



# Building a connectivity solution for Smart SOA on System z



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**Hursley, UK**

# Smarter Business Outcomes Through Smart SOA

**1** Drive Agility into the Organization



**2** Tame Chaos With Process



**4** Meet New Customer Needs



**3** Build a 'Smart' SOA Foundation



## 3 Build a 'Smart' SOA Foundation

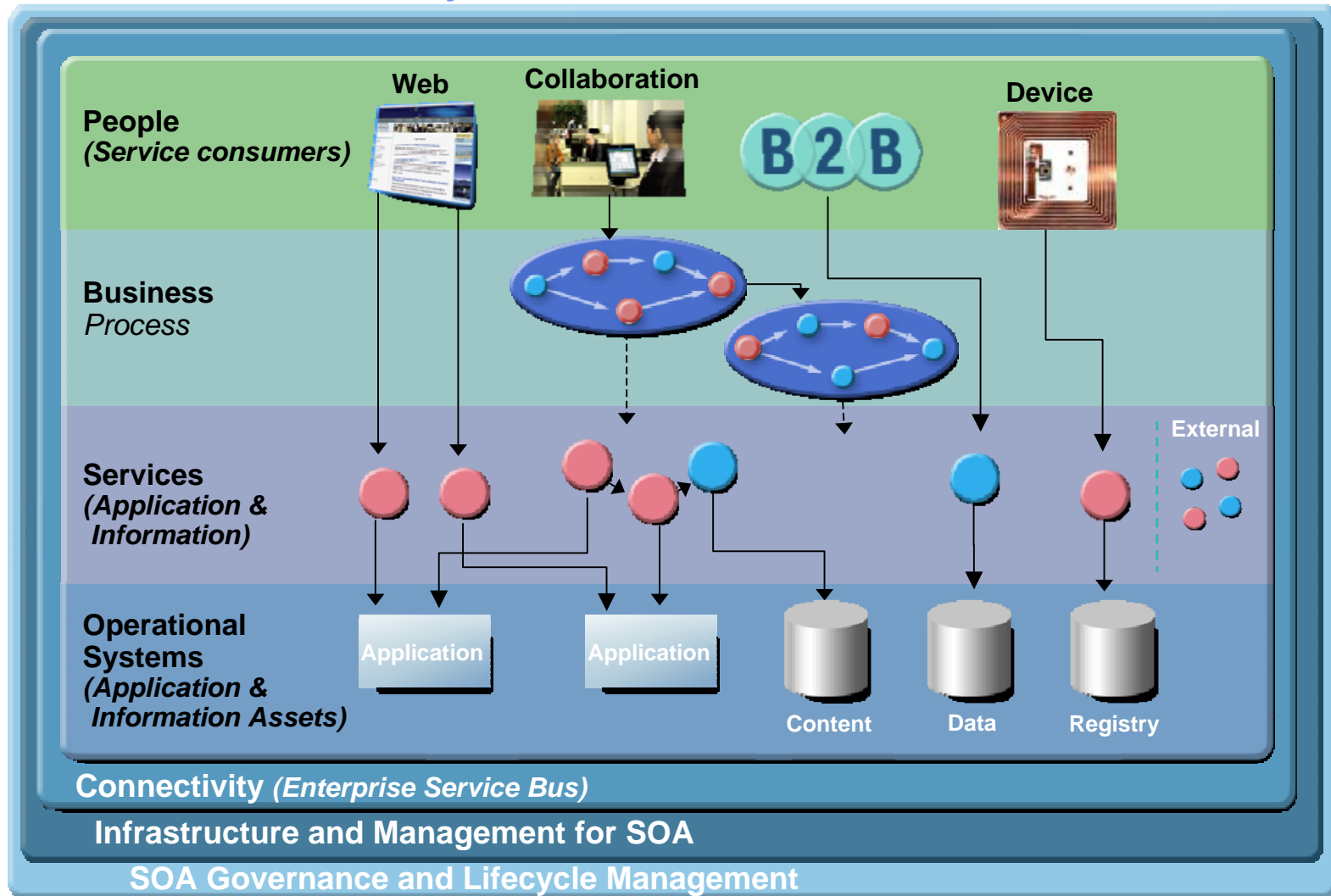


*Create sustainable  
differentiation by harnessing  
the power of smarter  
technology*

Connecting your SOA  
for greater business insight

- Enhanced business connectivity with managed file & application integration
- Greater empowerment with Web 2.0 & Mashups
- New efficient ways to continuously leverage z data

# Smarter Business Outcomes through flexible Service Connectivity



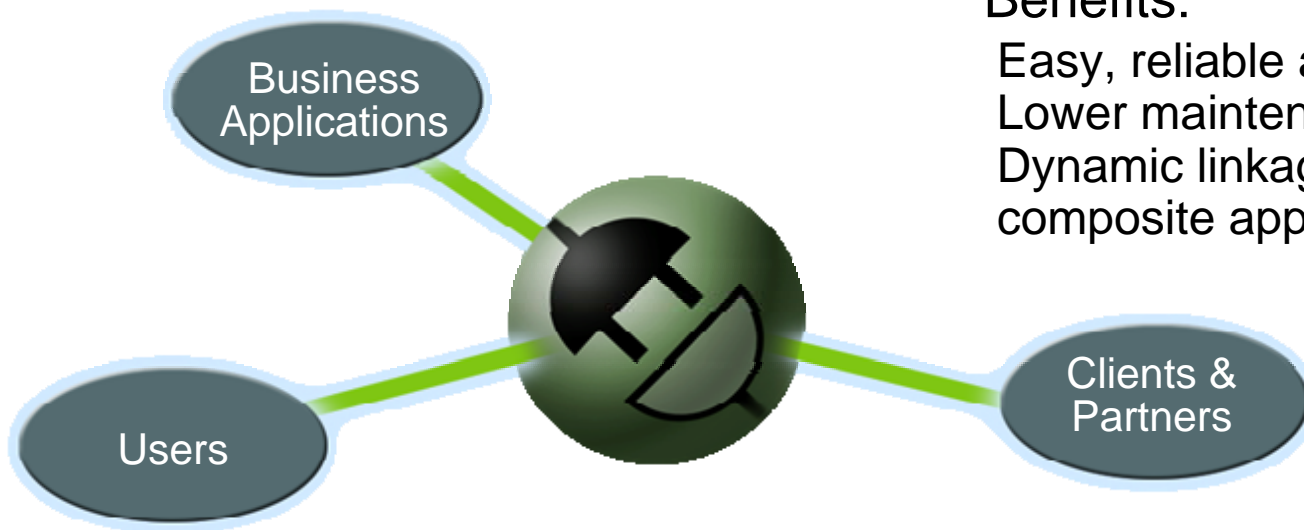
Flexible Enterprise Infrastructure through aligned Business and IT

# Connectivity for Greater Agility

Connectivity links applications, services and users to:

- Deliver a robust, resilient connectivity infrastructure that fully leverages your System z investment
- Provide integration between departments and partners without complexity
- Bring together new and existing IT assets

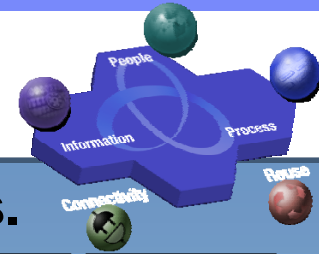
*“From DATEV point of view [WebSphere] MQ V7 offers two very important features. First at all the simplified usage of PubSub and secondly the asynchronous message consumer.”*



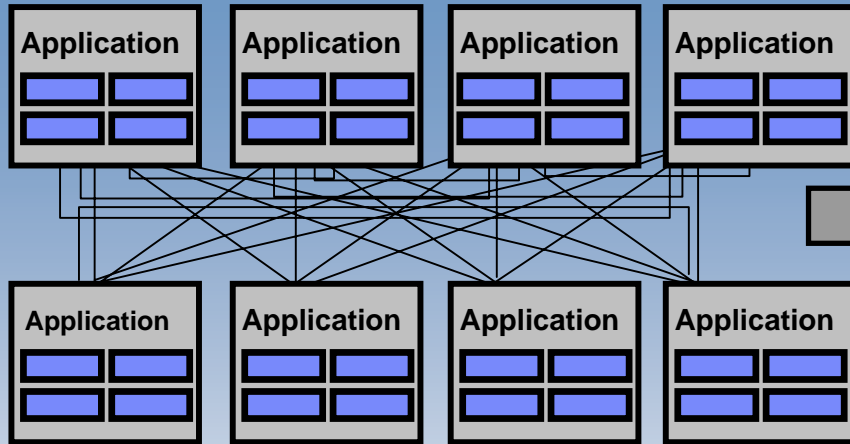
## Benefits:

Easy, reliable access across systems  
Lower maintenance cost  
Dynamic linkages when building composite applications

# SOA with an ESB – Simplifying Interfaces and Applications

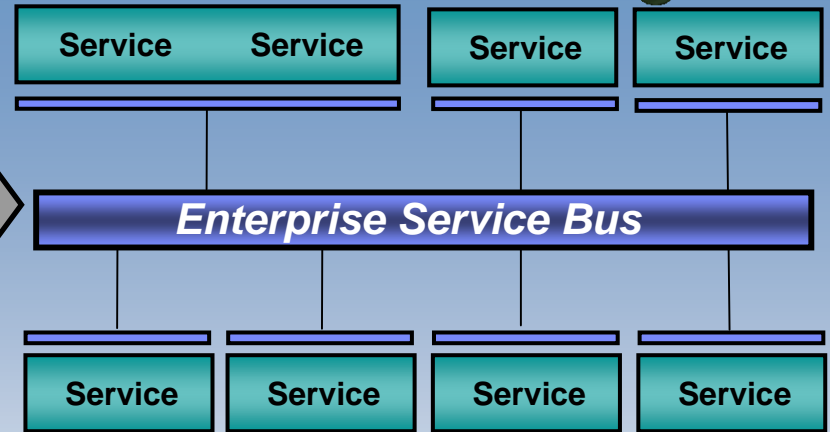


Turning this...



= interface

...into this.



## SOA + ESB:

- ✓ Introduces rich business abstractions to describe the application interface.
- ✓ Decouples the interfaces from the business applications and reduces technical complexity
- ✓ Consolidate multi vendor platforms into a unified messaging backbone, enable reuse of both the business applications and their interfaces
- ✓ QoS to match business need, sending the right data to the right service, logs and correlates events

*The ESB → Virtualizes access to services.*

# What is an Enterprise Service Bus?

- An ESB enables integration between loosely-coupled applications and services within and across
  - **Services oriented architectures** – where distributed applications are composed of granular re-usable services with well-defined, published and standards-compliant interfaces
  - **Message driven architectures** - where applications send messages through the ESB to receiving apps
  - **Event driven architectures** - where applications generate and consume messages anonymously
- Mediations within an ESB enable intelligent processing of service request/responses, events, messages
  - At application endpoints or distributed through the infrastructure of the Bus
  - Capabilities include:
    - Matching and routing of messages between services
    - Conversion of transport protocols between requestor and service
    - Transformations (e.g. XML to XML translations, DB lookups, aggregations),
    - Distribution of business events from/to disparate sources.
- **Enabling simple application integration across different platforms, programming models & messaging standards**
  - underpinning Business Process and managed Business Partner integration

# Why loose coupling?

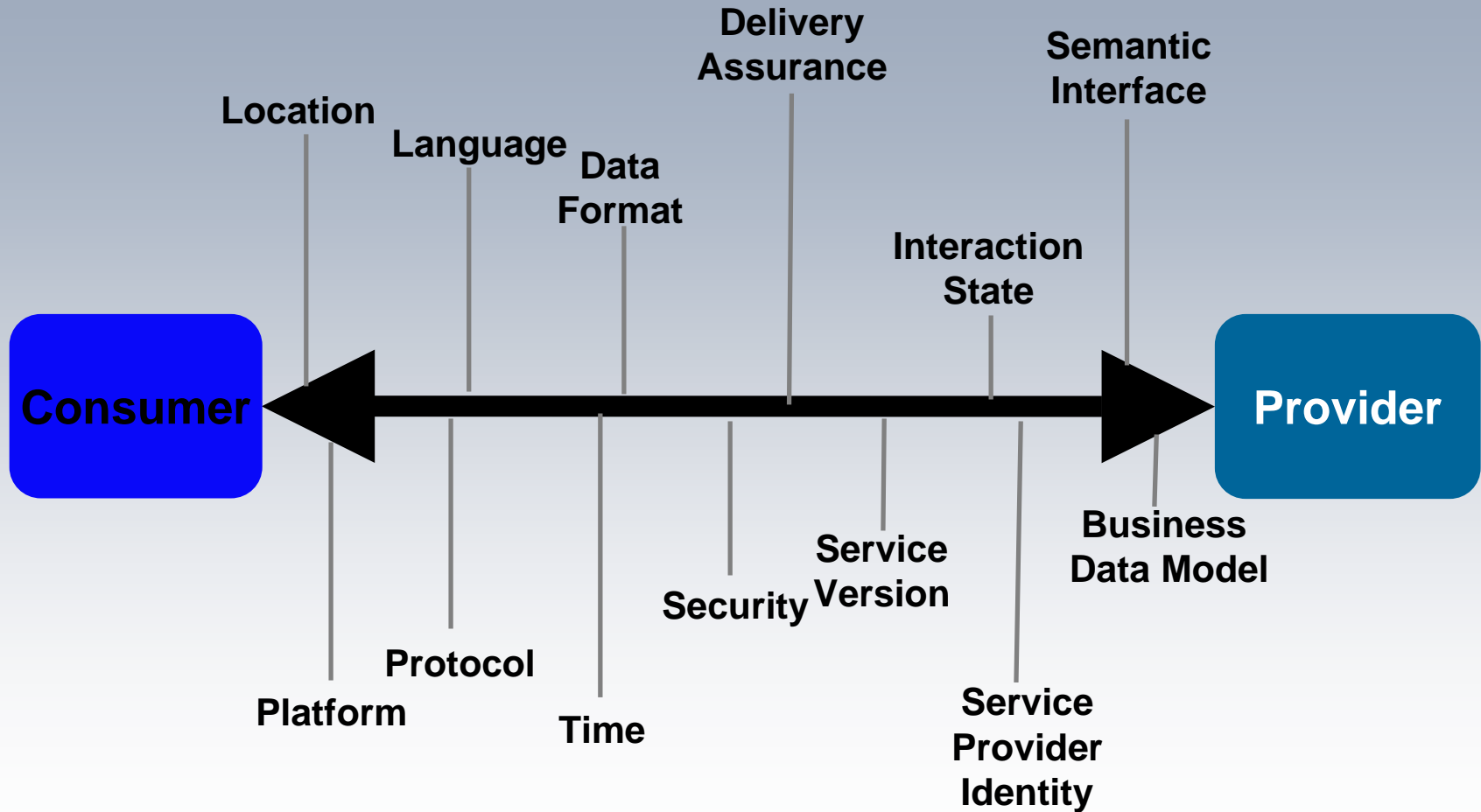
- **Tighter coupling tends to cost more over time:**
  - Synchronizing multiple organizations on change
  - Adapting, redeploying updated components without affecting others
  - Making changes is hard and expensive, or impossible:
    - Knowledge is distributed throughout the code
    - Same people are solving business and infrastructure problems
  - Different parts of the solution are difficult to manage separately
  - Hard to move, hard to scale, hard to distribute, hard to replace
  - More coupling implies more expensive testing
- **Loose coupling requires greater investment up front:**
  - More design work
  - More implementation work

