



IBM Application Development Tools

Dr. Lee R. Nackman

Vice President

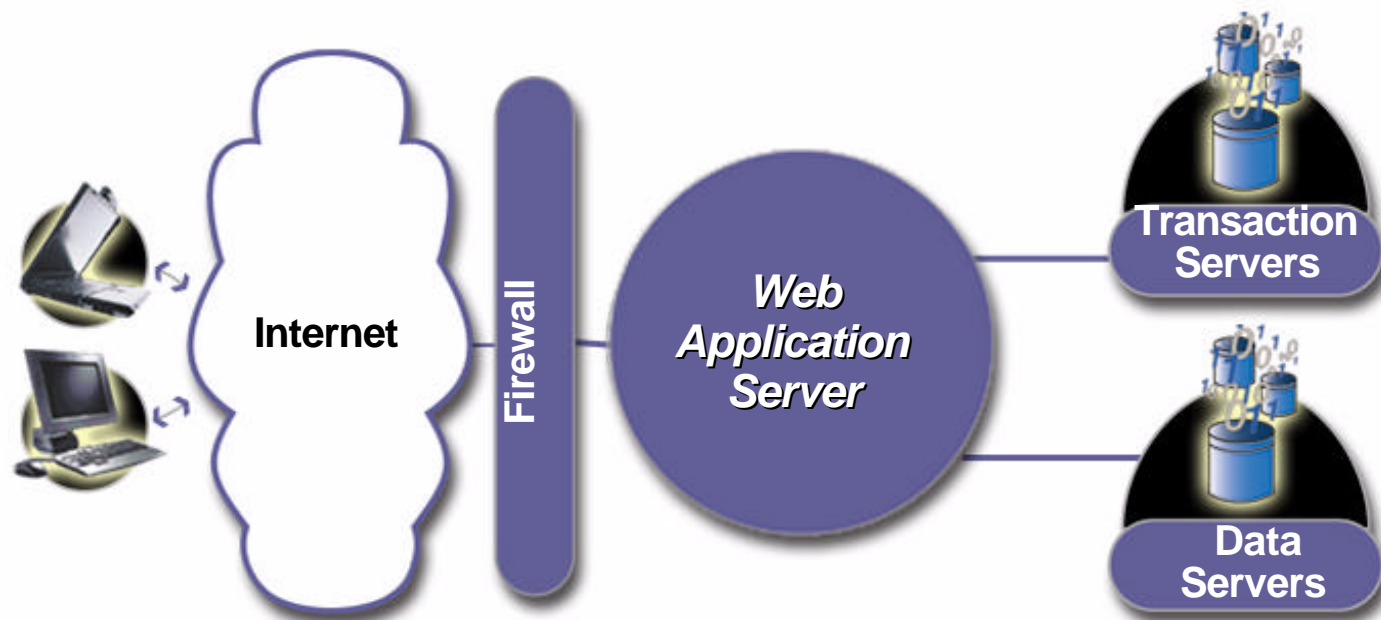
Application Development Tools

Application & Integration Middleware

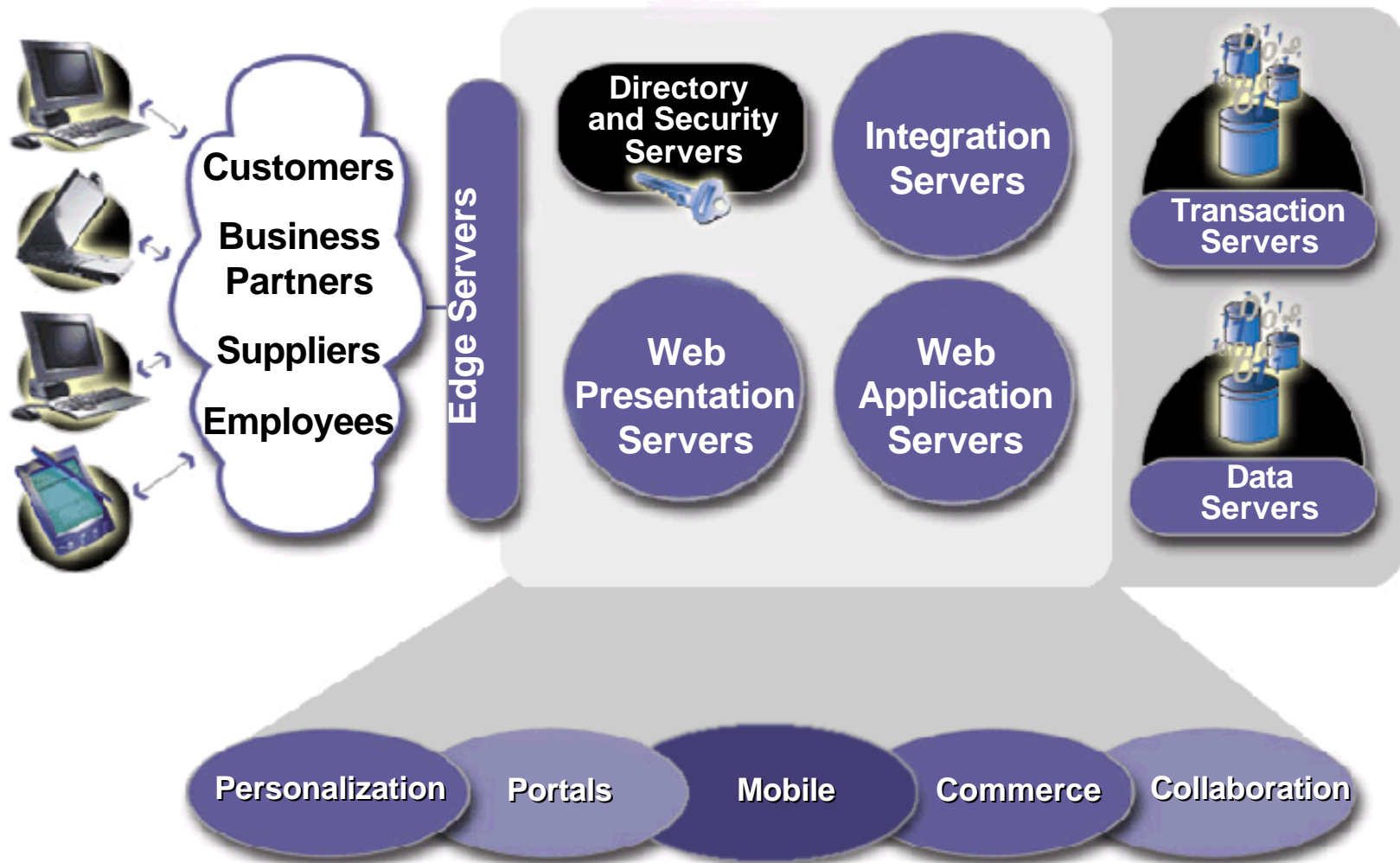
WebSphere software

| the fastest way to dynamic e-business | © Copyright IBM® Corporation 2001

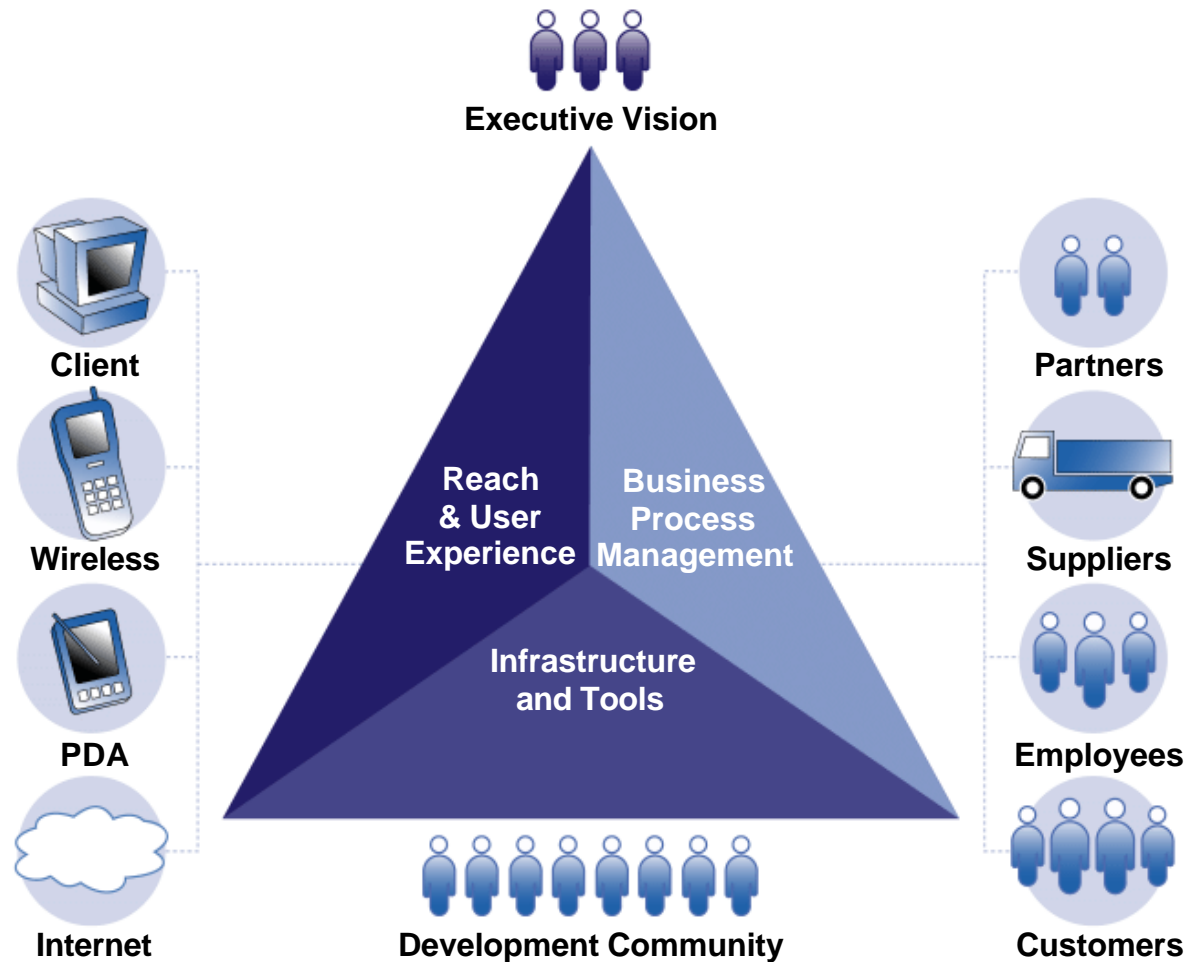
e-business Adoption - Technology Requirements changing from Web Application Server...



e-business Adoption - ... To full e-business Infrastructure

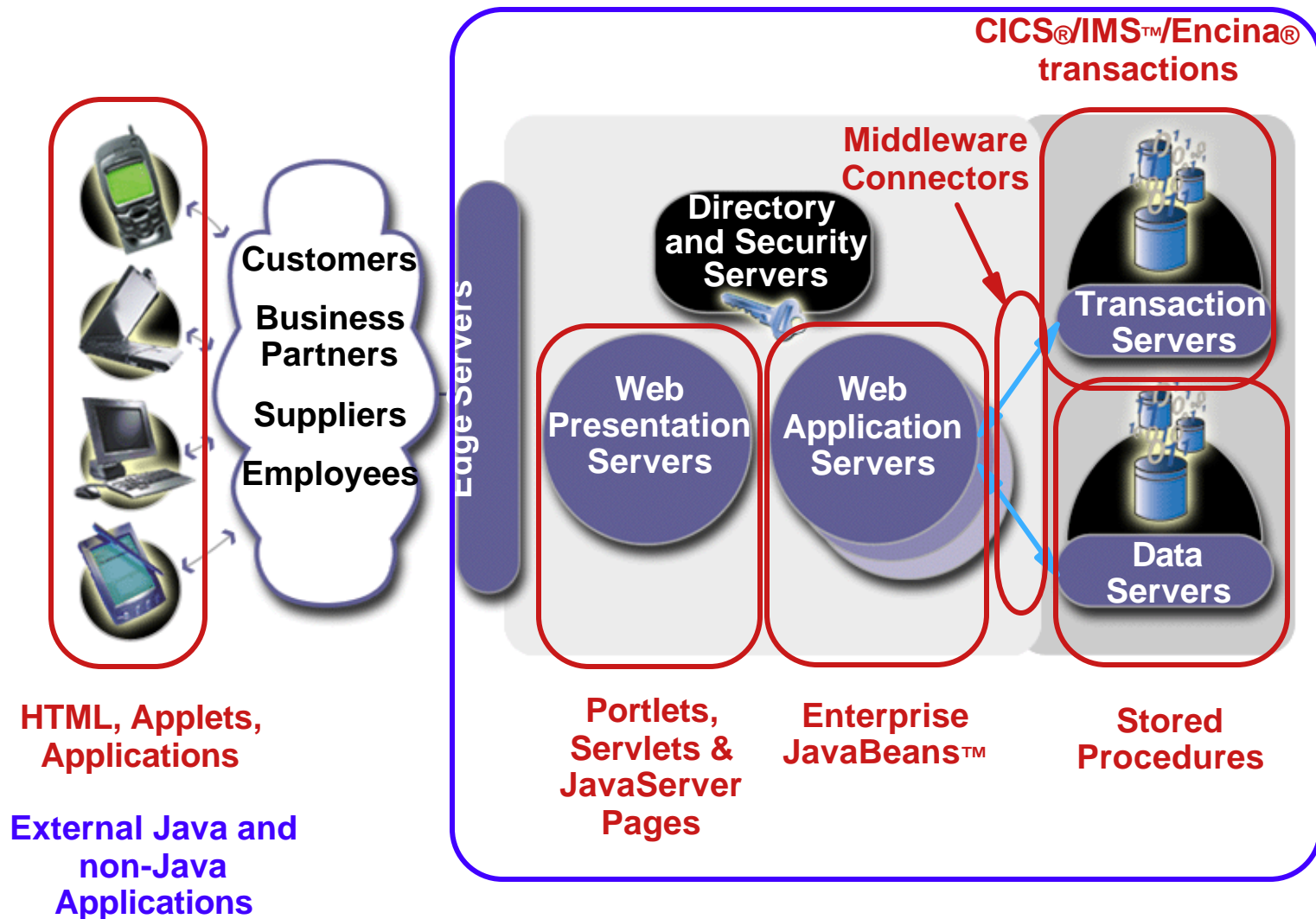


WebSphere® Software Platform



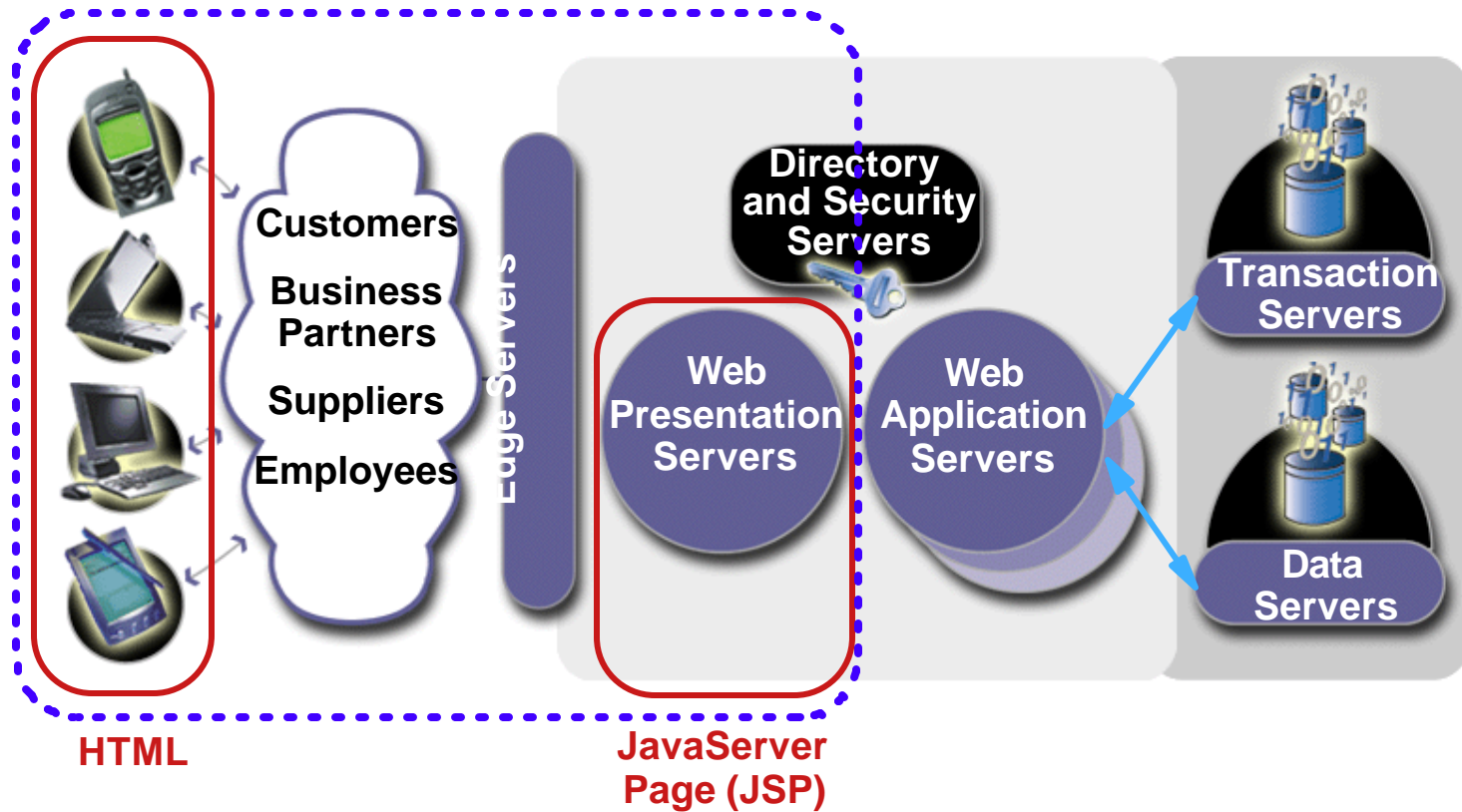
WebSphere Software Platform: The Tools

What do we develop?

