University of Applied Sciences Northwestern Switzerland
School of Business

Master of Science
Business Information Systems

Enterprise Architecture Frameworks

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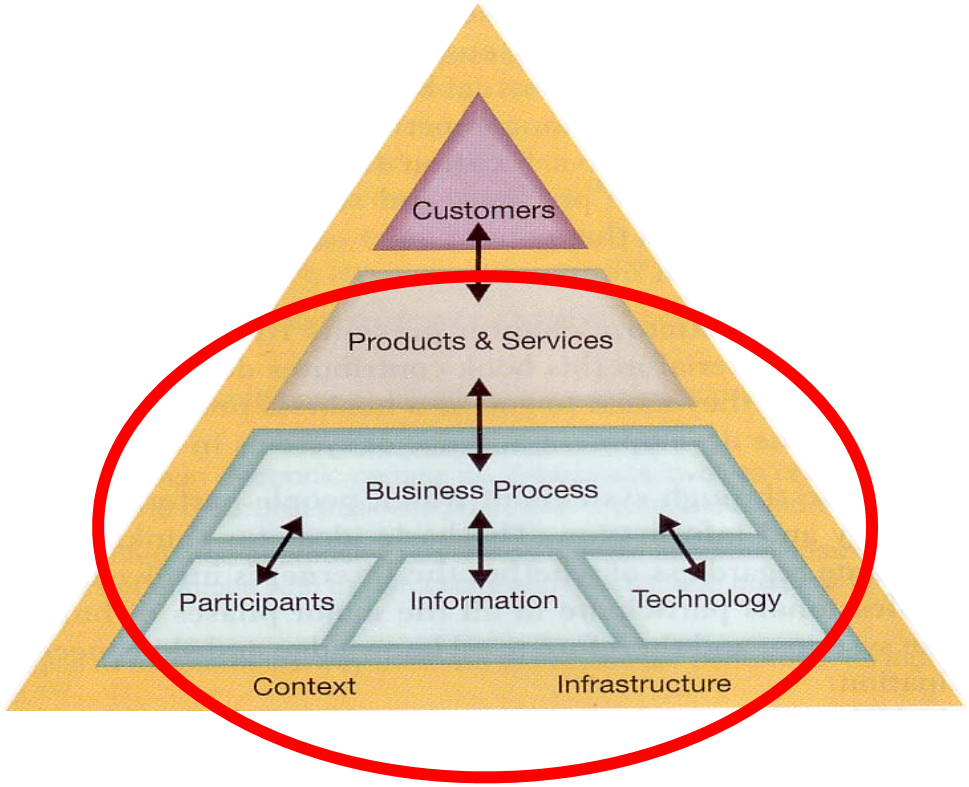
Chapter 2: Enterprise Architecture Frameworks

- Enterprise Architecture Frameworks
- Zachman Enterprise Ontology
- TOGAF
- ArchiMate

Enterprise Architecture

- **An Enterprise Architecture** is a coherent whole of principles, methods, and models that are used in the design and realisation of an enterprise's organisational structure, business processes, information systems, and infrastructure
- An Enterprise Architecture contains all *relevant*
  - Business structures
  - IT structures
  - and their relationships
- Enterprise Architecture gives an overall view on the enterprise
  - merge distributed information from various organisational entities and projects into a whole
  - show the interconnectedness and dependencies between these information
- Show which information systems contribute to which business processes.

Enterprise Architecture and Work-Centered Analysis



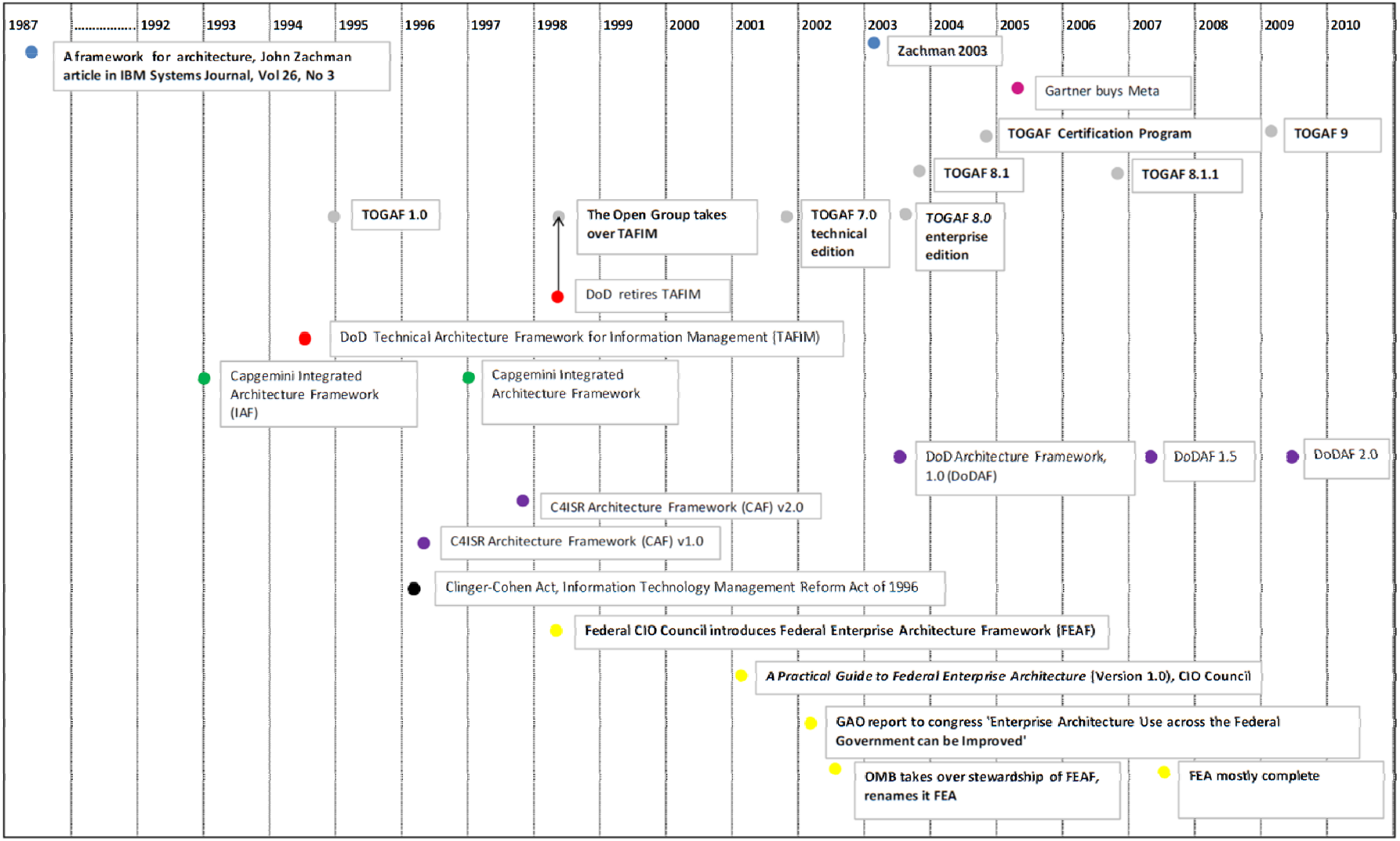
- The Enterprise Architecture
  - represents the main elements of the work centered analysis and their relations
  - models both business and IT perspective
  - relates to strategy (motivation)

