# 3.1 Motivation and Objectives of EA Management

Strategic IT-Management & EA Management

**Dr. Sabine Buckl**
**Prof. Dr. Florian Matthes**

**Matheus Hauder, Sascha Roth**
Software Engineering for Business Information Systems (sebis)

wwwmatthes.in.tum.de

# Overview on the lecture

- Block I „IT-Management“ (25.10.2012)
- Block II „IT Governance“ (08.11.2012)
- Block III „Enterprise Architecture Management“
  - Motivation and objectives of EA Management (12.11.2012)
  - Best-Practices for Situational EA Management (19.11.2012)
  - Models, meta-models and modeling (26.11.2012)
  - Frameworks and alternative approaches (03.12.2012)
  - EAM tools – State-of-the-Art (10.12.2012)
- Block IV „Case Studies“

# Learning objectives of this unit

At the end of this module you are able to

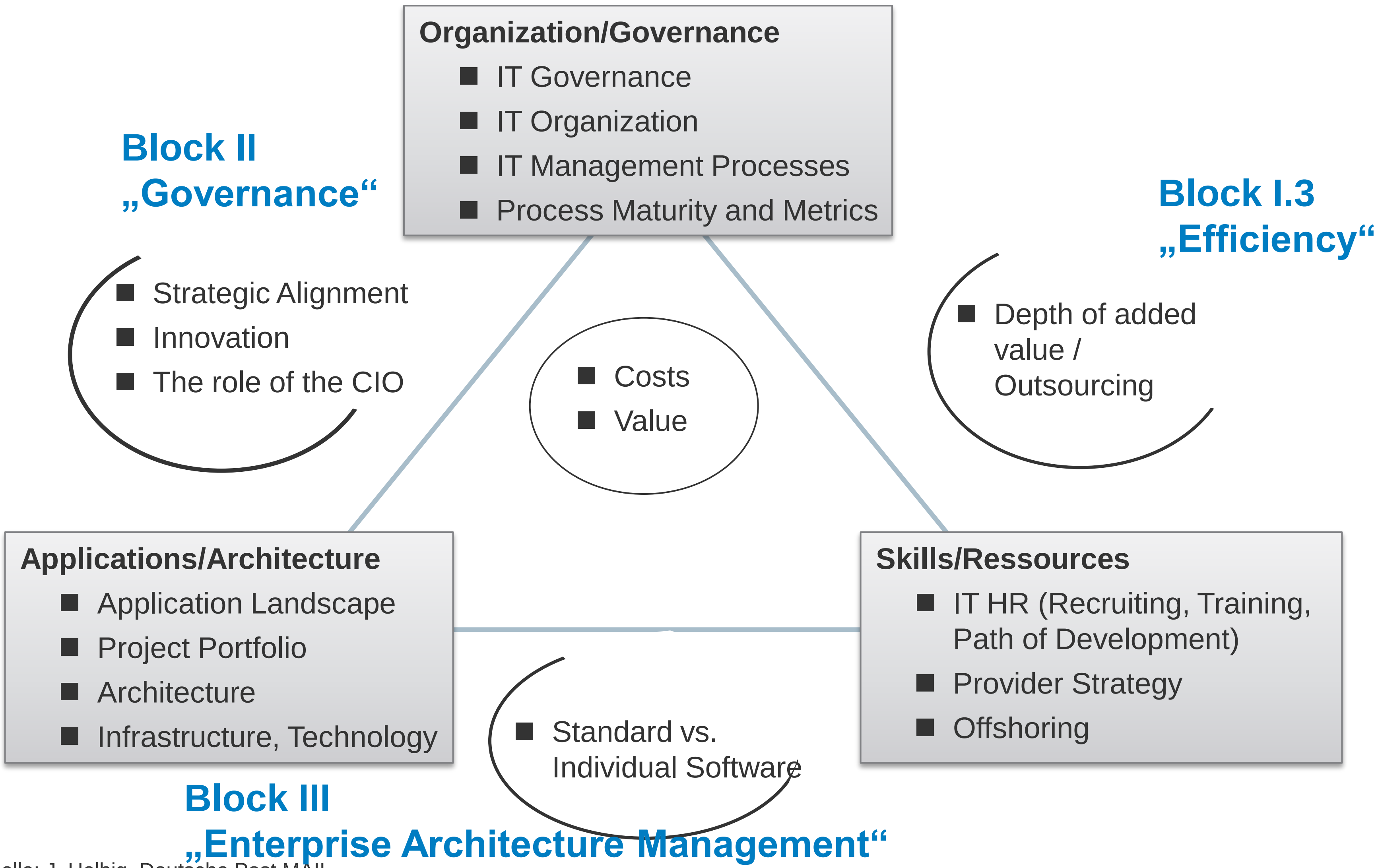
- understand the challenges arising in the context of managing complex application landscapes and enterprise architectures (EA).
- explain the meaning of the terms *current, planned,* and *target* state of an EA.
- apply a standardized terminology for architectural descriptions.

Objective of the module: You are able to use the acquired knowledge to solve small EA management tasks in practice.

# Outline of this unit

- Motivation from an IT perspective
- Analogy EA management and city/urban planning
- Introduction to EA management
- Architectural descriptions – the ISO Std. 42010

# Strategic decision fields and lectures



**Organization/Governance**

- IT Governance
- IT Organization
- IT Management Processes
- Process Maturity and Metrics

**Block II „Governance“**

- Strategic Alignment
- Innovation
- The role of the CIO

**Block I.3 „Efficiency“**

- Depth of added value / Outsourcing

- Costs
- Value

**Applications/Architecture**

- Application Landscape
- Project Portfolio
- Architecture
- Infrastructure, Technology

**Skills/Ressources**

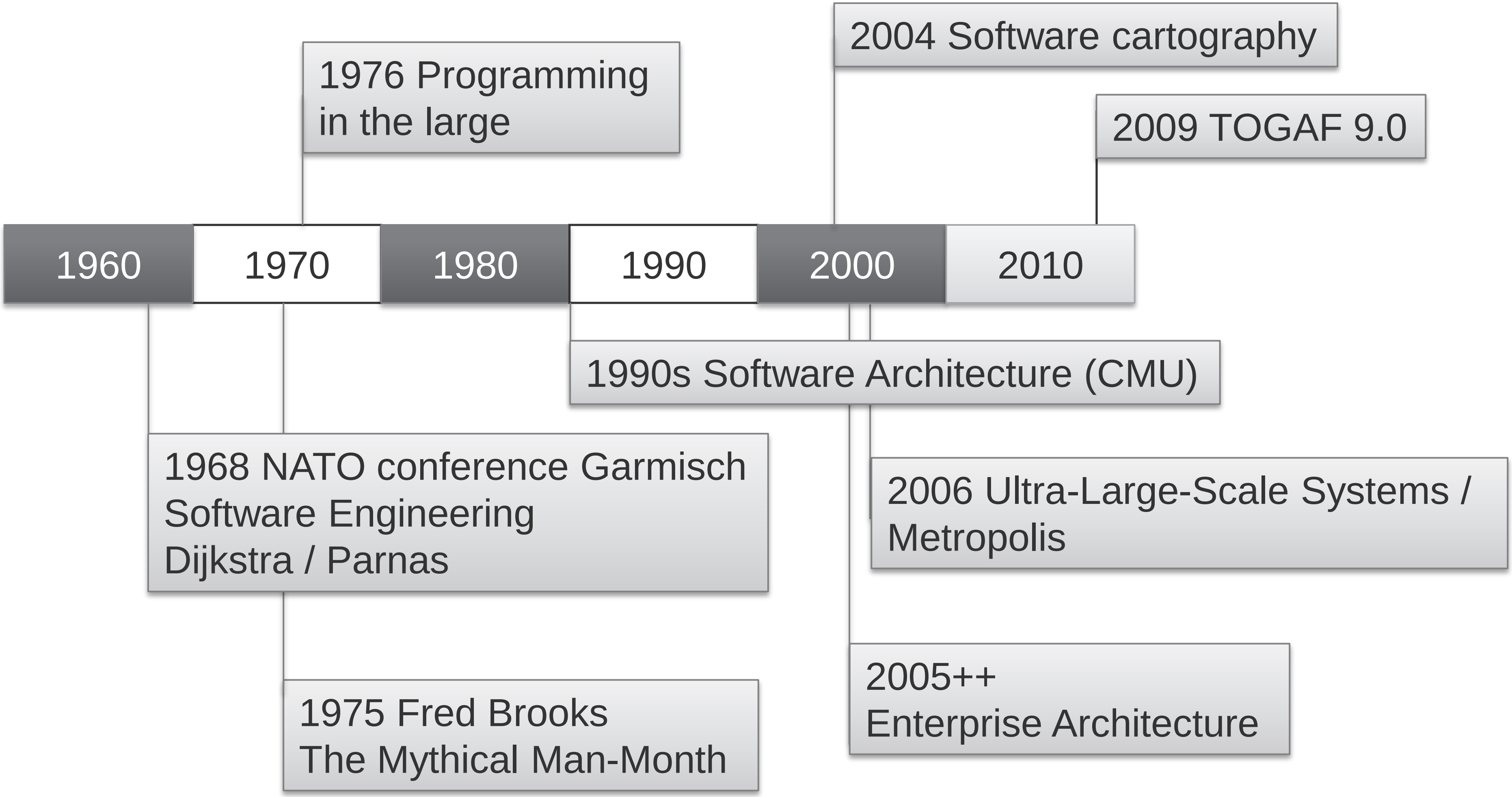
- IT HR (Recruiting, Training, Path of Development)
- Provider Strategy
- Offshoring

- Standard vs. Individual Software

**Block III „Enterprise Architecture Management“**

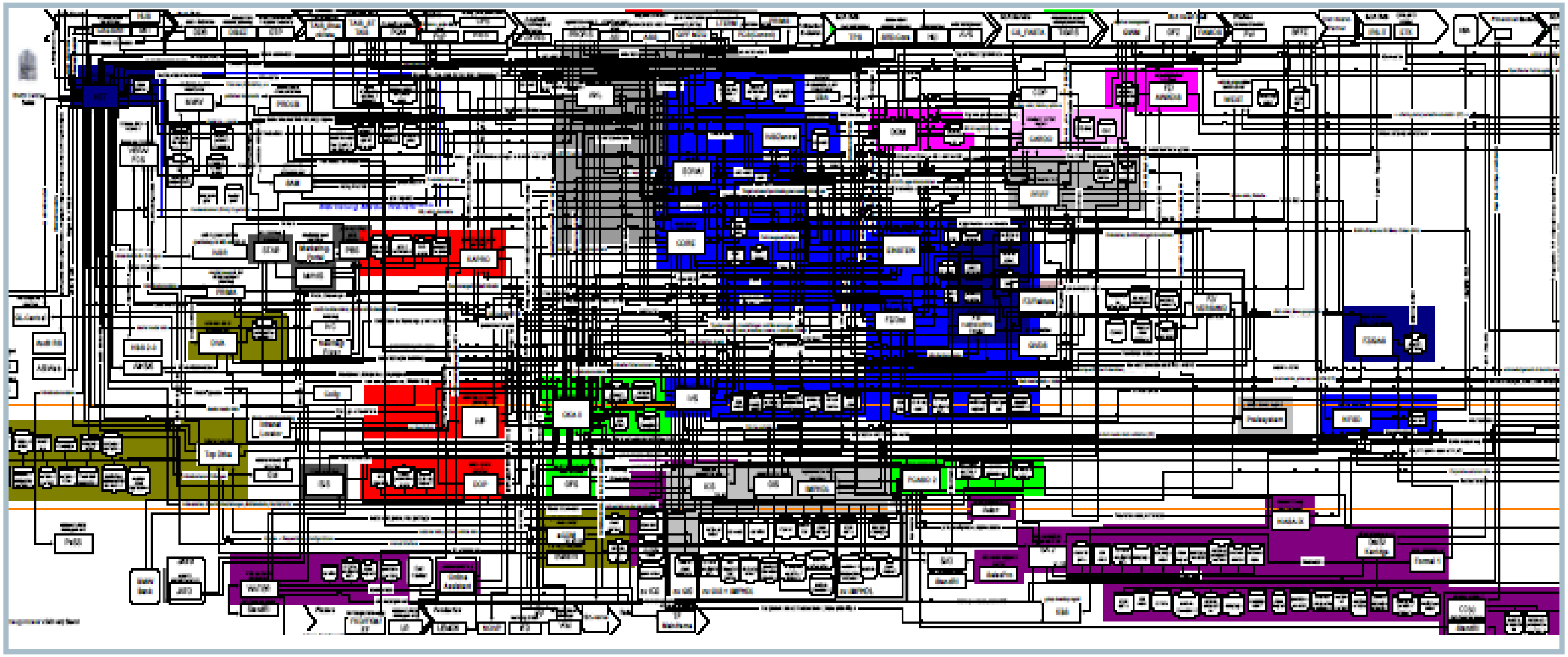
Quelle: J. Helbig, Deutsche Post MAIL

# Managing application landscapes: From an IT perspective


1976 Programming in the large
2004 Software cartography
2009 TOGAF 9.0
1960
1970
1980
1990
2000
2010
1990s Software Architecture (CMU)
1968 NATO conference Garmisch
Software Engineering
Dijkstra / Parnas
2006 Ultra-Large-Scale Systems / Metropolis
1975 Fred Brooks
The Mythical Man-Month
2005++
Enterprise Architecture

Based on [Ke07a]

# Today’s application landscapes consist of $10^2$ -$10^3$ networked information systems



- Complexity ~ number of relationships
- IT agility does not keep pace with the increasing dynamicity of the business
- Number of services  >> number of applications  
(smaller granularity + versioning)
- Extended enterprise: Coalitions, mergers, carve-outs, …

# These challenges have to be faced when managing application landscapes

## IT lies in dense fog

- Business and management criticize low cost/benefit  transparency of IT
- Each IT project starts with an analysis of systems and interfaces
- Repeated Excel-surveys regarding security, compliance, …

## Lack of interest on the part of business and management

- No familiarization with terms and notions of IT
- No explication of business strategies and goals (e.g. capability maps, KPIs)

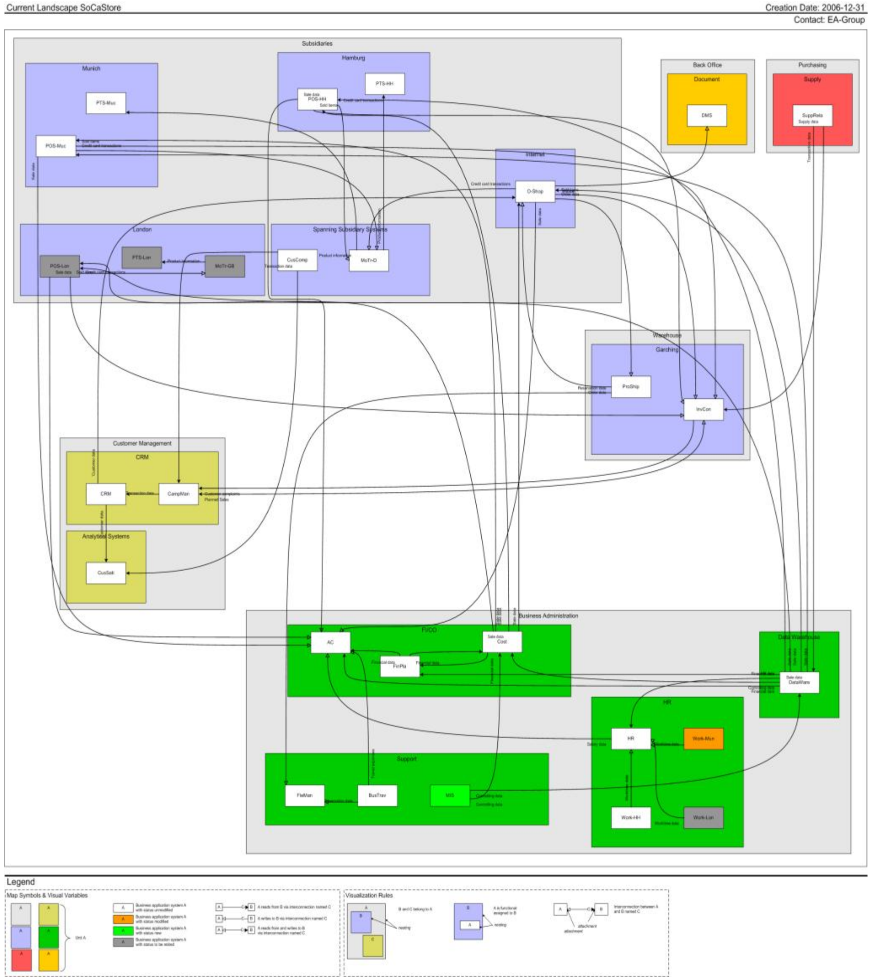
## Unclear responsibilities

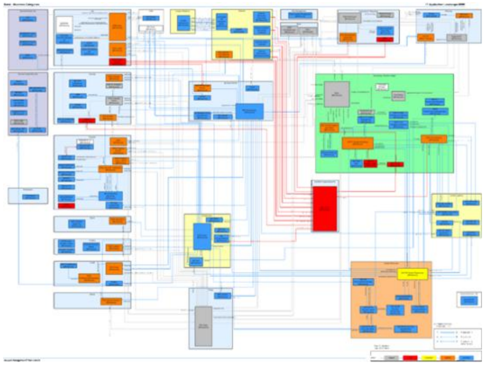
- No sustainable documentation of process-, application-, interface-, service- and domain-ownership
- No binding rights & obligations for IT and business

## Agility of IT doesn’t keep pace with the increasing business dynamics

# Examples for application landscapes (1)

- Multinational insurance company
- ~160 applications (location Munich, worldwide usage)

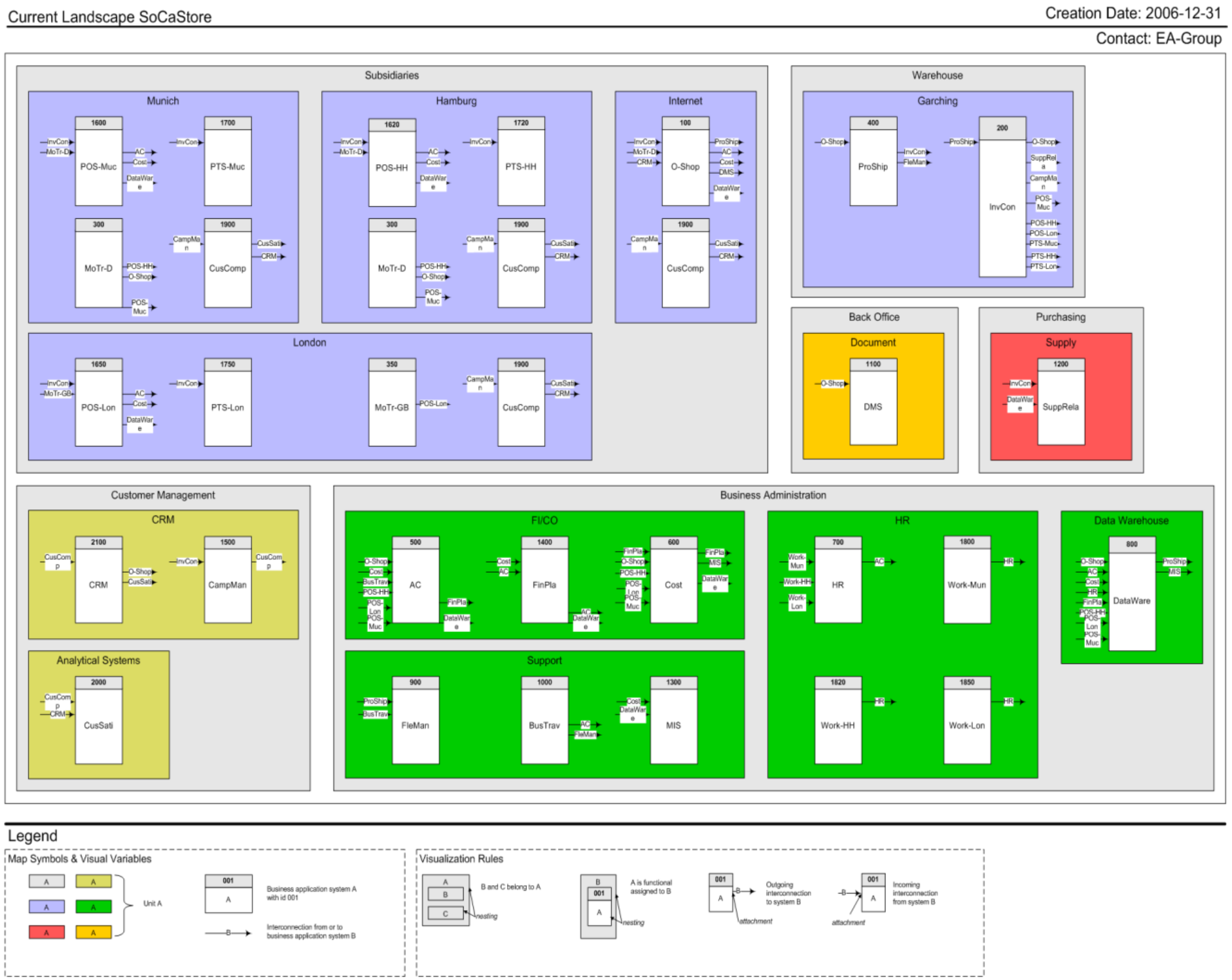




[Wi07a]

# Examples for application landscapes (2)

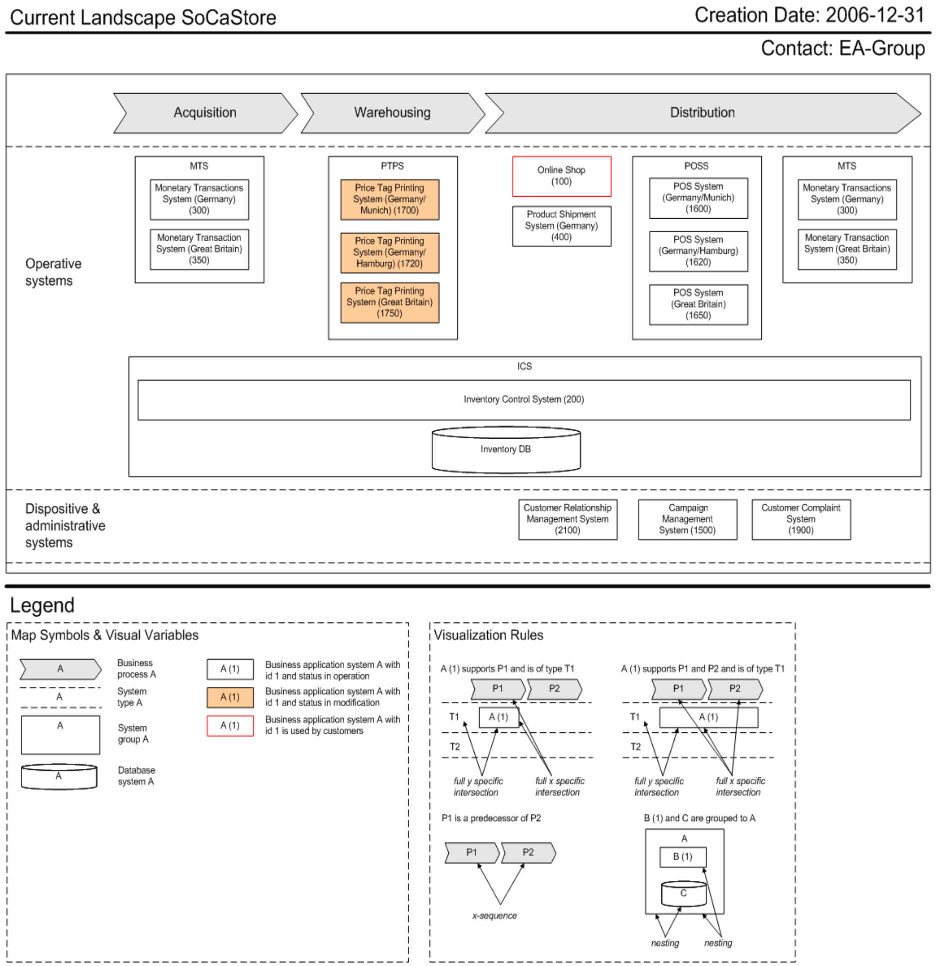
- Insurance company
- ~150 applications (location Germany,functionally used)



[Wi07a]

# Examples for application landscapes (3)

- Logistics service provider
- ~150 applications (one company division)



Current Landscape SoCaStore

Creation Date: 2006-12-31

Contact: EA-Group

Acquisition

Warehousing

Distribution

Operative systems

MTS

Monetary Transactions System (Germany) (300)

Monetary Transaction System (Great Britain) (350)

PTPS

Price Tag Printing System (Germany/ Munich) (1700)

Price Tag Printing System (Germany/ Hamburg) (1720)

Price Tag Printing System (Great Britain) (1750)

Online Shop (100)

Product Shipment System (Germany) (400)

POSS

POS System (Germany/Munich) (1600)

POS System (Germany/Hamburg) (1620)

POS System (Great Britain) (1650)

MTS

Monetary Transactions System (Germany) (300)

Monetary Transaction System (Great Britain) (350)

ICS

Inventory Control System (200)

Inventory DB

Dispositive & administrative systems

Customer Relationship Management System (2100)

Campaign Management System (1500)

Customer Complaint System (1900)

Legend

Map Symbols & Visual Variables

A — Business process A

A — System type A

A — System group A

A — Database system A

A (1) — Business application system A with id 1 and status in operation

A (1) — Business application system A with id 1 and status in modification

A (1) — Business application system A with id 1 is used by customers

Visualization Rules

A (1) supports P1 and is of type T1

P1 P2 T1 A (1) T2 *full y specific intersection* *full x specific intersection*

A (1) supports P1 and P2 and is of type T1

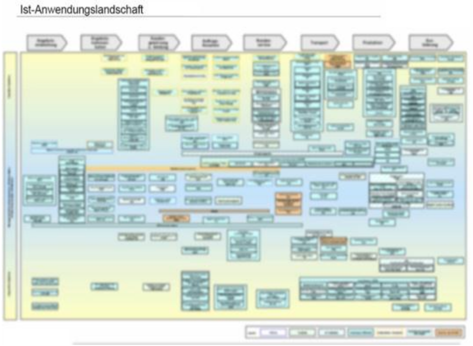
P1 P2 T1 A (1) T2 *full y specific intersection* *full x specific intersection*

P1 is a predecessor of P2

P1 P2 *x-sequence*

B (1) and C are grouped to A

A B (1) C *nesting* *nesting*

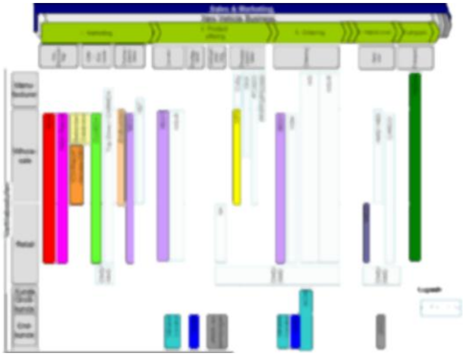


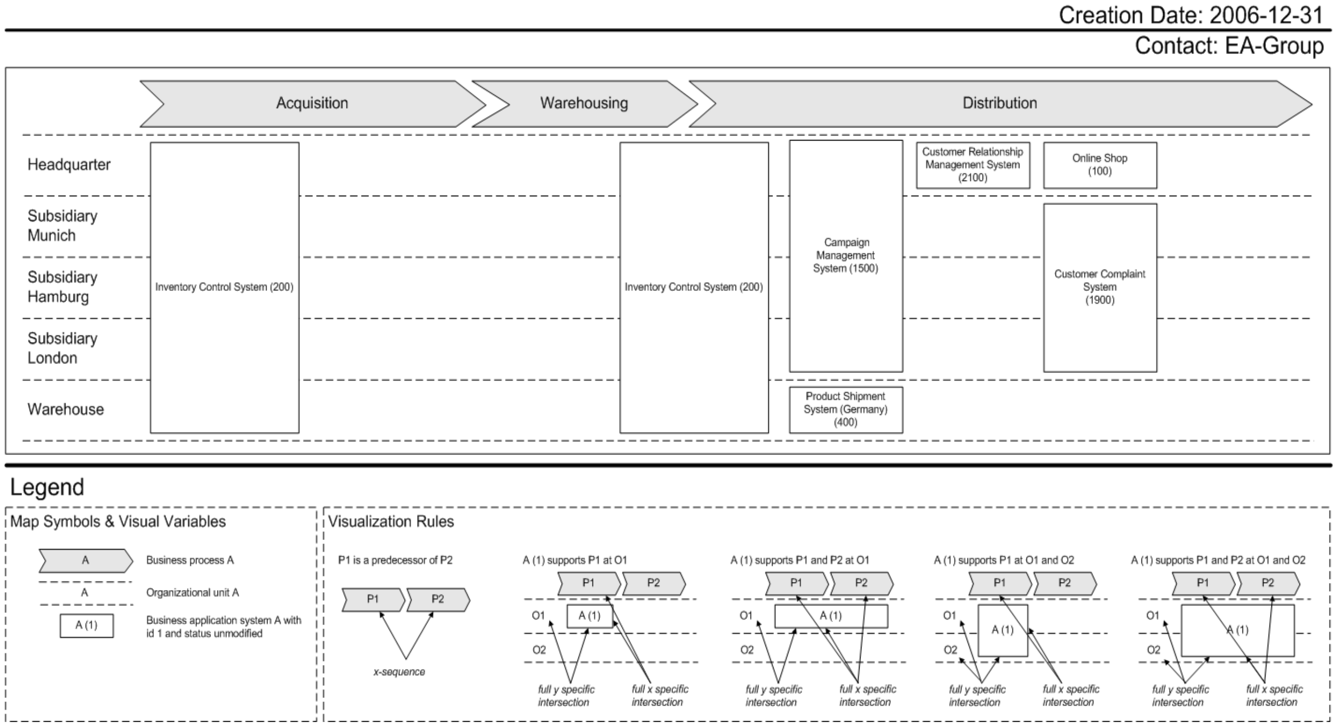
Ist-Anwendungslandschaft

[Wi07a]

# Examples for application landscapes (4)

- Automobile manufacturer
- ~2500-3000 applications (worldwide)





Creation Date: 2006-12-31
Contact: EA-Group

Acquisition
Warehousing
Distribution

Headquarter
Subsidiary Munich
Subsidiary Hamburg
Subsidiary London
Warehouse

Inventory Control System (200)
Inventory Control System (200)
Campaign Management System (1500)
Customer Relationship Management System (2100)
Online Shop (100)
Customer Complaint System (1900)
Product Shipment System (Germany) (400)

Legend

Map Symbols & Visual Variables

A – Business process A
A – Organizational unit A
A (1) – Business application system A with id 1 and status unmodified

Visualization Rules

P1 is a predecessor of P2
P1, P2
x-sequence

A (1) supports P1 at O1
A (1) supports P1 and P2 at O1
A (1) supports P1 at O1 and O2
A (1) supports P1 and P2 at O1 and O2

[Wi07a]

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# Application landscape ⇔ city

## Shared characteristics

- networked system of semi-autonomous systems
- alive, mostly growing, unbounded lifetime
- people are key elements of the system
- created and managed by people
- to be financed by people
- a long-term balance of interests has to be achieved
- a holistic and long-term perspective is required (as-is, to-be, next plan)
- heterogeneity: managed core & evolutionary periphery

## Challenges specific to application landscapes

- documentation of **ownerships** and derived **rights and obligations**
- system benefit vs. individual benefits ➔ value & utility functions
- shared vocabulary for communication ➔ holistic view
- problem-specific abstractions to master the inherent complexity ➔ views and maps

# First comparison: Plenty of analogies but also differences

- **(Buildings-)Architect**
  - Focus on one building
  - Relevant criteria are limited to single buildings
  - blueprints, plant layout, …

vs.

