Enterprise Architecture – Introduction

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Learning Objective of the Module

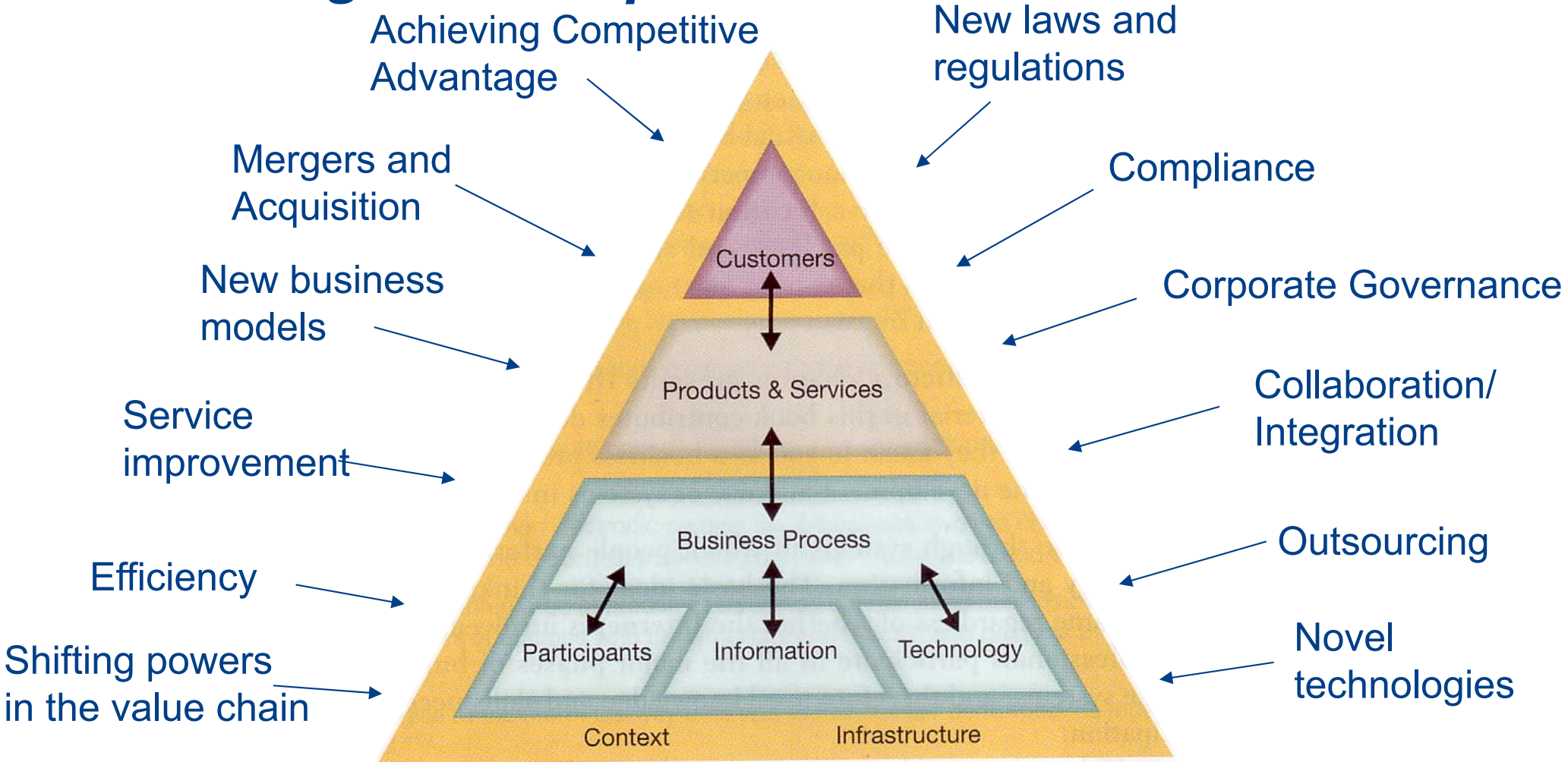
- Topic: Management and Modeling of Enterprise Architecture
  - Alignment of Business and IT
  - Supporting business goals with information systems
- We do this because architecture is necessary to deal with **complexity** and **change**
- Learning Objective
  - understand the interaction of corporate strategies, business processes and information systems.
  - understand the role of enterprise architectures for the alignment of business and IT
  - Implement enterprise architecture modeling and management

CHAPTER 1: INTRODUCTION INTO ENTERPRISE ARCHITECTURE MANAGEMENT

Learning Objective of Chapter 1

- Topic: Alignment of Business and IT
  - Strategic and operative Planning of IT
  - The need of Enterprise Architecture for change
- This is necessary because
  - Enterprise need to be **agile** in order to react on changes in business environment and technology or seize opportunities
  - To change **complex** systems like enterprises you need a description or a model
- Learning Objective
  - Mutual dependencies between business and IT
  - understand the role of Enterprise Architecture in change projects

Increasingly dynamic environment: Challenges confronting an Enterprise

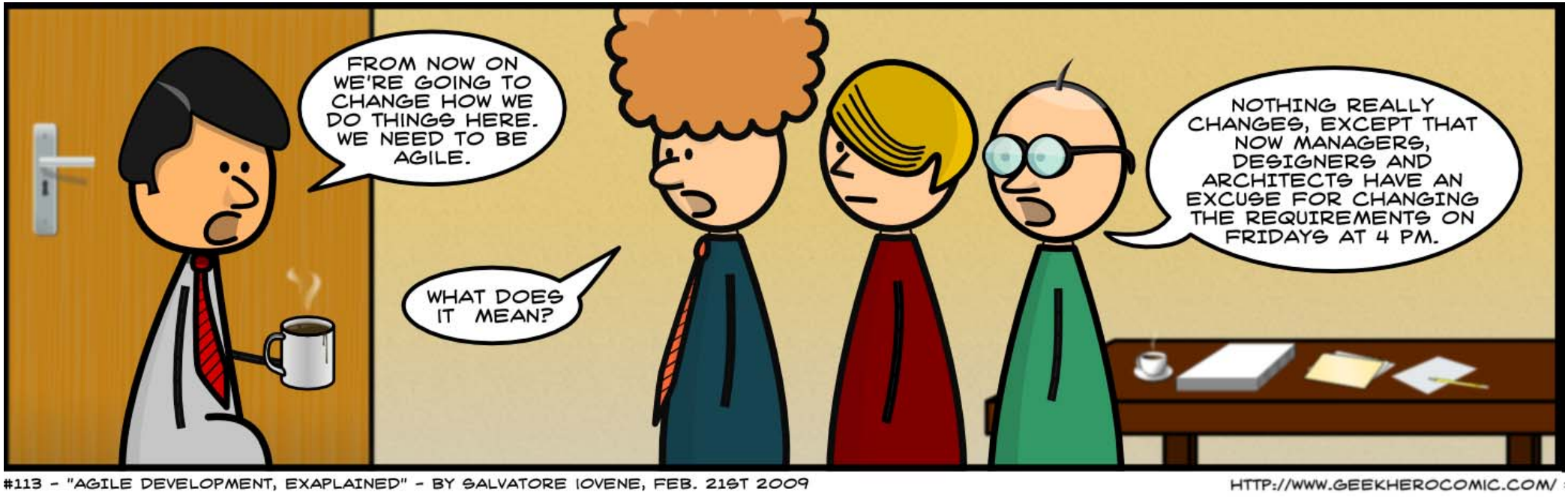


Agility: Being agile in the way we do business

- Being able to deal with individual customer requirements, to reduce response time to external demands, and to react on events
- Examples:
  - **Knowledge Work:** non-routine, judgement-oriented work reliant on expertise, e.g. consulting, IT development, medical treatment
  - **Mass customization**: mass production of individually customized goods and services, e.g. car industry and IT industry (PCs)
  - **Reduce time to market** has become a business requirement in many lines of business, e.g.
    - car industry (new model within few months instead of 6 years)
    - banking industry (time to market for a new product in few weeks instead of 9-12 months) [1)]

1) Op 't Land, M.; Proper, E.; Waage, M.; Cloo, J. and Steghuis, C.: Enterprise Architecture - Creating Value by Informed Governance, Springer-Verlag 2009, page 6. http://www.springerlink.com/content/k8jp3r/#section=132347&page=2&locus=10

Agility


FROM NOW ON WE'RE GOING TO CHANGE HOW WE DO THINGS HERE. WE NEED TO BE AGILE.
WHAT DOES IT MEAN?
NOTHING REALLY CHANGES, EXCEPT THAT NOW MANAGERS, DESIGNERS AND ARCHITECTS HAVE AN EXCUSE FOR CHANGING THE REQUIREMENTS ON FRIDAYS AT 4 PM.
#113 - "AGILE DEVELOPMENT, EXAPLAINED" - BY SALVATORE IOVENE, FEB. 21ST 2009
HTTP://WWW.GEEKHEROCOMIC.COM/

