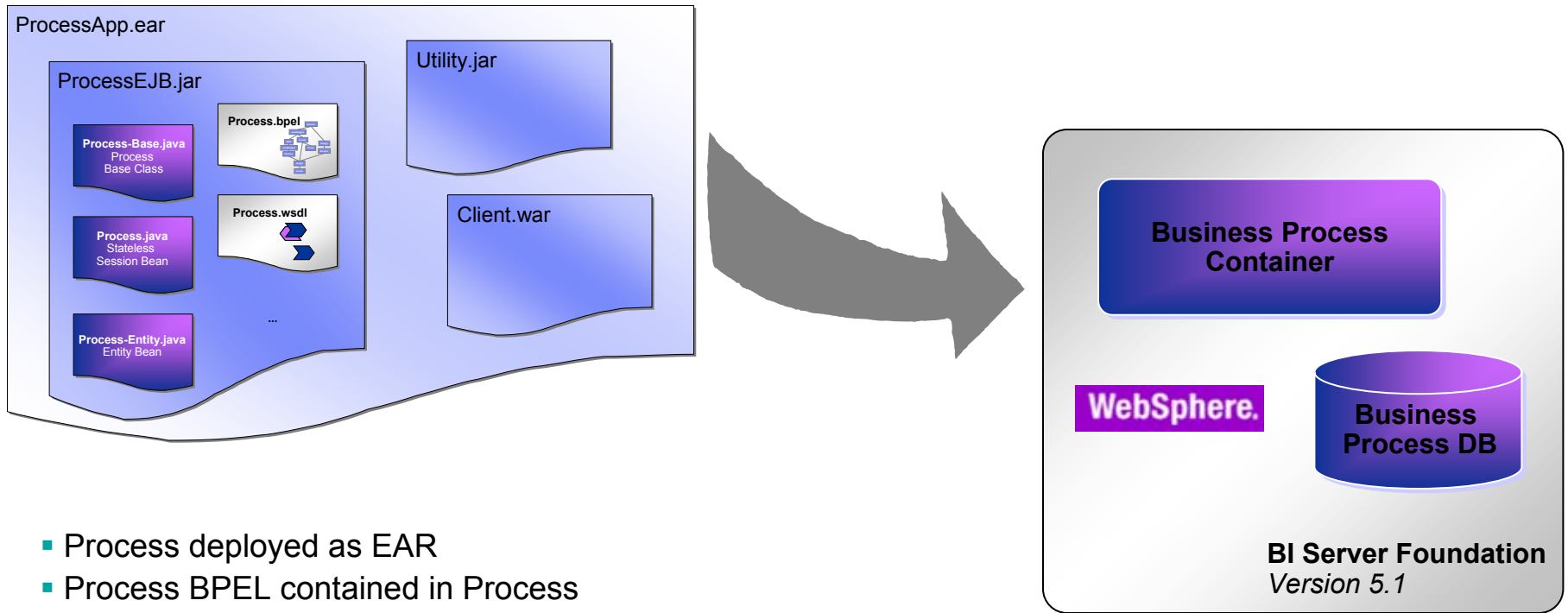
WebSphere Studio AD Integration Edition Process Editor



WebSphere Studio AD Integration Edition Process Debugger

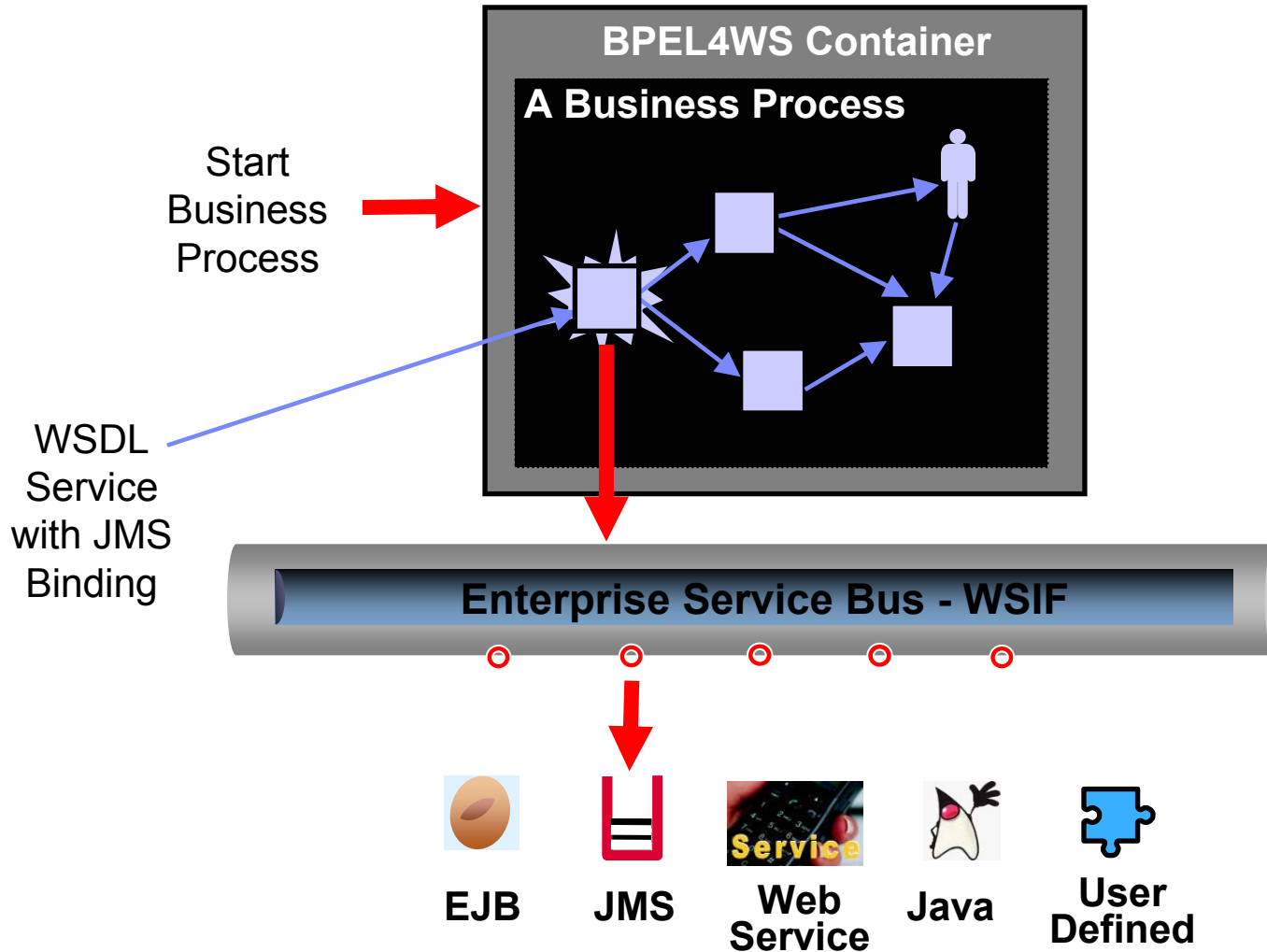
The screenshot shows the WebSphere Studio Application Developer Integration Edition Process Debugger interface. The main window displays a BPEL process diagram for 'a.bpel'. The process starts with a 'Receive' activity followed by an 'Empty3' activity. This is followed by a 'Sequence' activity that branches into three parallel paths, each containing a 'Sequence' activity followed by an 'Empty' activity (labeled Empty4, Empty5, and Empty6). The left sidebar shows the 'Bpel Sim Server' tree with several threads (Thread[0] to Thread[4]) suspended at activity 'a:16'. The bottom status bar shows 'Sequence' selected, with fields for 'Name' and 'BPEL Name'.