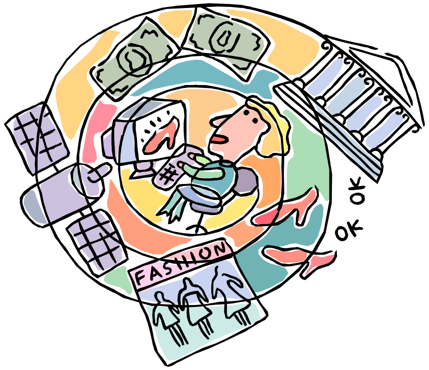
- **Software architect**
  - Focus on one software system
  - Relevant criteria are limited to single systems
  - UML, EPK, ER-Diagrams, …

- **City-/landscape designer**
  - Focus on superordinate planning and design processes
  - Relevant criteria refer to the entire landscape
  - Maps, city map

vs.

- **CIO, IT-lead, IT-architect**
  - Focus on the software application landscape
  - Relevant criteria refer to the entire landscape
  - ???

# Example: Architecture in the real world vs. architecture in the world of IT



**Construction of a new town hall:**

- "Construct a town hall for 1500 persons. The hall has to be multi-functional and must meet the subsequent requirements…
- Additionally, the hall has to be harmonically integrated in our baroque district. But we do not want an imitation of baroque architectural style. Instead, the hall has to express our orientation towards the future as well as the city's youthfulness. It has to be an idol for further projects in other districts of the city.
- The harmonic integration in the baroque district shouldn't increase the overall costs of more than 5%..."

**Elaborate a new "Internet- & telephone bank"**

- "Develop a new telephone- and internet banking platform for Germany, which covers subsequent access-channels, products, use cases….
- The solution should create the basic foundations of the retail direct-canal-platform of all other retail divisions
- The solution should be aligned with the retail-banking business as well as the IT-principles and standards of the SEB group
- The solution should enable the consulting and conclusion of retail products offered on the internet"

[De06]

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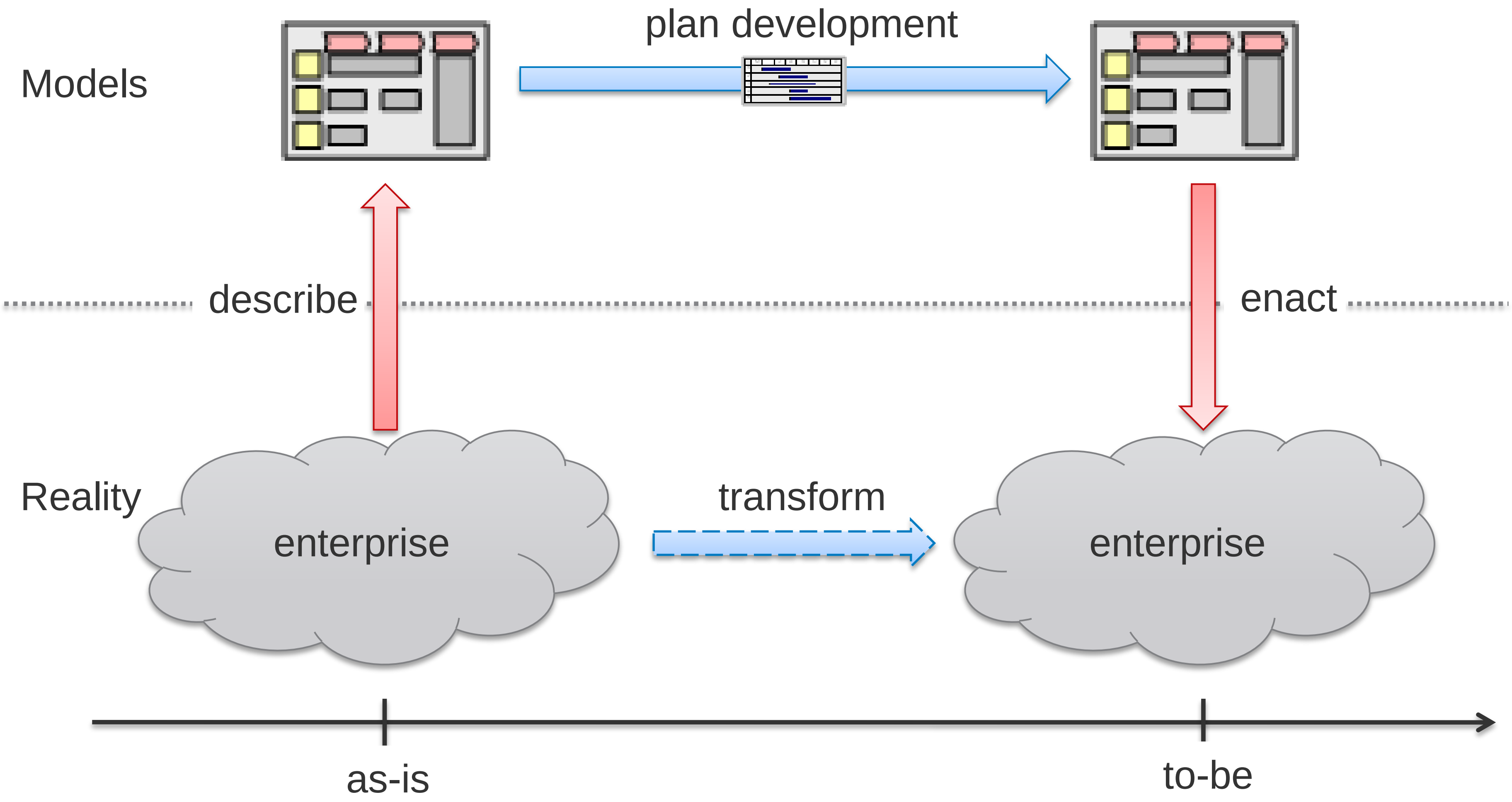
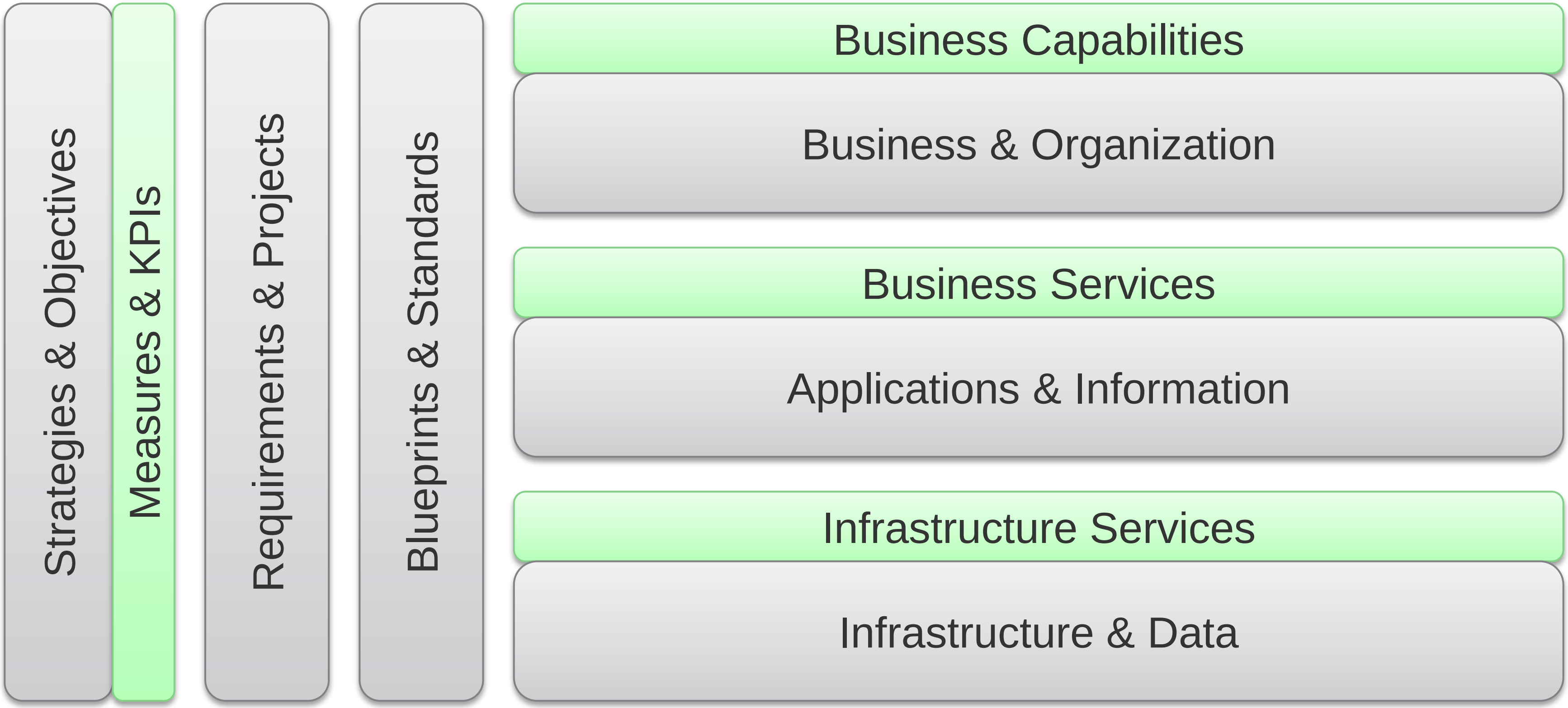
# How to transform the enterprise



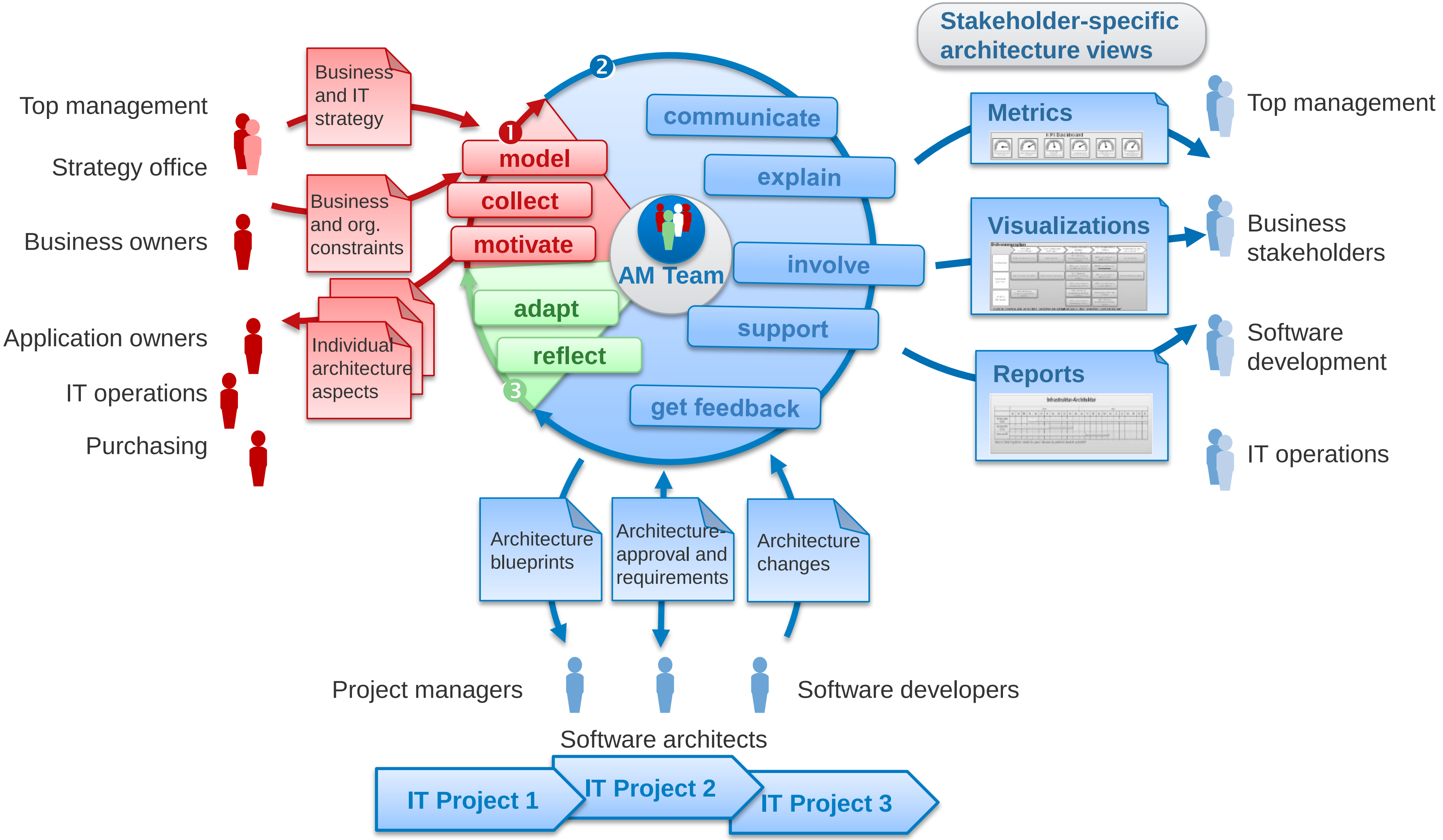
# From application landscapes to Enterprise Architectures – a holistic perspective

Fundamental organization of a system [enterprise] embodied in its components, their relationships to each other, and to the environment, and the principles guiding its design and evolution. [IS07]

- consists not only of IT but also of business aspects
- can be divided into layers and crosscutting functions

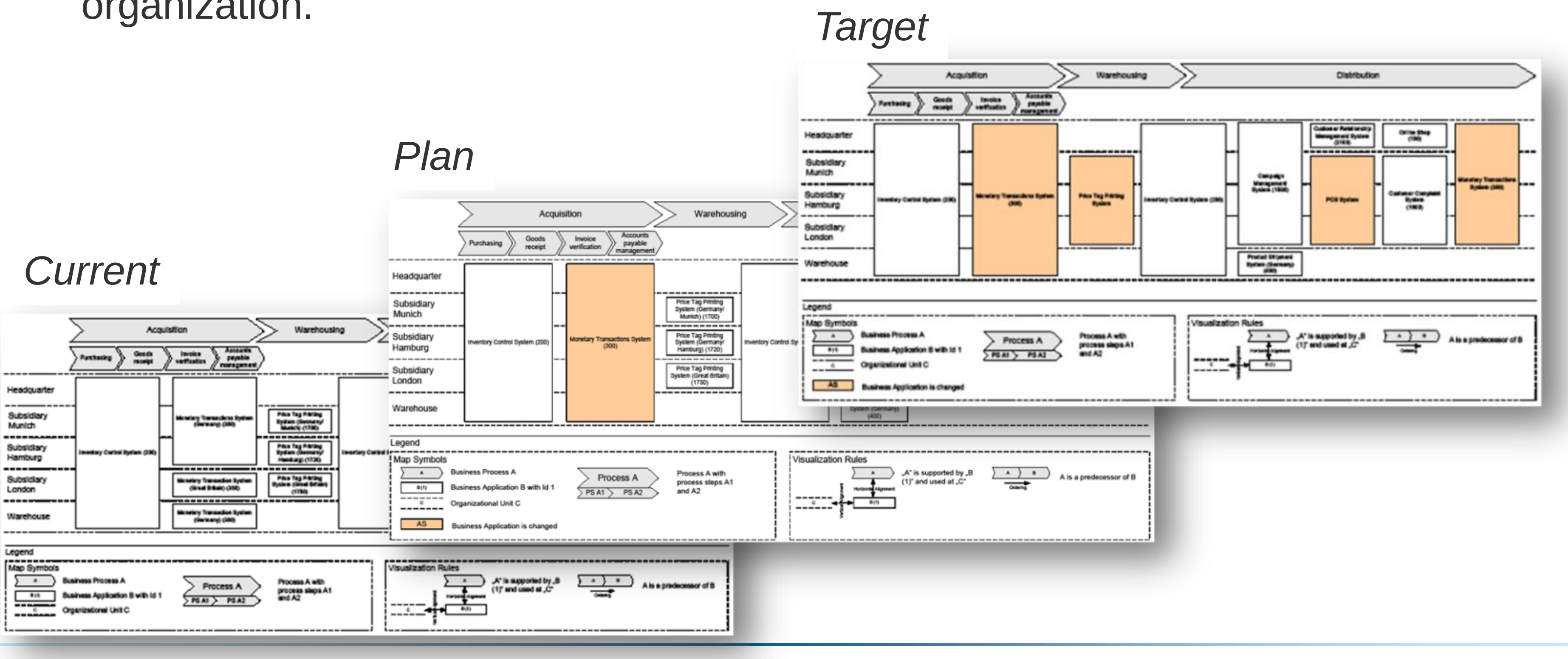


# An architecture model is a means and not an end.

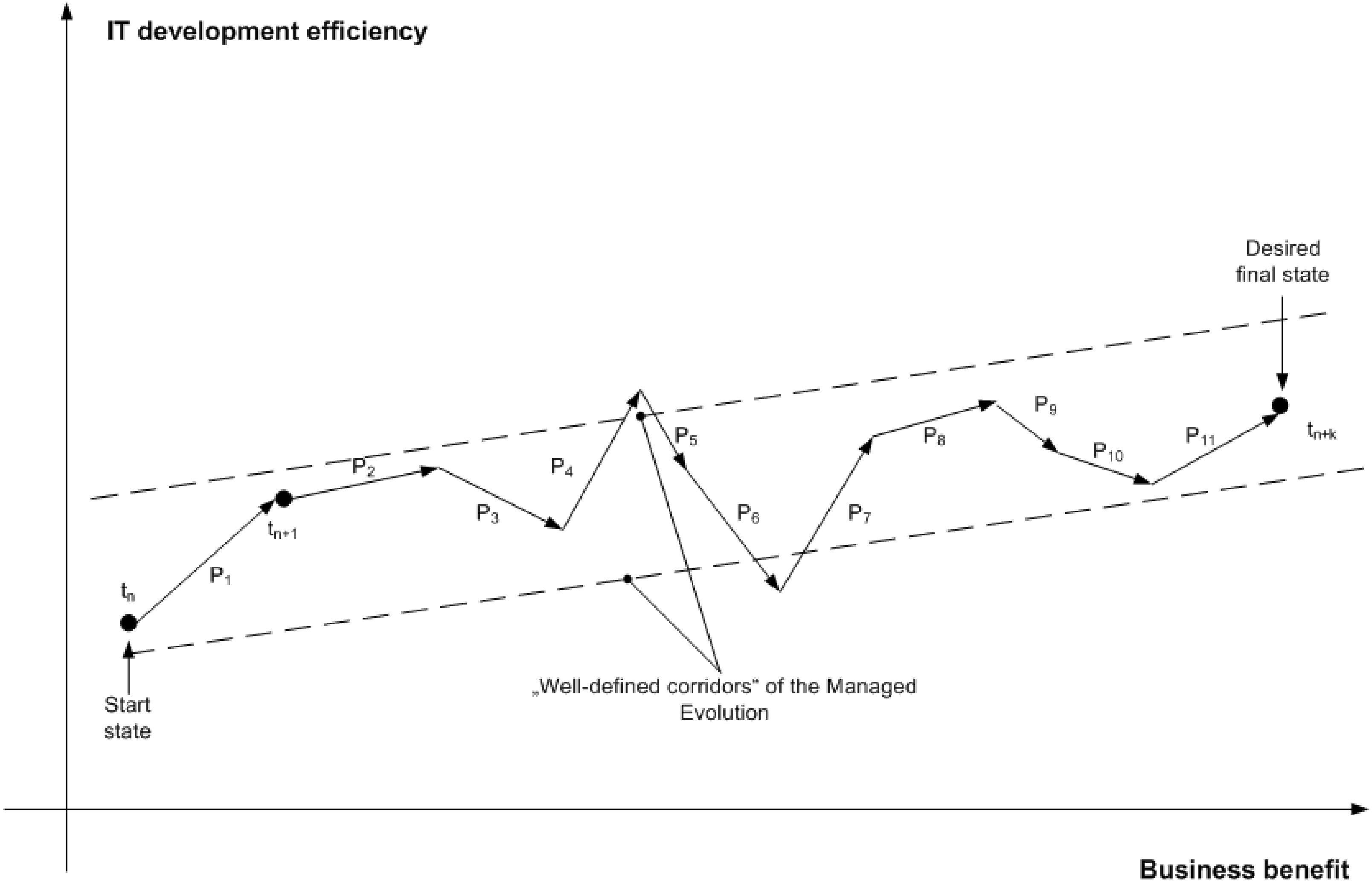


# EAM uses three EA models

- A **current** (as-is) state of the EA reflects the actual architecture (status quo) at a given point in time.
- A **planned** state of the EA is derived from planned and budgeted projects for transforming the EA until a certain point in time.
- A **target** (to-be, envisioned) state of the EA describes an ideal state to be pursued according to the strategies and architectural principles of the organization.

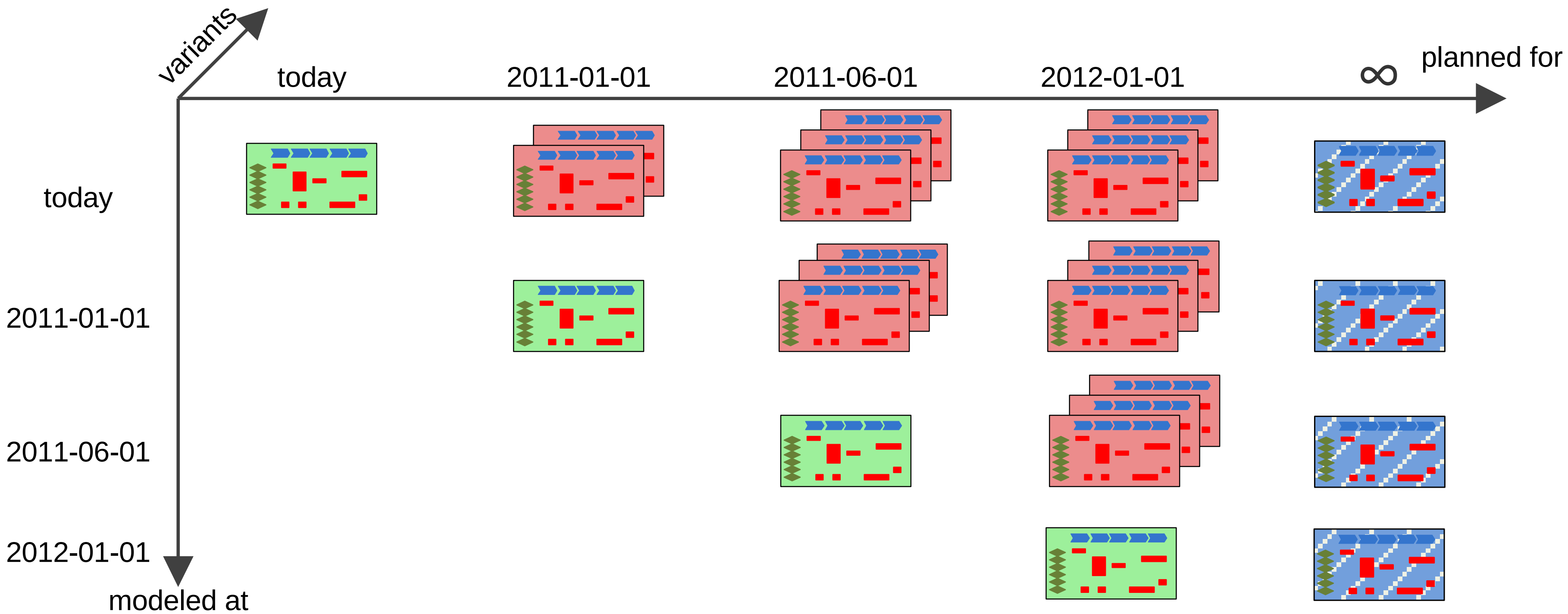


# Evolution trajectory of managed evolution



[Mu08]

# The dimensions *modeled at, planned for*, and *variants* may be combined



**Legend**

🟩 Current state of the EA

🟥 Planned state of the EA

🟦 Target state of the EA

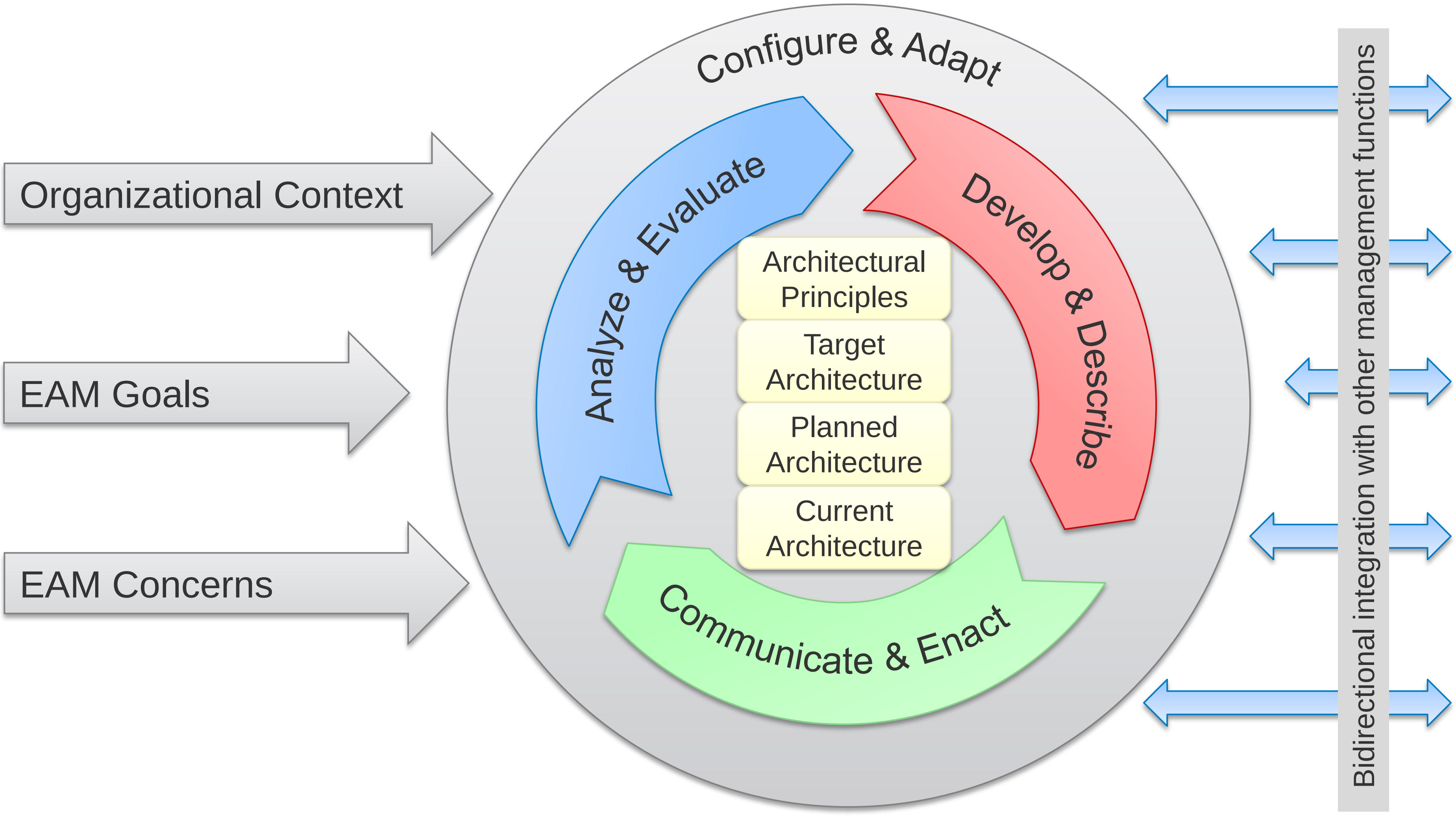
# Defining EAM

EA management is a continuous management function seeking to improve the alignment of business and IT and to guide the managed evolution of an organization.

Based on a holistic perspective on the organization the EA management function is concerned with the management, i.e., the documentation, analysis, planning, and enactment, of the EA.

