A PwC Perspective: Enterprise Architecture & Technology Strategy*

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*connectedthinking
Agenda

• Setting the Business Context

• Aligning Technology with Business Strategy – the Information Supply Chain

• The Architecture Stack

• Summing up
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Setting the Business Context - Data

- **Data as the raw fuel of Performance Management**
  - In a recent survey of CIOs and IT directors, respondents estimated that the value of their data represented some 37% of the worth of their organization.
  - PwC Global Data Management Survey, 2004

- **Challenges**
  - Plethora of data everywhere, lack of information
  - No clear ownership, accountability and responsibility of data

- **Key Question**
  - Do you know how information flows across your organization?
Setting the Business Context - Data

- **The Internal Focus**
  - Operating Efficiencies derive from systems that provide a performance management perspective
  - Risk Management Concerns are on the rise
    - Financial, regulatory, legal, security and privacy
  - Increasing IT Complexity
    - Enterprise Wide Silos ? Interoperability ? SOA ?

- **The External Challenges**
  - Regulatory Changes putting greater pressure on data processes
    - SARBOX, AML, FDA
  - Data and Systems Driven Competitive Advantage around Market and Customer
Setting the Business Context - Data

- Most companies do not have a formal data strategy
  - Can I map my business process to a data process and to a tangible business / performance metric
- Data Strategy ownership primarily resides in IT
- Critical gap between intention and execution around data
- Board level commitment to data is faltering

"Our number one challenge is to improve the integration and sharing of critical business information between businesses, operations, and technical divisions."

-- Finance Operations Executive, Large North American Bank
Setting the Business Context – a Fundamental Change in Technology

IT Constraining vs. Enabling

• Cost of changes exceeds benefits
• Legacy Application holding companies hostage
• Accidental Architectures
• Armies of IT professionals necessary to support extensive customizations and unique compilations of technology that exists within enterprises

Focus of the “new” CIO
Setting the Business Context – an Architecture Example

Transaction data

Multiple departmental Excel spreadsheets

Consolidated spreadsheets for management

2000 elements = 6500 spreadsheets (this is not a typo)

Senior Management
Setting the Business Context – an Architecture Example

Transaction Data

Multiple Department Excel Spreadsheets

Consolidated spreadsheets for management

Completeness, Validity, Accuracy
Setting the Business Context - Metadata

A consistent, agreed upon vocabulary, spanning across applications, infrastructure and usage

“Hello, Bob? It’s your father again. I have another question about my new computer. Can I tape a movie from cable TV then fax it from my VCR to my CD-ROM then E-mail it to my brother’s cellular phone so he can make a copy on his neighbor’s camcorder?”

© 1996 by Randy Glasbergen. E-mail: randyg@norwich.net
Setting the Business Context - Metadata

A vocabulary that is context sensitive and non-ambiguous, forming the basis of a consistent taxonomy
Setting the Business Context - Metadata

Given a taxonomy (e.g. location), the information based on the taxonomy has to add value (e.g. is getting out a feasibility)
Setting the Business Context – to summarize

Anyone have a ‘perfect’ business – people, processes, technology?
- Everything working together, high-value, low costs, flexible, agile, growing…

Why not?
- Incomplete alignment of people, processes, customers, suppliers and technology with business goals:
  • Everyone does their own thing – little sharing of capabilities or services
  • IT for IT’s sake
  • Business processes are often constrained, not enabled by technology

- Unclear transparency of costs across the business:
  • What does IT really cost? Is it value-for money?
  • Are investments justified? Could there be cheaper ways to provide the required business services?

- No overall control and value prioritisation of various business / IT initiatives:
  • Lots of projects – which ones are really contributing to P&L?
  • Why are the benefits usually less than expected?

A first step in addressing potential alignment, cost and value issues is to explicitly expose them to the business – architecture can help do this…
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The Information Supply Chain: Fueling Business Processes with Insight

Figure 1: “What is the Information Supply Chain?”
The Orders of Data Abstraction Along the Information Lifecycle

First order of abstraction: Data

Second order of abstraction: Information

Third order of abstraction: Knowledge

Adapted from “Refining Information Value from Supply Chains” Meta Group, October 2003
IT as an Enabler: Aligning IT with Business

• **Strategy through Architecture / Implementation**
  - Business Processing Mapped to Data Process through Architecture
  - Information Supply Chain Riding on Physical Supply Chain

• **Focus on Performance Measurement and Optimization**
  - How can I measure what I do: business process, data process, alignment
  - What is the architecture to enable such a solution
  - How can I tie it in to my decision making process?

• **Challenges of Governance, Security and Control**
Architecture is not just IT, it is a way of modelling all parts of a business to identify root causes and make appropriate decisions to address them.

Know where

Know what

Know how

Know when

Know who

Definition, discovery & analysis services

Metadata Services

Master Data Services

Information Integration Services

Content Services

Data Services
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What is Architecture?