**Several service elements must be considered when thinking about coupling:**

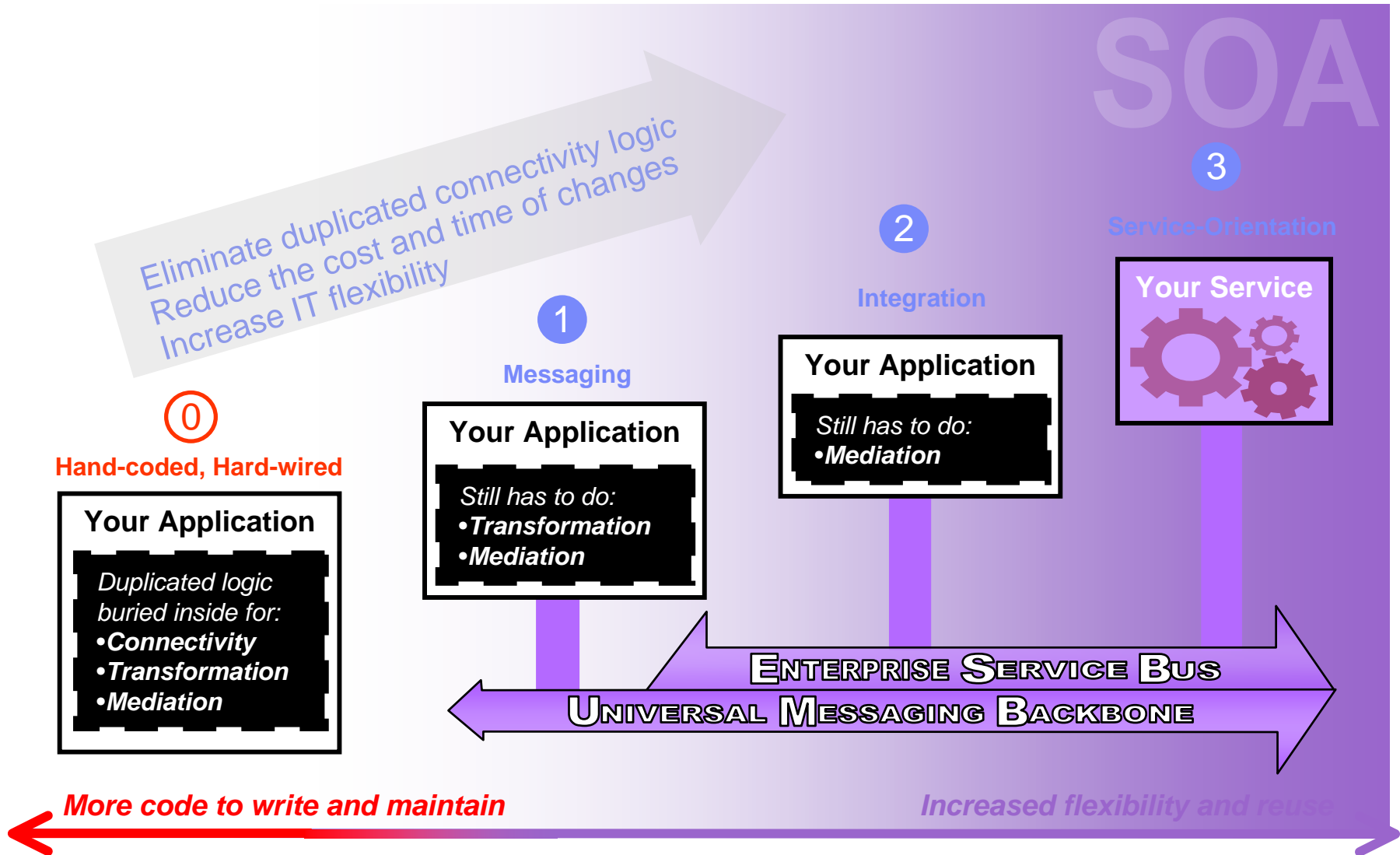
- **Service**
- **Message**
- **Interface**
- **Contract**
- **Policy**
- **Conversation**
- **State**
- **Transactions**
- **Process**



# Loose coupling aspects of service interactions



# Simplifying Connectivity – A First Step To SOA

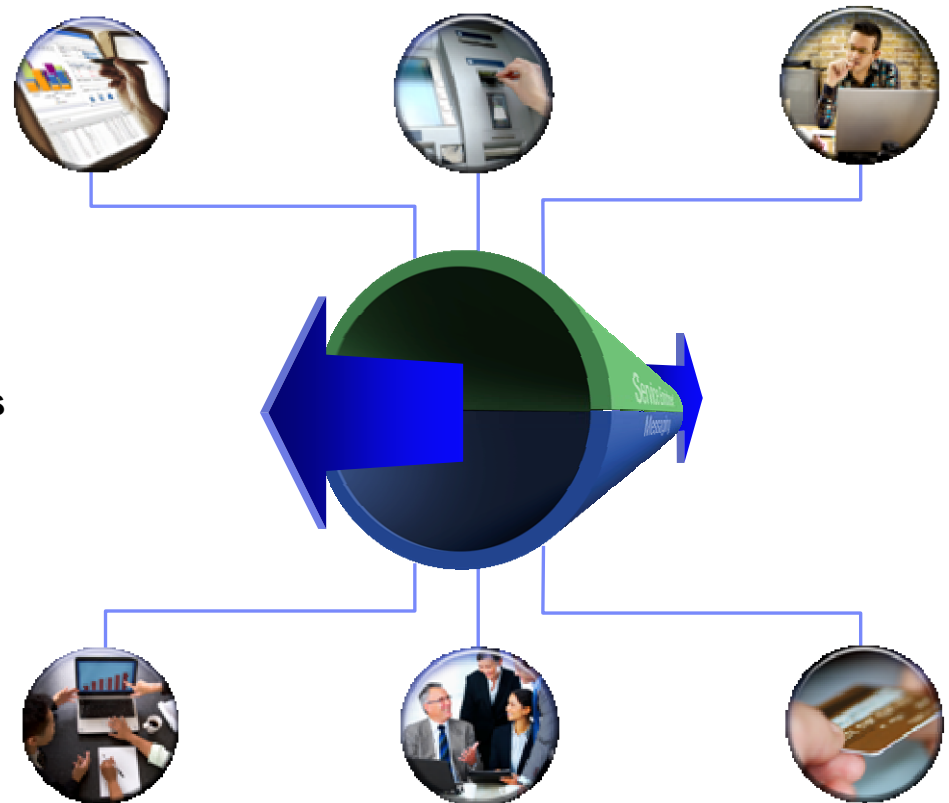




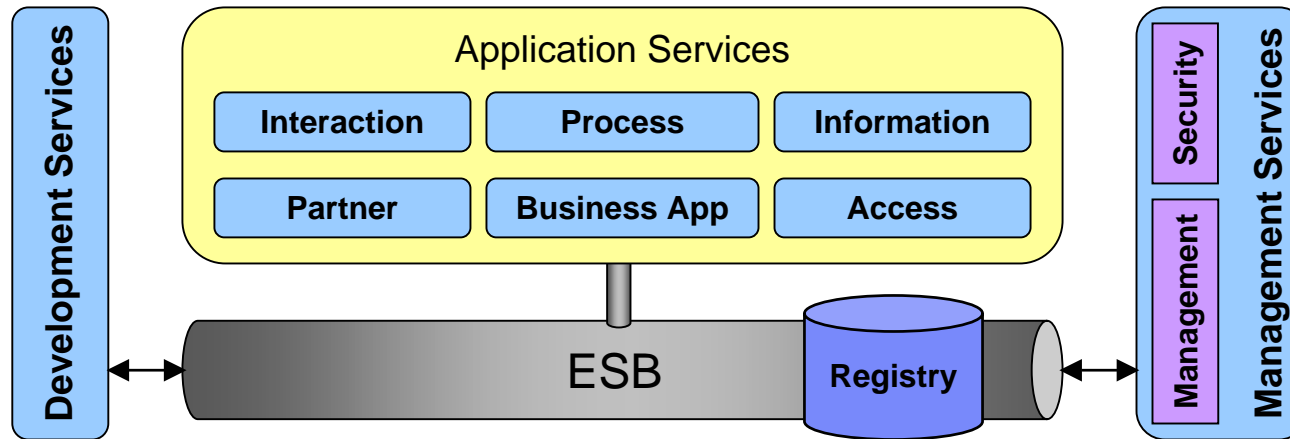
# Integrating business applications through an ESB

*An ESB is a flexible connectivity infrastructure for integrating applications and services*

-  **Connects Everything to everything**
-  **Matches & Routes Communications between services**
-  **Converts Between different transport protocols**
-  **Transforms Between different data formats**
-  **Distributes Business events**



# An ESB-centric view of the SOA Foundation Logical Model



- **Outside ESB**
  - Business Logic (Application Services)
    - ESB **does** contain integration logic or connectivity logic
    - Criteria: semantics versus syntax; aspects
- **Loosely coupled to ESB**
  - Security and Management
    - Policy Decision Point outside the ESB
    - ESB can be Policy Enforcement Point
- **Tightly coupled to ESB**
  - Service Registry
    - Registry a Policy Decision Point for ESB
    - ESB a Policy Enforcement Point for Registry
    - But, Registry has a broader scope in SOA
- **Tooling required for ESB**
  - Development
  - Administration
  - Configures ESB via Service Registry

Described in a developerWorks article by Greg Flurry  
<http://www-128.ibm.com/developerworks/architecture/library/ar-esbpat1/>

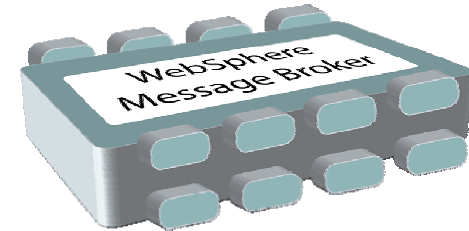
# IBM Recognizes and Embraces the Multiple ESB

*Reality with our ESB Portfolio Strategy*



## WebSphere ESB

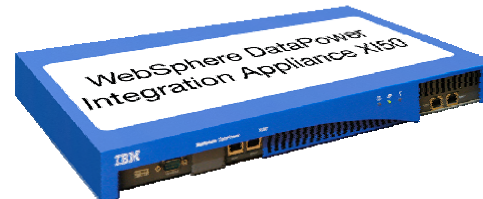
*Built on WebSphere  
Application Server for an  
integrated SOA platform*