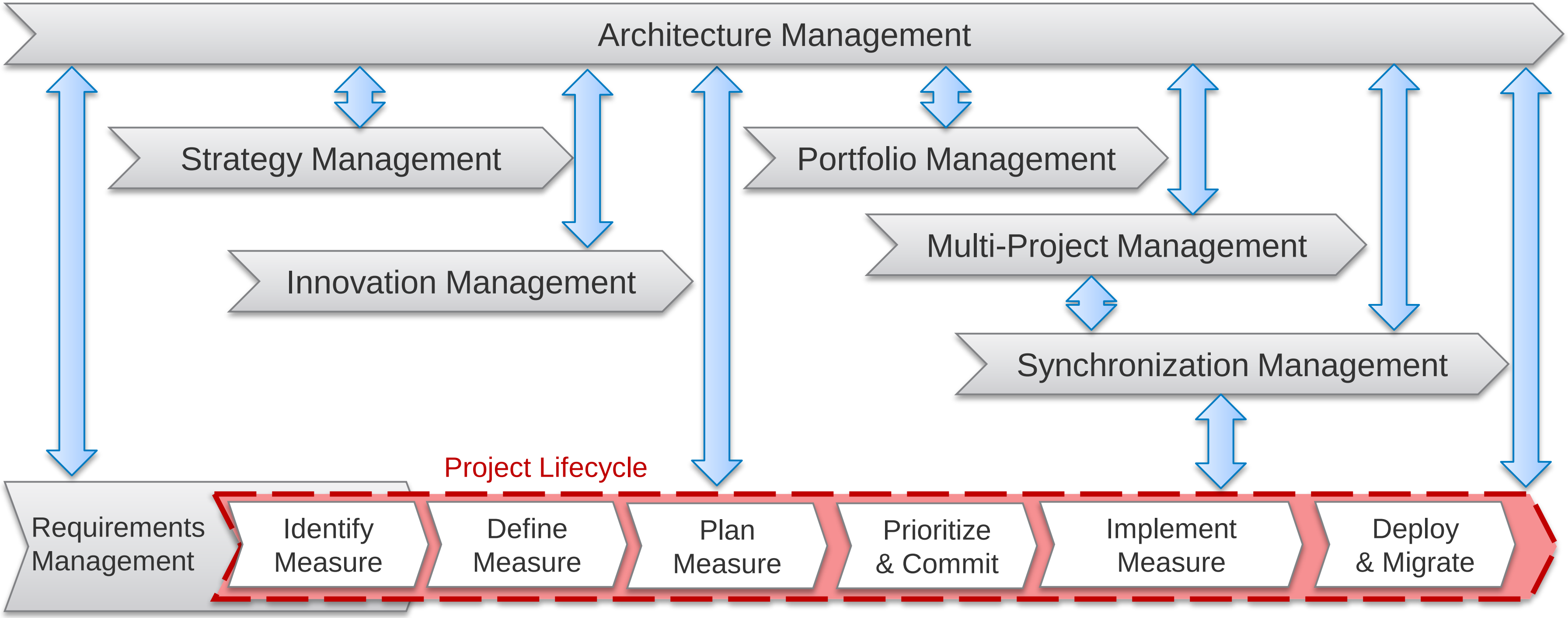
[Bu11]

# Challenges for EA management – Address the organizational specificities



# Challenges for EA management – Integration with other management functions

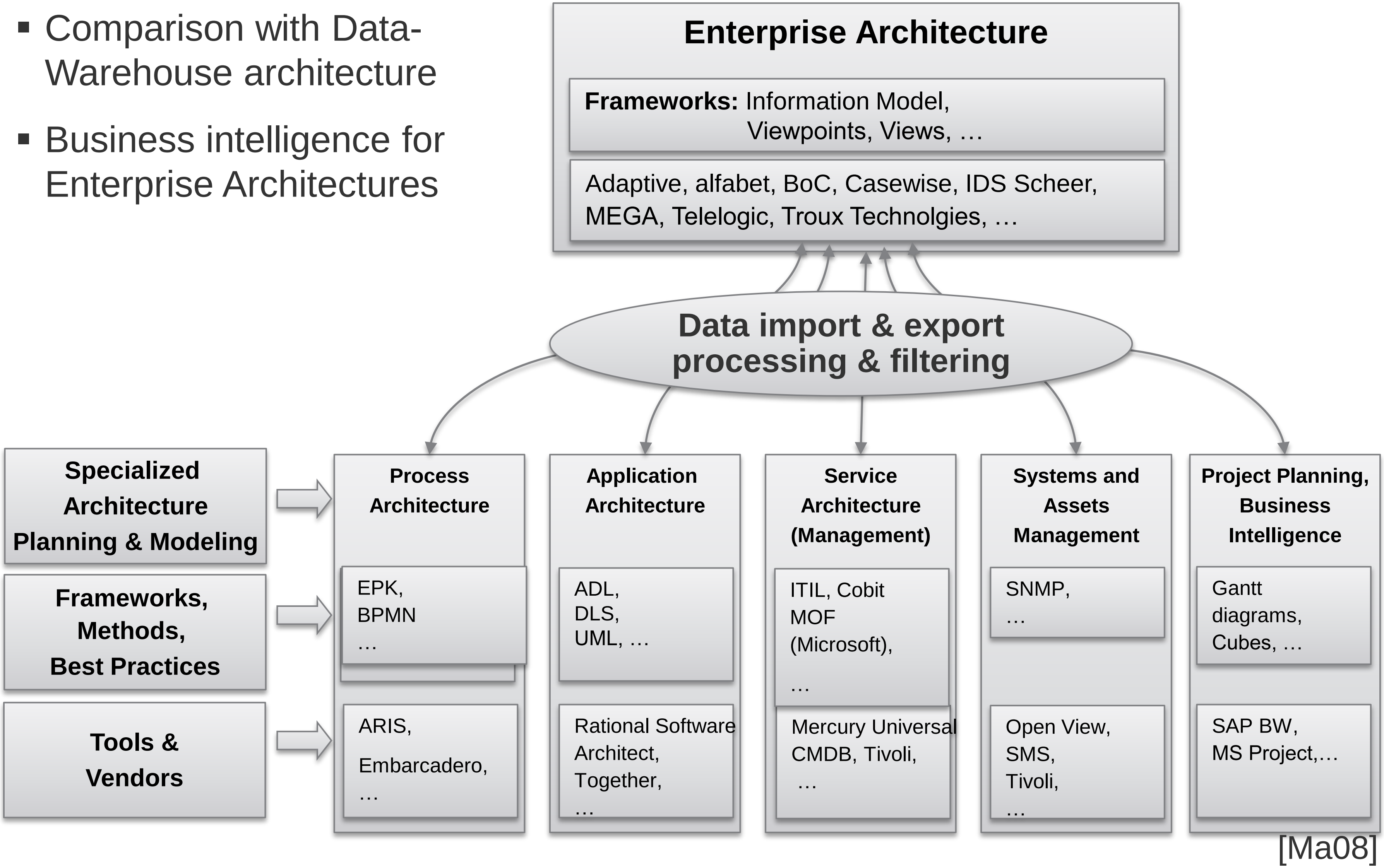
Example of a mature organization



- All architectural changes are performed through **projects.**
- EA management has to be integrated in the project lifecycle.
- EA management has to exchange information with other enterprise-level management functions

# Challenges for EA management – Integration of different information sources

- Comparison with Data-Warehouse architecture
- Business intelligence for Enterprise Architectures



**Enterprise Architecture**

**Frameworks:** Information Model, Viewpoints, Views, …

Adaptive, alfabet, BoC, Casewise, IDS Scheer, MEGA, Telelogic, Troux Technolgies, …

**Data import & export processing & filtering**

**Specialized Architecture Planning & Modeling**

**Frameworks, Methods, Best Practices**

**Tools & Vendors**

**Process Architecture**

EPK, BPMN …

ARIS, Embarcadero, …

**Application Architecture**

ADL, DLS, UML, …

Rational Software Architect, Together, …

**Service Architecture (Management)**

ITIL, Cobit MOF (Microsoft), …

Mercury Universal CMDB, Tivoli, …

**Systems and Assets Management**

SNMP, …

Open View, SMS, Tivoli, …

**Project Planning, Business Intelligence**

Gantt diagrams, Cubes, …

SAP BW, MS Project,…

[Ma08]

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# ISO Std 42010: Recommended practice for architectural description of software-intensive systems

## Scope

- Software-intensive systems
- Individual systems
- „Systems of systems“ (also application landscapes, enterprise architectures)

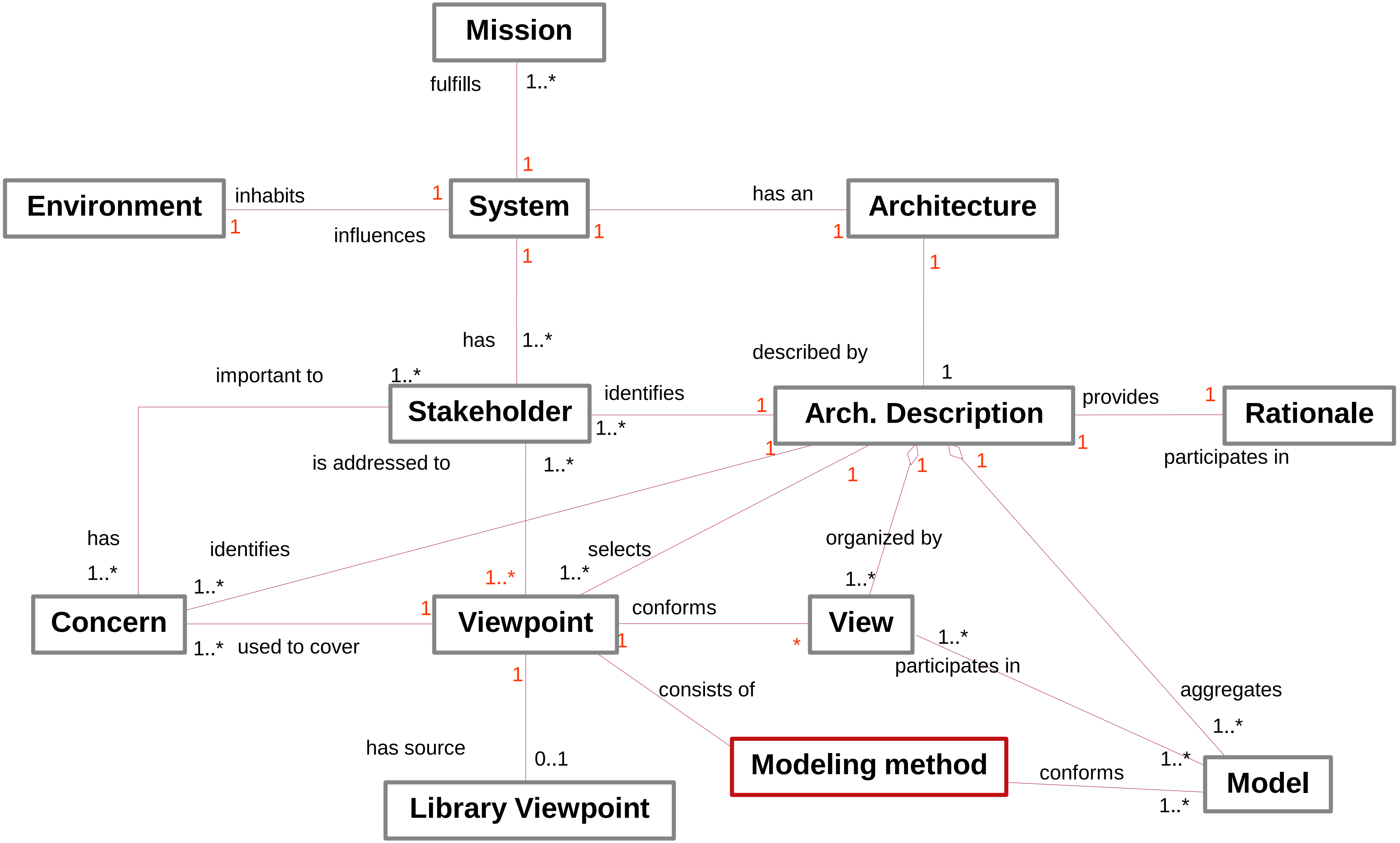
## Goals

- Supports documentation, explanation, and communication of architectures.
- Does not provide a graphical notation nor defines any conformance of systems, projects, organizations, processes, methods, or tools
- Defines notions in the context of architectural description – how to describe an architecture

## Architecture framework

Predefined set of concerns, stakeholders, viewpoints, and viewpoint correspondence rules; established to capture common practices for architecture descriptions within specific domains or user communities

# Conceptual model of architectural descriptions according to the ISO Std 42010



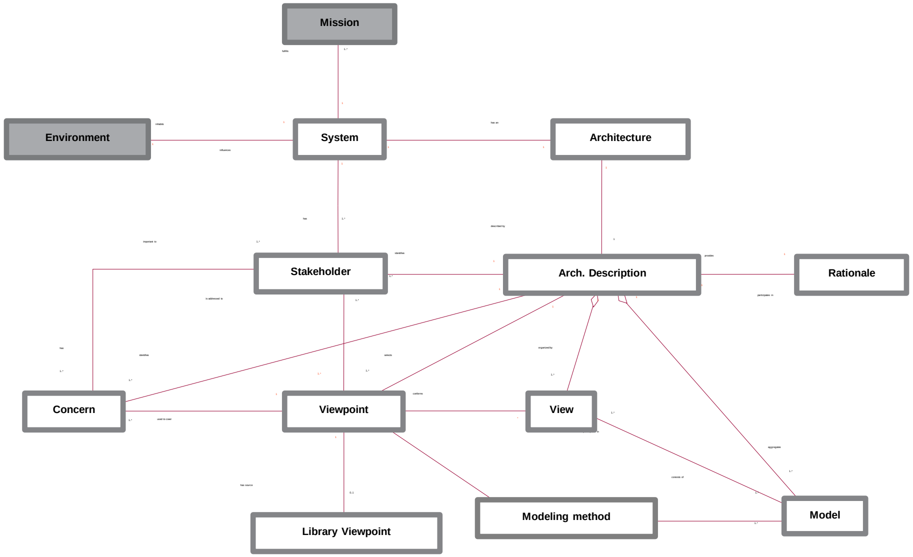
Red ➔ Adaptations to the ISO Standards, e.g. multiplicities are inserted according to the description in the standard

[IS07]

# Notions: System and environment

### System

A collection of components organized to accomplish a specific function or set of functions.



### Software-intensive

Software contributes essential influences to the design, construction, deployment, and evolution of the system as a whole.

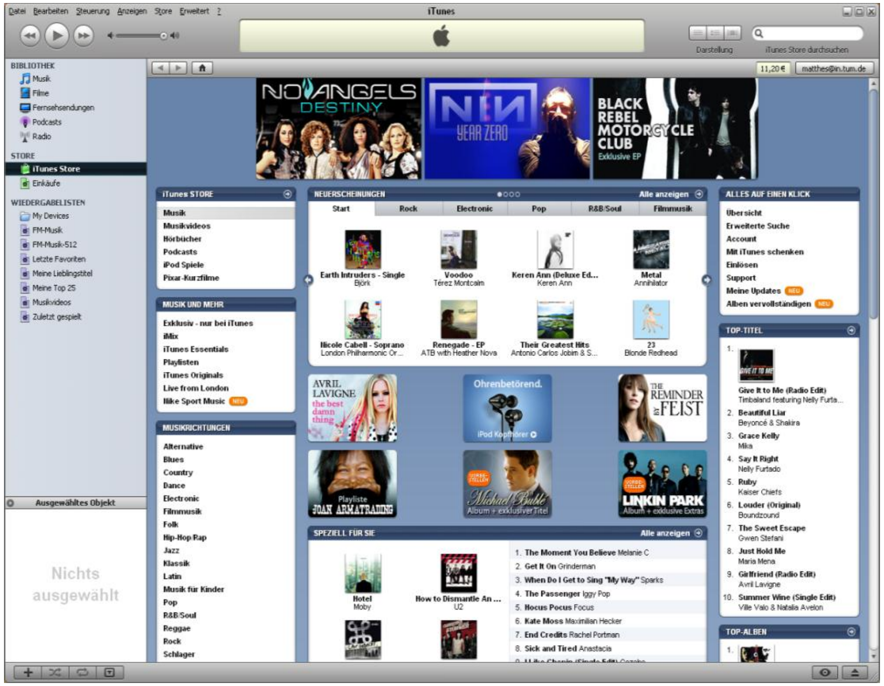
### Environment

Environment or context, which exerts influence on a system’s design. This comprises also other systems interacting with the latter one. The environment determines settings and circumstances of developmental, operational, political, and other influences upon that system.

➔ **Delimitation between the system and its environment**

# Example: Apple’s iTunes store

- System
  - iTunes Store Server
  - iTunes 7.1.-Client
  - Contentmanagementsystem to Create content
  - Reporting-Systems
- Environment
  - client-PCs of the customer
  - Internet
  - different iPods variants

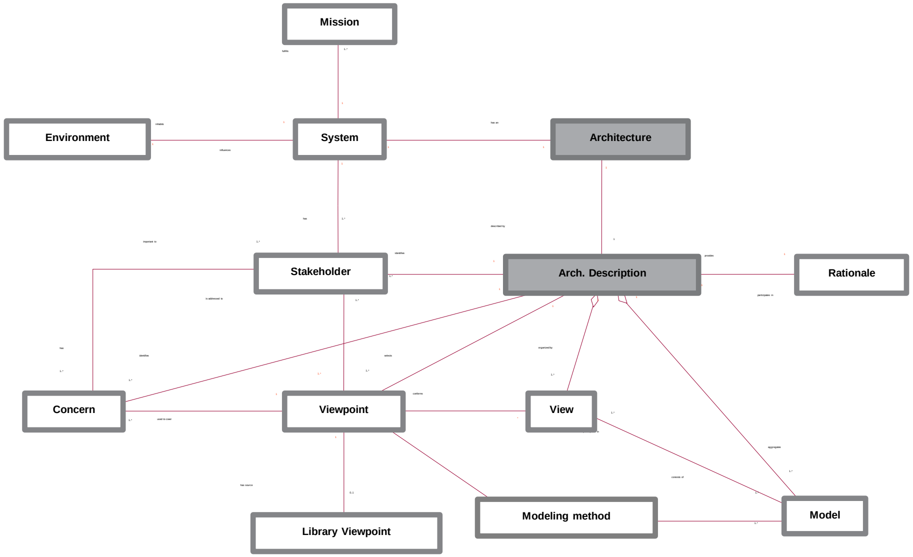


Datei Bearbeiten Steuerung Anzeigen Store Erweitert ?
iTunes
Darstellung
iTunes Store durchsuchen
11,20 €
matthes@in.tum.de
BIBLIOTHEK
Musik
Filme
Fernsehsendungen
Podcasts
Radio
STORE
iTunes Store
Einkäufe
WIEDERGABELISTEN
My Devices
FM-Musik
FM-Musik-512
Letzte Favoriten
Meine Lieblingstitel
Meine Top 25
Musikvideos
Zuletzt gespielt
Ausgewähltes Objekt
Nichts ausgewählt
NO ANGELS DESTINY
NIN YEAR ZERO
BLACK REBEL MOTORCYCLE CLUB Exklusive EP
iTunes STORE
Musik
Musikvideos
Hörbücher
Podcasts
iPod Spiele
Pixar-Kurzfilme
MUSIK UND MEHR
Exklusiv - nur bei iTunes
iMix
iTunes Essentials
Playlisten
iTunes Originals
Live from London
Nike Sport Music
MUSIKRICHTUNGEN
Alternative
Blues
Country
Dance
Electronic
Filmmusik
Folk
Hip-Hop/Rap
Jazz
Klassik
Latin
Musik für Kinder
Pop
R&B/Soul
Reggae
Rock
Schlager
NEUERSCHEINUNGEN
Alle anzeigen
Start
Rock
Electronic
Pop
R&B/Soul
Filmmusik
Earth Intruders - Single Björk
Voodoo Térez Montcalm
Keren Ann (Deluxe Ed... Keren Ann
Metal Annihilator
Nicole Cabell - Soprano London Philharmonic Or...
Renegade - EP ATB with Heather Nova
Their Greatest Hits Antonio Carlos Jobim & S...
23 Blonde Redhead
AVRIL LAVIGNE the best damn thing
Ohrenbetörend. iPod Kopfhörer
THE REMINDER FEIST
Playliste JOAN ARMATRADING
Michael Bublé Album + exklusiver Titel
LINKIN PARK Album + exklusive Extras
SPEZIELL FÜR SIE
Alle anzeigen
Hotel Moby
How to Dismantle An ... U2
1. The Moment You Believe Melanie C
2. Get It On Grinderman
3. When Do I Get to Sing "My Way" Sparks
4. The Passenger Iggy Pop
5. Hocus Pocus Focus
6. Kate Moss Maximilian Hecker
7. End Credits Rachel Portman
8. Sick and Tired Anastacia
ALLES AUF EINEN KLICK
Übersicht
Erweiterte Suche
Account
Mit iTunes schenken
Einlösen
Support
Meine Updates NEU
Alben vervollständigen NEU
TOP-TITEL
1. Give It to Me (Radio Edit) Timbaland featuring Nelly Furta...
2. Beautiful Liar Beyoncé & Shakira
3. Grace Kelly Mika
4. Say It Right Nelly Furtado
5. Ruby Kaiser Chiefs
6. Louder (Original) Boundzound
7. The Sweet Escape Gwen Stefani
8. Just Hold Me Maria Mena
9. Girlfriend (Radio Edit) Avril Lavigne
10. Summer Wine (Single Edit) Ville Valo & Natalia Avelon
TOP-ALBEN

# Notions: Architecture and architectural description

## Architecture

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.

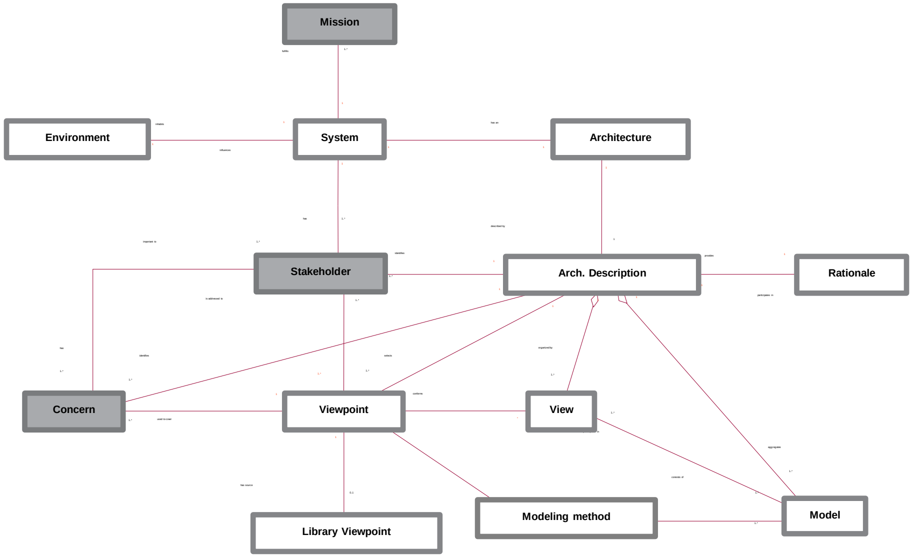


## Architectural description

Collection of products to document an architecture. An architectural description selects one or more viewpoints for use. The selection viewpoints typically will be based on consideration of the stakeholders to whom the architectural description is addressed and their concerns.

➔ **Every system has an architecture, whether understood or not; whether recorded or conceptual.**

# Notions: Concern, stakeholder, and mission



## Stakeholder

Individual, team, or organization (or collections thereof) with interests in, or concerns relative to, a system.

## Concern

Those stakeholders' interests, which pertain to the development, operation, or other key characteristics of the system (e.g., performance, reliability, security, evolvability, distribution, …)

## Mission

Use or operation for which a system is intended by one or more stakeholders to meet some set of objectives.

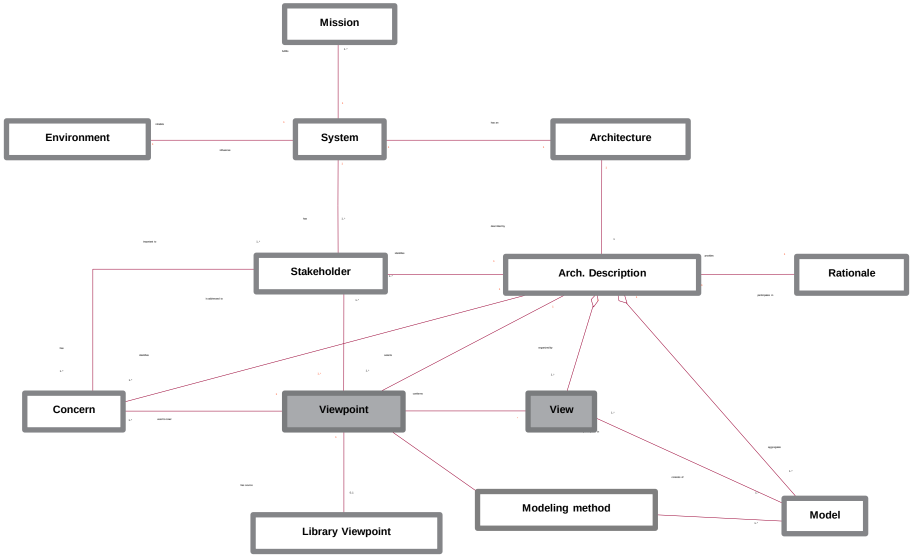
**➔ The architectural description has to be aligned with the stakeholders' concerns.**

# Example: Apple’s iTunes store

- Mission
  - Profitable sales of music, videos, and applications by means of an internet platform
  - Increase Customer loyalty

- Stakeholder and concerns
  - Management of the iTunes store Germany
  - Responsible for operating and maintaining the website
  - Software Developer (comprehensibility, testability, …)

# Notions: Viewpoint and view



## View

Representation of a whole system from the perspective of a related set of concerns. Views are the actual description of the system

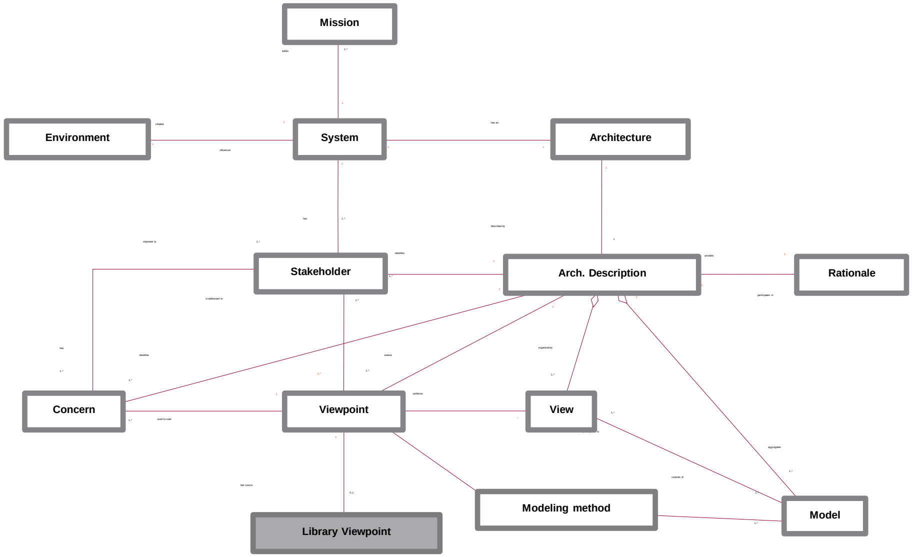
## Viewpoint

Specification of the conventions for constructing and using a view. A pattern or template from which to develop individual views by establishing the purposes and audience for a view and the techniques for its creation and analysis.

**➔Separation between viewpoint and view**

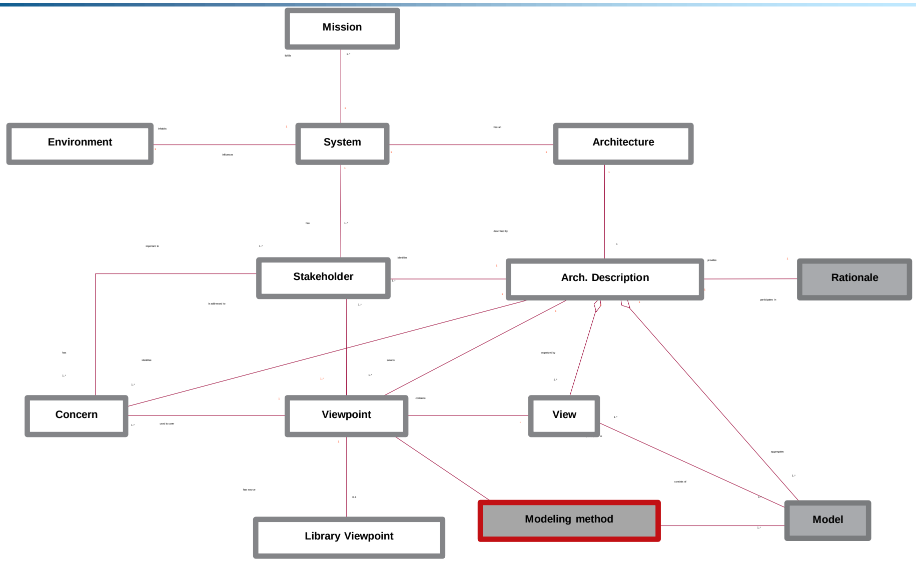
# Notions: Library viewpoint

**Library viewpoint:**
Viewpoint-definition from literature.



➔ **Reuse of techniques and notations for architectural descriptions in order to avoid ad-hoc notations for “boxes-and-lines everywhere viewgraphs”**

# Notions: Rationale and model



## Rationale

Describes the reasons, leading to the selection of an architecture as well as the intention an architect pursues with his decisions.

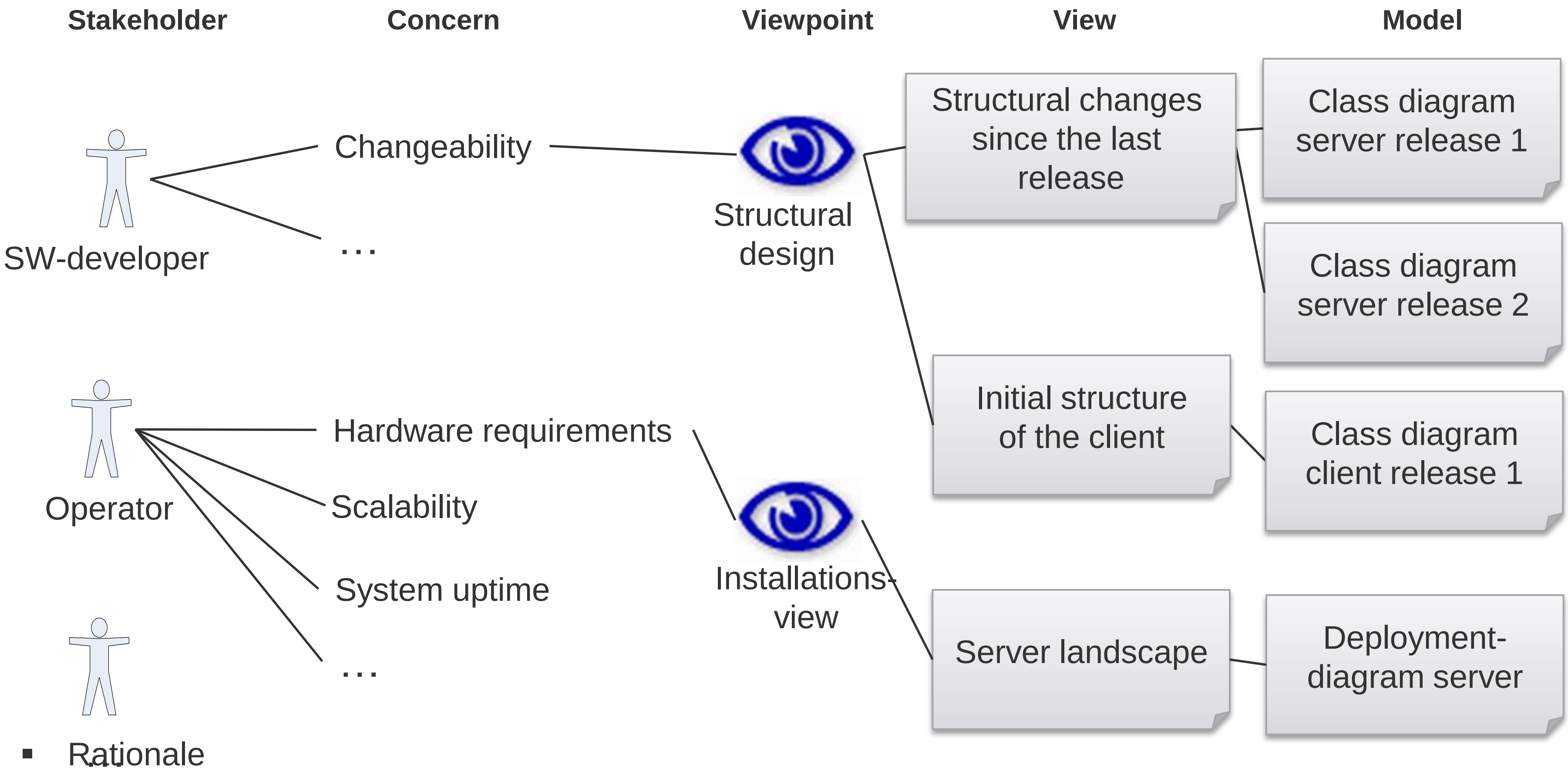
## Modeling method

Specification of the conventions for constructing and using a model. The modeling method determines the language to be used to describe the model.

