Software Innovation with Services Oriented Architecture (SOA)

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Executive IT Architect
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Agenda

- Why SOA?
- What for?
- Which roadmap to SOA?
- How to Implement the SOA Infrastructure?
- Conclusion
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Why SOA?

- What for?

- Which roadmap to SOA?

- How to Implement the SOA Infrastructure?

- Conclusion
From siloed applications to a modular model …

Providing flexibility and interoperability

An architecture model (and a set of principles) in which, business functions are exposed as services (or components), reusable and composable

To increase interoperability and improve flexibility of Information Systems

SOA (Architecture Principles) = Modularity, Flexibility

Web Services (Standards) = Interoperability
Is SOA a new story?

- **1970**: CICS/IMS and their API, LU6.2  
  Not universal enough

- **1980**: Remote Procedure Calls (RPC)  
  Unix only

- **1985**: DCE procedures  
  Complex

- **1990**: Distributed Objects (Corba)  
  Very complex, no real interoperability limited investment of SW Editors

- **1992**: Client/Server  
  Irrelevant good idea

- **1996**: SOA is introduced by Gartner:

  Service-oriented architecture (SOA) is a client/server software design approach in which an application consists of software services and software service consumers (also known as clients or service requesters). SOA differs from the more general client/server model in its definitive emphasis on loose coupling between software components, and in its use of separately standing interfaces.
Web Services – Basic principles
Why Web Services are succesful ?

- A real Standard – introduced by IBM and Microsoft
- A smart Simplicity
- Independance to implementation technologies :
  - Interoperability Java – MS .Net
  - Independant of languages ( Java, Cobol, php, C#), Component models ( J2EE, .Net…), middlewares (CICS, IMS…), Operating Systems…
- Interface Contract ( WDSL) allow to automate the implementation
  - Automatic generation of client stub, Server wrapping code, unit test sequence …
- Use of a universal transport protocol : http
  - Permet de traverser les Firewall
- And above all, success of initial projects on the Web
  - « act small , think Big »
Web and Web Services: « mash-up »

Advanced Web Client Interface

Web Services calls

Maps and Geo data server (Google)

Pictures server (Flickr)

Commerce Server (eBay)

www.mapetite-entreprise.com
Strategic Importance of SOA…
… according to Analysts

- Adoption of an SOA leads to an adaptive enterprise built from reusable components. Analysts predict widespread use of SOAs within two years.

- By 2006, more than 60% of enterprises will consider SOA a guiding principle in designing mission-critical applications and processes (Gartner)

SOA Drivers

- Increasing complexity of enterprise application portfolios.
  - There is a growing need for application interconnectedness and business optimization
- Drive for Multi-channel Applications
  - By 2009, over 40% of interactive apps will be designed for multi-channel deployment.
- Market Hype
  - Industry discussion prompts firms to consider SOA.
- Close to 80% of organizations currently implementing SOA components aim to "Create Efficiencies across Business Processes" and "Improve Access to Corporate Information" (Yankee Group CIO Survey 2004)

SOA is driven by the Business

- 63% respondents agree SOAs are driven by the business, whereas previous IT architectures were driven by IT (Cutter Benchmark Survey, 2004)
- 60% respondents agree that SOA must be based on a comprehensive business model of the enterprise (Cutter Benchmark Survey, 2004)
SOA is about flexible access to existing business domains

Visible to SOA
But what should be made visible that has Business value?

Invisible to SOA

SOA focuses on exposing some of the business domain to provide dynamicity and flexibility using:
- loose-coupling,
- protocol independence
- location independence
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- Which IT Infrastructure for SOA?
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Traditional Way to implement new Applications

New application
Software package or specific development

Use of various ways to integrate the new application in the Information System

Batch Programs

Files Transfer

ETL

Existing Applications
As Patterns Have Evolved, So Has IBM

**Enterprise Application Integration (EAI)**

- Point-to-Point connection between applications
- Simple, basic connectivity
- EAI connects applications via a centralized hub
- Easier to manage larger number of connections

**Service Orientated Integration**

- Integration of services through an Enterprise Service Bus
- Flexible connections with well defined, standards-based interfaces