Deployment of the Business Process Application



- Process deployed as EAR
- Process BPEL contained in Process EJB Archive

Business Process Choreography and Enterprise Services Bus



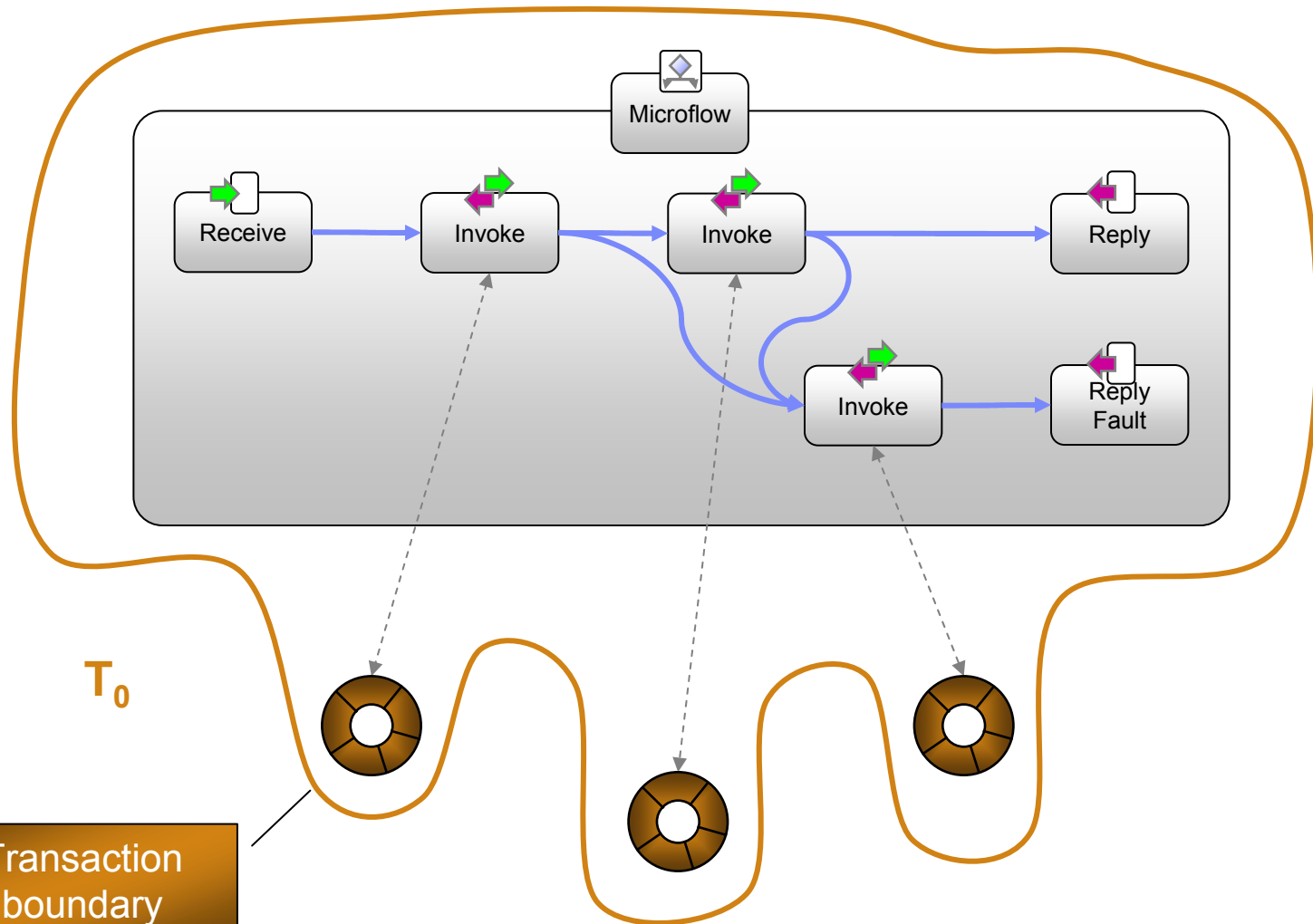
Types of Processes

- **Non-interruptible Process (Microprocess)**
 - ▶ short running, fully automatic
 - ▶ transient behavior, all activities within just one transaction
 - ▶ Value: Reusable business functions

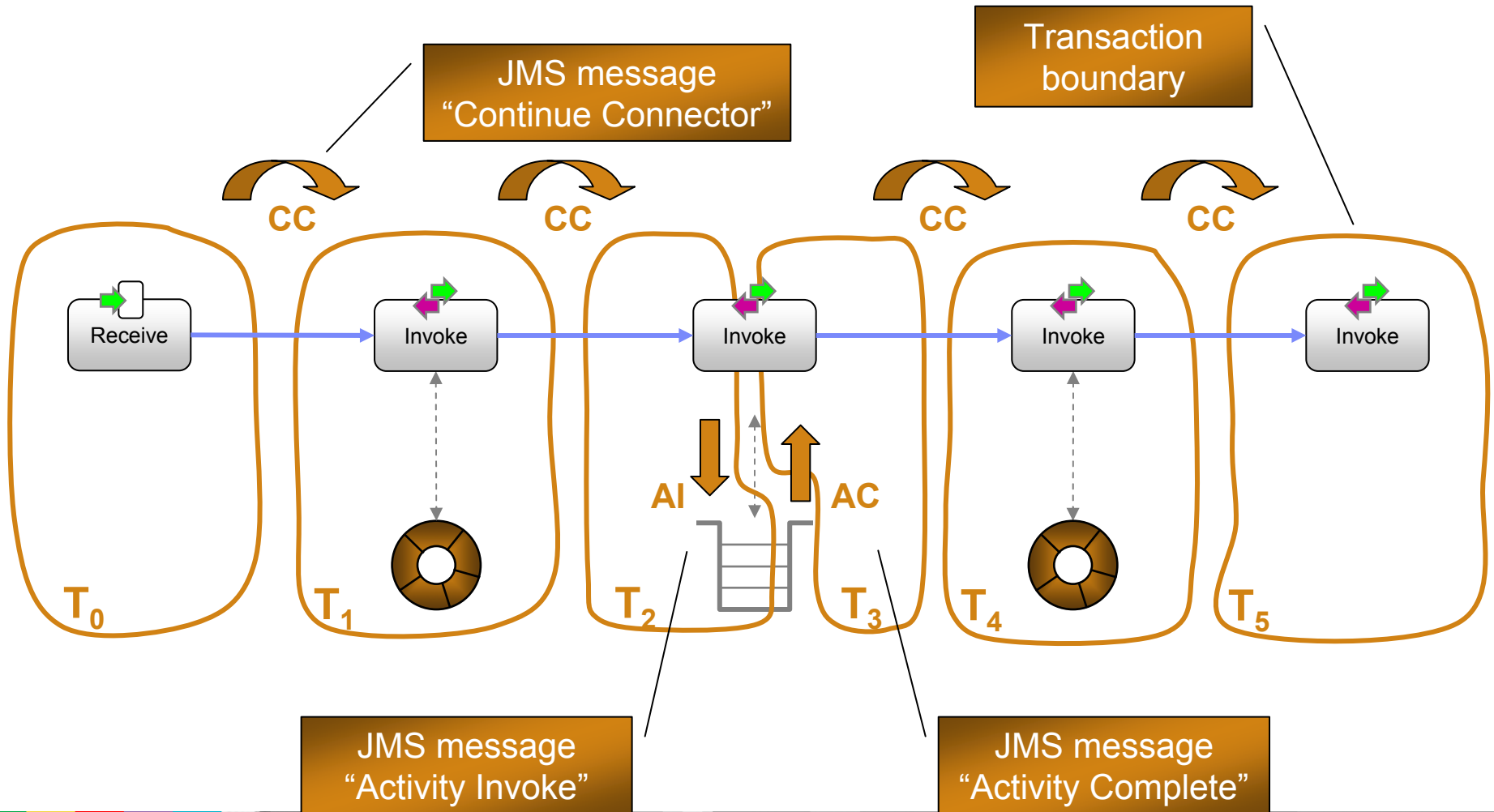
- **Interruptible Process (Macroprocess)**
 - ▶ long running, automatic
 - ▶ persistent state, set of separate activities, each is a single transaction
 - ▶ Value: Top-level Process including asynchronous or manual activities thereby including Microprocesses (Building blocks approach)