“Architecture” –

• “A common framework for systematically planning, aligning and understanding the relationships between business needs, business information, and IT”

• By “IT”, we mean in its widest sense – systems, data, technology, IT delivery, organisation / people, costs, standard et al.

Developing a good architecture is fundamental to avoiding business / IT mismatches and ensuring visibility of IT value and costs
Dimensions of Architecture

Architecture provides models and linkages between key business areas:

- **Business, Information, Information Systems, and Technology Viewpoints…**

  **Business Models & Requirements**
  - Business drivers, concepts, strategy, principles
  - Business operating model
  - Business interaction model
  - Business processes & functions

  **Information Models & Requirements**
  - Information types (e.g. customers)
  - Information flow model (supporting business interaction model)
  - Information relationships & organisation

  **IS Models / Applications**
  - IT drivers, concepts, strategy, principles
  - Business logic (supporting business processes)
  - User presentation
  - Application data (supporting information models)

  **Technology Models / Infrastructure**
  - Hardware / software platforms
  - Networks / communications
  - Storage
  - Integration
  - Security
  - Service levels (performance, etc.)
Types of Architecture (1)

The overall architecture framework, e.g. TOGAF can be used to model various different aspects of architecture:

- Different development paths through the framework give us different architectures.
Types of Architecture (2)

• **Enterprise Architecture:**
  - Provides a joined-up model of how business functions (e.g. sales) are or could be supported by combining information, software applications and technology infrastructure

• **Business Architecture:**
  - Provides a detailed model of how business functions (e.g. finance) are or could be realised by business processes (e.g. order-to-cash), business organisations, people, physical locations and assets

• **Information Architecture:**
  - Provides a detailed model of how key business information (e.g. products) is or could be represented by relationships with other information (e.g. customers) and is implemented in databases, documents, etc.

• **Application Architecture:**
  - Provides a detailed model of how software automation (e.g. e-procurement) is or could be realised by software modules (e.g. Oracle Purchasing) as built by specific configuration / coding and deployed into physical instances
Types of Architecture (3)

- **Technology Architecture:**
  - Provides a detailed model of how non-functional requirements (e.g. storage, security, performance) are or could be realised by technology services (e.g. disks, processors, connectivity) as implemented by physical computer clients, servers, networks, switches, etc.

- **Integration Architecture:**
  - Provides a joined-up model of how software applications (e.g. SAP) share or could share data and functions with other applications and databases and how technologies such as EAI or ETL can facilitate such interoperability

- **Other Architectures:**
  - Can include sub-sets or combinations of the above such as Security Architecture, Business Process Architecture, Governance Architecture, Organisation Architecture, Network Architecture...

- All can look at the current situation and/or a desired future state…

Whichever architecture is most relevant to the problem at hand, we need to understand how we are going to produce it, and what it will be used for…
Architecture Framework for Business Integration: from Business Process to Business Performance Management

**Business activity monitoring**
- Real time analysis, statistical reports, instance tracking, information aggregation, key performance indicators

**Process integration**
- Executable process model, long running flows, state management, human interaction workflow, Packaged flows, and data transformations, canonical object models

**Business process modelling**

**B2B integration**
- Public process models, trading partner agreements, Reliable internet messaging, security, business Transaction, common business vocabulary

**Application integration**
- Connectors, event triggers, A2A process automation, transaction coordination and compensation, message broker

**Connectivity and Data integration**
- Communications middleware, RPC, COM/COBRA, message queuing
  - Publish/subscribe, TP monitor, data translation, transformation
Enterprise Integration Stack

**Business Process Integration**
- Define, execute and monitor multi step processes
- Multiple records, multiple systems
- Includes human decision making via workflow

**Application Integration**
- Transport data structures (records)
- Content based routing
- Format validation/transformation
- Event and rule based data transformation

**Data Integration**
- Transport messages (bits)
- Reliable delivery, publish-and-subscribe
- Message oriented middleware

**Security Integration**
- Define, execute and monitor security policies
- Manage and monitor identity life cycle
- Manage and monitor other security controls
PwC’s View of Complexity Management Governance of Enterprise Data

**Data Complexity**
- Multiple platforms little governance
- Multiple platforms independently governed
- Multiple platforms centrally governed / centrally managed

**Direct cost of Data Group**
- Many duplications
- Operational inefficiencies / manual intervention
- Poor consolidated reporting / highly manual reports
- Intra-enterprise transactions like 3rd party

**Benefit of Governed Data**
- Cleaner data / not integrated across platforms
- X-platform duplications
- Poor consolidated reporting / highly manual reports
- Intra-enterprise transactions like 3rd party

**NONOPTIMAL**
- Few duplication X-Platform
- Easily consolidated enterprise reporting and analysis
- More seamless intra-enterprise transactions
- Clean data / faster at lower cost
- All platforms harmonized for Master Data