## WebSphere Message Broker

*Built for universal connectivity and  
transformation in heterogeneous  
IT environments*

**ESB  
offerings from  
IBM WebSphere**



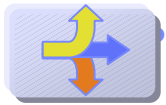
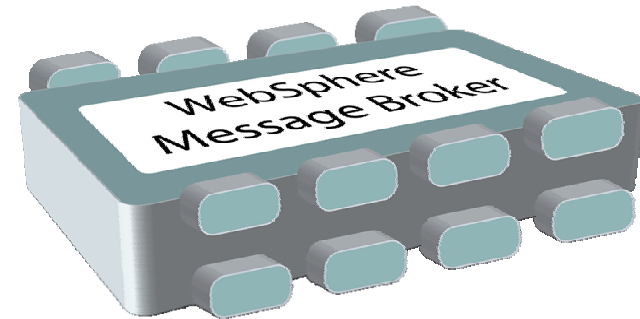
## WebSphere DataPower Integration Appliance

*Purpose-built hardware ESB  
for simplified deployment and  
hardened security*

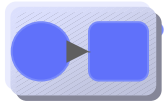
# WebSphere Message Broker on System z

*Built for universal connectivity and transformation in heterogeneous IT environments*

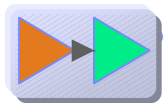
- Connect FROM anything TO anything: the broadest range of transport, protocol, data format and transformation capabilities
- Flexible and function rich ESB: address a wide range of requirements encompassing both existing & new, applications and services.
- Tightly integrated and optimized for the z/OS platform, including specific features for MQ, DB2, CICS, IMS and RRS subsystems.
- Advanced features such as Complex Event Processing and file based integration including VSAM.



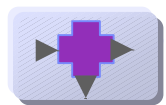
Exploits the unparalleled reach and reliability of the WebSphere MQ enterprise messaging backbone



Integrates everything through standard protocols, WebSphere Adapters for enterprise applications, and specialized connectivity options



Enables transformation between a wide range of data formats, including XML, legacy, and industry standards, and custom formats



Optimized for high-volume processing and rapid time to value for complex mediation requirements with a robust set of pre-built mediation function

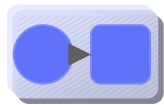
# WebSphere ESB on System z

*Built on WebSphere Application Server for an integrated SOA platform*

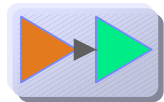
- Integrates seamlessly with WebSphere platform
- Delivers business-critical qualities of service
- Easily extended to WebSphere Process Server
- Integrated solution for service mediation and hosting



Delivers leadership in SOA standards for service composition, and leverages the embedded messaging and web services engines from WebSphere



Integrates everything with WebSphere Adapters for enterprise applications, the breadth of the WebSphere ecosystem, and support for standard protocols



Optimized for standard XML and web services formats, with basic support for other common formats

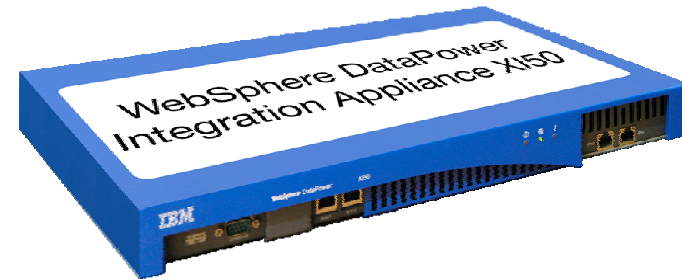


Provides business visibility with embedded event engine for Business Activity Monitoring solutions

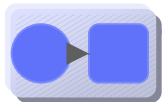
# WebSphere DataPower Integration Appliance XI50

*Purpose-built hardware ESB for simplified deployment and hardened security*

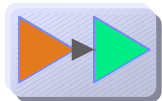
- Redefines the boundaries of middleware with specialized hardware
- Many functions integrated into a single device
- Simplified deployment and ongoing management



Secures services on the network with sophisticated web services access control, policy enforcement, message filtering, and field-level encryption



Optimized to bridge between leading standard protocols at wirespeed, including web services, messaging, files, and database access



Enables transformation between a wide range of data formats, including XML, legacy, and industry standards, and custom formats



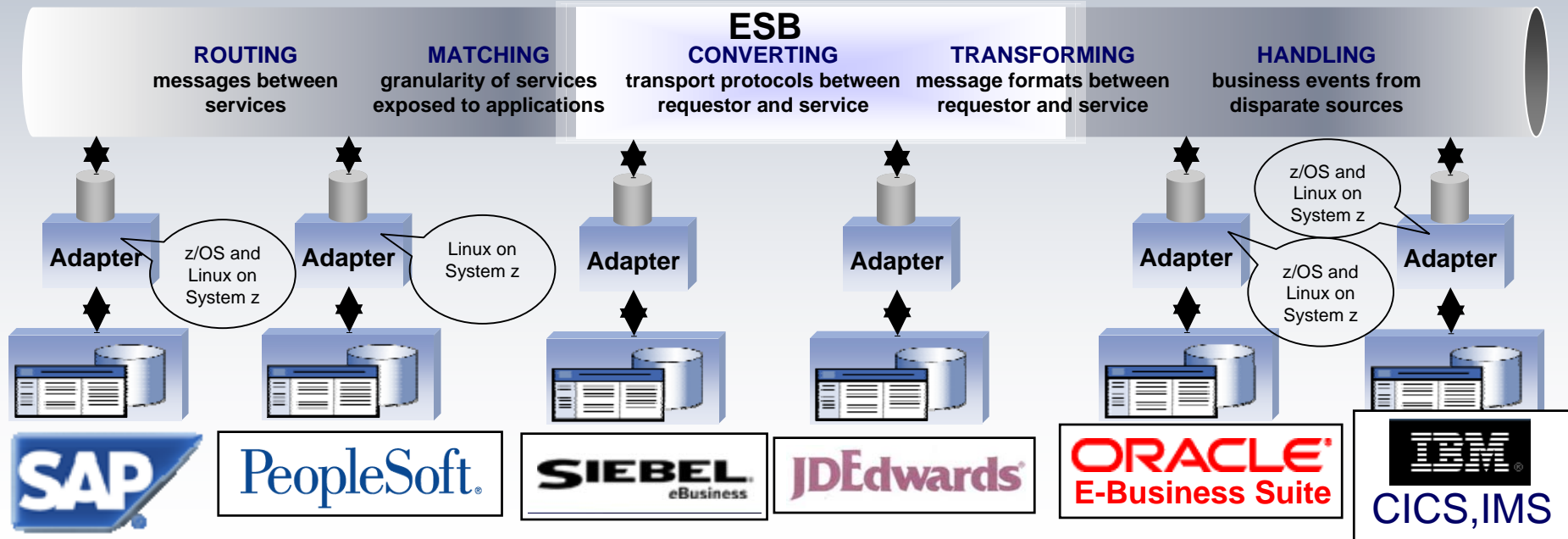
Captures and emits events to facilitate web services management and enable business visibility in Business Activity Monitoring solutions



# WebSphere Adapters helping to Reuse, Connect, Compose

## Service-enable existing applications to an ESB

- Move beyond just accessing data to reuse both data and logic in composite applications
- End-to-end interaction with application driven business events
- A portfolio of pre-built SAP, Oracle and other application adapters as well as a toolkit to generate your own
- Use adapters, MQ Service Definitions or ESB mediations to service enable assets



# SOA Connectivity – Integration Across Your Business

## *Building and Governing Your ESB*

**New!**

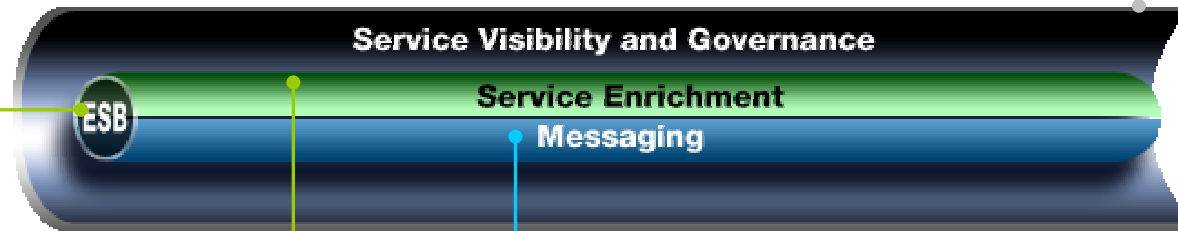
**QuickStart for WebSphere DataPower**

- Low-cost, low-risk start for your SOA implementation

**New and Enhanced!**

**WSRR 6.2**

- Publish and Find Your Services to extend business applications
- Manage & Govern your SOA
- Ensure consistent enforcement of policies



