Architectural Requirements for an SOA Based on Web Services

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Agenda

- Web Services is an integration technology
- Web Services’ role in an SOA
- Unique Features and Challenges of Web Services
- Architectural Requirements of an SOA
  - Standards-based solutions
  - Software-based solutions
- Case Study
  - A Web Services-Based SOA at Providence Health System
SOA Reduces Integration Costs Over Time

Source: ZapThink
Web Services ≠ SOA

SOA Framework

Business Objects
- Person
- Inv. item
- order
- etc.

System Services
- security
- messaging
- orchestration
- etc.

WS wrapper
- Enterprise System

Service Client
- person
- order
- inv. item
- etc.

WS wrapper
- Enterprise System

Enterprise System
- security
- messaging
- transactions
- etc.
## Unique Features of Web Services

<table>
<thead>
<tr>
<th></th>
<th>Tightly Coupled</th>
<th>Loosely Coupled</th>
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</thead>
<tbody>
<tr>
<td><strong>Interaction</strong></td>
<td>Synchronous</td>
<td>Asynchronous</td>
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<tr>
<td><strong>Messaging Style</strong></td>
<td>RPC</td>
<td>Document</td>
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<tr>
<td><strong>Message Paths</strong></td>
<td>Hard Coded</td>
<td>Routed</td>
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<td><strong>Technology Mix</strong></td>
<td>Homogeneous</td>
<td>Heterogeneous</td>
</tr>
<tr>
<td><strong>Data Types</strong></td>
<td>Dependent</td>
<td>Independent</td>
</tr>
<tr>
<td><strong>Syntactic Definition</strong></td>
<td>By Convention</td>
<td>Published Schema</td>
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<td><strong>Bindings</strong></td>
<td>Fixed and Early</td>
<td>Delayed</td>
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<td><strong>Semantic Adaptation</strong></td>
<td>By Re-Coding</td>
<td>Via Transformation</td>
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<tr>
<td><strong>Software Objective</strong></td>
<td>Re-Use, Efficiency</td>
<td>Broad Applicability</td>
</tr>
<tr>
<td><strong>Consequences</strong></td>
<td>Anticipated</td>
<td>Unexpected</td>
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Source: *Loosely Coupled*, Doug Kaye
Challenges of Web Services-Based SOA

- **Change Management**
  - No method of versioning services
  - No way to track dependencies between components
  - No way to ensure backward compatibility when services upgraded

- **Interoperability**
  - Not just SOAP, WSDL, UDDI, etc.
  - Data formats / semantics

- **Lack of Reuse**
  - No central point of control
  - No way to track multiple versions
Requirements for an SOA

"Web Services Management"

Development

- "Talking SOAP"
- Deployment Provisioning
- Testing
- UDDI publication

Execution

- Orchestration / BPM
  - Workflow design
  - Workflow provisioning
- Transactions
  - Messaging
  - Synch/Asynch processes
  - Non-repudiation
- Security
  - Authorization / Authentication
  - Encryption / Decryption
  - Non-repudiation
- Operations
  - Monitoring & Logging
  - Reporting and Alerts
  - Routing & Failover
  - Billing & Metering

Change Mgmt

Lifecycle Mgmt
- Versioning
- Dependencies
- Deprecation & Expiration
- Namespace Management

Data Management
- Transformations
- Data & Business Objects
- XML Semantics (ns, etc.)

Maturity

Composite Services

Simple Services
Standards for Web Services Management
Standards Status

- **Security**
  - Authentication & Authorization
  - Encryption

- **Performance management**
  - Logging and monitoring
  - Reporting and alerts
  - Routing and failover
  - Deployment and provisioning

- **Transactionality**
  - Reliable messaging
  - Long running processes

- **Change management**
  - Versioning, lifecycle, expiration
  - Records and semantics

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<table>
<thead>
<tr>
<th>Standards</th>
<th>Providers</th>
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<tbody>
<tr>
<td>Security</td>
<td>LDAP, SAML, XACML, WS-Security</td>
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<tr>
<td></td>
<td>XML Enc, SOAP/XML-DSig</td>
</tr>
<tr>
<td>Performance management</td>
<td>NONE</td>
</tr>
<tr>
<td>Logging and monitoring</td>
<td>OMI, SNMP</td>
</tr>
<tr>
<td>Reporting and alerts</td>
<td>WS-Routing, WS-Referral</td>
</tr>
<tr>
<td>Routing and failover</td>
<td>NONE</td>
</tr>
<tr>
<td>Deployment and provisioning</td>
<td>JMS, WS-R</td>
</tr>
<tr>
<td>Transactionality</td>
<td>WS-Transaction, BPEL, WSCI, ebBPSS</td>
</tr>
<tr>
<td>Reliable messaging</td>
<td>WS-Change, UDDI, WS-Inspection</td>
</tr>
<tr>
<td>Long running processes</td>
<td>XSLT, Namespaces</td>
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Standards

- Evolve when
  - There is a need for interoperability
  - Requirements are fully understood
  - Dominant players support the standard

- Fail when
  - The need is not yet well understood
  - Dominant players are threatened by the standard

- For Infrastructure
  - Are easier to develop and implement by vendor agreement
  - Are more technology focused – point solutions
  - Have (s)lower impact on the business

- For Verticals
  - Need large business driver to justify customer involvement
  - Develop slowly over many iterations
  - Generate massive ROI’s if widespread adoption is achieved
Software Solutions
Broker Network with Central Management

- Systems management
- Semantics
  - Data Mappings
  - Business objects
  - Namespaces
- System Services
  - Defined providers
- Change management
  - Assigns versions
  - Maps dependencies
Case Study

Objective: Managing a Web Services-based SOA
Technology Alternatives

- **Problem**
  - Integrate Customer Data from Multiple Systems
  - Move to a Service Oriented Architecture

- **Established a Point of Comparison**
  - Data Warehouse
    - Never completed
  - Existing EAI Solution
    - High Cost – Maintenance of multiple point-to-point integrations
    - Rigid – Could not keep pace with change
    - Proprietary – Required significant developer knowledge, services
    - Lack of reuse – Not an open SOA platform
Integrated Web Application with back-end systems

Collected and shared customer data across multiple systems

Created “Profile Manager” Service

Established Web Services management layer
  ◆ Security
  ◆ Logging
  ◆ Versioning
Expanding the SOA at Providence

SOA Framework

Web Application Server Farm

Profile Manager Web Service
Patient Access Web Service
Physician Access Web Service
Web Applications

Person
Physician
Employee
Laboratory

PHS Web Access WS
AMISYS Access WS
McKesson Access WS
ERP Access WS
Logician Access WS
System Access WS

PHS Web
AMISYS
McKesson
ERP
Logician

(SMX)
(SQL Cache)
(CORBA)
(Lawson)
(SQL)

...
Infravio Web Services Resource Center

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