Agility: Demand for Continuous Change

- To improve their chances of survival, enterprises need to be agile.
- Agility is the ability of enterprises to
  - quickly **adapt themselves to changes** in their environment and
  - **seize opportunities** as they avail themselves
  - have **flexibility** to deal with individual demands and to react on events
- Agility leads to ***change*** of the ***enterprise architecture***

Source: Op 't Land, M.; Proper, E.; Waage, M.; Cloo, J. and Steghuis, C.: Enterprise Architecture - Creating Value by Informed Governance, Springer-Verlag 2009, page 6. http://www.springerlink.com/content/k8jp3r/#section=132347&page=2&locus=10

CHANGE

Drivers for Change can be internal and external

- External Drivers (strategic level)
  - Market Opportunities, new business models
  - New regulations
  - Demand for new services and products
  - Innovations

Seize **Opportunities**
React on **Threats**

- Internal Drivers (operational level)
  - Business Process Optimisation
  - Increase flexibility
  - Reorganisation
  - Migration of Information Systems
  - Changes in IT infrastructure

Exploit **Strengths**
Eliminate **Weaknesses**

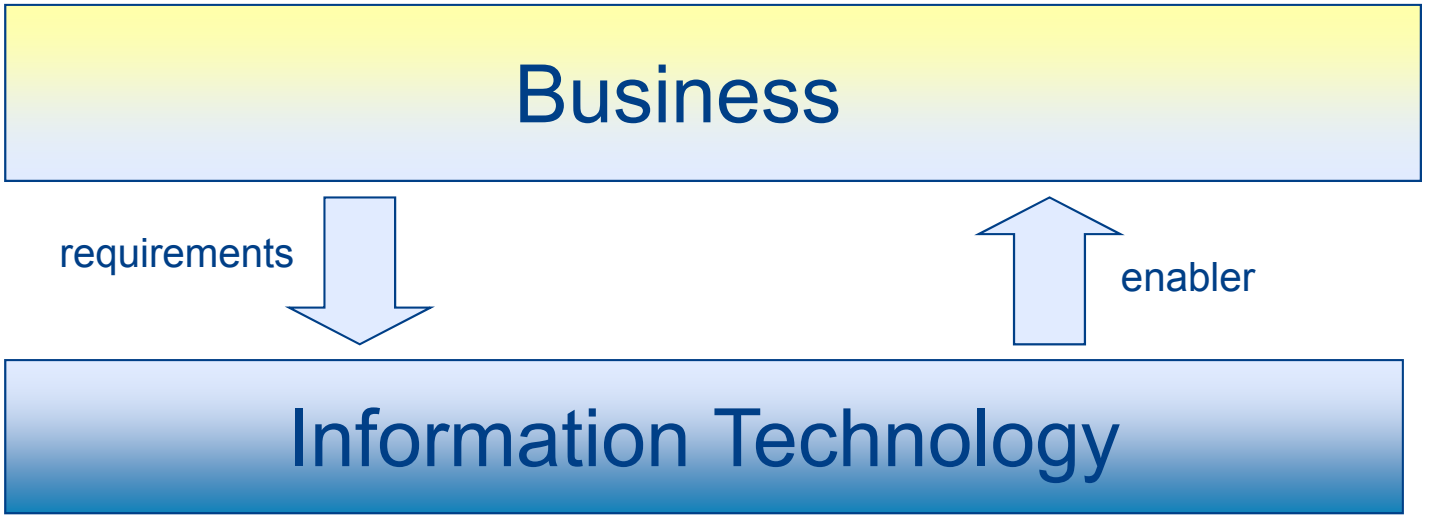
Drivers for Change can come from Business or IT

- Almost all processes have become IT reliant, if not fully automated.
- Thus, there is a mutual influence between information systems and the design of business process
  - A (re-)design of a business process often demands changes in the IT
  - Changes in IT applications and information systems can demand a re-design of business processes

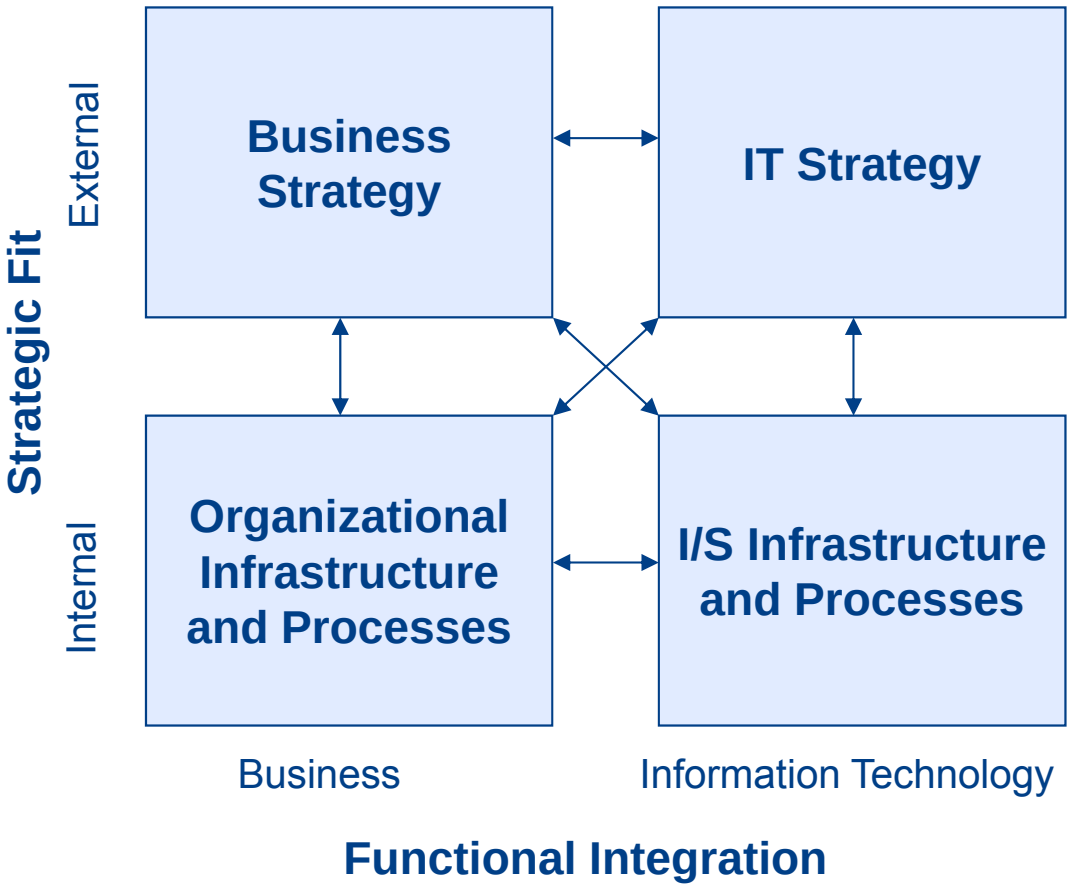
"There are no IT projects, only business projects."
(Paul Coby, CIO of British Airways)

Alignment of Business and IT

- There are ***mutual dependencies*** between business and IT
- The alignment of business and IT has to create an environment in which the IT department and the CIO
  - are not merely installing technology to support business processes but
  - are also using technology to shape business strategy.



