Introduction to Connectivity and ESB

Economic Conditions change IT Budgets

Economic Upturns: Business drivers for projects focus on top-line growth and strategic investments

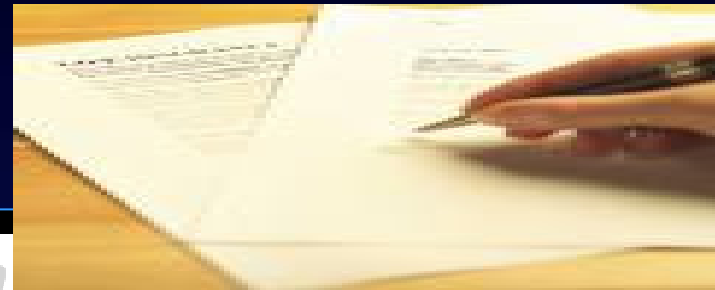*Economic Downturns: Business drivers for projects focus on operational efficiency and compliance*

Ray Wang, principal analyst at Forrester Research
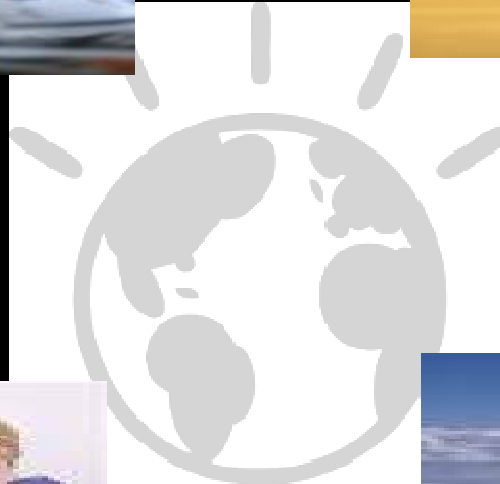
ESBs address ALL economic climates

ESB Messaging and Enrichment allows for Smart Work

Banks - move huge amounts of data dynamically responding to customer needs.

Insurance companies - move from batch claim processing to real-time processing to accelerate payment

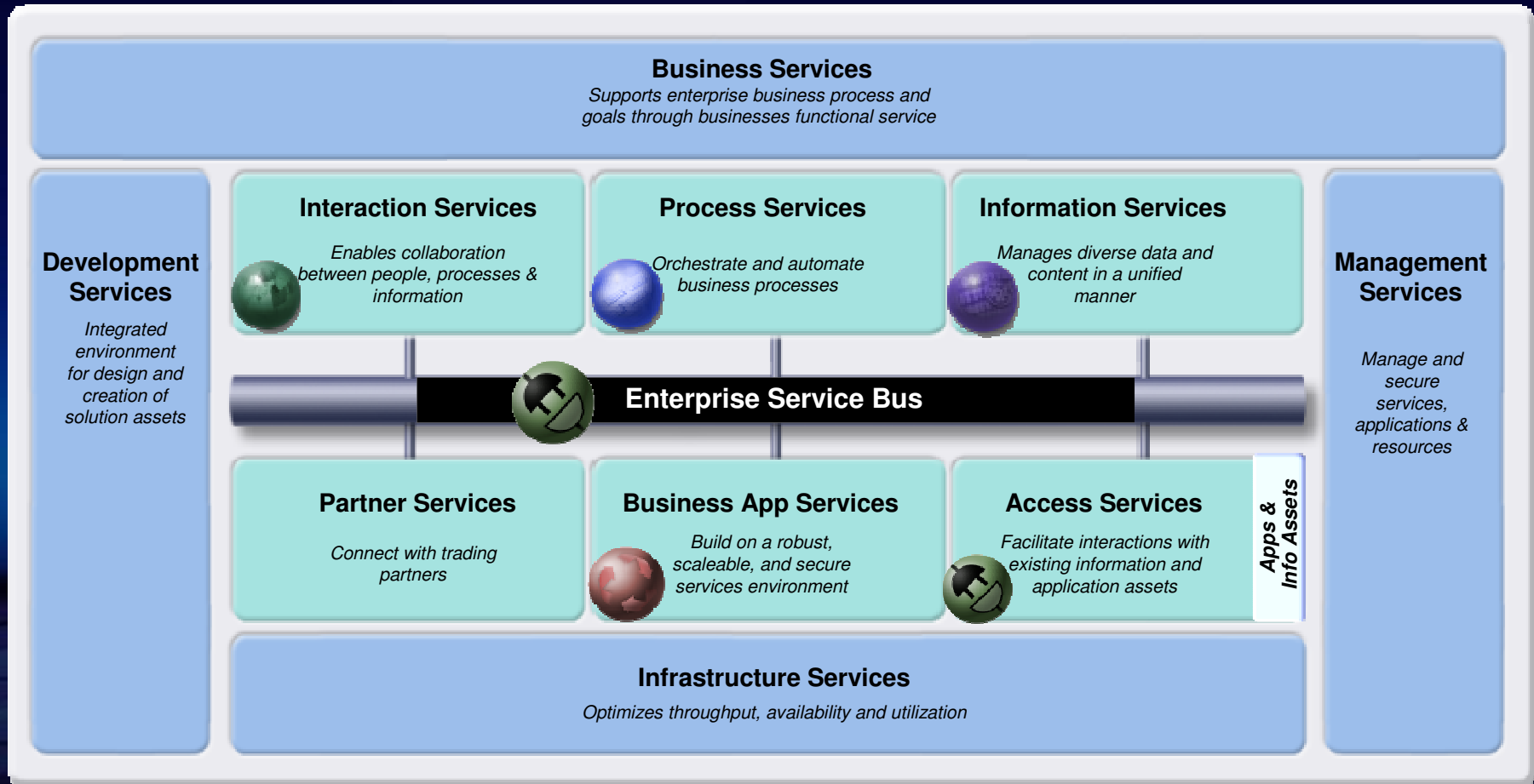Automobile manufacturers - get a better yield rate for car production