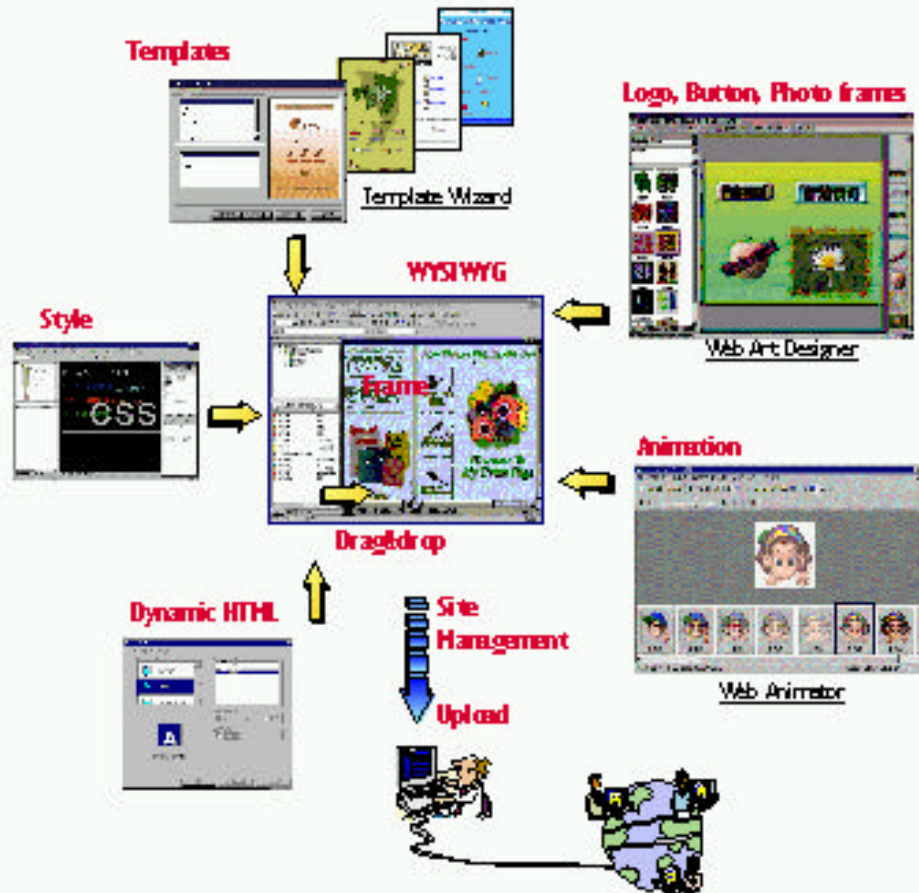


How do we develop?

Built by a page designer
in WebSphere Studio



WebSphere Studio



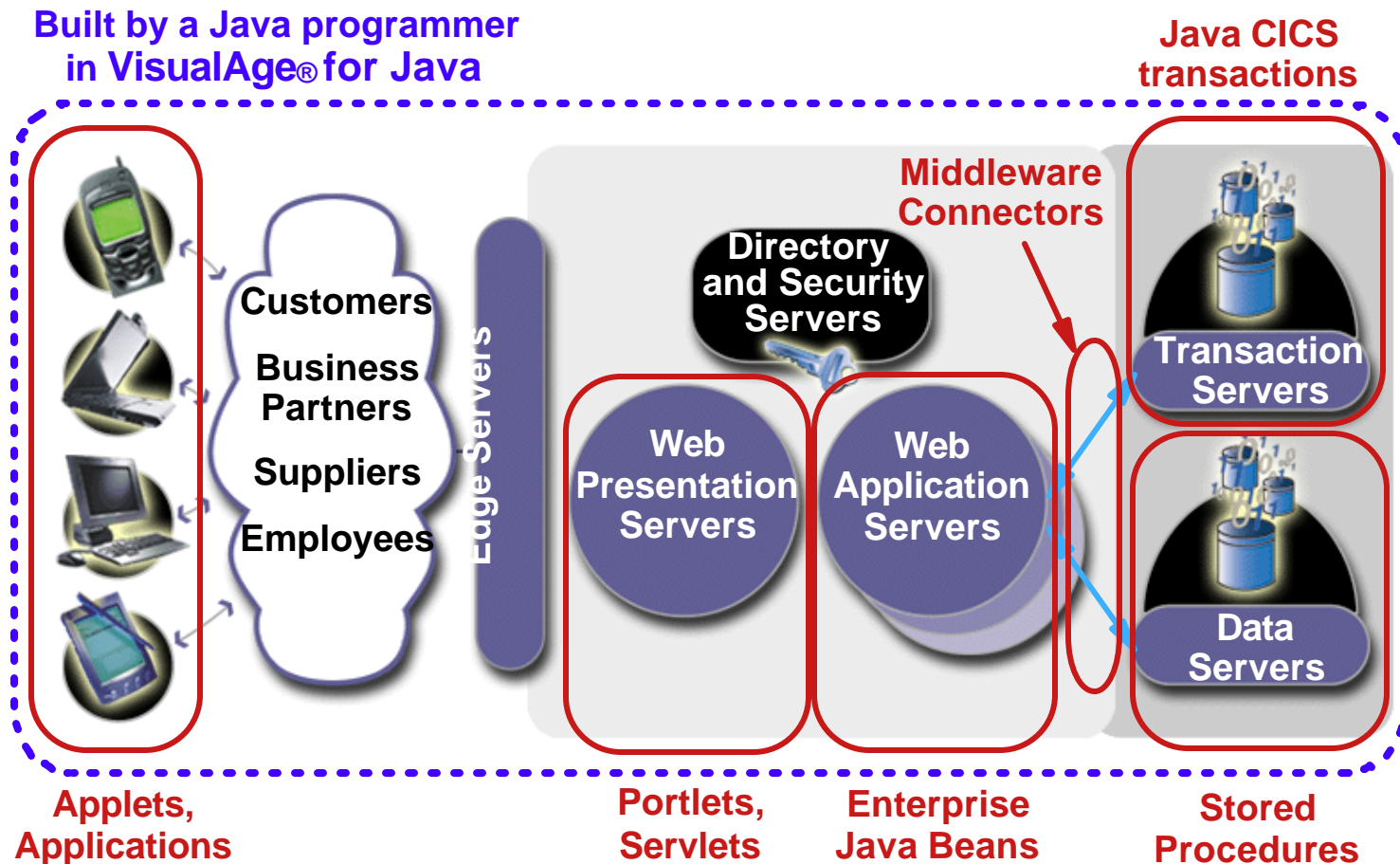
Tool set for creating dynamic web pages

- ▶ Homepage Builder
- ▶ Pervasive Devices support
- ▶ XML tools
- ▶ Personalization support
- ▶ Web page Analyst tool
- ▶ Team development environment
- ▶ Advanced publishing support

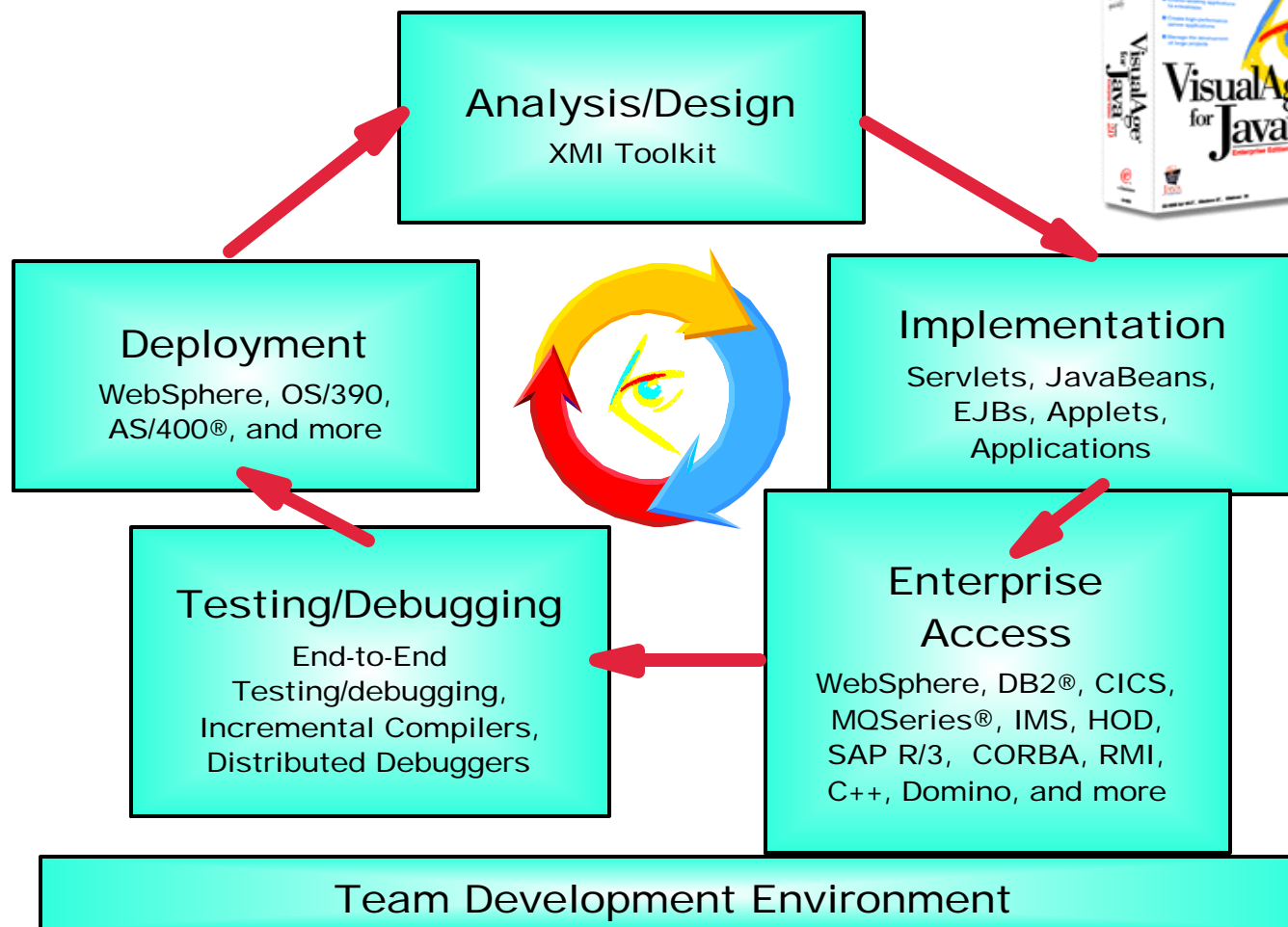
Complementary products

- ▶ IBM Hotmedia® multimedia effects
- ▶ IBM Perfect Photo® image manipulation
- ▶ Macromedia Flash, Fireworks, Freehand and Director (trial copies)

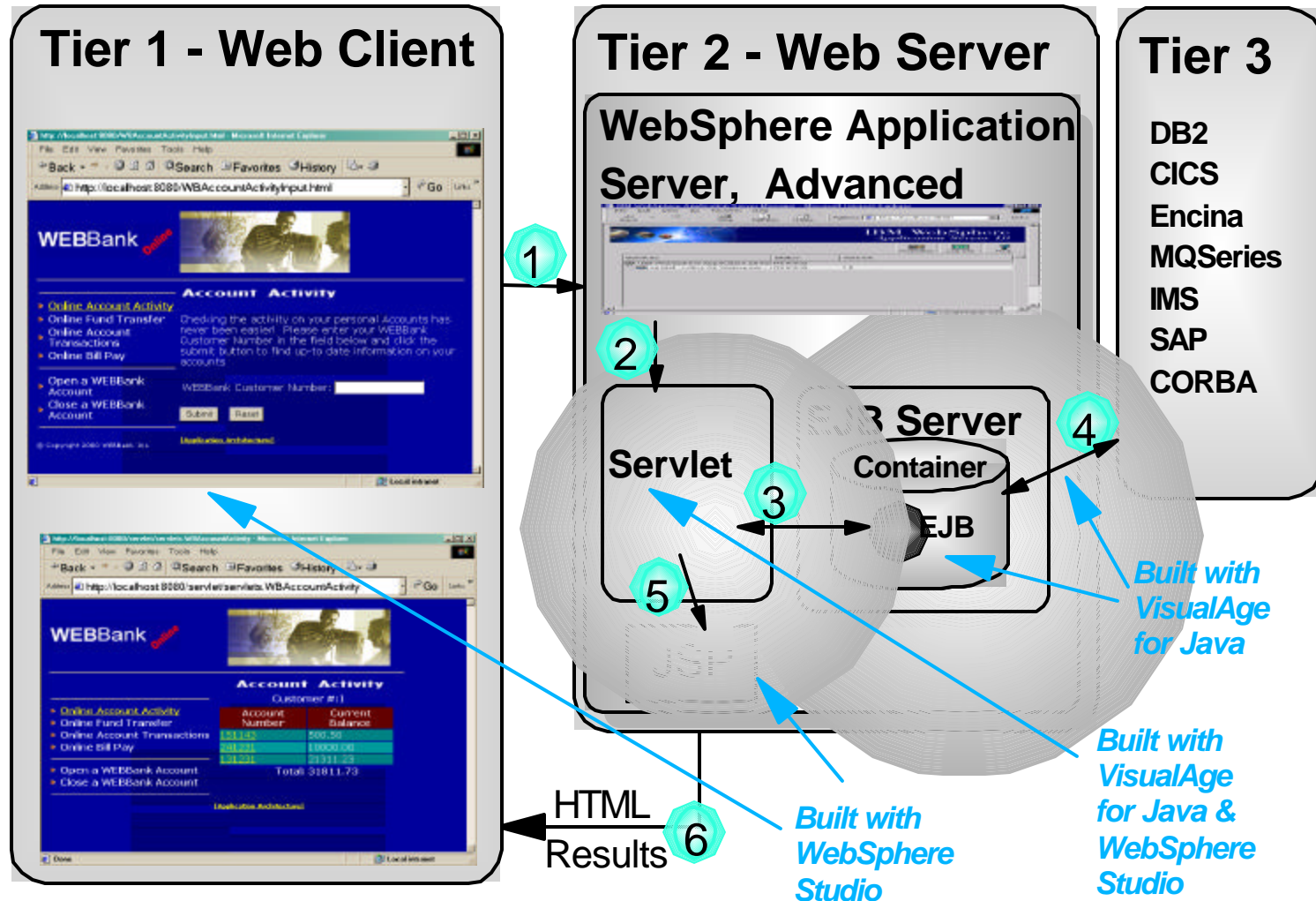
How do we develop them?