Strategic Alignment Model



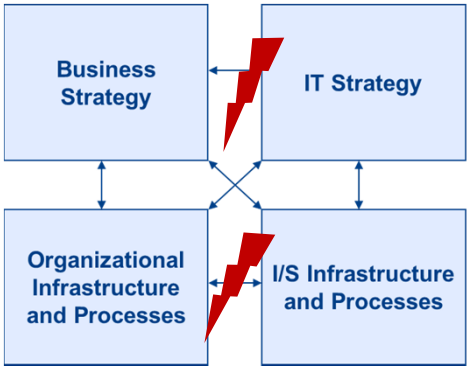
- The strategic alignment model of Henderson and Venkatraman (1993) combines the two dimensions
  - Aligning business and IT (functional integration)
  - Aligning interal and external drivers (strategic fit)
- Two principle approaches for alignment:

  business-driven: take the business strategy as the starting point and derive the IT infrastructure

  IT driven: focus on IT as an enabler; start from IT strategy deriving organisational infrastructure

(Henderson & Venkatraman 1993)

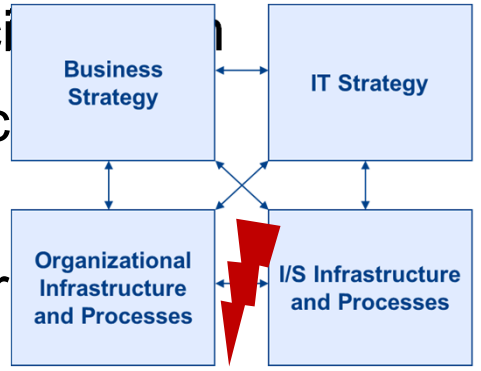
Alignment of Business and IT



- The alignment of business and IT is an issue on both strategic and operational level
- On strategic level the alignment of business and IT has to deal with problems like the following:
  - What happens to IT if the company has to react on market requirements?
  - What IT innovations are needed to remain competitive?
  - How do changes in the IT affect the business?
- On the operational level questions can be:
  - Can the new collaboration platform improve the business processes?
  - What does the

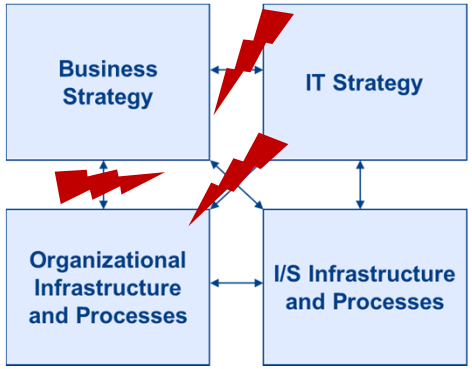
Examples of Conflicts between Business and IT

- Alignment of business and IT is usually a compromise between business requirements and IT potentials
- Some examples:
  - Business requirements cannot be fully satisfied, because
    - there are *already systems available* that cannot be replaced (reasons can be costs or other dependencies)
    - standards set by IT strategy avoid unmanagable varieties and ensure reliability
    - centralisation reduces costs at the expense of speci
  - Chances of IT innovations cannot be implemented, bec
    - missing skills of employees
    - business processes or organisation are not appropr
    - incompatibility with business strategy

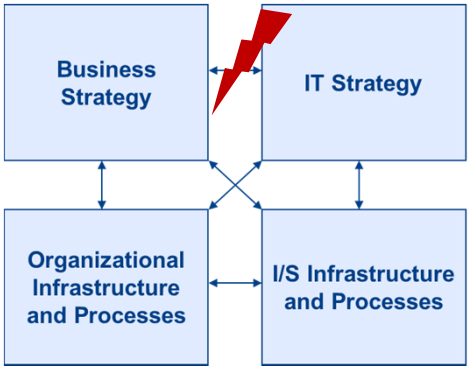


Business Transformation: Align Operations with Strategy

- Business transformation is a key executive management initiative that attempts to align People, Process and Technology initiatives of an organisation more closely with its business strategy and vision to support and help innovate new business strategies and meet long term objectives
- Business transformation is achieved by realigning
  - the way staff work (processes),
  - how the organisation is structured (people)
  - how technology is used



Strategic Planning of Information Technology

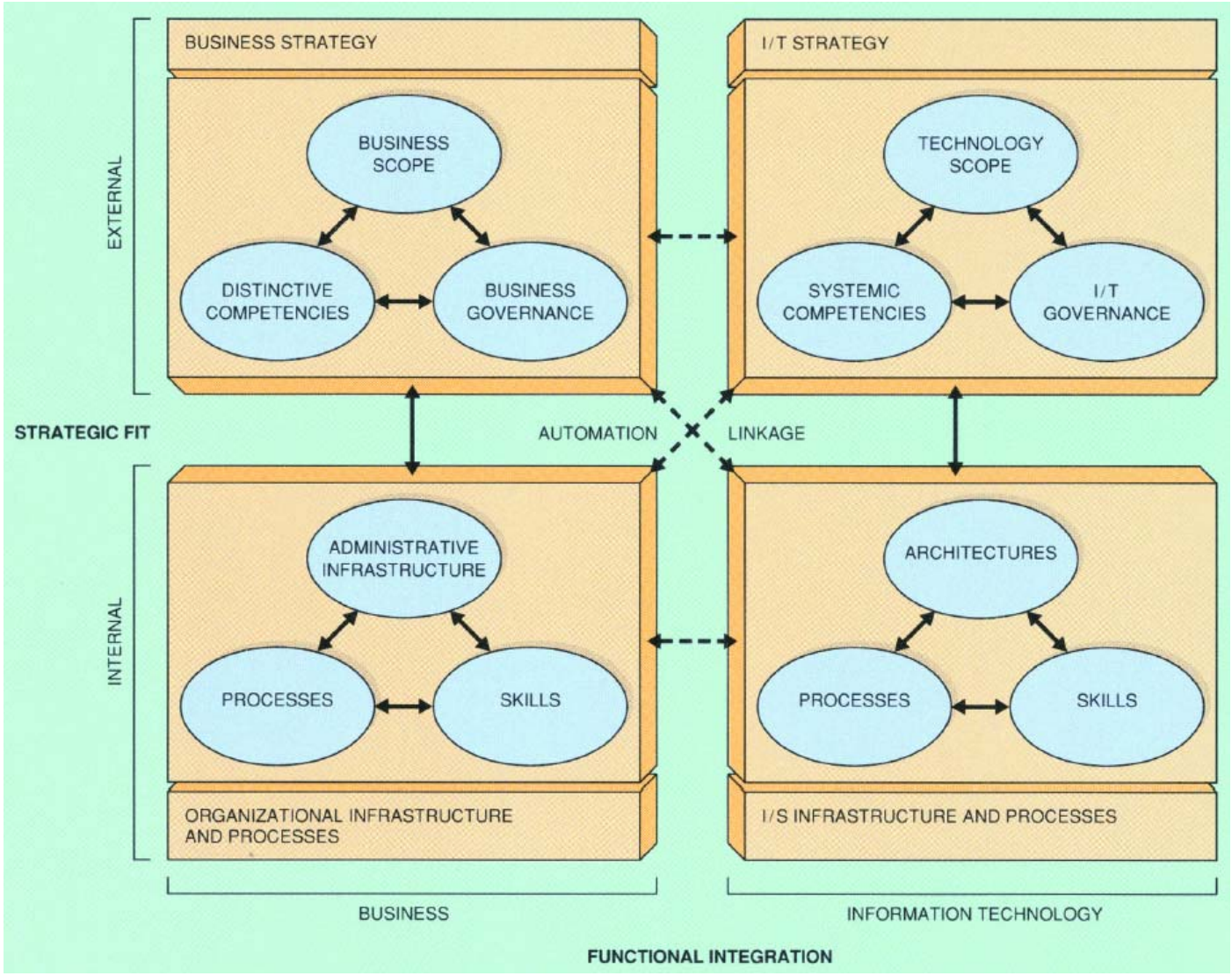


The objective of planning IT strategically is to **align** it with overarching corporate goals and business requirements and make it **agile** enough to deal with constant change in the company and its environment

(Hanschke 2010, p. 7)

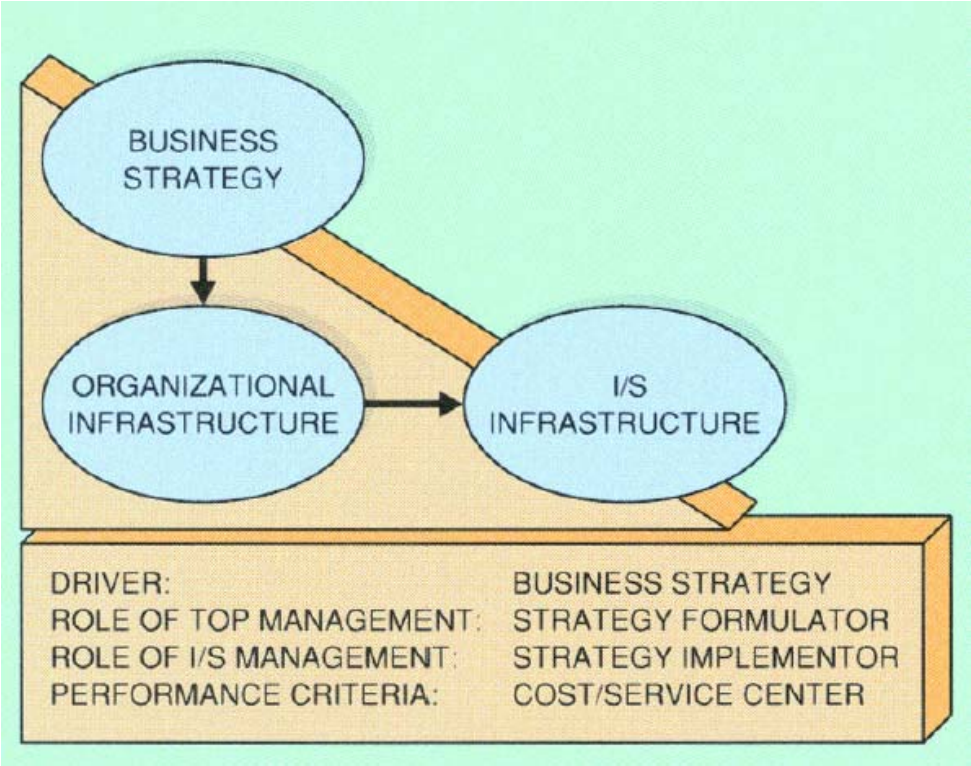
- **Agility – Ability to change**
- **Business-IT alignment**