Quelle: Alter, Steven: Information Systems – The Foundation of E-Business, 4. Auflage, Prentice Hall, New Jersey, 2002

Enterprise Architecture Frameworks

- There are a large number or Enterprise Architecture Frameworks, e.g.
  - Zachmann Enterprise Architecture Framework
    - An enterprise Ontology
  - TOGAF - The Open Group Architecture Framework
    - A methodology for Enterprise Architecture Development
  - ArchiMate
    - A graphcial language for Enterprise Architecture Descritpion
  - Best Practice Enterprise Architecture

Timeline of Enterprise Architecture



(Bespoke Systems 2012)

Zachman Framework

- The Zachman framework is regarded the origin of enterprise architecture frameworks (although originally called "Framework for Information Systems Architecture")
- John A. Zachman published the first version in 1987
- It is still further developed by Zachman International (http://www.zachman.com)
- The Framework is often referenced as a standard approach for expressing the basic elements of enterprise architecture
- The framework is a logical structure for classifying and organising the descriptive representations of an enterprise

The Zachman Framework for Enterprise Architecture – Enterprise Ontology

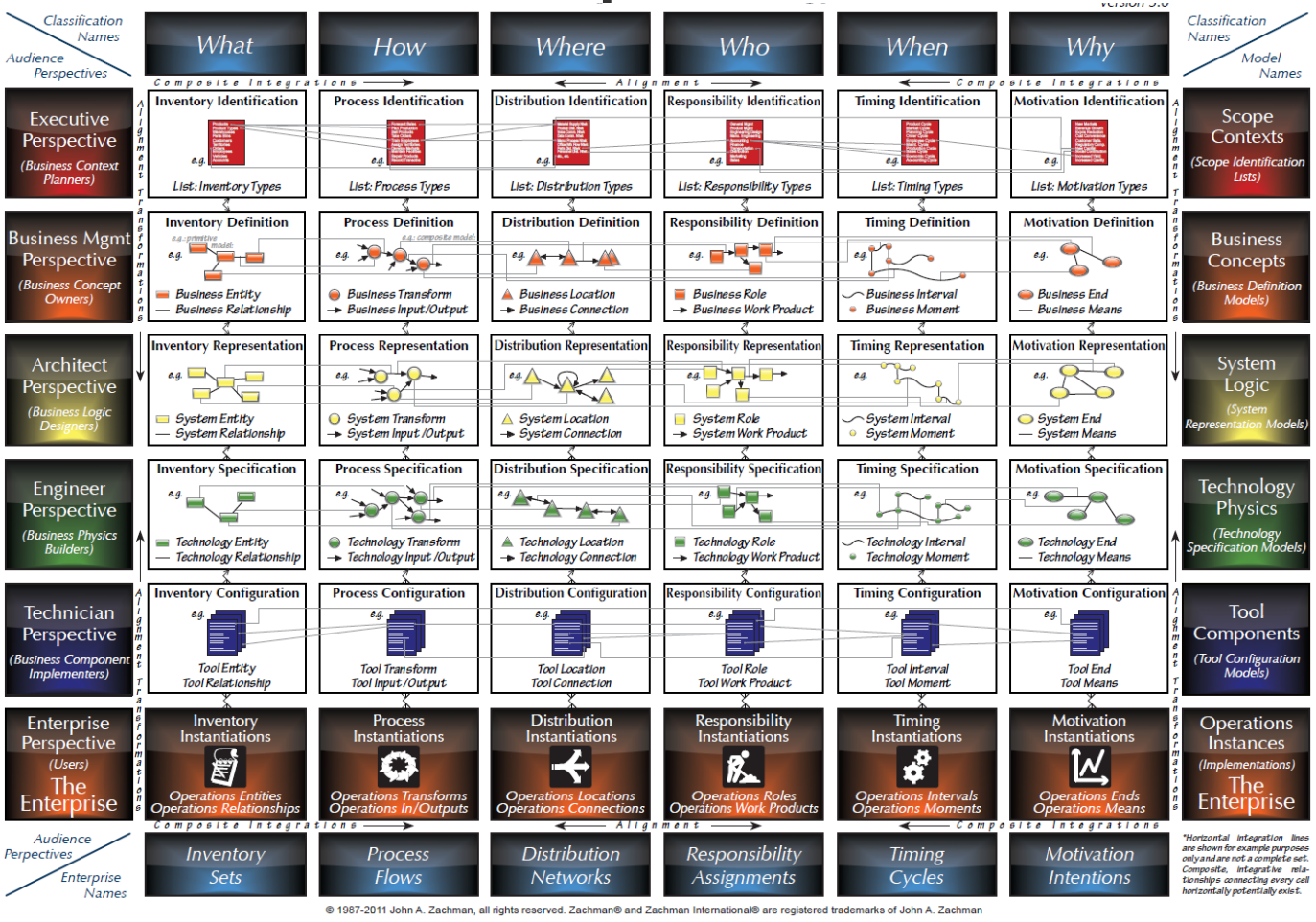
Each cell contains models

Aspects

Perspectives

Business

Information Technology



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 contrained 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