## Model

Represents a certain aspect of an architecture, according to a notation defined through a viewpoint.

# Example: Apple‘s iTunes store


Stakeholder
Concern
Viewpoint
View
Model
SW-developer
Changeability
…
Structural design
Structural changes since the last release
Class diagram server release 1
Class diagram server release 2
Initial structure of the client
Class diagram client release 1
Operator
Hardware requirements
Scalability
System uptime
…
Installations-view
Server landscape
Deployment-diagram server
…

- Rationale
  - Ease of use for the customer
  - It shouldn’t be possible for customers to download registered video and music material without paying it
  - …

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[Ma08] Matthes, F.; Buckl, S.; Leitel, J.; Schweda, C.M.: *Enterprise Architecture Management Tool Survey 2008*. Technische Universität München, Chair for Informatics 19, (sebis), 2008, http://www.systemcartography.info/eamts, last accessed 09.02.2010.

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# 2 Best Practices for Situational EA Management

Strategic IT-Management & EA Management

**Dr. Sabine Buckl**
**Prof. Dr. Florian Matthes**

**Sascha Roth**
Software Engineering for Business Information Systems (sebis)
wwwmatthes.in.tum.de

# Overview on the lecture

- Block I „IT-Management“ (25.10.2012)
- Block II „IT Governance“ (08.11.2012)
- Block III „Enterprise Architecture Management“
  - Motivation and objectives of EA Management (12.11.2012)
  - Best-Practices for Situational EA Management (19.11.2012)
  - Models, meta-models and modeling (26.11.2012)
  - Frameworks and alternative approaches (03.12.2012)
  - EAM tools – State-of-the-Art (10.12.2012)
- Block IV „Case Studies“

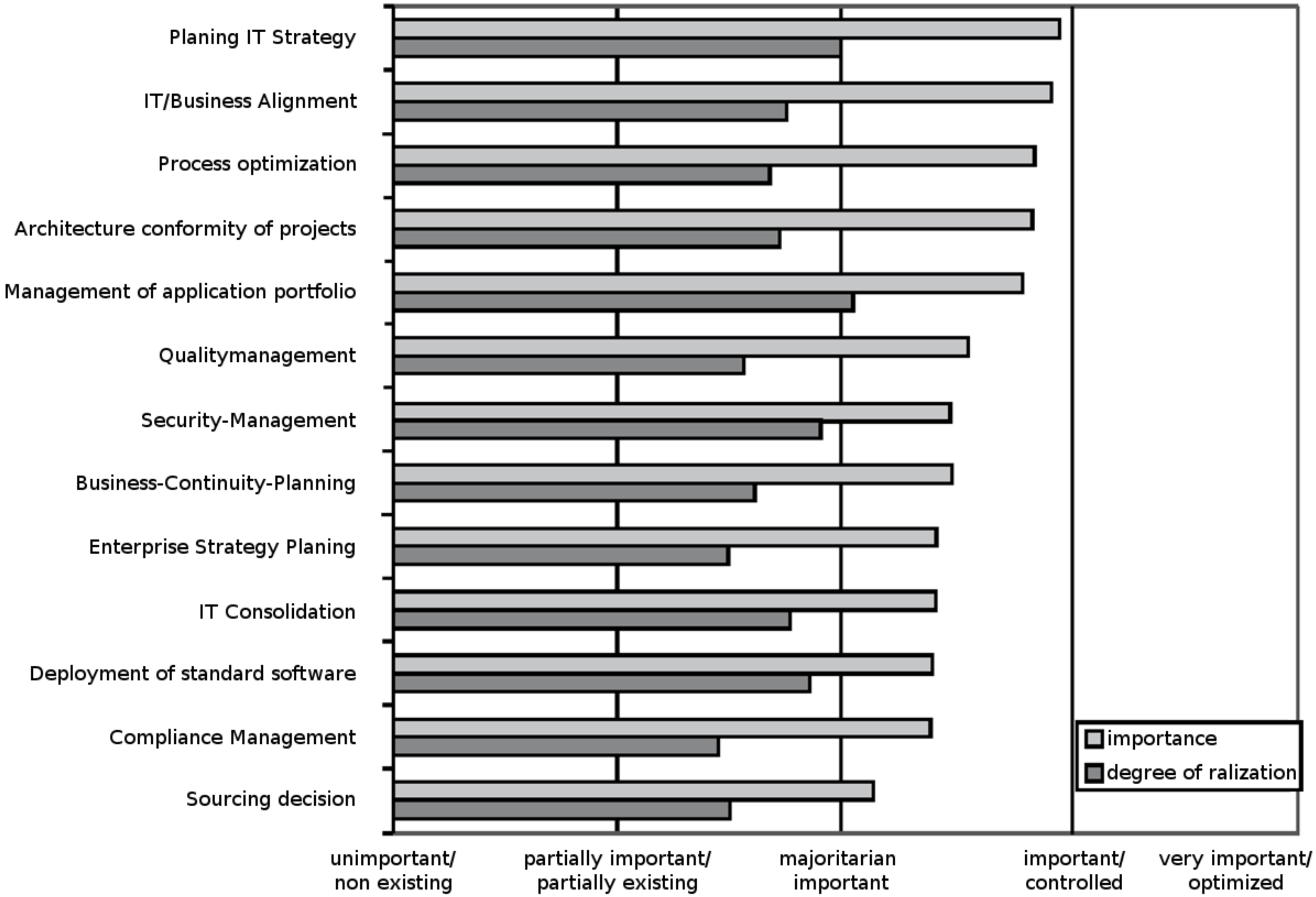
# Learning objectives of this unit

At the end of this module you are able to

- give an overview about typical goals and concerns of an EA management endeavor.
- apply best practice methods, visualizations, and models to design a situational EA management function
- apply techniques to communicate & enact as well as analyze and evaluate an EA
- support project portfolio decisions with means of EA management
- compare and classify analysis techniques to choose the right technique for a given problem
- systematically tailor an EA management function to a given organization

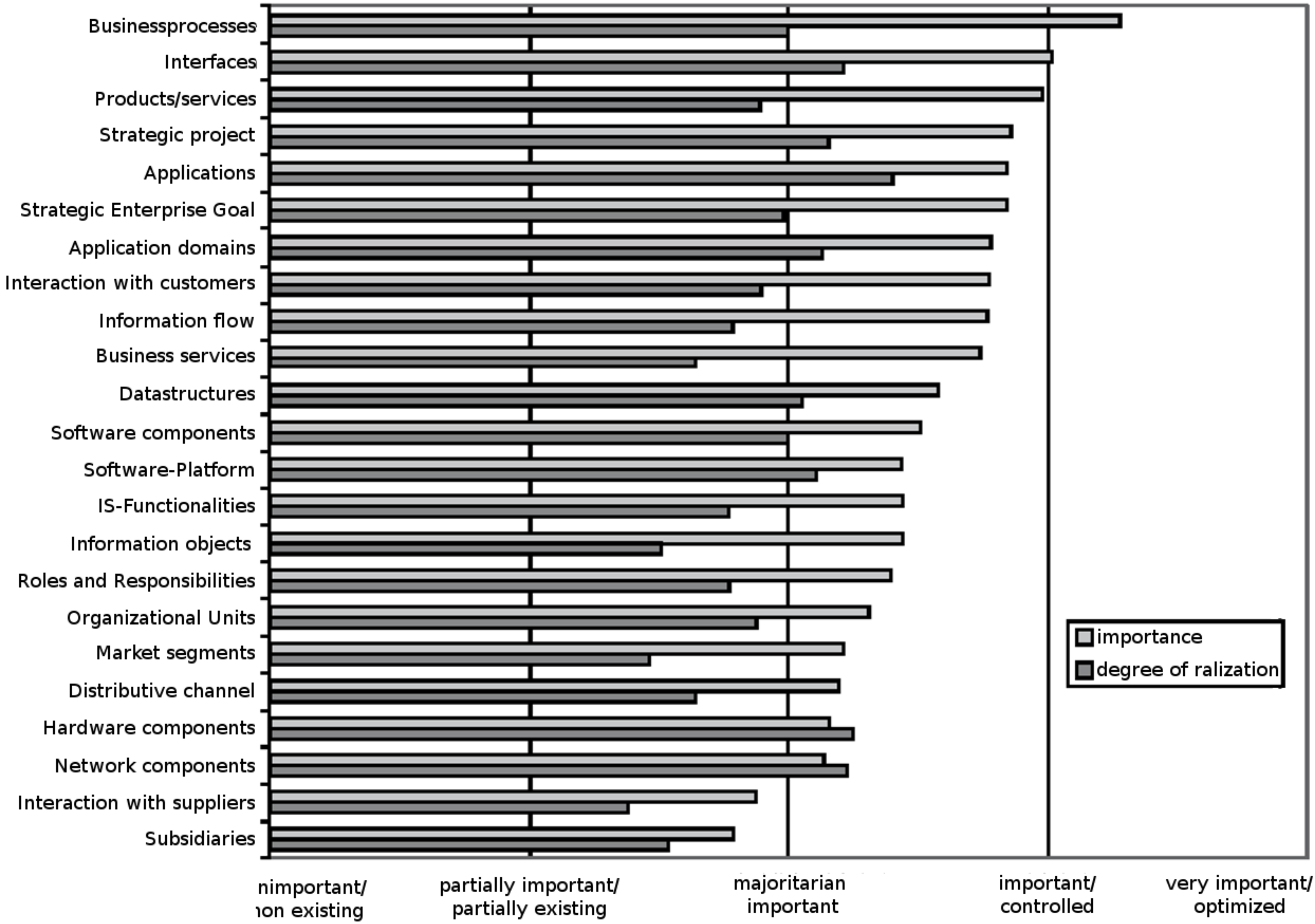
Objective of the module: You are able to use the acquired knowledge to solve small EA management tasks in practice.

# Application scenarios for EAM



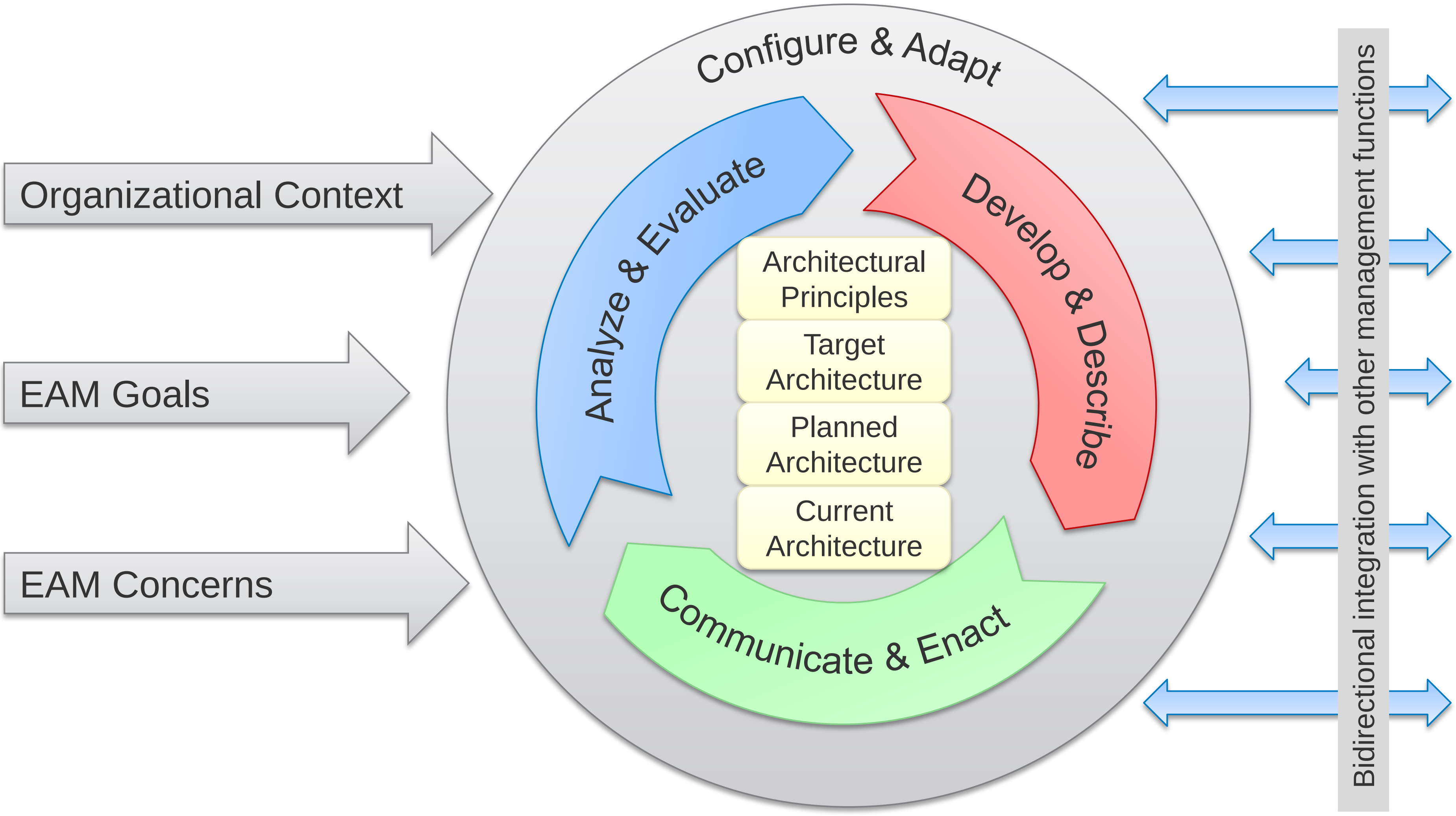
[Ai08]

# Typical concerns of enterprise architecture management are



[Ai08]

# An EA management function has to be organization-specific



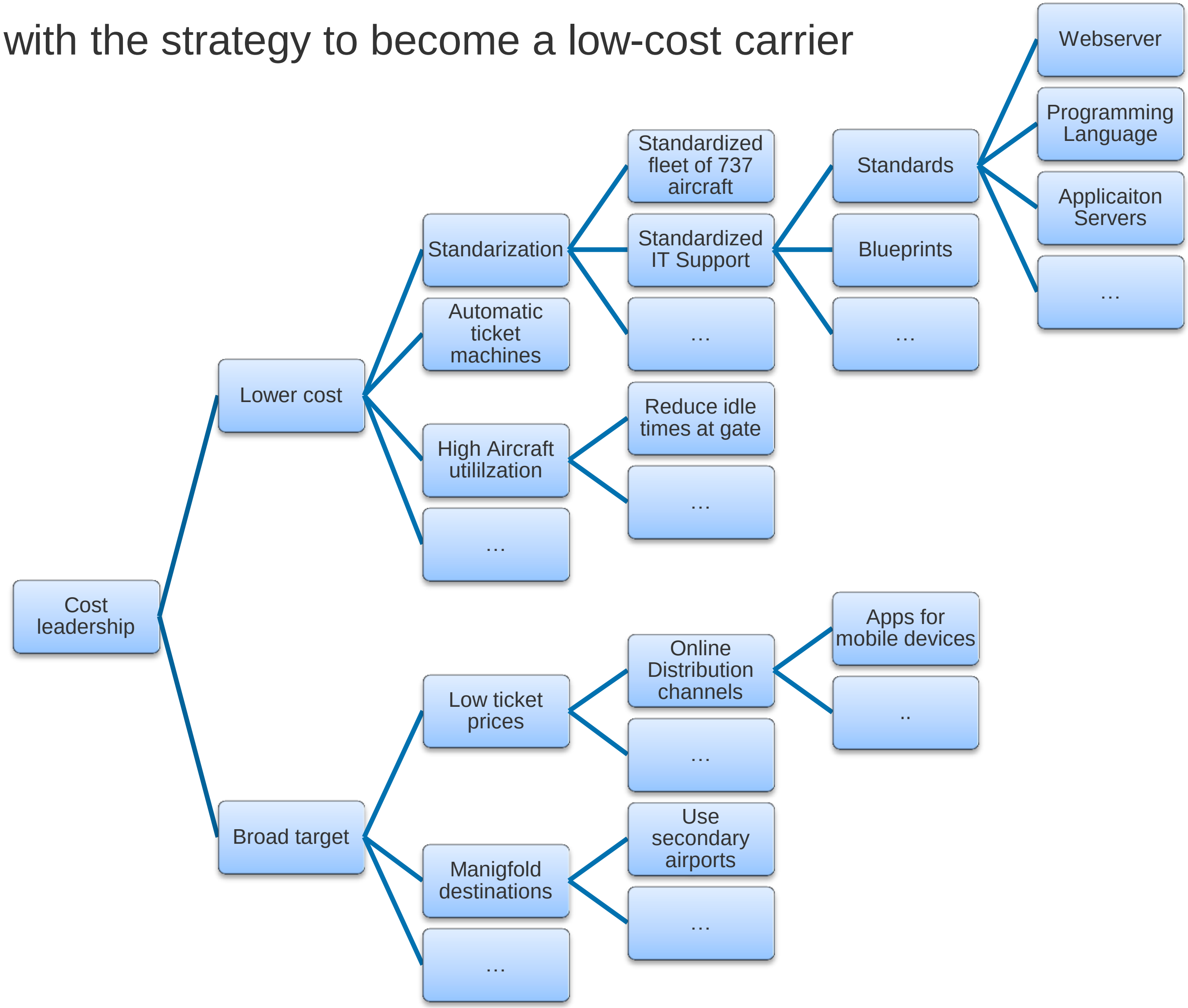
# Excursus: From Business Strategy to EA principles ?

# Excursus: From Business Strategy to EA principles – Porter‘s strategy matrix

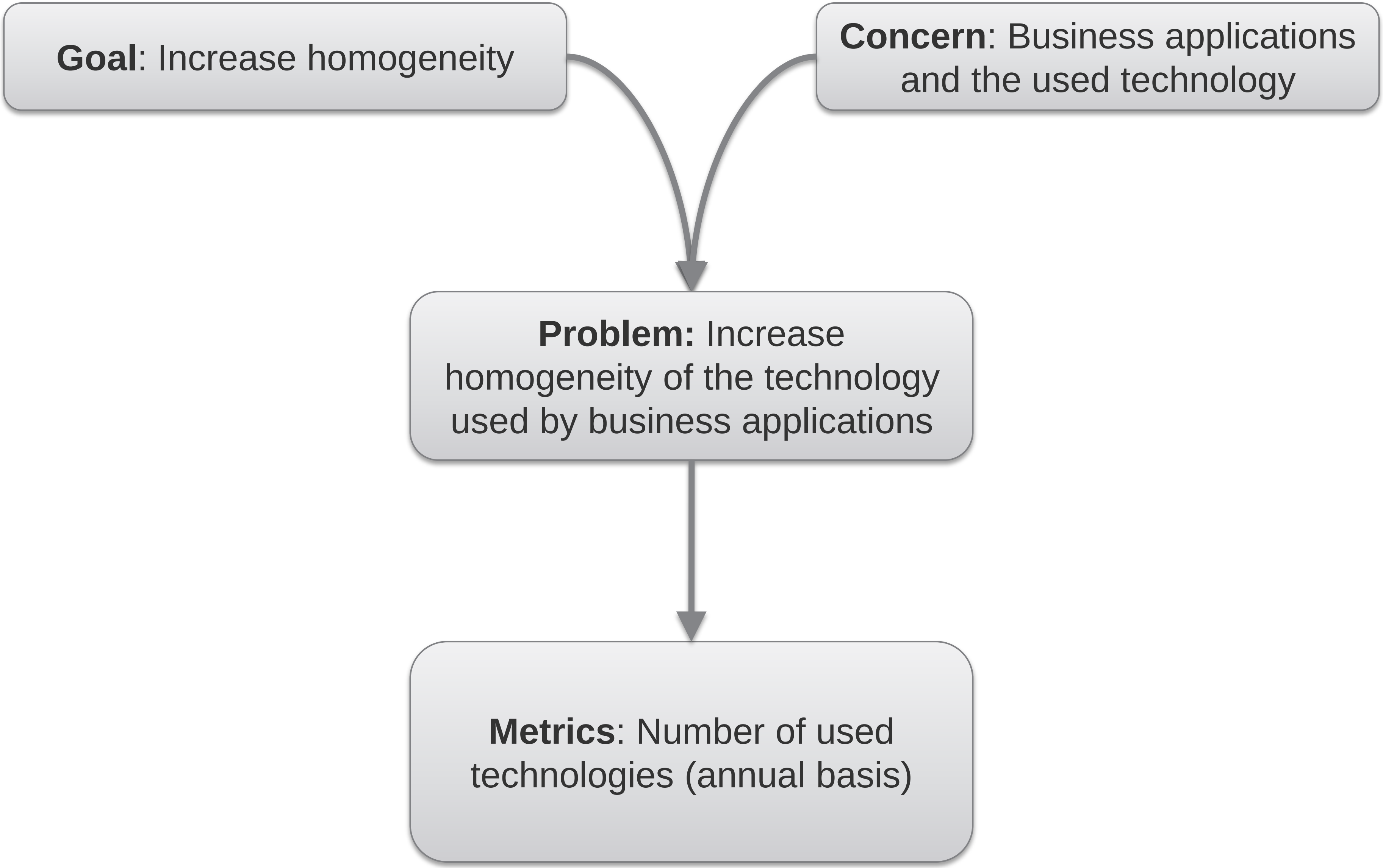
| | | Competitive advantage | |
|---|---|---|---|
| | | Lower costs | Differentiation |
| Competitive scope | Broad target | (1) Cost leadership | (2) Differentiation |
| | Narrow target | (3A) Cost focus | (3B) Differentiation focus |

# Excursus: From Strategy to EA principles

An airline with the strategy to become a low-cost carrier



# Making EAM objective explicit – The interplay of goal, concern, problem, and metric



**Goal**: Increase homogeneity

**Concern**: Business applications and the used technology

**Problem:** Increase homogeneity of the technology used by business applications

**Metrics**: Number of used technologies (annual basis)

# The organizational context influences the design of the EAM function

- IT organization
  - Decentralized, centralized, federated
- Upper management support
  - Bottom-up initiative
  - Top-down initiative
- Budgeting
  - EAM team has a budget at its disposal for conducting EA-related projects
  - EAM team has a certain budget at its disposal for supporting projects (e.g. to provide a budget for attaining architectural principles)
  - EAM team has no budget at its disposal.
- Enterprise culture
  - Innovation
  - Communication
  - Acceptance of formal models
  - Interest in performance data
- …

[Bu11]

# Four phases of a typical management process

**Plan**

- Establish the objectives and processes necessary to deliver results in accordance with the expected output. By making the expected output the focus, it differs from other techniques in that the completeness and accuracy of the specification is also part of the improvement.

**Do**

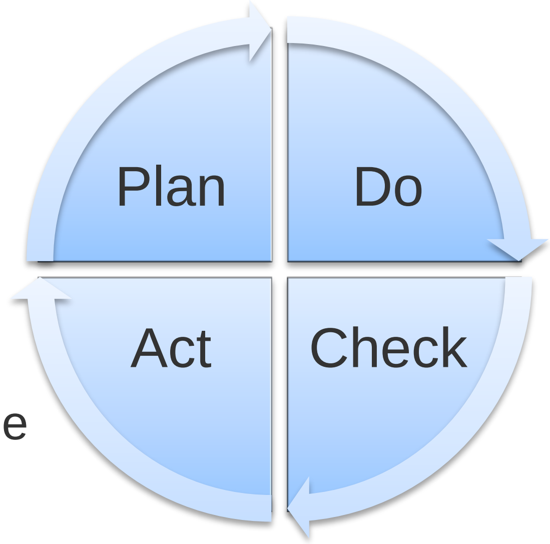
- Implement the new processes, if possible start on a small scale.

**Check**

- Measure the new processes and compare the results against the expected results to ascertain any differences.

**Act**

- Analyze the differences to determine their cause. Each will be part of either one or more of the P-D-C-A steps.
- Determine where to apply changes that will lead to improvements. When a pass through these four steps does not result in the need to improve, refine the scope to which PDCA is applied until there is a plan that leads to improvement.



[De82,Sh86]

# EAM has to be a sustainable management function and not a one-off project

**Develop & Describe**

- Gather information and describe the *current state* of the EA
- Develop long-term *vision* (target state) of the EA and *architectural principles*
- Design medium-term *planned states* of the EA

**Communicate & Enact**

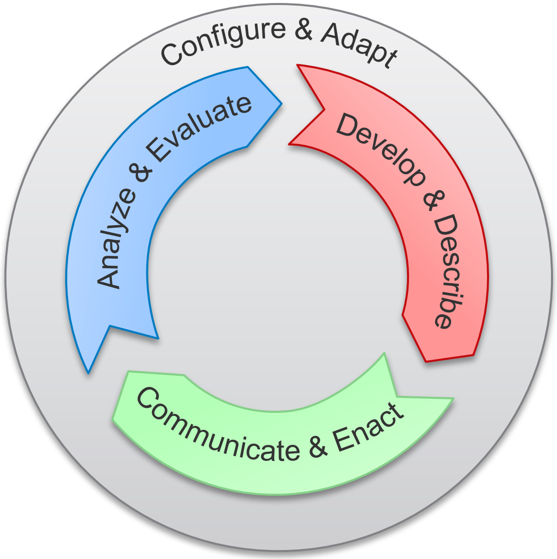
- Communicate *current state* to the different stakeholders
- Enact *planned states* by influencing projects
- Enforce *architectural principles*

**Analyze & Evaluate**

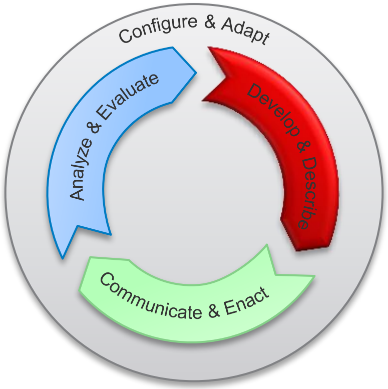
- Assess *current state* of the EA and identify potentials for improvement
- Evaluate different *planned states* of the EA
- Analyze the gaps between the
  - current state & target state of the EA
  - planned states & target state of the EA

**Configure & Adapt**

- Measure performance of the EA management function
- Adapt the EA management function by reassessing
  - goals, concerns
  - environmental influences
  - …



# Develop & describe current, planned, and target states of the EA

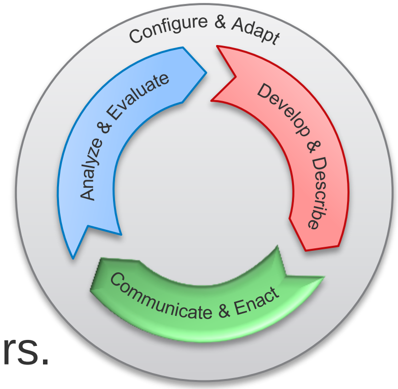


- Trigger of a develop & describe activity
  - Due to an initial information demand
  - Based on a schedule
  - By external events (e.g. legal regulation)
  - New or changed architecture concept (e.g. application introduced)

- Method building blocks
  - Describe by questionnaire
  - Describe via repository
  - Describe by interviews
  - Document automatically by crawler
  - Develop target state in strategy board
  - Check consistency
  - Approve description
  - …

# Communication is the biggest challenge in EAM

- The EAM team lacks authority in the enterprise.
- The people that have to provide information have no immediately benefit from providing up-to-date information.
- Architecture constraints may lead to additional work in IT projects.
- Business and IT people lack shared terminologies and assume tacit knowledge that may not be shared by all stakeholders.
- …



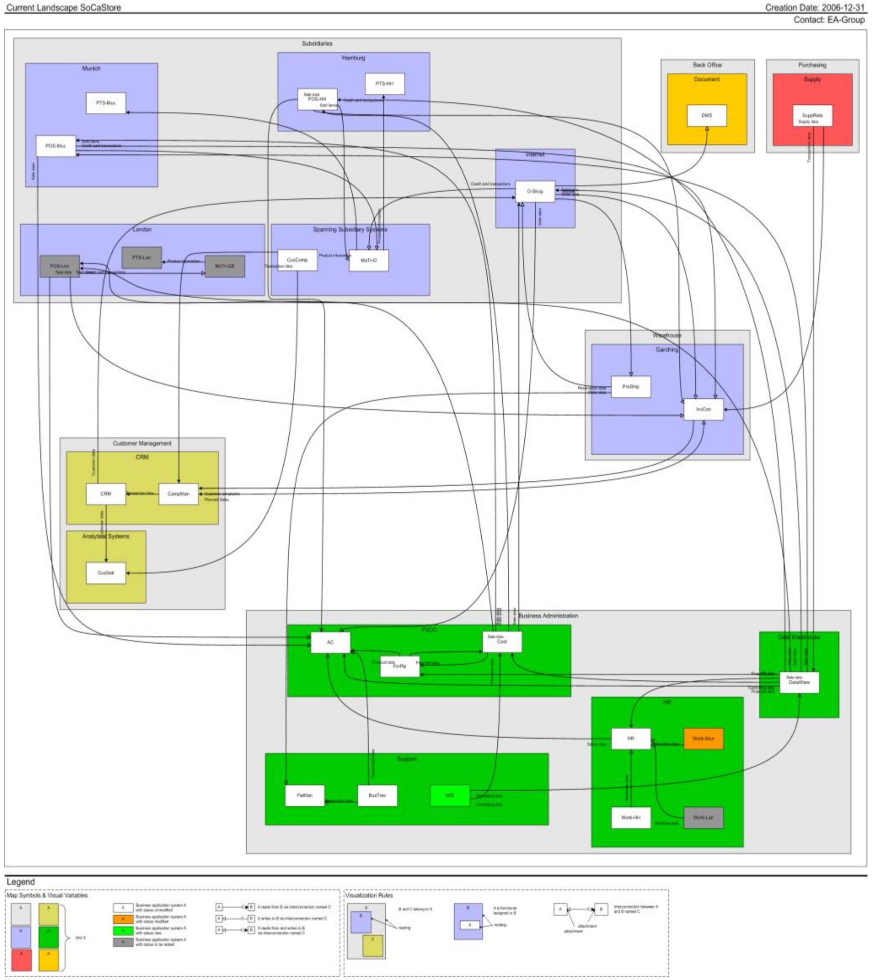
**Helpful tips**

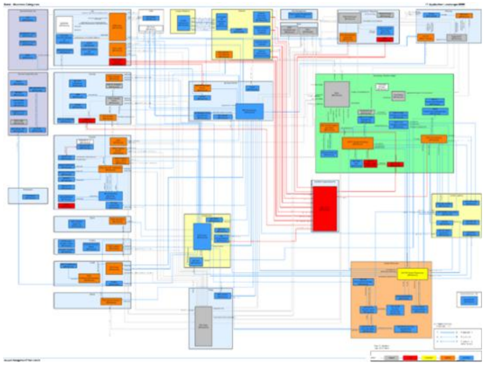
- Learn and use the language(s) of the stakeholders
- Develop a lean glossary of EA-related terminology
- Offer free training and consulting
- Publish “cookbooks” targeting specific communities describing methods and models
  - software architects
  - project managers
  - business development experts