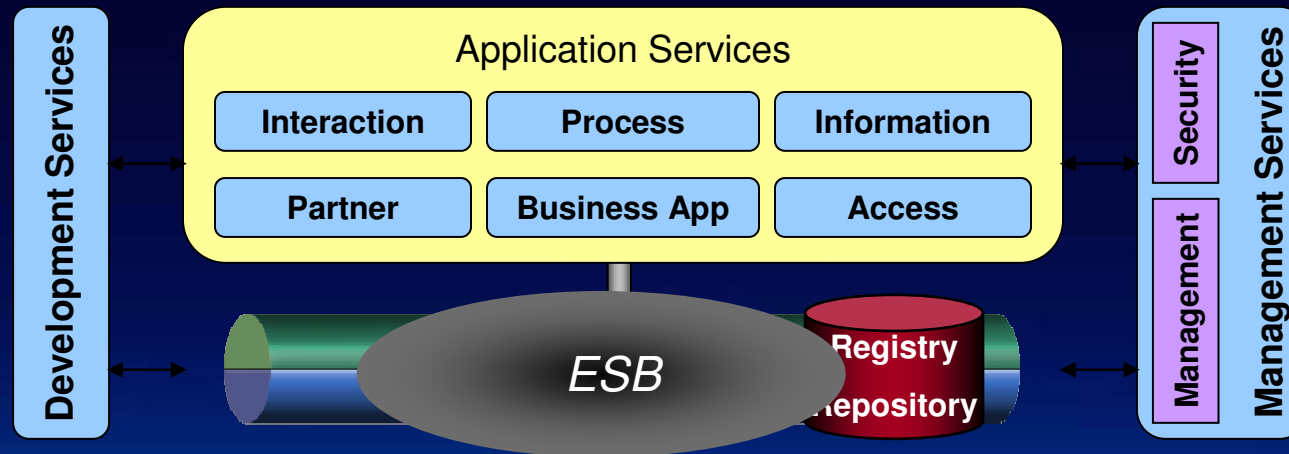Airlines - gain operational efficiency and reduce Sabre transaction fees,

ESB Messaging and Enrichment enables a Smarter Planet

ESB Messaging is core to your SOA environment
SOA Reference Architecture

Business Services

Supports enterprise business process and goals through businesses functional service