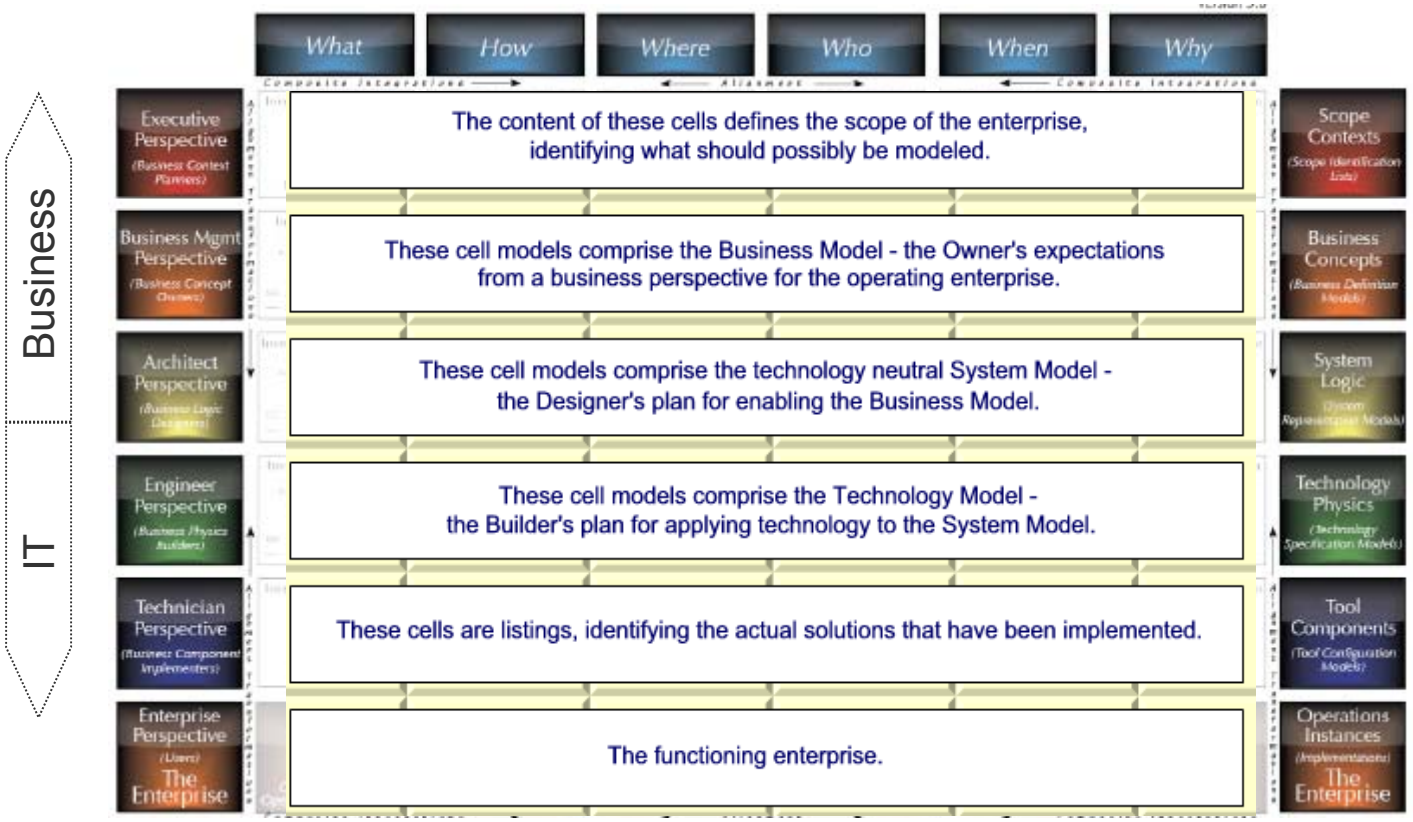
(Zachman 1987)

Dimension 1: Architectural Representations with analogies in Building and Information Systems

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

(Zachman 1987)

Dimension 1 - Perspectives



Scope (Boundaries)

Requirements (Concepts)

Design (Logic)

Plan (Physics)

Part (Configurations)

Product (Instances)