Develop a shared **visual language** for architectural descriptions ➔System Cartography

# Examples for EA descriptions

- Multinational insurance company
- ~160 applications (location Munich, worldwide usage)


Current Landscape SoCaStore
Creation Date: 2006-12-31
Contact: EA-Group
Subsidiaries
Munich
PTS-Muc
POS-Muc
Hamburg
PTS-HH
POS-HH
Internet
O-Shop
London
PTS-Lon
POS-Lon
MoTr-GB
Spanning Subsidiary Systems
CusComp
MoTr-D
Back Office
Document
DMS
Purchasing
Supply
SuppRela
Warehouse
Garching
ProShip
InvCon
Customer Management
CRM
CRM
CampMan
Analytical Systems
CusSati
Business Administration
FICO
AC
Cost
FinPla
Data Warehouse
DataWare
HR
HR
Work-Mun
Work-HH
Work-Lon
Support
FleMan
BusTrav
MIS
Legend
Map Symbols & Visual Variables
Unit A
Business application system A with status unmodified
Business application system A with status modified
Business application system A with status new
Business application system A with status to be retired
A reads from B via interconnection named C
A writes to B via interconnection named C
A reads from and writes to B via interconnection named C
Visualization Rules
B and C belong to A
nesting
A is functional assigned to B
nesting
Interconnection between A and B named C
attachment
attachment



[Wi07a]

# System Cartography – Classification of EA descriptions as found in practice

- Interviews with various stakeholders
- Manually crafted maps

| | Business Object | | |
|---|---|---|---|
| *System* | *Customer* | *Constructionplan* | *Contract* |
| *CRM* | rw | – | rw |
| *ERP* | – [r]$^1$ | rw | – |
| *Portal* | – | – | rw |
| *Web* | – | – | rw |

(a) System⇔Business Object

| | Business Object | | |
|---|---|---|---|
| *Group/Role* | *Customer* | *Constructionplan* | *Contract* |
| *HR* | rw | – | rw |
| *Sales* | rw | – | rw |
| *R & D* | – | rw | – |
| *Production* | – | – | rw |

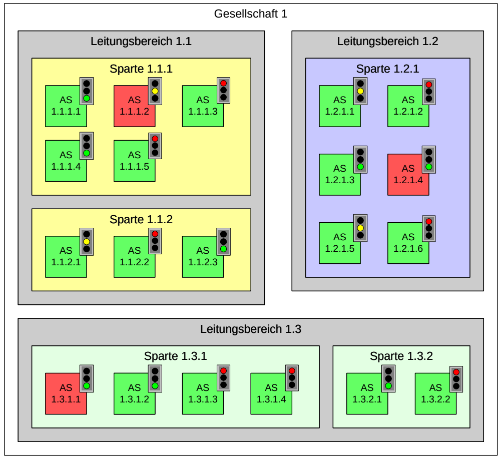
(b) Role⇔Business Object

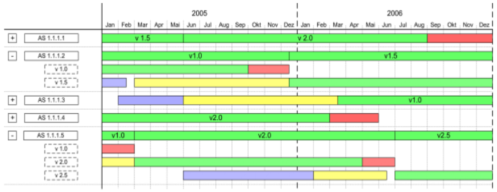
| | Business Object | | |
|---|---|---|---|
| *Business Object* | *Customer* | *Constructionplan* | *Contract* |
| *Customer* | rw | – | rw |
| *Constructionplan* | – | rw | – |
| *Contract* | rw | – | rw |
| *Another BO* | rw | – | rw |

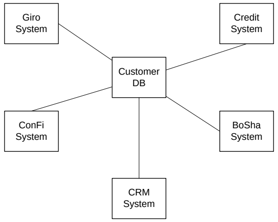
(c) Business Object⇔Business Object

| | System | | |
|---|---|---|---|
| *System* | *CRM* | *ERP* | *Portal* |
| *CRM* | rw | rw | rw |
| *ERP* | r | rw | – |
| *Portal* | – | – | rw |
| *Web* | – | – | rw |

(d) System⇔System



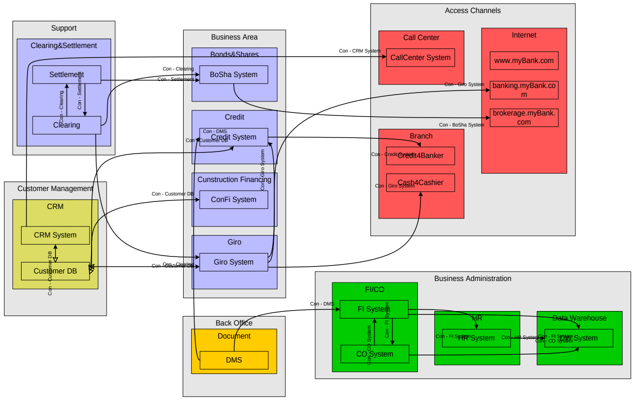




# Viewpoint template 1: Cluster map

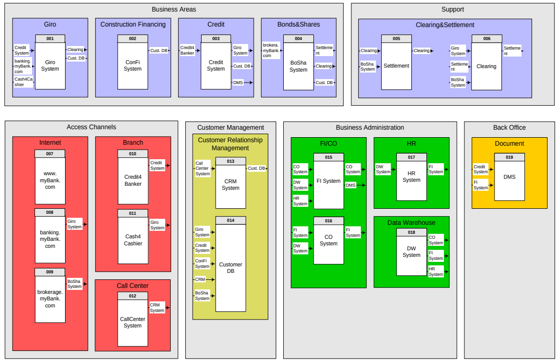
Partition the map into logical **domains** based on

- functional areas
- business units
- technology stacks
- …



Placement of elements:

- optimized space utilization
- optimized routing of connections
- layout conventions (e.g. customers to the right, suppliers to the left)



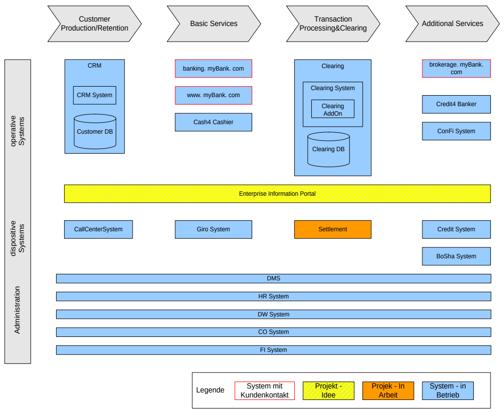
Domains can be nested and provide a coarse-granular **measure of distance**

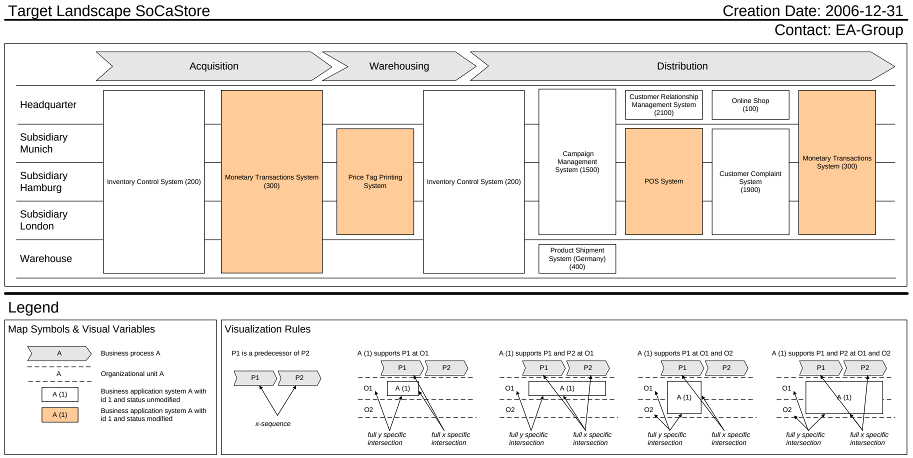
# Viewpoint template 2a: Cartesian map

Two-dimensional space

- **X-Axis** e.g. for business processes
  - layer 0 to 3
  - linear process
  - viewed as a value chain
- **Y-Axis** e.g. for
  - organizational units
  - plants
  - target markets
  - products
  - …

Useful for benchmarks and consolidation projects

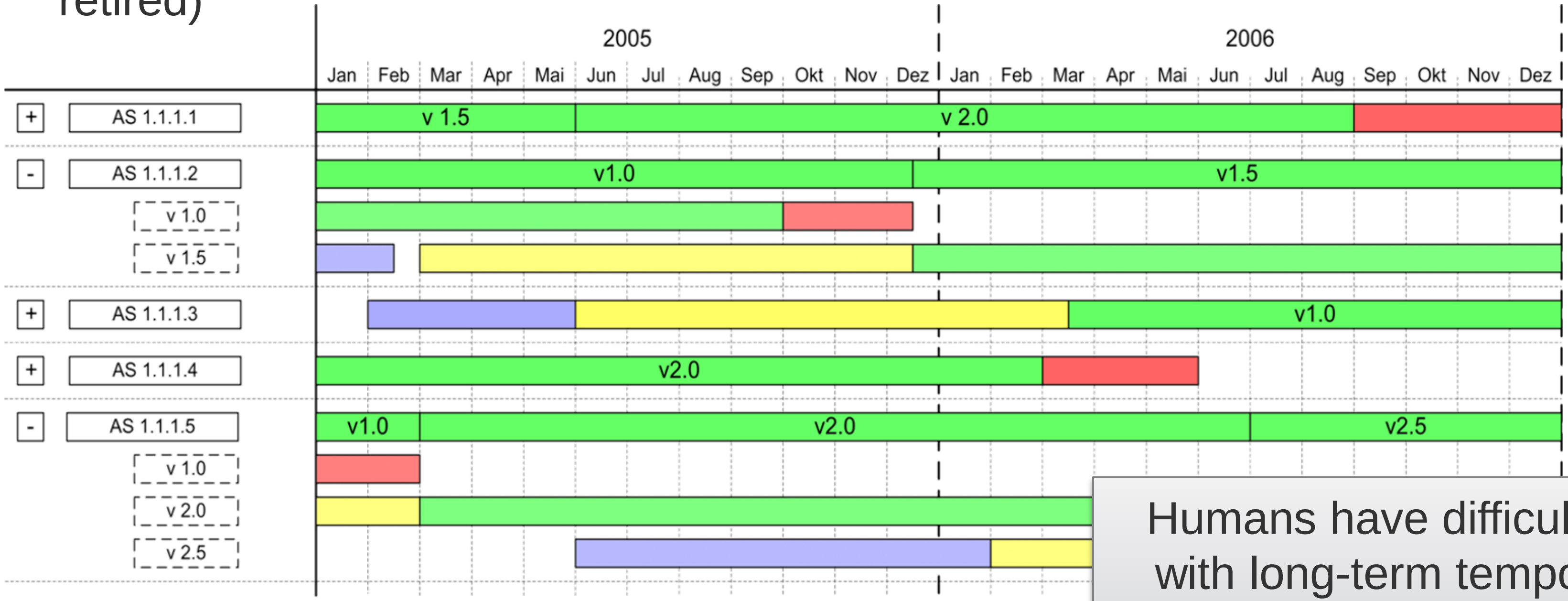



Target Landscape SoCaStore
Creation Date: 2006-12-31
Contact: EA-Group
Acquisition
Warehousing
Distribution
Headquarter
Subsidiary Munich
Subsidiary Hamburg
Subsidiary London
Warehouse
Inventory Control System (200)
Monetary Transactions System (300)
Price Tag Printing System
Inventory Control System (200)
Campaign Management System (1500)
Customer Relationship Management System (2100)
Online Shop (100)
POS System
Customer Complaint System (1900)
Monetary Transactions System (300)
Product Shipment System (Germany) (400)
Legend
Map Symbols & Visual Variables
A
Business process A
A
Organizational unit A
A (1)
Business application system A with id 1 and status unmodified
A (1)
Business application system A with id 1 and status modified
Visualization Rules
P1 is a predecessor of P2
P1
P2
x-sequence
A (1) supports P1 at O1
A (1) supports P1 and P2 at O1
A (1) supports P1 at O1 and O2
A (1) supports P1 and P2 at O1 and O2
O1
O2
full y specific intersection
full x specific intersection

# Viewpoint template 2b: Cartesian map – interval map

Two-dimensional space

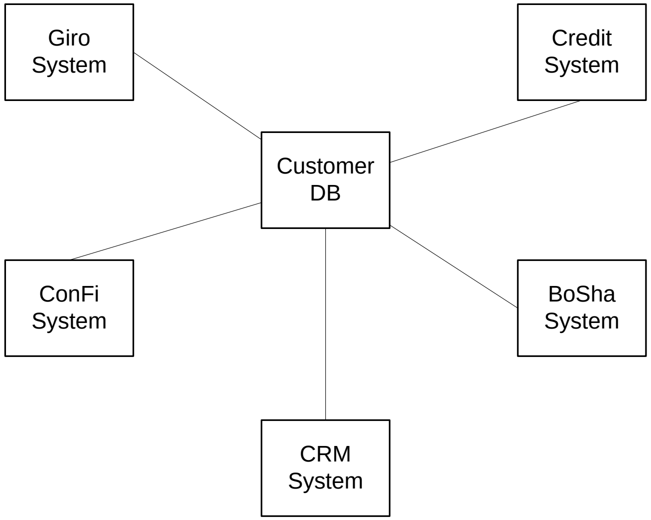
- **X-Axis:** time
- **Y-Axis:** groups of related entities
  - versions of information systems, projects, organizational units, …
- **Color:** state of the elements (planned, in development, in operation, to be retired)



Humans have difficulties with long-term temporal patterns but are experts in spatial pattern recognition

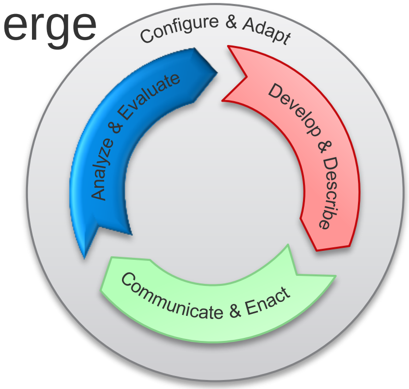
# Viewpoint template 3: Graph layout map

- Generated from a repository, possibly optimized manually based on well-known layout algorithms
- Use of the same cartographic vocabulary (icons, colors, sizes, …)
- Drastic layout changes even for small model changes
- Should the manual layout of the views be a part of the system model?



# Analyze & evaluate

Over time, different states of the EA or architecture scenarios emerge



Analyze & Evaluate

- makes different architecture states comparable and
- helps to assess the quality of a single state.

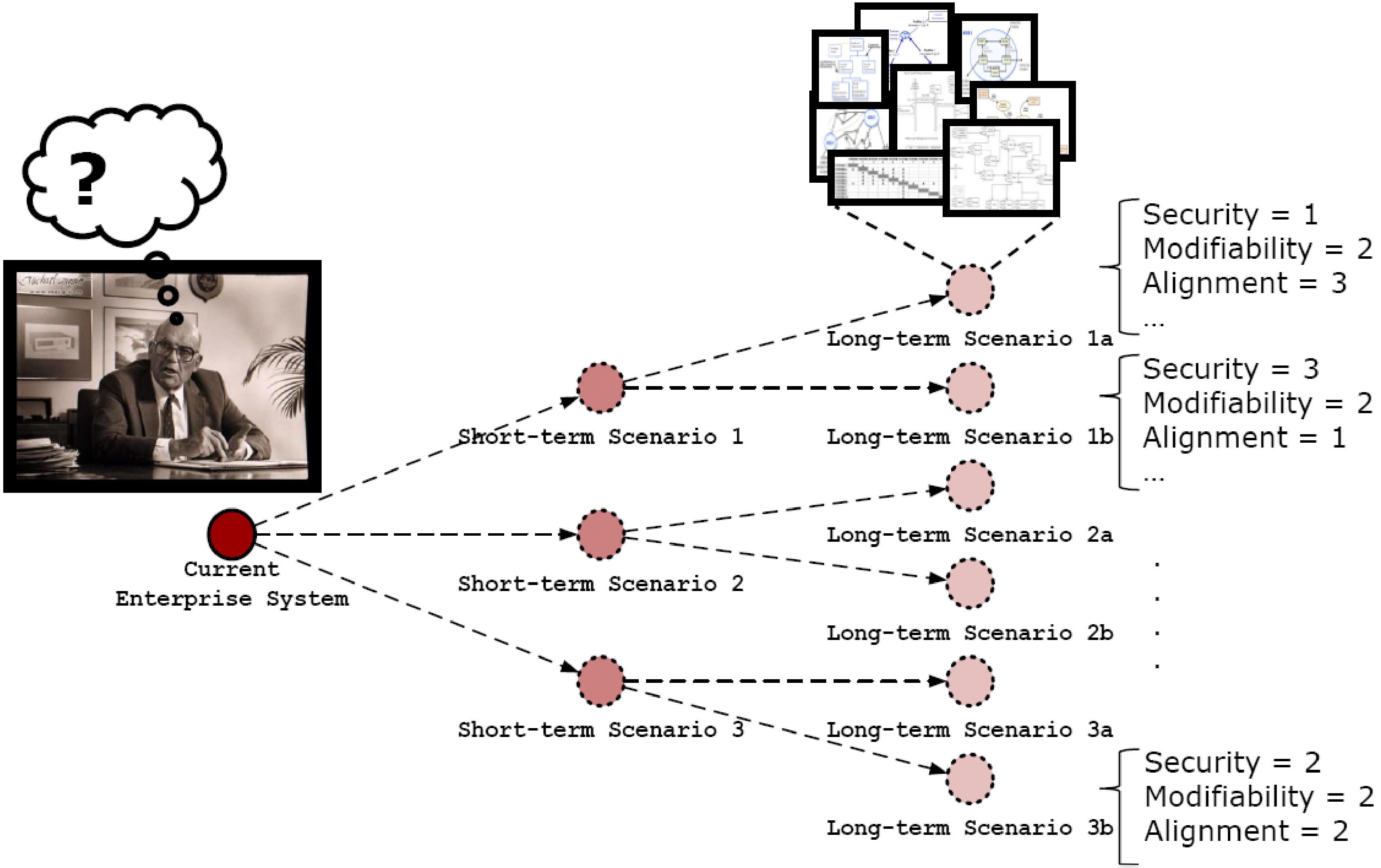
How to obtain EA analysis results

- Calculated indicator value (e.g. number of applications)
- Pattern-based analysis (e.g. vertical integration pattern)
- Single expert evaluation (e.g. interpretation of impact analyses on business processes)
- Multi-expert evaluation
- …

How to aggregate analysis results

- Weighting
- Prioritization (e.g. business expert overrules technical expert)

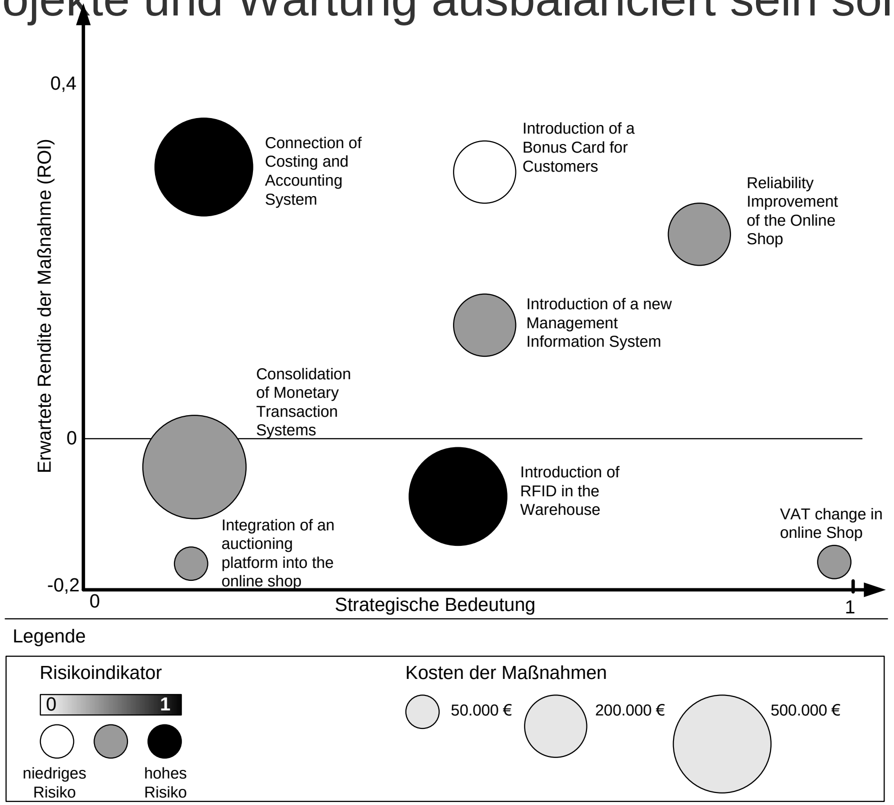
# Strategic EA planning by scenario selection



[Jo07a]

# Exercise: Decide on project portfolio

Erstellen Sie eine Liste von drei Maßnahmen, die Sie mit einem Budget von 800.000 EUR umsetzen wollen und begründen Sie ihre Entscheidung in knappen Worten. Erklären Sie auch, aus welchen Gründen Sie sich gegen die Durchführung einer Maßnahme entschieden haben.  Achten Sie darauf, dass das Budget in Teilbudgets eingeteilt und zwischen verschiedenen relevanten Projektarten, wie z.B. strategische Projekte und Wartung ausbalanciert sein sollte.



# Classification schema for EA analysis approaches

<table>
<tr><td><b>Analysis Technique</b></td><td>expert-based</td><td colspan="2">rule-based</td><td>indicator-based</td></tr>
<tr><td><b>Body of Analysis</b></td><td>structure</td><td colspan="2">behavior statistics</td><td>dynamic behavior</td></tr>
<tr><td><b>Time Reference</b></td><td colspan="2">ex-ante</td><td colspan="2">ex-post</td></tr>
<tr><td><b>Analysis Concern</b></td><td colspan="2">functional</td><td colspan="2">non-functional</td></tr>
<tr><td><b>Self-Referentiality</b></td><td>none</td><td colspan="2">single-level</td><td>multi-level</td></tr>
</table>

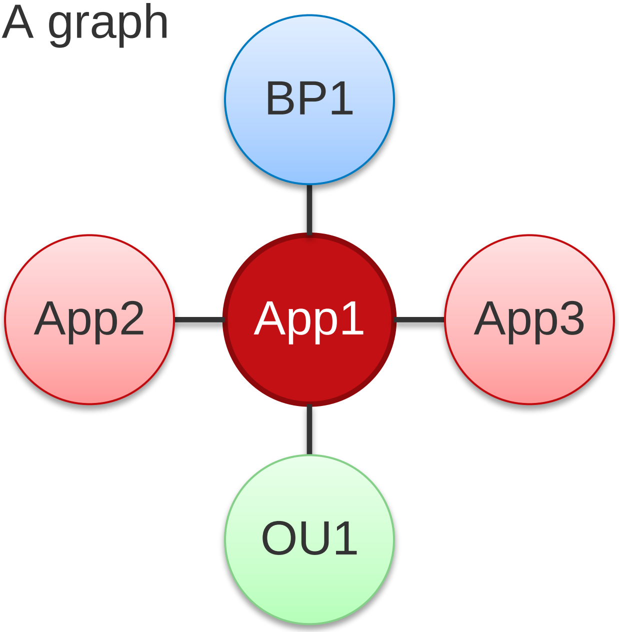
# Example: Expert-based analyses, e.g. Impact analyses [KA07]

- Basic analysis technique
- Widely alluded to by many approaches
- Supported by almost all EA management tools [Ma08]

- Basic idea: (transitive) traversal of relationships between the EA artifacts
- By design strongly focused on structural aspects of the EA

- Analysis results are sub-graphs of the overall EA graph
- Results have to be interpreted by experts
- Interpretation of results complicated due to low specificity

→ Often used in an *ad-hoc* manner



# Example: Pattern-based analyses, e.g. [KA07]

- Intuitive operationalization of the impact analyses
- Least frequently discussed analysis technique
- Supported only by a minority of EA management tools [Ma08]

- Basic idea: search the EA with the help of rules that describe
  - architectural *patterns* (solutions that have worked well)
  - architectural *anti-patterns* (solutions that showed to not work well)
- Strongly focused on structural aspects of the EA

- Analysis results are found occurrences of (anti-) patterns
- Results can be directly used for decision making but may need additional interpretation by experts

# Example: Indicator-based analyses, e.g. [Fr08]

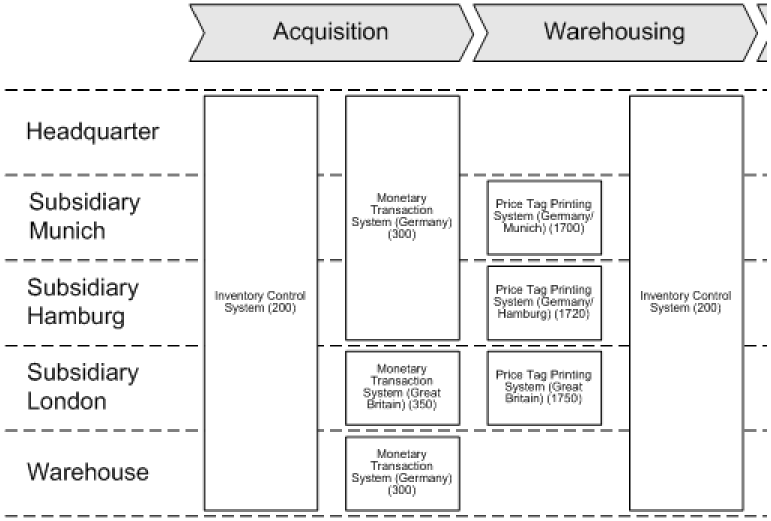
- Widely called for by practitioners “You can’t manage, what you can’t measure” → Indicator systems are used in many management disciplines
- Discussed by both practitioners and researchers
- Supported by some EA management tools but often rather inflexible [Ma08]

- Basic idea: Compute a value that represents a not-observable architecture property from values describing observable architectural properties
- May target both structural and behavioral aspects of the EA

- Analysis results are indicator values
- Results can directly be used for decision making or may need expert interpretation (e.g. dependent on the level of measurement and on indicator weighting)

# Exemplary analysis: homogeneity of business process support

- **Expert-based** (impact analysis): business process “Warehousing” links to business applications “Price Tag Printing System Munich”, “Price Tag Printing System Hamburg”, “Price Tag Printing System London”, and “Inventory Control System” ➔ is inhomogeneity in Germany needed?
- **Pattern-based**: business process “Warehousing” is *vertically integrated* in respect to “Inventory Control System” and is not in respect to “Price Tag Printing Systems”
- **Indicator-based**: business process “Warehousing” is supported by four distinct business applications


Acquisition
Warehousing
Headquarter
Subsidiary Munich
Subsidiary Hamburg
Subsidiary London
Warehouse
Inventory Control System (200)
Monetary Transaction System (Germany) (300)
Price Tag Printing System (Germany/ Munich) (1700)
Price Tag Printing System (Germany/ Hamburg) (1720)
Monetary Transaction System (Great Britain) (350)
Price Tag Printing System (Great Britain) (1750)
Monetary Transaction System (Germany) (300)
Inventory Control System (200)

# Body of analysis

- **Structure**:

  Analysis of the complex relationships between the enterprise artifacts

  Example: Number of interfaces, Number of installations

- **Behavioral Statistics**:

  Aggregated analysis of enterprise artifacts' behavior

  Example: Mean-time-between-failure, Average availability

- **Dynamic Behavior**:

  Detailed analysis of enterprise artifacts' behavior

  Example: Transitive propagation of application failure or restart (*pathological effects*)

- Most literature is on structural analyses, some literature exists on behavioral statistics. The publication of de Boer [dB05] outlines a method for analyzing the dynamic behavior.

# Time reference of analyses

- EA management is concerned with different kinds of states of the EA:
  - Current state EA representing an “existing” architecture
  - Planned state EA representing an intended future architecture (or scenario thereof)
  - Target state EA representing long-term architectural visions

- For current architectures many architectural properties can be measured (*structural* and *behavioral*)
- For planned architectures, mostly only structural information is known, behavioral information has to be estimated.

