Modernizing Mainframe applications for mobile and more

Track 3: Extending the mainframe to the mobile enterprise

Where we are in todays agenda

- Mobilizing the mainframe

- Modernizing mainframe applications for mobile and more

- Exposing mainframe applications and services to mobile

- Developing an IBM MobileFirst platform application for z Systems

- Optimizing applications and data for mobile workloads

- Client use cases and getting started with mobile and z Systems

IBM.

Reduce

- Cost
- Risk
- Complexity
- Outage

Manage

- Operational efficiency
- Critical business data
- Security & Compliance
- Skills and resources

Deliver

- Service agility
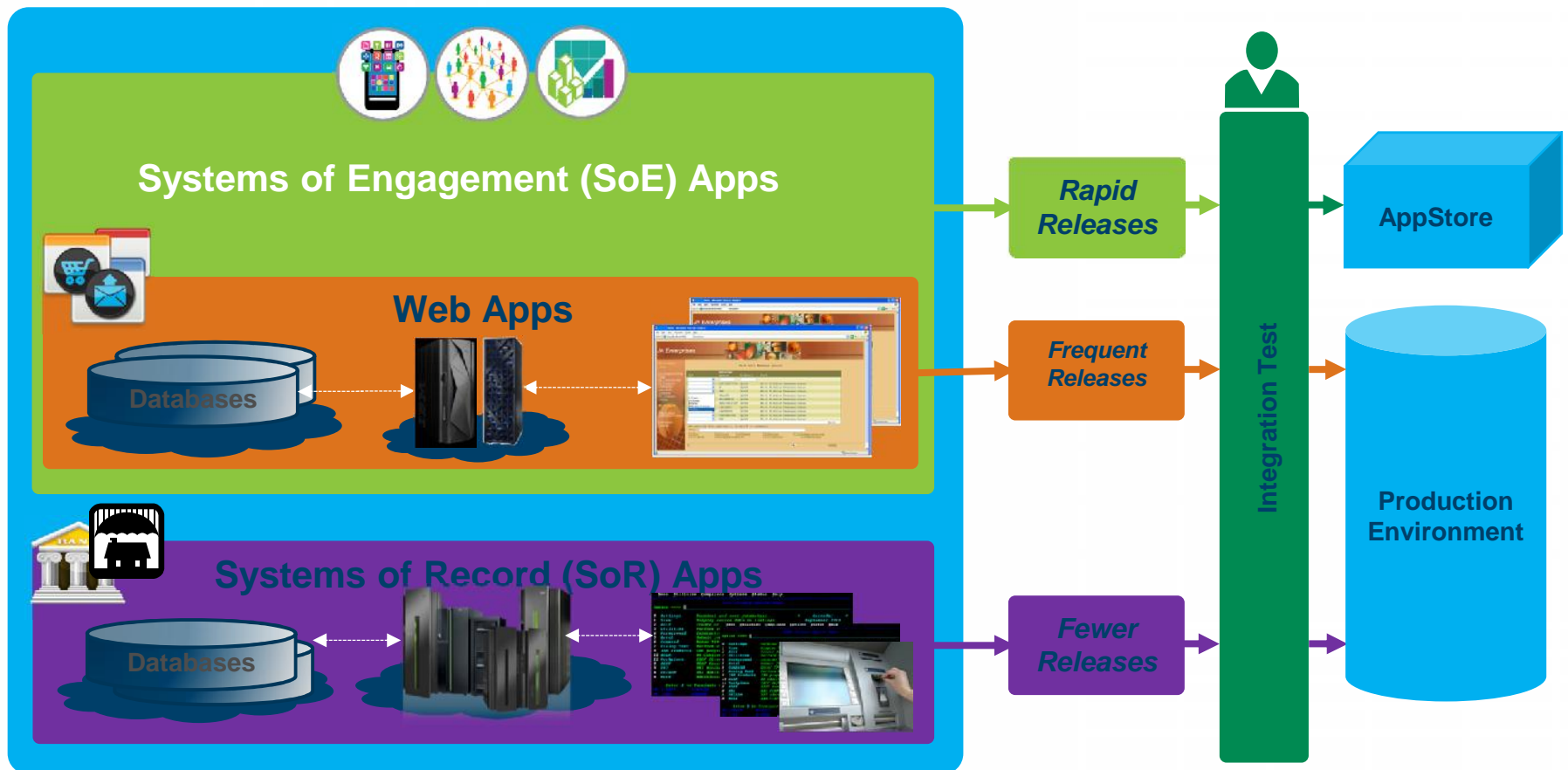- Business Intelligence
- Mobile solutions
- Cloud solutions

Gartner.

"Agility and accessibility will make the successful organization of the future."
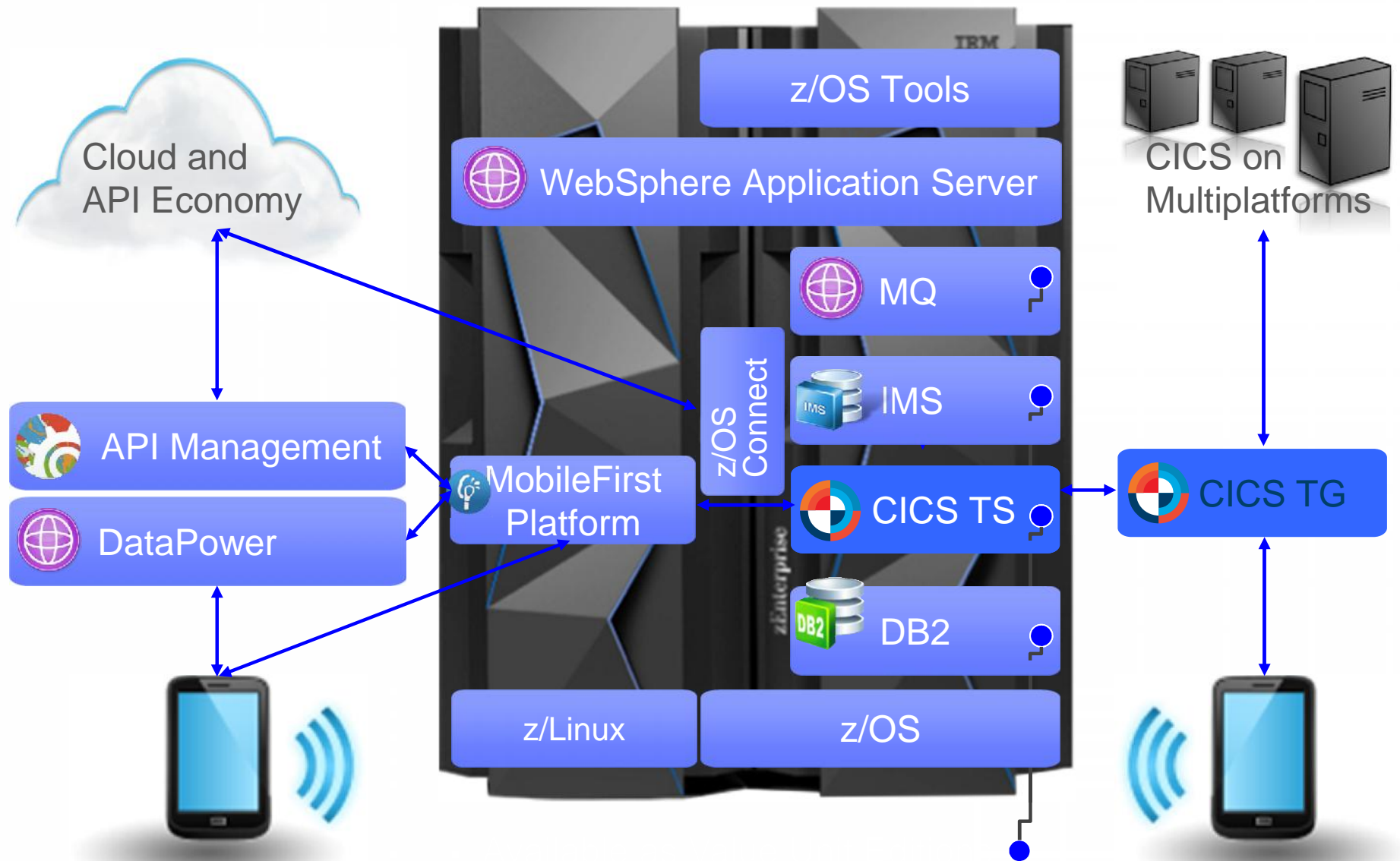
pwc

Digital technologies lead CIO technology priorities

CIO technologies	Ranking of technologies CIOs selected as one of their top 3 priorities in 2013				
Ranking	*2013*	2012	2011	2010	2009
Analytics and business intelligence	1	1	5	5	1
Mobile technologies	2	2	3	6	12
Cloud computing (SaaS, IaaS, PaaS)	3	3	1	2	16

Today's Systems landscape

Bringing together the people, processes, and tools across the entire software delivery lifecycle – spanning mobile to mainframe platforms
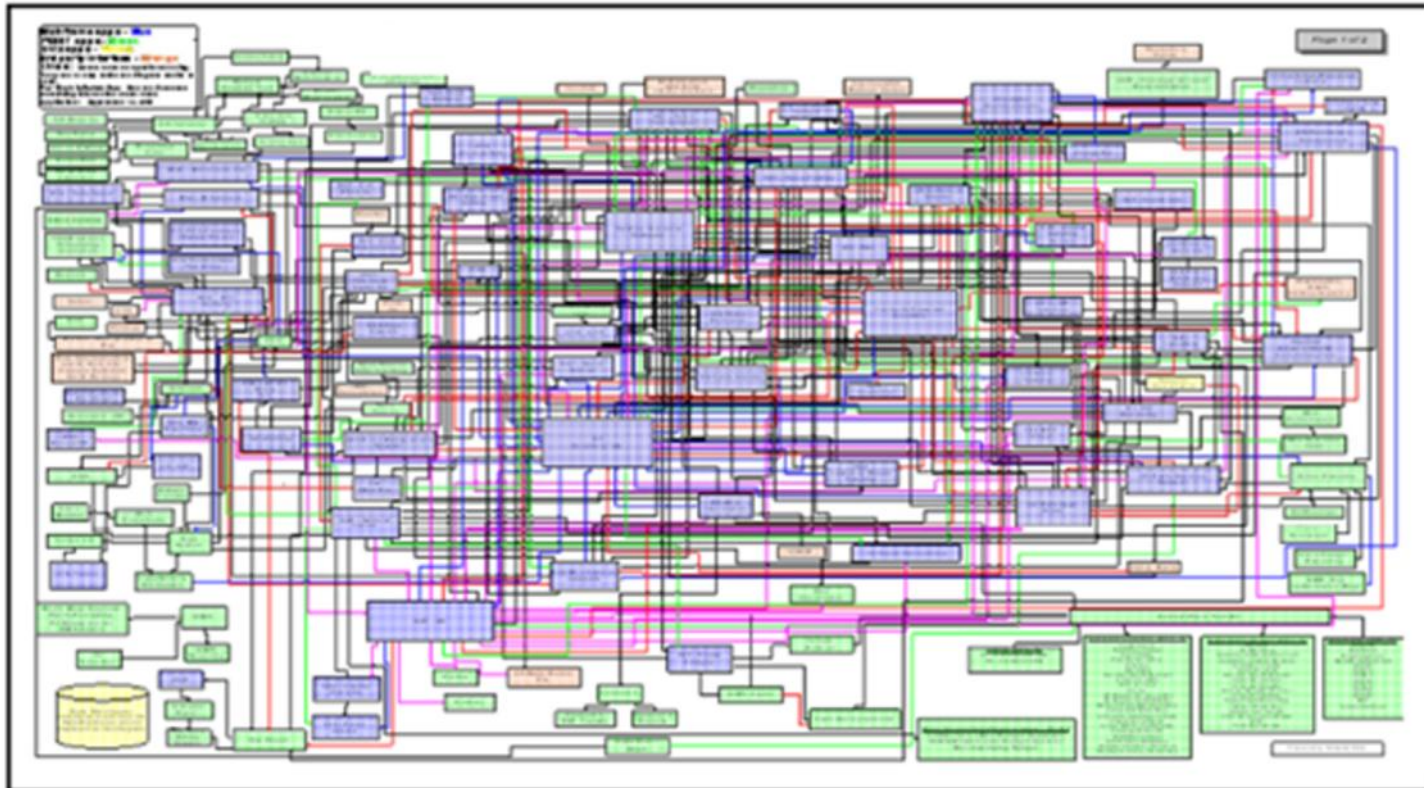