**Messaging Backbone**

- As Patterns Have Evolved, So Has IBM
The SOA Approach

**New Application Based on SOA …**

Significant functions and data of existing applications & tools are exposed as services …

New application logic is calling services exposed by other applications …

Additional functions can be developed and … exposed as services
What enterprises are doing with SOA?
Adapt and Innovate, focusing on heterogeneity (current or future)

**Adapt for broader connectivity and increased revenues.**

- e.g. Telco operators, Insurance companies, Automotive industry, Pharmaceutics, Airline companies

**Innovate by restructuring applications for greater flexibility and lower costs.**

- e.g. Banks, Container Shipping, Heavy industry, Mergers & acquisitions
SOA Components as it relates to Value

**Direct** – SOA components provide out-of-box functions to deliver business value

**Indirect** – applications must use services in a way that will deliver business value

- Services
- Service Connectivity
- Composite Services
- Integration of Services
- Information as a Service
- Business Process Management (BPM)
Agenda

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SOA Roadmap The necessary focus areas

- Cross LOB Management leadership
- Financial support
- SOA Governance

- Business Domain models
- Business Processes
- Business Information

Organization

Models

Methods

Architecture

- Business modeling
- Service Identification, Specification
- SOA Realization

- Solution layering
- Flexible infrastructure, ESB
- Standards (SCA, SDO, BPEL, WS-I)
Establishing SOA Governance domains

- Organizational Change for Service Orientation
- IT Processes for Service Orientation
- IT Mechanisms for Service Orientation

- Service Quality of Service and SLA Management
- Service Change Management
- Service Security Management

SOA Governance

- Business Services Portfolio Management
- Service Operational Management
- Service Oriented Development Management

- Service Modeling Techniques
- Service Development Standards
- Service Development Guidelines
Service Registry Vision

Service Oriented Development Management

- Develop, Reuse
  - Development Tool
  - Governance function
  - Candidate services to use
  - Description of new service, reuse record
  - Operational policies & service descriptions
  - Operational Monitoring & Mgmt Tool
  - Governance function

- Operational Efficiency & Resilience
  - Operational Data
  - Operational Monitoring & Mgmt Tool
  - Governance function

Business Services Portfolio Management

- Life Cycle Management & SOA Governance
  - Lifecycle Management Tool
  - Governance function
  - Config/Deploy Tool
  - Candidate endpoints and policies
  - Candidate endpoints and policies
  - Bus Mediation
  - Search, Select, Bind, Route, Filter, Transform
  - Service Config
  - Operational Data

Service Registry

- Assets
- Config/Deploy Tool

Service Operational Management

- Service Config
- Config Items
- Description of new service, reuse record
- Assets
- Operational policies & service descriptions

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The SOA Layered Model
Services Identification and Design: Services Oriented Modeling and Architecture

**Identification of Candidate Services and Flows**

**Specification of Services, Components, and Flows**

**Realization Decisions**

**What we do?**

- Domain Decomposition
- Goal-Service Modeling
- Existing Asset Analysis

**How we do it?**

- Component flow specification
- Subsystem Analysis
- Service Specification
- Message & event specification
- Realization Decisions
- Component layering
- Technical feasibility exploration
- Service allocation to components
Service exposure decision

- Opportunity Management
  - 0 Opportunity Management
  - 1.6 Estimate & Quote
  - 1.8 Contract

- Legal Management
  - 1.8.3 Execute Legal Review
  - 1.8.3.1 Request Legal Review
  - 1.8.3.2 Review Legal Issue

- Risk Management
  - 1.6.2 Execute Estimate VRB
  - 1.6.2.1 Request VRB Session
  - 1.6.2.2 Initialize VRB Session
  - 1.6.2.3 Put Opinion
  - 1.6.2.4 Assign Mitigation
  - 1.6.2.5 Decide Final Cost
  - 1.8.4 Execute Contract VRB
  - 1.8.4.1 Request VRB Session
  - 1.8.4.2 Initialize VRB Session
  - 1.8.4.3 Put Opinion
  - 1.8.4.4 Assign Mitigation