Strategic Alignment Model – Detailed View

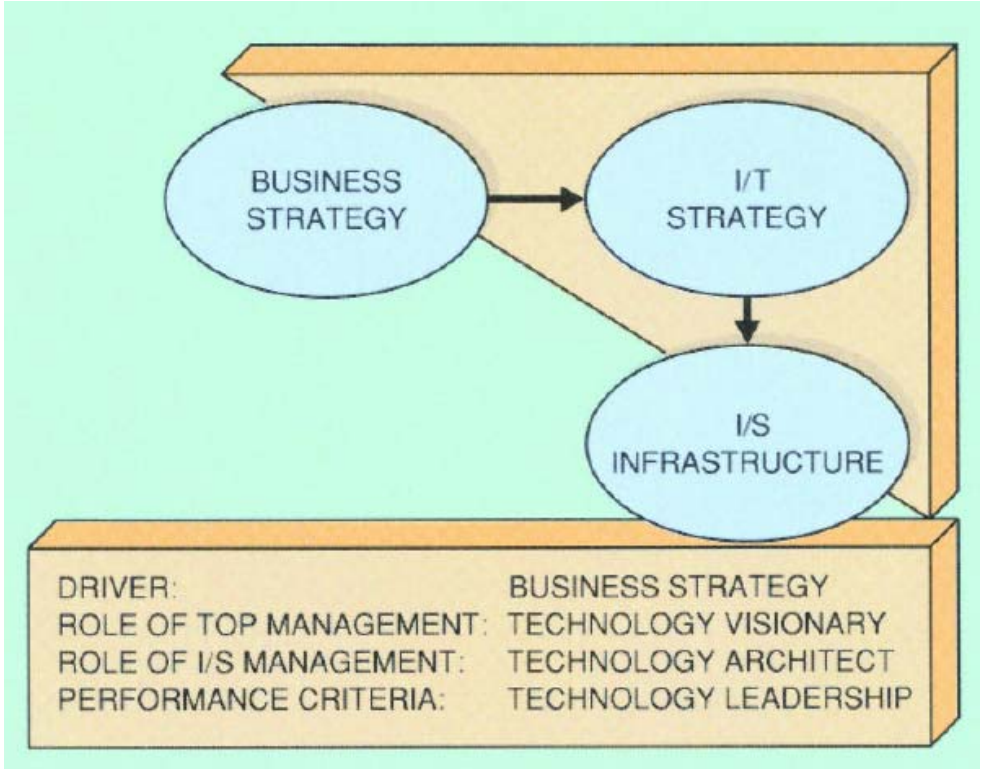


(Henderson & Venkatraman 1993)

Four Dominant Alignment Perspectives: I) Business Strategy as the Driver



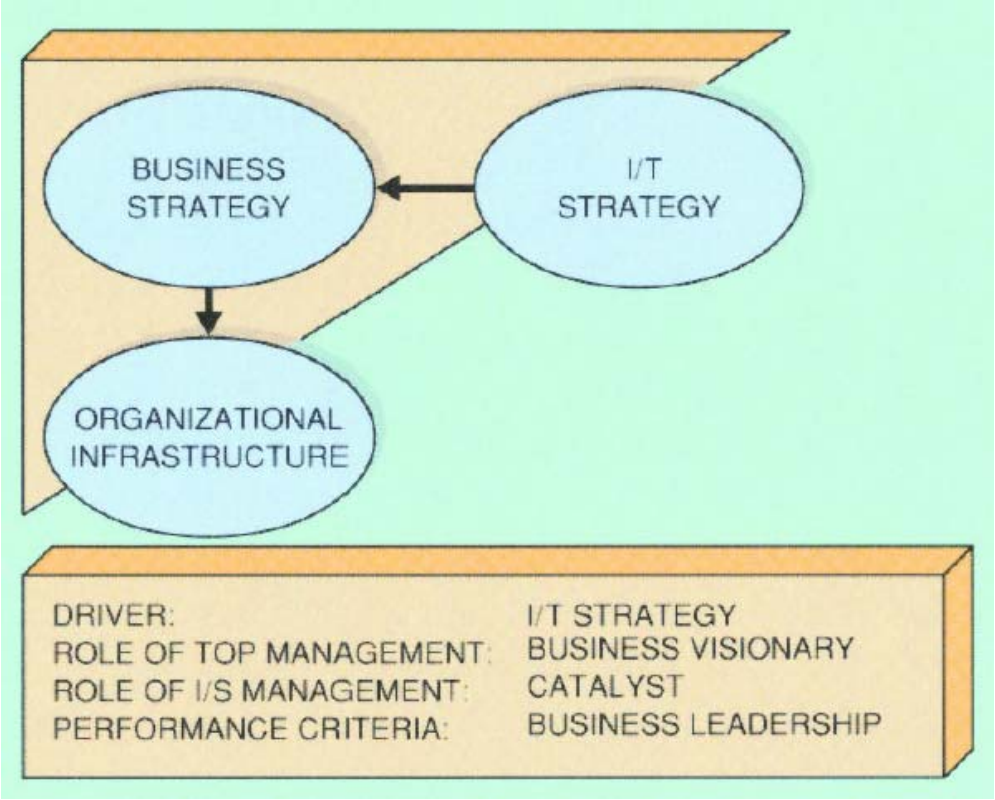
Strategy Execution Alignment



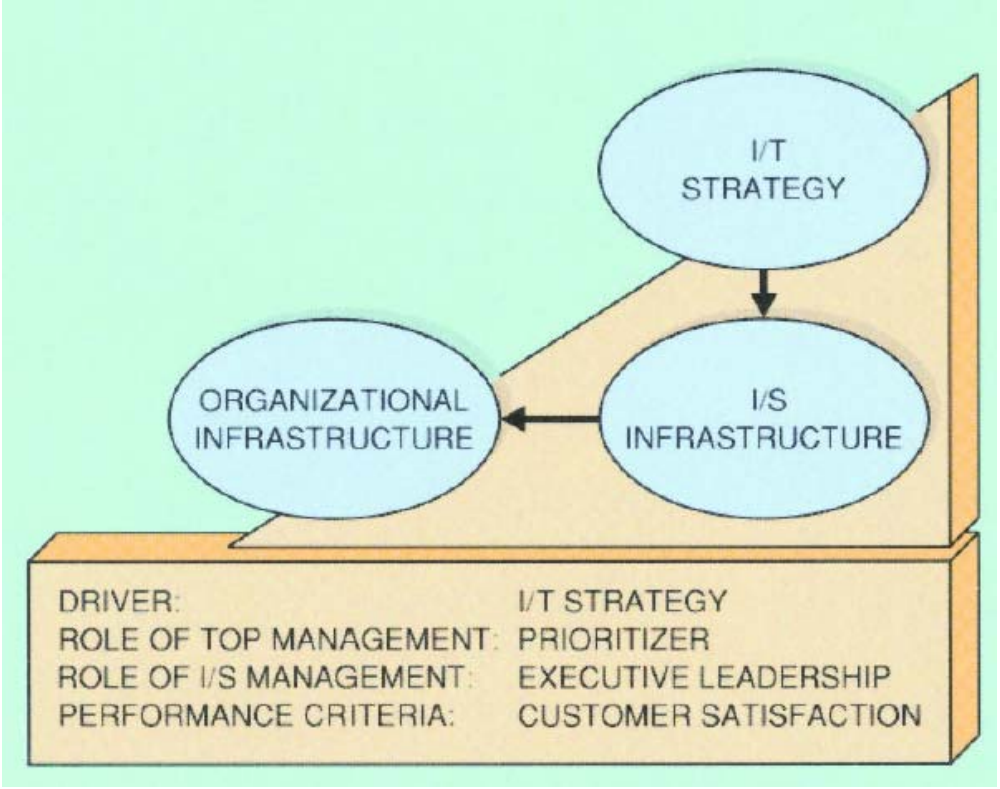
Technology Transformation Alignment

(Henderson & Venkatraman 1993)