- 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 question word

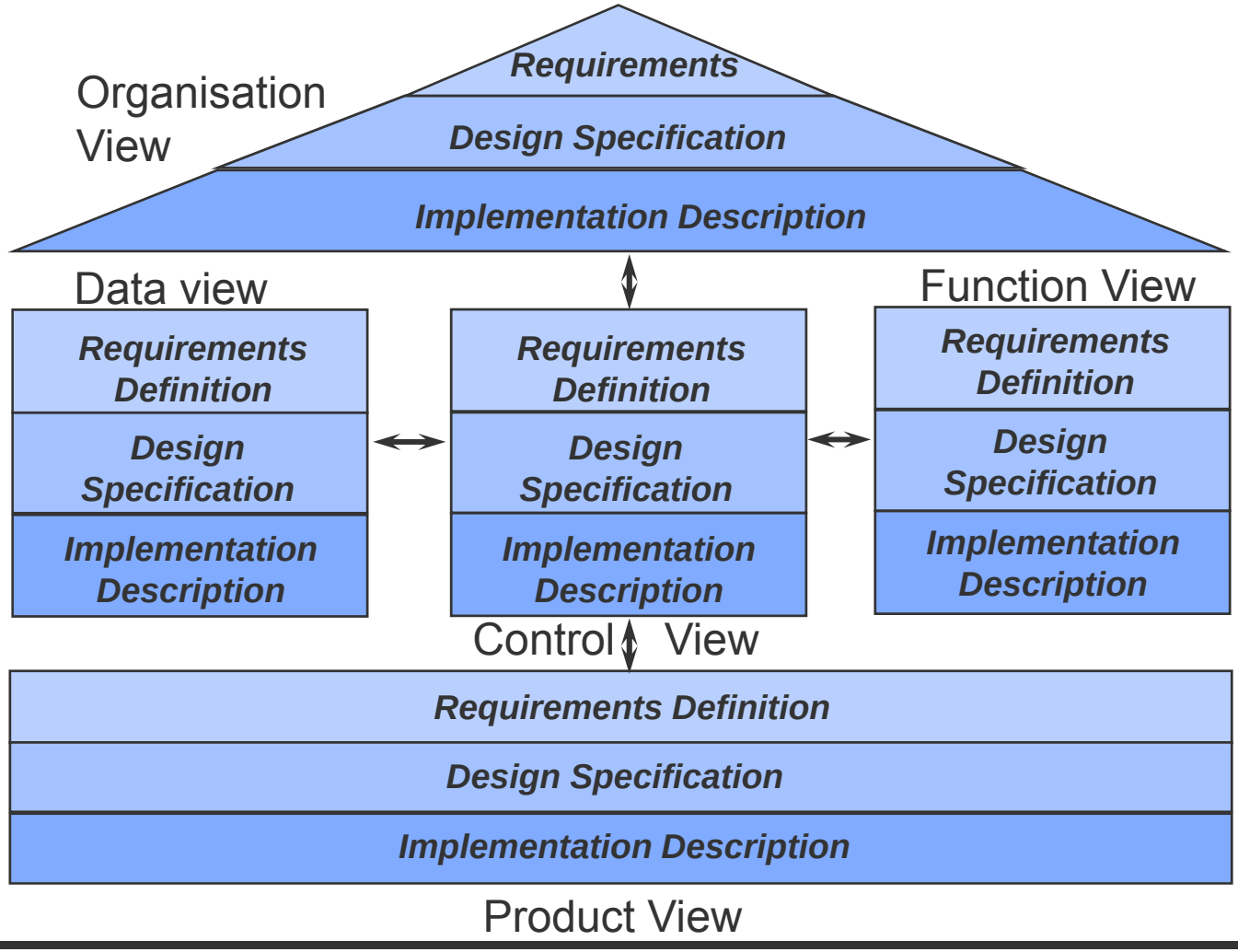
WHAT	material description
HOW	functional description
WHERE	location description
WHO	organisational description
WHEN	temporal description
WHY	motivational description

(Zachman 1987)

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 activitiy
- Vertical relations: Between different perspectives
  - Implementation of an application
  - Database model for an entity relationship model

ARIS – Architecture for integrated Information Systems

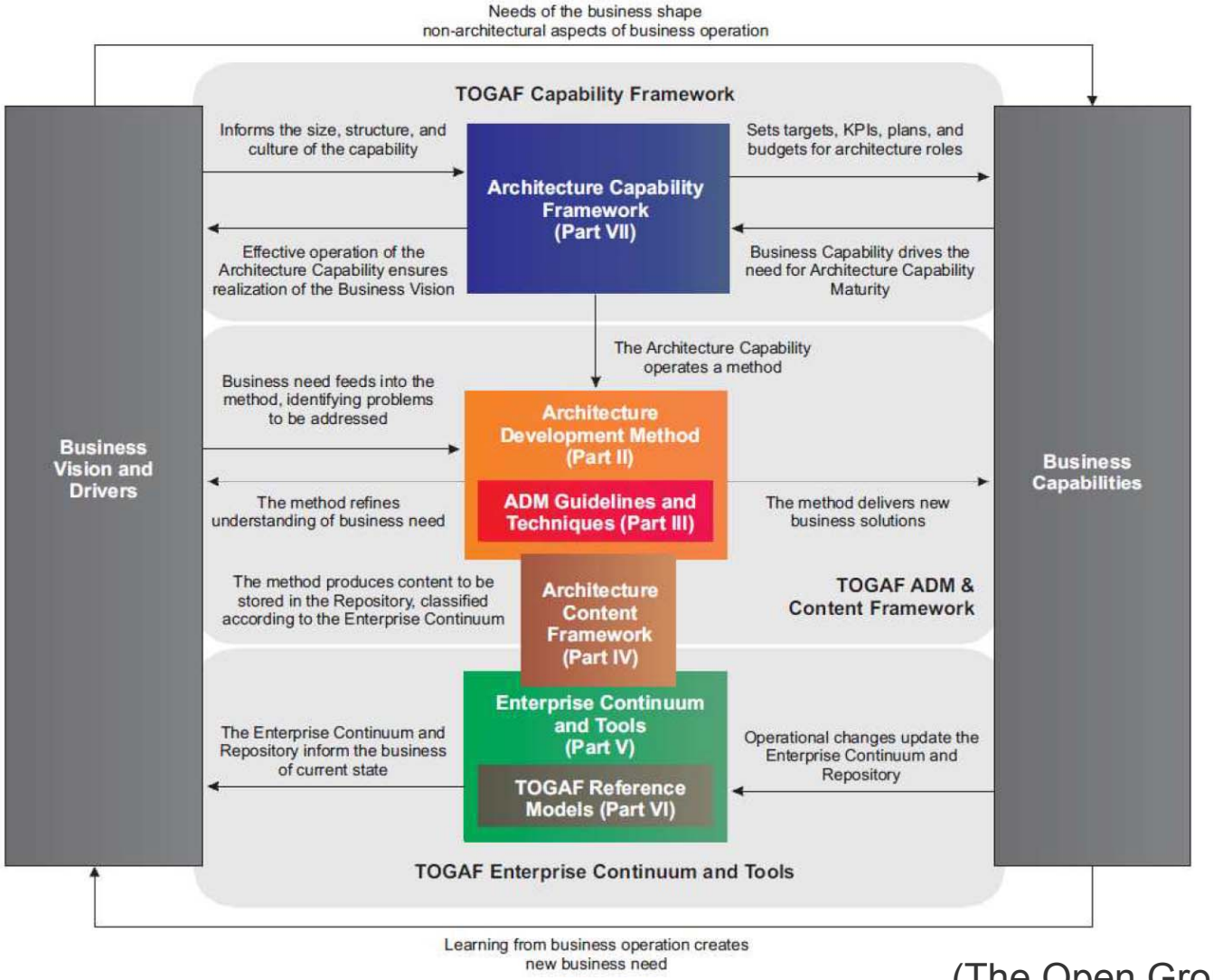


Views correspond to aspects
Levels correspond to prespectives

TOGAF – The Open Group Architecture Framework

- Developed and continuously evolved since the mid-90's by The Open Group's Architecture Forum
- While Zachman is more an ontology, TOGAF is a methodology
- At the heart of the framework is the Architecture Development Method (ADM)
- http://www.opengroup.org/togaf/

