

Service Oriented Architecture and the DBA

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New England DB2 Users Group

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Service Oriented Architecture and the DBA

- What is Service Oriented Architecture (SOA)
 - Information on Demand
 - Master Data
- The challenges and opportunities for DBAs
- Database Architecture and Design for SOA
- Systems and Infrastructure Impacts for SOA
- Best Practices and Lessons Learned



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SOA - How did we get here?

- Increased Management Interest/Understanding of SOA
 - Bottom line value for companies
- SOA is about the business and IT
 - SOA is a journey – a multi-step process
 - Growing acceptance of SOA as an approach to integrate and to structure collections of interacting applications/services
- Many approaches – different results
 - Same as current development methodology
 - Start with a clean slate or incorporate legacy
 - Vendor Product driven or Business driven
- Information and Database Role
 - Analysis and design
 - Resource optimization
 - Problem resolution
- Provide SOA foundation, experiences and areas for further investigation



What is Service Oriented Architecture

- An approach that enables business processes to be assembled from reusable components or services that are independent of applications and the computing platforms on which they run
 - The business design describes how the business works and is thought of as a compilation of services.
 - Business processes are defined as services.
 - The information system design is driven from the business design.
 - Enables flexible connectivity of applications and resources
 - Enables flexibility in an technology agnostic manner
 - Uses interface-based service descriptions
 - Architectural style that exploits specific principles and characteristics



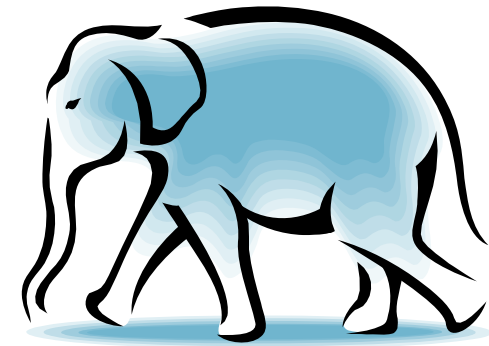
Principles & Characteristics

- **Componentized**
 - Standardized services interfaces
- **Interoperable**
 - Easy information exchange
- **Modular**
 - Mix and match, add and remove for business processes, information services and infrastructure
- **Scalable**
 - Adding additional resources as needed
- **Loosely Coupled**
 - No dependency on another service implementation
 - No impact to the service from changes to the implementation



Wide Range of SOA Views

- Business
 - A set of services a business wants to expose
 - Customers or partners or other parts of the organization
- Architecture
 - An architectural style
 - Requires a service provider, requestor and service description
 - A set of architectural principles, patterns and criteria which address modularity, encapsulation, loose coupling, separation of concerns, abstraction, reuse, composability and single implementation
- Implementation
 - A programming model
 - Standards, tools and technologies such as Web Services



Value and Benefits

- Business challenges
 - Risk, revenue, cost, integration, delivery and innovation
- **CEO**
 - Provide business flexibility and enable growth
 - Provide for Business innovation
- **Line Of Business**
 - Enable rapid change to be competitive
 - Improve business processes
- **CIO**
 - Align IT priorities with business goals
 - Protect investments
 - Simplify IT Infrastructure
- **IT Management**
 - Lowering total cost and simplify integration
 - Rapid implementation of change



Moving toward SOA

- **Driving Forces**

- Emerging industry standards
- Access to enterprise data
- Easier exchange of data
- Consistent enterprise data
- Reduced development time
- Reduced costs
- Availability of external services
- Better integration – internal and external (business partners)

- **Restraining Forces**

- Costs
- Service scope
- “Bleeding edge” technology
- Data Redundancy
- Performance Requirements
- Not invented here
- Lack of training/understanding
- Inertia – why change