Four Dominant Alignment Perspectives: II) IT Strategy as the Driver



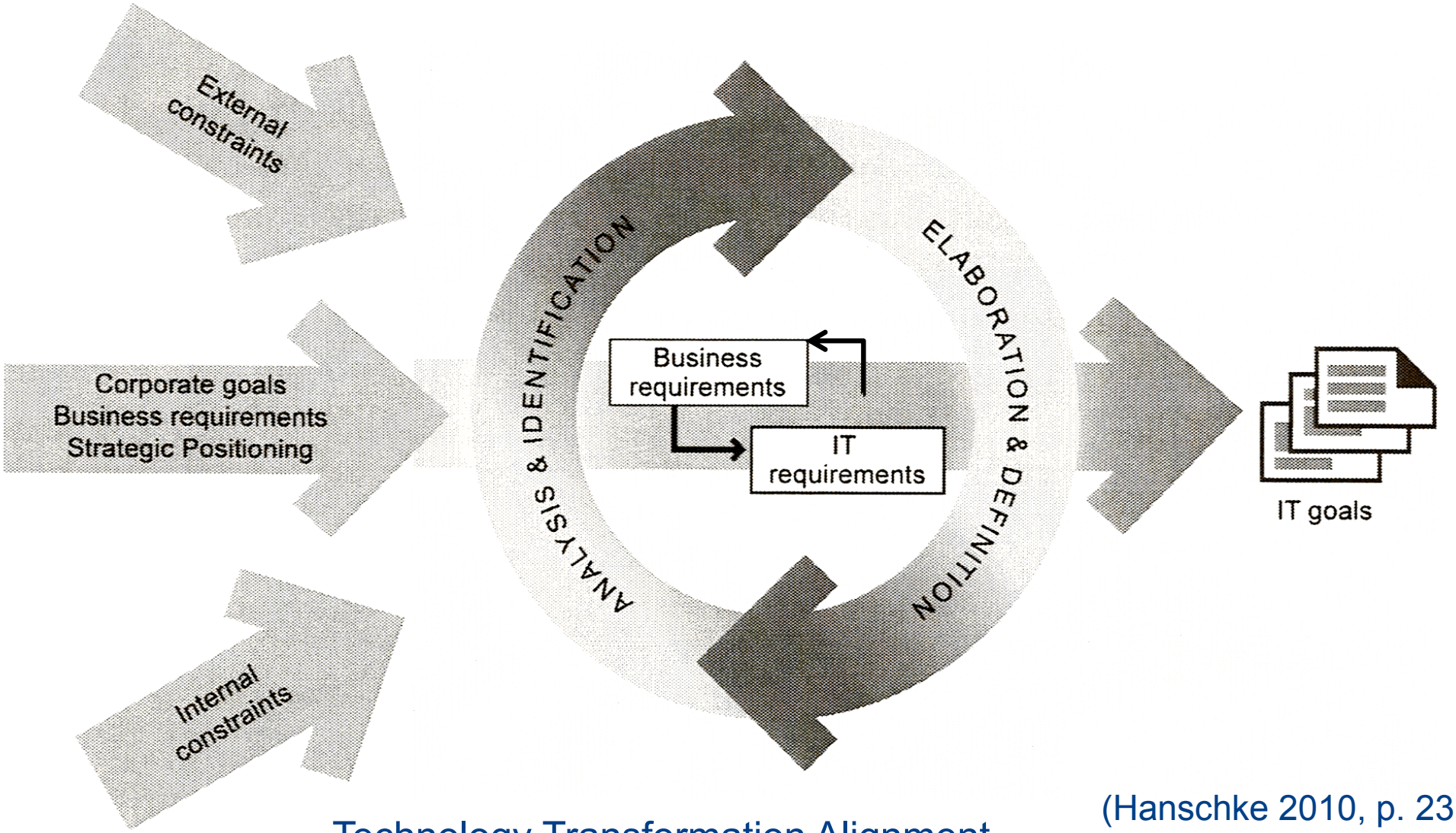
Competitive Potential Alignment



Service Level Alignment

(Henderson & Venkatraman 1993)

Deriving IT Goals



(Hanschke 2010, p. 23)

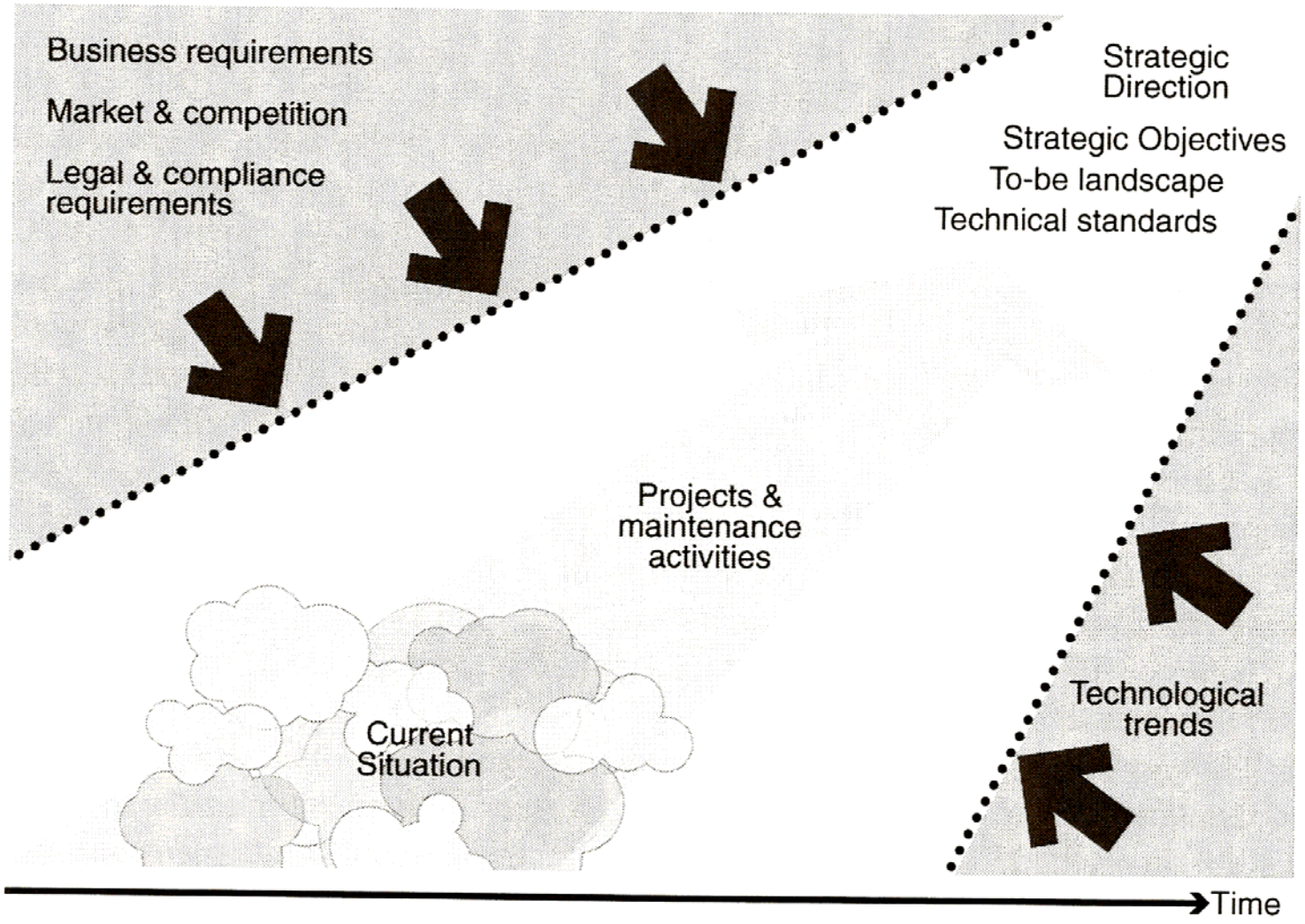
Technology Transformation Alignment

Changes on the Operational Level

- Examples of changes on the operational level:
  - Optimization of a business process
  - Replacement of an IT application
  - Update of an IT application
  - Re-organisation of a business unit
  - Outsourcing of a business process
  - Outsourcing of IT applications to a cloud provider
  - Implementation of a new information system
  - Introducing a new collaboration platform

