Enterprise Architecture in Practice
Methods and Tools


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In the early days...

Automation of manual tasks
- Payroll
- Bookkeeping
- Order entry
- Invoicing
- Statistics

In-House Development: Close relations between Business and IT-department
The next steps...

Application packages
- Personnell
- Financial administration
- Production Control
- Material Requirements
- Inventory-Orders-Shipping-Invoicing
- Purchasing
- Product development
- ...

Development by softwarehouses

Not so close relations between Business and IT-department
The running business needs applications to be integrated

Chains of business functions = Business Processes

- Purchasing
- Raw material inventory control
- Manufacturing
- Finished product inventory control
- Sales, order entry
- Shipments
- Invoicing
Example: An Enterprise
Example: Larger enterprise
How do we survive in this jungle?

Incompatibilities

- Data between applications
- User interfaces
- Terminologies
- Workflows
- Hardware and software platforms
- Business and IT!
Enterprise Architecture!
Speaker background

- Teacher, Aalto Yliopisto, SoberIT
  - Enterprise Systems Architecture, 2006-2010
  - Business Process Design and Implementation, 2009-2010
  - Thesis supervisor

- Researcher,
  - SOLEA, Service Oriented Locally Adapted Enterprise Architecture, 2008-2011
  - MyWellbeing, 2008-2010, Citizen Centric Architecture

- PhD Student, Dynamic Business Framework for Networks in Health and Wellbeing Services

- Consultant, Conceptia Oy, 2000 ->
Enterprise Architecture in Practice

Frameworks

Model Templates

Skills

Notations

Methods

Tools
Enterprise Architecture:

- To build
- To change
Building Enterprises

The purpose of the models?

The Enterprise to be modeled

The modeler and the resulting model

Enterprise?

The user of the model
What is Enterprise? Systems? Architecture?

Our organization produces products and services for our customers.

The revenue covers our costs and makes profit to our owners.

The products and services are results of our core business processes which need information processed by our applications which run on our infrastructure.
-60’s

Textbook 1969

"Automated Data Processing"
Viewpoints of the system to be built

Systems Analyst

Programmer

Operator

Workflow

Flowchart

Job Control
Zachman Framework

http://apps.adcom.uci.edu/EnterpriseArch/Zachman/zachman.jpg
IAF Framework

Why do I want to do this?

What do I want to do?

How could it be realized?

With what can it be realized?
Architecture to build

Architect

Engineer

Builder
What is the result of Architects work?

- **IEEE 1471: Software Architecture:** The fundamental organization of a system embodied in its components, their relationships to each other, and to the environment, and the principles guiding its design and evolution.

- **Practicing Architect:** Develop a solution, which satisfies the needs and requirements (often conflicting) of the stakeholders.
Example: Helsinki Music Hall
Architecture

- How it looks?
- How it functions?
- How it sounds?
- How it fulfills its purpose?

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Enterprise Architecture:

- To build

- To change
How Architect works?

- Listen to
- Ask questions
- Collect needs
- Make drafts
- Iterate

Worlds most used platform for drafts
Notations: ArchiMate
The ArchiMate Language

High-level modeling *within* a domain

Modeling relations *between* domains

Archimate language

Basis for visualizations

Map to standards

Basis for analyses
Key requirements of an Enterprise Architecture Modelling Language

- Focused on modelling inter-domain relations
- Modelling the global structure within each domain, showing the main elements and their dependencies, in a way that is easy to understand for non-experts of the domain
- Visualise models in a different way, tailored towards specific stakeholders with specific information requirements
Layered Services Approach

Business Layer
The Business layer offers products and services to external customers, which are realised in the organisation by business processes performed by business actors.

Application Layer
The Application layer supports the business layer with application services which are realised by (software) applications.