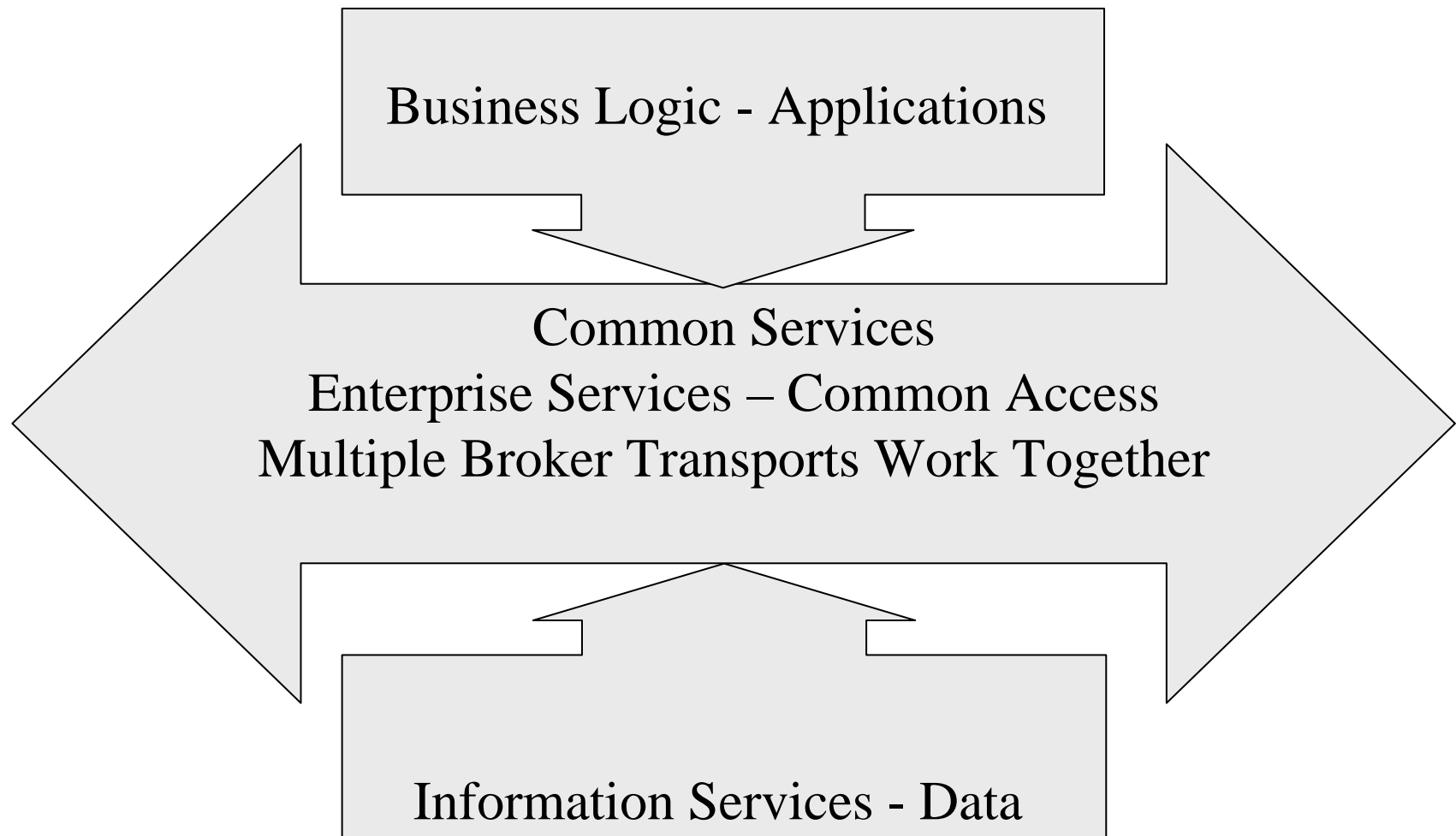


Recognizing a service?