ENTERPRISE ARCHITECTURE

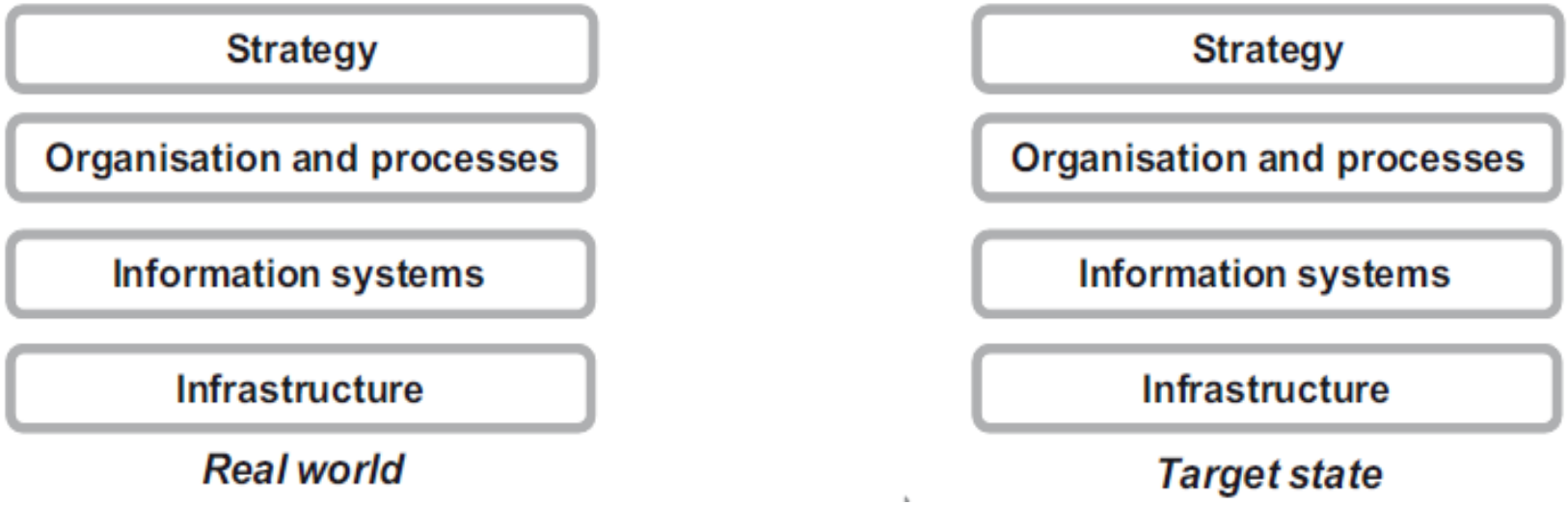
Change Projects



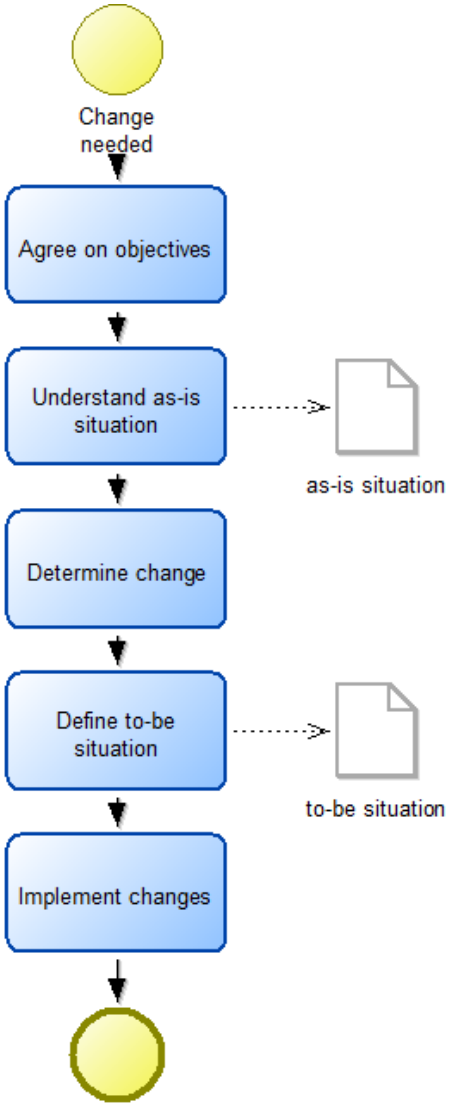
- Change projects transform a current situation (as-is) into a future situation (to-be)
- The change has to align business and IT.

(Hanschke 2010, p. 11)

Change Projects

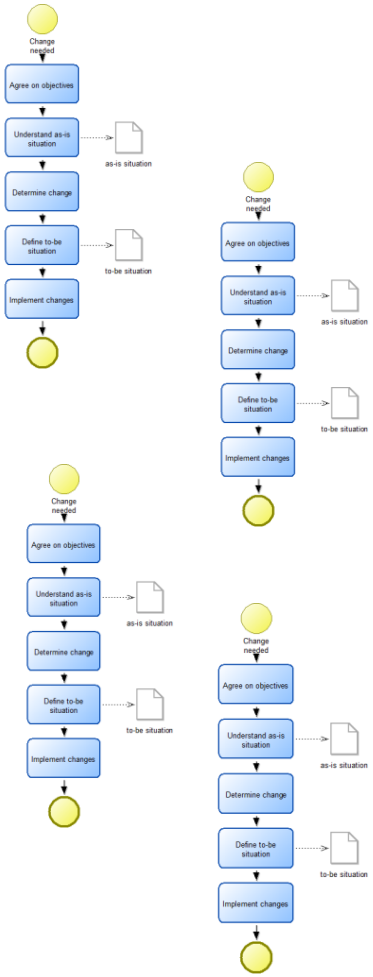


Typical (Change) Projects



- Typically organisations go through several stages in a change project:
  - recognizing the need to change
  - agreeing on the objectives of the change and a vision that describes a better future
  - understanding what the organisation is changing from (as-is model)
  - determine what needs to change
  - designing the new way of working and its support and management (→ to be model)
  - testing and implementing changes

Architecture Descriptions in an Enterprise



Typically …

… there are a large number of projects

- running concurrently or
- building on the result of previous projects

… projects have an extensive documentation of their (intended) result

… each project manages its own documentation which is not available for other projects

… there is a lack of coordination between projects

Problems for Change in Today's Enterprises

In practice, enterprises see themselves hampered in their ability to change in several ways, which is a consequence of uncoordinated projects:

- being uninformed about their own products, services, capabilities, internal structures
- traditionally, organisations were designed with efficiency and effectiveness in mind rather than agility
- no common understanding and governance of key data resources
- a plethora of legacy applications and infrastructures
- duplicated functionality in terms of people and/or technology
- interwoven and unclear responsibilities
- organisational silos, self-contained business units who operate on their own, with no sharing of data
- silo applications, i.e. self-contained and isolated applciations, which only provide functionality to a specific business process

- Solution: ***Enterprise Architecture***

Source: Op 't Land, M.; Proper, E.; Waage, M.; Cloo, J. and Steghuis, C.: Enterprise Architecture - Creating Value by Informed Governance, Springer-Verlag 2009, page 6, http://www.springerlink.com/content/k8jp3r/#section=132347&page=2&locus=10

Architecture: Dealing with Complexity and Change

- If the object (process, IT application, information system) you want to create or change is simple, and it is not likely to change, then you can do it directly.
- On the other hand, if the object is **complex**, you can't see it in its entirety at one time and it is likely to **change** considerably over time, you need a description or model.
- This description is what we call an "**Architecture**".