Systems of Engagement (SoE) Apps

Web Apps

Databases

Systems of Record (SoR) Apps

Databases

Rapid Releases

Frequent Releases

Fewer Releases

Integration Test

AppStore

Production Environment

Change? **Fix problems?** **Optimize?**

Modernize? **Where do I start?** **Re-use?**

Applications

- Service and mobile enablement
- Modern web and Java development
- Events, business rules and, Decision Management

Infrastructure

- Connecting mobile, J2EE, and client-server applications
- Cloud enablement
- Modern batch

Data

- Updating and testing new data schemas
- Data conversion
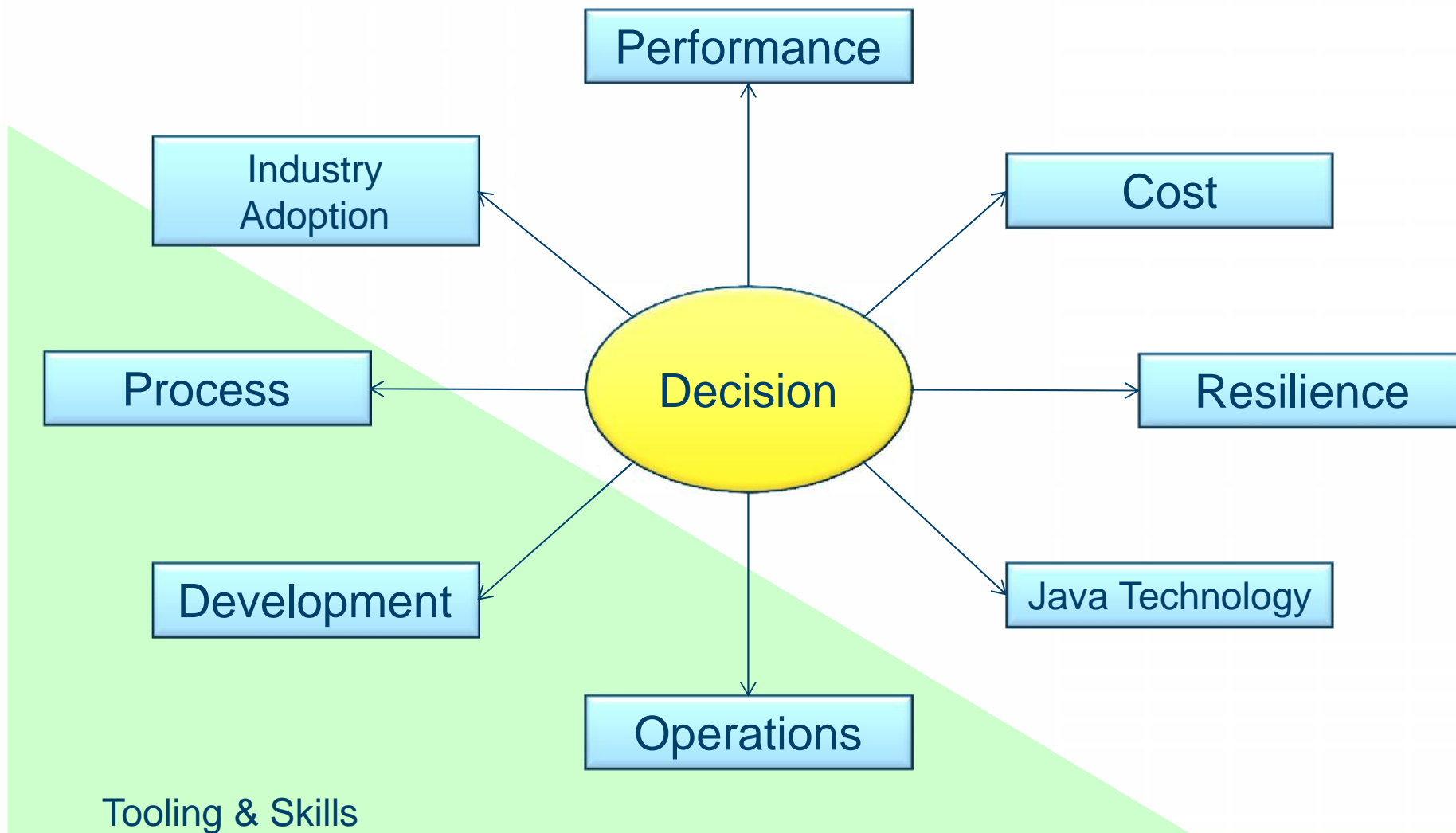- Migrating VSAM data to DB2 without application change

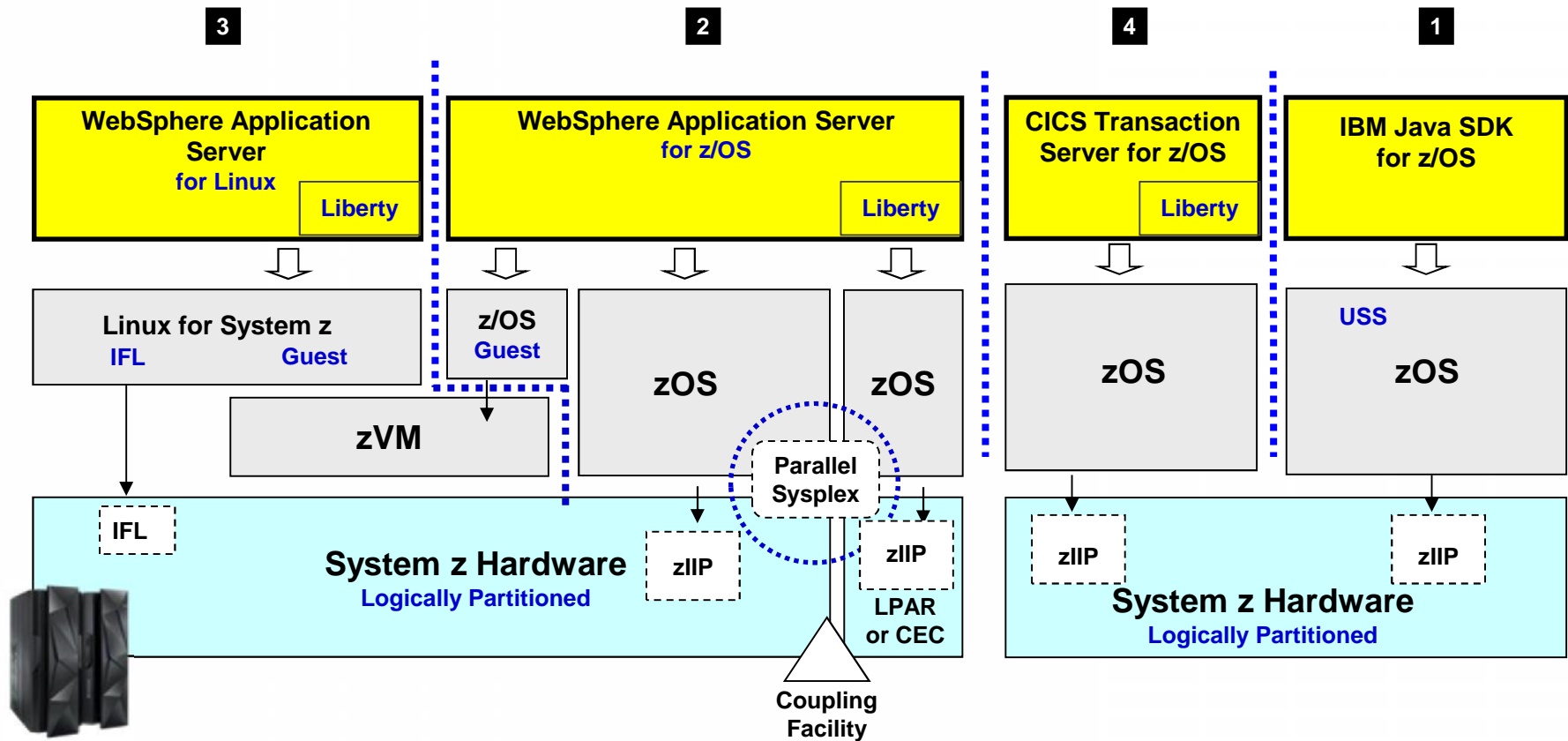As a Developer or Architect, **Integrated tooling and DevOps** help me modernize applications, data, infrastructure, and processes

Mobile enablement scenario by DevOps phase

Steer	Develop and Test	Deploy	Operate
Create capacity plan CICS PA	Create dev / test regions CICS DA (take advantage of on premise/cloud RD&T)	Create production regions CICS DA	Analyze / optimize performance CICS PA, CICS IA, APA
Identify mobile service entry points CICS IA	Create mobile services CICS TS, CICS TG, z /OS Connect	Migrate production configuration CICS CM	Automate fault processing FA
Mobile workload usage and SLA reports CICS PA	Update data model FM	Update production data sources FM	Implement continuous availability CICS VR, Lifeline
	Update and unit test CICS programs (RDz, RD&T on premise and cloud)	Update production libraries UC Deploy	Event- and rule-enablement ODM
	Build mobile app MobileFirst Platform		API self-service API Management
	Package configuration changes CICS CM		Migrate VSAM to DB2 CICS VT
	Function and load tests WSIM, RTVS		
	Time-sensitive testing Hourglass		
	Diagnose problems DT		
	Eliminate performance hot-spots APA, CICS PA		
	Create test data sources FM		