- Supplier and Contract Management
  - 1.8.1.1 Retrieve Material Cost

- Sales Management
  - 1.6.1 Prepare Estimate
  - 1.6.3 Execute Estimate Approval
  - 1.8.1.1 Prepare Contract Draft
  - 1.8.2 Execute Contract Approval
  - 1.8.5 Setup Contract
  - 1.8.5.1 Prepare Contract Document
  - 1.8.5.3 Setup PM Info
  - 1.8.5.5 Setup EPMS Info

- Risk Management
  - 1.6.2 Execute Estimate VRB
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- Legal Management
  - 1.8.3 Execute Legal Review
  - 1.8.3.1 Request Legal Review
  - 1.8.3.2 Review Legal Issue

- Project Management
  - 1.8.5.3 Setup PM Info
  - 1.8.5.5 Setup EPMS Info

- Financial Management
  - 1.8.5.4 Setup Accounting Info

Composable, as repeatable tasks
Business Aligned (Verified by goal service modeling)
Stable when facing change?
# Webify SOBAs – Healthcare Example

## IBM Infrastructure

Application Server, Process Server, Database, Portal, Workflow, BPEL Modeler, Identity Management, Event and Message Bus

## Webify Healthcare Fabric

Source – Assemble – Deliver – Manage – Govern

### Provider Collaboration
- Direct claim filing
- PMS integration
- WEDI 1-7 editing
- Online error repair
- Auto claim status
- Intelligent claim lifecycle

### Benefits and Eligibility
- HIS integration
- B&E request mgr
- Real-time and batch capability
- Deductible accumulators
- Message filtering

### Claim Attachments
- Payer request manager
- Electronic returns
- Attachment lifecycle manager
- Image system integration

### CDH Management
- Instant validation
- HSA balances
- Aggregated HRA/FSA information
- Multiple payment reconciliation

### Rate and Quote
- Multi-product quote
- Online policy issue
- Broker self-service
- Legacy enrollment modernization
Agenda

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How to implement the SOA Infrastructure?

- Create Order
- Produce a service which is easy to call
- Transform
- Orchestrate

Service Requesters

Service Providers

Web applications

BPM, EAI, EII

Portals

Dashboards

Master Data Stores

Legacy Apps

Business Partner Data

Data Warehouses

Packaged Apps (Siebel, SAP, Peoplesoft, etc.)
How to build an Infrastructure for SOA?

Application logic

Mediation
- Filtering
- Routing

Mediation
- Aggregation
- Transformation

Service Registry

Mediation
Non WS functions

Synchronous, Asynchronous
Event Driven, Pub Sub, Broadcast ...

Existing applications

New application
SOA based ...

+ Logging, trace, billing
Workload management and Quality of Service
From Services Orchestration to Business Process Management

New Application
SOA based …

Business Process Modeling
Business Process Monitoring

Existing Applications
# SOA Standards – Current and Emerging

<table>
<thead>
<tr>
<th>Emerging Stack</th>
<th>Current Stack</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Integration</td>
<td>Business Web Services (Best Practices): Service offerings and components (e.g., Book Flight, Low Fare Search, Update PNR Data, TEA, Request For Design)</td>
</tr>
<tr>
<td></td>
<td>Evolving industry semantics (RosettaNet, AIAG, ACORD, FIXML, OTAXML, UCCnet, etc.)</td>
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<td>Service-oriented Business Resource Description &amp; Interaction Patterns (WS-Collab)</td>
</tr>
<tr>
<td>Service Composition</td>
<td>WS-Service Group</td>
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<tr>
<td></td>
<td>WS-Notification</td>
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<td>BPEL4WS</td>
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<td>Quality of Experience (QoX)</td>
<td>WS-Reliable Messaging</td>
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<td>WS-Resource Lifetime</td>
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<td>WS-Metadata Exchange</td>
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<td>WS-Addressing</td>
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<td>Transports</td>
<td>HTTP/HTTPS</td>
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<td>SMTP</td>
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<td>RMI / IIOP</td>
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<td>JMS</td>
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**IBM SOA Architecture Model**

**Business Innovation & Optimization Services**
Facilitate better decision-making with real-time business information

**Interaction Services**
Enable collaboration between people, processes & information

**Process Services**
Orchestrate and automate business processes

**Information Services**
Manage diverse data and content in a unified manner

**Partner Services**
Connect with trading partners

**Business App Services**
Build on a robust, scalable, and secure services environment

**Access Services**
Facilitate interactions with existing information and application assets

**Infrastructure Services**
Optimize throughput, availability and performance

**ESB**
Facilitates communication between services

**Model**
Assemble

**Deploy**

**Manage**

**IT Service Management**
Manage and secure services, applications & resources
WebSphere Service Registry & Repository

Discover and reuse services that could serve as building blocks for new composite applications. Publish newly developed services.