- **Work assignment to people = Extension to Interruptible Process**
 - ▶ manual activities are assigned to people based on special definitions and the contents of an external directory

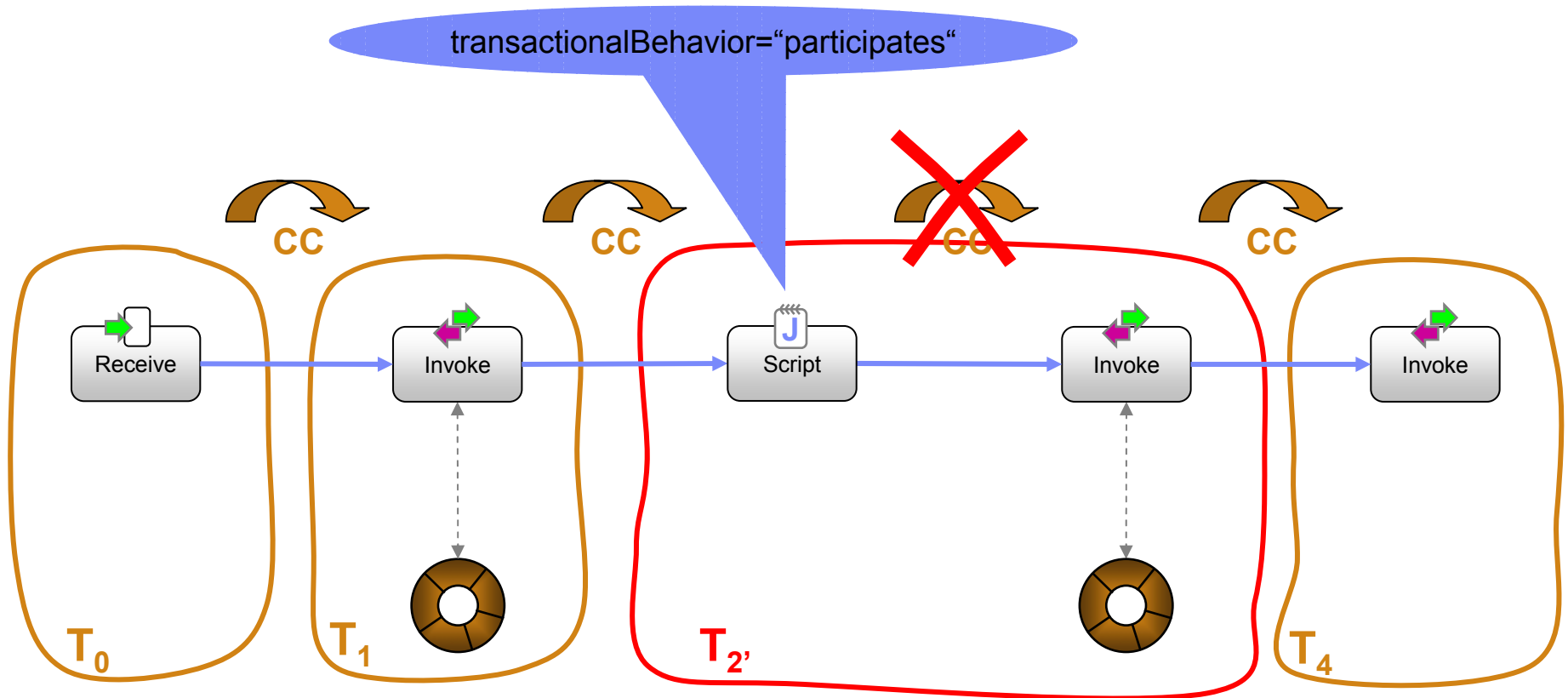
Transactions: Microflow (Short-running Process)



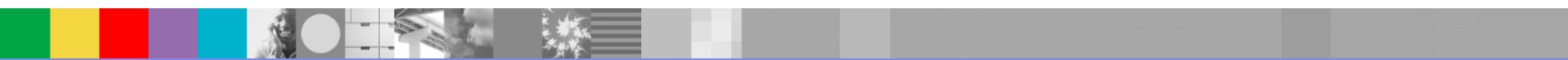
Transactions: Macroflow (Long-running Process)



Transactions: Modified Transaction Boundaries



Other options: commit after, commit before, requires own



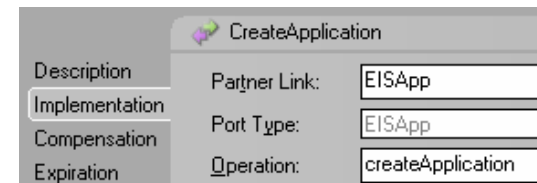
Compensation Support

- Why use Compensations?
 - ▶ Long lived transactions cannot rely on resource locking mechanism of transaction managers
 - ▶ To enable rollback of operations that have no transaction support
- How does it work?
 - ▶ For each Service that needs to be compensated, define a Compensation Service
 - ▶ Associate Compensation Services the Services that need to be compensated.
 - ▶ Tell the runtime to manage compensations
 - ▶ In the event of a failure runtime automatically executes Compensation Services in the reverse order
 - This is called Reverse Navigation