➔ More complex: ex-ante analyses of the behavior of (planned) states of the EA require for simulative techniques

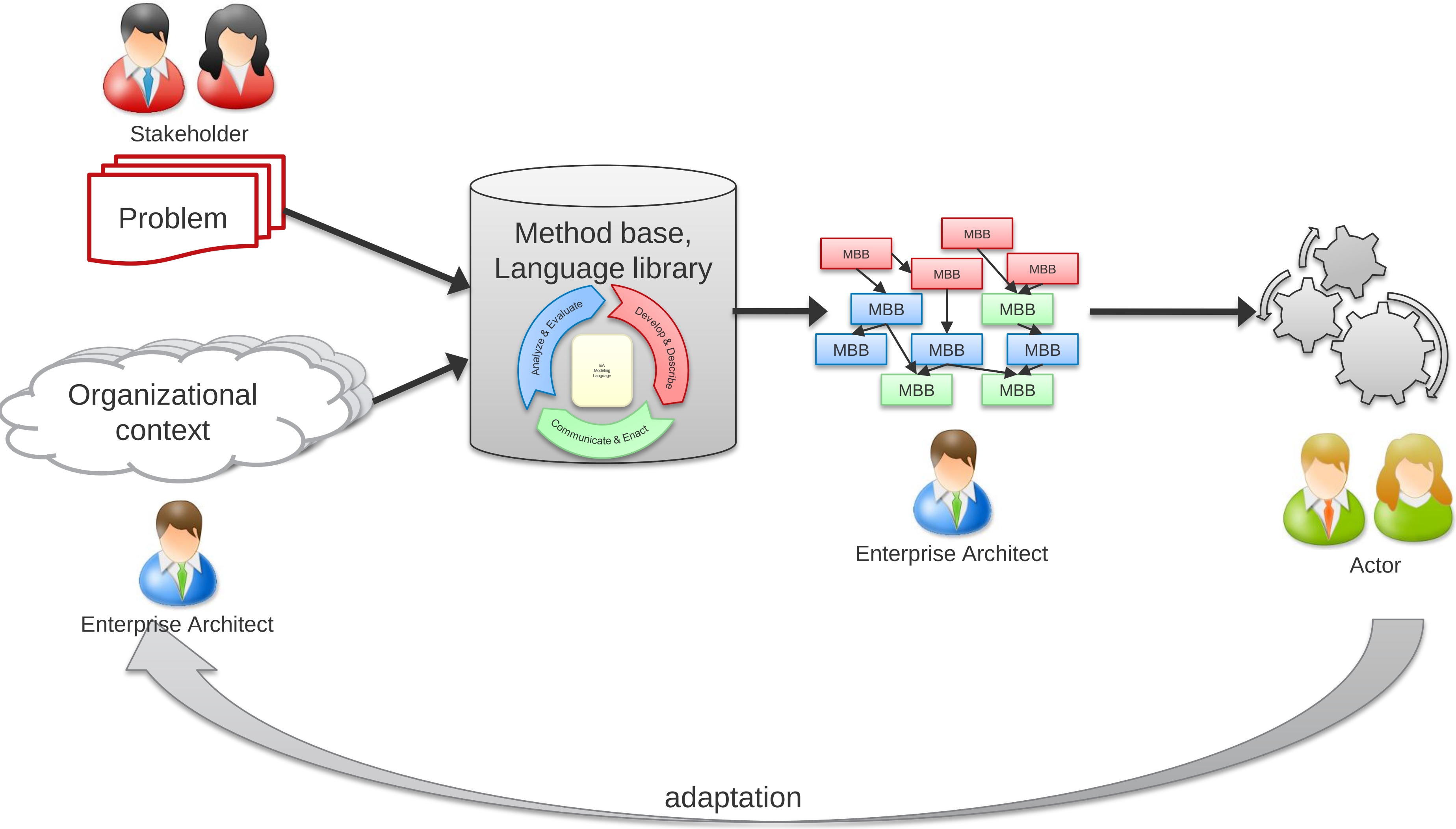
# Two more dimensions of distinction

- Analysis concern
  - **Functional**: (To which extent) can the architecture fulfill the requirements, i.e., the core enterprise goals as incorporated in the business processes?
  - **Non-functional**: Which (execution and evolution) qualities does the EA show?
  - **(Economic)**: How much does cost to maintain/operate the architecture?

  → Economic concerns can be argued to be a subtype of non-functional ones.

- Self-referentiality
  - Not only the EA is a system worth to be analyzed, also the EA management function is
  - **None**: consider only the EA during the analyses
  - **Single-level**: consider the EA management function, i.e., model and analyze its structure and influences
  - **Multi-level**: consider the self-maintaining and -adapting aspects of EA management (*configure & adapt*)

# Best practice building blocks assist the enterprise architect to tailor the EAM function

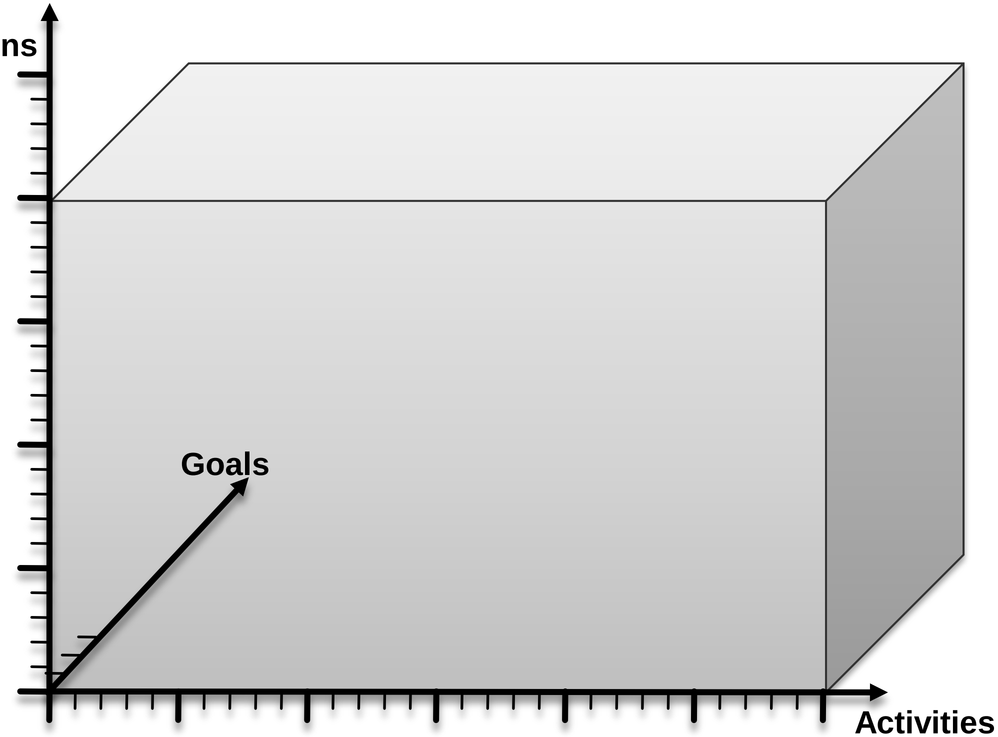


BEAMS: Building blocks for EAM solutions

# Develop an organization-specific EA Management function

- Two scenarios:
  - Develop a new EA Management function
  - Revise an existing EA Management function

- The scope of the EA management function depends on
  - EA management goals
  - EA concerns
  - Activities
    - document, analyze, communicate, …



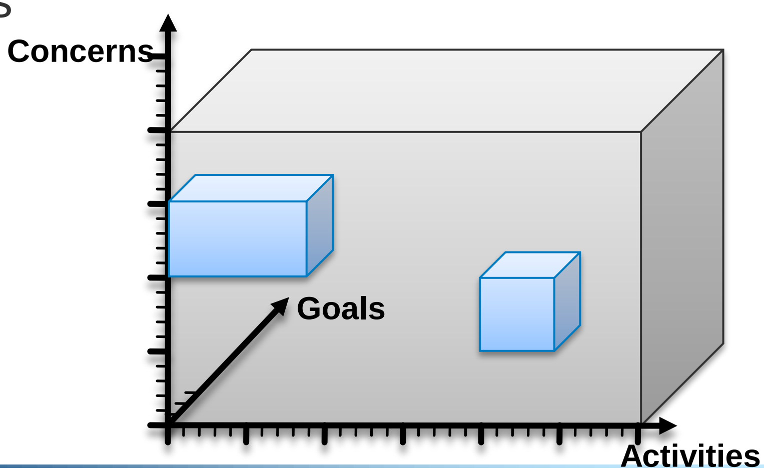
# How to scope an EA management function – two examples

1. Replace existing enterprise resource planning system (ERP)
   - Identify and describe existing business applications providing ERP functionality
   - Develop planned state for the ERP system including interfaces to existing systems
   - Monitor and guide the ERP transformation

   ➔ **Backdoor pilot** for EA management

2. Increase homogeneity of business support for business process “Sales” at organizational unit “Munich”
   - Describe supporting business applications
   - Develop target business support
   - Perform gap analysis
   - Develop planned states and roadmap
   - Monitor and guide transformation project

   ➔ **Pilot** for EA management



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# 3.3 Enterprise Architecture Modeling

Strategic IT-Management & EA Management

**Dr. Sabine Buckl**
**Prof. Dr. Florian Matthes**

**Sascha Roth**
Software Engineering for Business Information Systems (sebis)

wwwmatthes.in.tum.de

# Learning objectives of this unit

Students

- know the basic principles of conceptual modeling
- can distinguish between describing and designing models and know their corresponding quality criteria
- are able to structure a modeling language into its constituents and know different methods for describing these constituents
- can explain the fundamentals of UML MOF
- are able to derive the information model from a specific viewpoint
- can apply different techniques to develop an organization-specific information model

# Outline of this unit

**3.1 An introduction to conceptual modeling**

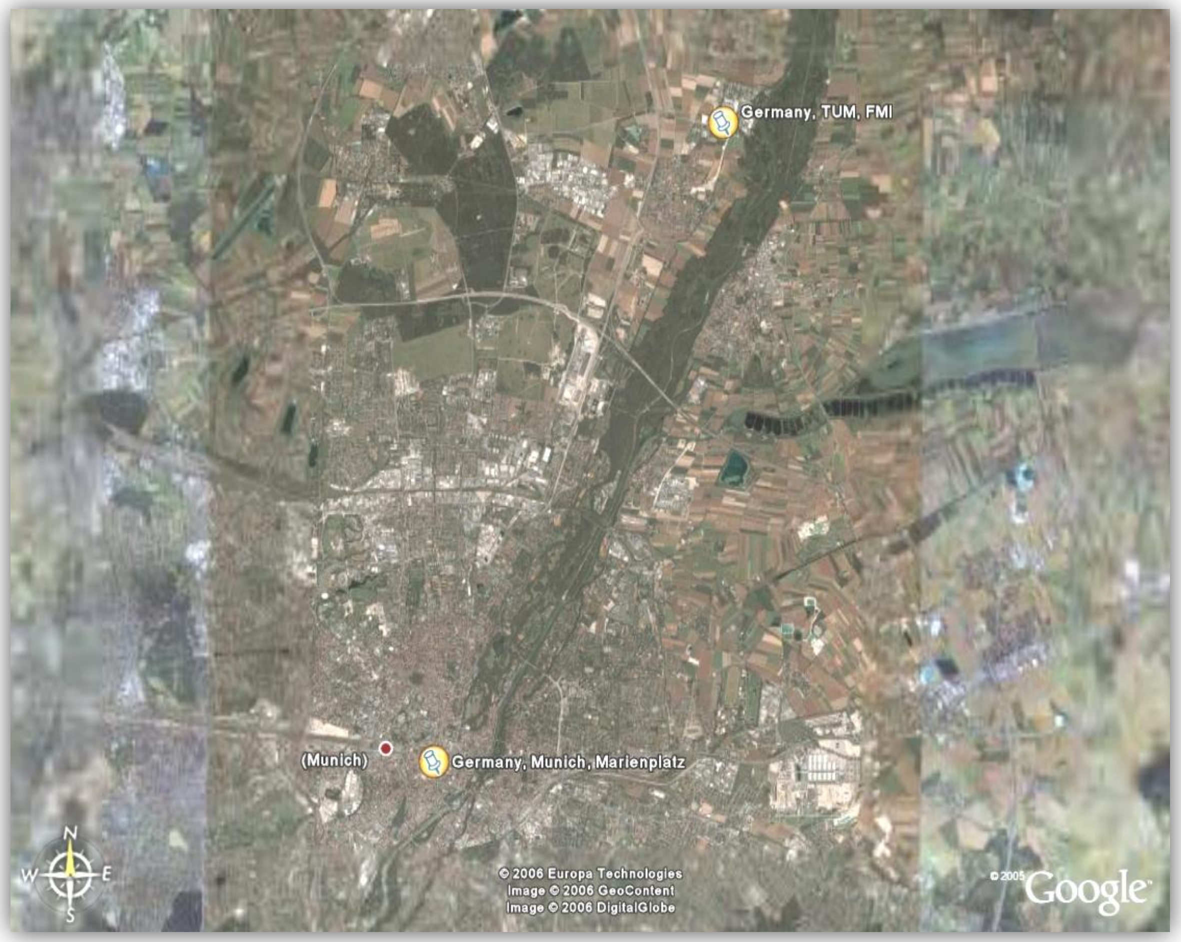
- Models in context
- Modeling languages and meta-models

**3.2 EA Modeling**

**3.3 Collaborative, emergent EA modeling**

# Motivating example (1)

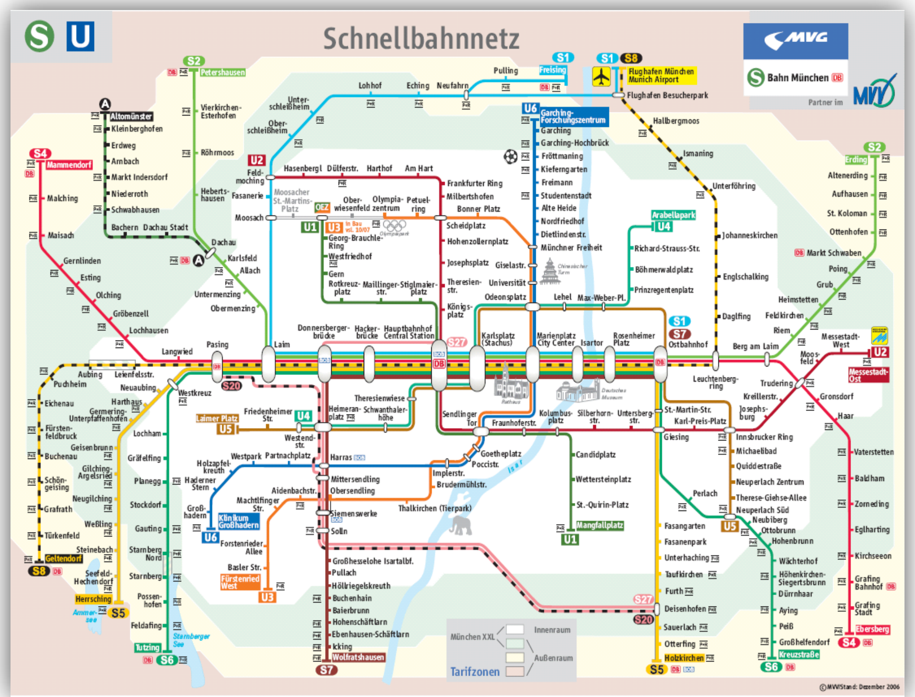
- Reality is often too complex to model or comprehend it.
  - Task: How do I get from FMI in Garching to the Marienplatz with the public transport system of the MVV?


Germany, TUM, FMI
(Munich)
Germany, Munich, Marienplatz
N
W
E
S
© 2006 Europa Technologies
Image © 2006 GeoContent
Image © 2006 DigitalGlobe
© 2005
Google

Source: Google Earth

# Motivating example (2)

- Questions
  - Do I have to know where a traffic light is?
  - Do I have to know where a tree stands?
- Result is *abstraction* and *reduction*
  - The model has to contain the important information for the user.
- Model
  - Plan of the public transport system of the MVV



Source: MVV

# Key characteristics of a model

Key characteristics of a (representing) model – according to Stachowiak [St73]:

- *Models are always models of something, namely surrogates or representations of natural or artificial originals, which can be models themselves*.
  (engl. **Mapping** – dt. **Abbildungsmerkmal**)
- *Models commonly do not capture all attributes of their corresponding original, but only those, which seem to be relevant for the model creator and/or model user.* (engl. **Abstraction** – dt. **Verkürzungsmerkmal**)
- *Models are no 1:1 copies of their originals, they are surrogates for the original*
  - for certain – cognitive and/or acting, model using – subjects,
  - within given time intervals and
  - under constraints to certain mental or real operations.

  (engl. **Pragmatics** – dt. **Pragmatisches Merkmal**)

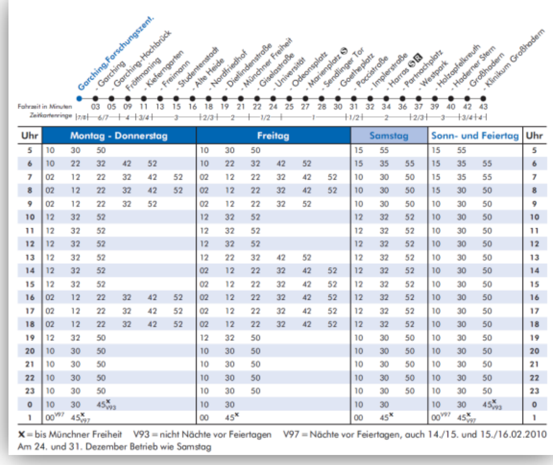
**But:** Models may refer to yet not built originals, i.e. may be *design models*.

➔ Slightly different definition of model

# Motivating example (ctd.) – Two more models of the MVV public transport system

## Model 2 (Timetable):

- Different selection of attributes – arrival and transport times
- Similar model pragmatics:
  - Users that want to get via MVV from FMI to Marienplatz
  - in the year 2012



Garching,Forschungszent. · Garching · Garching-Hochbrück · Fröttmaning · Kieferngarten · Freimann · Studentenstadt · Alte Heide · Nordfriedhof · Dietlindenstraße · Münchner Freiheit · Giselastraße · Universität · Odeonsplatz · Marienplatz Ⓢ · Sendlinger Tor · Goetheplatz · Poccistraße · Implerstraße · Harras Ⓢ Ⓡ · Partnachplatz · Westpark · Holzapfelkreuth · Haderner Stern · Großhadern · Klinikum Großhadern

Fahrzeit in Minuten: 03 05 09 11 13 15 16 18 19 21 22 24 25 27 28 30 31 32 34 36 37 39 40 42 43

Zeitkartenringe: 7/8 – 6/7 – 4 – 3/4 – 3 – 2/3 – 2 – 1/2 – 1 – 1/2 – 2 – 2/3 – 3 – 3/4 – 4

| Uhr | Montag - Donnerstag | Freitag | Samstag | Sonn- und Feiertag | Uhr |
|---|---|---|---|---|---|
| 5 | 10 30 50 | 10 30 50 | 15 55 | 15 55 | 5 |
| 6 | 10 22 32 42 52 | 10 22 32 42 52 | 15 35 55 | 15 35 55 | 6 |
| 7 | 02 12 22 32 42 52 | 02 12 22 32 42 52 | 10 30 50 | 15 35 55 | 7 |
| 8 | 02 12 22 32 42 52 | 02 12 22 32 42 52 | 10 30 50 | 15 30 50 | 8 |
| 9 | 02 12 22 32 52 | 02 12 22 32 52 | 10 30 50 | 10 30 50 | 9 |
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| 12 | 12 32 52 | 12 32 52 | 12 32 52 | 10 30 50 | 12 |
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| 20 | 10 30 50 | 10 30 50 | 10 30 50 | 10 30 50 | 20 |
| 21 | 10 30 50 | 10 30 50 | 10 30 50 | 10 30 50 | 21 |
| 22 | 10 30 50 | 10 30 50 | 10 30 50 | 10 30 50 | 22 |
| 23 | 10 30 50 | 10 30 50 | 10 30 50 | 10 30 50 | 23 |
| 0 | 10 30 $45^{x}_{V93}$ | 10 30 | 10 30 | 10 30 $45^{x}_{V93}$ | 0 |
| 1 | $00^{V97}$ $45^{x}_{V97}$ | 00 $45^{x}$ | 00 $45^{x}$ | $00^{V97}$ $45^{x}_{V97}$ | 1 |

**X** = bis Münchner Freiheit V93 = nicht Nächte vor Feiertagen V97 = Nächte vor Feiertagen, auch 14./15. und 15./16.02.2010
Am 24. und 31. Dezember Betrieb wie Samstag

Source: MVV

## Model 3 (Spatial plan):

- Different selection of attributes – spatial information
- Different model pragmatics:
  - Users that want to perform urban planning
  - in the year 2012

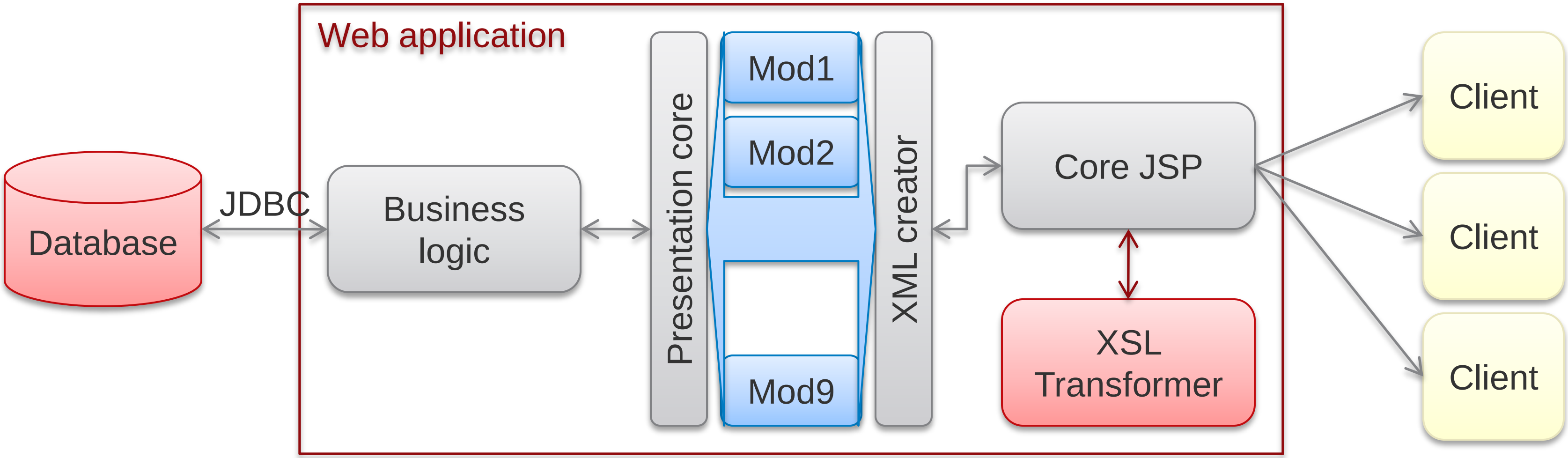
R
V
P
K
MK
V
P
MK
P
R
AG
R
V
K
WB
WB
E
AG
SO
Frauenstr.

Source: Stadt München

➔ Make-up of the models depends on its users (**stakeholders**).

➔ Users might combine different models to a **view**.

# A model?



Questions:

- Who is the intended user of the visualization? (Stakeholder)
- What do the rectangles and colors mean? (Viewpoint)

Anecdote:

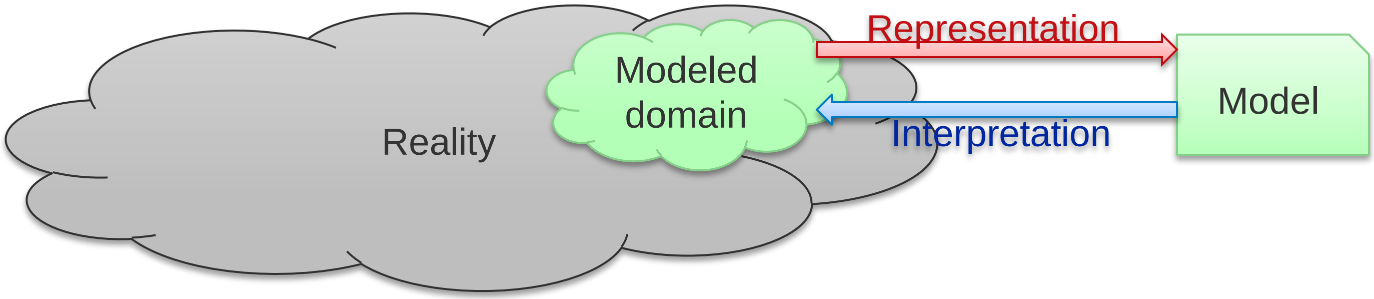
**„These pictures are meant to entertain you. There is no significant meaning to the arrows between the boxes.“**

[Cle03]

# What makes a (representing) model a good one? Conceptions of model quality (1)

Connecting model and modeled domain – *representation* and *interpretation* [Gu05]:

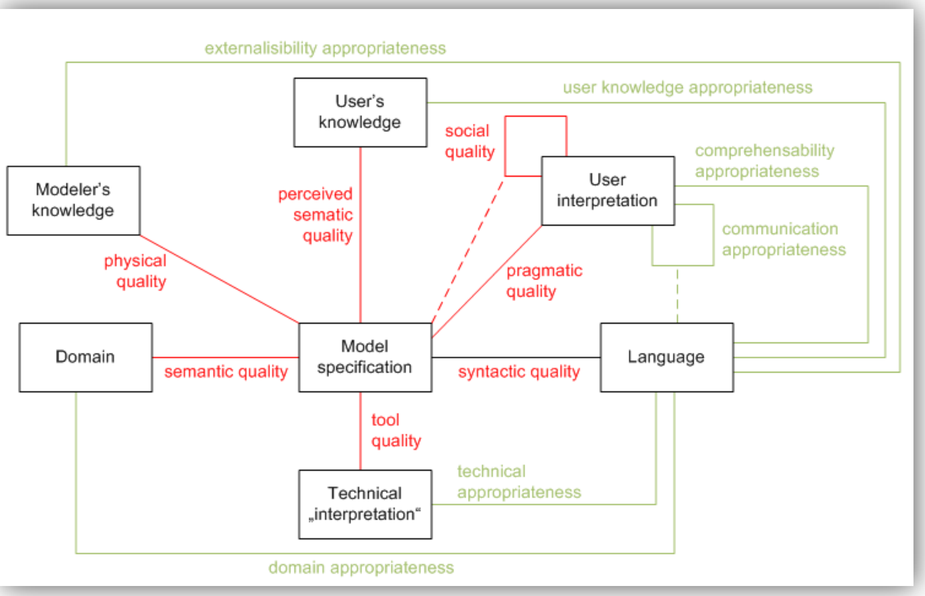
- *Lucidity*: Every construct in the model must represent at most one object from the modeled domain. Overloaded model constructs are forbidden. (*injective representation*)
- *Soundness*: Every construct in the model must represent at least one object from the modeled domain. Construct excess in the representation is avoided. (*surjective representation*)
- *Laconicity*: Every object from the modeled domain must "interpret" at most one construct in the model. Construct redundancy is forbidden. (*injective interpretation*)
- *Completeness*: Every object in the modeled domain must "interpret" at least one construct in the model. Model completeness is ensured. (*surjective interpretation*)



# What makes a (design) model a good one? Conceptions of model quality (2)

Different types of model quality for the model in usage context [Kr02]:

- *Semantic quality*: Does the model cover the modeled domain?
- *Pragmatic quality*: Can the model be interpreted by the model users?
- *Physical quality*: Does the model capture the modeler's domain knowledge?
- *Perceived semantic quality*: Does the model correspond to the users' knowledge about the domain?


externalisibility appropriateness
User's knowledge
user knowledge appropriateness
social quality
comprehensability appropriateness
Modeler's knowledge
perceived sematic quality
User interpretation
communication appropriateness
physical quality
pragmatic quality
Domain
Model specification
Language
semantic quality
syntactic quality
tool quality
technical appropriateness
Technical „interpretation"
domain appropriateness

- *Social quality*: Does the model facilitate user discussions on the domain?
- *Tool quality*: Can the model be "interpreted" by a modeling tool?
- *Syntactic quality*: Does the model conform to a *modeling language*?

# Outline of this unit

## 3.1 An introduction to conceptual modeling

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- Modeling languages and meta-models

## 3.2 EA Modeling

## 3.3 Collaborative, emergent EA modeling

# Every model has a modeling language

Main parts of a modeling language [Kü04]:

- **Syntax:** Describes the set of language concepts and their relationships to each other as well as the rules for forming *correct* models.
- **Notation:** Describes the representation of the language concepts (may be graphically or textually).
- **Semantics:** Describes the meaning of the language concepts and of their relationships.

A modeling language

- incorporates *domain knowledge*,
- reifies the *substantial laws* of the domain, and
- determines what a *valid model* is.

**But**: Not all *valid models* are *sensible* models, too.

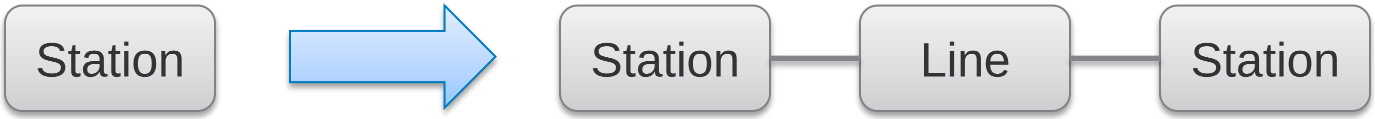
# Different ways of defining the syntax (1)

*Grammar-based*: a grammar describes how to get from a correct simpler language element to a more complex one – examples:

For textual languages: semi-Thue system and term rewriting systems, e.g. (Extended) Backus-Naur-Form (BNF)

- For graphical languages: graph rewriting systems
- **Advantages**:
  - easy to use
  - easy to implement in a tool
- **Disadvantages**:
  - grammar rules do not necessarily reflect domain concepts
  - hardly used and taught for conceptual models

For our example:

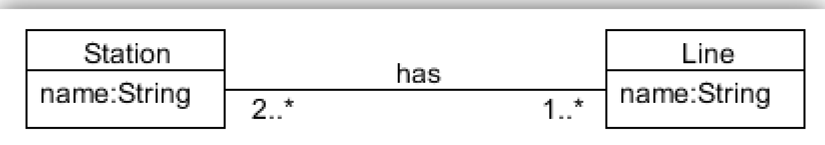


# Different ways of defining the syntax (2)

*Meta model-based*: a model of higher abstractness, the meta model, describes the language elements and their intended relationships

- For object-oriented languages: MOF, UML
- For general knowledge representations: RDF, OWL
- **Advantages**:
  - meta model concepts reflect domain concepts
  - widely used and taught in conceptual modeling
- **Disadvantages**:
  - meta model is expressed in (another) modeling language → infinite regress
  - meta modeling language influences conceptualization of domain

For our example:



# Modeling language syntax and model

Syntax has two main functions:

- Specify the admissible model constructs
- Impose rules how the constructs can be combined

A model can comply with a syntax on different levels:

- "Nonsense" – does not (only) use the admissible constructs
- "Gibberish" – uses the admissible constructs but does not comply with the rules
- "Unintended models – uses the constructs, complies with the rules, but does not correspond to a sensible reality
- "Intended models" – uses the constructs, complies with the rules, and is sensible

Language expressiveness may not be sufficient to avoid unintended models:

➔ *Contextual grammar rules* in grammar-based language specifications

➔ *Constraints* on meta-level in meta-model based language specifications

# Different ways of defining semantics

- *Textually*: language concepts are provided informal descriptions of their meanings
- *Denotational*: language concepts are mapped to mathematical concepts, e.g. sets or groups, with well-founded semantics
- *Algebraic*: language concepts form elements and operators in an algebraic structure
- (*Operational*: language concepts are operationalized via code-fragments)
- (*Axiomatic*: language concepts are complemented with logical pre- and post-conditions)

➔ For enterprise architecture modeling the first three ways are applicable

➔ Different ways are helpful for different utilization contexts

# Different ways of defining notations

Definition by *example*

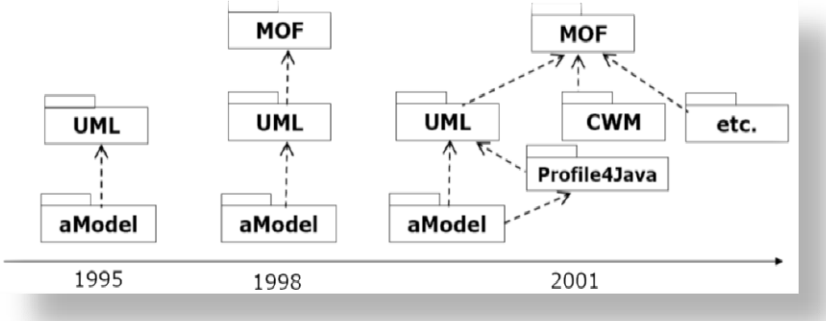
- exemplary graphical symbols representing the modeling concepts
- rules for adapting the symbols according to concept's properties are either
  - not given (*static symbols*) or
  - given textually (*dynamic symbols*).

