Architectures for enterprise agility

Francesco Virili
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Outline

• **Organizational emergence, enterprise agility and architecture**
  – Truex, Baskerville & Klein (1999): Emergent organizations struggling for “continuous redevelopment”
  – El Sawy & Pavlou (2008): Architecture as an answer to organizational emergence and continuous redevelopment; the need for IT infrastructural capabilities

• **SOA foundation (brief, just recalling well known concepts)**
  – High et al (2005): SOA Lifecycle, logical, and programming model

• **BPM enabled by SOA**
  – Chang et al (2008): BPM enabled by SOA

• **The strategic value of SOA**

• **Final wrap up**
  – SOA and BPM business game: Innov8
To execute better, hardwire your core operations

Hardwire your core:

- Standardize critical operations
- Connect operations so they execute seamlessly
- Define standards for information about customer, sales, and products
Enterprise Architecture

Design of the Business

Customer
Bank
Shared Service
Bank 2 – “Supplier”
Outsourced

Design of the Information System

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EA as Strategy Systemic Model

- **Operating Model**: Defines integration & standardization requirements
- **Enterprise Architecture**: Defines core capabilities & evolves architecture
- **Engagement Model**: Establishes priorities & learning & exploitation
- **Foundation for execution**:
  - Core Business Processes
  - IT Infrastructure
Alternative IS lifespan economies
# Classical and emergent ISD goals

<table>
<thead>
<tr>
<th>Levers to stimulate emergence:</th>
<th>Revoked ISD goals:</th>
<th>Emergent ISD goals:</th>
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<tbody>
<tr>
<td>Shared reality construction</td>
<td>Economic advantages of lengthy analysis</td>
<td>&gt; Always analysis</td>
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<tr>
<td>Self-reference and organizational identity</td>
<td>User satisfaction</td>
<td>&gt; Dynamic requirements negotiations</td>
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<tr>
<td>The dialectics of organizational autopoeisis</td>
<td>Abstract requirements</td>
<td>Incomplete, usefully ambiguous specifications</td>
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<tr>
<td></td>
<td>Complete and unambiguous specifications</td>
<td>Continuous redevelopment</td>
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| New system projects as achievements |
IT infrastructure capabilities as enabler of business capabilities
Building dynamic business capabilities with IT infrastructures: 7 hurdles

1. IT Seen Primarily as an Enabler of Operational Capabilities
2. Improvisation Seen as Unacceptable
3. IT Not Woven Into the Enterprise’s Business Fabric
4. Limited Availability of IT Infrastructures
5. Difficulty of Funding Emerging IT Infrastructures
6. Resistance to Loose/Tight Coupling
7. The Temptation to Cut Corners
Service Oriented Architecture activity flow

Consumer

Business Process
Composition; choreography; business state machines

Services
atomic and composite

Service Components

Operational Systems

Channel B2B

Packaged Application
Custom Application
OO Application

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SOA lifecycle

- Model
- Assemble
- Deploy
- Manage
- Governance & Processes
SOA logical architecture model

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

- **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

- **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

- **Infrastructure Services**
  - Optimizes throughput, availability and performance

- **ESB**
  - Enable inter-connectivity between services

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SOA programming model (based on service components, data, and bus)

- **Roles**
  - Enterprise Architect
  - Business Analyst; Integration Specialist
  - Software Architect; Application Developer; Enterprise Developer

- **Tasks**
  - modeling your business design, including KPI;
  - transforming that model into a software architecture;
  - coding the process flows or state machines;
  - reusing preexisting service implementations;
  - wrapping, re-factoring existing business function or coding new services as needed;
  - defining the data and message schemas, and schema transformations;
  - setting control flow and integrity policies, business rules and selection conditions;
  - assembling your service modules, and testing the assemblies.

- **Languages**
  - Language neutrality: any language should be allowed

- **Coding rules**
  - code the service logic;
  - declare the service dependencies and quality of service policies;
  - only invoke services when safely, without temporal constraints;
  - exchange data and messages
BPM: main elements

- Designing and modelling
- Executing and automating
- Monitoring and optimizing
BPM approaches

• Tactical approach
  – Addressing specific problems in a single business area
  – Still need for integration and flexibility

• Strategic approach
  – BPM solution set or portfolio
  – Need for full interoperability among its component parts
  – Rich capabilities for users, managers, developers
  – Broad array of capabilities addressing different process types:
    • Collaborative
    • Transactional
    • Structured
    • Content-centric
    • Dynamic
  – Realtime visibility across processes
  – Can not only optimize existing processes, but help define parameters for new processes

• SOA as an enabler for a strategic approach to BPM
An example: IBM BPM Suite

- IBM WebSphere Dynamic Process Edition
- IBM FileNet Active Content Edition
- Business event processing
- Asset repository for BPM
- Collaboration tools
- Advanced analytics
- Process accelerators and adapters

Foundational offerings

Extended value offerings

BPM methodology • BPM professional services • BPM mentoring
IBM’s BPM Suite Roles, Tools and Runtimes

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<td></td>
<td></td>
<td>- External services -</td>
<td>WebSphere Service Registry and Repository</td>
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<td>Deployed services</td>
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Business Leader

Process Owner

Business Analyst

IT Leader

IT Architect

IT Developer

WebSphere Business Modeler

WebSphere Integration Developer

WebSphere Process Server

WebSphere Business Monitor

WebSphere Enterprise Service Bus

Monitor Toolkit

Monitor model
IBM’s BPM Suite Roles and Responsibilities

Integration Developer
1. Imports process model
2. Implements services
3. Creates user interface
4. Tests process model