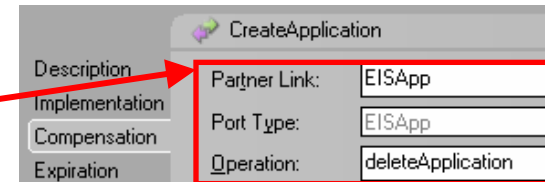
Service with Compensation



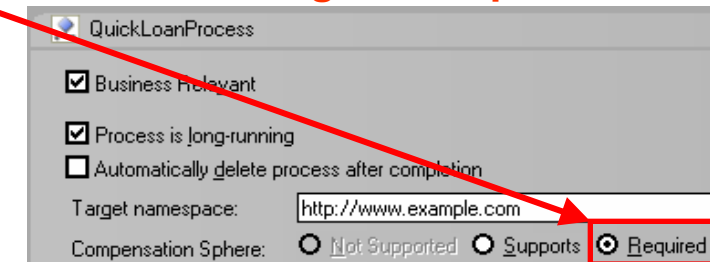
Primary Service



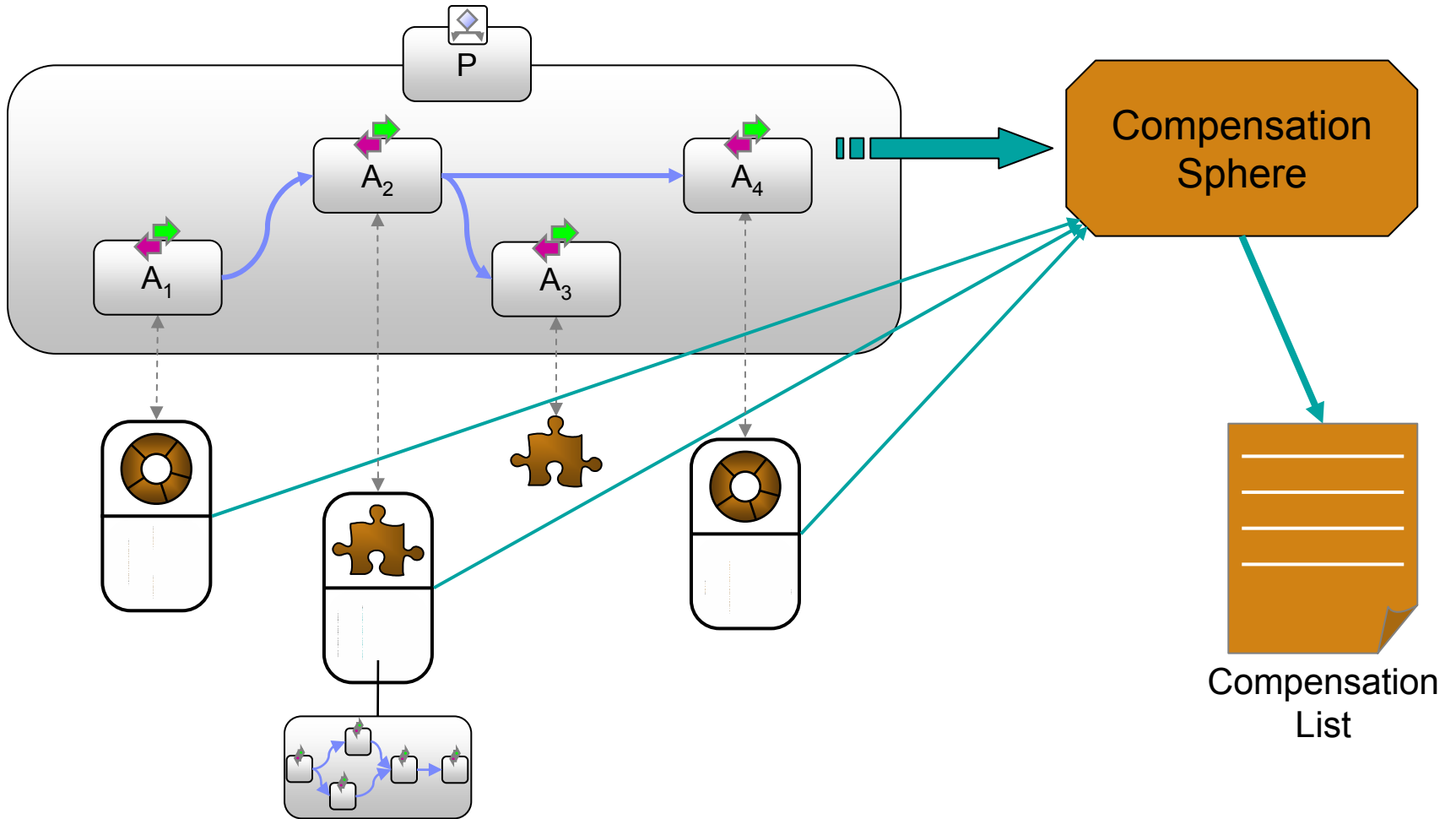
Compensation Service



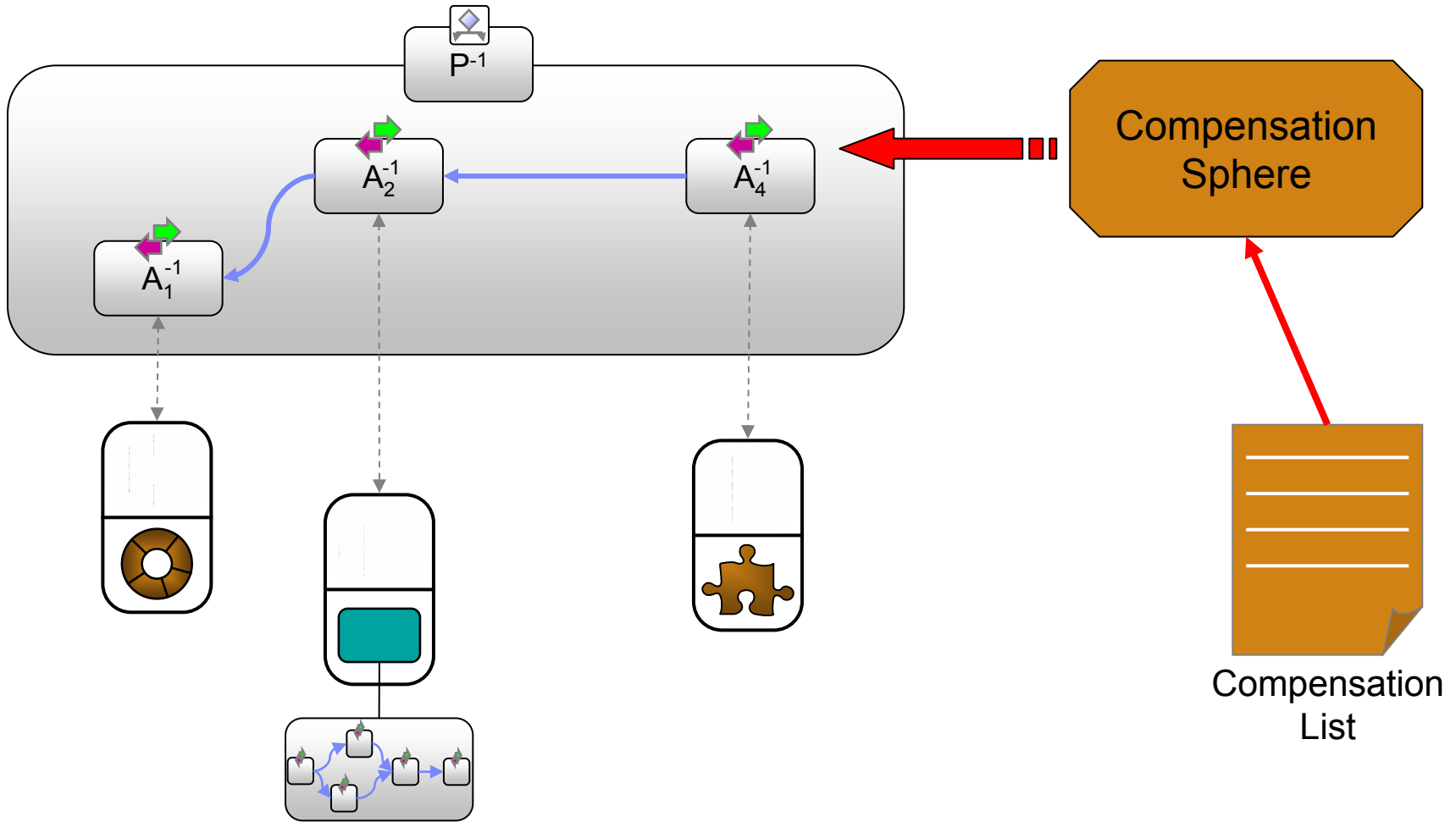
Process Manages Compensations



Compensation: Forward Navigation – Logging

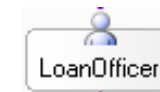


Compensation: Backward Navigation



Staff Support

- Defines how a Business Process interacts with people



- **Business Process Web Client**

- ▶ A Web application that interacts with the Process
 - Easy to customize
- ▶ People can see and control the status the tasks assigned them

Specify JSPs to Customize

Web Client Settings:		
Name	Value	Context Root
InputMessageJSP	/LoanOfficerInput.jsp	/BPEWebClient
OutputMessageJSP	/LoanOfficerOutput.jsp	/BPEWebClient
MessageMappingJSP	/LoanOfficerMM.jsp	/BPEWebClient
ReplaceJSP	<default>	

- **Staff Directory**

- ▶ Metadata - organizational structure
- ▶ Data - the people and the activities they can perform

- **Staff Plug-in Provider**

- ▶ A flow engine plug-in for interaction with a **Staff Directory**