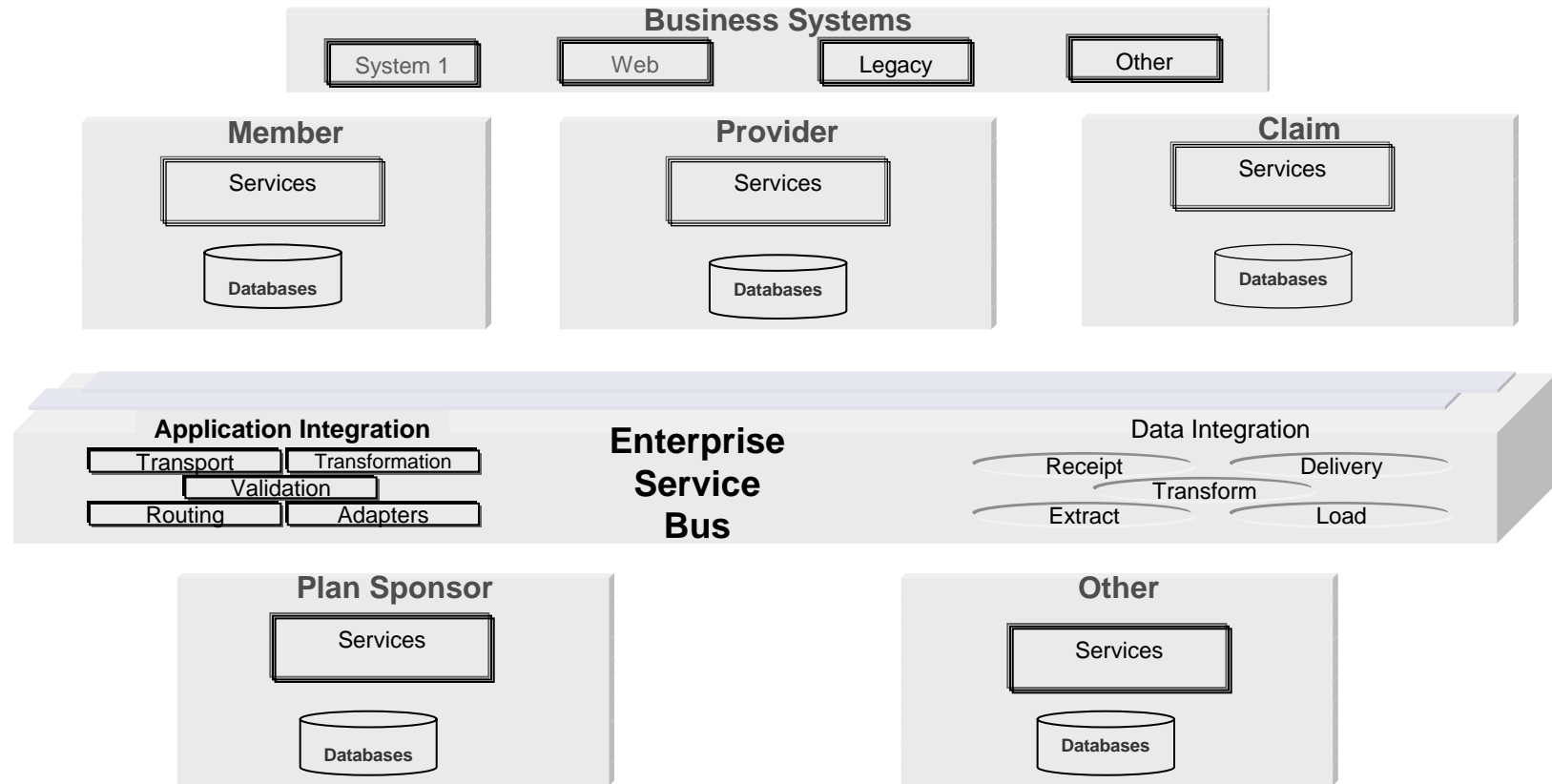
- Service is a repeatable task within a business process.
- Varied interpretations of this
 - Function within application?
 - Include system services?
 - Are all applications services?
 - Do components make up services?
 - Can information be a service?
 - Are resources services?
- Enterprise services
 - Functional services
 - Business services