Structure of the TOGAF Document



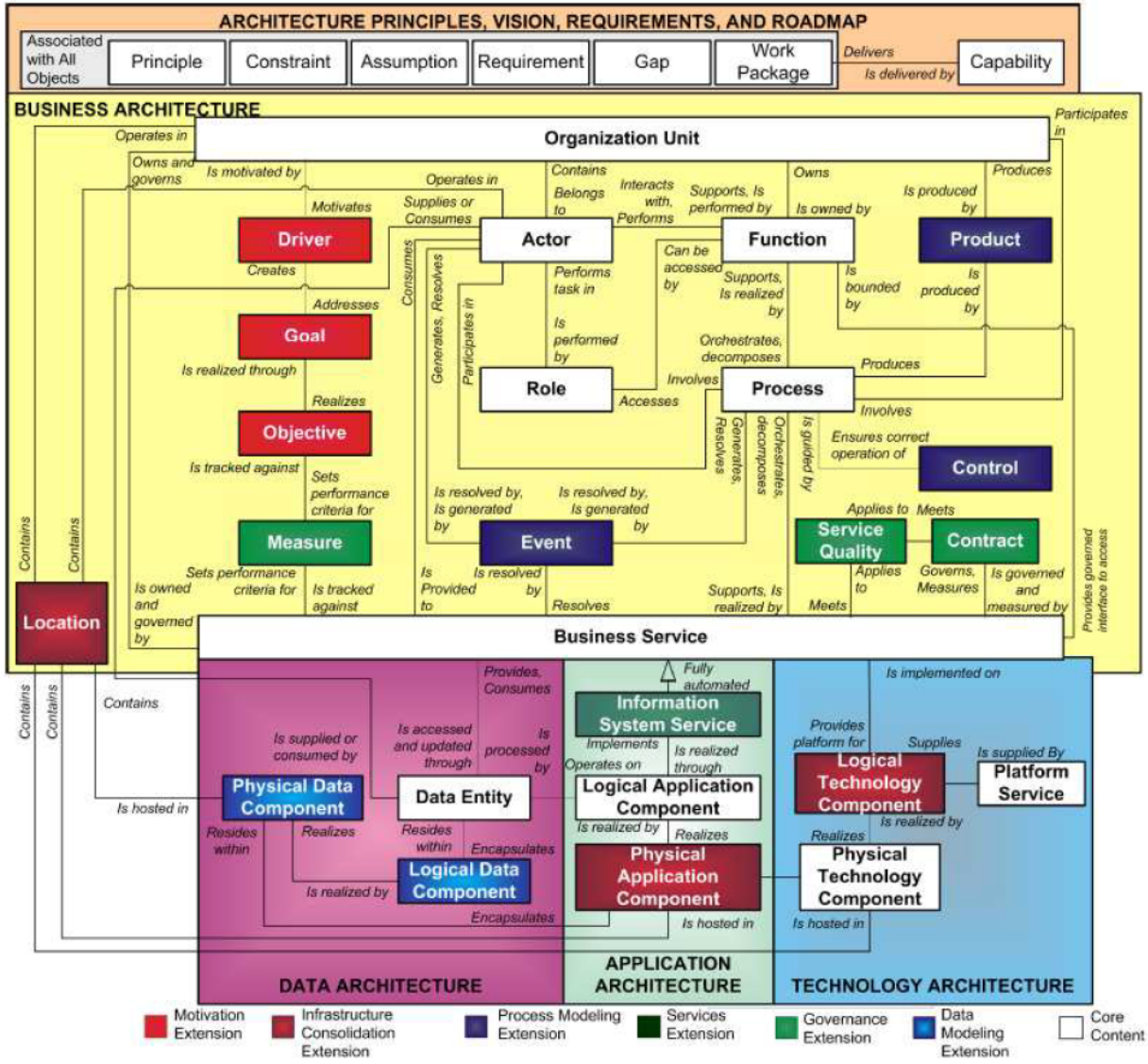
(The Open Group 2009, p. 4)

TOGAF (Sub-)Architecture Views

- The model of an enterprise architecture described in TOGAF is organised in four partial sub-architectures:
  - **Business Architecture**
    - Strategies, governance, organisation and business processes of the enterprise
  - **Data Architecture**
    - data and their releations as well as principles for the organisation and the management of resources
  - **Application Architecture**
    - information systems and their relations to business processes
  - **Technology Architecture**
    - currenct technical realisation and future enterprise-specific standards like operating system, middleware and infrastructure

Data Architecture and Application Architecture together are the **Information System Architecture**