Staff Plugin Providers:

Name	Description
User Registry Staff Plugin Provider	This staff plugin provider can be used for User Registry based staff queries.
LDAP Staff Plugin Provider	This staff plugin provider can be used for LDAP based staff queries.
System Staff Plugin Provider	This staff plugin provider may be used for System based staff queries.

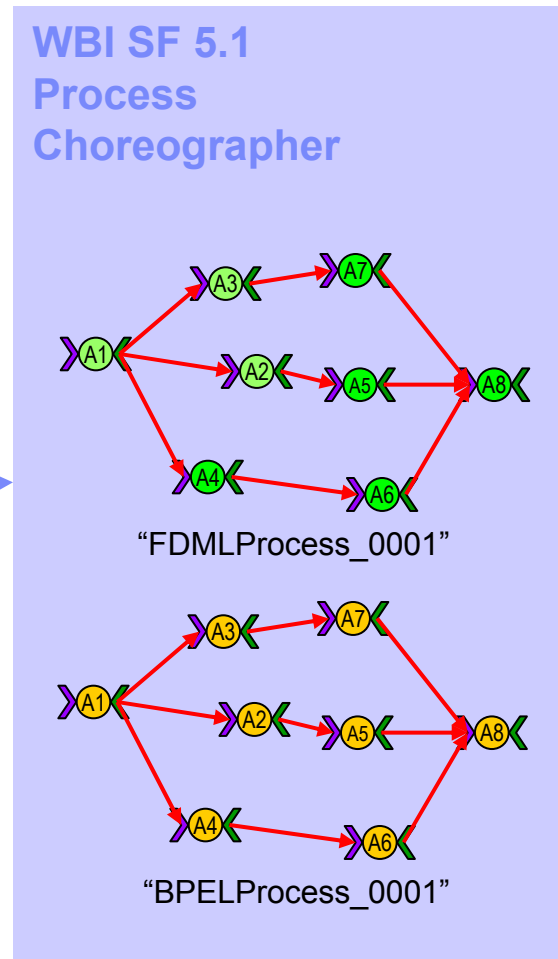
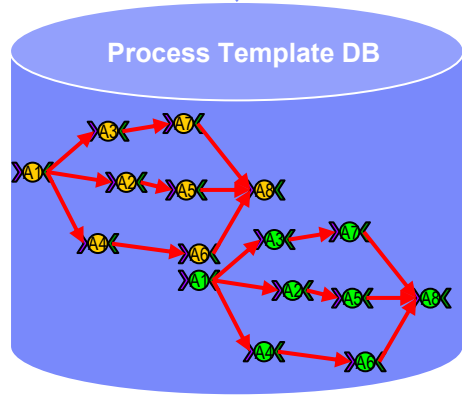
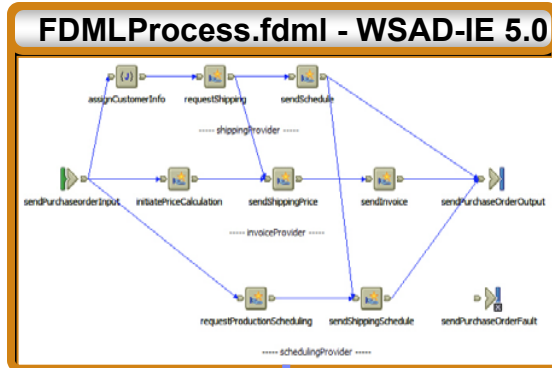
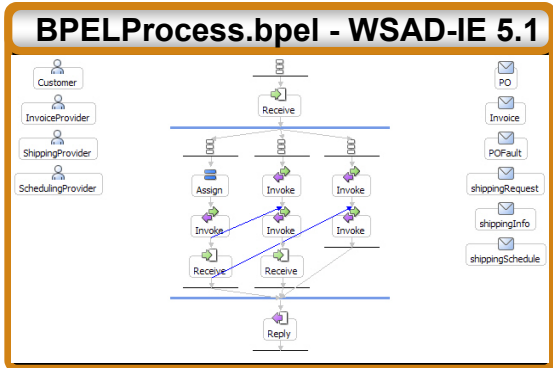
Customized Web Client

Customer 1 has credit rating of 'B' and requested a loan of \$75000.0.

Please approve or reject the loan for customer 1.
[Customer Credit Query](#) - For more information you can query this customer's credit history.

- Approve the loan.
- Reject the loan.

Process Model Compatibility



Process Choreographer 5.0 to 5.1 Process Migration

- FDML to BPEL conversion is part of WSAD-IE 5.1 Business Integration Perspective

Migration Wizard

Start of Migration

Migrate all the processes of this project to BPEL processes.