**OPTIMAL**
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The Core Issue

Business Process Chain

Information Supply Chain

LATENCY / LAG

REALTIME RESPONSIVENESS

INFORMED DECISIONS
Architecture decisions: Real-Time vs. Right-Time vs. Value-Time

• Real-time is the ‘friendly’ term
• Right-time is a better description
• But actually, it’s about Value time*


• The goal is to maximize value
Doing ‘things right’
The 5 ‘A’s

- Awareness Factors
- Approach Imperatives
- Architecture Considerations
- Application Components
- Action Plans
Doing ‘things right’

The CARTA Topic Map

<table>
<thead>
<tr>
<th>Awareness Factors</th>
<th>Approach Imperatives</th>
<th>Architecture Considerations</th>
<th>Application Components</th>
<th>Action Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Stakeholders</td>
<td>• Vendor Agnostic</td>
<td>• Transparency Across</td>
<td>• Skills Inventory</td>
<td>• Staffing Plan</td>
</tr>
<tr>
<td>- Customers/Users</td>
<td>• Leverage existing</td>
<td>Stakeholders*</td>
<td>• Vendor Selection</td>
<td>• Change Man. Plan</td>
</tr>
<tr>
<td>- Regulators</td>
<td>familiarity/training</td>
<td>• Org. Architecture</td>
<td>• Feedback Mechanism</td>
<td>• Training Plan</td>
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<td>- Key Vendors</td>
<td>• Broad Buy-in</td>
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<td>• Knowledge Xfer</td>
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<tr>
<td>• Maturity Framework</td>
<td>• Right/Real-time</td>
<td>• ‘Factory’ Model</td>
<td>• Process Integration</td>
<td>• Process Improvement Plan</td>
</tr>
<tr>
<td>• Process models</td>
<td>• Distributed</td>
<td>• Event Driven*</td>
<td>• Error Resolution</td>
<td>• Data Management Strategy</td>
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<tr>
<td>• Process Issues</td>
<td>• Rules Driven</td>
<td>• Agile*</td>
<td>• Process Visibility</td>
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<tr>
<td>• Data Assessment</td>
<td>• Service Oriented</td>
<td>• Automated Controls</td>
<td>• Cont. Improvement</td>
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<td></td>
<td>• Plan for errors</td>
<td>• Simplification*</td>
<td>• Self Service</td>
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<tbody>
<tr>
<td>• Asset Inventory</td>
<td>• Asset Reuse</td>
<td>• Ref. Architectures</td>
<td>• Application Selection</td>
<td>• Portfolio Strategy</td>
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<tr>
<td>• System Details</td>
<td>• Compose vs. Code</td>
<td>• Service Architecture</td>
<td>• Portfolio Rationalization</td>
<td>• Impl. Blueprint</td>
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<tr>
<td>• Interface</td>
<td>• Incremental</td>
<td>• Info. Architecture</td>
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<td>• POC’s</td>
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<td>Inventory</td>
<td>• Security Focus</td>
<td>• Data Architecture</td>
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<td>• Recommendations</td>
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<td>• Dependencies</td>
<td>• Scalable &amp; Agile</td>
<td>• System Architecture</td>
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<tr>
<td>• Industry Std’s</td>
<td>• Standards Based</td>
<td>• Industry Standards</td>
<td>• Level of Standards</td>
<td>• Standards Mandate</td>
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<td>• Internal Std’s</td>
<td>• Compliance Focus</td>
<td>• Integration Patterns</td>
<td>• Adherence</td>
<td>• Taxonomy Dev.</td>
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<tr>
<td>• Best Practices</td>
<td>• Cross polllation of</td>
<td>• Tech &amp; Dev Std’s</td>
<td>• Peer Benchmarking</td>
<td>• Regulation</td>
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<td>• Tech &amp; Dev Std’s</td>
<td>• Best Practices</td>
<td>• Best Practices</td>
<td>• PwC GBP</td>
<td>• Monitor/Tracking</td>
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<td>• Regulations</td>
<td>• Canonical Models</td>
<td>• Canonical Models</td>
<td>• Dashboards</td>
<td>• Metrics Plan</td>
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<tr>
<td>• Business Strategy</td>
<td>• ‘Strategically</td>
<td>• Bus. Architecture</td>
<td>• Service Contracts</td>
<td>• Governance Strategy</td>
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<td>Tactical”</td>
<td>• ‘Context’ vs. ‘Core’</td>
<td>- Service Registry</td>
<td>• Risk Mitigation</td>
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<td>• Business Drivers</td>
<td>• ‘Rapid Success</td>
<td>• ROI Focus*</td>
<td>- SLA’s</td>
<td>• Milestone Gating</td>
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<td>• CSF’s &amp; KPI’s</td>
<td>Experiences”</td>
<td>• Out/Offshoring</td>
<td>• Commercial Terms</td>
<td>• Execution Plan</td>
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<td>• Constraints</td>
<td>• Stewardship Roles</td>
<td>• Utility/Grid Computing</td>
<td>• Controls</td>
<td>• Funding Model</td>
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<td>• Other initiatives?</td>
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* Also considered an approach imperative
Doing ‘things right’

