Enterprise Architecture – Dealing with Complexity and Change
The Zachman Framework
Zachman Framework

- Regarded the origin of enterprise architecture frameworks (originally called "Framework for Information Systems Architecture")
- First version published in 1987 by John Zachman
- It is still further developed by Zachman International (http://www.zachman.com)
- Often referenced as a standard approach for expressing the basic elements of enterprise architecture

Rationale of the Zachman Architecture

■ There is not a single descriptive representation for a complex object ... there is a SET of descriptive representations.

■ Descriptive representations (of anything) typically include:
  ♦ Perspectives
  ♦ Abstractions

(Zachman 2012)
Dimension 1 – Perspectives

Zachman originally used the analogy of classical architecture

For the different stakeholders different aspects of a building are relevant - models of the building from different perspectives

- **Bubble charts**: conceptual representation delivered by the architect
- **Architect's drawing**: transcription of the owner's perceptual requirements – *owner's perspective*
- **Architect's plans**: translation of the owner's requirements into a product – *designer's perspective*
- **Contractor's plans**: phases of operation, architect's plans constrained by nature and technology – *builder's perspective*
- **Shop plans**: parts/sections/components of building details (out-of-context specification) – *subcontractor's perspective*
- **The building**: physical building itself

(Zachman 1987)
### Dimension 1: Architectural Representations with analogies in Building and Information Systems

<table>
<thead>
<tr>
<th>Generic</th>
<th>Buildings</th>
<th>Information Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ballpark</td>
<td>Bubble charts</td>
<td>Scope/objectives</td>
</tr>
<tr>
<td>Owner’s representation</td>
<td>Architect’s drawings</td>
<td>Model of the business (or business description)</td>
</tr>
<tr>
<td>Designer’s representation</td>
<td>Architect’s plans</td>
<td>Model of the information system (or information system description)</td>
</tr>
<tr>
<td>Builder’s representation</td>
<td>Contractor’s plans</td>
<td>Technology model (or technology-constrained description)</td>
</tr>
<tr>
<td>Out-of-context representation</td>
<td>Shop plans</td>
<td>Detailed description</td>
</tr>
<tr>
<td>Machine language representation</td>
<td>—</td>
<td>Machine language description (or object code)</td>
</tr>
<tr>
<td>Product</td>
<td>Building</td>
<td>Information system</td>
</tr>
</tbody>
</table>

(Zachman 1987)
Each row is different in nature, in content, in semantics from the others – representing different perspectives.

Representations do not correspond to different levels of details – level of detail is an independent variable, varying within one representation.
Dimension 2: Aspects of an Architecture

- There exist different types of descriptions oriented to different aspects
- Zachman associates each aspect with a question word
  - WHAT: inventory models
  - HOW: functional/process models
  - WHERE: location/distribution models
  - WHO: organisation models
  - WHEN: timing models
  - WHY: motivation models

(Zachman 1987)
Abstractions for Manufacturing

(Zachman 2012)
The Zachman Framework for Enterprise Architecture – Enterprise Ontology

### Abstractions/Aspects

<table>
<thead>
<tr>
<th>Perspectives</th>
<th>Business Information</th>
<th>Technology Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>Business Processes</td>
<td>Technology Processes</td>
</tr>
<tr>
<td>Architecture</td>
<td>Business Entities</td>
<td>Technology Entities</td>
</tr>
<tr>
<td>Information</td>
<td>Business Services</td>
<td>Technology Services</td>
</tr>
<tr>
<td>Technology</td>
<td>Business Products</td>
<td>Technology Products</td>
</tr>
</tbody>
</table>

Each cell contains models.
The Zachman Framework is not a Methodology

**Ontology**

The Zachman Framework™ schema technically is an ontology -
a theory of the existence of a structured set
of essential components of an object
(the object being an Enterprise, a department, a value chain,
a "sliver," a solution, a project,
an airplane, a building, a bathtub or whatever or whatever).

A Framework is a STRUCTURE.
(A Structure DEFINES something.)

**Methodology**

A Methodology is a PROCESS.
(A Process TRANSFORMS something.)

A Structure IS NOT A Process
A Process IS NOT a Structure.
**Ontology vs Methodology**

An Ontology is the classification of the total set of **Primitive** (elemental) components that exist and that are relevant to the existence of an object.

A Methodology produces **Composite** (compound) implementations of the Primitives.
“Primitives” are Timeless.

This is NOT a Process.
Analogy: Chemistry

Elements are Timeless
Until an ontology exists, nothing is repeatable, nothing is predictable. There is no DISCIPLINE.

This is NOT a Process.
Analogy: Chemistry

**Process**
(METHODOLOGY)

Add Bleach to an Alkali and it is transformed into Saltwater.

HCl + NaOH → NaCl + H₂O

**Compounds**

<table>
<thead>
<tr>
<th>Compound</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt</td>
<td>NaCl</td>
</tr>
<tr>
<td>Aspirin</td>
<td>C₉H₈O₄</td>
</tr>
<tr>
<td>Vicodin</td>
<td>C₁₈H₂₁NO₃</td>
</tr>
<tr>
<td>Naproxen</td>
<td>C₁₄H₁₄O₅</td>
</tr>
<tr>
<td>Ibuprophen</td>
<td>C₁₅H₁₈O₂</td>
</tr>
<tr>
<td>Viagra</td>
<td>C₂₂H₃₀N₆O₄S</td>
</tr>
<tr>
<td>Sulphuric Acid</td>
<td>H₂SO₄</td>
</tr>
<tr>
<td>Water</td>
<td>H₂O</td>
</tr>
<tr>
<td>etc., etc., etc.</td>
<td></td>
</tr>
</tbody>
</table>

This is NOT an Ontology.
Strategic Alignment Model and Zachman Framework
Models and the Zachman Framework

- Concepts for modelling are related to cells.
- Models are composites, they can roughly be assigned to cells, if they are composed of elements (concepts) of this cell.
- The elements of models can (roughly) be assigned to cells, but often cover...
Relations between Models and Model Elements

- There are relations between (elements of) the models

- **Horizontal Relations**: In same perspective, e.g.
  - Data used in a process
  - Application implementing a process activity

- **Vertical relations**: Between different perspectives
  - Implementation of an application
  - Database model for an entity relationship model
Enterprise Architecture Modeling – Examples of Models Kinds

- Process Model
- Organisation Model
- Data/Documents
- Fact Type Model
- UML class diagram
- UML activity diagram
- UML sequence diagram
- UML component diagram

Business Motivation
Southwest Airlines

For the Southwest Airlines…

…what information can you find to describe the enterprise architecture according to the Zachman Framework

…from the enterprise perspective (scope contexts)