Definition by *transformation*

- transformation rules translate from modeling concepts to graphical symbols
- strongly dependent on the expressiveness of the graphical language
  - nodes and edges visualizations (see e.g. [DV02])
  - charts and diagrams visualizations (see e.g. eclipse BIRT)
  - hierarchies, nodes and edges visualizations (see e.g. eclipse GMF)
  - visualizations with complex relative positioning (see e.g. [Er06])

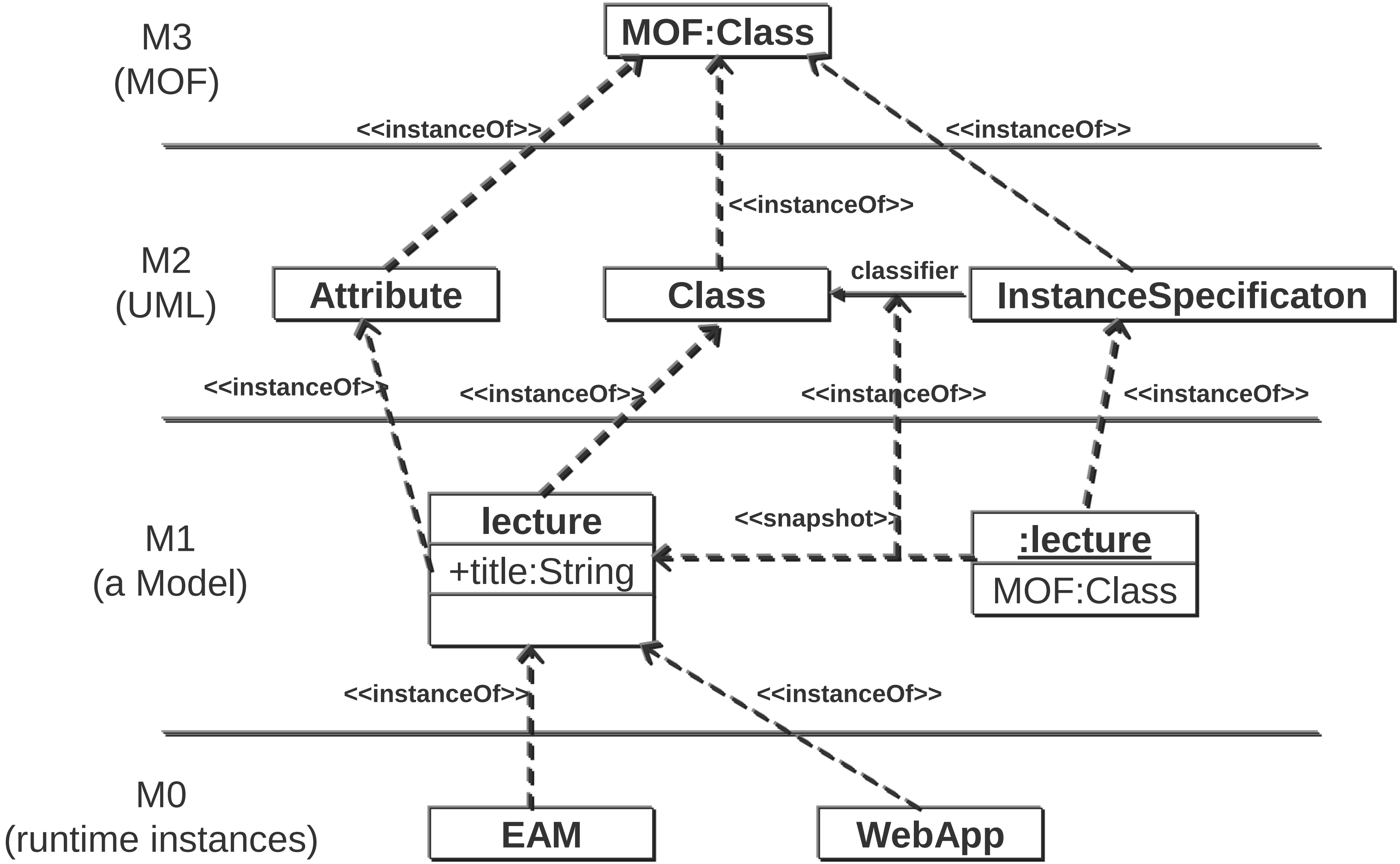
# Object-oriented modeling – UML and MOF

Development of MOF (Meta Object Facility) by the OMG was heavily influenced by the evolution of UML and the appearance of MDA (Model Driven Architecture)



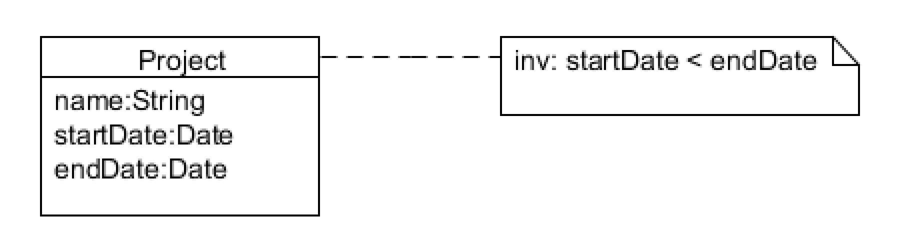
- **4-layer architecture**
  - Instantiation is used repeatedly
    ➔ M3-, M2-, M1-, M0-layer
  - MOF on M3 layer
    ➔ “hard-wired” meta-metamodel
- **MOF** does not “only” define the syntax
  - Possible forms of notations: MOF-Notation (~class diagram)
  - Restrictions define guidelines for the models
- **Notation** is defined by example
  - Through notation tables
  - Possible notation options with natural language
- **Semantics** is described in natural language
  - Additional semantic variations are defined

# Language architecture of UML 2.4
# 4 layer architecture

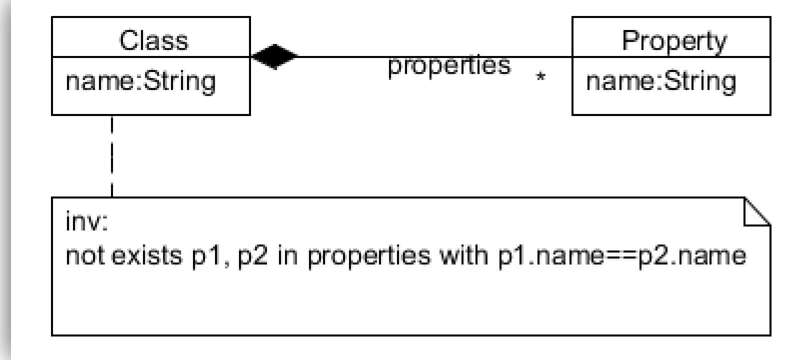


# Language architecture of UML and MOF – Constraints

- The UML and MOF support the utilization of constraints
- Constraints are specified textually
  - using natural language
  - using mathematical terms
  - using the Object Constraint Language (OCL)
- **Example (M1):** any project must start before it ends



- **Example (M2):** all properties must have unique names



# Conceptual modeling beyond UML – Challenges of EA modeling

Relevant meta-properties for types:

- Notion of rigidity: *rigid*, *anti-rigid,* and *semi-rigid*:
  - any instance of a rigid type remains an instance of that type over its entire lifetime – example rigid type *human*
  - any instance of an anti-rigid type has not always been or will not forever be an instance of that type – example anti-rigid type *baby*
  - some instances of a semi-rigid type may forever be or have always been an instance of that type, while others not – example semi-rigid type *rich person*
- Versioning
- Ordering
- Hierarchical

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**3.1 An introduction to conceptual modeling**

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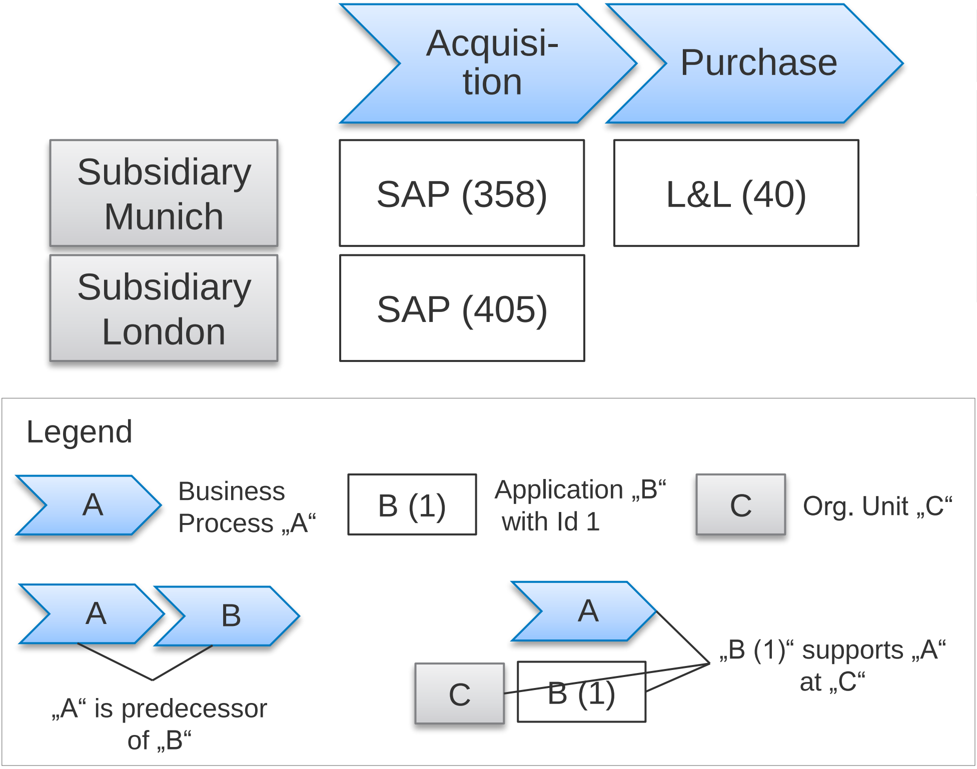
# Multiple EA modeling languages – example

## Process owner

- **View:**



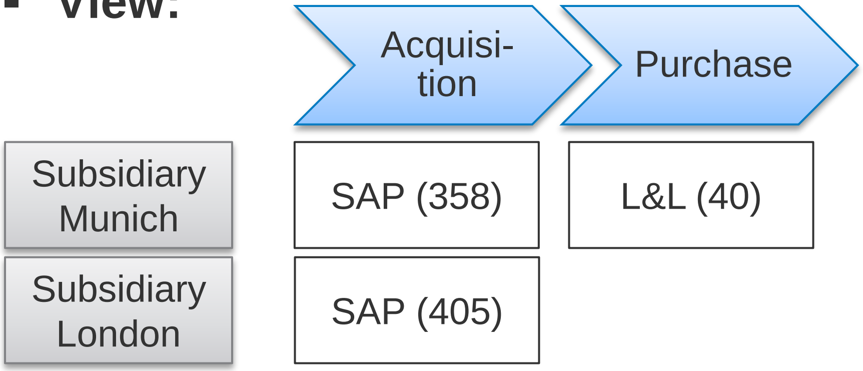
## Project manager

- **View:**

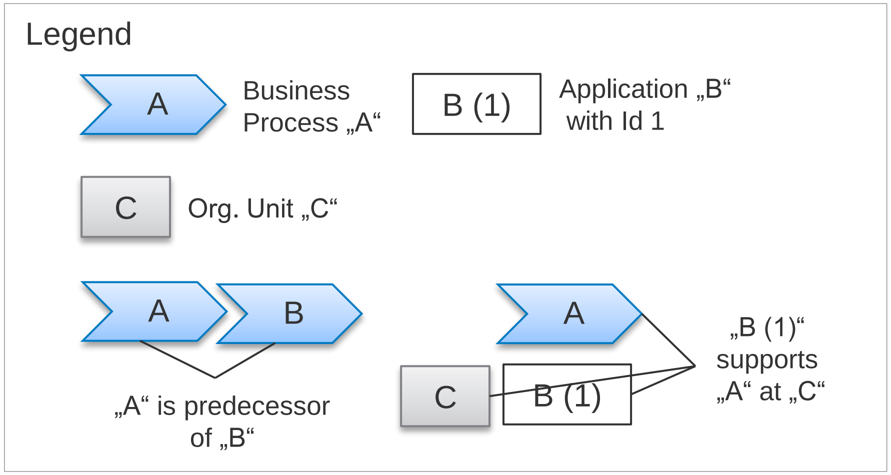
| | SAP v3.58 | SAP v4.05 | L&L 4.0 |
|---|---|---|---|
| **Subsidiary Munich** | X | | X |
| **Subsidiary London** | | X | |

# An information model can be derived from a view

- **View:**



| | Acquisition | Purchase |
|---|---|---|
| Subsidiary Munich | SAP (358) | L&L (40) |
| Subsidiary London | SAP (405) | |



Legend
A
Business Process „A“
B (1)
Application „B“ with Id 1
C
Org. Unit „C“
A
B
„A“ is predecessor of „B“
A
C
B (1)
„B (1)“ supports „A“ at „C“

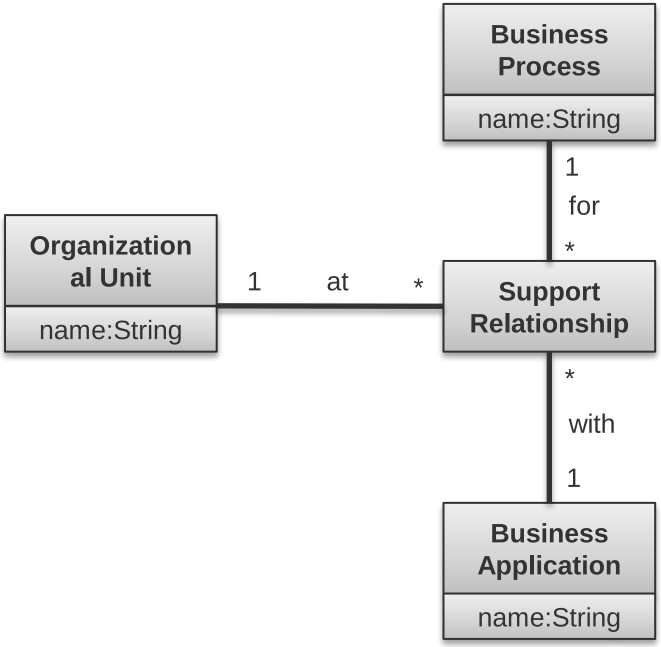
- **Information model:**
  **<to be completed in the lecture>**

# Discussion of information model variants

## Can this information model be used for a process support map?

If not, why?

If yes, what would be advantages/disadvantages of this map?



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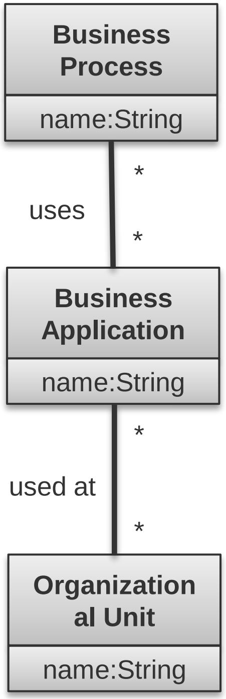

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# Challenges in EA modeling

- Emerging EA management initiatives often start informal using spreadsheets or text documents since
  - the development of an information model is a labor intensive task and
  - no widely-accepted standard information model exists.
- With the growing complexity of the management body and the rising number of stakeholders involved, problems arise regarding
  - scalability and
  - collaborative work.
- Introducing an EA management tool is often regarded to solve these problems.

➔ How to support an evolutionary approach to EA development (esp. regarding the design of an enterprise-specific information model)?

➔ How to avoid the ivory tower syndrome?

# Extending wikis with templates to support structured content

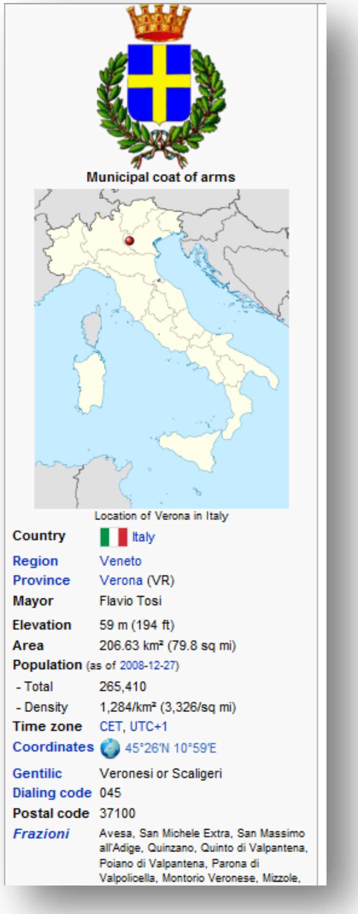
- Automated data processing and visualization, which are essential in an EA management context impose additional requirements on data representation.

  ➔ capture data in a structured form

- Existing wikis rely on text formatting conventions to express structure (e.g. www.wikipedia.org, cf. Figure), but do not offer native support of automated data processing.

- Semantic wikis (e.g. http://semantic-mediawiki.org), try to exploit complex semantic web technologies but often lack usability.

- *Our approach:* templates provide a simple extendable table containing attributes, textual values, and links.

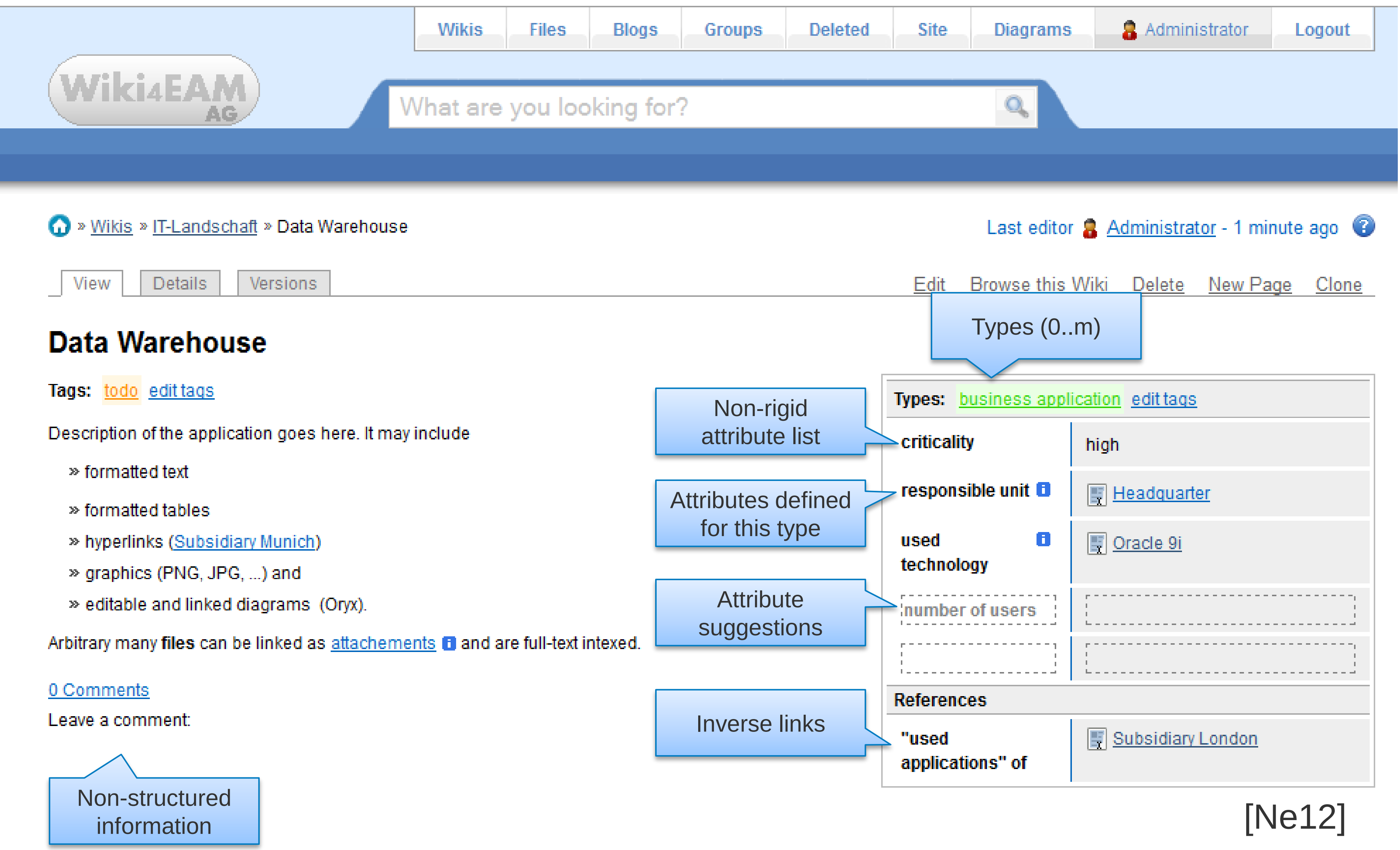


Municipal coat of arms

Location of Verona in Italy

| | |
|---|---|
| Country | 🟩🟥 Italy |
| Region | Veneto |
| Province | Verona (VR) |
| Mayor | Flavio Tosi |
| Elevation | 59 m (194 ft) |
| Area | 206.63 km² (79.8 sq mi) |
| Population (as of 2008-12-27) | |
| - Total | 265,410 |
| - Density | 1,284/km² (3,326/sq mi) |
| Time zone | CET, UTC+1 |
| Coordinates | 45°26′N 10°59′E |
| Gentilic | Veronesi or Scaligeri |
| Dialing code | 045 |
| Postal code | 37100 |
| *Frazioni* | Avesa, San Michele Extra, San Massimo all'Adige, Quinzano, Quinto di Valpantena, Poiano di Valpantena, Parona di Valpolicella, Montorio Veronese, Mizzole, |

# Capture non-structured and structured information in a unified way.



» Wikis » IT-Landschaft » Data Warehouse

Last editor Administrator - 1 minute ago

## Data Warehouse

Tags: todo edit tags

Description of the application goes here. It may include

- formatted text
- formatted tables
- hyperlinks (Subsidiary Munich)
- graphics (PNG, JPG, ...) and
- editable and linked diagrams (Oryx).

Arbitrary many **files** can be linked as attachements and are full-text intexed.

0 Comments

Leave a comment:

Types: business application edit tags

|  |  |
|---|---|
| criticality | high |
| responsible unit | Headquarter |
| used technology | Oracle 9i |
| number of users |  |
|  |  |

References

|  |  |
|---|---|
| "used applications" of | Subsidiary London |

Types (0..m)

Non-rigid attribute list

Attributes defined for this type

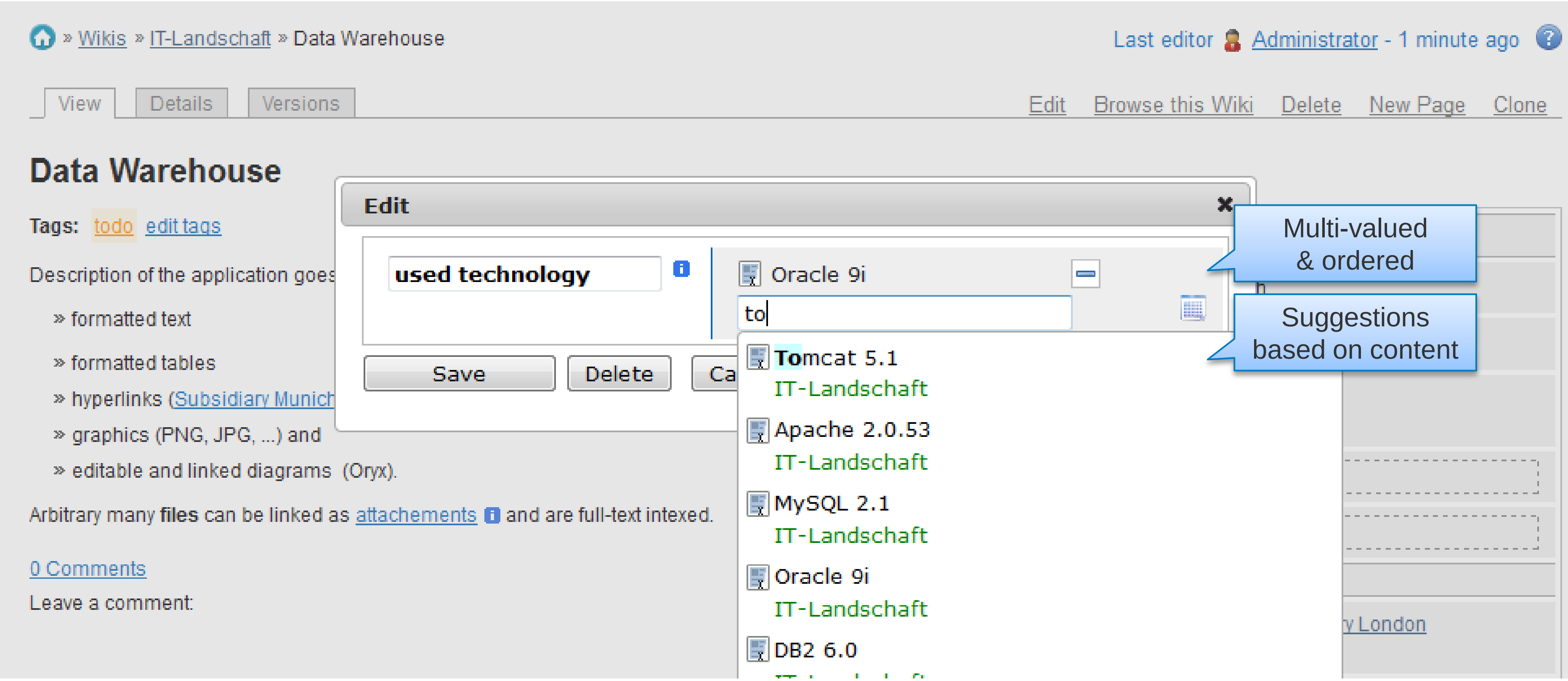
Attribute suggestions

Inverse links

Non-structured information

[Ne12]

# Change the information and its structure at any time.



» Wikis » IT-Landschaft » Data Warehouse

Last editor Administrator - 1 minute ago

## Data Warehouse

Tags: todo edit tags

Description of the application goes

- formatted text
- formatted tables
- hyperlinks (Subsidiary Munich
- graphics (PNG, JPG, ...) and
- editable and linked diagrams (Oryx).

Arbitrary many files can be linked as attachements and are full-text intexed.

0 Comments

Leave a comment:

Edit

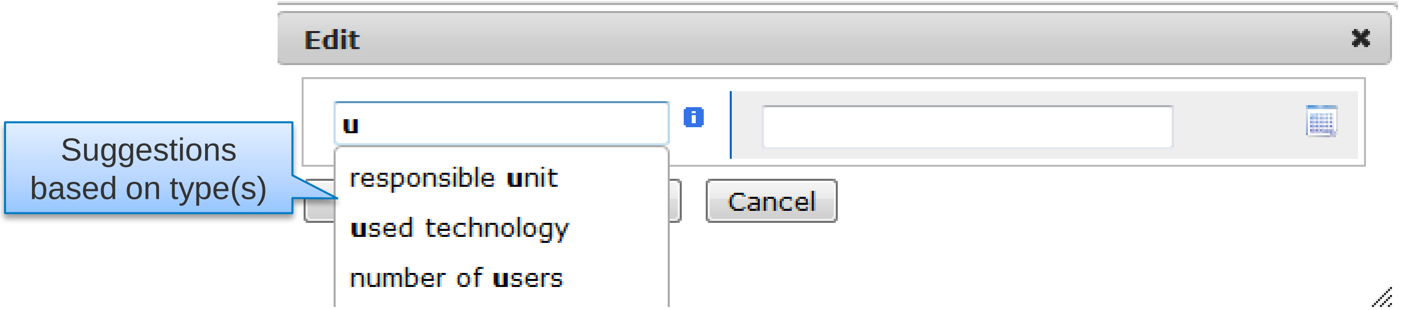
used technology: Oracle 9i

to

Tomcat 5.1 IT-Landschaft
Apache 2.0.53 IT-Landschaft
MySQL 2.1 IT-Landschaft
Oracle 9i IT-Landschaft
DB2 6.0

Multi-valued & ordered

Suggestions based on content



Edit

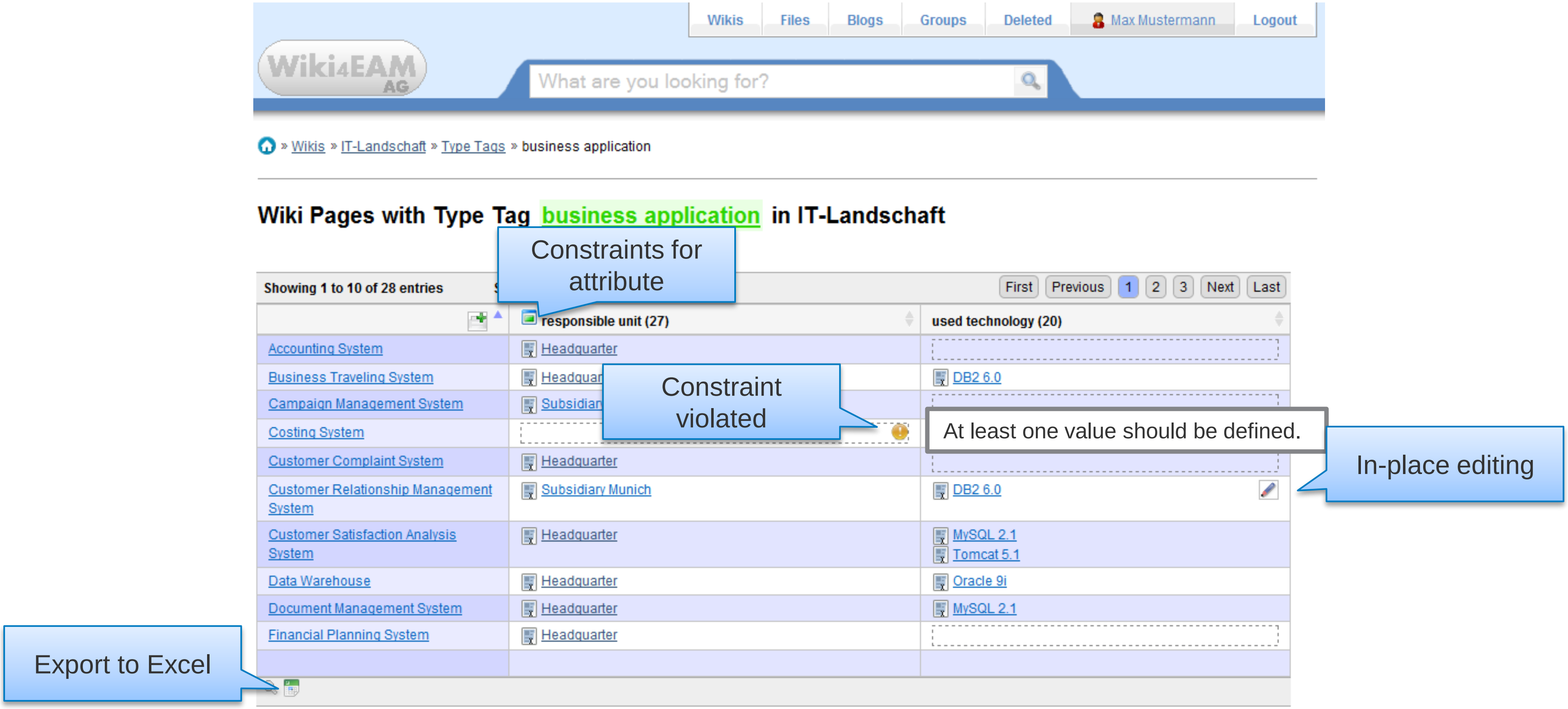
u

responsible unit
used technology
number of users

Suggestions based on type(s)

[Ne12]

# Manage the evolution of the information structures to match changing business needs.



» Wikis » IT-Landschaft » Type Tags » business application

**Wiki Pages with Type Tag business application in IT-Landschaft**

Showing 1 to 10 of 28 entries

| | responsible unit (27) | used technology (20) |
|---|---|---|
| Accounting System | Headquarter | |
| Business Traveling System | Headquar | DB2 6.0 |
| Campaign Management System | Subsidiar | |
| Costing System | | |
| Customer Complaint System | Headquarter | |
| Customer Relationship Management System | Subsidiary Munich | DB2 6.0 |
| Customer Satisfaction Analysis System | Headquarter | MySQL 2.1<br>Tomcat 5.1 |
| Data Warehouse | Headquarter | Oracle 9i |
| Document Management System | Headquarter | MySQL 2.1 |
| Financial Planning System | Headquarter | |

At least one value should be defined.