3 | **2** | **4** | **1**

WebSphere Application Server for Linux	WebSphere Application Server for z/OS	CICS Transaction Server for z/OS	IBM Java SDK for z/OS
Liberty	Liberty	Liberty	

Linux for System z		z/OS	zOS	zOS	zOS	USS
IFL	Guest	Guest				zOS

zVM

Parallel Sysplex

System z Hardware
Logically Partitioned

IFL

zIIP

zIIP

LPAR or CEC

zIIP

System z Hardware
Logically Partitioned
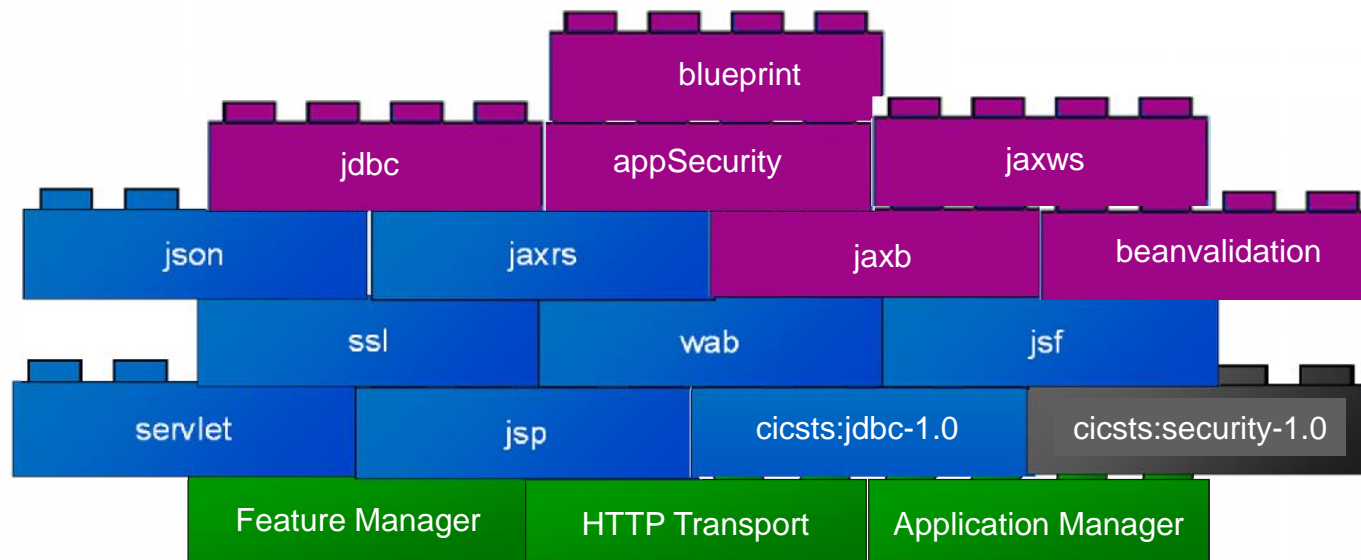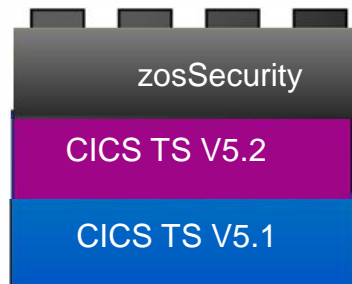
zIIP

Coupling Facility

A lightweight, dynamic, composable runtime

- Lightweight
  - Server install is only about 55 MB
  - Extremely fast server starts – typically well under 5 seconds
- Dynamic
  - Available features are user selected and can change at runtime
  - Restarts are not required for server configuration changes
- Composable
  - Features are implemented as loosely coupled components with lazily resolved optional and mandatory dependencies
  - The availability of features and components determines what Liberty *can* do and what's available to applications

IBM

z/OS

ND

Base, Express

Liberty Core

★ New in Liberty 8.5.5

zosWlm

zosSecurity | zosTransaction | collectiveController ★ | clusterMember ★

mongodb ★ | jaxb ★ | jaxws ★

wsSecurity ★ | wmqJmsClient ★ | jmsMdb ★ | wasJmsSecurity ★

concurrent ★ | wasJmsClient ★ | wasJmsServer ★

oauth ★ | collectiveMember ★ | ldapRegistry ★ | webCache ★

ejblite ★ | cdi ★ | managedBeans ★

jaxrs | osgi.jpa | localConnector | beanvalidation

blueprint | restConnector | ssl

jsf | wab | json | appSecurity

jsp | monitor | sessionDatabase

servlet | jpa | jndi | jdbc

Feature Manager | HTTP Transport | Application Manager

zosSecurity

CICS TS V5.2

CICS TS V5.1

blueprint

jdbc | appSecurity | jaxws

json | jaxrs | jaxb | beanvalidation

ssl | wab | jsf

servlet | jsp | cicsts:jdbc-1.0 | cicsts:security-1.0

Feature Manager | HTTP Transport | Application Manager

New Java web container is built on WebSphere Application Server Liberty profile technology

- – Provides a fast and lightweight Java web container
- – Provides "off the shelf" Web-server capabilities (JSPs and Servlets)
- – JSP and Web servlets have direct, local, access to CICS data and resources
- – Servlets can take advantage of existing CICS OSGi applications to provide a Dynamic Web front end

IBM.
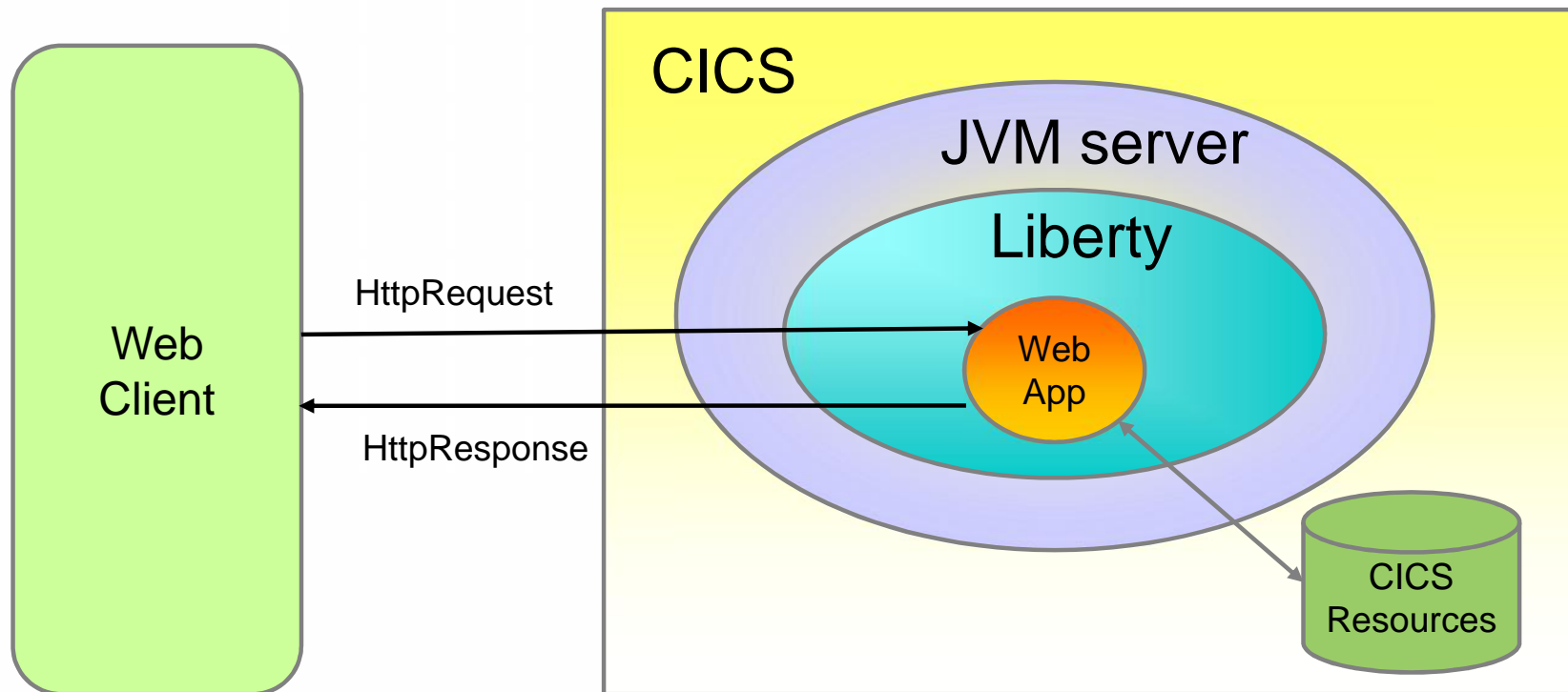
- Optimal scenarios for Web app. deployment to CICS
  - Access to existing CICS programs
  - Access to CICS/VSAM data
  - Sharing access to DB2 tables controlled by CICS
  - Reducing network I/O by removing remote connector

New capabilities to speed delivery of dependent, multi-platform applications

Mainframe SCM / CI

Rational Developer for System Z

ISPF (Green Screen)

Rational Team Concert

ca technologies

CA Endevor

Serena Changeman

Deploy

- Download build output from artifact repository on z/OS
- Deploy to z/OS or RD&T to test application changes

Promote

Application under test

Test Environment – RD&T

COBOL, PL/I, C++, Java, EGL, Batch, Assembler, Debug Tool

IMS		DB2
	CICS	
WAS		MQ

z/OS

x86 PC running Linux

Test Automation

RTW, Z Unit tests

- **Unified solution** for continuous delivery of heterogeneous enterprise applications
- **Accelerate delivery** and reduces cycle time to develop/test multi-tier applications across heterogeneous environments and platforms
- **Reduce costs** and eliminate delays for delivering mainframe applications
- **Minimize risk** improve productivity across disparate teams w/ cross-platform release plans

Built on an open standards based platform and a set of services enabling software teams to leverage open source and third party tools

urban{code}

UrbanCode Release

Application Release Management

SmartCloud Orchestrator
Pure Application System
Enterprise Systems

CHEF

Rational Focal Point
Rational Doors Next Generation

UrbanCode Deploy

Application Deployment Automation

Cloud Provisioning

Jenkins

Line of Business

Rational Build Forge

Development | Build | Package Repo | TEST ENV. | STAGE ENV. | PROD ENV.