Development Services

Integrated environment for design and creation of solution assets

Interaction Services

Enables collaboration between people, processes & information

Process Services

Orchestrate and automate business processes

Information Services

Manages diverse data and content in a unified manner

Management Services

Manage and secure services, applications & resources

Enterprise Service Bus

Partner Services

Connect with trading partners

Business App Services

Build on a robust, scaleable, and secure services environment

Access Services

Facilitate interactions with existing information and application assets

Apps & Info Assets

Infrastructure Services

Optimizes throughput, availability and utilization

Expanding the use of the ESB Messaging and Enrichment

Application Services

| Interaction | Process | Information |
| Partner | Business App | Access |

Development Services

Security

Management

Management Services

ESB

Registry Repository

- **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

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
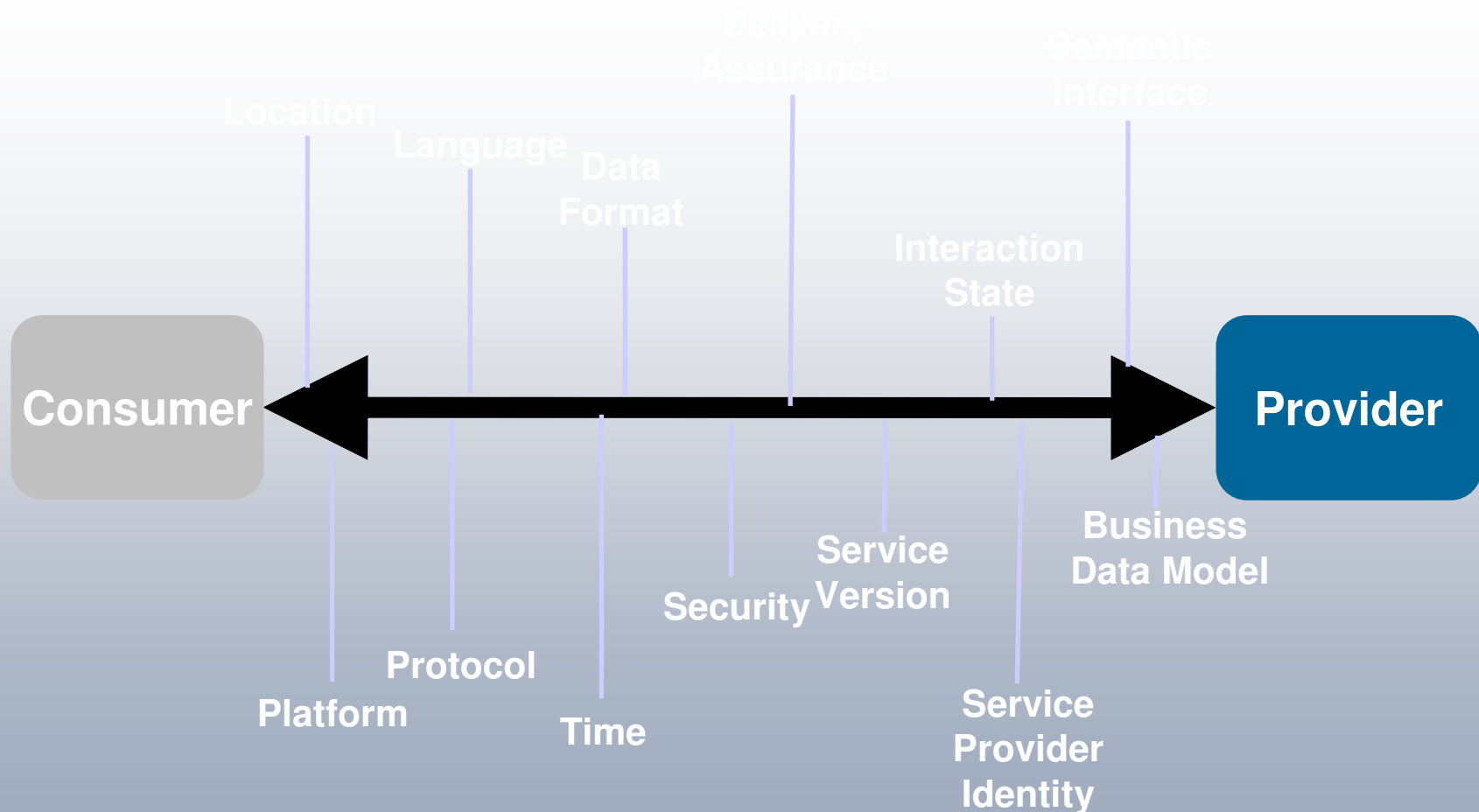 - underpinning Business Process and managed Business Partner integration

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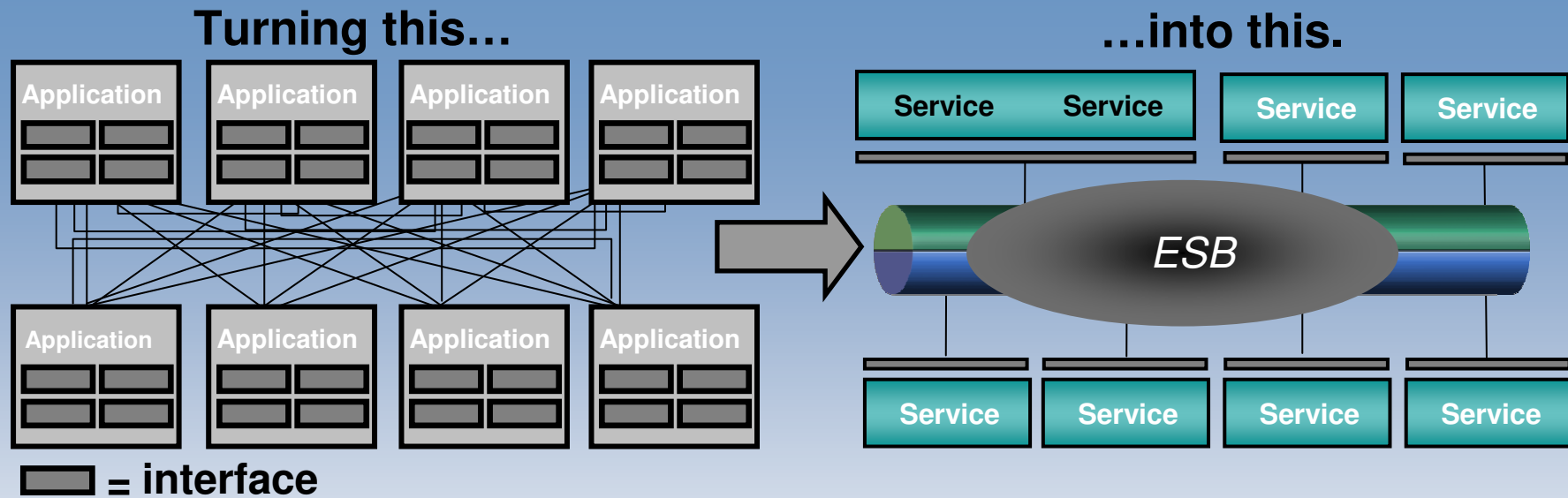
- **Service**
- **Message**
- **Interface**
- **Contract**
- **Policy**
- **Conversation**
- **State**
- **Transactions**
- **Process**