Technology Layer
The Technology layer offers infrastructural services (e.g., processing, storage and communication services) needed to run applications, realised by computer and communication hardware and system software.
Layers, Aspects and Domains

- **Environment**
  - Product domain
  - Information domain
  - Process domain
  - Organisation domain

- **Business**
  - Data domain
  - Application domain

- **Application**
  - Technical infrastructure domain

- **Technology**

**Information** | **Behaviour** | **Structure**

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Services as Binding Concept

Customer

External business service

Internal business service

External application service

Internal application service

External infra. service

Internal infra. service
Example of layers

Business layer

Application layer

Technology layer
Examples
As-Is: Provider centric processes
To-Be: Customer centric processes
To-Be Opt.1: Organization centric citizen data

Citizens

- Birth and Death Registration
- Marriages, Divorces
- Passports, Naturalization
- Education
- Other Services

Ministry 1
Ministry 2
Ministry 3
Ministry 4
Ministry X

System 1
System 2
System 3
System 4
System X

Citizen Data 1
Citizen Data 2
Citizen Data 3
Citizen Data 4
Citizen Data X
To-Be Opt. 2: Citizen-centric citizen data

Citizens

- Birth and Death Registration
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Ministry 1
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Ministry X

System 1
System 2
System 3
System 4
System X

Shared Master Data Services

Shared Master Data Management

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Notations
The purpose of the model is to help to find the solution to the need

- Example: Business Process Modeling
- Model the **As-Is** process
  - Show areas of problems or opportunities
- Analyse problems or opportunities
  - What are related to the process?
- Model the **To-Be** process
  - Solutions to problems or opportunities
  - Basis for implementation
Example in Hospital: As-Is situation

- Process of medical records:
  Doctors dictate the medical records, typists write them into the medical record system and print them on paper

- Problem with throughput at some departments

- Long backlogs of dictations waiting for transcription

- A requirement to deliver the transcription in five days

- What is causing the problem?
A simple process model

See the patient → Dictate → Transcribe → Print → File

Why backlogs?
More complete process model (BPMN)

Why backlogs?

This model does not help.
Idea: Escalators at Helsinki metrostation

- When do the traffic lights change?
- Why?
Process model:
Same process down and up

- Come to escalator
- Go down
- Go to train

- Why lights do not change?

- Come to escalator
- Go up
- Go to street

- This model does not help.
Look at the flow!

Bursts of people

Steady flow of people
Let us use Stock and Flow models

The behaviour of the process
Back to hospital

Why backlogs?
Simulation: Wait time behaviour

Number of transcriptionists

Dictate → Transcribe

Backlog

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Solution to backlogs?

As-Is: Distributed

To-Be: Centralized

- Digital dictation was introduced
- Transcriptionist center was established
- Backlogs disappeared
- Response times shortened
- Throughput increased
Lesson learned: The model has to enable understanding the problem

- Task centric:
  - What to automate
  - What to integrate
  - What to implement as services

- Flow centric:
  - Behaviour of the process
  - Locate bottlenecks
  - Improve throughput

- Improve, Redesign, Reengineer
Needs of an Enterprise?
EA metaphors

- Building
- City Plan
- Factory
Business Models

What is a business model?
Change is always here

- Build to change!

- Conflicting needs:
  - Build to last
  - Build to change

- Try to find out:
  - What is stable
  - What will change
Service Orientation
What is happening with processes...

But: Have we moved from one set of silos (functions) to another set of silos (processes?)
**Business Process Management (BPM): The Third Wave**
Our business process
What if...

We ask the customer to do some of the work
What if...

We want to share things we have
What if...

Some of our things are outsourced...
What if...

We then acquire a competitor who does certain things better than we do!
What if...

We then make changes to our brilliant process design on 18 months...
What if: Service Orientation

Service:
A reusable business task – e.g., check customer credit, create new account

Business Processes:
A way of integrating your business as linked services and the outcomes that they bring

Service oriented architecture (SOA):
An IT architectural style that supports service orientation
Example: Healthcare
Business Process and Business Services

Business Process: Care Process of a patient

Business Services:
- Lab tests, radiology tests, endoscopy tests etc...
- Procedures, Medication, Therapies
- A care process consists of multiple services
- A service can be requested in any task of the process

Flexibility:
Each patient has a unique care process model, in details....
Information Architecture
Business processes and data

Intersections indicate activities = Transactions

Product Data
Bill-Of-Material

Master Data

Chain of Activities = Business Process:
Associated Transactions
Data Model of Process and Services

Analogy: Product Data Management
- Type = Kind of Bike (Product code)
- Instance = Individual Bike (serial number)
- Product Bill-Of-Materials

Process Data Management
- Type = Kind of Process (Process Type Code)
- Instance = Individual execution of Process (Process Instance ID)
- Process Bill-Of-Materials!
Conclusion: Architecture to agility and stability!
Thank You!

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