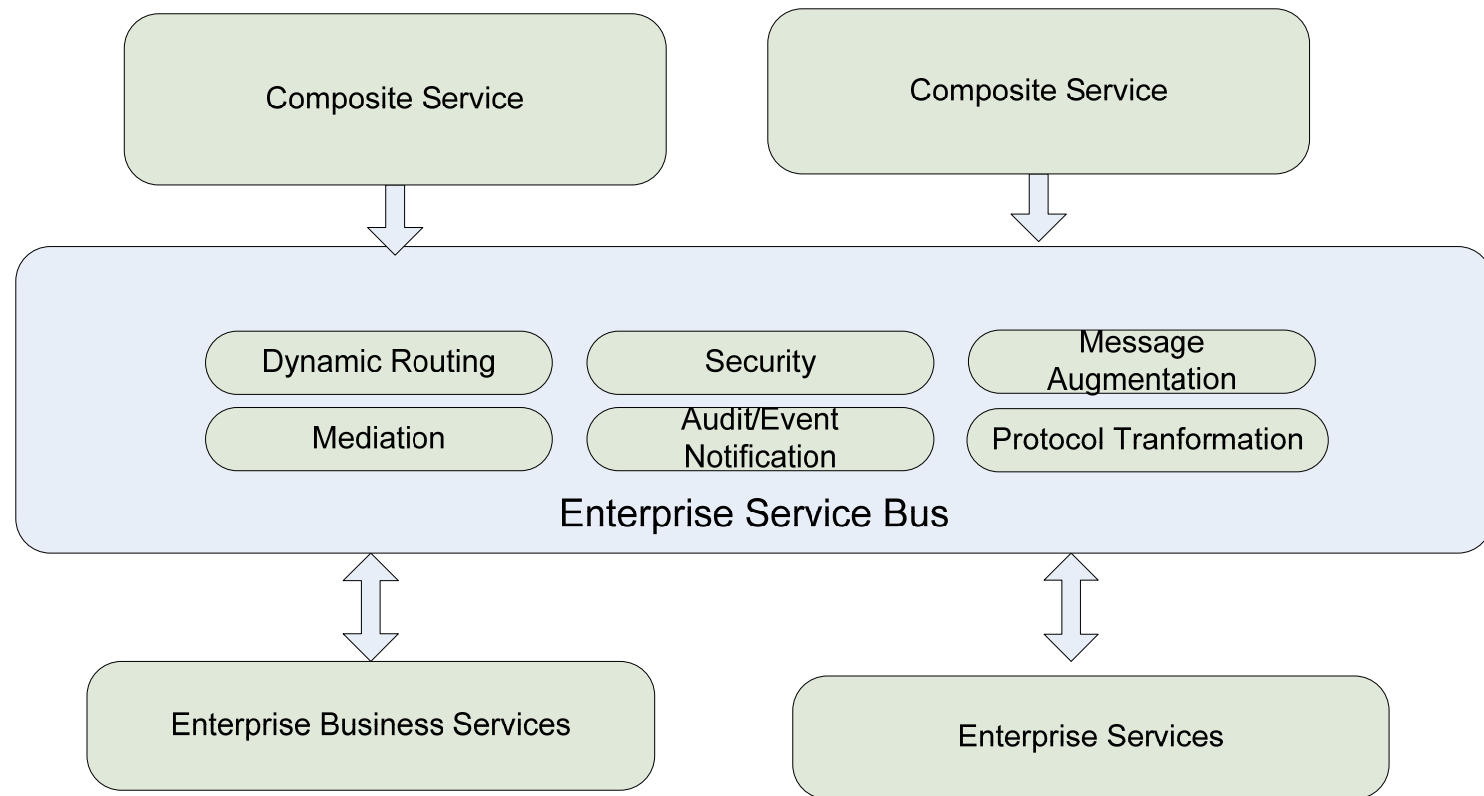
Is Everything a Service



Integrated Business View



Enterprise Service Bus



Impact of Standards

- For Web Services
 - XML
 - WSDL
 - JMS
- For Information
 - XQuery
 - XPath
 - JSR170
 - JDBC
 - SQL
 - BPEL
- Service Data Objects (SDO)
 - Abstraction/Realization for ‘sources of data’
 - JDBC/SQLJ
 - XML
 - ESB Messages



Best Practices SOA & Web Services

- Loose coupling and flexibility must be designed and built in
- Services designed to reduce change for future business requirements
- Design services to provide for re-composition or dynamic reconfiguration
- Avoid business logic in the Enterprise Service Bus
- Certification of web services based on defined characteristics provides for effective usage