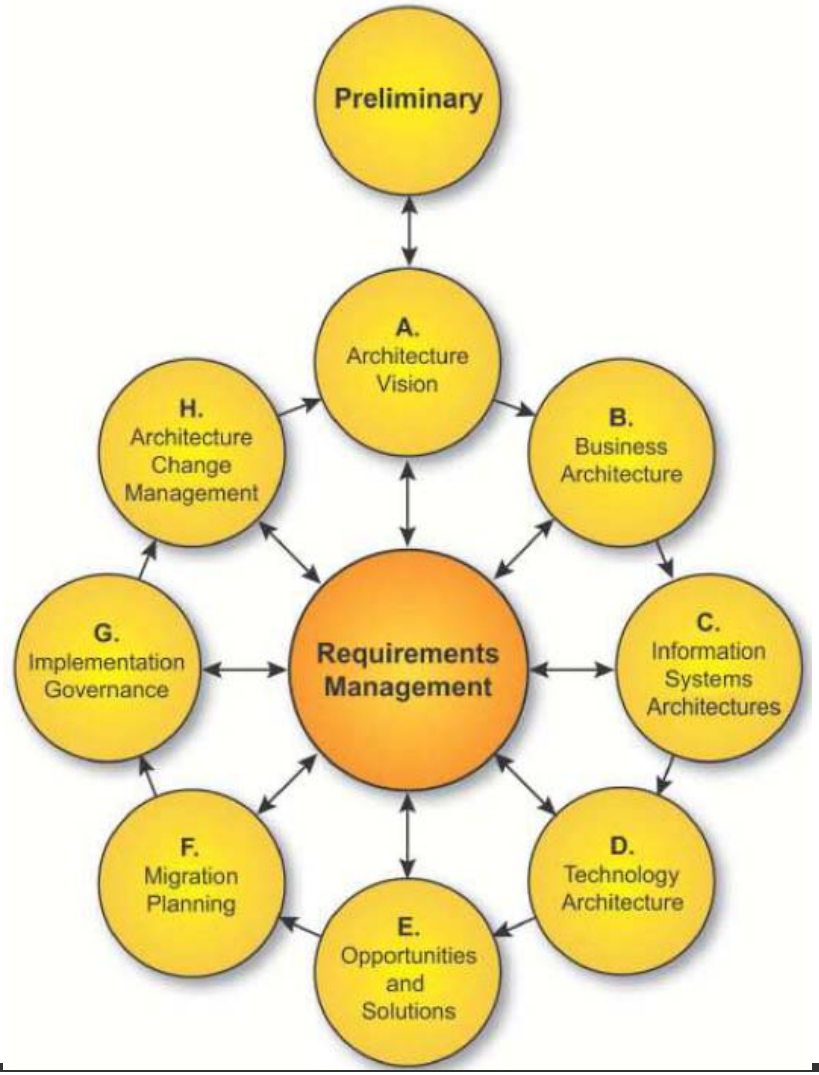
TOGAF: Architecture Content



The architecture content framework "provides a structural model for architectural content" and may also be substituted with other frameworks, such as the Zachman Framework (The Open Group, 2009, p. 361).

(The Open Group 2009, p. 379)

TOGAF Architecture Development Cycle (ADM)



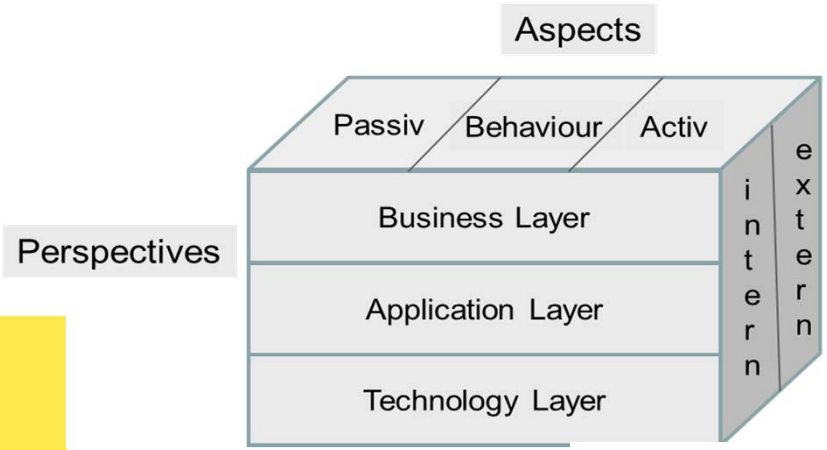
TOGAF addresses the whole enterprise architecture lifecycle

(The Open Group 2009)

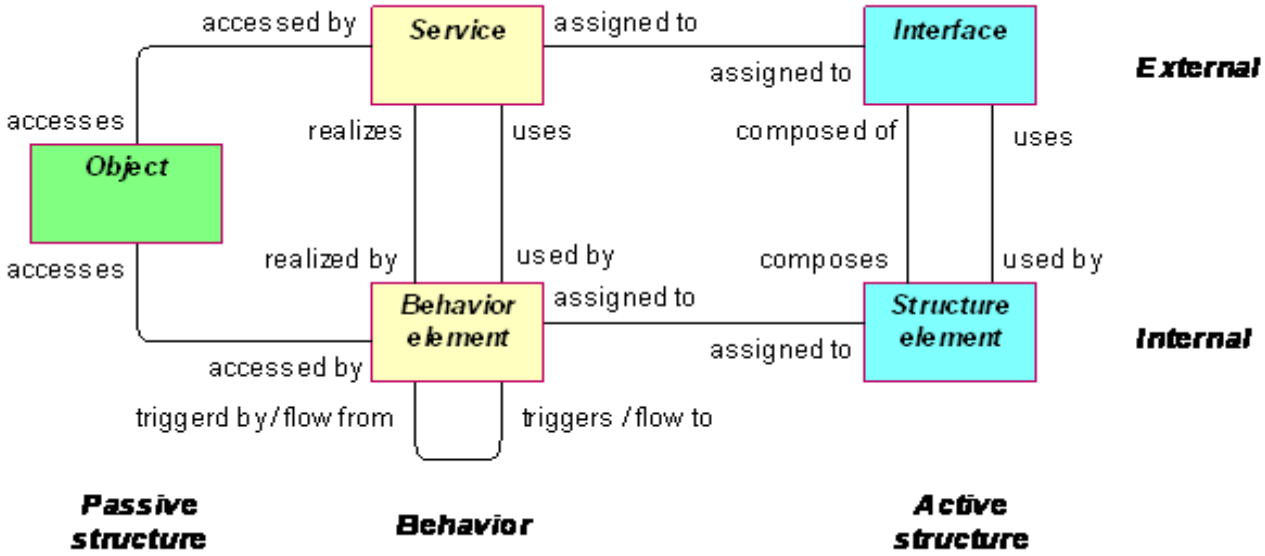
ArchiMate

- Developed 2005 and evolved by members of The ArchiMate Forum
- Current version: ArchiMate 2.0, from 2005
- Management framework for the overall architecture
- Defines a terminology to describe core architecture elements and their relations («a high level modelling language»)
- http://www.opengroup.org/archimate/doc/ts_archimate/