Loose coupling aspects of service interactions

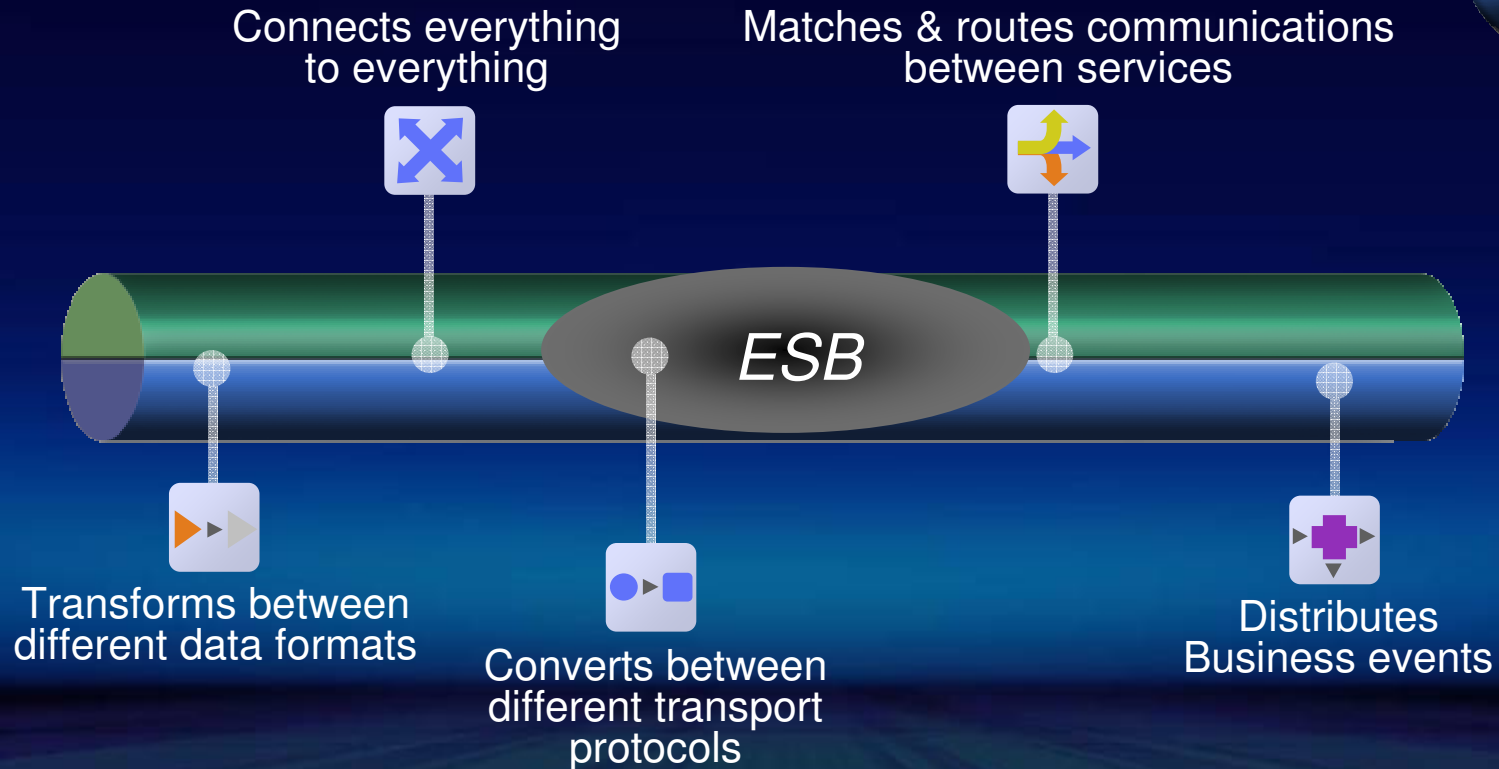# SOA with an ESB – Simplifying Interfaces and Applications

Turning this…

…into this.

| Application | Application | Application | Application |

| Application | Application | Application | Application |

| Service | Service | | Service | | Service |

ESB

| Service | Service | | Service | | Service |

□□ = interface

SOA+ESB:

✓ **Introduces rich business abstractions to describe the application interface.**

✓ **Decouples interfaces from the business applications and reduces technical complexity.**

✓ **Consolidate multi vendor platforms into a unified messaging backbone, enable re-use 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.