Rational Team Concert
Rational Developer for System z
Rational Developer for IBM i
Rational Application Developer
Compilers

Rational Quality Manager
Rational Test Workbench
Rational Development and Test Environments for System z
Rational Test Virtualization Server
InfoSphere Optim Test Data Mgmt

SmartCloud Application Performance Management
Tealeaf

OSLC   openstack   OASIS

- RESTful web services with JSON
- Web services over SOAP
- JCA – CICS TG or WOLA
- CICS Web Support
- Messaging
- CICS sockets

WebSphere Application Server

SOAP Web services

CICS, WAS, IMS
COBOL, PL/I, C/C++,
Java
Services

SOAP Web services or JSON

JSON

MobileFirst Platform

CICS TG

JSON

JSON
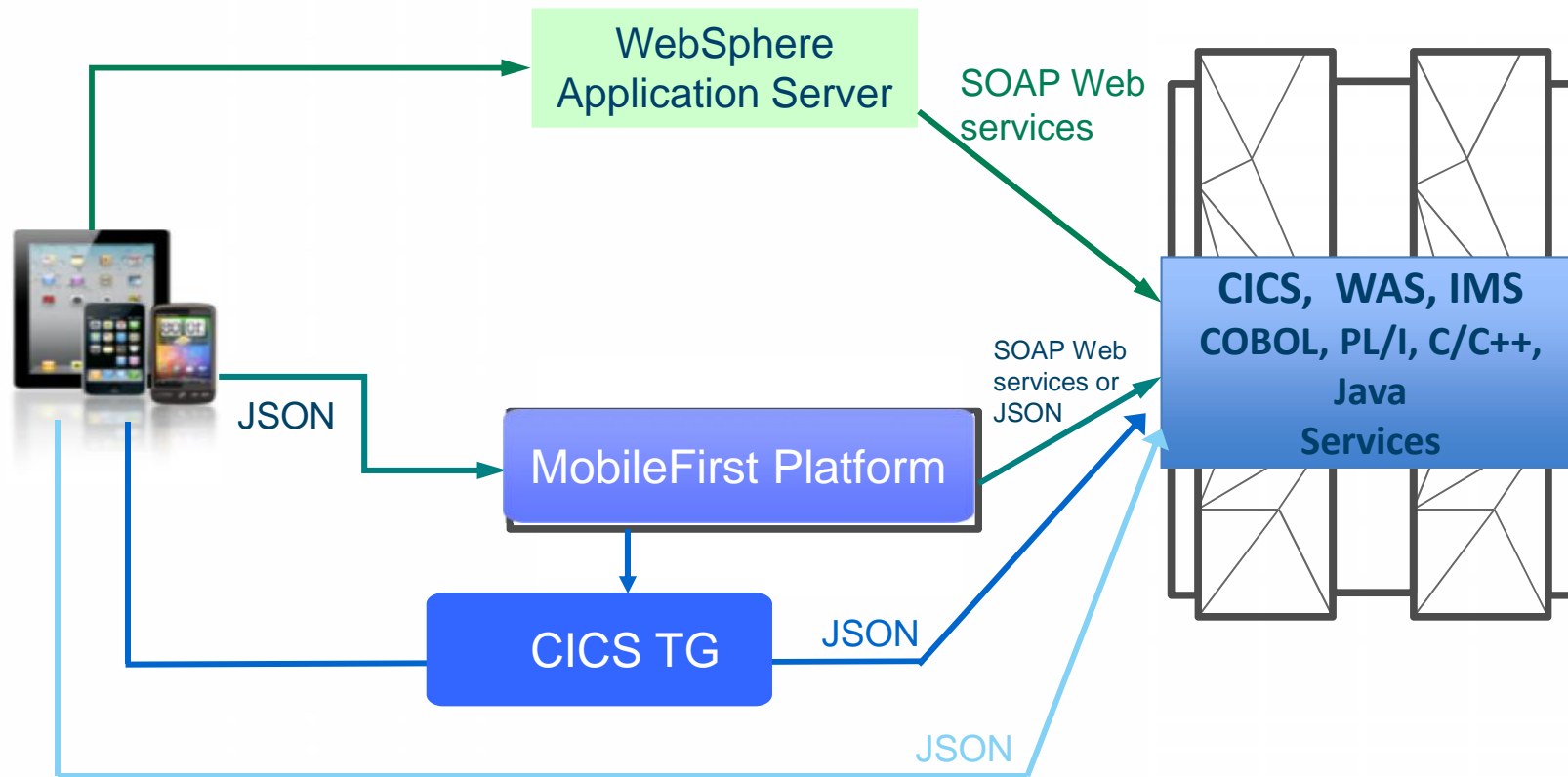
This represents another component to configure and maintain in your environment. So what value does it bring?
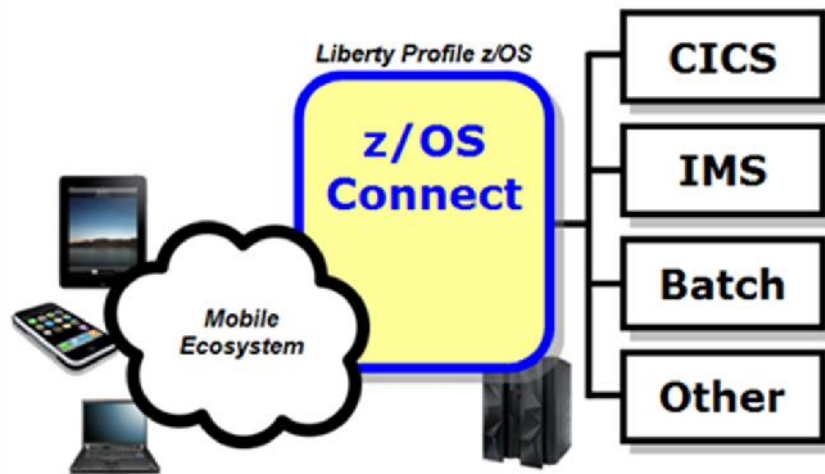
You *could* enable Mobile access without z/OS Connect

z/OS Connect simplifies and makes the environment more consistent and manageable

- Provides a common and consistent entry point for mobile access to one or many backend systems

- Java, so runs on specialty engines

- Shields backend systems from requiring awareness of RESTful URIs and JSON data formatting

- Provides point for authorization of user to invoke backend service

- Provides point for capturing usage information using SMF

- Simplifies front-end functions by allowing them to pass RESTful and JSON rather than be aware of or involved in data transformation

Context Within Overall Mobile Architecture

IBM

The message here is that z/OS Connect is a *piece* of the Mobile architecture, but in most cases will not be the only component:

Firewall

Firewall

Liberty Profile z/OS

z/OS Connect

Mobile Ecosystem

DMZ Device
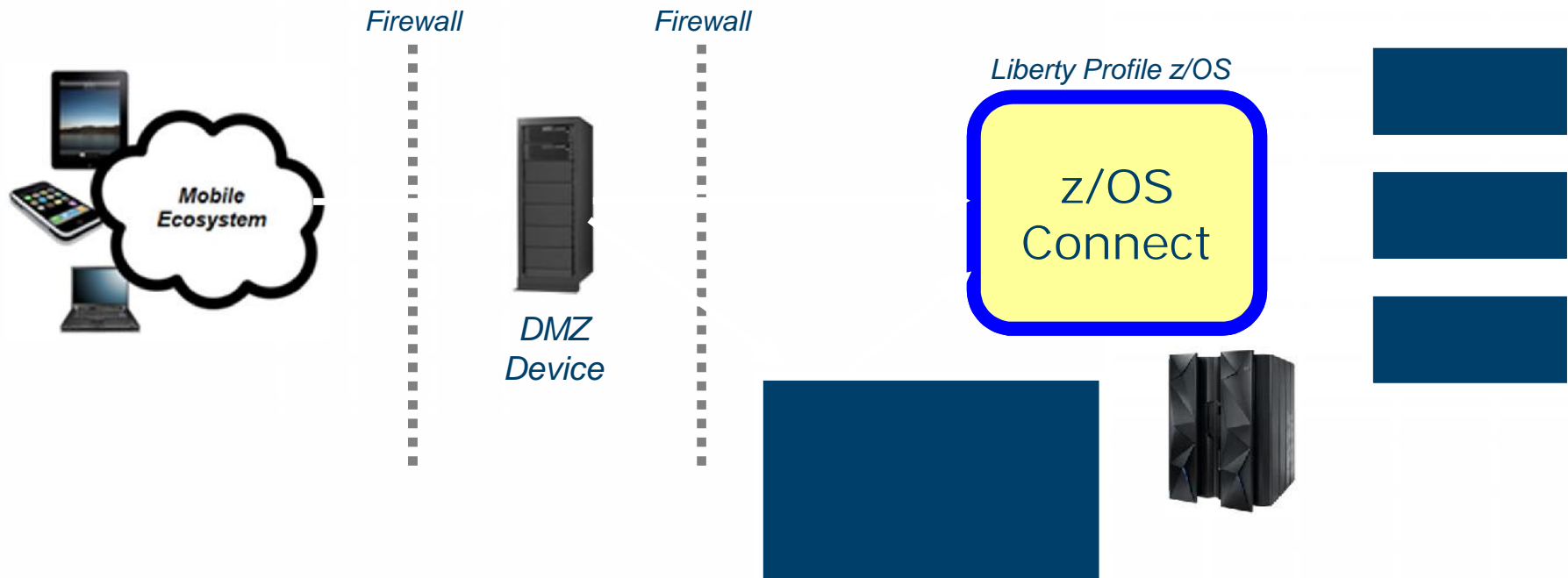
Users of z/OS Connect would access through normal corporate firewall infrastructure

IBM Worklight to provide application management, security and operational governance for mobile applications

z/OS Connect would be behind the secure firewall, and on LPARs along with backend systems

21

IBM

Provider – means that CICS is the host of the web service which is being invoked from elsewhere.

WSDL JSON

Top down

Top down – Start with a WSDL or JSON document and convert it into a form usable as a CICS web service.

Web service requester

CICS as provider

CICS

CICS as requester

Web service provider

Bottom up – Start with a language structure and convert it into a form usable as a CICS web service

Bottom up

Language structures

Requester – means that CICS is the user of a web service provided elsewhere

Bottom-up

New service: WSDL / JSON

Generate

Existing
business application
(COBOL, C, C++, PLI)

Top-down

Existing service
description WSDL / JSON

Generate

New business application
(COBOL, C, C++, PLI)

Meet in the middle

Existing service
description WSDL / JSON

**Map and
Generate**

Existing
business application
(COBOL, C, C++, PLI)

- Web Services and XML development
  - Offers the ability to create, view, edit and validate WSDL, document-type definitions (DTD) and XML schemas, transforms XML documents into text, HTML, or other XML document types.
  - Integrates relational databases and XML.
  - Generates COBOL adapters and CICS TS V3 WSBind and COBOL artifacts for converting between Web Service Definition Language.

- The CICS service flow feature provides components that extend CICS Transaction Server by providing adapters that exploit CICS interfaces to invoke the CICS terminal-oriented transactions and COMMAREA programs required by the web service generated from the service flow project.