SOA Evolution and Maturity

- Business View - Function Oriented to Service Oriented
- Systems – Silo to Integrated to Components to Services
- Methodology - Structured Methods to Component Based Development to Service Modeling
- Applications – Modules to Components to Services
- Architecture – Monolithic to Layered to Component to Services Oriented
- Infrastructure – Platform Specific to Platform Neutral to Sense and Respond



Information Management

- Objectives
 - Right information, right people, right time
 - Horizontally integrate information
 - Integrate, analyze, and optimize heterogeneous types and sources of business information throughout its lifecycle
 - Use information to manage risk and create new business insight
- Difficulties
 - Complex information architecture
 - Each new process builds a connection to information
 - Lack of enterprise cradle-to-grave information lifecycle management
 - Lack of ability to centrally govern information
 - Difficult to change processes as needed



Information on Demand Capabilities

- Information as a Service
 - Consistent, managed information available to business processes in a standardized way for reuse
- Master data – Single view of the truth
 - Consolidated view of core business entities
- Metadata Management
- Data Quality
 - Understanding of structures and content – Trusted data
- Virtualized data
 - Real time unconstrained access - Location Transparency
- Optimized Data Movement and Placement
 - Information Integration
- Business Intelligence and Analytics



Master Data

- The facts describing core business entities: customers, products
 - The high value information used by many business processes
 - Used across the enterprise
 - Data is critical (currency, quality) for key business processes
 - Provides the business context for a particular domain
 - Master data does not imply a particular usage pattern and is application independent
- Metadata
 - Definitional Master Data – definition of types of business entities
 - Instance Master Data – Values of the definitional master data for business entities
- Management
 - Decouples master information from individual applications
 - Simplifies ongoing integration and new application development
 - Ensure consistent master information – transactional and analytical
 - Proactively addressed data quality and consistency



Challenges and Opportunities

- Current database portfolio
- Database methodology paradigm shift
- Changing application characteristics
- Pace of technology change
- Evolving DBA responsibilities
- Metrics



Current Database Portfolio

- Characteristics of today's databases
 - Current databases defined and built without a planned published architecture
 - Information architecture complexity
 - Purchased applications
 - Incorporate legacy
 - Tight coupling of data to process
 - Inconsistency in sources and how data is derived
 - Multiple points of maintenance
 - Inconsistent rules applied to data
 - Inconsistent 'view' of the data



Database Methodology Paradigm Shift

- Current Methodology
 - Design, Code and Implement
 - Model, Assemble, Deploy, Manage
- Model Based Development
 - Requirements driven by business view of information
 - Several applications/services accessing one database
 - Physical design complexity
 - Application/Services Delivery Process
- Increased Complexity in several dimensions
 - Database structures
 - Database access by applications and services
 - Performance & Availability
 - Consolidation of data sources - Master data
 - Service Levels



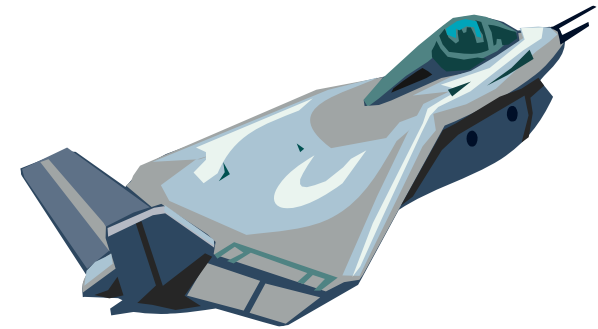
Changing Application Characteristics

- Application staffing models and developer skills
- Increased use of dynamic SQL
- Variations in Application Development Methodology
 - Change Management Discipline
- Incorporation of WebSphere or Messaging
 - asynchronous characteristics
- Application delivery process
 - Stovepipe applications – one application using one database
 - Several applications using one database
 - One application using several databases
- Capacity Management
 - Resource consumption & Rate of change