Agile Connectivity Begins with Integration
The Enterprise Service Bus (ESB)

Connects everything to everything

Matches & routes communications between services

ESB

Transforms between different data formats

Converts between different transport protocols

Distributes Business events

An ESB enables flexible SOA connectivity for integrating business applications, services and processes

A Closer Look at the ESB

Service Enrichment

- Match & Route communications between services
- Converts between transport protocols
- Transforms between data formats
- Identifies and distributes bus events

Messaging

- Connect everything in your SOA
- Leverage existing skills and assets
- Support business growth and agility
- Deliver fast ROI

IBM WebSphere MQ Family
Delivering Unrivalled Messaging

- **The Messaging Leader** for 15 years

- **Universal Support** for all your system

- **Standards:** Only JMS engine for any compliant JEE server

- **Continued Innovation:**
  - Reliable Web 2.0 & web services support
  - Low latency messaging for mission critical delivery
  - Secure messaging for compliance requirements

- • WebSphere MQ
- • WebSphere DataPower Low Latency Messaging Appliance

IBM Vision for an ESB Messaging Backbone

- Addressing the full spectrum of transport requirements

Messaging

Skills	**End-Points**	**Qualities-of-Service**	**Delivery Styles**
Languages	Vendor Platforms	Transactional	Client-Server
COBOL, C/C++, RPC	*JEE, .NET, etc*	Guaranteed	Backbone
Java, JEE, JMS	Operating Systems	Persistent	Point-to-Point
.NET, C#, VB, WCF	*Exploitation & Support*	At-Most-Once	Peer-to-Peer
AJAX, Perl, Python…	Applications	Replay	Publish/Subscribe
Orientations	*SAP, Siebel, etc…*	At-least-once	Grid
Service	Devices	Best-Effort	Bus
Batch	*Mobile, Wireless, PoS,*	Fire-and-Forget	Multicast
File	*Sensor, Actuator, RFID…*	Request-Reply	Unicast
Message	Web services	Fastest speed	
Resource…	*SOAP, WSDL, WS-RM, WS-N…*	Lowest Latency	
Mindsets	Web 2.0		
WSDL, XML, WS- *	*HTTP, AJAX, REST,…*		
REST, MEST, KISS	Appliances		

Maturing Requirements for Enrichment

"ESBs are not a one size fits all. You have to find the one that works best for you."

Eric Roch, Chief Technologist at Perficient Inc.

- Distinct categories of ESB technology are emerging

- Enterprise adoption is largely incremental even across departments

- Deployment scenarios continue to advance driving varying requirements

A Choice of ESBs
Solutions to Meet Any and Every Demand

WebSphere ESB

ESB offerings from IBM WebSphere

WebSphere Message Broker

Optimized with WebSphere Application server for an integrated SOA platform

Built for universal connectivity and transformation in heterogeneous IT environments

WebSphere DataPower Integration Appliance XI50

Purpose-built hardware for simplified deployment and hardened security

# IBM WebSphere DataPower Integration Appliance XI50

Purpose-built hardware ESB for simplified deployment and hardened security

- **Specialized hardware** that redefines the boundaries of middleware

- **Drop-in integration** for simplified deployment and ongoing management

- **Many functions** integrated into a single device

- **Continued Innovation:**
  - Delivers new security capabilities
  - Enhanced interoperability with IBM and 3rd party products

Service Enrichment

Messaging
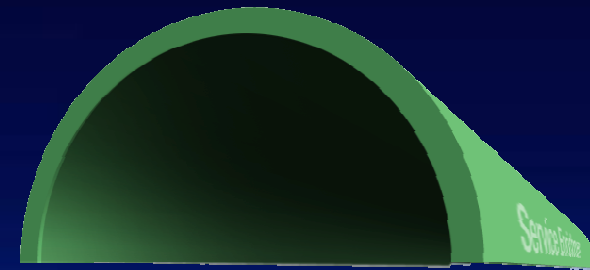
IBM WebSphere Enterprise Service Bus
Built on WebSphere Application Server for an integrated SOA platform
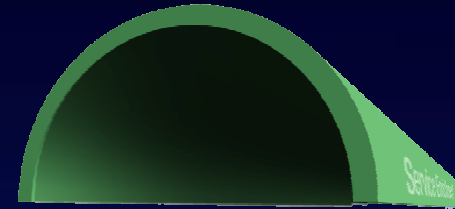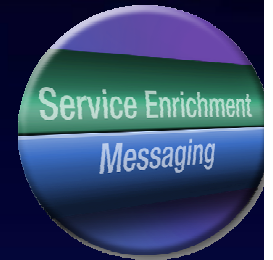
- **Seamless integration** with the industry leading WebSphere platform