Discover services from other registries or deployed environments ready for harvesting into the SOA lifecycle.

Manage information that Enables dynamic binding of service requestors to service providers and allows the infrastructure to enforce registered policies.

Govern deployed services to ensure changes are authorized and service integrity is maintained. Notify clients of changes.

Manage efficiency by providing detailed information about service interaction endpoints being monitored.
Interaction Services

Customer

Loan Service Order

Process Instance

Offering

Accept

Send Invoice

Web Service

Pay

Provide Service

Underwriter

Loan Service Agent

Processing Team

Processing Team

Design

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Portal as platform for Composite Applications

- Build and deploy composite applications using portal services

- New Concepts:
  - Portlet Factory
  - Templates
  - Application Context
  - Membership / Community
  - Application Roles
Extend SOA to the Desktop  Lotus Expeditor
What is an Information Service?

- access
- validate
- consolidate
- align
- transform

Produce a service which is easy to call

Consistent Information Issues:

- Source of data e.g., which system contains true address?
- Usage context e.g., local vs. international addresses
- Structure of service response (XML)
- Governance issues
- Business rules
Examples of Information Services

**Information Integration Services**

<table>
<thead>
<tr>
<th>Data Validation Services</th>
<th>Data Cleansing Services</th>
<th>Data Transformation Services</th>
<th>Partner Data Integration Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Validate records against defined business rules</td>
<td>Cleanse &amp; match inbound records to existing data</td>
<td>Transform and align data from different sources</td>
<td>Electronic integration with partners <em>SWIFT, EDI, HIPAA</em></td>
</tr>
</tbody>
</table>

**Operational Data Services**
Unified access to data in files, databases, and applications

**Analytical Data Services**
Access to analytical data for closed-loop processes

**Unstructured Data Services**
Access to unstructured information alongside structured data

**Master Data Services**
Access to and integration of master data

**Information Access Services**
IBM Information Services Offering

1. Data Complexity, Inconsistency, & Inaccessibility
   - Multiple Versions of the Truth

2. Unleveraged and Unexplored Content
   - Unleveraged and Unmanaged XML

3. Information as a Service
   - Optimize, Virtualize, Integrate, Accelerate

4. Insightful Relationships
   - Business Context

Information Server

Tools & Application

Processes

People

Data & Content

Business Context

Data Servers & Content Repositories

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Conclusion
SOA projects snapshot

Business

- SOA Method pilot project on “Dockings & painting protections for new vehicles”
- SOA Center Of Excellence
- Bill of Material process vehicle work in progress
- Airport Ramp Control
- Trucks Customer Order process
- Electronic Industry Contracts management
- Container Shipping

Technology

- Parts query
- HR partners
- Service registry.
- Dealers Interaction, parts

Service Components

- Simplified Composition and Implementation of Services and Data

Web Services

- Interoperability across Heterogeneous Environments

Business Processes

- Business Process Modeling & Management
- Governance support

SOA Method & Organization

- SOA projects snapshot
- Parts query
- HR partners
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- Dealers Interaction, parts
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How to address SOA Roadmap with IBM?

IBM SOA Governance Model

IBM Industry Models
Service Oriented Business Applications

Component Business Model
Service Oriented Modeling an Architecture
Starting with Project Definition Workshop (PDW) to answer the following questions

- **Why should “Company” leverage a Service-Oriented Architecture?**

- **What are the preferred Business Processes “Company” wants to leverage a Service Oriented Architecture on?**

- **Select the preferred Business process / processes**

- **What is the architecture approach and roadmap to move to SOA?**

- **How do we get started on the selected process?**