Using CICS IA data to identify mobile entry points

IBM.

Benefits
• Upfront knowledge of resources required to define an Application Bundle

Open CICS SM Editor and assign an entry point
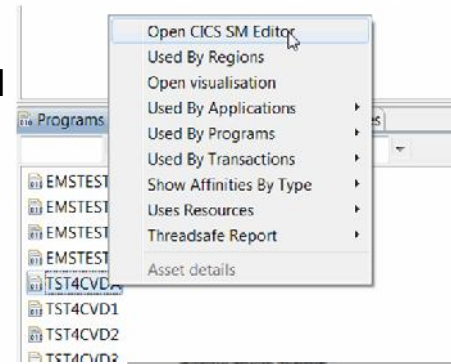
New! Multi-version support
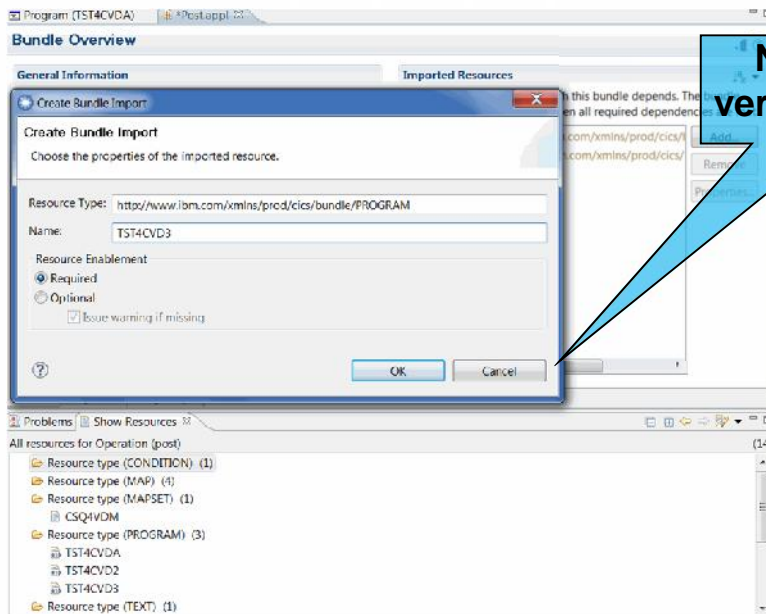
Collect and load data into DB2

Define bundle using IA information

Would you like to:

- Receive an SMS when the stock trade file is open for business?
- Notify your mobile dashboard whenever an application uses any 24-bit user storage?
- Reduce mobile workload driven by repeated balance inquiries, by pushing notification of balance updates to customers?
- Send claim details to the other party's mobile device when an insurance claim is initiated?
- Trigger authorization request to a sales manager's mobile dashboard when an order is placed for > 50 high value items?
- Automatically send an email or PDF receipt to a customer when an order is processed
- Have a means of delivering analytic data requested by the business without incurring long development cycles?

z System

CICS Transaction Server

CICS application

CICS Events

zLinux
MobileFirst Platform

Adapter
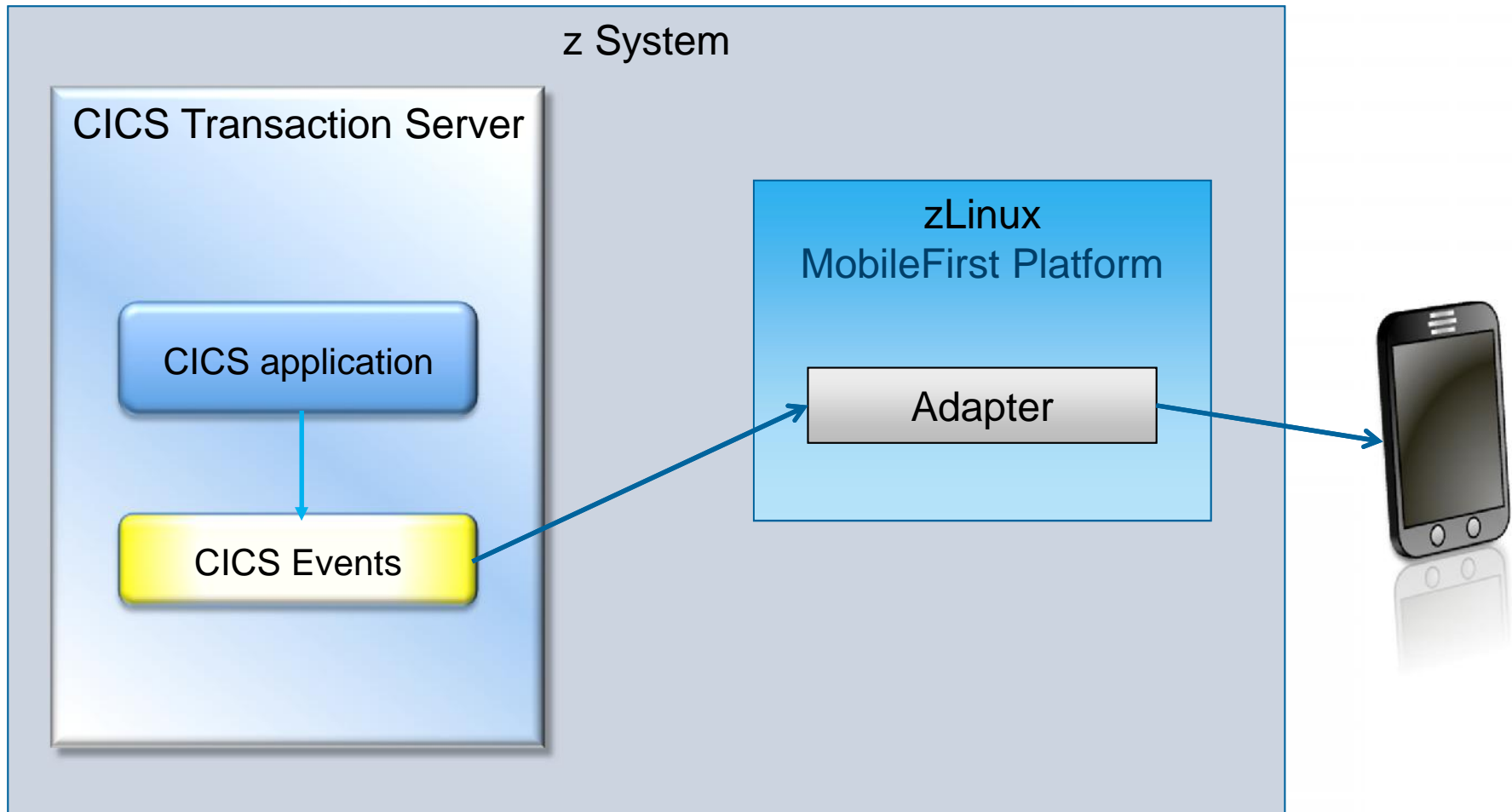
- Populate business dashboards

- Comply with compliance and governance requirements

- Customize promotional offers

- Monitor and improve warehouse efficiency

- Get notification if key files fail to open at CICS startup

- Fraud detection

  – Send text message when fraud occurs

  – Use events to optimize fraud checking

  – See also *ACI-1992: From OLTP to OLTAP - Real-time Fraud Detection for CICS Payments Processing*

- Events to drive BigData and Analytics

28
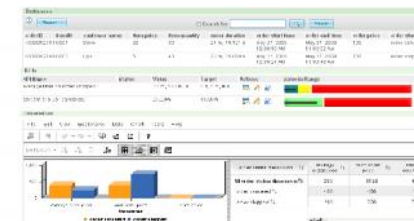
The scenario

(2) Customer 2 starts a claim on their car policy using their mobile, specifying customer 1's details
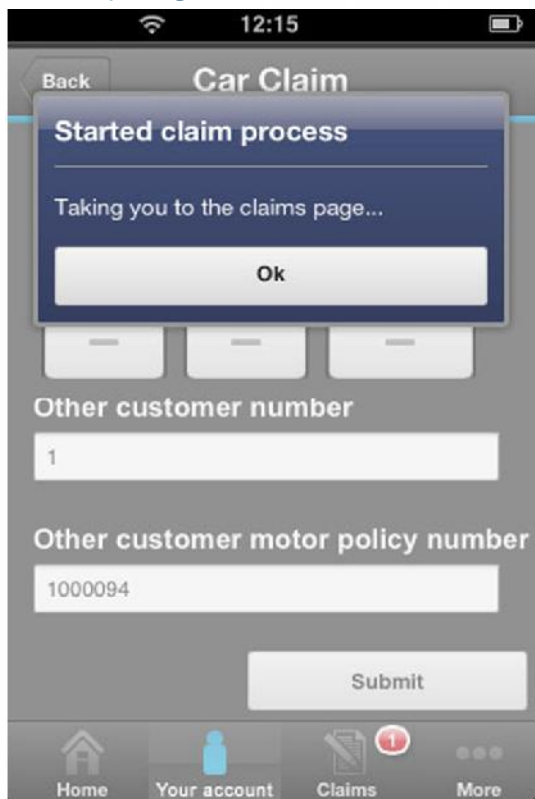
(1) Customer 1's car "makes contact with" customer 2's car

	GENAPP_Mobile

Policy Claims

A claim has been made against your car insurance.