**Enhanced!**

**WebSphere ESB 6.2**

- Leading Web services standard support
- Delivers Policy-driven connectivity

**New and Enhanced!**

**WebSphere MQ and MQ File Transfer Edition**

- Leading SOA messaging backbone capabilities
- File transfer scheduling, automation, auditing and triggering

# Selecting your Connectivity platform:

*System z is uniquely capable of ensuring QoS*

- Up to 99.999% availability in a Parallel Sysplex to avoid planned and unplanned outages
- Change management and rolling maintenance reduces planned outages
- GDPS enables recovery of whole systems across vast distances in split second time
- Component level recovery for both hardware and software
- Automated recovery response to failures including restart and isolation, as appropriate
- Dynamic workload balancing across systems and logical partitions for 24x7 operations

*A large bank running their ESB on System z has seen 99.99% availability since their initial deployment two years ago.*



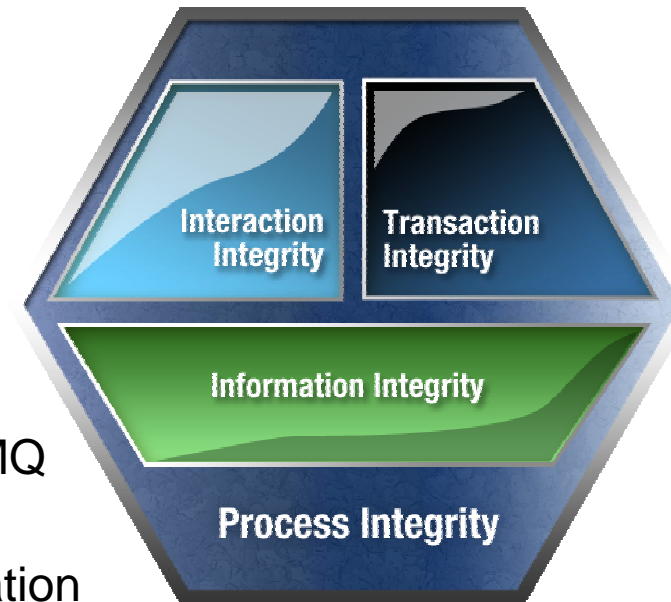
Quality of Service



# Selecting your Connectivity platform:

*Process Integrity with Connectivity software for System z*

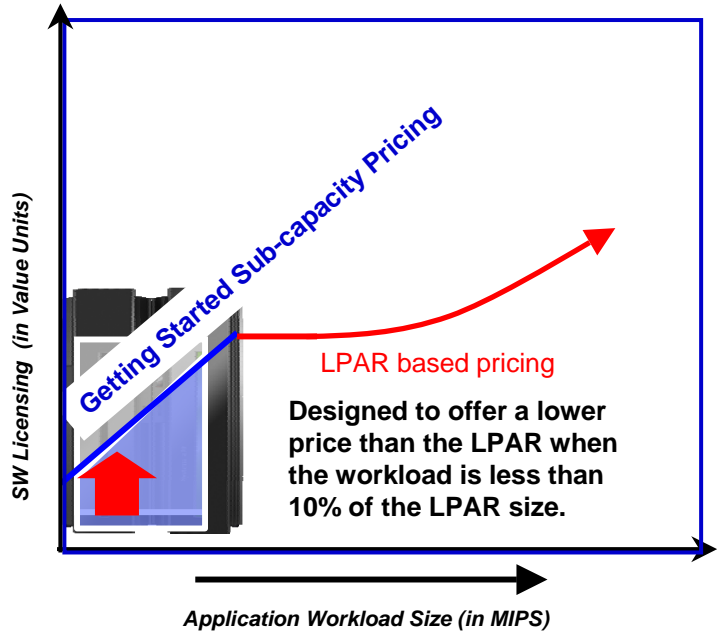
- **WebSphere MQ for z/OS, WebSphere Message Broker for z/OS, WAS for z/OS, WESB for z/OS**
  - Fully ARM-enabled
  - Workload Management
    - Goal-oriented resource allocation
    - Workload scaling, workload isolation
  - Takes full advantage of Parallel Sysplex for with MQ Shared Queues
  - Sophisticated heterogeneous transaction coordination
  - Supports DB2 data sharing, CICS EXCI support and Resource Recovery System (RRS) global transaction coordination
  - RACF for integrated security
  - Reporting and Chargeback



- **Reduced points of failure**
- **Faster processing**
- **Fast End-to-end recovery**

# Selecting your Connectivity platform:

## Introduction to Getting Started Sub-capacity Pricing



### Problem

**Projects that should be on z/OS software may be blocked by Software Costs**

- When the workload is small, creating and administering a dedicated LPAR for the workload may cost more than the SW license for the workload.
- LPARs are sometimes constrained to sizes larger than the projects need
- Small project or pilot projects may not justify the cost of the whole LPAR
- Once a project is deployed on an alternate platform, it may tend to stay there.

### Solution to Date

- Focus on Total Cost of Ownership
- Traditional Sub-capacity pricing may provide a significant software pricing advantage. Customers software requirements are based on the actual LPAR utilization.
- Specialty Processors (zAAP and zIIP) may provide significant price performance if they contribute workload processing power without contributing to the software costs

### Solution Target

- ✓ Address Total Cost of Acquisition
- ✓ Deliver a more suitable Getting Started price slope for z/OS customers
  - Help augment the sub-capacity solution for up to 10% of the LPAR
  - Provide a smooth starting price experience for getting started with IPLA products on z/OS Software

# Reference Information

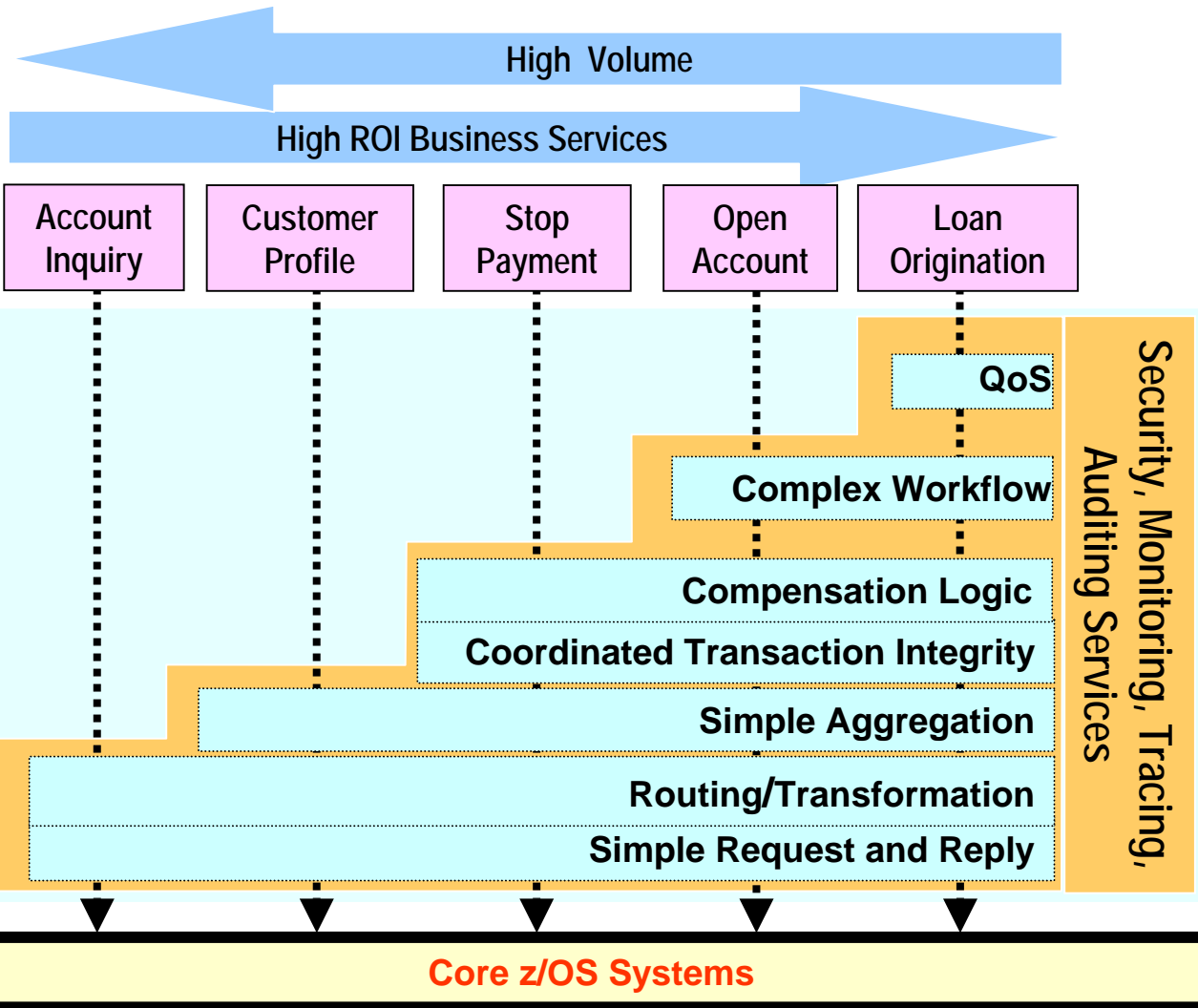
- New! Redpaper - IBM Connectivity Reviewer's Guide  
<http://www.redbooks.ibm.com/redpapers/pdfs/redp4434.pdf>
- ESB Portfolio Trifold  
[ftp://ftp.software.ibm.com/software/websphere/integration/wbimessagebroker/esb\\_trifold\\_0103A.pdf](ftp://ftp.software.ibm.com/software/websphere/integration/wbimessagebroker/esb_trifold_0103A.pdf)