- **Delivers** business-critical qualities of service

- **Easily extended** to WebSphere Process Server

- **Continued Innovation:**
  - Delivers new policy-driven connectivity
  - Enhanced web services standards support
  - Enhanced service mediation capabilities

WebSphere Process Server

WebSphere ESB

WebSphere Application Server ND

WebSphere Application Server
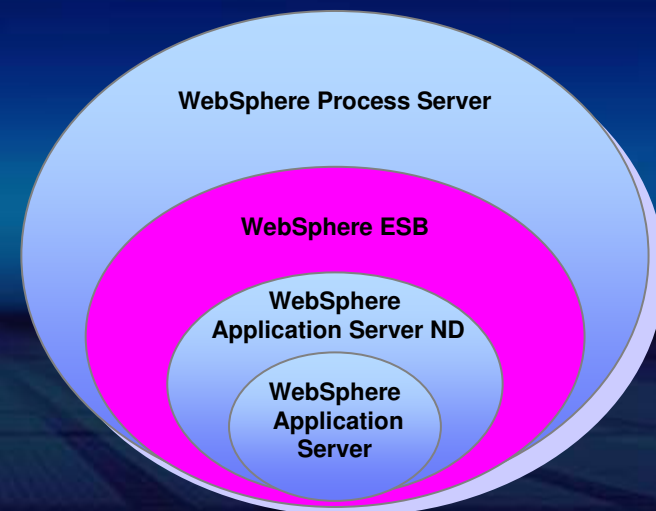
IBM WebSphere Message Broker Product Line

Built for universal connectivity and transformation in heterogeneous IT environments

- **Endless integration** to virtually any platform, operating system or device

- **Exploits** the industry-leading WebSphere MQ messaging infrastructure

- **Easily handles** complex messaging structures delivering extensive administration and systems management facilities

- **Continued Innovation:**
  - Over 80 nodes for connectivity, integration, and transformation
  - Starter to full enterprise versions
  - Works with the latest implementations of standards
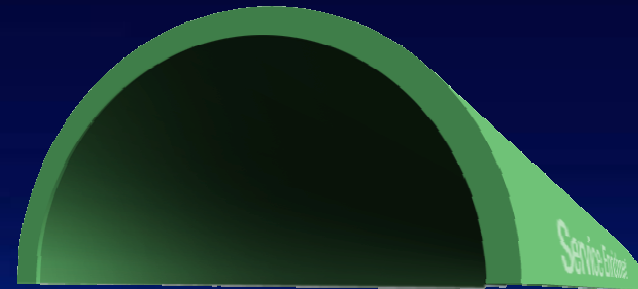
- WebSphere Message Broker Starter Edition
- WebSphere Message Broker for Remote Deployment
- WebSphere Message Broker
- WebSphere Message Broker for Retail Store Edition

Service Visibility & Governance

- Publish & find Your Services to extend business applications

- Manage & govern your ESB messaging & services

- Ensure consistent policy enforcement

Extend Your SOA to Customers and Partners

- Quickly create new business services

- Easily adapt to changing industry standards

- Improve ROI by quickly leveraging existing systems for multi-enterprise collaboration

Optimize the value of your SOA connectivity by extending to customers and partners

Architect for Advanced SOA Connectivity
Federated SOA Domains

Today's Globally Integrated, Agile Businesses Requires
End-to-end Transaction Integrity; Unified Governance; and Security

ESB 1

Federated ESB

ESB 3

ESB 2

- ESB Messaging and Service Enrichment solutions
  - WebSphere MQ, Message Broker, ESB and DataPower Integration Appliance

- Service Visibility & Governance solutions
  - WebSphere Service Registry and Repository
  - WebSphere XML Security Gateway
  - Plus Tivoli products - TFIM and ITCAM

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.