VisualAge for Java



WebSphere Application Development



Tight Runtime/Tool Integration

Scenario: Modify code in an EJB running in an Application Server

VisualAge/WebSphere

1. Start Debugger
2. Change Code
3. Incremental Compile
4. Continue application

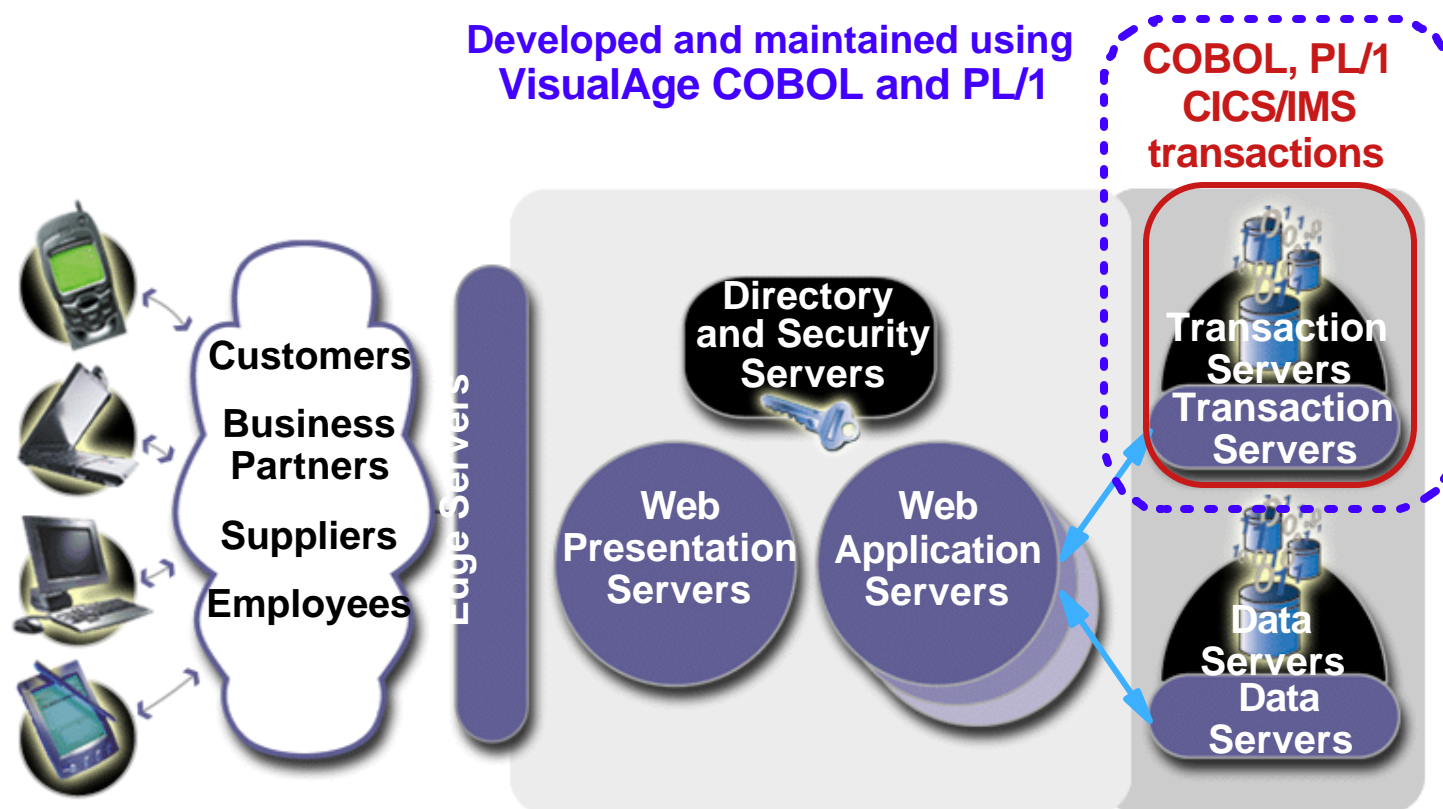
Other Tools/Runtimes

1. Start Debugger
2. Change Code
3. Stop Debugger
4. Regenerate EJB
5. Recompile EJB
6. Redeploy EJB
7. Restart application
(repeat debug steps)

VisualAge for Java 4.0 and WebSphere Studio 4.0 : J2EE and Web Services Development

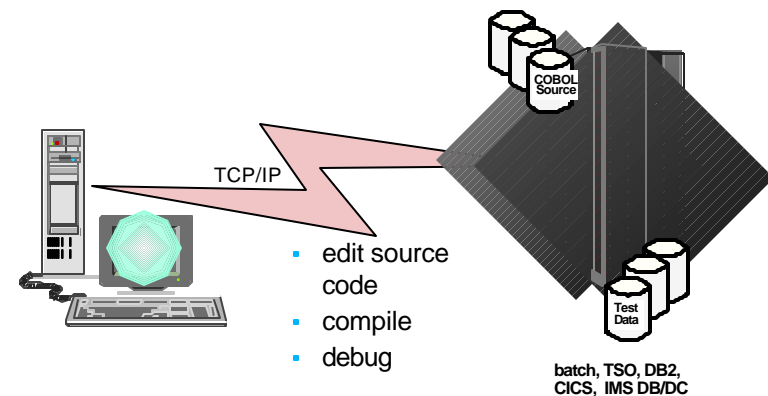
- **Industry's first Integrated AD environment for J2EE, XML, SOAP, WSDL, UDDI and other Web Services standards for dynamic e-business**
 - ▶ The first development environment (server + tools) that enables developers to build Web Services for deployment across multiple Java platforms
 - ▶ Supports open standards: XML, HTTP, UDDI, SOAP, WSDL, and J2EETM
 - ▶ Supports publishing/finding Web service descriptions in public/private UDDI registries
 - ▶ Generates Java code that implements the interface to a Web service (WSDL/SOAP)
 - ▶ Extends existing applications easily and turns them into web services enabled e-business applications (legacy asset analysis and leverage)
 - ▶ Supports Visual Workflow Composition of Web Services
 - ▶ Sample code, design patterns and education and training

How to create new transactions?

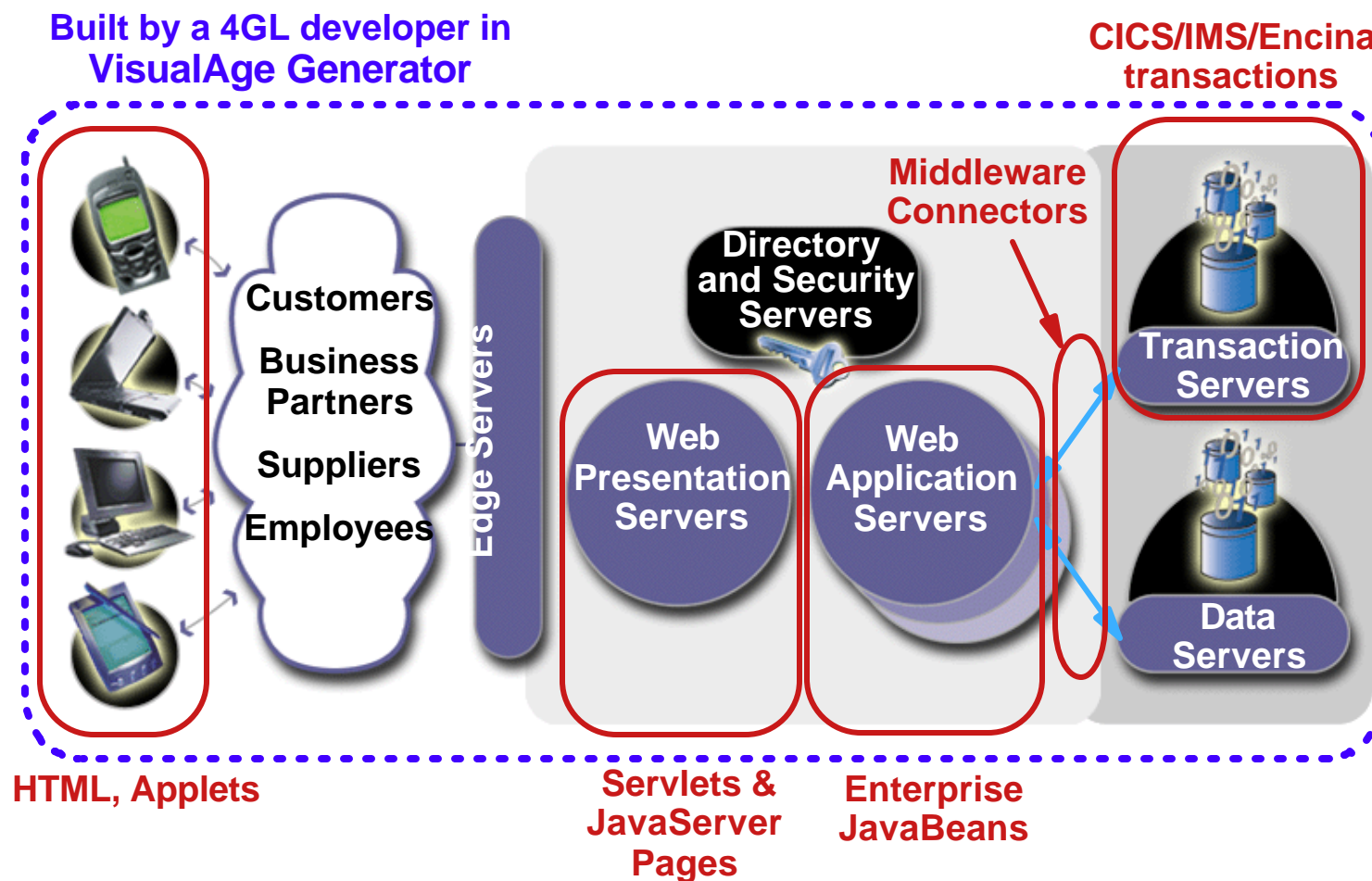


VisualAge for COBOL

- **IBM COBOL Compiler**
 - Based on COBOL for OS/390 & VM
 - ANSI 85 COBOL + OO
 - Consistent with OS/390, MVS™, VM, VSE, AIX®, Windows®
- **Language Sensitive Editor**
 - Context sensitive help
 - Navigator
 - Multiple source view
 - Data Assistant
- **Interactive Debug Tool**
 - Source-level debugging
- **Euro currency support**
- **Visual Builder**
 - VisualAge family Visual Builder
 - COBOL code generator
- **BMS Map Editor**
 - Visually create/modify CICS 3270 screens
 - Read/Write BMS maps
- **Data Access**
 - VSAM (Indexed file support): workstation and host
 - DB2, BTrieve
 - Record-Oriented local file access
- **Language Environment Date/Time Callable Services**
 - Additional 4-digit year support
- **Performance Analyzer**
 - Provides COBOL paragraph support
 - Visual optimization and tuning of complex applications
- **Middleware Support**
 - VisualAge CICS Enterprise AD
 - TXSeries
 - MQSeries
 - DB2 Co-Processor
- **Remote Development**
 - Remote edit/compile/debug



How do we develop them?

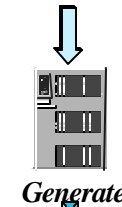


VisualAge Generator

End-to-end development

RAD Development

- High level abstraction specification
- Target platform neutral
- Shield complexity of target system
- Interactive test of logical specification
- Strong Team support
- Java not required

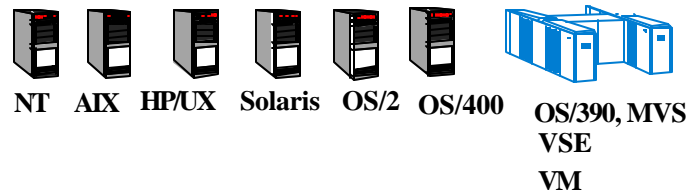


Generation

- Transform logical specification into optimized source for the selected target
- C++, Java, or COBOL for server
- GUI, Java/JSP, TUI client



Execute



Execution

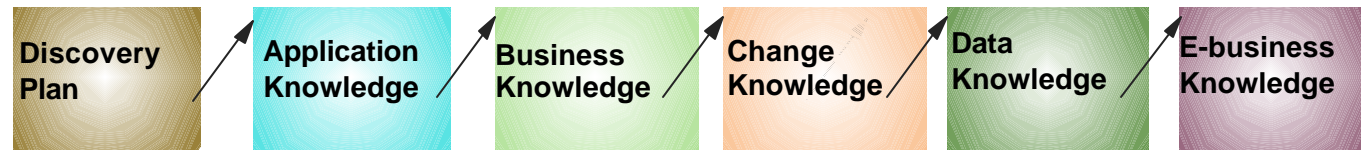
- Exploit Transactional Systems
- Multiple execution Platforms
- Middleware transparency

The diagram illustrates a software development lifecycle with the following components and flow:

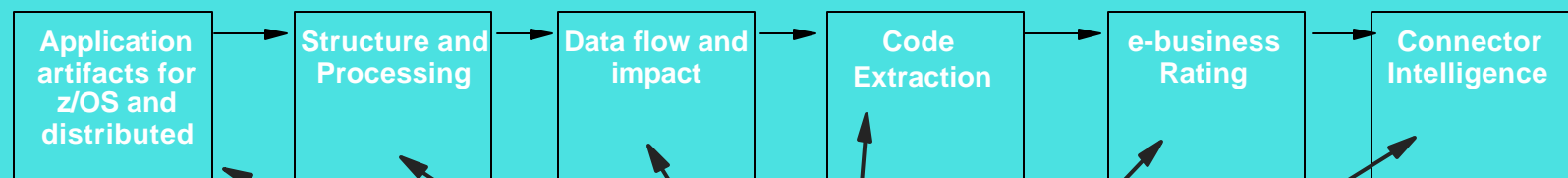
- Process Flow (Yellow Oval Nodes):**
 - Business request
 - Estimate effort/cost
 - Understand App.
 - Analyze Impact
 - Generate
 - Code
 - Build
 - Debug
 - Test
 - Promote
 - Deployment
- Tools and Frameworks (Colored Rectangles):**
 - WebSphere Studio Asset Analyzer** (Light Blue): Connected to the 'Business request' and 'Estimate effort/cost' steps.
 - Fault Analyzer for OS/390** and **File Manager for OS/390** (Light Green): Connected to the 'Test' and 'Promote' steps.
 - VisualAge Enterprise Suite Ver 2.0** (Yellow): Connected to the 'Generate', 'Code', 'Build', and 'Debug' steps.
 - Deploy** (Green): Connected to the 'Deployment' step.
- Phases (Colored Rectangles):**
 - Discovery** (Blue): Connected to the 'Business request' step.
 - Develop** (Pink): Connected to the 'Deployment' step.

WebSphere Studio Asset Analyzer for Application Understanding to Extract Business Rules

Process:



Tooling



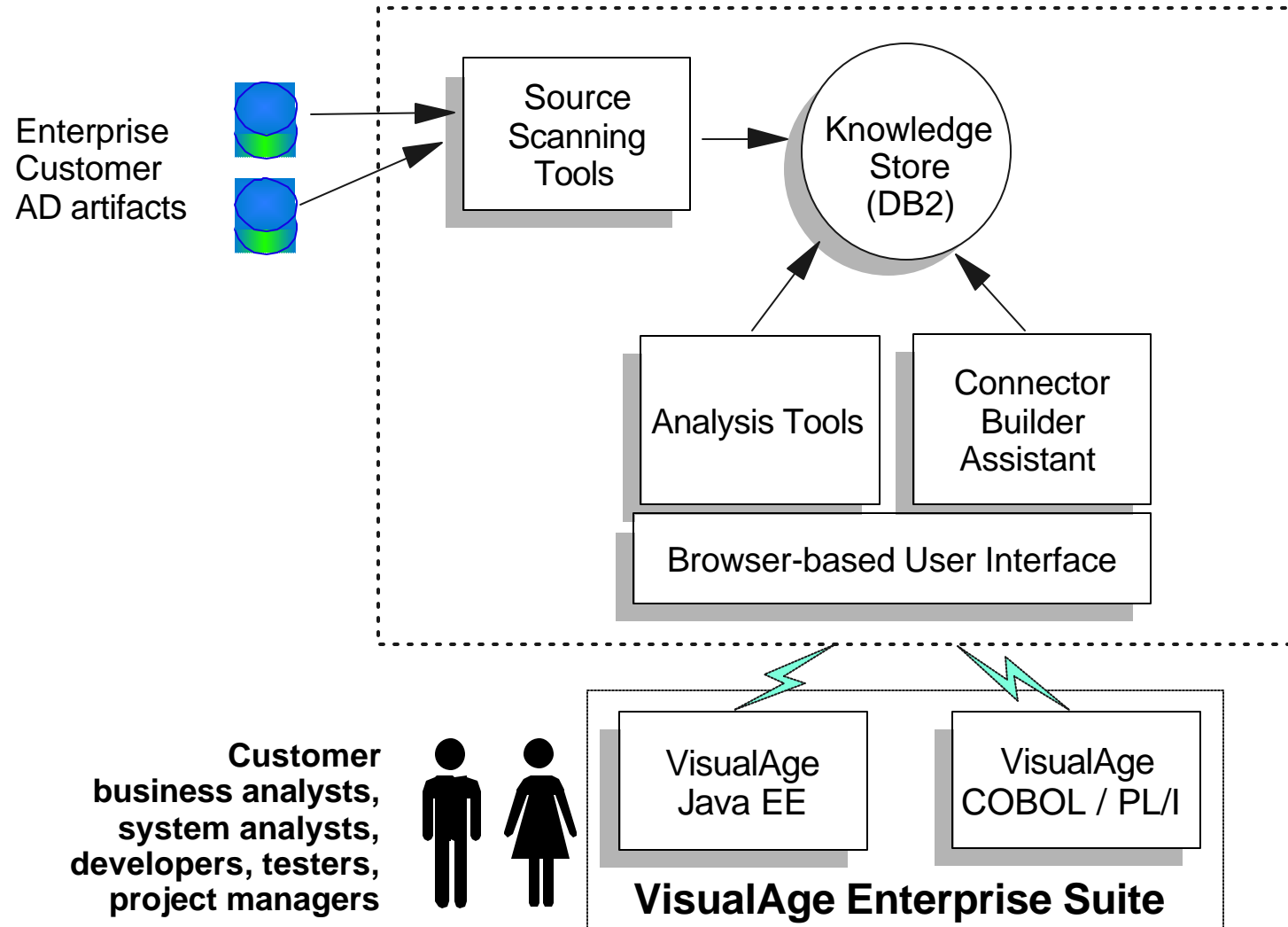
■ VALUE

- ▶ Analyze, isolate, and reuse existing business logic for the Web
- ▶ Reduce or eliminate labor intensive efforts to create connectors
- ▶ Use existing skills