## ■ Other teleconferences

- Introducing reliable, Managed File Transfer for z/OS  
<http://www.ibm.com/software/os/systemz/telecon/27aug/index.html>
- Which ESB on System z? Selection Guidelines for WebSphere Message Broker, WESB and DataPower XI50  
<http://www.ibm.com/software/os/systemz/telecon/30jul/>
- z/OS and Linux for System z: Selecting the best SOA platform for you  
<http://www.ibm.com/software/os/systemz/telecon/9jul/>
- Strategic options for extending CICS to an SOA - this supports the 'Strategic options' <http://www.ibm.com/software/os/systemz/telecon/23apr/>

Thank  
You

# Summary: ESB deployment is dictated by business requirements



As the complexity of the business transaction increases (rightward movement) the workload becomes more targeted to a mainframe deployment:

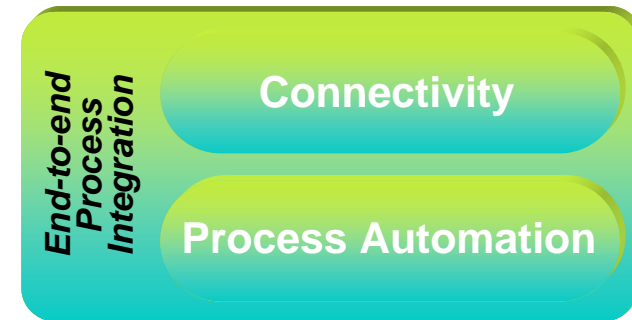
- Need to handle complex transactions
- Ability to effectively monitor end-to-end transaction
- Rollback/compensate support
- Stringent security/isolation requirements
- Elimination of 3 tier latency (value of proximity to data)



# Process Integrity Demands High Quality of Service

## System z is uniquely capable of ensuring QoS

- Up to 99.999% availability in a Parallel Sysplex to avoid planned and unplanned outages
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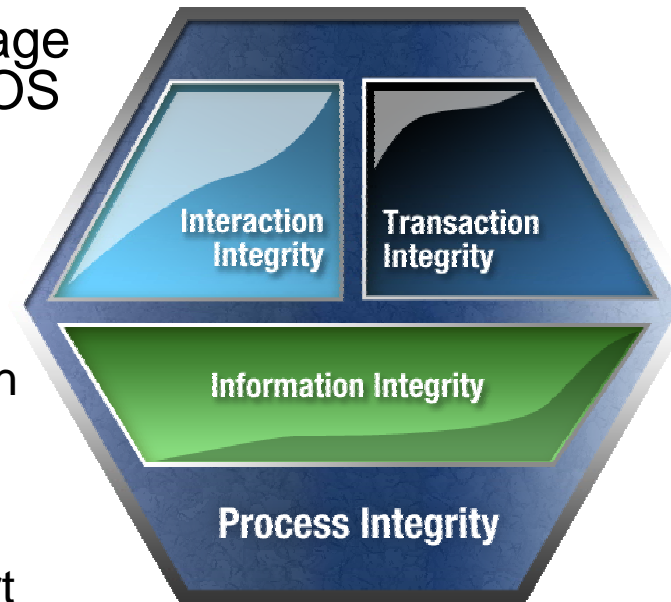
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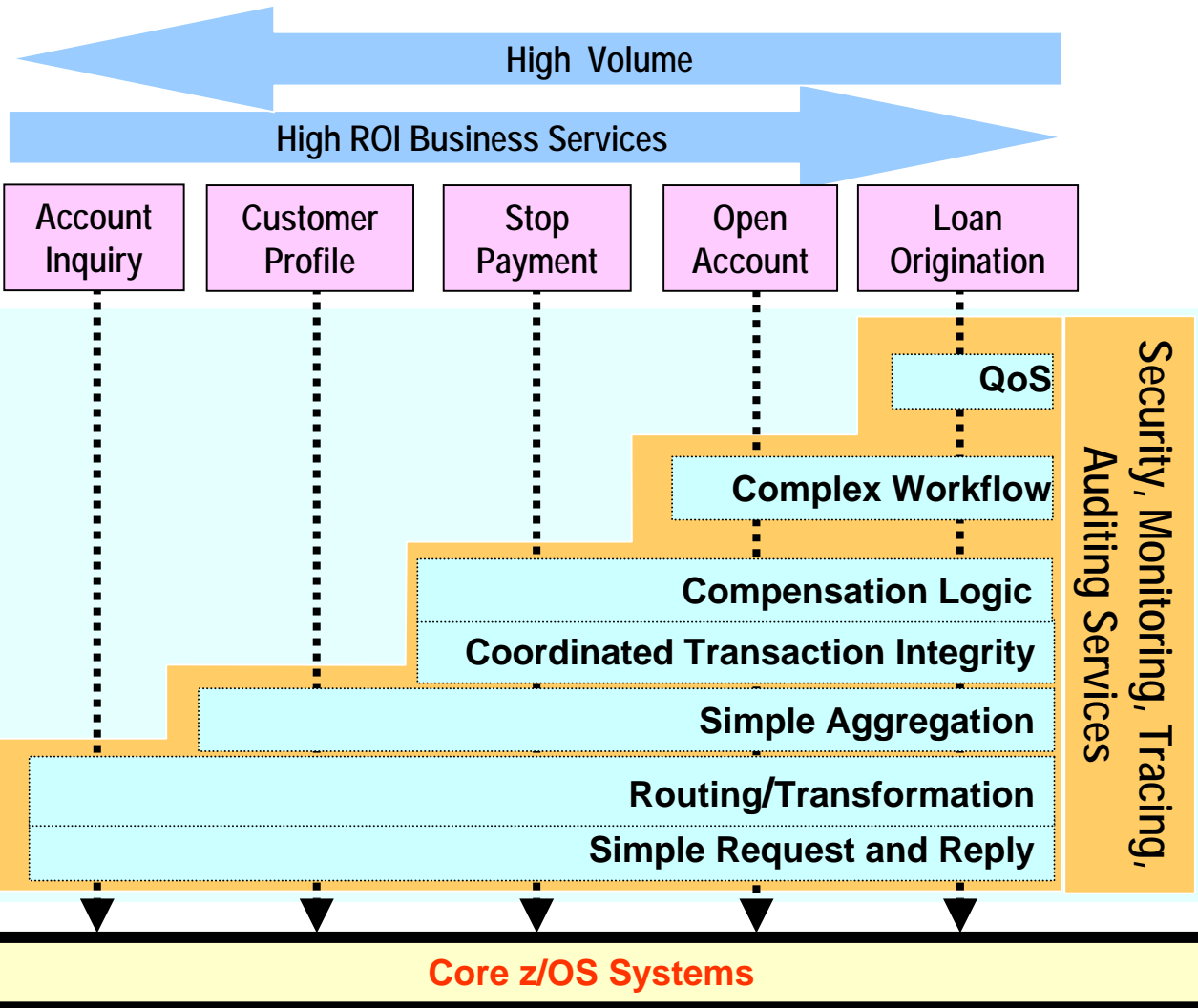
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Thank  
You

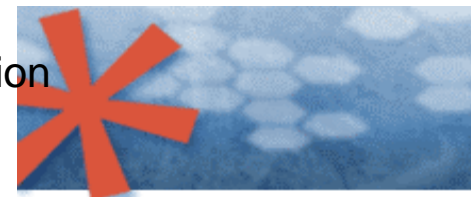


# Additional considerations for placing workloads on z



# Key Takeaways

1. Connectivity on System z – fundamental to Smart SOA
  - ✓ Connects virtually any commercial IT system
  - ✓ Provides availability, security and compliance to help you meet your business objectives
  - ✓ Integrates easily with your key System z business environments (e.g. CICS, IMS) to help reduce risk and cost of core application reuse
  - ✓ Provides connectivity for your business services that matches Service Levels of your System z applications
  - ✓ Ensures flexibility and scalability needed for growth and shared services workload balancing
  - ✓ Adoption of SOA on System z is growing
2. IBM is continuing to invest in the mainframe
  - ✓ SOA products and services
  - ✓ Significant investment for the next five years to drive simplification
  - ✓ Continued focus on the ecosystem



SOA: Unlock business value.  
→ New software and services.