ArchiMate Generic Metamodel



Core Concepts



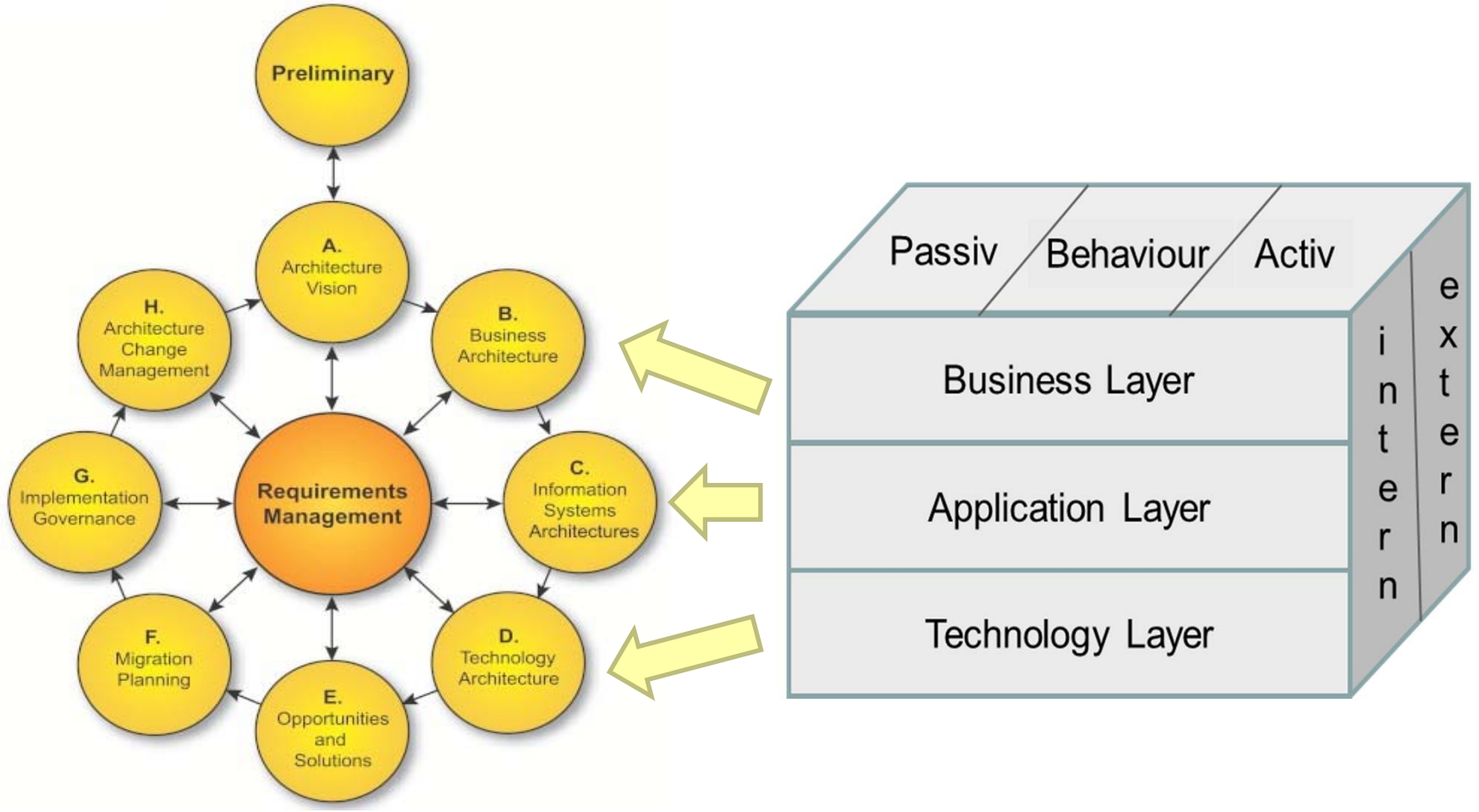
http://www.opengroup.org/archimate/doc/ts_archimate/

Using ArchiMate with an Architecture Method (e.g. TOGAF)

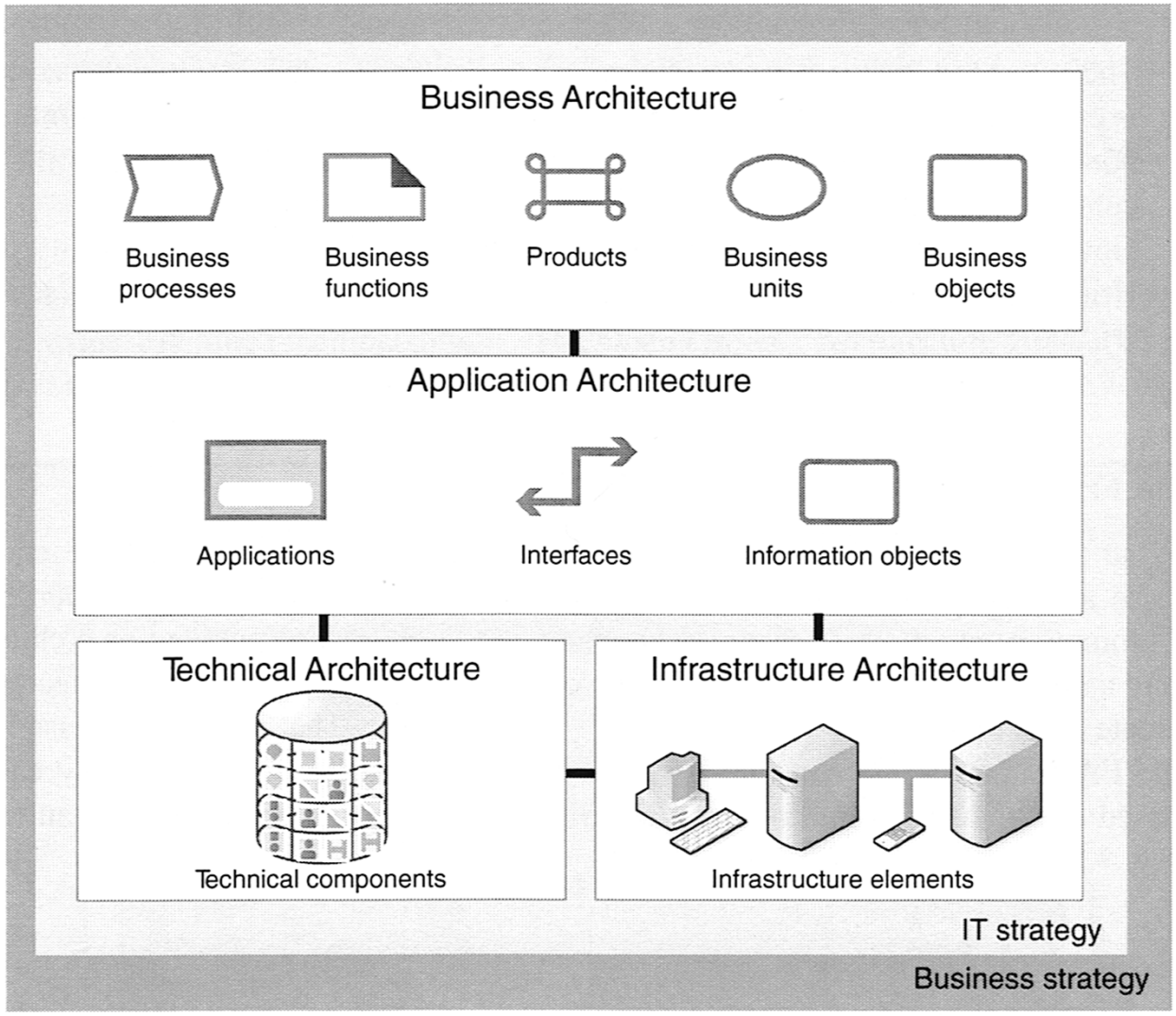
- TOGAF's ADM process refers to artifacts and deliverables; those artifacts could be represented in 'ArchiMate-Style'
- TOGAF is concerned with the application portfolio rather than application design. ArchiMate provides a language (kind of UML representation) for application design
- ArchiMate is probably best used at the level of system or solution architecture, whereas TOGAF is used at the level of cross-organisational strategic enterprise architecture
- The most important disparity between TOGAF and ArchiMate is that ArchiMate deals with the relationships between architectural layers, whereas TOGAF's views are confined to a single architectural layer