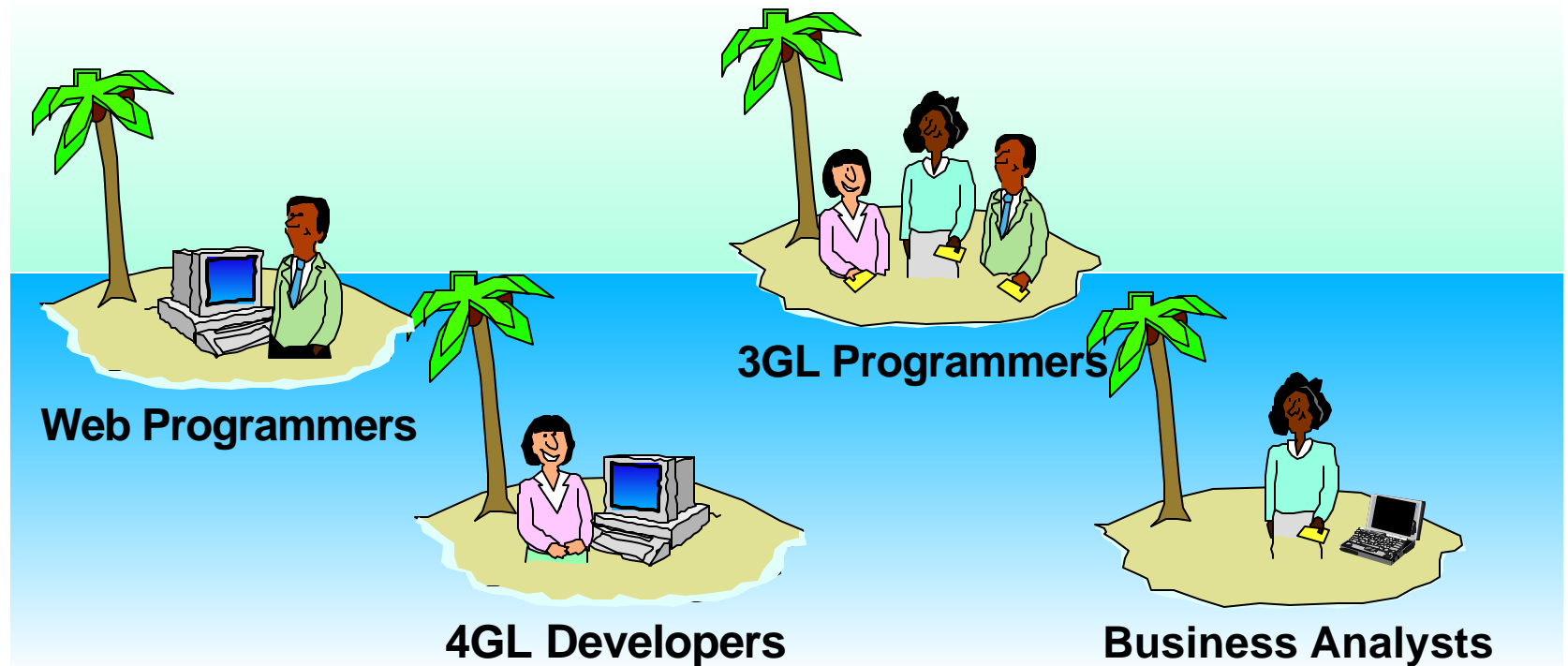


**Browser-based
Visualization
Tool**

WebSphere Studio Asset Analyzer

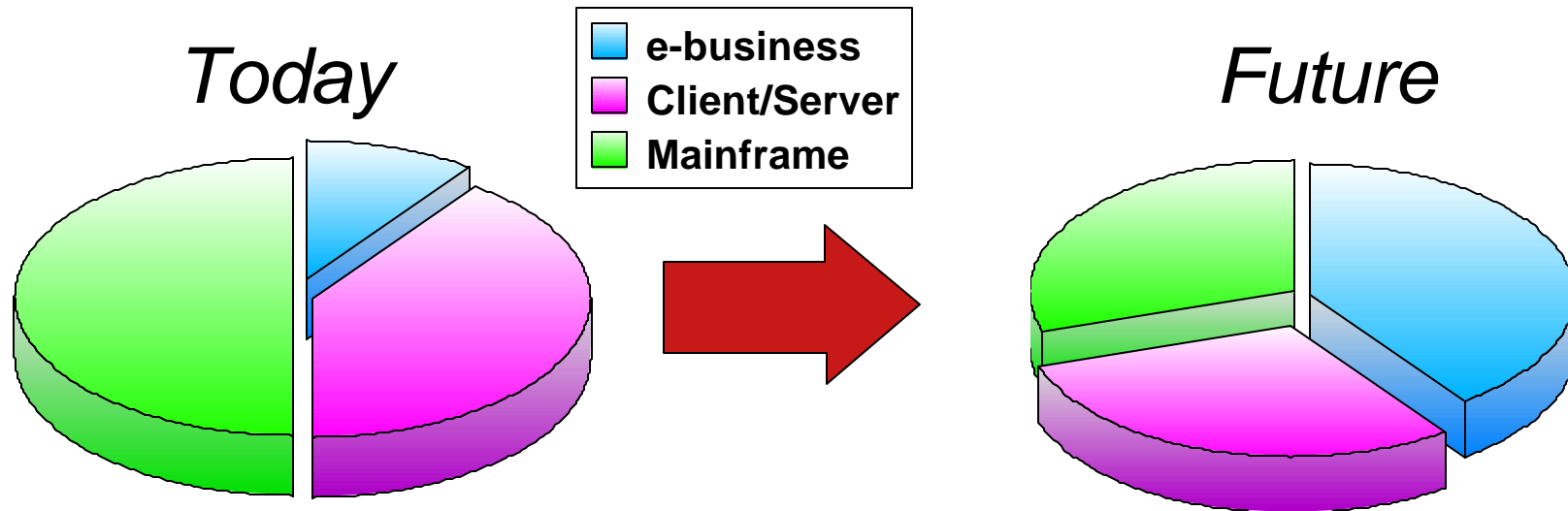


A Common Scenario: AD Islands



- **Each island is likely to have it's own ...**
 - ▶ development processes
 - ▶ configuration management
 - ▶ testing procedures

Typical Developer Skill Base



- **Rapidly changing market needs mean that you must plan with flexibility in mind**
 - ▶ minimize retraining costs
 - ▶ manage maintenance and migration issues
 - ▶ maximize retention of key resources
 - ▶ maximize productivity benefits
 - ▶ minimize the risk of obsolescence

What is VisualAge Enterprise Suite?

- A suite of application development software products packaged together to meet the needs of both e-business application developers and traditional developers, as well as to simplify the tasks of software ordering and licensing administration

VisualAge Enterprise Suite Ver 3 consists of:

- ◆ Versata Studio Client V5.1*
- ◆ VisualAge COBOL Ver 3.0
- ◆ VisualAge Generator Developer Ver 4.5
- ◆ VisualAge for Java Ver 4.0 Enterprise Edition
- ◆ VisualAge PL/I Ver 2.1
- ◆ WebSphere Studio Professional Edition Ver 4.0

* Versata Studio Client is an IBM Business Partner product



Value Proposition

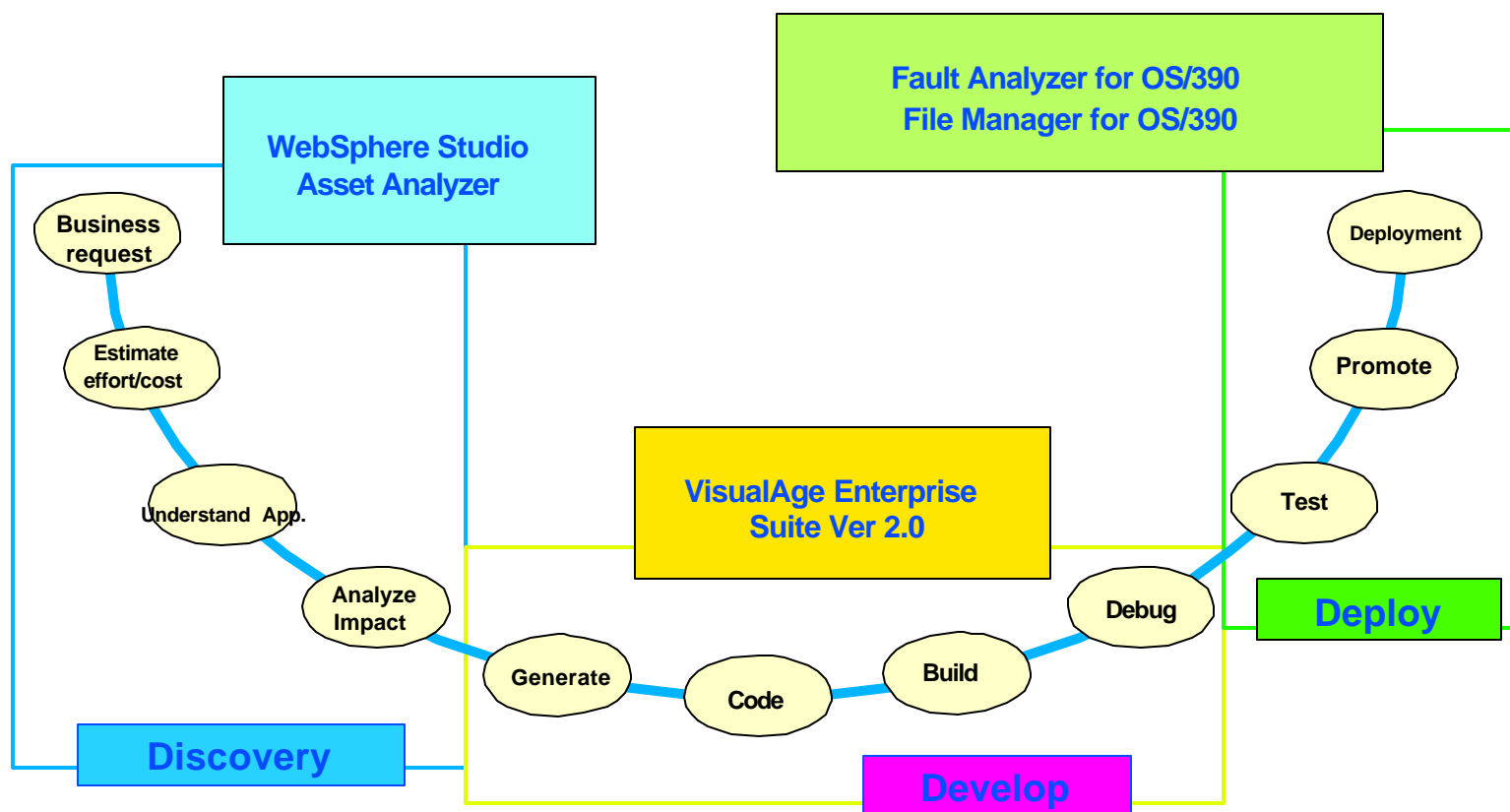
■ Value to I/T:

- ▶ Complete, end-to-end Application Development tool set for a per seat price
- ▶ Increased productivity for every developer in the organization
- ▶ Complete flexibility of deploying the right tools for the right person in each project
- ▶ Reduce the risk of tools and skills obsolescence
- ▶ Reduce skills islands

■ Commercial/Financial Value:

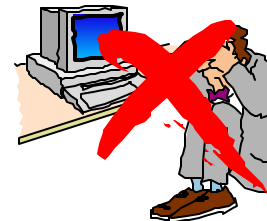
- ▶ Reduce administration costs involved in tracking licenses of deployed AD products
- ▶ Excellent pricing value
- ▶ Optimize I/T expenditures; no more shelfware

Enterprise AD Offerings



IBM Fault Analyzer for OS/390

*Oh no, application failures!
me?!?*



Why

Don't let application failures take you down ...

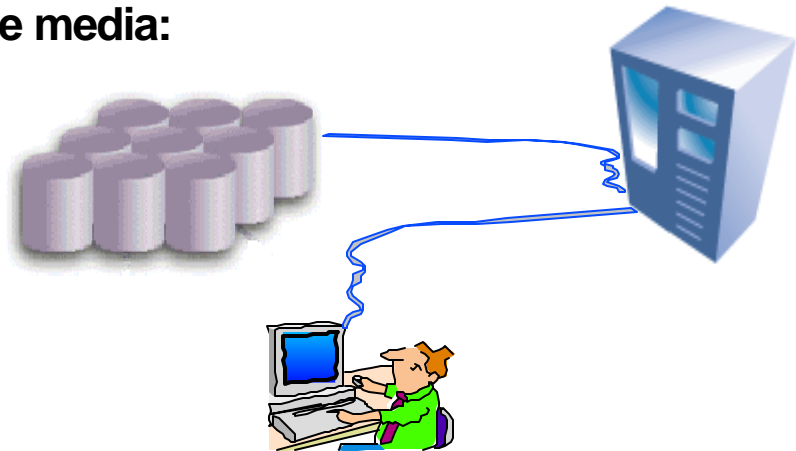
■ IBM Fault Analyzer for OS/390

- ▶ analyzes the cause of an abend at the application level
- ▶ gathers information about an application and its environment at the time of an abend
- ▶ translates low-level “dump” information into application-level information
- ▶ expands abend code and message descriptions
- ▶ works in a range of OS/390 application environments
- ▶ does not need recompile of applications or change of JCL
- ▶ has no performance overhead!



IBM File Manager for OS/390

- Integrated suite of functions to help OS/390 application developers work with data across a wide range of formats and storage media:
 - ▶ browse
 - ▶ find
 - ▶ edit
 - ▶ create
 - ▶ copy
 - ▶ print
 - ▶ erase data
- Ideal for creating and working with application test data, or locating problems in application data files
- Functions can be accessed via interactive panels, or called in REXX procedures and batch jobs



COBOL / Java Interoperability

- **Integrate existing assets with WebSphere**
 - EJB use of COBOL and PL/I applications
 - exploit new Java from COBOL and PL/I applications
- **IBM approach to solve the problem:**
 - ▶ multi-threading capability
 - ▶ ASCII support
 - ▶ IEEE floating point
 - ▶ Java to COBOL and PL/I
 - ▶ EJB use of COBOL and PL/I
- **Coming soon to COBOL and PL/I**

COBOL XML Support

■ Customer Problem:

- ▶ Exploit XML for flexibility and ease of generation
 - to enable Web Services
 - to interconnect mainframe applications
- ▶ Use XML directly from COBOL and PL/I applications

■ IBM approach:

- ▶ Provide a high-speed XML parser and generator
- ▶ That work in all runtimes, including WebSphere, MQSeries, CICS and IMS
- ▶ Integrated into COBOL and PL/I

■ Coming to COBOL and PL/I 4Q2001

VisualAge Pacbase Evolution

■ VisualAge Pacbase characteristics

- ▶ Case Approach
- ▶ Enterprise Repository
- ▶ Standards support

■ VisualAge Pacbase helps you Web enable your back-end applications

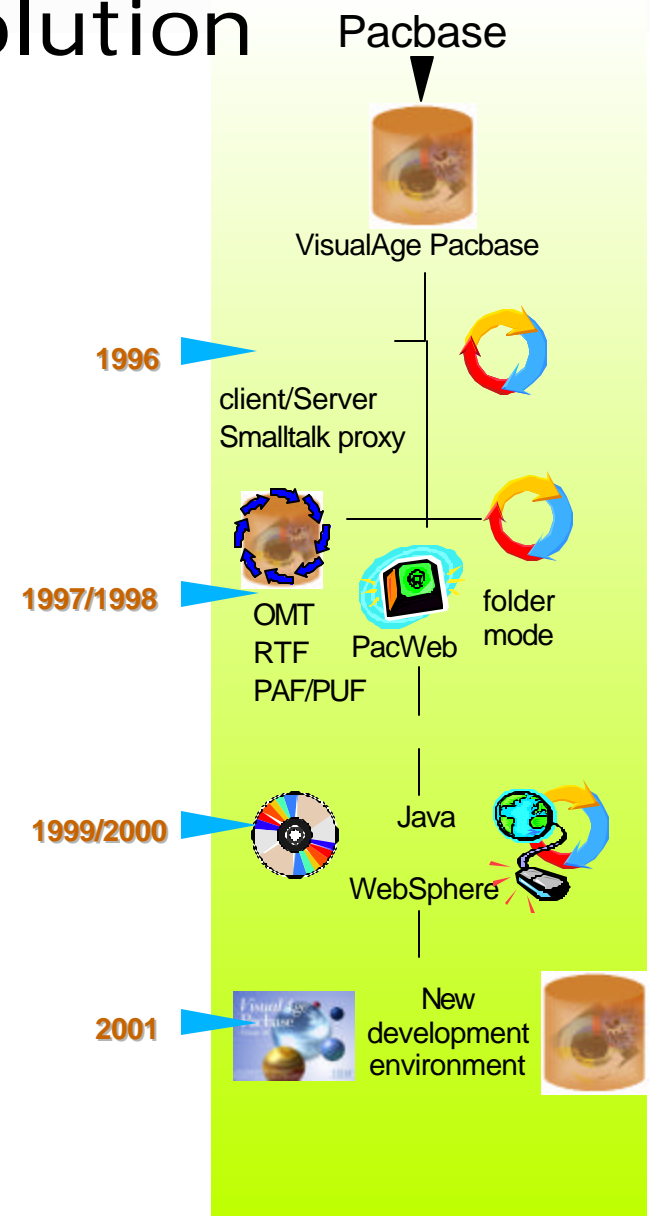
- ▶ Java proxy generation
- ▶ WebSphere Support

■ VisualAge Pacbase V 3.0

- ▶ Produce application better and faster
- ▶ Provide homogeneous environment
- ▶ Protect & reuse existing assets

■ VisualAge Pacbase V 3.x

- ▶ XML and WebServices Support



WebSphere Software Platform: Next Generation AD Tools

New Tools Family

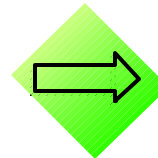
Announced November 5th

Solutions that unlock the full power of open e-business platforms through unprecedented gains in developer productivity and quality