Claimant details:

Claimant	Claimant 2
Customer number	2
Motor policy number	1000093
License plate	DR3AM
Make / Model	Make / Model name

(3) Customer 1 gets notified on their mobile about the claim, with the claimant's details
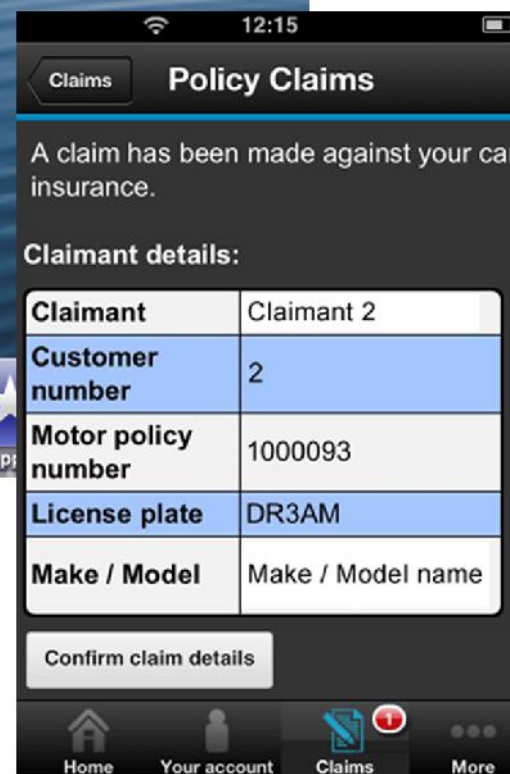
CA0D: IBM GENAPP mobile application sample for CICS TS
CB12: GENAPP, a General Insurance Application

What happened? CICS PA can tell you

Use IBM ODM to unlock rules hidden in existing applications

Application

Rule 1

Rule 2

Rule 3
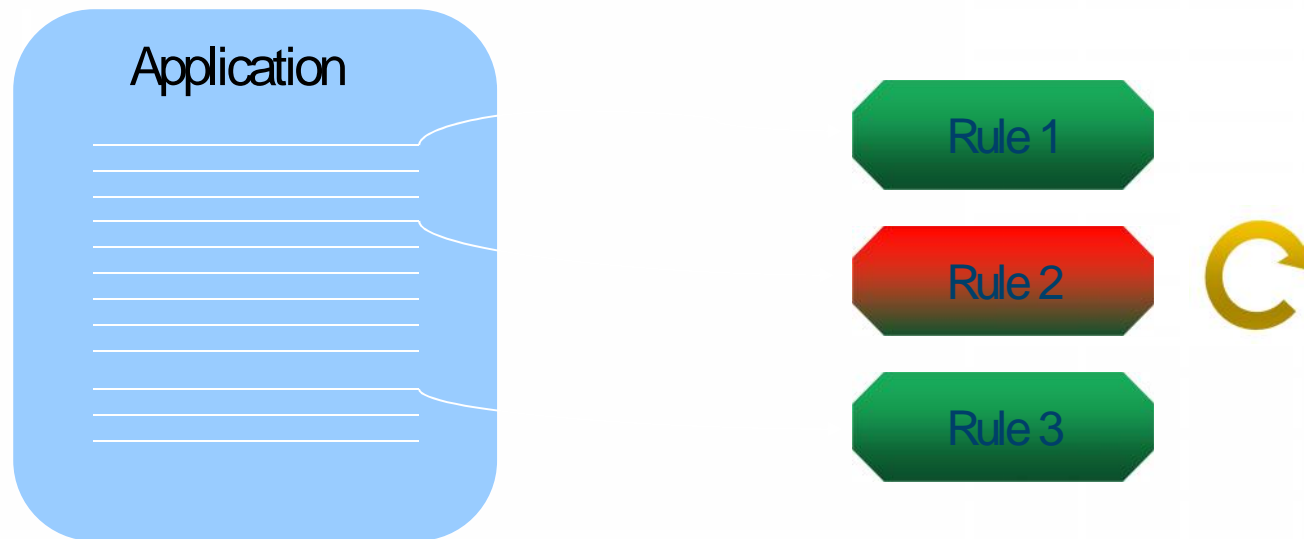
- Gradually pull out rules from existing applications
  - Focus on those business decisions that change fast and often
  - Re-express business rules in natural language
  - Manage and store them in a central facility
  - Does not require a "big bang" change

Redefined Application Change Cycle

**Functions / Tasks / Flow
changes in Weeks / Months**

Application
Developer

**Application
Development**

| Functional
Requirements | | Functional
Enhancements /
Platform Upgrades |

**In-Production
Business Rule Application**

Synchronization

**Business Rule
Management**

| Business
policies | Business policy
and rule
changes | Business policy
and rule
changes | Business policy
and rule
changes | Business policy
and rule
changes |
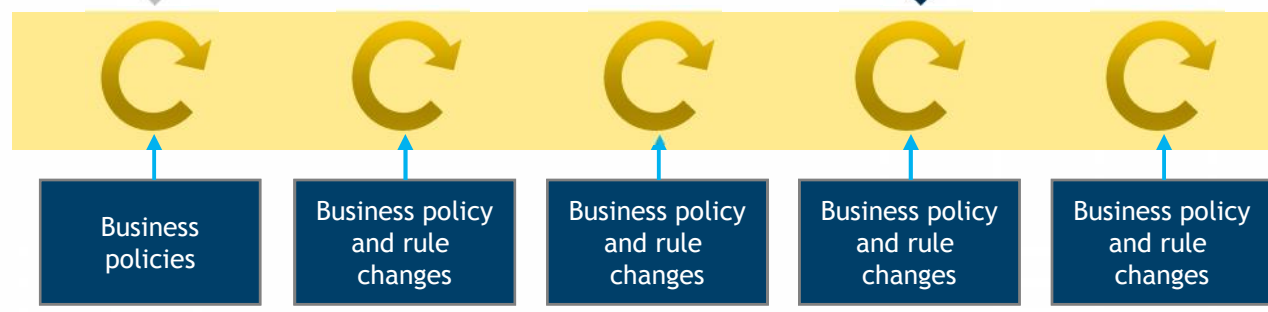
Business & IT

**Decisions / Policies
Changes in Days / Weeks**

Decision Management: Comprehensive Flexibility

IBM.

Architect, Application Developer

Rule Designer

Workstation

Business Analyst, Business Manager

Decision Center

Decision Center Repository

Distributed or z/OS

Deploy

Deploy

z/OS

CICS

zRES

COBOL & PL/I Applications

zRES

WOLA

Cross Memory

z/OS Batch

zRES

COBOL & PL/I Applications

WAS for z/OS

RES

Java Applications

RES

IMS

COBOL & PL/I Applications

Decision Server access on z/OS optimized for COBOL & PL/I

Decision services delivering consistent business behavior enterprise wide

RES

Java Applications

WAS

Distributed

Yes ... for many very good reasons:

z/OS Specialty Engines

Pressures on cost containment often dictate greater use of z/OS specialty engines. Java offloads to zAAP. Java batch does as well.

Tooling Support

Development tooling for Java has advanced to the point where some tools (IBM Rational Application Developer) are very powerful and sophisticated.
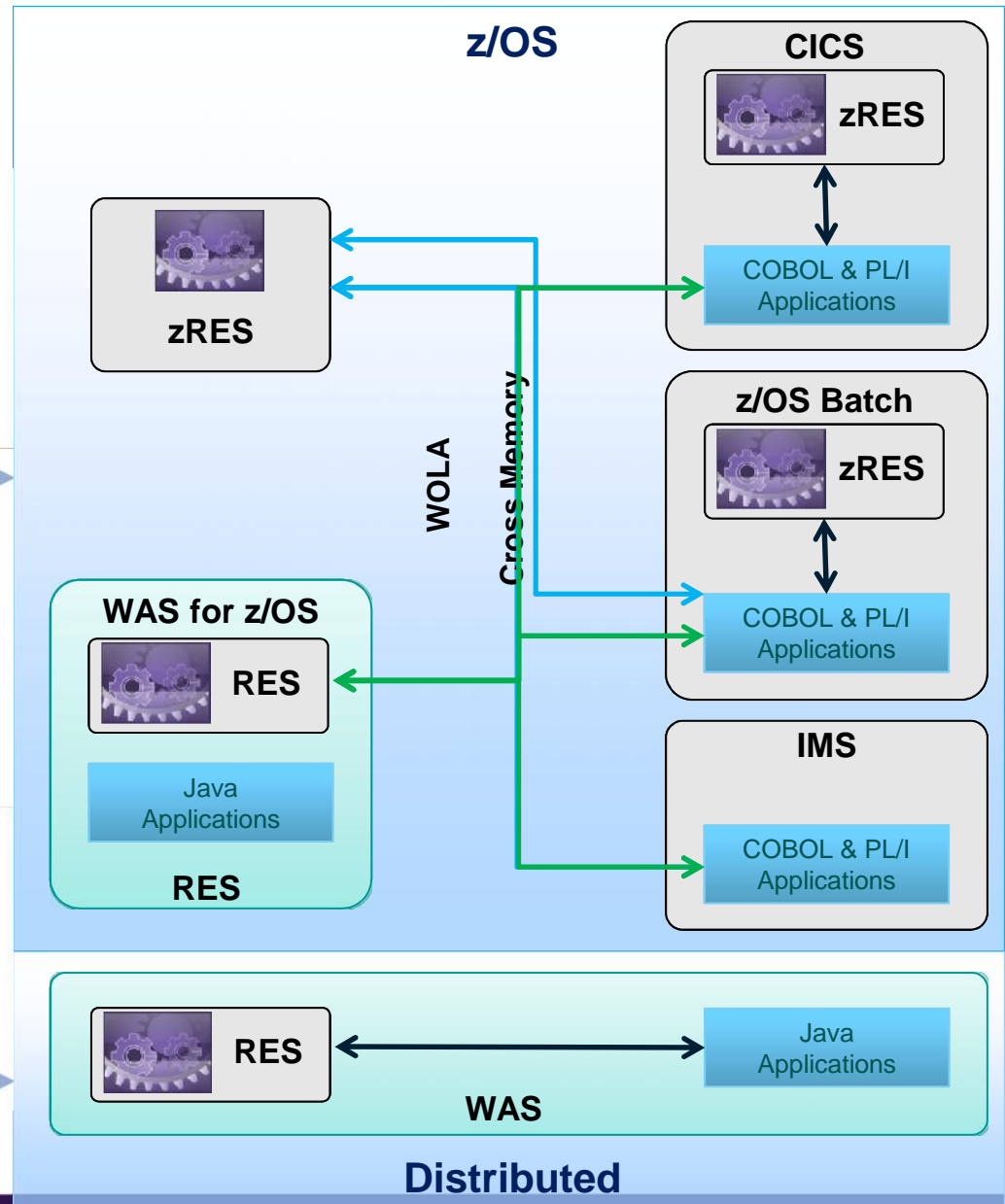
This also provides an opportunity to consolidate to a common tooling environment for both OLTP and batch development.

Processing in OLTP Runtime

Running Java batch in the same execution runtime as Java OLTP provides an opportunity to mix and manage the two processing types together under the same management model.