PwC’s CARTA* Reference Architecture

*Composite Application Real-Time Architecture
Driving Value with BPM & SOA

Doing ‘things right’

The Candidate Technology Map

<table>
<thead>
<tr>
<th>Basic Functionality</th>
<th>ETL</th>
<th>ESB</th>
<th>BI Tool</th>
<th>BPM Tool</th>
<th>Rules Engine</th>
<th>Database</th>
<th>Custom</th>
<th>Coding</th>
<th>Other</th>
<th>COFS</th>
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<td>1a Data Integration: Real-time</td>
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<td>8 State Report Generation</td>
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<td>11 Web/UI Integration</td>
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<td>12 Roll-based Access Control</td>
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</table>
## Vendor Selection Framework

**Doing ‘things right’**

### Project management, Quality assurance

<table>
<thead>
<tr>
<th>Outline of alternatives</th>
<th>Requirements</th>
<th>Selection</th>
<th>Recommendation</th>
<th>Strategy for the realization</th>
</tr>
</thead>
<tbody>
<tr>
<td>• detailed PwC market knowledge • complement with the current client solution</td>
<td>• extended standardized requirements catalog existing • supplement of client specific criteria • client specific weighting of the criteria • definition of k.o.-criteria</td>
<td>• detailed assessment of the requirements fulfillment • on basis of the PwC market knowledge and the vendors representation</td>
<td>• degree of fulfillment of the client’s goals and requirements</td>
<td>• estimate of project duration • estimate of license fees • estimate of project costs</td>
</tr>
</tbody>
</table>

### Communication (goals, contents, results, relevance)

- Vendor Vision & Viability
- Functionality
- Technology
- Service & Support
- Cost
# Driving Value with BPM & SOA

Doing the ‘right thing’

*Business Value Analysis, Return On Investment & SOA Jumpstart*

<table>
<thead>
<tr>
<th><strong>BVA (Idea Generation)</strong></th>
<th><strong>ROI (Quantitative)</strong></th>
<th><strong>SOA Jumpstart (Action)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Benefit</strong></td>
<td><strong>Benefit</strong></td>
<td><strong>Benefit</strong></td>
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<tr>
<td>• Generate Big Picture View</td>
<td>• Involves Stakeholders</td>
<td>• Involves Stakeholders</td>
</tr>
<tr>
<td>- What the primary challenge</td>
<td>- User buyer</td>
<td>- IT buyer</td>
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<tr>
<td>- What is potential</td>
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<tr>
<td>- Focus on big wins</td>
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<tr>
<td><strong>Who</strong></td>
<td><strong>Who</strong></td>
<td><strong>Who</strong></td>
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<tr>
<td>• CFO, COO</td>
<td>• Finance, Operations, IT</td>
<td>• IT, Business, Finance, Operations</td>
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<tr>
<td><strong>How</strong></td>
<td><strong>How</strong></td>
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<tr>
<td>• 1 week effort</td>
<td>• 3 to 4 week effort</td>
<td>• 10-12 week effort</td>
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<td><strong>Deliverable</strong></td>
<td><strong>Deliverable</strong></td>
<td><strong>Deliverable</strong></td>
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<tr>
<td>• BVA Summary</td>
<td>• Executive Summary</td>
<td>• Maturity &amp; Gap Assessment</td>
</tr>
<tr>
<td></td>
<td>• ROI quantitative analysis</td>
<td>• Pilot &amp; “Enabling Platform”</td>
</tr>
<tr>
<td></td>
<td>• Business Case Document</td>
<td>• SOA Action Plan</td>
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<tr>
<td><strong>Factors</strong></td>
<td><strong>Factors</strong></td>
<td><strong>Factors</strong></td>
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<tr>
<td>• Time &amp; cost</td>
<td>• Time &amp; cost</td>
<td>• Governance</td>
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<td></td>
<td>• Accuracy</td>
<td>• People &amp; Organization</td>
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<td>• Capacity</td>
<td>• Processes &amp; Methodology</td>
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<td></td>
<td>• Costs</td>
<td>• Technology &amp; Data</td>
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<td>• Metrics &amp; Measurements</td>
</tr>
</tbody>
</table>
Architecture – keeping IT rooted in Business Reality
Where is the wisdom we have lost in knowledge?

Where is the knowledge we have lost in information?

T. S. Eliot's *Choruses from the Rock*

Thank You

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