Tools + Infrastructure + Open Technology + Community

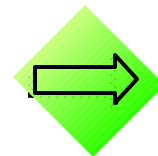
Business Problem

Productivity & quality limitations due the inability to integrate best-of-breed tools & infrastructure in a single, seamless environment



Technology Problem

Lack of an open application development integration platform similar in nature to what is available for servers
(e.g., Apache / J2EE / Linux)

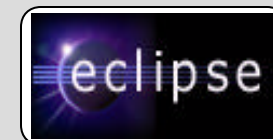


A newly integrated, open

WebSphere Studio Family

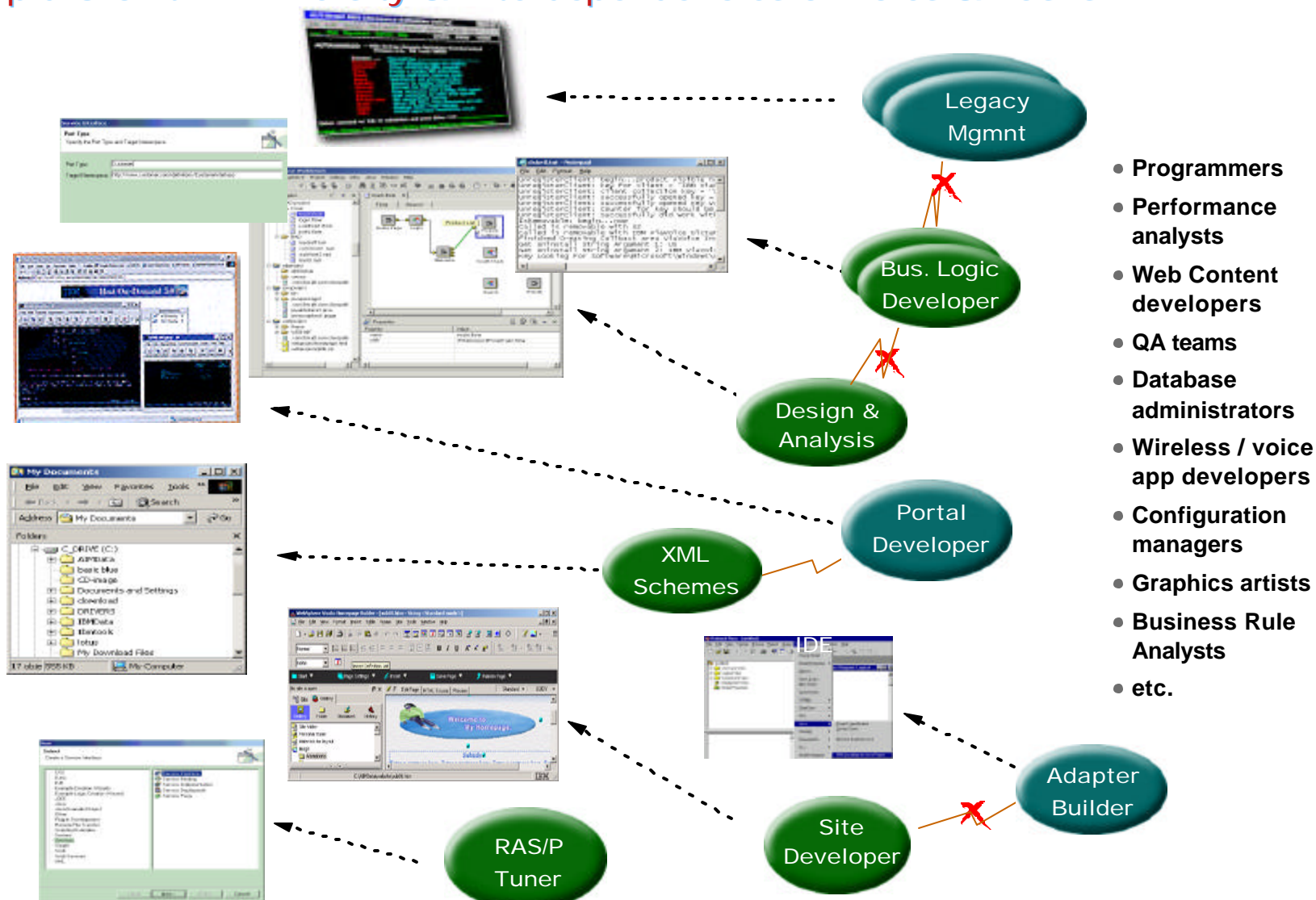


An open tool platform contributed by IBM to an Independent open source organization



Proliferation of Poorly Integrated Development Tools

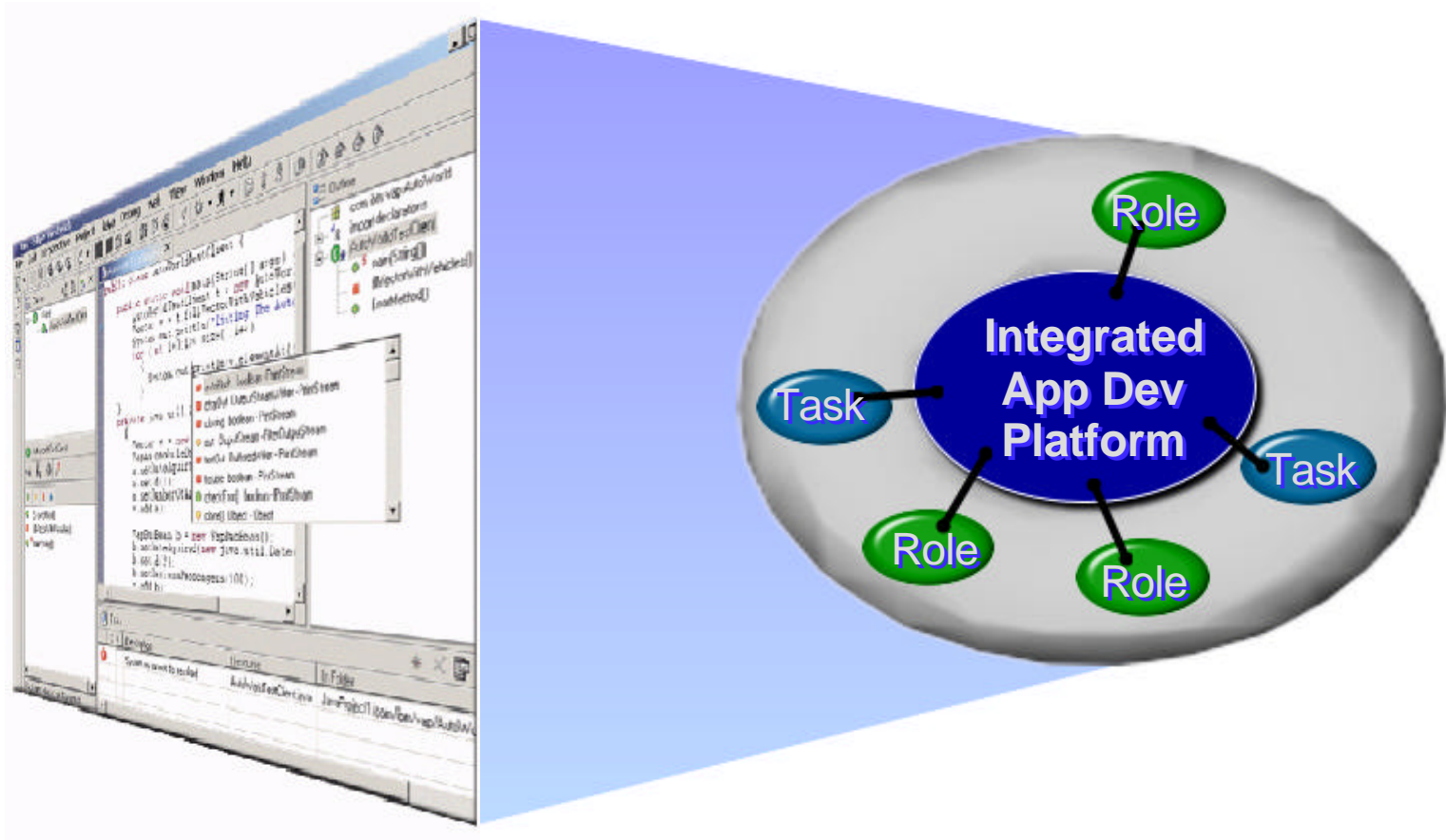
Rapid Growth in Diversity & Interdependencies of Roles & Tasks



- Programmers
- Performance analysts
- Web Content developers
- QA teams
- Database administrators
- Wireless / voice app developers
- Configuration managers
- Graphics artists
- Business Rule Analysts
- etc.

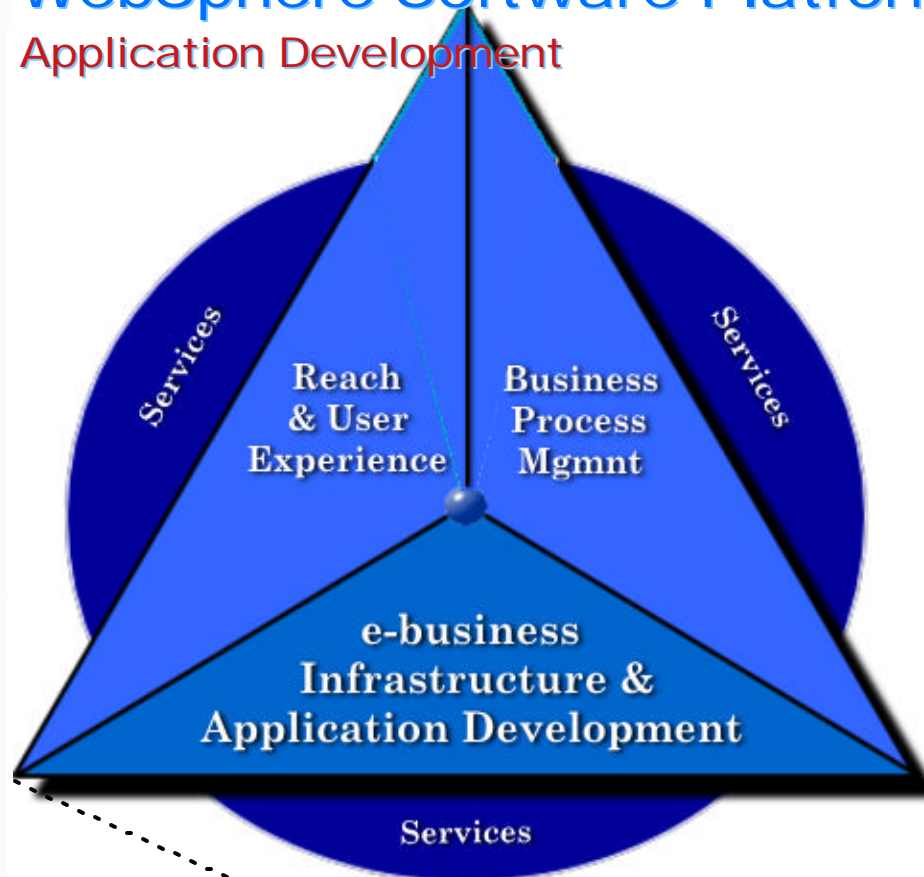
A "Portal-like" Approach for e-business Development

An integrated experience unlocks greater productivity by bringing order, collaboration and integration to rapidly expanding e-business development processes



WebSphere Software Platform

Application Development



Help customers
deliver, grow &
differentiate their
e-business to sustain
competitive
advantage

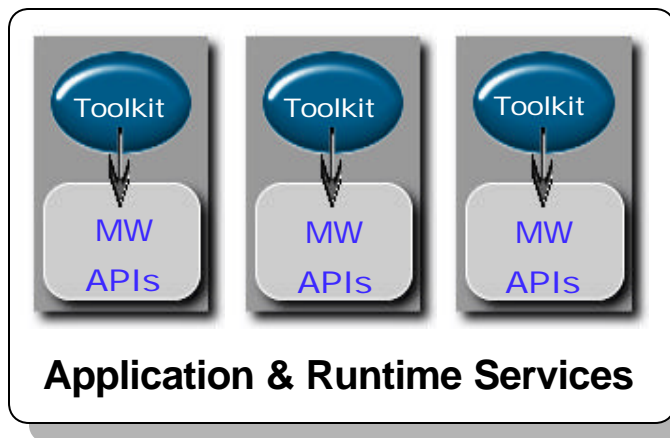
Tools + Infrastructure +

Open Technology + Community

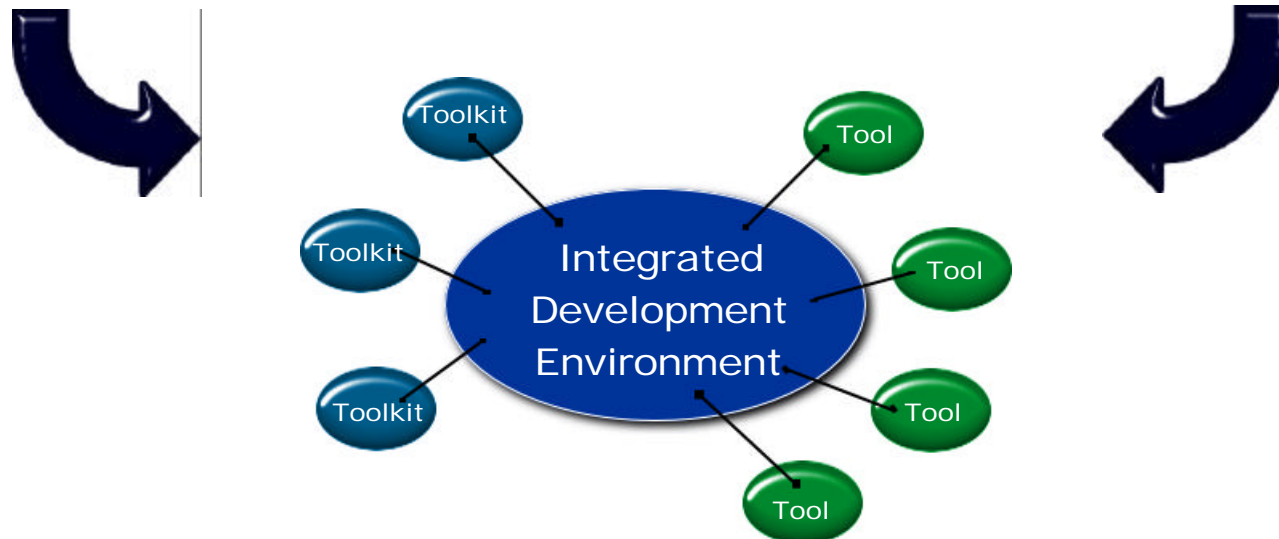
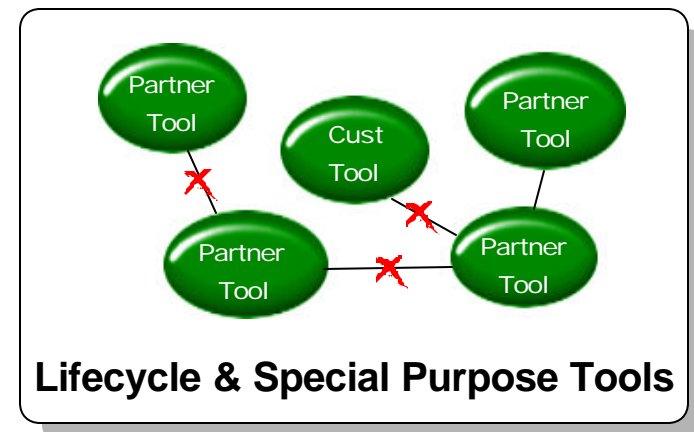
Higher Quality Applications
in a Fraction
of the Time

A Comprehensive, Integrated AD Environment Leveraging the Power of Open Integration Technology

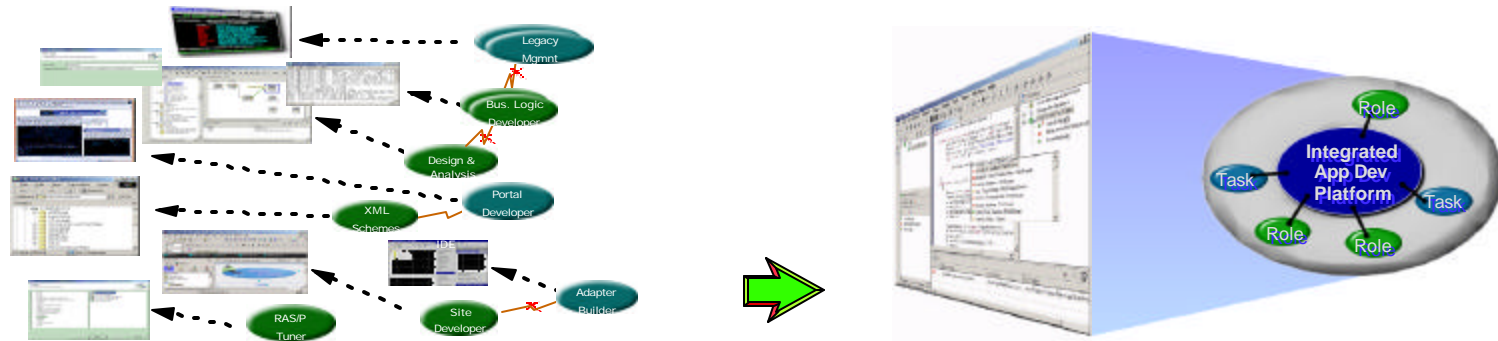
**What type of application needs
to be built?**