Changing Application Characteristics

- Architectural Changes
 - Information Integration
 - Content and other unstructured data
 - Master Data
 - Business Intelligence
 - ETL
 - Cross Functional Applications
- Composite applications
 - Business logic and resources spanning multiple systems
 - Difficult to design, build, test, and manage
 - Usually require high performance and availability
 - Must have a holistic approach to management
 - Composed of services



Pace of Technology Change

- Traditional Focus
 - Database and SQL
- Today and Future
 - Use of XML
 - Structured and Unstructured Data
 - Cross product integration - EII
 - Replication – ETL
 - Enterprise Services
 - Master Data
 - Standards and Open source impacts



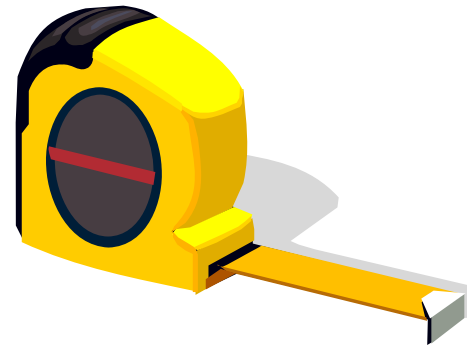
Evolving DBA Responsibilities

- Traditional DBA Responsibilities
 - Logical and Physical Database design
 - Performance - CPU, disk , memory tradeoffs
 - Availability - Backup and recovery
- Additional Responsibilities
 - Technical Architecture
 - Platform and product selection, recommendation and use
 - Services Architecture – Information Services
 - Management of increased database, transaction & service volumes
 - Integration/implications of Websphere, MQSeries and CICS.



Changing Metrics

- New Definitions of Success - How is success measured today?
- Measures
 - Identification of characteristics to be measured
- Database and Infrastructure
 - Service Level Agreements
 - Availability
 - Performance
 - Service performance measures
- End to end Measures
 - Databases, Information Services and Infrastructure - part of larger more holistic measurements
- Determine Rewards - salary/bonus



Database Architecture and Design for SOA

- Information Architect and DBA Roles
- Architecture Process
- Design Process and Patterns
- Reuse
- Governance



Information Architect and DBA Roles

- Encompass enterprise and project view
 - Expand current view
- Evolving responsibilities
 - Key partner with business analysts, enterprise and application architects, application development and business analysts
 - Knowledge of internal systems/services and databases for external interface
 - Knowledge of databases, content repositories and metadata
 - Enabler in business intelligence and information integration
 - Multi Lingual - know multiple DBMSs
 - Expanded role - transition to information/enterprise architect



Architecture Process

- Business Process Requirements
 - Information/Logical Model
 - Model Based Process
- Information as a Service
 - Business Rules
- Metadata Management
- Patterns
 - Information Transformation - ETL
 - Information integration
 - Data Replication
 - Availability
 - Infrastructure and Backup/recovery
 - Security
 - Scalability



Design Process and Patterns

- Database development process
 - Business requirements inputs to design
 - Blueprint and pattern inputs to design
- Consistent processes
 - Information Service design
 - Application design
- Data Access requirements
- Planning for capacity growth and volume increases
- Use of standards
- Measures
 - requirements for time, resources, quality and scope



Reuse

- Planning and identification of artifacts for reuse
 - Blueprints and Patterns
 - Models
 - Information structures
 - Database designs
- Data and information reuse
 - Shared databases – data
 - Information services
- Measure the value
 - Degree of reuse
- Repository
 - Models, structures and patterns available



Governance

- Established process for governance
 - What has to be done?
 - How is it done?
 - Who has the authority to do it?
 - How is it measured?
- Ensure architecture and design compliance for alignment to technology architecture and traceability to business requirements
- Use of business and technology blueprints and roadmaps
- Establish process for governance reviews
 - Issues escalation and resolution