Source: Berrisford, G., & Lankhorst, M. (2009). Using ArchiMate with an Architecture Method A conversation. Via Nova Architectur.
Lankhorst, M., & Drunen, H. V. (2007). Enterprise Architecture Development and Modelling. Via Nova Architectura.

TOGAF and ArchiMate



Best Practice Enterprise Architecture



Partial Architectures of the Best Practice Architecture

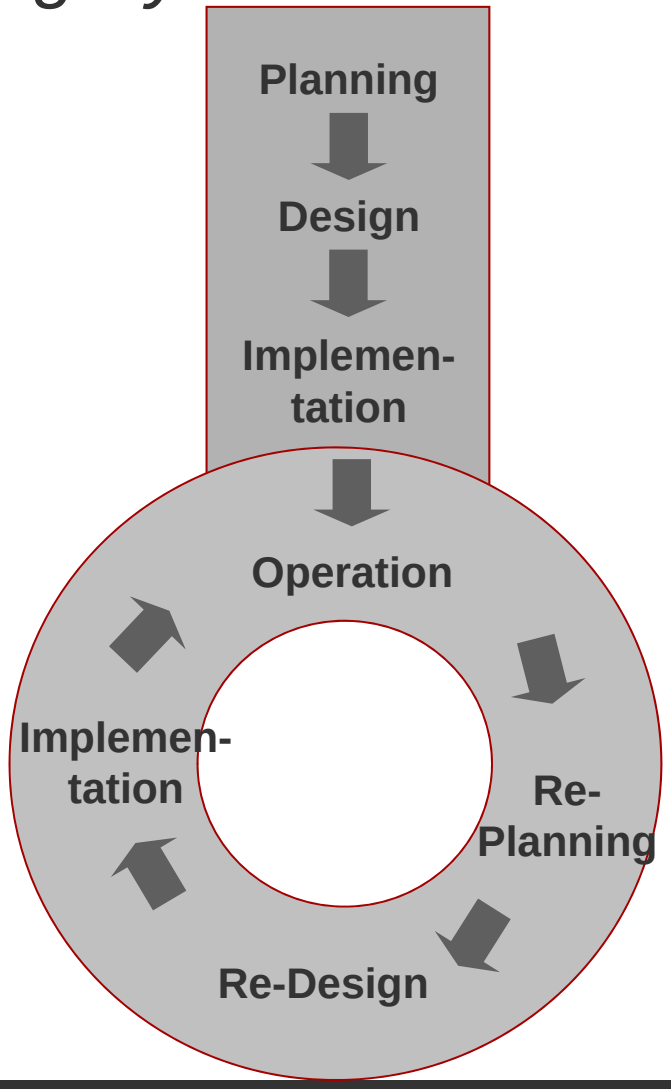
- **Business Architecture**
  - Describing main entities that determine the business: business processes, functions, products, business units and business objects.
- **Application Architecture**
  - documentation of the information systems landscape, i.e. information systems, their data und interfaces und the information flow
  - bridge between business architecture and the architectures of technology and infrastructure
- **Technology Architecture**
  - determination of enterprise-specific technical standards for information systems, interfaces and infrastructure
- **Infrastructure Architecture**
  - Entities of the infrastructure, on which the information systems are running

Enterprise Architecture vs. Business Process Management

- From the *business process perspective*, enterprise architecture achieves enterprise integration through
  - capturing and describing processes, strategies, organisation structures, information and material flow, resources etc.
  - concentration on how to perform core business processes in an organisation
  - considering the information and material flow in the entire process
- In this sense, business process management (BPM) relies on enterprise architecture
- *Tools for BPM are part of the toolset of enterprise architecture*

(Bernus et al. 2003, p. 9f)

Summary: Enterprise Architecture, Alignment and Agility



- Use of the EA models
  - Designing a new business/company (analogy: building a new house)
  - Reorganisation of the enterprise
    - Business Process Re-Engineering
    - migration of an IT infrastructure
    - exchanging/upgrading an information system

  (analogy: reconstructing a building)
- Any re-organisation must ensure alignment of Business and IT
- Enterprise Architecture supports agility by
  - providing transparency of context in case of business IT alignment
    - requirements of business for IT
    - influences of IT changes on business
- On the other hand, any re-organisation project leads to changes of the Enterprise Architecture