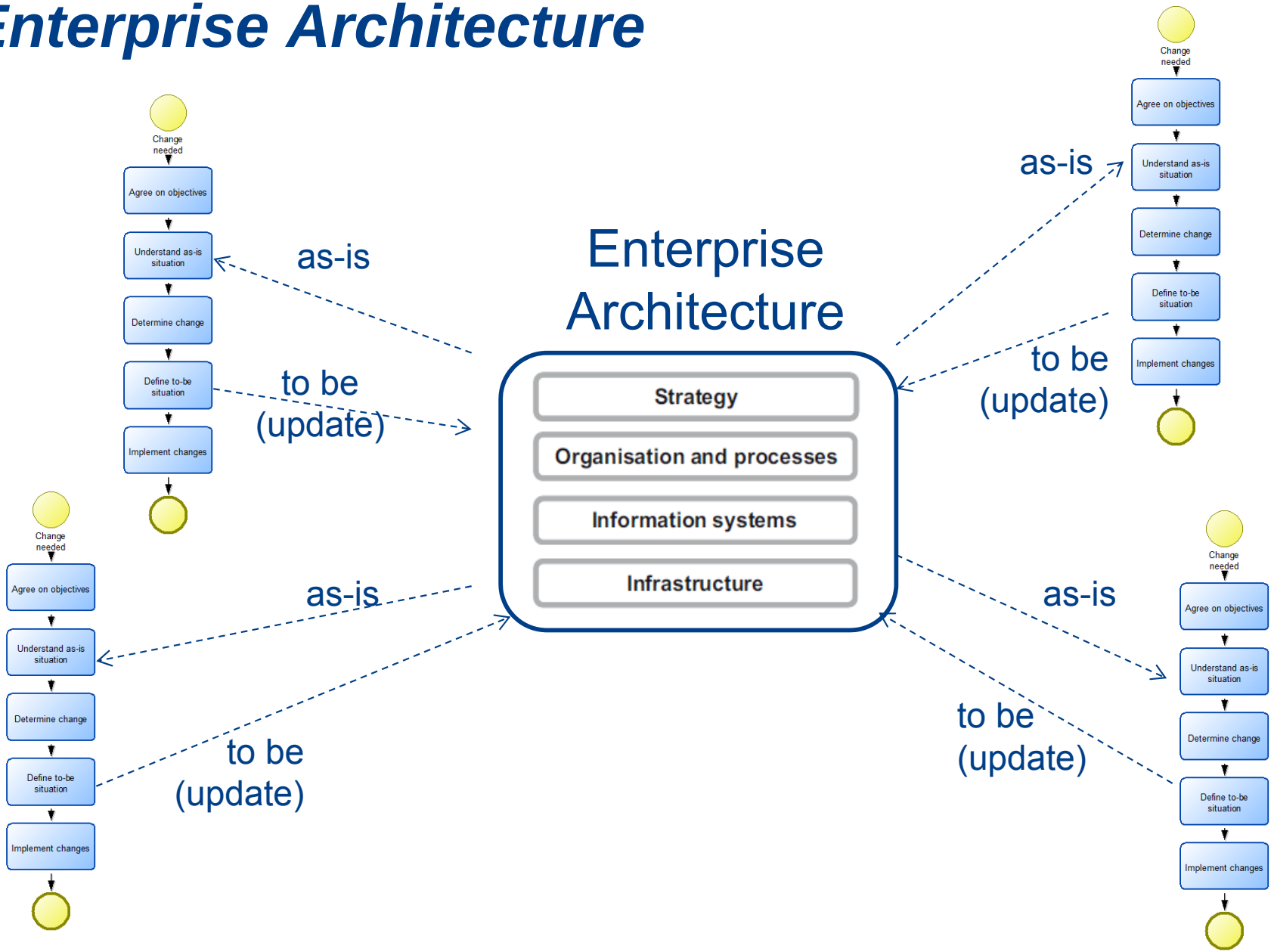
(John Zachmann, 2012)

The Need for Architecture

- **Complexity:** If you can't describe it, you can't create it (whatever "it" is).
- **Change:** If you don't retain the descriptive representations after you create them (or if you never created them in the first place) and you need to change the resultant implementation, you have only three options:
  - Change the instance and see what happens. (High risk!)
  - Recreate ("reverse engineer") the architectural representations from the existing ("as is") implementation.
    (Typical for many projects - Takes time and costs money!)
  - Scrap the whole thing and start over again.

(John Zachmann, 2012)

Enterprise Architecture



Need for Enterprise Architecture Management : Transparency

- Many organisations lack transparency due to the number and frequency of their organisational changes and suffer from overly complex enterprise architecture.
- Some of the questions they cannot answer are
  - How can we successfully integrate new firms after an acquisition?
  - Can we introduce new products and services, using the existing business processes and the underlying applications?
  - Which business units and users will be affected by an application's migration?
  - What applications and infrastructure technologies do we require to run new or redesigned business processes?

(Ahlemann et al 2012, p. 6)

Architecture – What is it?

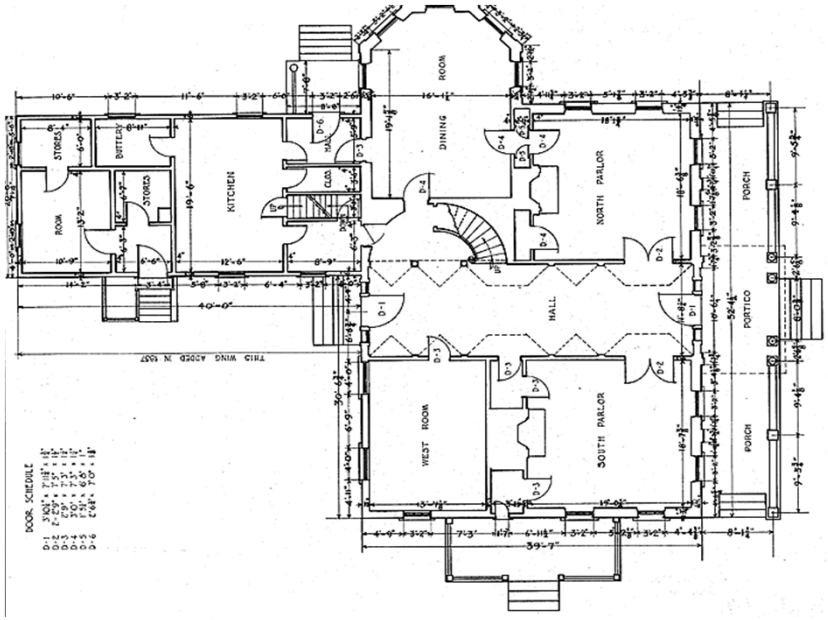
- Is this an Architecture?

- No, this NOT the Architecture. This is the RESULT of architecture.
- In the result you can see the Architect's "architecture"
- The result is an implementation, an instance

Adapted from Zachman (2012)

Architecture – What is it?

- Is this an Architecture?



- No, this NOT the Architecture. This is the DESCRIPTION of an architecture.
- The description is an artifact that expresses an architecture.
- It is used to understand and analyse an architecture and to communicate about an architecture and as a blueprint to build something.

Key Ideas of ISO/IEC/IEEE 42010:
Architecture

- "*Architecture*" names that which is fundamental about a system; the set of essential properties of a system which determine its form, function, value, cost, and risk.
- That which is **fundamental** to a system takes several forms:
  - its **elements**: the constituents that make up the system;
  - the **relationships**: both internal and external to the system; and
  - the **principles of its design and evolution**.

http://www.iso-architecture.org/ieee-1471/cm/

Architecture – What is it?

An ***architecture*** is defined as the «fundamental organisation of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design» (Ahlemann et al. 2012, p. 16)

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ISO/IEC/IEEE 42010 - http://www.iso-architecture.org/ieee-1471/cm

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.

Architecture and Architecture Description

- An architecture is a *conception of a system* – i.e., it is in the human mind. An architecture may exist without ever being written down.
- An *architecture description* (AD) is an artifact that expresses an Architecture to share with others.
  - An AD is what is written down as a concrete work product. It could be a document, a repository or a collection of artifacts used to define and document an architecture
  - Architects and other system stakeholders use Architecture Descriptions to understand, analyze and compare Architectures, and often as "blueprints" for planning and construction.

http://www.iso-architecture.org/ieee-1471/cm/

Enterprise Architecture Description – What is it?

- An "Architecture [Description][1)]" (for anything) would be the total set of descriptive representations (models) relevant for describing a complex object such that it can be created and that constitute a baseline for changing the object after it has been instantiated.
- Therefore "**Enterprise Architecture [Description]**" would be the total set of models relevant for describing an Enterprise, that is, the descriptive representations required
  - ♦ to create a (coherent, optimal) Enterprise and
  - ♦ to serve as a baseline for changing the Enterprise once it is created.