The following Business Process files will be migrated:

Business Process File	Service Project Folder	Package Name
StopOnErrorSVTProcess.proc...	StopOnErrorSVT	com/ibm/bpe/svt

StopOnErrorSVTProcess.bpel

Variables

- input
- output
- evaluateDollarAmountRequest
- evaluateDollarAmountResponse
- exception
- BuiltinBranchContainer0

Correlation Sets

Tasks (8 items)	Description	Resource	In Folder	Location
<input checked="" type="checkbox"/>	A Receive Event Node with one or mor...	StopOnErr...		
<input checked="" type="checkbox"/>	A correlation java method getCorrelati...	StopOnErr...		
<input checked="" type="checkbox"/>	A correlation java method getCorrelati...	StopOnErr...		
<input checked="" type="checkbox"/>	A correlation java method getCorrelati...	StopOnErr...		
<input checked="" type="checkbox"/>	BPED0277E: Pick/receive activity 'Even...	StopOnErr...	StopOnErrorSVT_bpel/com/i...	
<input checked="" type="checkbox"/>	BPED0277E: Pick/receive activity 'Inpu...	StopOnErr...	StopOnErrorSVT_bpel/com/i...	
<input checked="" type="checkbox"/>	IWAA0378W The message type of var...	StopOnErr...	StopOnErrorSVT/com/ibm/b...	
<input checked="" type="checkbox"/>	IWAA0378W The message type of var...	StopOnErr...	StopOnErrorSVT/com/ibm/b...	

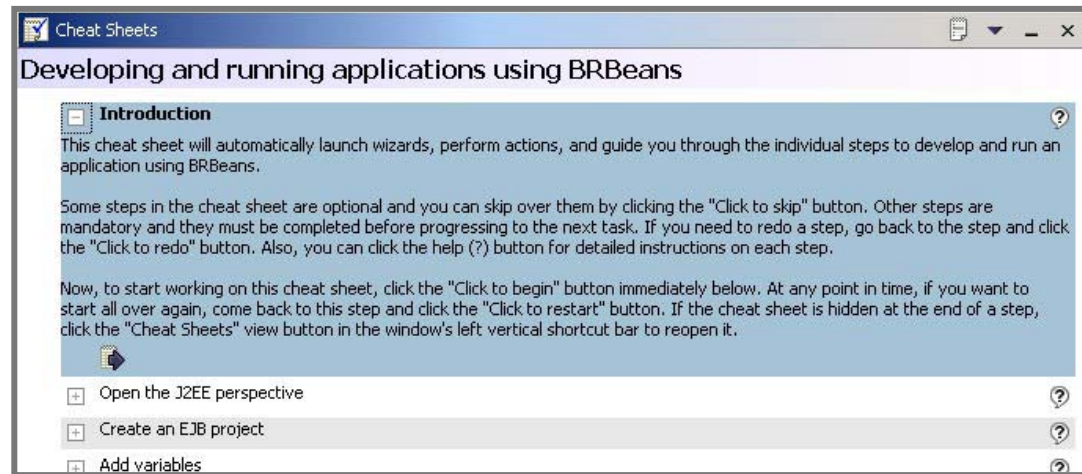
Business Rules Support

Powerful real-time framework for defining, executing, and managing business rules that encapsulate business policies that vary based on changes in the business environment.



- ▶ For example, a simple business rule might be, "If a customer's shopping cart is greater than \$X, then offer a Y% discount."

Support for business rules includes:

- ▶ Easy to use tools for defining, executing, and managing business rules
- ▶ Cheat sheets to walk developers through the process of defining business rules
- ▶ Ability to update business rules at runtime using a straightforward user interface without the need to bring the application or server down
- ▶ Ability to organize business rules into logical categories
- ▶ Support for defining a start and end date for when the rule is in effect



Adapters

- IBM J2C adapters 
 - ▶ CICS-ECI, CICS-EPI, HOD, IMS
 - Development license included
 - Communicate through
 - IMS Connect
 - CICS Transaction Gateway
 - ▶ SAP (mySAP.com)
 - Not included in Integration Edition
- Any J2C 1.0 adapter will work with WebSphere
 - ▶ J2C 1.0 API must be used to access
- WebSphere Application Server Partner J2C Adapters 
 - ▶ Several key vendors:
 - i.e. iWay – 200 Adapters!
 - ▶ Tested and certified for with WebSphere
 - ▶ <http://www.ibm.com/software/webserver/s/appserv/was/partneradapters>
- IBM WBI Adapters
 - ▶ Use WebSphere MQ queues to communicate with WebSphere (not J2C)
 - ▶ 50 Adapters
 - ▶ Will be migrated to J2C 1.5



-- Tools support; Wizard to create J2C Services

Programming Model Extensions

- **Startup beans** - enables J2EE applications to execute business logic automatically, whenever an application starts or stops normally.
- **Scheduler service** - enables tasks to be executed at a requested time. When used in conjunction with asynchronous beans, it enables batch processing applications within J2EE. Includes a generic calendar mechanism.

New in
v5.1



Distributed Map - offers an interface to enable J2EE applications and system components to cache and share Java objects by storing a reference to the object in the cache in order to improve performance.

New in
v5.1



Container Managed Persistence over anything - extends the existing J2EE Container Managed Persistence (CMP) framework to support any backend system or service that supports create, retrieve, update, and delete (CRUD) methods

New in
v5.1



Stored Procedures support for CMP – enables CMP entity beans to utilize stored procedures in backend databases

- **Additional programming model extensions** - Asynchronous beans, Last participant support, Activity session services, Internationalization service, Work areas, Dynamic query service, WSGW Filters, Object pools, Container Managed Messaging, Application profiling