Availability of Skills

Java is a programming language with wide adoption in the industry. Skills for Java programming are common and affordable.
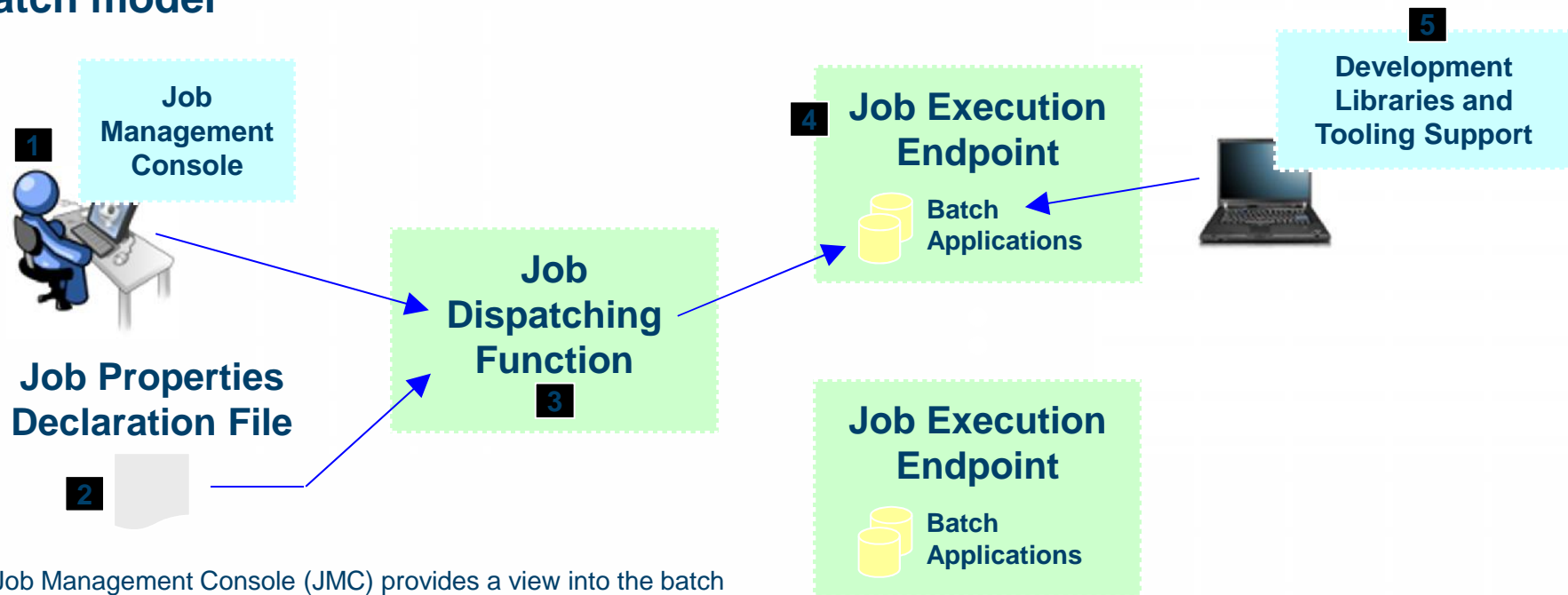
Windows of time which used to be dedicated to batch processing are shrinking, while batch workloads continue to grow as online transactions increase

24 x 7 x 365 Access

Mobile Users

Online

Online

Batch

Batch

The need to process batch work has not gone away.

The need to perform batch concurrent with online has emerged.

This picture illustrates some of the key components of the WebSphere Java Batch model

5
Development Libraries and Tooling Support

1	**Job Management Console**

Job Properties Declaration File

2

Job Dispatching Function	3

4	**Job Execution Endpoint**
	Batch Applications

Job Execution Endpoint

Batch Applications

1. Job Management Console (JMC) provides a view into the batch environment and allows you to submit and manage jobs
2. Job declaration file (xJCL) provides information about the job to be run, such as the steps, the data input and output streams and the batch class files to invoke
3. The Job Dispatching function interprets the xJCL, dispatches the job to the endpoint where the batch application resides, and provides ability to stop and restart jobs
4. The Execution Endpoint is a WAS server in which the deployed batch applications run
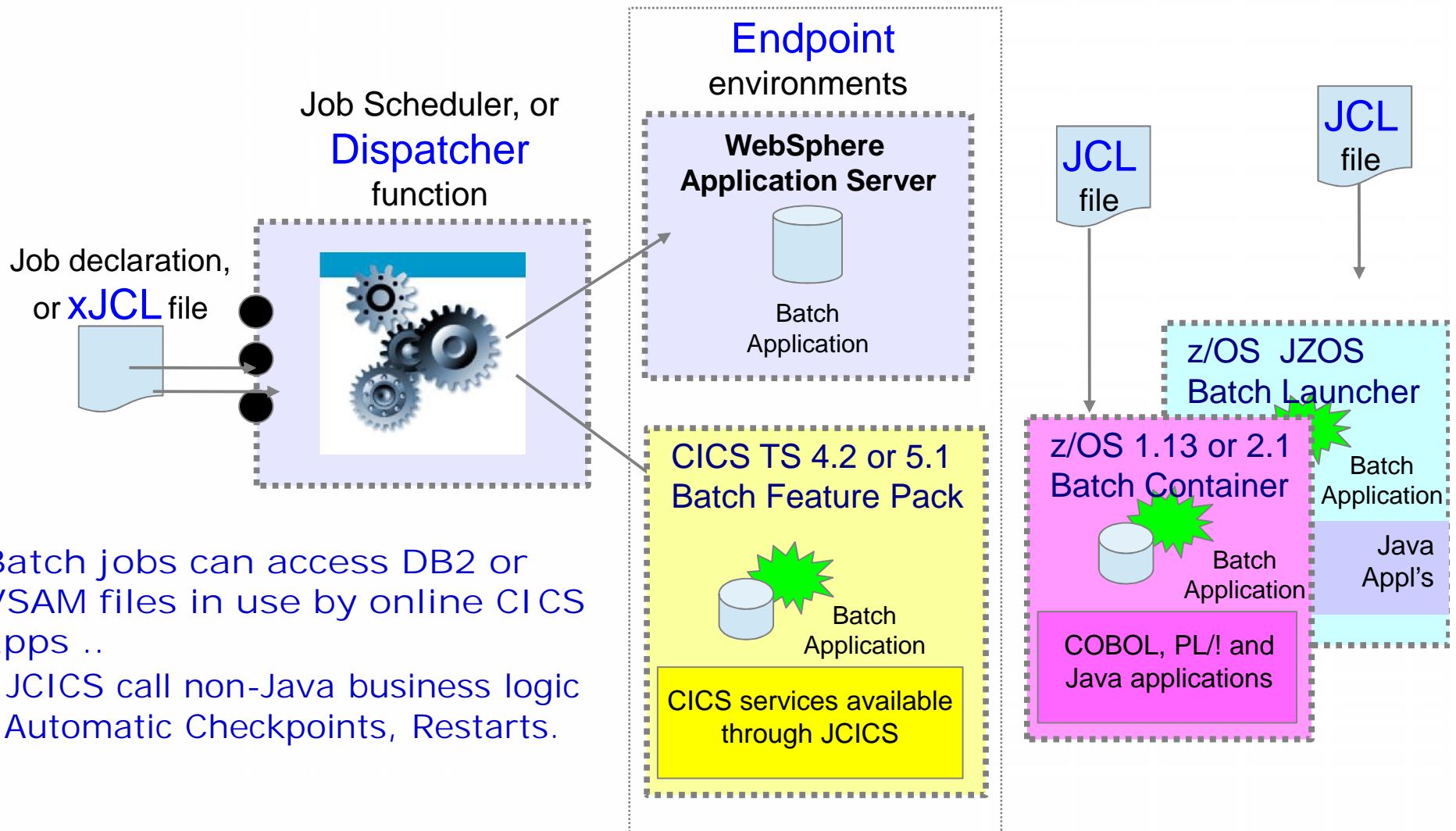5. The development libraries and tooling assist in the creation of the batch applications

A comprehensive Java batch execution platform
Built on the proven Java runtime environment of WebSphere Application Server

There's also a Java batch container for CICS ...   and z/OS

Endpoint
environments

Job Scheduler, or
Dispatcher
function

Job declaration,
or **xJCL** file

**WebSphere
Application Server**

Batch
Application

JCL
file

JCL
file

z/OS JZOS
Batch Launcher

Batch
Application
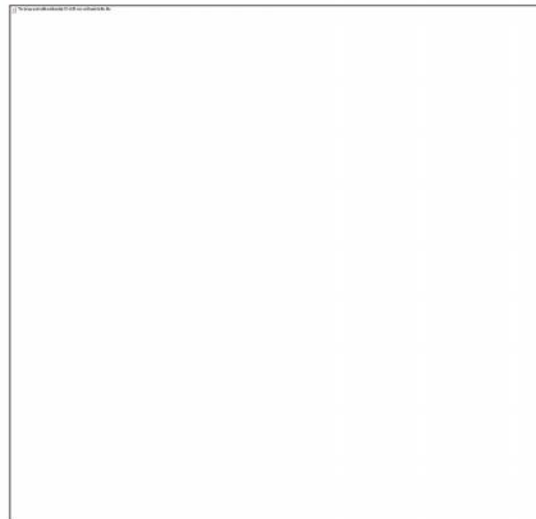
Batch jobs can access DB2 or
VSAM files in use by online CICS
apps ..
- JCICS call non-Java business logic
- Automatic Checkpoints, Restarts.

CICS TS 4.2 or 5.1
Batch Feature Pack

Batch
Application

CICS services available
through JCICS

z/OS 1.13 or 2.1
Batch Container

Batch
Application

COBOL, PL/! and
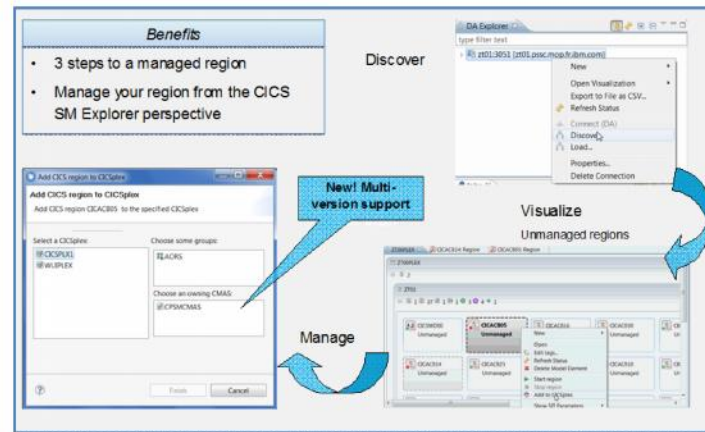Java applications

Java
Appl's

Optimize applications, systems, and processes to achieve more with less

Step 1

Threadsafe analysis and implementation to reduce CPU utilization by up to 20%

Step 2

Workload Management to cope with mobile scalability and availability needs
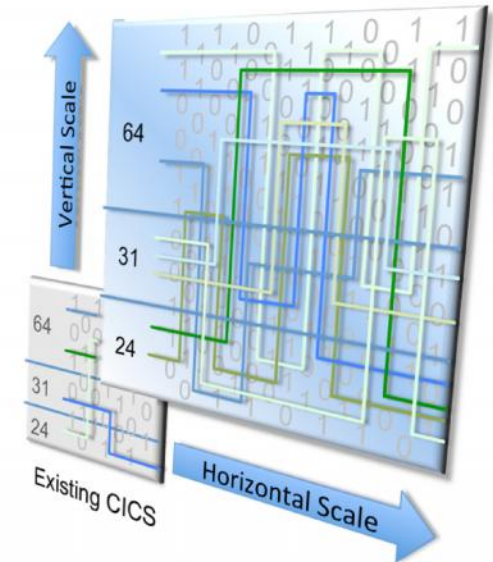
Step 3

Region **Consolidation** to reduce management overhead and CPU utilization (up to 10%)
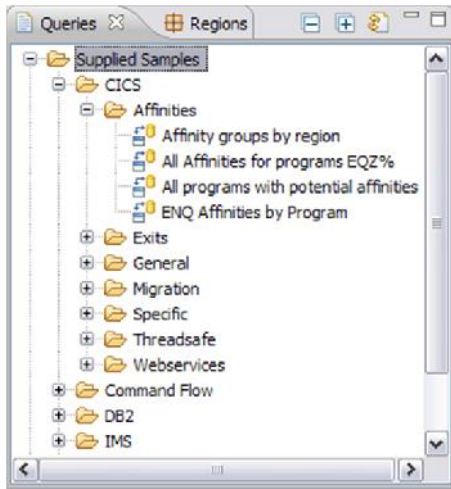
Humana.