**What are the developer roles
and processes involved?**



Keys to Significant Productivity Gains



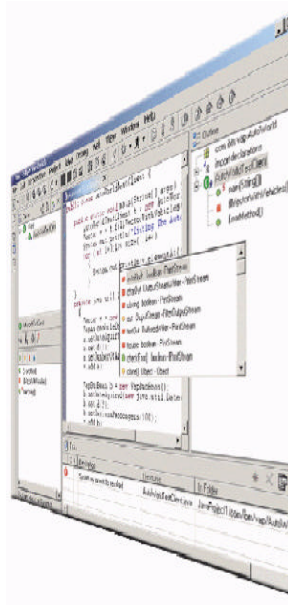
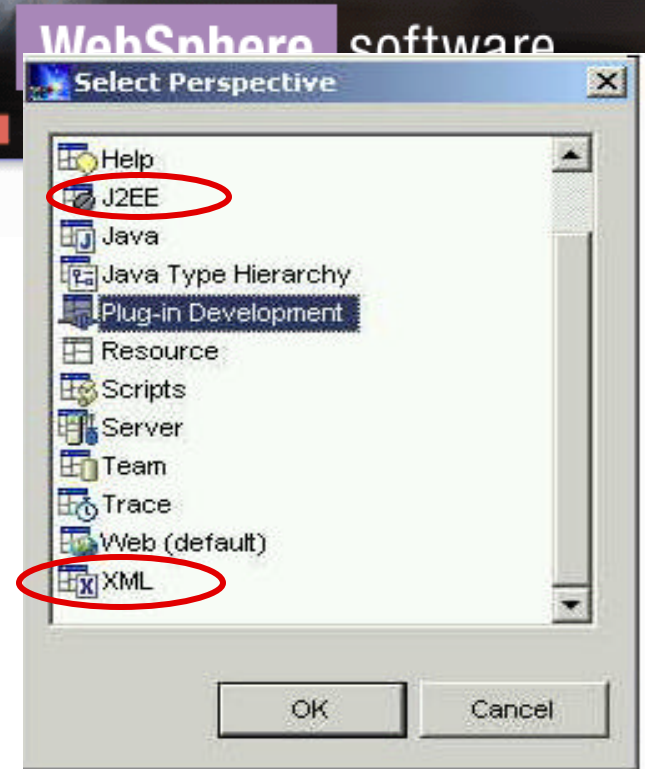
Productivity Drag	Solution
Most AD environments involve more than one tool from multiple suppliers	Best-of-breed tools working together as an integrated environment
Multiple incompatible tools for <u>different runtimes</u>	Single AD platform for all middleware & servers
Iterative runtime-based <u>deploy, test & debug</u>	Integrated runtime -> rapid develop-test iteration
Poor integration of <u>lifecycle & specialized tools</u>	Seamless integration & customization of all tools - organized by tasks & roles
Slow integration of <u>emerging technologies</u>	Rapid deployment via dynamic plug-ins
No common way to view & leverage <u>assets</u>	A federated, dynamic view of all assets

WebSphere Studio Workbench

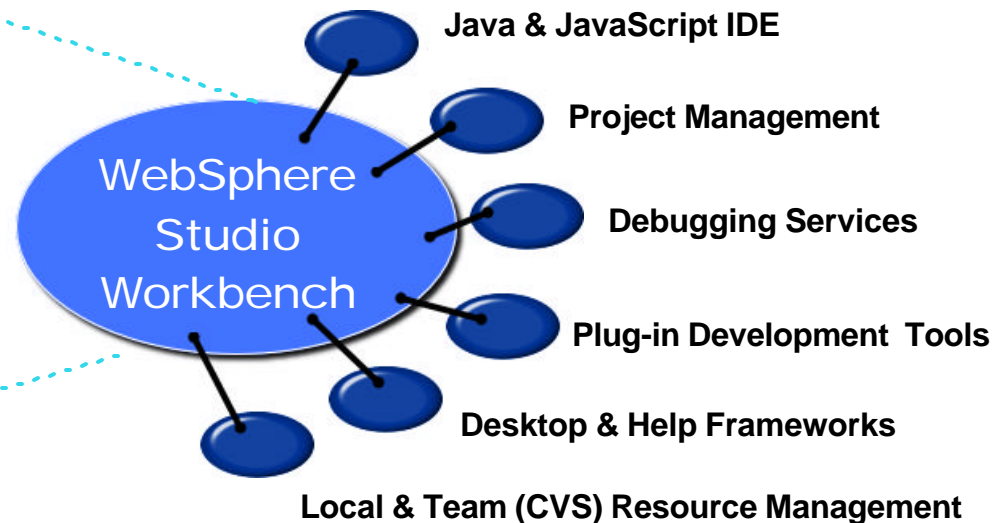
An Open Tool Integration Platform

A personalized, extensible
development platform organized
via developer

"Perspectives"

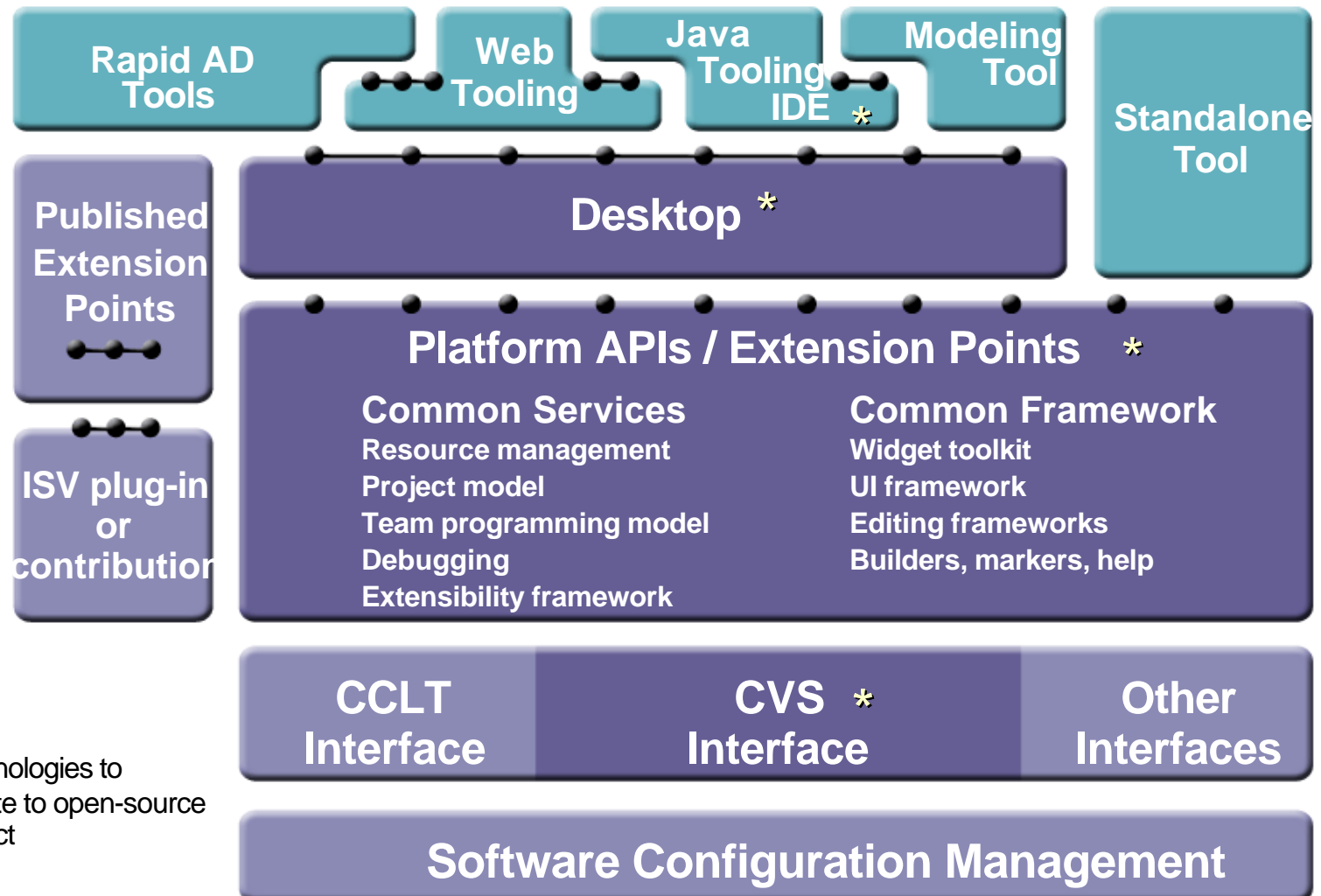


Products built
with Eclipse
inherit these
capabilities
plus 'plug-ins'
built by others



WebSphere Studio Workbench -

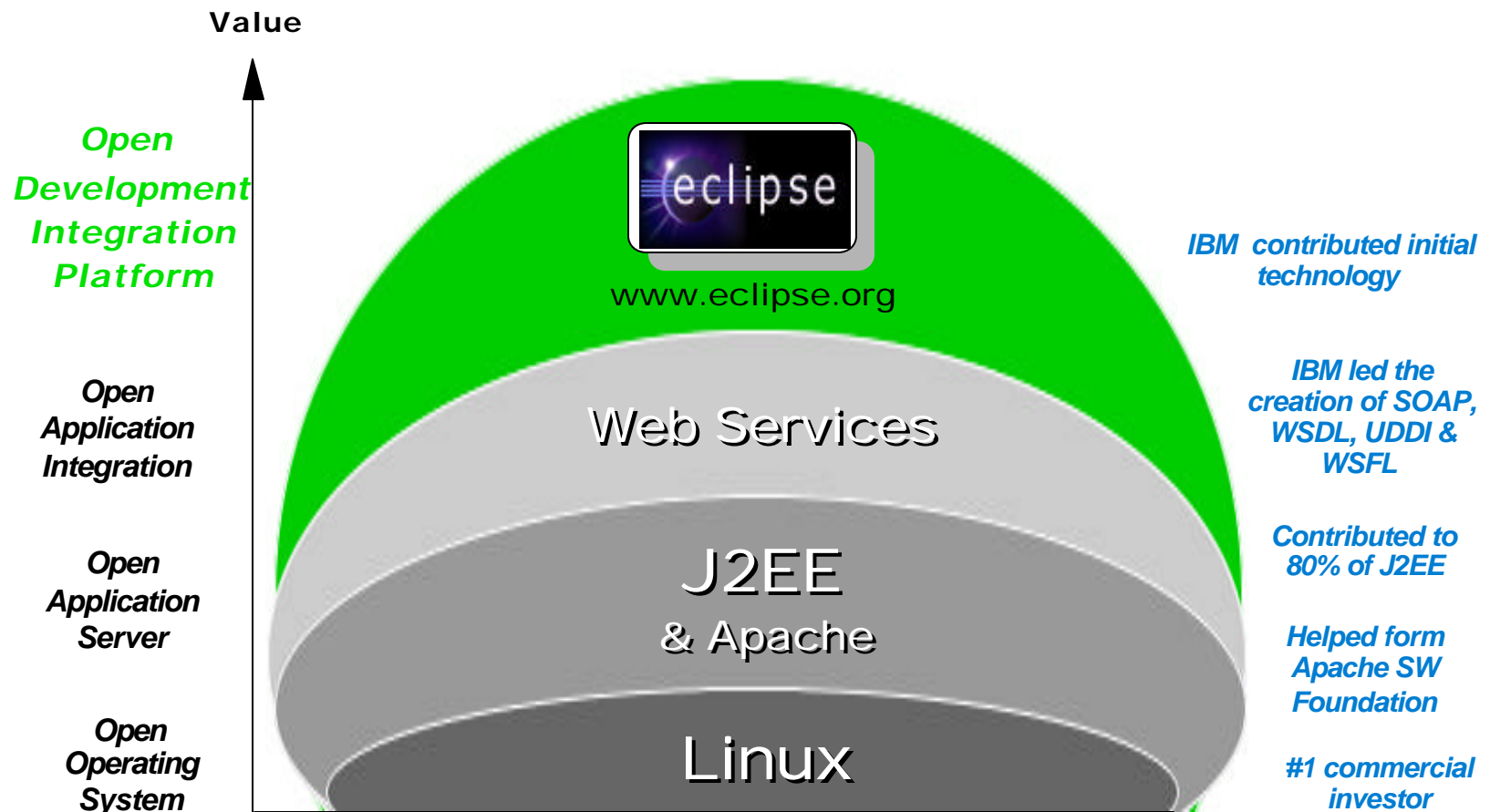
An open tool runtime and development toolkit



* Technologies to donate to open-source project

Open Technology Leadership

The first AD integration platform to fully embrace open technologies, adopting the open approach that has been successful for Apache, J2EE & Linux



Eclipse - Broad Industry Participation

- Altoweb
- Asist
- Bowstreet
- BrowserSoft
- Cast Software
- CollabNet
- CommerceQuest
- Computer Assoc.
- Compuware
- Crystal Decisions
- Embarcadero
- Holosofx
- Instantiations
- Interwoven
- LegacyJ
- LogicLibrary
- Macromedia
- Merant
- Mercury Interactive
- Midcomp Intl.
- MKS
- NeuVis
- Peregrine
- QSSL
- Rational
- Red Hat
- Serena
- Sitraka
- Skyva
- Starbase
- SuSE
- Telelogic
- TogetherSoft
- Versant
- Versata
- Wily Technology

"Rational Software has been an early adopter of the Eclipse platform because we believe it delivers high value to software teams. We've been working closely with IBM to integrate our products into Eclipse...."

Dave Bernstein, Sr VP of Products, Rational Software

"The Eclipse community will allow developers to collaborate on enhancements to the Workbench technology and more rapidly integrate it within their own applications."

Brian Behlendorf, co-founder and CTO, CollabNet

"This has long been a dream of developers, and now IBM is providing the integration framework to make it possible." *Arun Gupta, CTO, NeuVis Software*

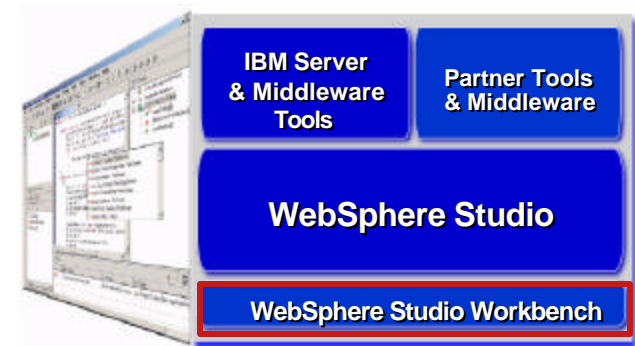


www.eclipse.org

Eclipse Workbench

An Open Development Integration Platform

- ★ Enables vendors and customers to develop, customize and integrate tools and repositories via open standards
- ★ Based on Java with initial support for Linux & Windows
- ★ IBM has contributed the initial technology which is licensed via the Common Public License
- ★ IBM will continue to participate in Eclipse development and will adopt enhancements