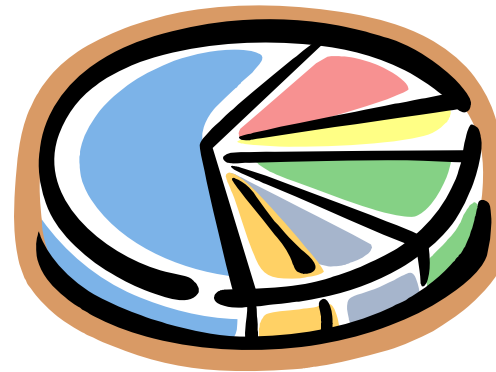
Systems and Infrastructure Impacts for SOA

- Platform Selection
- Technology Blueprints
- Environment Growth and Management
 - Configuration Management
 - Multiple environments supporting multiple delivery paths
- Infrastructure
 - Software and Systems Impacts
 - Code Asset Management –
 - Build and Reuse
 - Change Management
 - Problem Resolution
 - Service Level Agreements



Platform Selection

- Architecture and DBA Coordination
 - Analysis and decision roles
- Characteristics
 - Workload
 - Reliability
 - Availability
 - Concurrent users
 - Database sizes
 - Transaction volumes
- Methodology
 - Consistent process



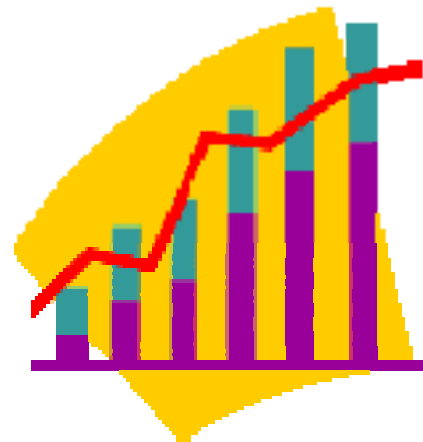
Technology Blueprints

- Linkage to other Enterprise Strategic Plan
 - IT Planning and Initiatives
 - Business, Information, Application Architecture
- Blueprint Value
 - Current and future technical capabilities
 - Prioritize future state capabilities
 - Gap assessment
 - Market scan, product identification
 - Reference architecture and strategic products to address gaps



Environment Growth and Management

- Environment creation, maintenance, problem resolution, obsolescence and removal
 - Configuration Management
 - Growth and scale of environments
 - Duplication of environments
- Patterns
 - Models
 - Design and Deployment
 - Administration and Management
- Application Testing
 - Unit, System, Stress, QA testing
 - Regression and new function



Infrastructure

- DBMS and supporting software
 - New versions and upgrades
 - Fixes
 - Prerequisites and Dependencies
- Introduction of Change
 - Infrastructure Growth
 - Manual vs. Automated
- Application Release management
 - Planning for and management of scope, scheduling, access path selection, reuse and maintenance
- Change Management
 - Protect availability, manage risk, provide audit, reduce failures



Common Pitfalls

- SOA equals Web Services
 - Use existing APIs, little architectural focus
- IT Leading the SOA effort
 - Lack of Business Alignment
- Not much really new
 - Failure to see and incorporate value
 - Oversimplify
- Big Bang
 - Change systems and architecture all at once



Lessons Learned

- SOA requires effort
 - Don't assume that someone else can and should do the hard work
- Over Communicate
 - New methodology and language involved
- Whatever is delivered won't be perfect
 - Trying to make it perfect is futile
- Leave it on the shelf
 - White papers don't equal success
- Implementations involve many versions or releases
 - Services life cycle and maintenance



Lessons Learned

- Successes incorporate technology, products, methodology and organization/culture
- Define and update Information Architect & DBA Role
 - Flexibility is key
- Integration with and understanding of related products is needed (i.e. WebSphere, CICS, MQSeries)
- Prepare for growth and scalability
- SOA is a team sport



Summary

- Roles and Organization
 - Teamwork with Business Analysts, System Architects, Information Architects and DBA
- Technology
 - Leverage existing, prepare to change
- Methodology and Processes
 - Architecture and Design
 - Increased integration and complexity
- Reuse
 - Reusable patterns, designs, structures, databases
- Service Oriented Architecture
 - The question isn't 'If' the question is 'When'



Resources and References

- Service Oriented Architecture
<http://www.ibm.com/developerworks/webservices/newto/>
- Standards and Web Services
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