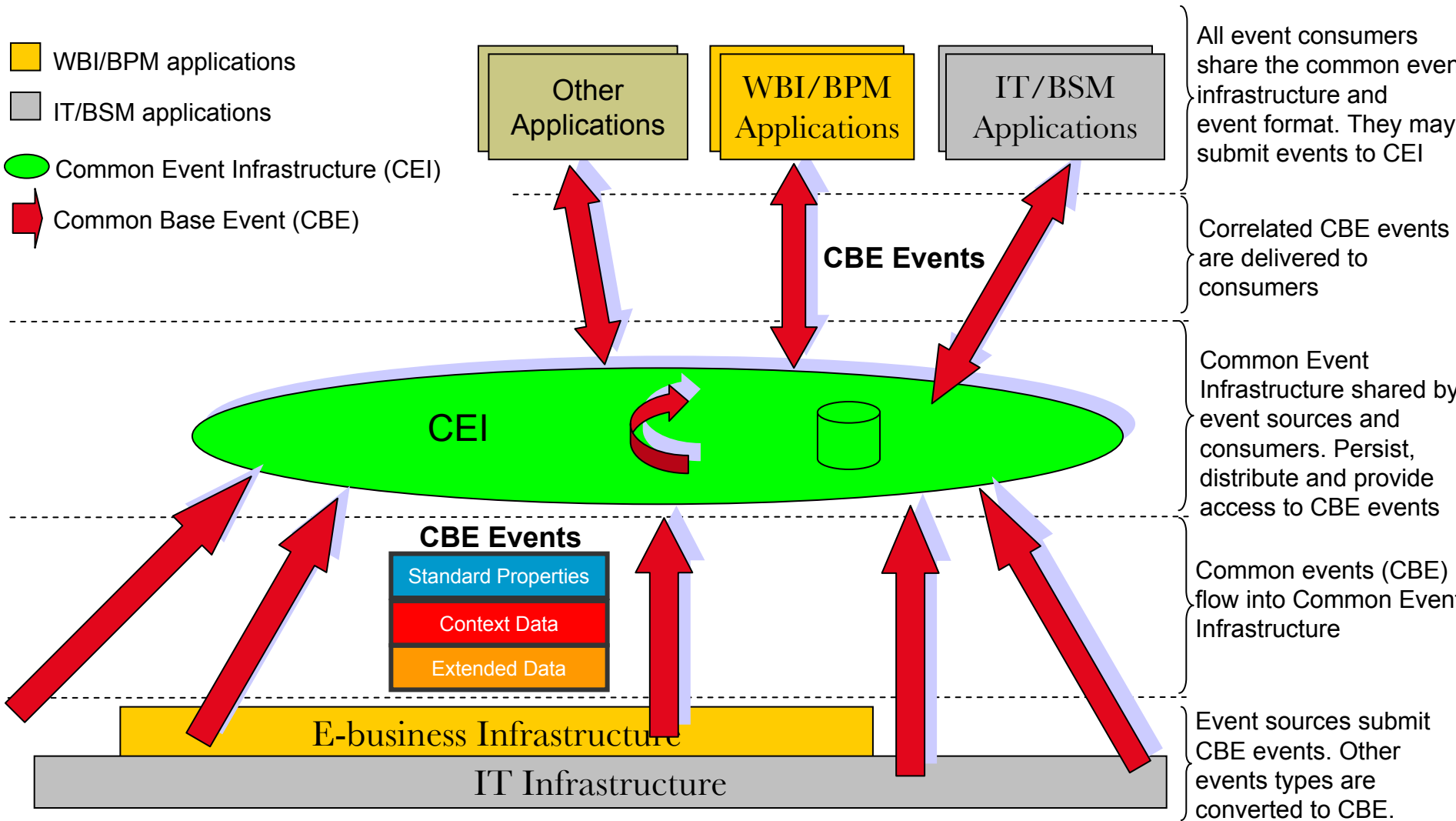
Common Event Infrastructure

WBI/BPM applications

IT/BSM applications

Common Event Infrastructure (CEI)

Common Base Event (CBE)



All event consumers share the common event infrastructure and event format. They may submit events to CEI

Correlated CBE events are delivered to consumers

Common Event Infrastructure shared by event sources and consumers. Persist, distribute and provide access to CBE events

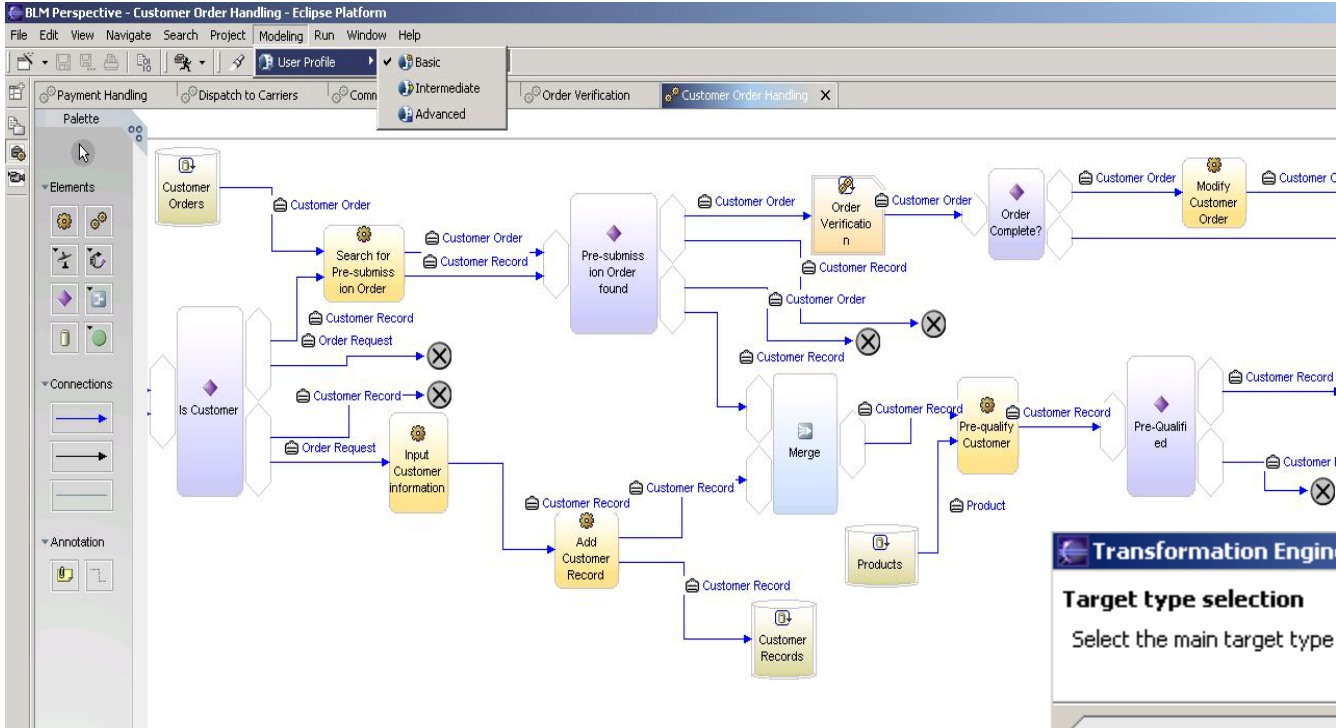
Common events (CBE) flow into Common Event Infrastructure

Event sources submit CBE events. Other events types are converted to CBE.

CEI SDK

- February 2004: PartnerWorld Launch of the CEI SDK Technology
White papers will be available explaining how CBE and CEI can be used to develop Business Process Management applications
- April 2004: CEI Tech Preview in WBISF 5.1
 - ▶ Cookbook explaining entire process of how to install CEI, create CBE events, send events to a central server, and query those events out of CEI.
 - ▶ More detailed CEI Programmer's Guide included as reference.
- August 2004: CEI Production Quality Code in WBISF 5.1.1