Contribute



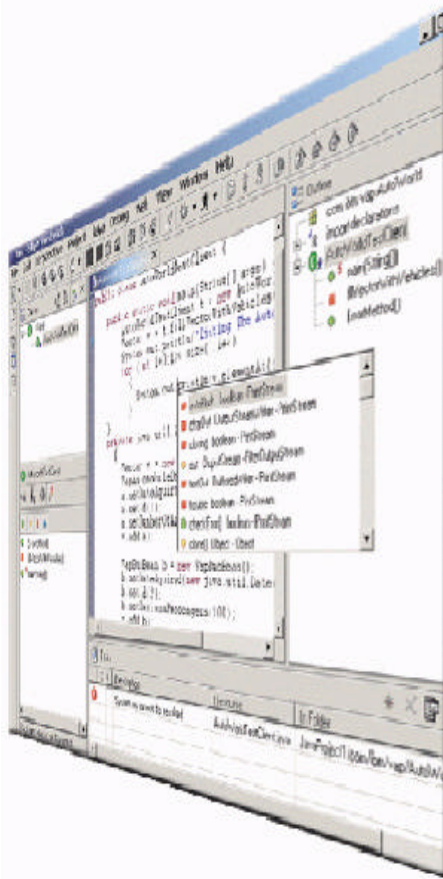
Adopt



www.eclipse.org

The New WebSphere Studio Family

IBM's Development Solution for e-business



**IBM Server
& Middleware
Tools**

**Partner Tools
& Middleware**

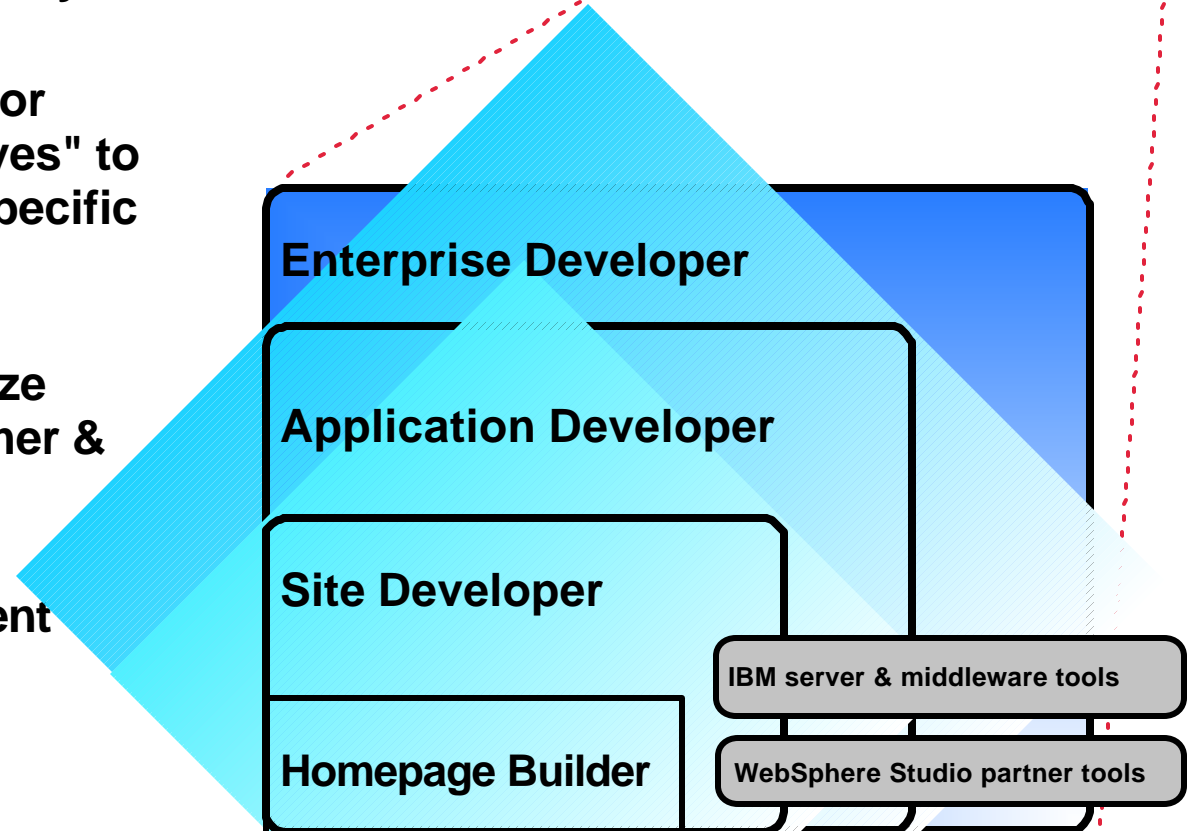
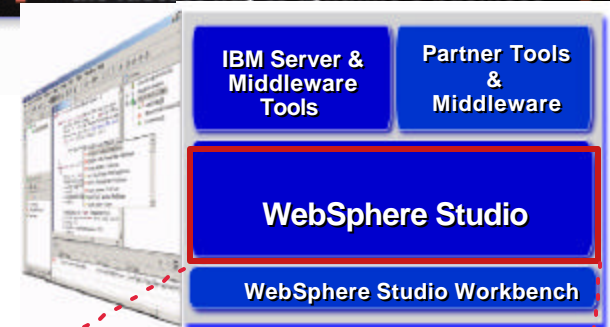
WebSphere Studio

WebSphere Studio Workbench

The New WebSphere Studio

Fast, Easy and Powerful

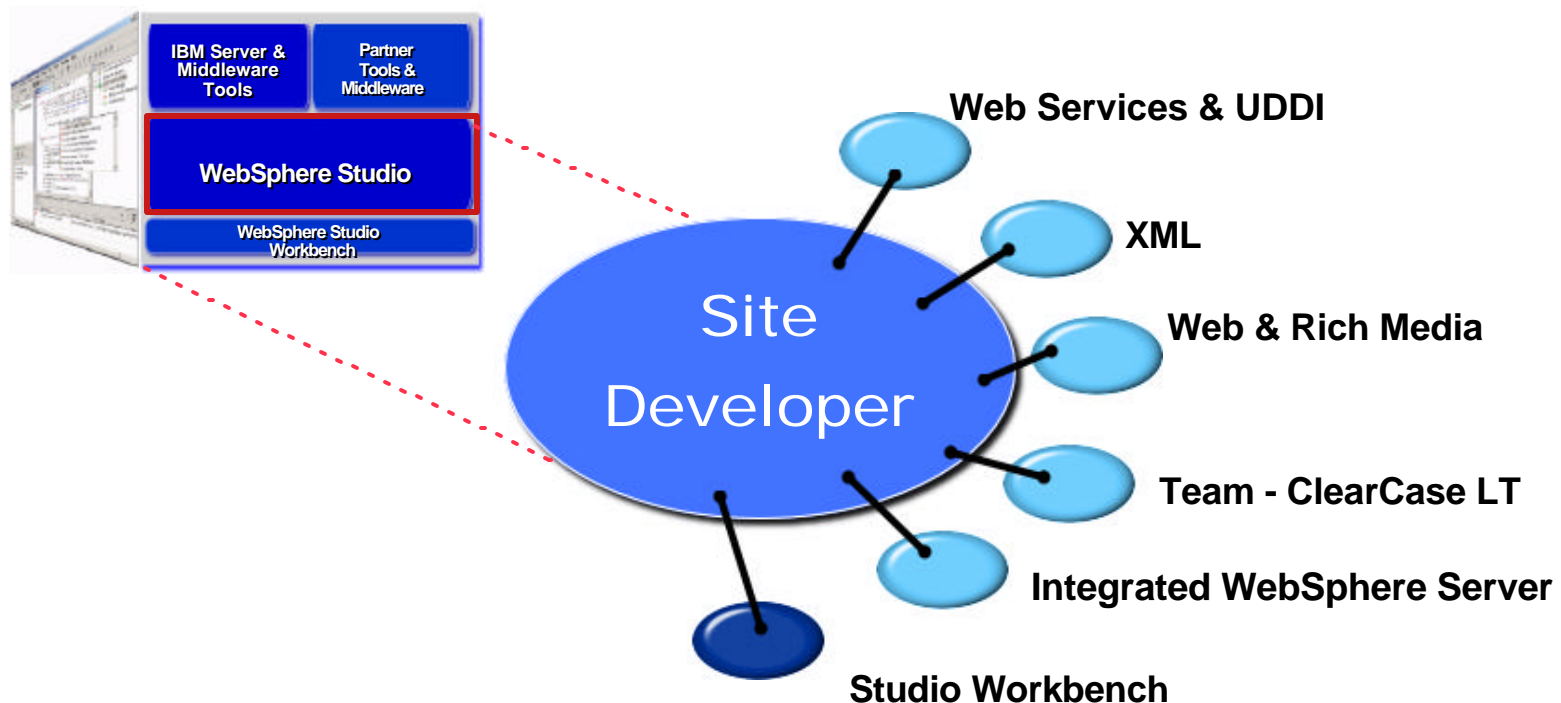
- ★ A single, comprehensive IDE with unprecedented flexibility & extensibility
- ★ Configurations add or subtract "perspectives" to meet the needs of specific developer roles
- ★ Extend and customize with partner, customer & IBM plug-ins
- ★ Common development environment across Windows and Linux



The New WebSphere Studio

Site Developer

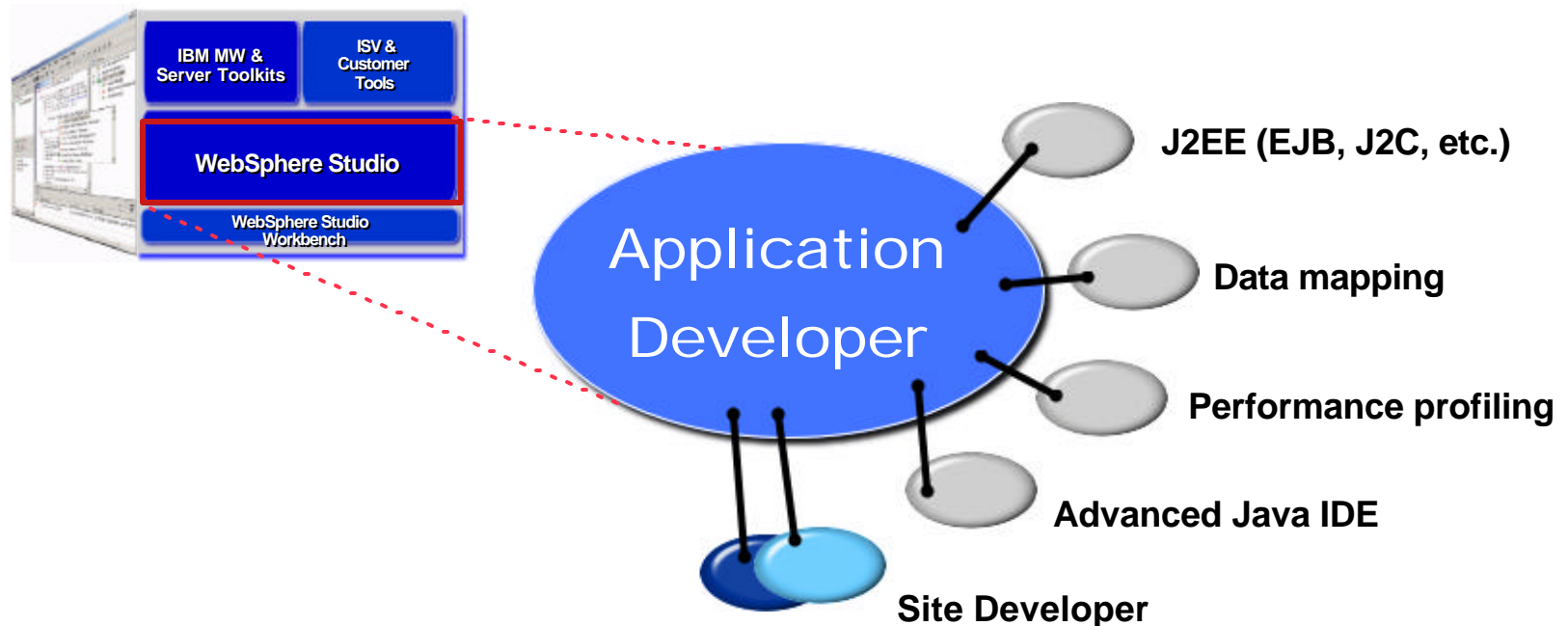
- ★ For professional developers of dynamic Web applications & sites
- ★ Delivers integrated support for open Web standards, including Java, JSP, XML, Rich Media & Web services tools
- ★ Includes Rational ClearCase LT as a team development option



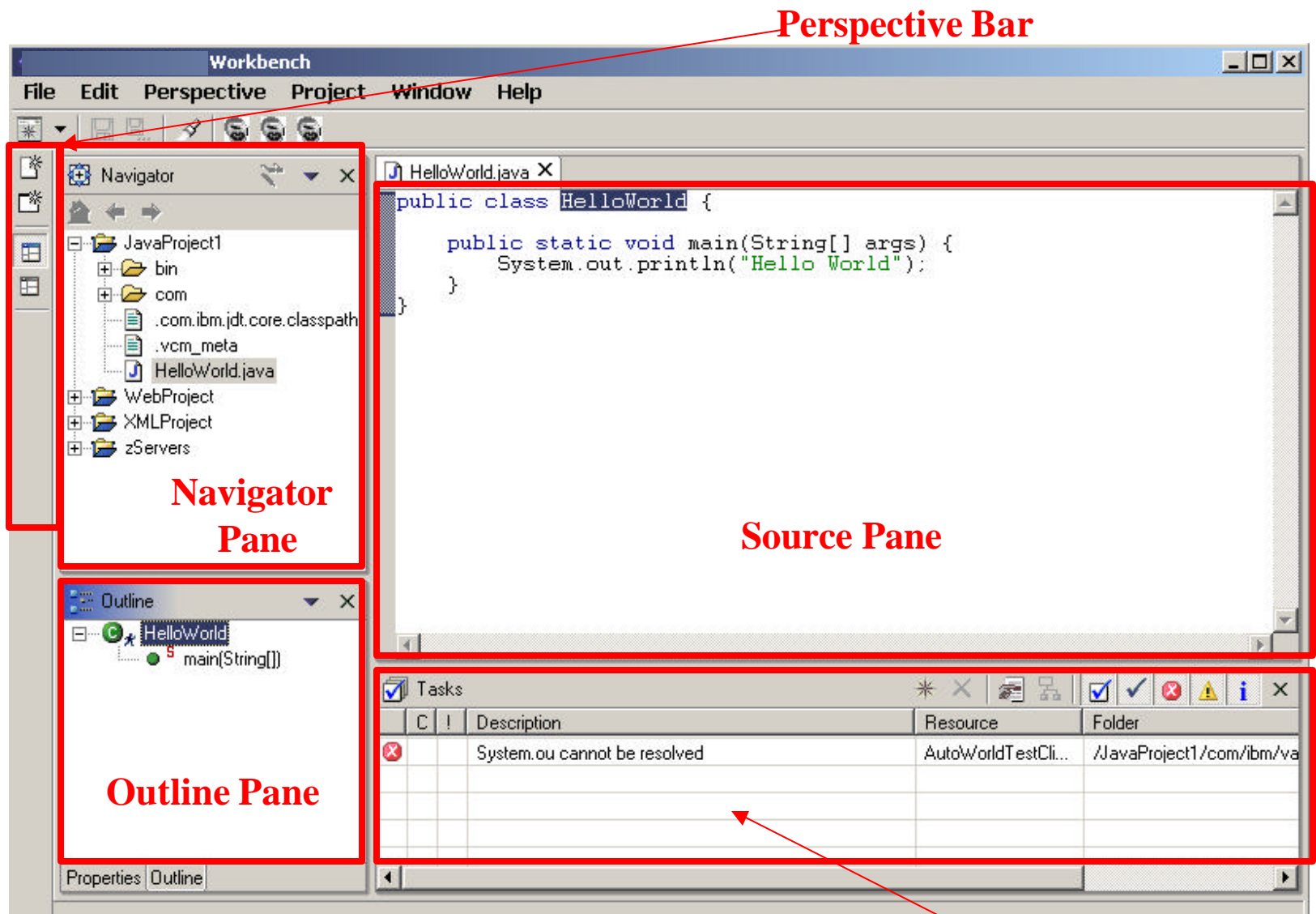
The New WebSphere Studio

Application Developer

- ★ For professional developers of Java & J2EE applications, requiring integrated Web, JSP, XML & Web services support
- ★ Advanced tools for code generation, performance tuning & quality
- ★ Includes a highly integrated WebSphere Application Server test environment and deployment automation tools