Business Analyst
1. Creates process model
2. Specifies implementation
3. Exports process model
4. Specifies what to monitor
5. Exports monitor definition

Monitor Model Developer
1. Imports monitor model
2. Defines process events
3. Implements monitor mode
4. Creates Dashboards
5. Tests monitor model

IT Administrator
1. Deploys process EAR
2. Deploys monitor model EAR

Dashboard Admin
1. Defines dashboard pages
2. Customizes dashboards

Model

Deploy

Assemble

Monitor Model Development Path

Process Development Path
The strategic value of SOA
A resource-based model (Mata, Fuerst and Barney 1995)
SOA as strategic enabler

• **Generating a blend of resources and capabilities**
  – Valuable
  – Original and unique
  – Difficult to replicate
  – Sustainable over time

• **Banking industry case study analysis**
  – Four typical strategic challenges in the banking industry
  – Two banks, two different SOA adoption strategies
  – The SOA enabling effect
    • Service reusability
    • Service evolution
<table>
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<tr>
<th>SOA Strategic Challenge</th>
<th>SOA Potential result (Null, Limited, Medium, High)</th>
<th>SOA Achieved result</th>
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<tr>
<td>Application integration</td>
<td>High: Service Oriented architectures are a step towards modular design of business functionality, providing a method to reduce the complexity of connecting and reconfiguring business functions.</td>
<td>Limited (compared to the whole application portfolio): SOA application integration model is adopted, at the moment, by the Cash Management System (CMS) and by another recent project (Portfolio Management System). Still, IS development strategy is now heavily based on SOA (see below).</td>
</tr>
<tr>
<td>Value reconfiguration</td>
<td>Medium: Web services standard architecture provides a more standardized approach to value reconfiguration compared with XML. Drawbacks due to immature technology and overall complexity (Web-services security, performance, management…)</td>
<td>Null: No actual business based on value reconfiguration (e.g. organizational networks with external banks) at the moment. Indeed the CMS project provided an opportunity to take into account this potential issue for the future. This is in line with the CE Bank conservative, risk adverse attitude and culture.</td>
</tr>
<tr>
<td>Value preservation in M&amp;A</td>
<td>Limited: Web-services based SOA could facilitate value preservation in Merge &amp; Acquisitions.</td>
<td>Null: Central Europe Bank has not been active in M&amp;A recently. In the last few years no M&amp;A operations.</td>
</tr>
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<td>Agile IS development</td>
<td>High: Enabled by Web-services based SOA, due to extensibility and reusability.</td>
<td>Medium: IS development practices observed within the CMS project are partly traditional and partly agile. More than half of new internal IS development efforts are now based on SOA and Web services.</td>
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## Northern Europe Bank
(SOA based on EAI integration platform + XML)

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<td>Application integration</td>
<td><strong>High</strong>: Potentially no limits to extending Web services based AI to other applications, thanks to SOA</td>
<td><strong>Medium</strong>: More than 1000 operations in production. E.g. the complete customer portal works with a SOA interface to the systems behind.</td>
</tr>
<tr>
<td>Value reconfiguration</td>
<td><strong>Limited</strong>: XML has no standard architecture providing a standardized approach to value reconfiguration.</td>
<td><strong>Null</strong>: No actual business based on value reconfiguration at the moment.</td>
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<tr>
<td>Value preservation in M&amp;A</td>
<td><strong>High</strong>: Northern Europe Bank active in M&amp;A.</td>
<td><strong>Medium</strong>: The way SOA is implemented allows for better value preservation in M&amp;A. This is actually being demonstrated at the time of writing – after the Northern Europe Bank bought two other banks</td>
</tr>
<tr>
<td>Agile IS development</td>
<td><strong>High</strong>: Developing new systems with existing services has the potential of being very agile. However, XML approaches may have a lower potential for standardized component based reuse than WS approaches.</td>
<td><strong>Medium</strong>: The gradual reconfiguration of the system portfolio towards SOA is providing progressively higher levels of flexibility. The current development model embraces and utilises the potential for agility that SOA provides.</td>
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SOA enabling effect: Service evolution vs reusability

- **Service Evolution Factor**
  - High
  - Low

- **Service Reusability Factor**
  - Low
  - High

- **Services**
  - 1. CRM Cashier Management System
  - 2. Customer Profitability Analysis
  - 3. Mortgage Interest Rate Calculation
  - 4. Debit & Credit General Ledger

OrgLab [http://www.orglab.unicas.it](http://www.orglab.unicas.it)
SOA adoption strategies

- NE bank: SOA for integration
- CE bank: extensible SOA for agility
- NE bank: SOA for value reconf/preserv

Service Evolution Factor

Service Reusability Factor

High
Low

High
Low

1
2
3
4
Final wrap up:
SOA BPM simulation

http://www.orglab.unicas.it/innov8/innov8.zip
Download, unzip, install, and play the simulation

IBM is hosting the first Serious Games Day on Tuesday February 10 at its headquarters in Research Triangle Park (RTP), North Carolina. Game development is big business in North Carolina and is getting bigger. With more than 30 companies employing over 1,000 people, the greater Raleigh area is home to one of the largest concentrations of game development companies in the United States. In addition to nationally recognized game development studios, there are publishers, engine developers, serious game, simulation and advanced learning technology companies, as well as industry and trade associations for sharing best practices and opportunities. Local universities, colleges and private schools are training the next generation of game developers.