"Improved application performance by 10–20 percent and reduced the cost of processing claims, positioning it to handle growing numbers of claims"

Adding new data fields and converting EBCDIC data to UNICODE

Step 1

Identify CICS programs & data affected by this change
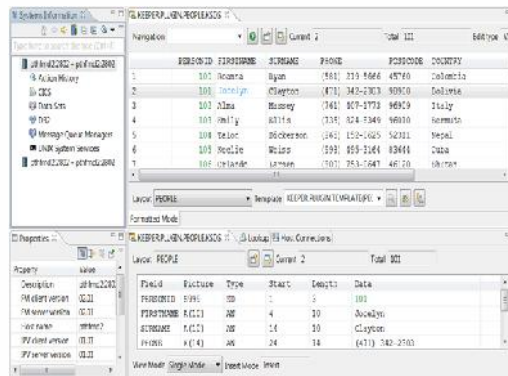
Step 2

Create masked test data in new format and initialize new fields to something sensible
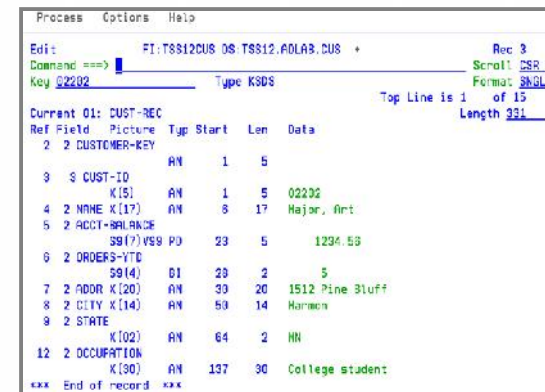
Step 3

Copy the current production data to the new format , converting text data from EBCDIC to UNICODE and the initialized new fields

Major US manufacturer Purchased FM to copy data from EBCDIC to UTF8. This was a need for them and could not be fulfilled by the CA File Master product.

CICS VSAM Transparency for z/OS

Why Migrate from VSAM to DB2?

- Integration with new applications that are already DB2 based
  - Web App. Servers
  - Multi-platform applications
  - Data analytics

- Shared data for inquiry and update

- Ease in running ad-hoc queries

- Built in Data Integrity

- Adhere to data governance mandates

- Support 24x7 Applications

CICS VT enables you to...

- Migrate VSAM files to DB2 without changing application programs
- Maintain single copy of the data
- CICS and batch programs access data in DB2 under the control of CICS VT
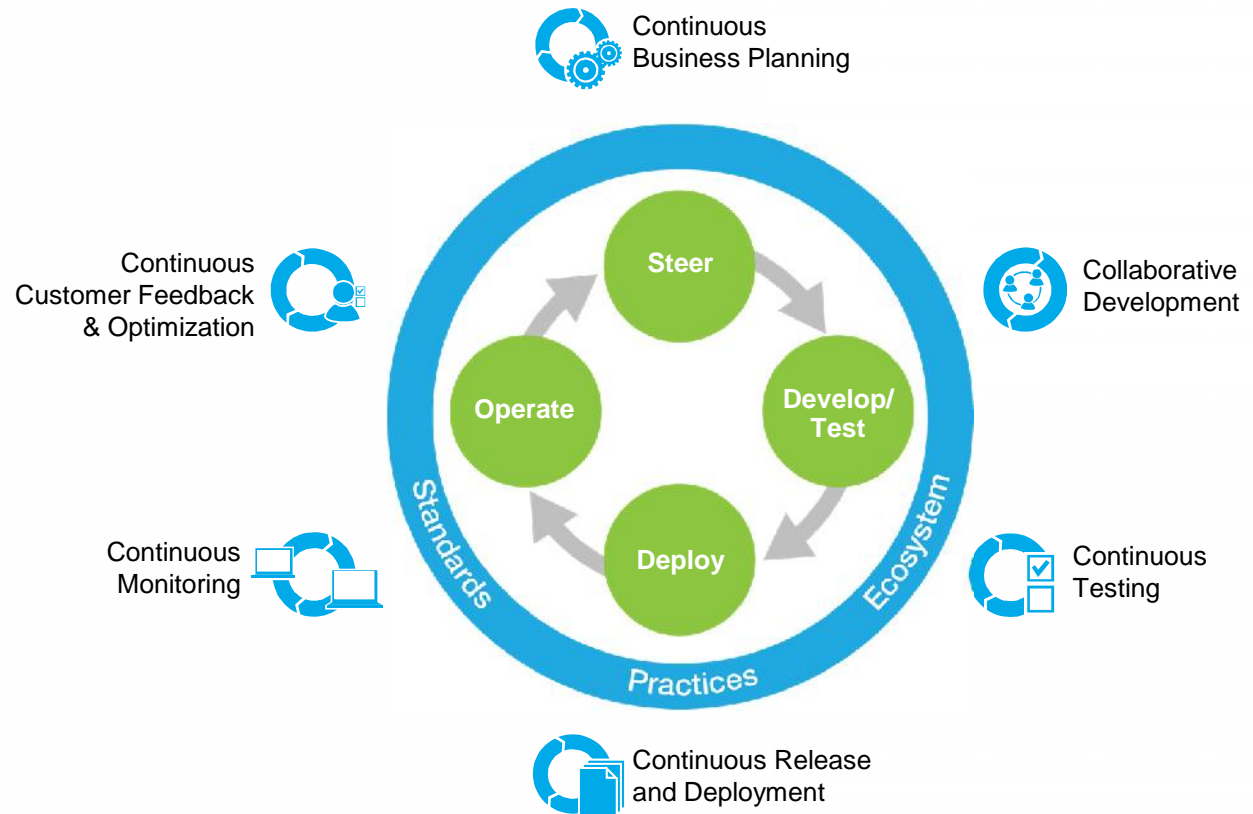- Access migrated DB2 data natively using SQL

Application Program → CICS VT → INSERT UPDATE / SELECT → DB2 Table #1
GET READ / WRITE, REWRITE → VSAM File #2

Application programs unchanged

Enterprise capability for continuous software delivery that enables organizations to seize market opportunities and reduce time to customer feedback

Accelerate software delivery – *for faster time to value*

Balance speed, cost, quality and risk – *for increased capacity to innovate*

Reduce time to customer feedback – *for improved customer experience*

Continuous Business Planning

Continuous Customer Feedback & Optimization

Collaborative Development

Steer

Operate

Develop/ Test

Deploy

Standards

Ecosystem

Practices

Continuous Monitoring

Continuous Testing

Continuous Release and Deployment

Our DevOps POV is resonating with clients and they are delivering **measurable business outcomes with DevOps**

Integrated tooling to respond to mobile dynamics
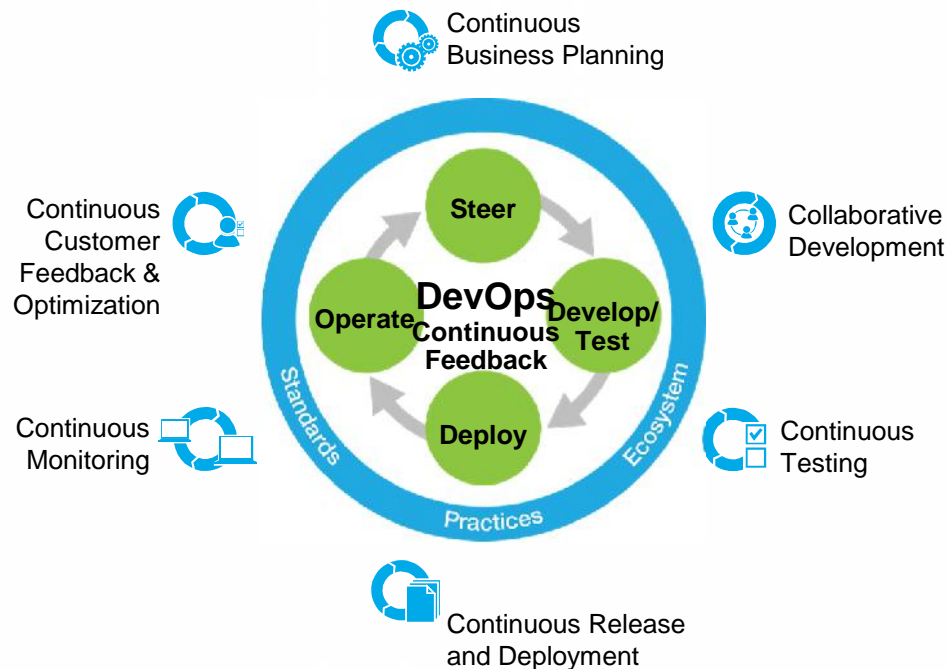
"CICS products helped streamline processes, increase productivity and reduce errors"
Leading healthcare provider

Continuous Business Planning

Continuous Customer Feedback & Optimization

Steer

DevOps
Continuous Feedback

Operate

Develop/Test

Collaborative Development

Continuous Monitoring

Deploy

Standards

Ecosystem

Practices

Continuous Testing

Continuous Release and Deployment

"Threadsafe functionality helped us cut our CPU usage by 550 MIPS - US$440,000 annually
HUK-COBURG

HUK-COBURG
Aus Tradition günstig

IBM CICS Tools
IBM Problem Determination Tools
IBM Rational Developer for the Enterprise
IBM Rational Team Concert
IBM MobileFirst Platform
IBM z/OS Explorer
IBM Enterprise COBOL, PL/I, C/C++

Enabling you to…

Optimise applications, data, infrastructure for IT value

Modernize applications, data, infrastructure for business value

Diagnose problems and test and solutions for successful outcomes

"Increased programmer productivity by 10 percent with fewer transaction failures"
HSBC Bank Argentina S.A

HSBC
En Argentina y en el mundo, HSBC

More information

- Web pages
  - http://ibm.com/cics
  - http://ibm.com/cics/showcase
  - http://ibm.com/cics/tools
  - http://ibm.com/software/awdtools/deployment
- Analyst reports
  - IBM CICS Tools: Discovery and Optimization for the Next Generation link
  - IBM PD Tools – leads the pack again link
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