End-to-end Process Integration

Connectivity

Process Automation

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
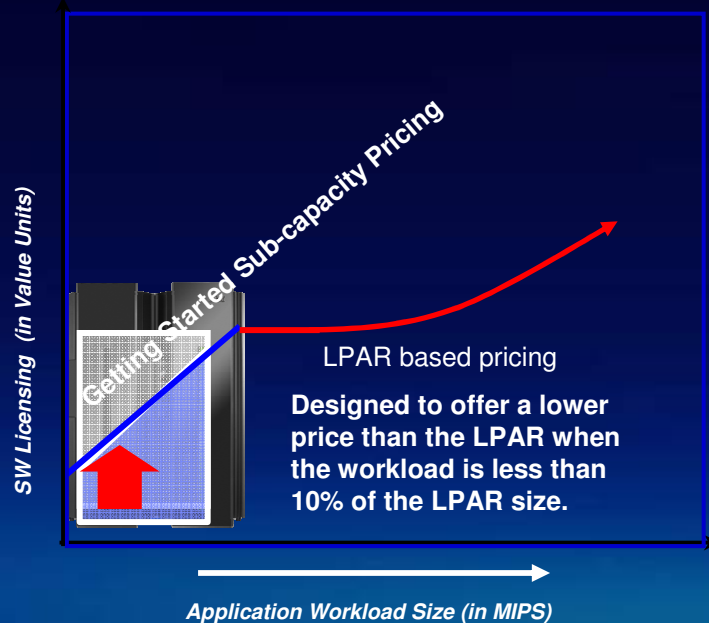 - Reporting and Chargeback

Interaction Integrity

Transaction Integrity

Information Integrity

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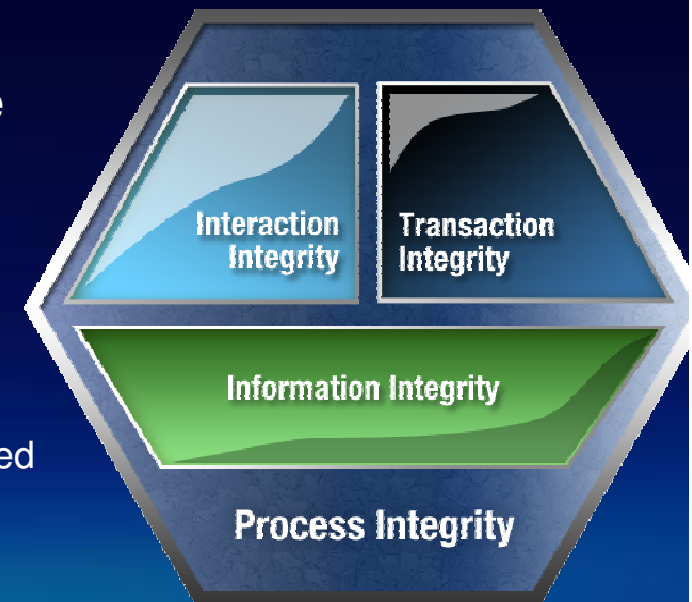
- Reduced points of failure
- Faster processing
- Fast End-to-end recovery

Selecting your Connectivity platform:
Introduction to Getting Started Sub-capacity Pricing

SW Licensing (in Value Units)

Getting Started Sub-capacity Pricing

LPAR based pricing

Designed to offer a lower price than the LPAR when the workload is less than 10% of the LPAR size.

Application Workload Size (in MIPS)

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 to10% of the LPAR
  - ▫ Provide a smooth starting price experience for getting started with IPLA products on z/OS Software
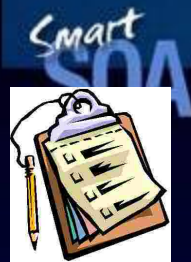
Who Qualifies for this offering?

Eligible customers meet the following criteria:

- ✓ Sub-capacity WLC/EWLC pricing customers
  - ✓ Using the Sub-capacity Reporting Tool
- ✓ Customers that use eligible products that meet the utilization criteria
  - ✓ Product at the Version, Release or Service level that supports the enhanced reporting
  - ✓ Product Utilization less than 10% of LPAR

*Current list of eligible products and applicable releases and service on the web:
http://www.ibm.com/servers/eserver/zseries/library/swpriceinfo/ipla_exe.html

Eligible Products*:

- WebSphere Application Server for z/OS V6.1 service level 16 or higher
  5655-N01 & 5655-F81 (S&S)
- WebSphere Message Broker for z/OS V6.1 service level 2 or higher
  5655-M74 & 5655-I59 (S&S)
- WebSphere Transformation Extender for z/OS V8.2 service level 2 or higher
  5655-R95 & 5655-R96 (S&S)
- WebSphere Process Server for z/OS V6.1
  5655-N53 & 5655-P27 (S&S)
- WebSphere ESB for z/OS V6.1
  5655-R15 & 5655-R16 (S&S)
- WebSphere Services Registry and Repository V6.1
  5655-R41 & 5655-R42 (S&S)
- WebSphere Business Services Fabric V6.1
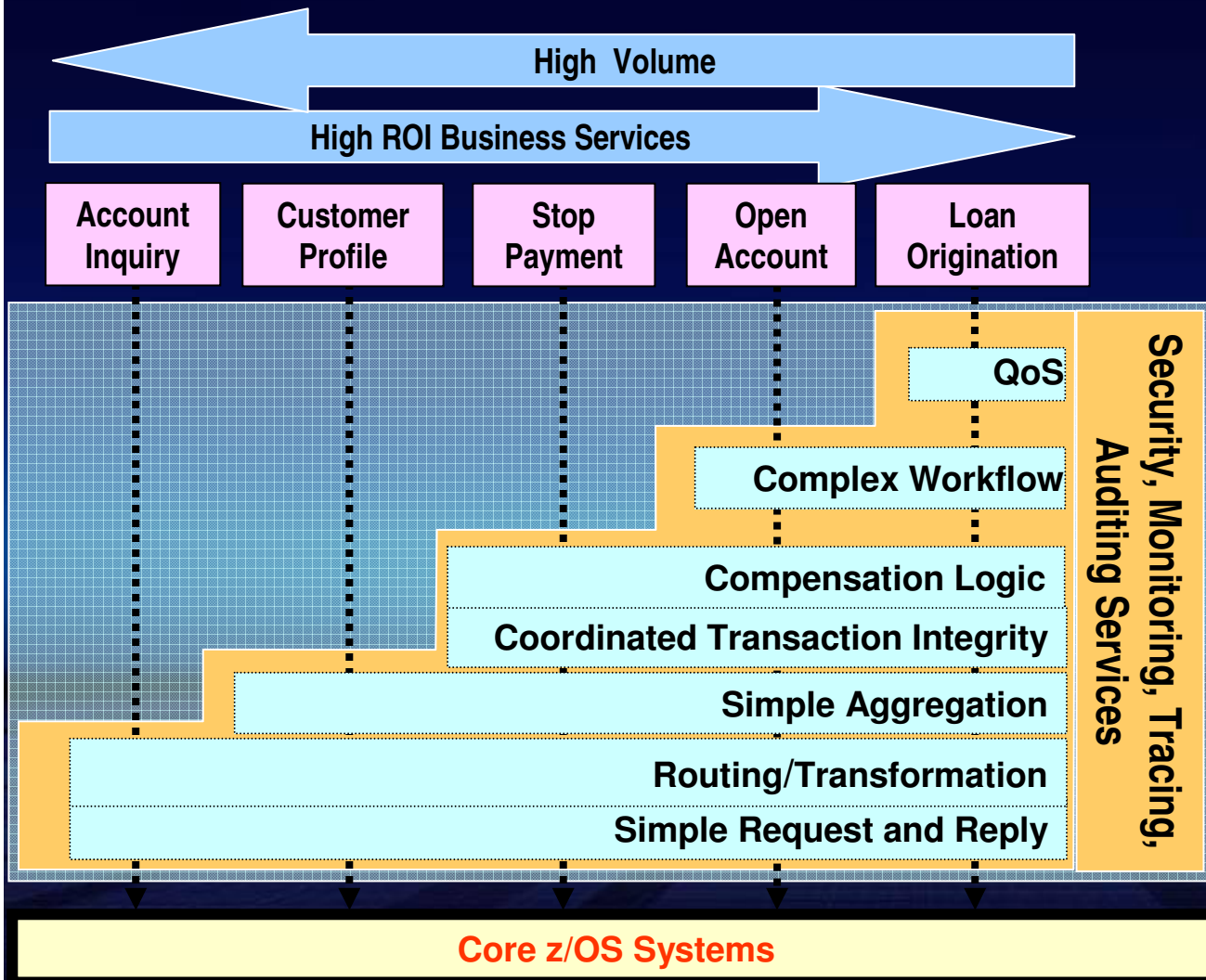 5655-S30 & 5655-S31 (S&S)

Statement of Direction for Possible Future Availability

- WebSphere Portal Enable
  5655-R17 & 5655-K13 (S&S)
- WebSphere Extended Deployment for z/OS
  5655-P28 & 5655-P29 (S&S) and by Components
  5655-S33 & 5655-S34 (S&S)

Summary: ESB deployment is dictated by business requirements

High Volume

High ROI Business Services

Account Inquiry	Customer Profile	Stop Payment	Open Account	Loan Origination

QoS

Complex Workflow

Compensation Logic

Coordinated Transaction Integrity

Simple Aggregation

Routing/Transformation

Simple Request and Reply

Security, Monitoring, Tracing, Auditing Services

Core z/OS Systems

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)

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_01
03A.pdf

- Teleconferences

  – Real life use cases for Message Broker on z/OS and Linux for System z http://www-01.ibm.com/software/os/systemz/telecon/19nov/index.html

  – 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/

Need more information?

- **IBM Product Websites**
  ibm.com/software/websphere/products/appintegration/

- **Developerworks**
  IBM.com/developerworks

- **Redbooks**
  redbooks.IBM.com

- **Proof of Technologies**

- **Integration Architecture Workshop**

- **Social Networking sites**
  Twitter – SOAConnectivity
  Facebook - IBM SOA Application Integration and Connectivity
  YouTube – SOAConnectivity

Let's Build a Smarter Planet