# Improving Business Agility

## ...and the challenge of integrating existing applications

**“Legacy modernization is morphing into a strategic function. IT can't afford to toss away reliable application transactions indiscriminately.”**

-- Phil Murphy, Forrester Research, April 2007

**Software archeology**

### Assets

Layer of disjointed, poorly understood enterprise assets, preventing reuse

### Architectures

Tightly-coupled architectures hindering IT flexibility

### Skills

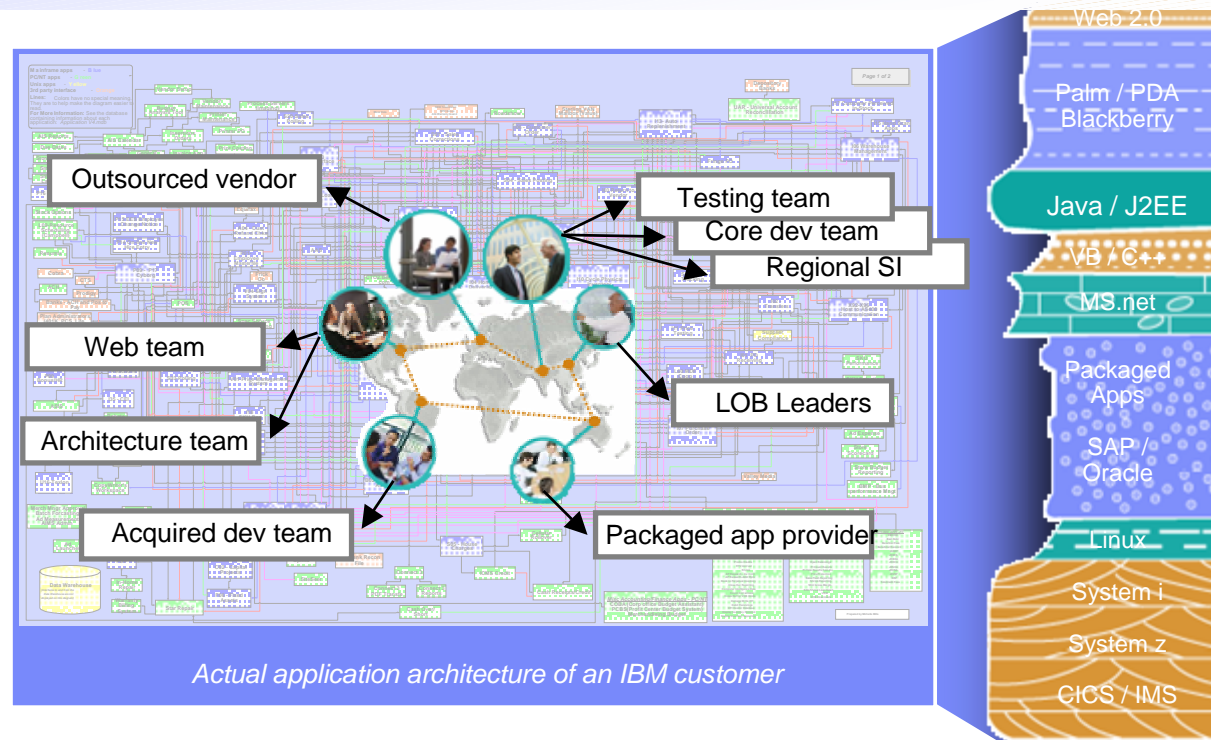
IT skills shortage and silos limiting staff productivity and mobility

### Processes and tools

Duplicate processes, tools and infrastructures limiting collaboration

### Investments

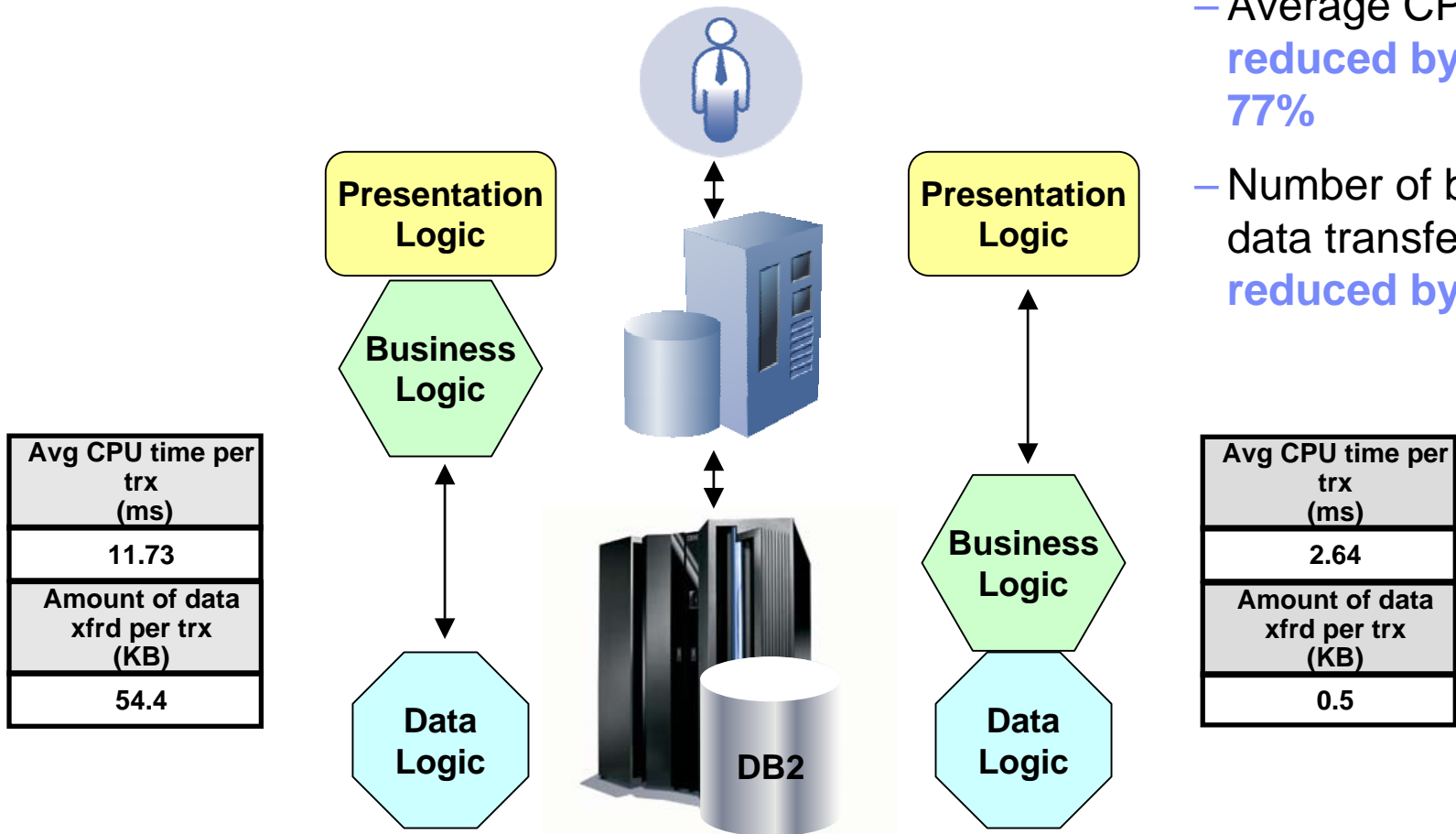
Increasing maintenance costs limiting flexibility for new investments



# Performance: The value of proximity

Per EJB transaction:

- Average CPU time **reduced by over 77%**
- Number of bytes of data transferred **reduced by 99%**