WebSphere Business Integration Modeler



Transformation Engine wizard

Target type selection
Select the main target type

Available target types

- WBI 5.1 (BPEL,WSDL,XSD)
- MQ Workflow
- UML Business Modeling Profile

WebSphere Business Integration Monitor

Supervise end-to-end business process execution

IBM WebSphere Business Integration Monitor

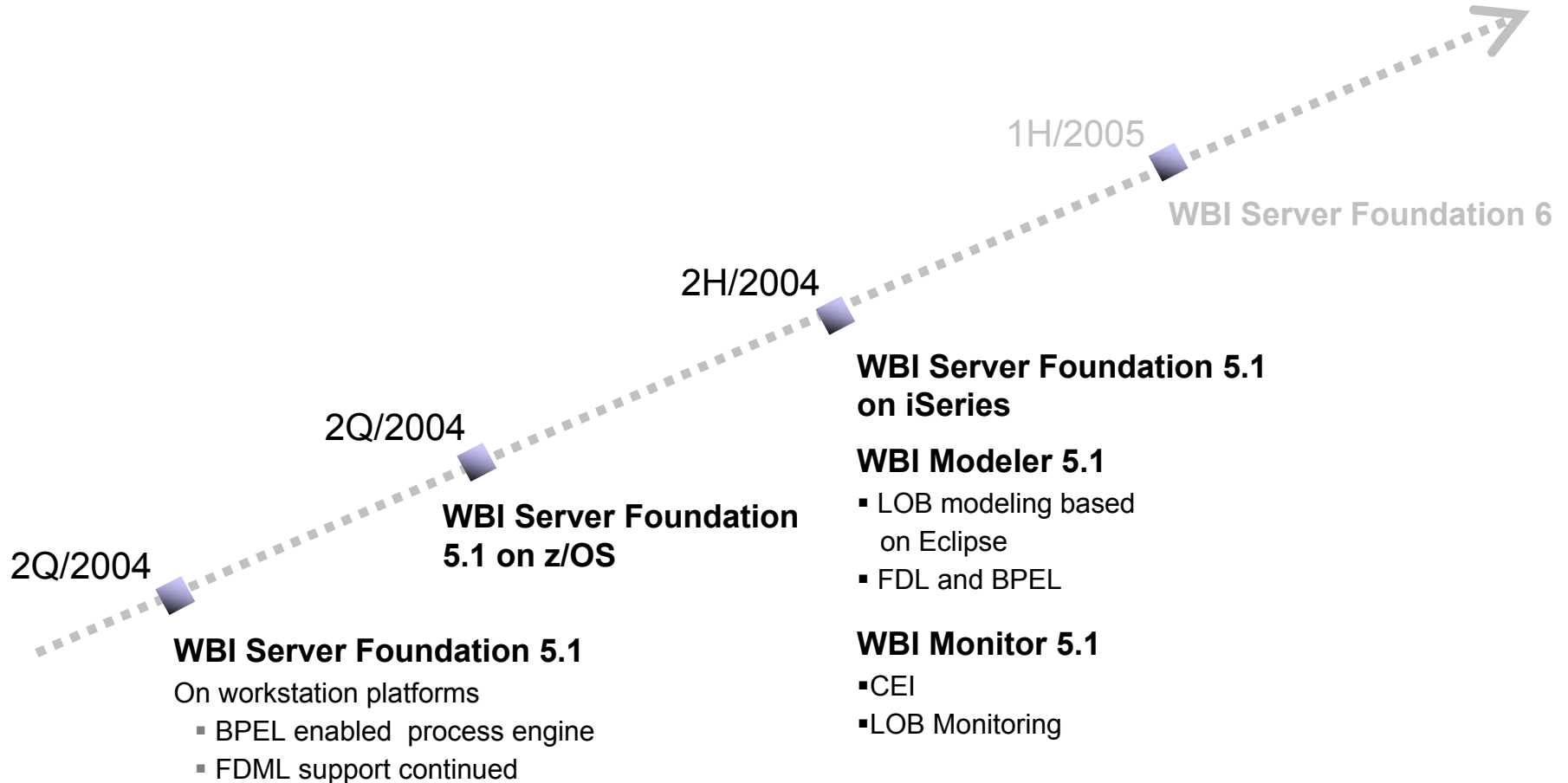
- Monitor and manage business process status and execution
- Track process in near real-time across value chain
- Display information on custom dashboards
- Alert the business to react to out-of-line conditions

Item	Activity Instance	Process Diagram	Status	Starting Time	Working Duration	Elapsed Duration	Cost	Is Delayed	PCycle_Time_After_Accept
1	⊕	⊕	Ready	Jan 18, 1970 9:40:28 AM	---	---	\$0	●	---
2	⊕	⊕	Running	Sep 5, 2003 11:28:05 PM	---	2 d, 30 m, 51 s	\$0	●	---
3	⊕	⊕	Ready	Jan 18, 1970 9:40:28 AM	---	---	\$0	●	---
4	⊕	⊕	Running	Sep 5, 2003 11:28:08 PM	---	2 d, 30 m, 48 s	\$0	●	---
5	⊕	⊕	Ready	Jan 18, 1970 9:40:28 AM	---	---	\$0	●	---
6	⊕	⊕	Ready	Jan 18, 1970 9:40:28 AM	---	---	\$0	●	---
7	⊕	⊕	Running	Sep 5, 2003 11:28:12 PM	---	2 d, 30 m, 44 s	\$0	●	---
8	⊕	⊕	Running	Sep 5, 2003 11:28:14 PM	---	2 d, 30 m, 42 s	\$0	●	---

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Technology Roadmap 2004





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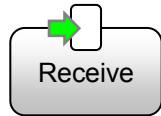
Backup



WebSphere Business Integration Server Foundation STEW

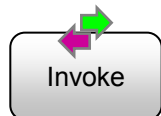
 **business on demand software**

Some BPEL Basic Activities



Receive

Do a blocking wait for a matching message to arrive



Invoke

Invoke a one-way or request-response operation on a portType offered by a partner



Reply

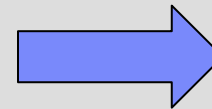
Send a message in reply to a message that was received through a Receive



Throw

Generate a fault from inside the business process

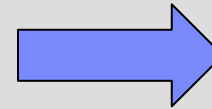
WPC 5.0 equivalents



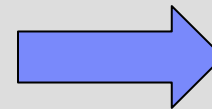
Event



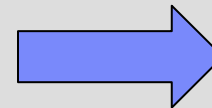
Process input



Sync Process Activity

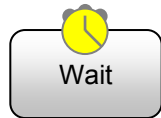


Process Output

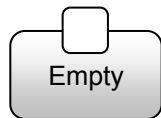


Fault Node

Some BPEL Basic Activities II



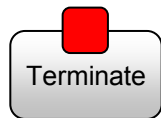
Wait for a given time period or until a certain time has passed



Insert a "no-op" operation into a business process

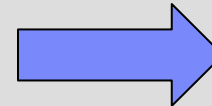


Update the values of variables or partner links with new data

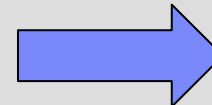


Immediately terminate the a business process instance

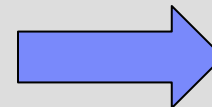
WPC 5.0 equivalents



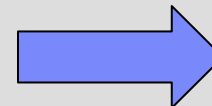
Modified Event



Empty Activity

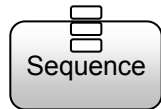


Transformer Service



Fault Node

BPEL Structured Activities



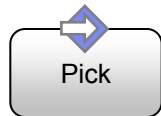
Sequence

Collection of activities to be performed sequentially



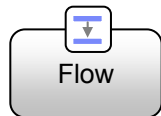
While

Indicate that an activity is to be repeated until a certain success criteria has been met



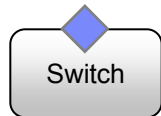
Pick

Block and wait for a suitable message to arrive or for a time-out alarm to go off



Flow

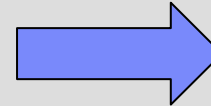
Specify one or more activities to be performed concurrently



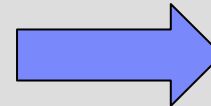
Switch

Select exactly one branch of activity from a set of choices

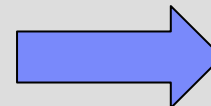
WPC 5.0 equivalents



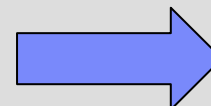
Block



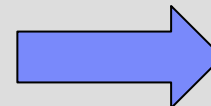
Loop



Event



Block



No comparable construct