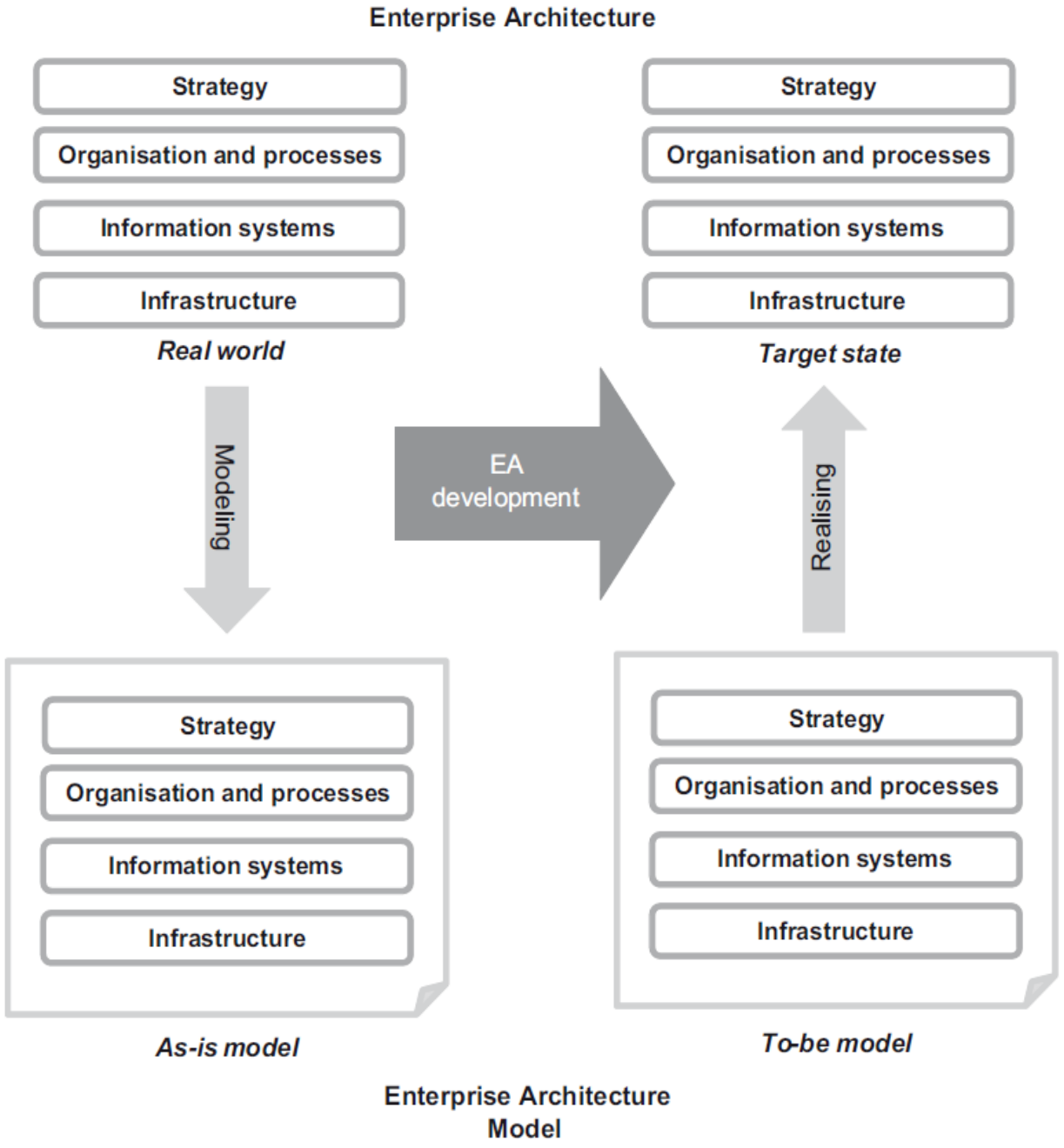
Adapted from Zachman (2012)

1) Zachman here uses the term Architecture synonymous for "Architecture Description". This is not really correct but common in practice.

Use of Enterprise Architecture: Managing Change

- Managing Change is the duty of every manager
  - Change is decision making and leading
  - And this is exactly what managers do
- Change the architecture before you change the object!
- The Enterprise Architecture is managed as a program that facilitates
  - systematic organization change
  - continuously aligning technology investments and projects with organisation mission needs.
- Enterprise Architecture is updated continuously to reflect changes
- It is a primary tool for baseline control of complex, interdependent enterprise decisions and communication of these decisions to organization stakeholders.

(Schekkermann 2008, p. 107)



(Ahlemann et al. 2012, p. 17)

Idea of EAM

- EAM seeks to ***maintain the flexibility, cost-efficiency and transparency*** in the enterprise architecture.
- It emphasises the ***interplay between***
  - ***business*** (such as business models, organisational structures and business processes) and
  - ***technology*** (including information systems, data and the technological infrastructure).
- EAM helps to systematically ***develop the organisation according to its strategic objectives and vision***.

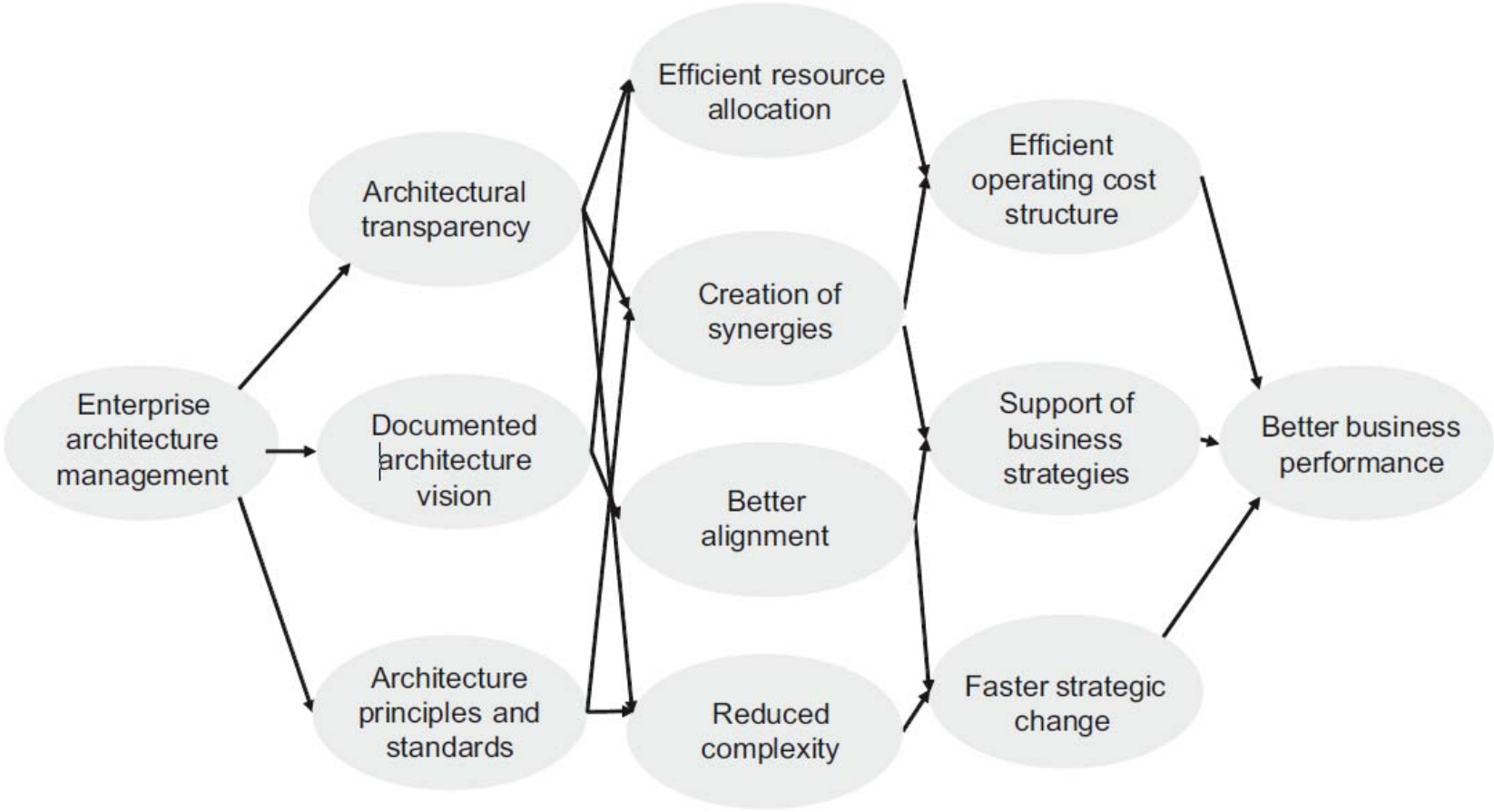
(Ahlemann et al 2012, p. 6)

Analogy: City Planning and Enterprise Planning

- Good ~~city~~ *enterprise* planning is characterised by a number of attributes. To achieve this, the ~~city~~ *enterprise* planner must:
  - anticipate future demands and requirements,
  - make plans and develop the ~~city~~ *enterprise* accordingly,
  - bring the different stakeholders together and discuss their interests,
  - serve the ~~city~~ *enterprise* as a whole and not local interests, and have a holistic, multi-perspective view on the ~~city~~ *enterprise* (socially, *technically,* economically and logistically).

cf. (Ahlemann et al. 2012, p. 8)

Effects of Enterprise Architecture Management



cf. (Ahlemann et al. 2012, p. 10)

Objective of Enterprise Architecture

- Dealing with complexity and change
- Coherent common description of the enterprise for all projects instead of distributed project documentation
- Providing overview and avoiding the modeling of as-is situation over and over again.
- Ensuring alignment of business strategy and IT investments
- Describing the interaction between business and information technology
- Making dependencies and implications of changes in business and IT visible
- Supporting communication between different stakeholders by appropriate models