*Transportation industry POC*

*<http://www.ibm.com/support/techdocs>, Optimizing WebSphere Performance on DB2, WP100558*

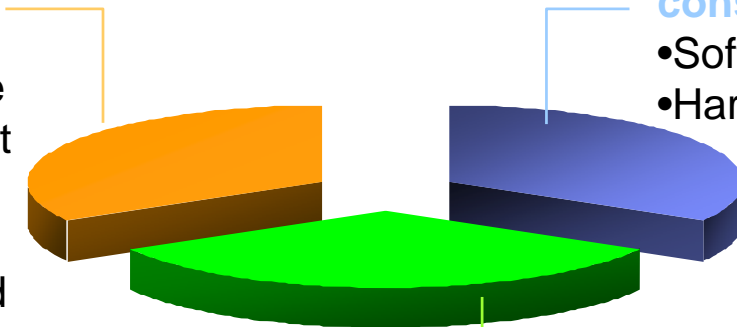


# Cost of Ownership

- The cost of running incremental workload on the mainframe goes down as the total workload grows
- Consolidation opportunities accelerate the benefit
- When considering your ESB deployment, consider Total Cost of Ownership vs Total Cost of Acquisition

## Often overlooked:

- Maintenance
- Development and Test software, hardware and maintenance



## Always considered:

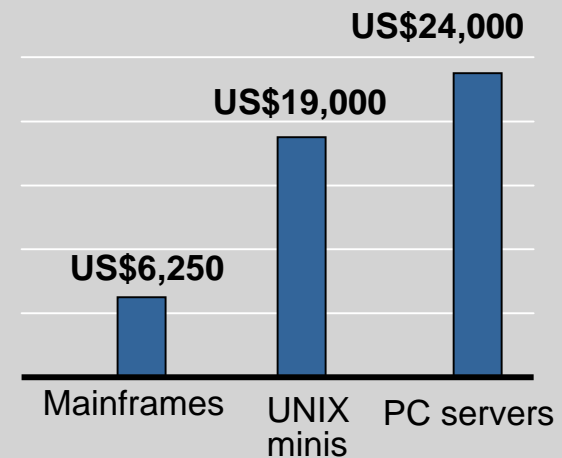
- Software
- Hardware

## Rarely considered:

- People
- Power/Cooling
- Space
- Ease of growth
- Cost per application

## Arcati

Predicted average cost per end user in 2010



Five-year costs for hardware, software and maintenance

Arcati Research 2005.  
 "The Dinosaur Myth 2004 Update."

# z/VM Virtualization Value: Environmental Cost



z10 EC – 26 IFLs

30 Square Feet

Hourly Energy Usage: 16.3 KWatts

Annual Energy Usage: 0.2 M KWatts\*

Cost: \$24.6 K/year

***z/VM Virtualization?  
IT Cost Implications of  
consolidating  
760 x86 processor cores***



20 Racks of x86 Blades (760 CPUs)

108 Square Feet

Hourly Energy Usage: 219.5 KWatts\*

Annual Energy Usage: 2.77 M KWatts\*

Cost: \$332.5 K/year

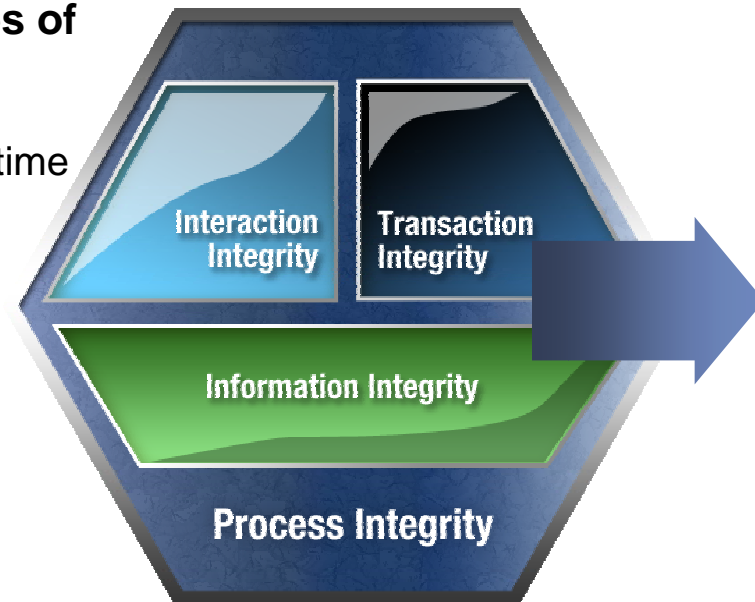
**z/VM Net Savings  
per year  
2,570,000 KWatts  
\$307.9K  
92% Less electricity**

**Become Greener with z/VM Virtualization on z10 EC:  
13X better than unvirtualized x86**

# Transaction Integrity Assures Consistency of Execution

## Enabling Consistent Transaction Processing in an SOA Environment

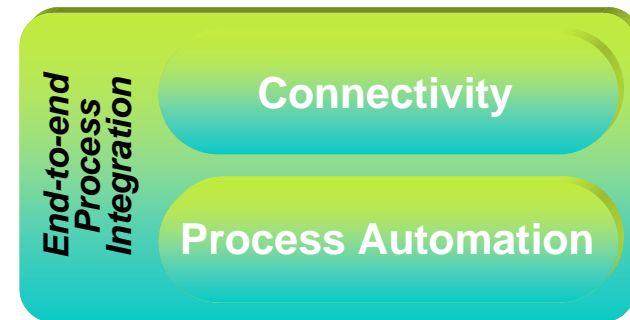
- **Transaction Integrity ensures that individual updates of IT / business resources are linked together and processed as a single unit of work**
  - Atomic transactions are short-lived and operate in real-time in a single unit of work
  - Transactions can be long running, lasting seconds or months, and can include multiple atomic transactions
- **Key Transaction Integrity Products:**
  - WebSphere Process Server, WebSphere ESB, WebSphere Application Server
  - WebSphere Message Broker, WebSphere MQ
  - WebSphere DataPower Integration Appliance XI50
  - WebSphere Service Registry and Repository
  - WebSphere Adapters
  - CICS Transaction Server



# Process Integrity Demands High Quality of Service

## Scalability, Availability and Performance are Fundamental

- **Maintaining High QoS in End-to-end Processes**
  - Workload management and high availability of transactions
  - SOA appliances to accelerate XML and security processing
  - Virtualization to enable flexible allocation of resources
- **Performance Testing and Monitoring**
  - Performance testing and problem analysis tools
  - Runtime monitoring to proactively identify performance problems in end-to-end processes
- **Key Quality of Service Products:**
  - Tivoli Composite Application Managers
  - WebSphere Application Server
  - WebSphere XD
  - WebSphere DataPower SOA Appliances
  - Rational Performance Tester Extension for SOA Quality
  - IBM Systems Servers



Quality of Service

# WebSphere Adapters V6.1 on System Z

<http://www.ibm.com/support/docview.wss?uid=swg27006249>



An adapter is the preferred method of connectivity when

...an application has a large number of interfaces

- ▶ A single instance of an adapter provides one place to access multiple interfaces

...an application is not enabled for web services connectivity

- ▶ Even when applications are web-service enabled, this often covers only a subset of functionality

...customers are on multiple versions of the application which each have different interfaces

- ▶ Many applications have old versions that are still in use by customers and do not have the same degree of open connectivity as later versions
- ▶ Using an adapter to encapsulate the integration logic minimizes the impact of upgrading between application versions

...it is common for customers to customize the application's functionality

- ▶ A meta-data driven adapter helps customers to service-enable their custom functionality without having to also customize the adapter

# Complex Data requires Powerful Capabilities

- *Code-Free Design and Deployment*
  - *There is no “language” to TX, the transforms and data process are all maintained within the spreadsheet-like GUI, and you never need to drop down to writing code to handle complex transforms. You create portable “transformation objects”.*
- *Self-describing Data Model*
  - *WebSphere TX uses data in its native format, and has a unique mechanism for describing data in its native form. WebSphere TX is able to handle complex and mixed data types using one design environment*
- *Data Validation as part of the transformation process*
  - *data is validated to content rules and context usages as part of the transformation process. You do not need to write separate logic or have separate executions in order to provide extremely rich data validation*
- *High-Throughput of Complex Transforms and Enhancements*
  - *WebSphere TX has a unique many-to-many model of transforming and processing data, which allows it to execute all transforms, lookups and data enrichments with only one pass at the data, making it one of the most performing transformation engines on the market*
- *One Engine – Mature – with Multiple Deployment Options including Z*
  - *Using the same design environment, you can deploy transformation to a number of runtime environments including ,embedded, standalone batch and event driven scenarios across a number of OS platforms.*