WebSphere Studio Application Developer



Perspective Bar

Navigator
Pane

Source Pane

Outline Pane

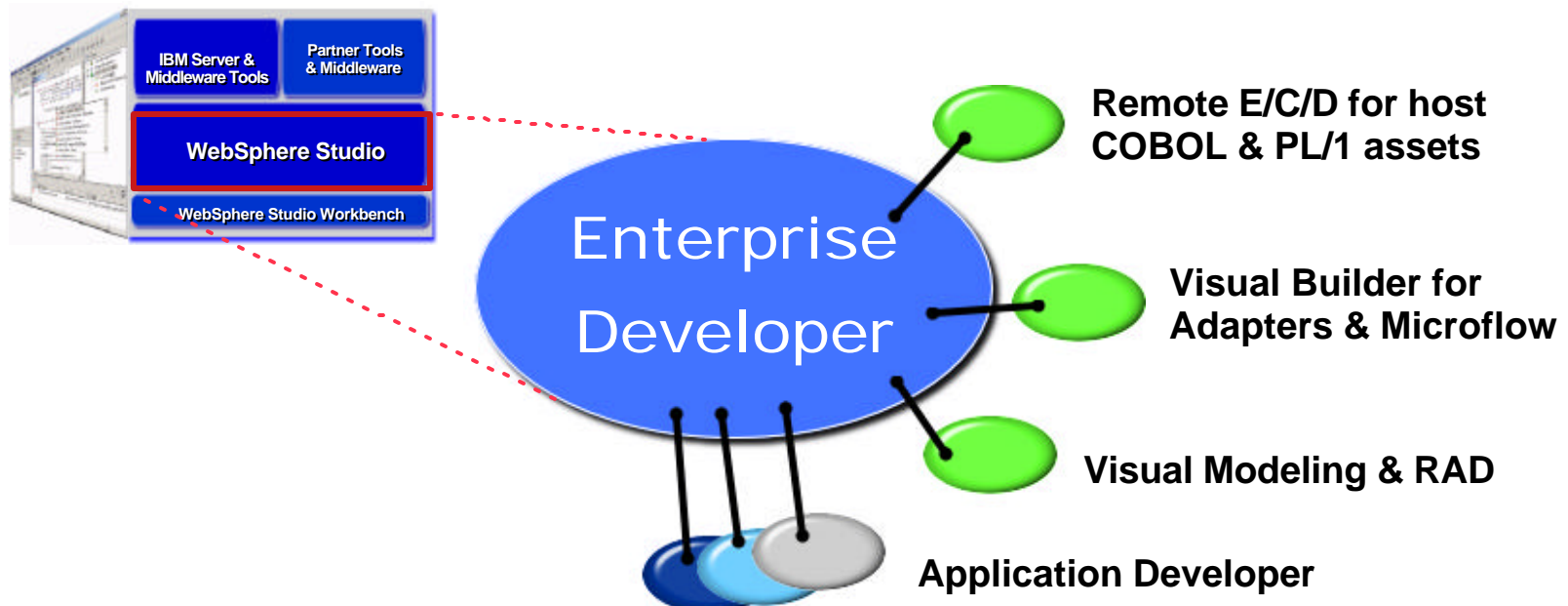
Task Sheet

Look and Feel will change

The New WebSphere Studio

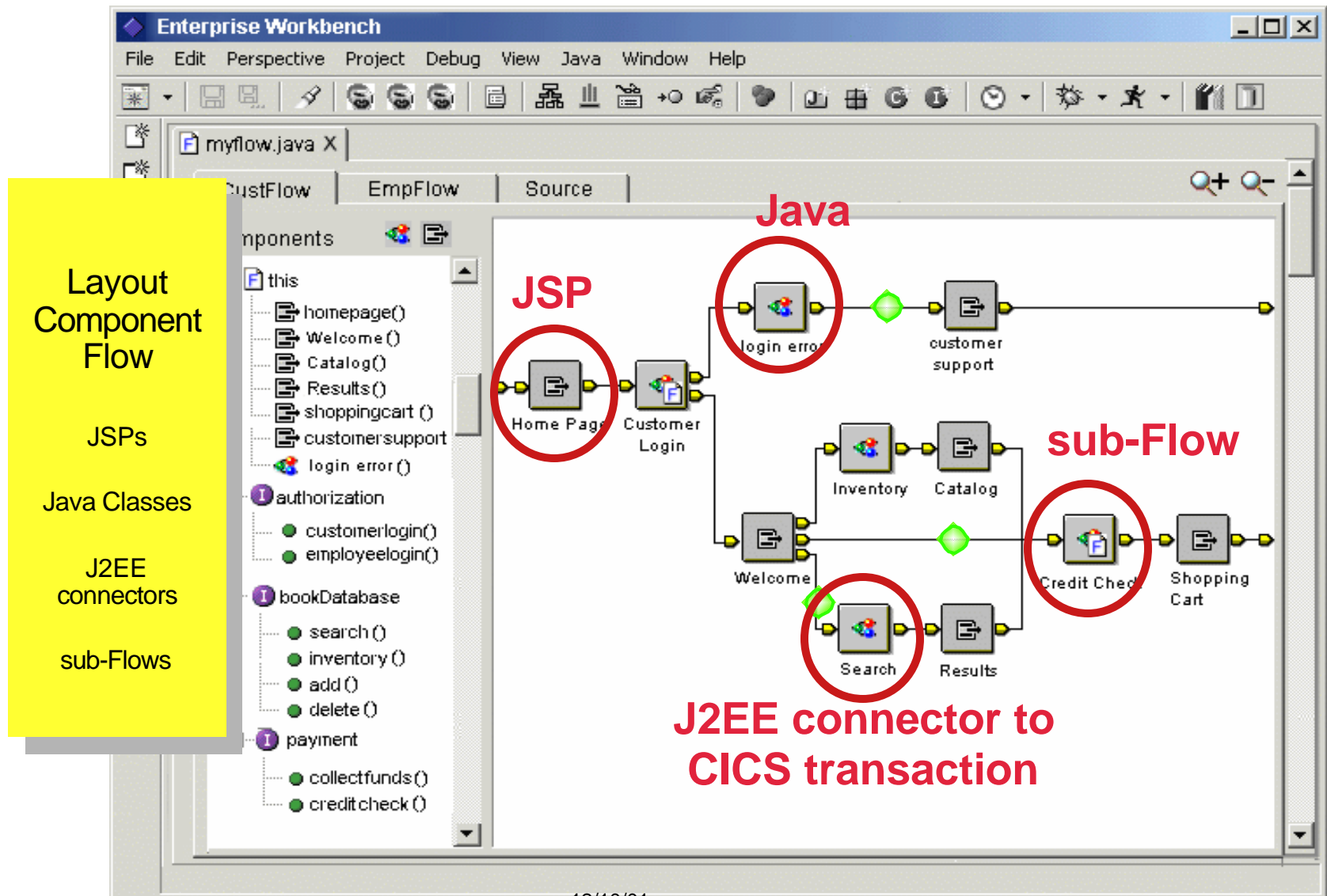
Enterprise Developer

- ★ For developers & integrators of advanced J2EE & Web services
- ★ RAD tools for visual application modeling, composition & adaptability (e.g., business rules)
- ★ Advanced EAI tools for generating adapters & dynamic microflows including integration of remote host assets



Visual Assembly in WSED

Components contain operations, nodes are invocations of operations.



Navigation via an Outline View in a COBOL Program

The screenshot displays the IBM Enterprise Workbench interface. The main window shows the source code of a COBOL program, `*acct01.cob`. The left pane contains a Navigator view showing the project structure, including folders like `UTIL.COBOL`, `UTIL.JCL`, and `UTIL.LOAD`. The right pane shows an Outline view of the COBOL source file, listing sections such as `IDENTIFICATION DIVISION`, `ENVIRONMENT DIVISION`, `DATA DIVISION`, and `WORKING-STORAGE SECTION`. The central editor displays the COBOL code, including comments and program logic.

Enterprise Workbench

File Edit Perspective Project Window Help

Navigator

- 390Project
 - UTIL.COBOL
 - acct01.cob
 - UTIL.JCL
 - COMP1.jcl
 - LINK1.jcl
 - RUN1.jcl
 - UTIL.LOAD
 - UTIL.OBJECT
 - UTIL.OUTPUT
 - UTIL.SYSADATA
- ejbproject
- javaproject
- RADproject
- webproject

Properties

Property	Value
editable	true
last modified	7/24/01 3:53 P
name	acct01.cob
path	/390Project/UT
size	342

Outline

- COBOL Source F
 - IDENTIFICATION DIVISION
 - ENVIRONMENT DIVISION
 - DATA DIVISION
 - WORKING-STORAGE SECTION
 - LINKAGE SECTION
 - 01 DFHCOMM
 - PROCEDURE DIVISION
 - EXEC CICS F
 - IF EIBRID = 0
 - IF EIBCALEN
 - EXEC CICS S
 - EXEC CICS F
 - ELSE GO TO
 - IF EIBRID = 0
 - IF EIBRID NO
 - GO TO MEN
 - IF EIBCALEN
 - EXEC CICS F
 - IF RESPONSE
 - IF RESPONSE
 - IF REQML >
 - IF REQMF N
 - IF ACCTML >
 - IF ACCTMF N
 - IF PRTRML :
 - IF PRTRMF I
 - IF SNAMEML
 - IF SNAMEML

***acct01.cob**

```

*****00110000
*
* MODULE NAME = DFH0S01
*
* DESCRIPTIVE NAME = File Inquiry for Sample Application
*
* 5655-018
* COPYRIGHT = NONE
*
* STATUS = 3.3.0
*
*
* DESCRIPTION :
*
* THIS PROGRAM IS THE FIRST INVOKED BY THE 'AC01'
* TRANSACTION. IT ANALYZES ALL REQUESTS, AND COMPLETES
* THOSE FOR NAME INQUIRIES AND RECORD DISPLAYS. FOR
* UPDATE TRANSACTIONS, IT SENDS THE APPROPRIATE DATA E
* SCREEN AND SETS THE NEXT TRANSACTION IDENTIFIER TO
* 'AC02', WHICH COMPLETES THE UPDATE OPERATION. FOR PRI
* REQUESTS, IT STARTS TRANSACTION 'AC03' TO DO THE ACTU
* PRINTING.
*
*
* CHANGE ACTIVITY :
* $SEG(DFH0S01) COMP(SAMPLES) PROD(CICS/ESA):
*
* PN= REASON REL YYMMDD HDXIII : REMARKS
* $L0= Z30 170 85 HD1XIC : CREATED.
* $L1= SP1 310 8701 HD1CHW : RESTRUCTURE
* $P1= M56440 310 8905 HD3WJG : REMOVE COMPILE WARM
* $P2= M90474 330 910807 HDBW'SH : Prologue fixed.
* $P3= M91869 330 920204 HDCTRC : INSPECTs replaced.
  
```


Internet Generation Language (IGL)

Enterprise Workbench

File Edit Perspective Project Window Help

Navigator

- Copy (2) of jon.rad
- Copy of Parts.rad
- fff.rad
- Function1.rad
- ggg.rad
- item1.rad
- ion.rad
- theme

Outline

- RAD V1
 - ProgramDefinition Prog
 - ItemDefinition Item
 - ItemDefinition Item
 - ItemDefinition
 - ItemDefinition
 - FunctionDefinition Fur
 - ItemDefinition Item
 - RecordDefinition Recd
 - StructureDefinition Str
 - ItemDefinition Item1
 - ItemDefinition Item
 - BuildDescriptorDefiniti
 - ItemDefinition Item

Parts.rad

```
totalScore = 0;
numberOfGrades = 0;
while ( gradesRecord.student = current)
  scan gradesRecord
    on exception { ezertn;} /* read the record*/
//homework counts 10%, quizzes and exams count 20 %, final counts 40%
select (gradesRecord.type)
{
  case (homework):
    { totalScore = totalScore + gradesRecord.score;
      numberOfGrades = numberOfGrades + 1;
    }
}
```

Source RAD Program - Program1 Record - Recor

Tasks (6 items)

C	!	Description	Resol
		/web/webApplication/small icon here- ...	aweb.
		/web/webApplication/large icon here- ...	aweb.
		/web/webApplication/packageName....	aweb.
		/web/webApplication/small icon here- ...	web.x
		/web/webApplication/large icon here- ...	web.x
		/web/webApplication/packageName....	web.x

Tasks Styles Links Thumbnail Color Palette

Properties

COBOL-like language

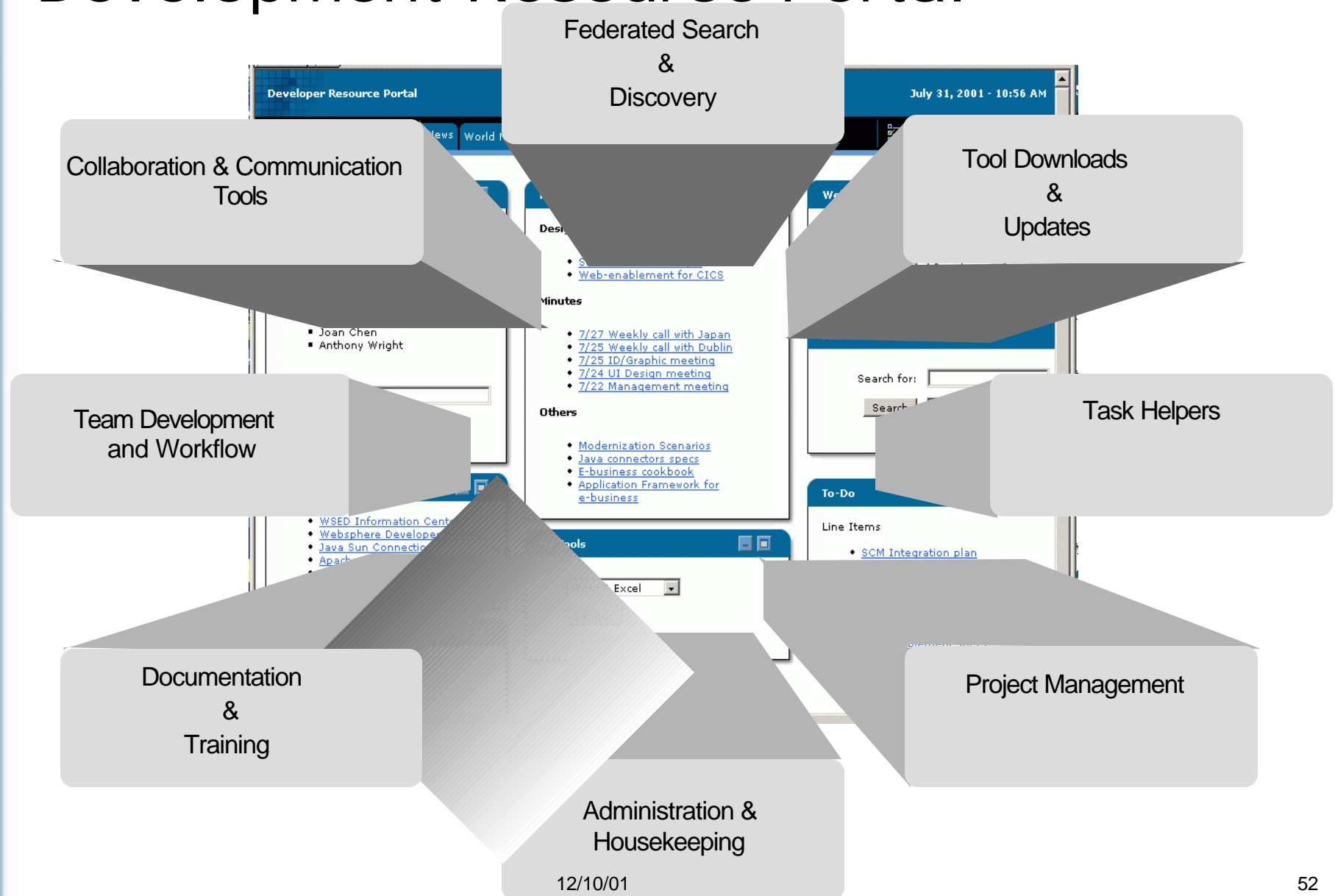
Code programs, functions, structures...

Extensive wizards to reduce need to code by hand

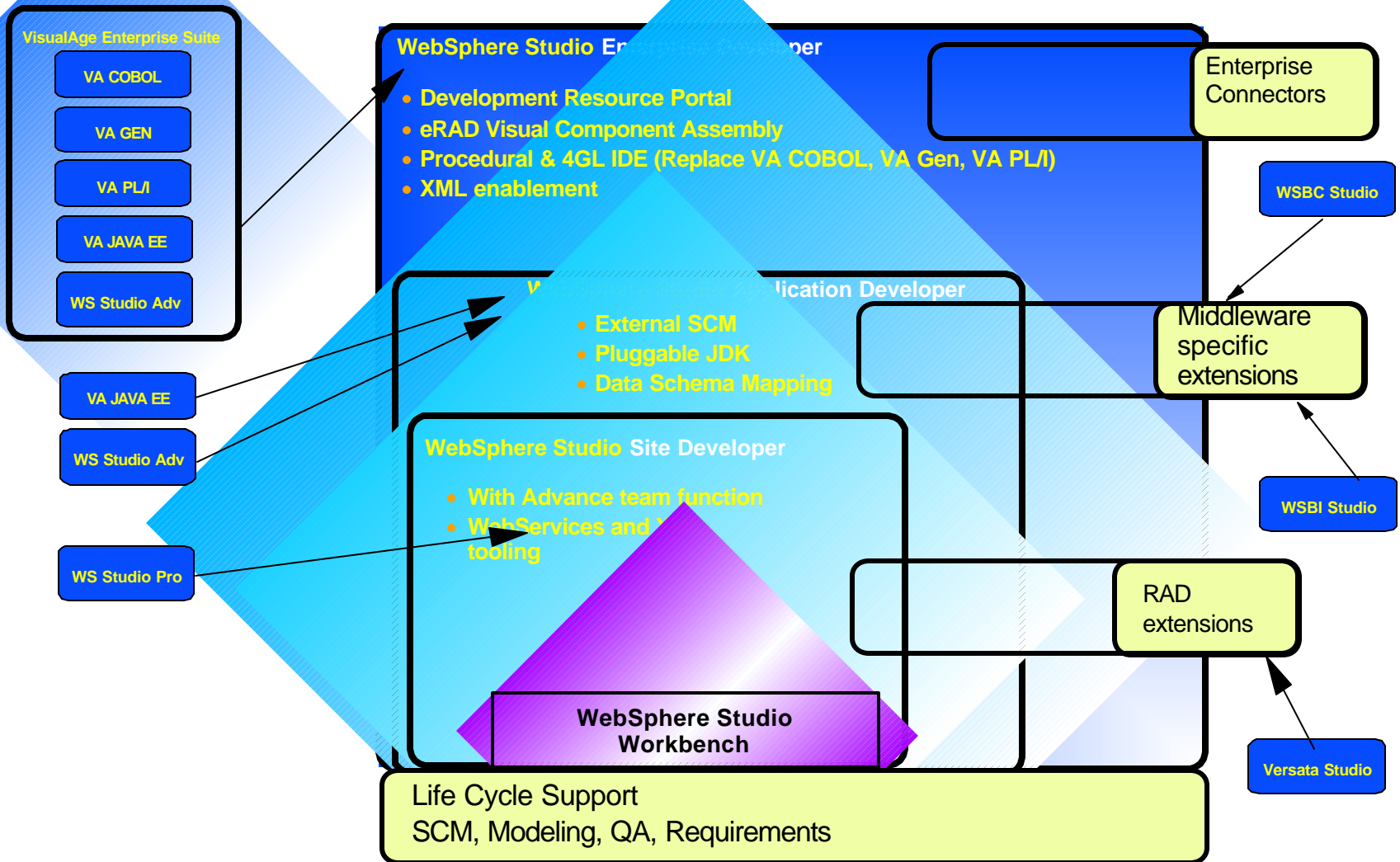
Generate COBOL and the associated Java connectors used in Flows

Code once, generate COBOL for CICS or Java for WAS

Development Resource Portal



Product Migration Roadmap



IBM dynamic e-business infrastructure:

Software backed by real-world experience

- Global experience
- World-class partners
- End-to-end integrated solutions
- Speed to market
- Multiplatform integration
- Security
- Offers dependable support

WebSphere software

DB2 software

Software is the heart of infrastructure

Lotus software

Tivoli software

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