Constraints for attribute

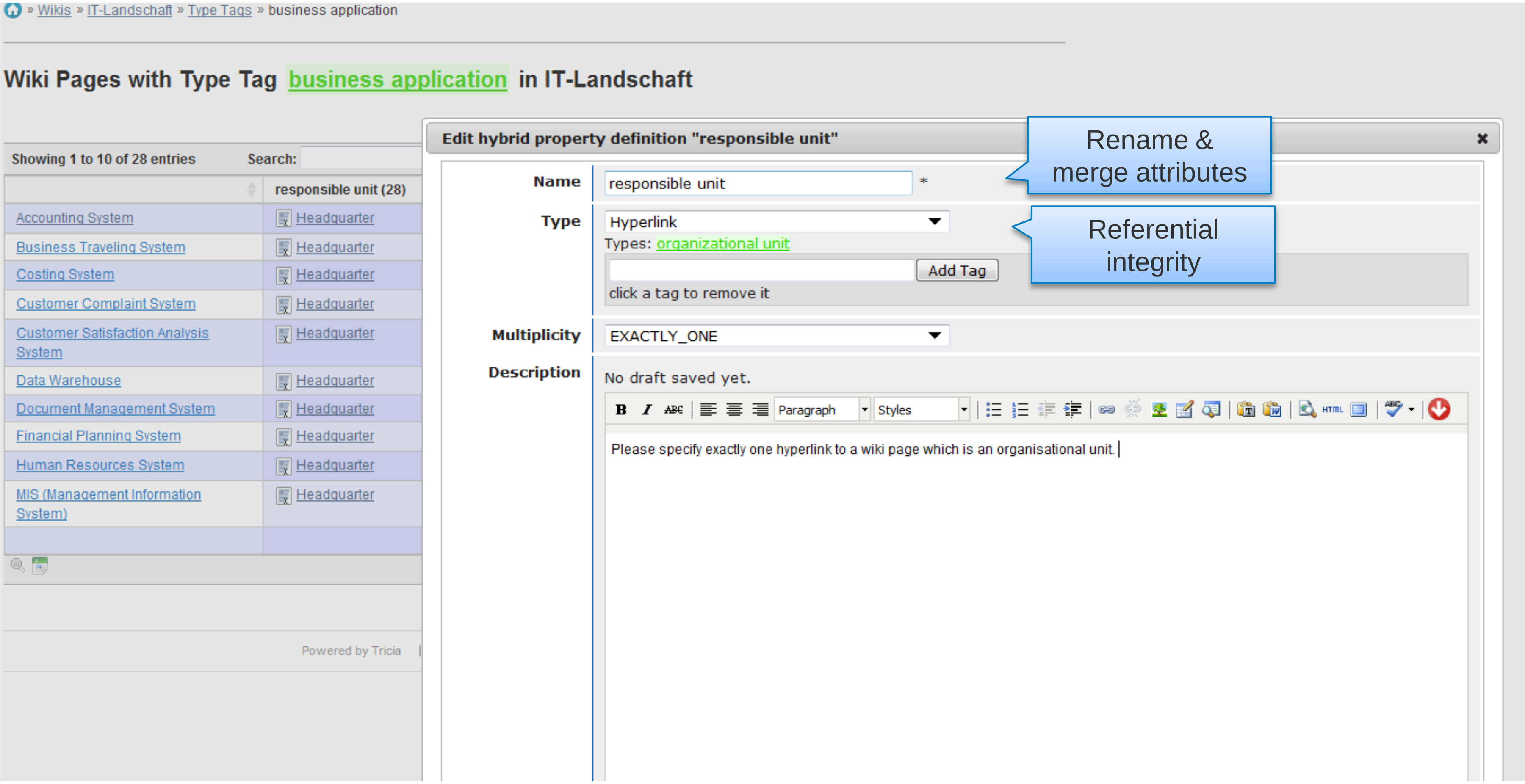
Constraint violated

In-place editing

Export to Excel

[Ne12]

# Define the information model and its constraints incrementally (top-down or bottom up).



» Wikis » IT-Landschaft » Type Tags » business application

**Wiki Pages with Type Tag business application in IT-Landschaft**

Showing 1 to 10 of 28 entries

Search:

| | responsible unit (28) |
|---|---|
| Accounting System | Headquarter |
| Business Traveling System | Headquarter |
| Costing System | Headquarter |
| Customer Complaint System | Headquarter |
| Customer Satisfaction Analysis System | Headquarter |
| Data Warehouse | Headquarter |
| Document Management System | Headquarter |
| Financial Planning System | Headquarter |
| Human Resources System | Headquarter |
| MIS (Management Information System) | Headquarter |

Powered by Tricia

**Edit hybrid property definition "responsible unit"** ×

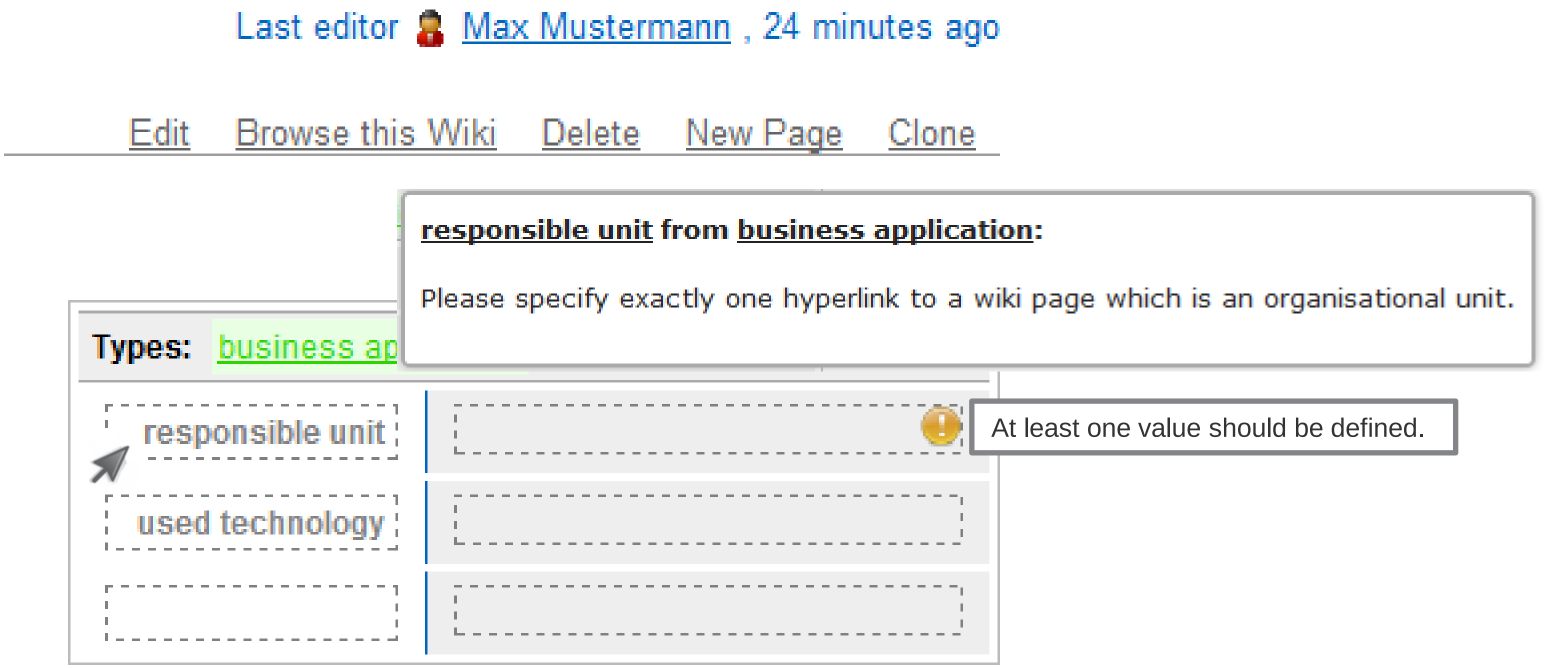
| | |
|---|---|
| **Name** | responsible unit * |
| **Type** | Hyperlink<br>Types: organizational unit<br>Add Tag<br>click a tag to remove it |
| **Multiplicity** | EXACTLY_ONE |
| **Description** | No draft saved yet.<br>Paragraph Styles<br>Please specify exactly one hyperlink to a wiki page which is an organisational unit. |

Rename & merge attributes

Referential integrity

[Ne12]

# Identify, understand and cooperatively resolve constraint violations.



Last editor Max Mustermann , 24 minutes ago

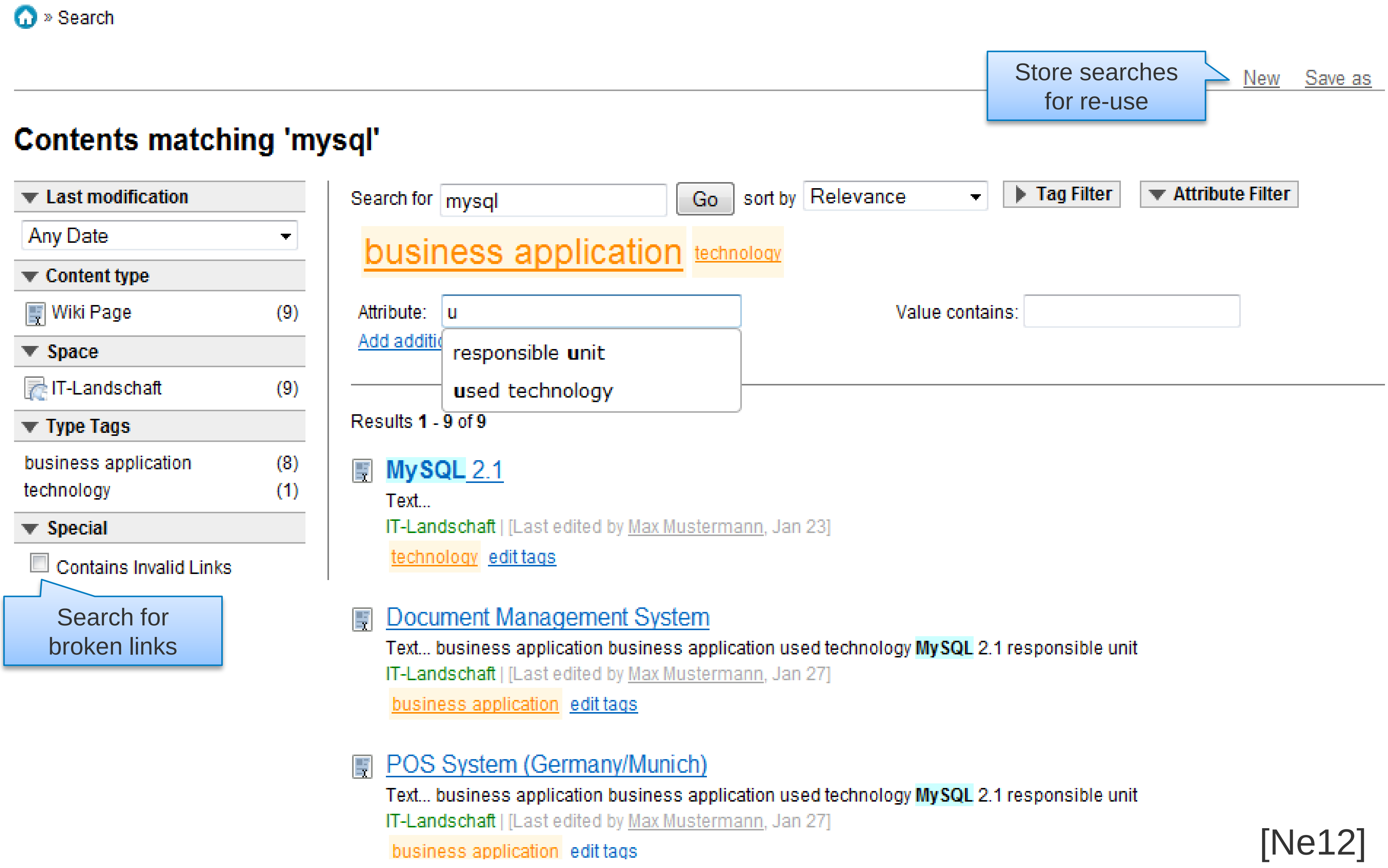
**responsible unit from business application:**

Please specify exactly one hyperlink to a wiki page which is an organisational unit.

At least one value should be defined.

[Ne12]

# Search by full text, tags, attributes and other relevant facets in combination.



⌂ » Search

Store searches for re-use

New Save as

## Contents matching 'mysql'

▼ Last modification

Any Date ▾

▼ Content type

| | |
|---|---|
| Wiki Page | (9) |

▼ Space

| | |
|---|---|
| IT-Landschaft | (9) |

▼ Type Tags

| | |
|---|---|
| business application | (8) |
| technology | (1) |

▼ Special

□ Contains Invalid Links

Search for broken links

Search for: mysql [Go] sort by: Relevance ▾ ▶ Tag Filter ▼ Attribute Filter

business application technology

Attribute: u Value contains:

Add additi

responsible unit
used technology

Results **1 - 9** of **9**

**MySQL 2.1**
Text...
IT-Landschaft | [Last edited by Max Mustermann, Jan 23]
technology edit tags

**Document Management System**
Text... business application business application used technology **MySQL** 2.1 responsible unit
IT-Landschaft | [Last edited by Max Mustermann, Jan 27]
business application edit tags

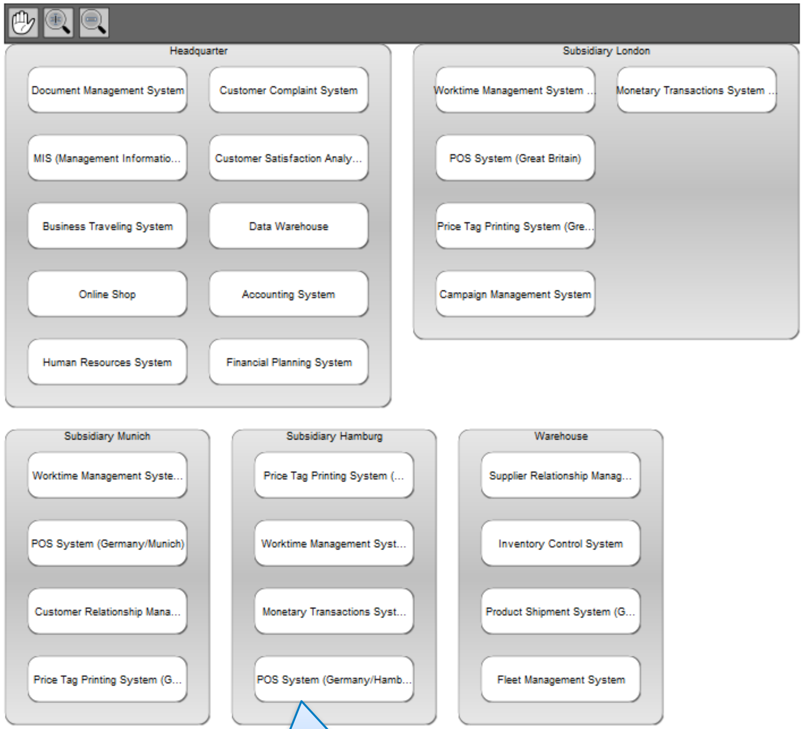
**POS System (Germany/Munich)**
Text... business application business application used technology **MySQL** 2.1 responsible unit
IT-Landschaft | [Last edited by Max Mustermann, Jan 27]
business application edit tags

[Ne12]

# Use generated lists, tables and diagrams to provide stakeholder-specific views.

Which organizational unit is responsible for which business application?

Which business application uses which technology?



Headquarter

- Document Management System
- Customer Complaint System
- MIS (Management Informatio...
- Customer Satisfaction Analy...
- Business Traveling System
- Data Warehouse
- Online Shop
- Accounting System
- Human Resources System
- Financial Planning System

Subsidiary London

- Worktime Management System ...
- Monetary Transactions System ...
- POS System (Great Britain)
- Price Tag Printing System (Gre...
- Campaign Management System

Subsidiary Munich

- Worktime Management Syste...
- POS System (Germany/Munich)
- Customer Relationship Mana...
- Price Tag Printing System (G...

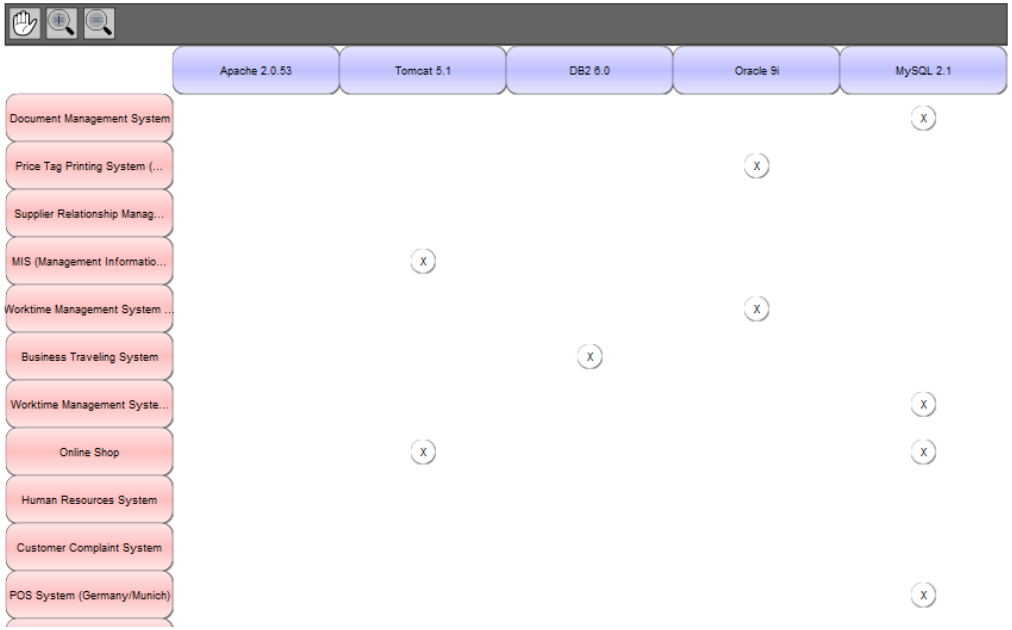
Subsidiary Hamburg

- Price Tag Printing System (...
- Worktime Management Syst...
- Monetary Transactions Syst...
- POS System (Germany/Hamb...

Warehouse

- Supplier Relationship Manag...
- Inventory Control System
- Product Shipment System (G...
- Fleet Management System

Link to detailed information

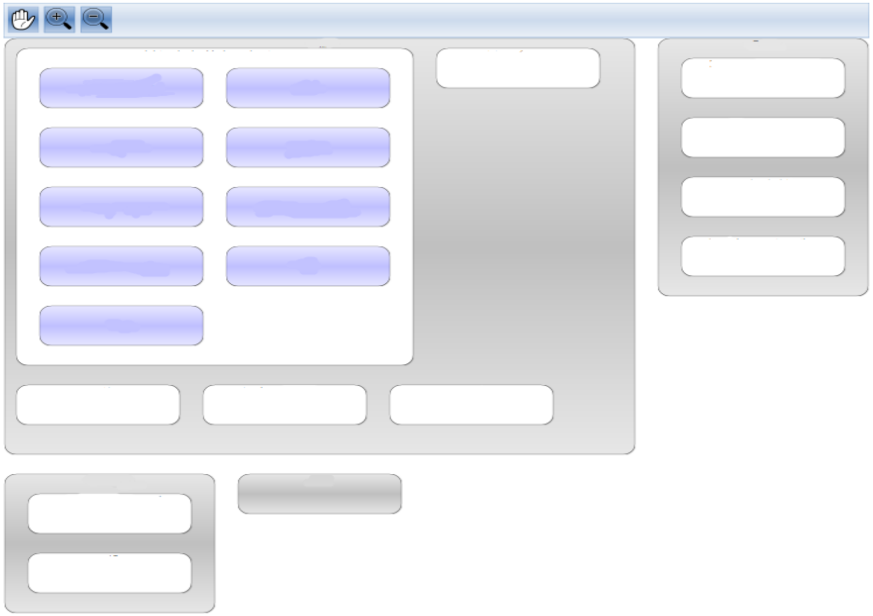


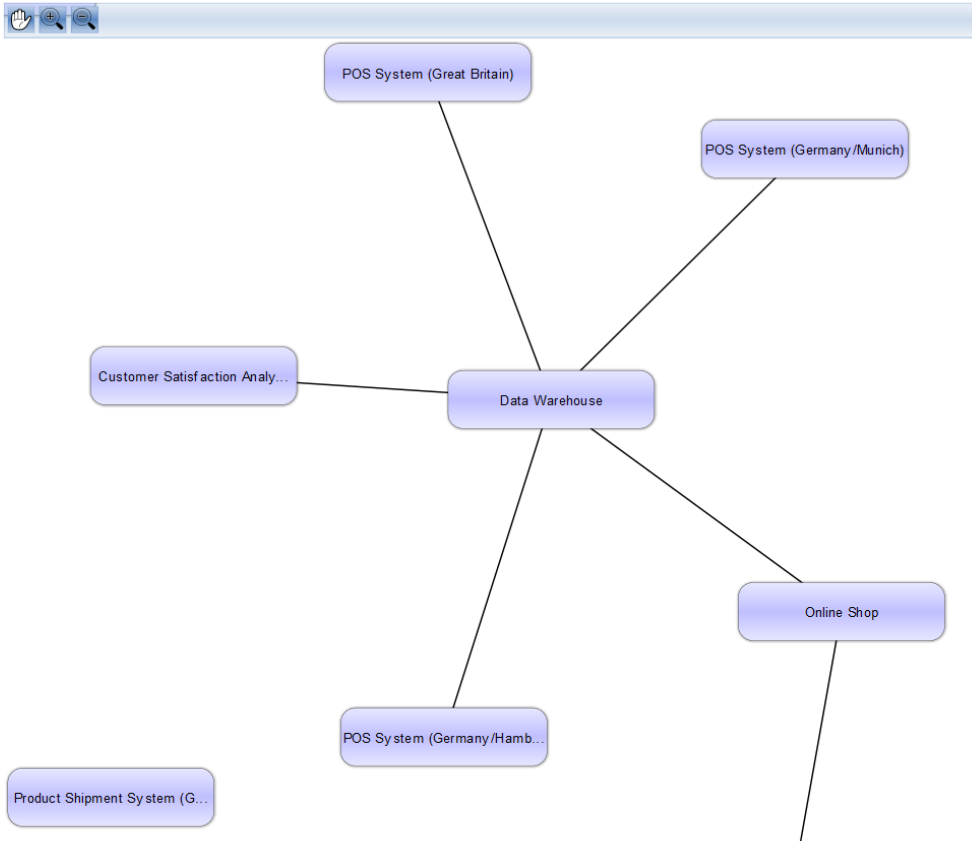
| | Apache 2.0.53 | Tomcat 5.1 | DB2 6.0 | Oracle 9i | MySQL 2.1 |
|---|---|---|---|---|---|
| Document Management System | | | | | X |
| Price Tag Printing System (... | | | | X | |
| Supplier Relationship Manag... | | | | | |
| MIS (Management Informatio... | | X | | | |
| Worktime Management System ... | | | | X | |
| Business Traveling System | | | X | | |
| Worktime Management Syste... | | | | | X |
| Online Shop | | X | | | X |
| Human Resources System | | | | | |
| Customer Complaint System | | | | | |
| POS System (Germany/Munich) | | | | | X |

# Use generated lists, tables and diagrams to provide stakeholder-specific views.

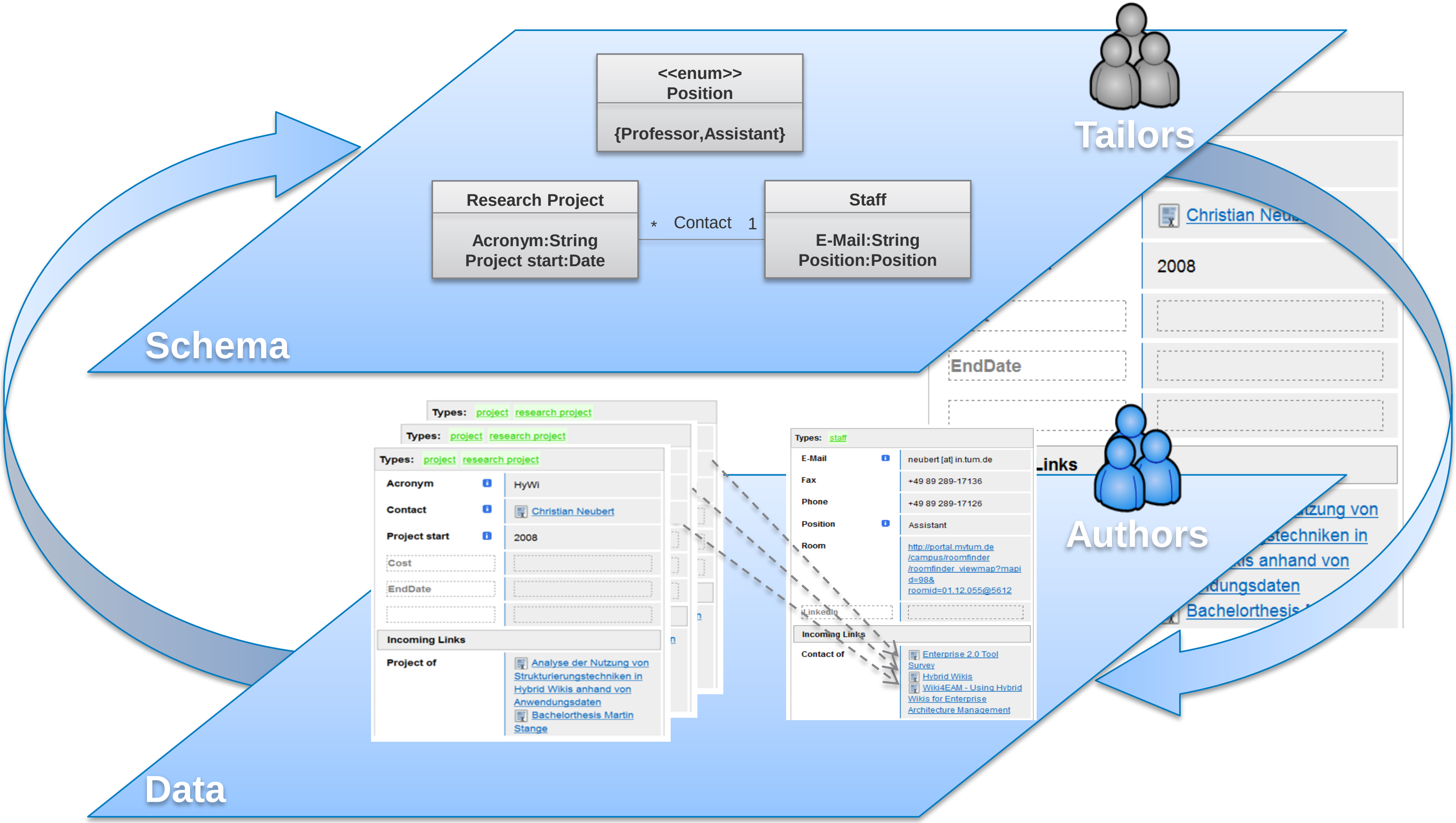
What are our domains, subdomains and business applications?

What information dependencies exist for the data warehouse?




POS System (Great Britain)
POS System (Germany/Munich)
Customer Satisfaction Analy...
Data Warehouse
Online Shop
POS System (Germany/Hamb...
Product Shipment System (G...

# The principle behind hybrid wikis – Data first, schema second



Types: project research project

| | |
|---|---|
| Acronym | HyWi |
| Contact | Christian Neubert |
| Project start | 2008 |
| Cost | |
| EndDate | |
| | |
| **Incoming Links** | |
| Project of | Analyse der Nutzung von Strukturierungstechniken in Hybrid Wikis anhand von Anwendungsdaten<br>Bachelorthesis Martin Stange |

Types: staff

| | |
|---|---|
| E-Mail | neubert [at] in.tum.de |
| Fax | +49 89 289-17136 |
| Phone | +49 89 289-17126 |
| Position | Assistant |
| Room | http://portal.mytum.de/campus/roomfinder/roomfinder_viewmap?mapid=98&roomid=01.12.055@5612 |
| LinkedIn | |
| **Incoming Links** | |
| Contact of | Enterprise 2.0 Tool Survey<br>Hybrid Wikis<br>Wiki4EAM - Using Hybrid Wikis for Enterprise Architecture Management |

[For more details see www.infoasset.de]

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# 3.4 Alternative EAM approaches

**Dr. Sabine Buckl**
**Prof. Dr. Florian Matthes**
**Sascha Roth**

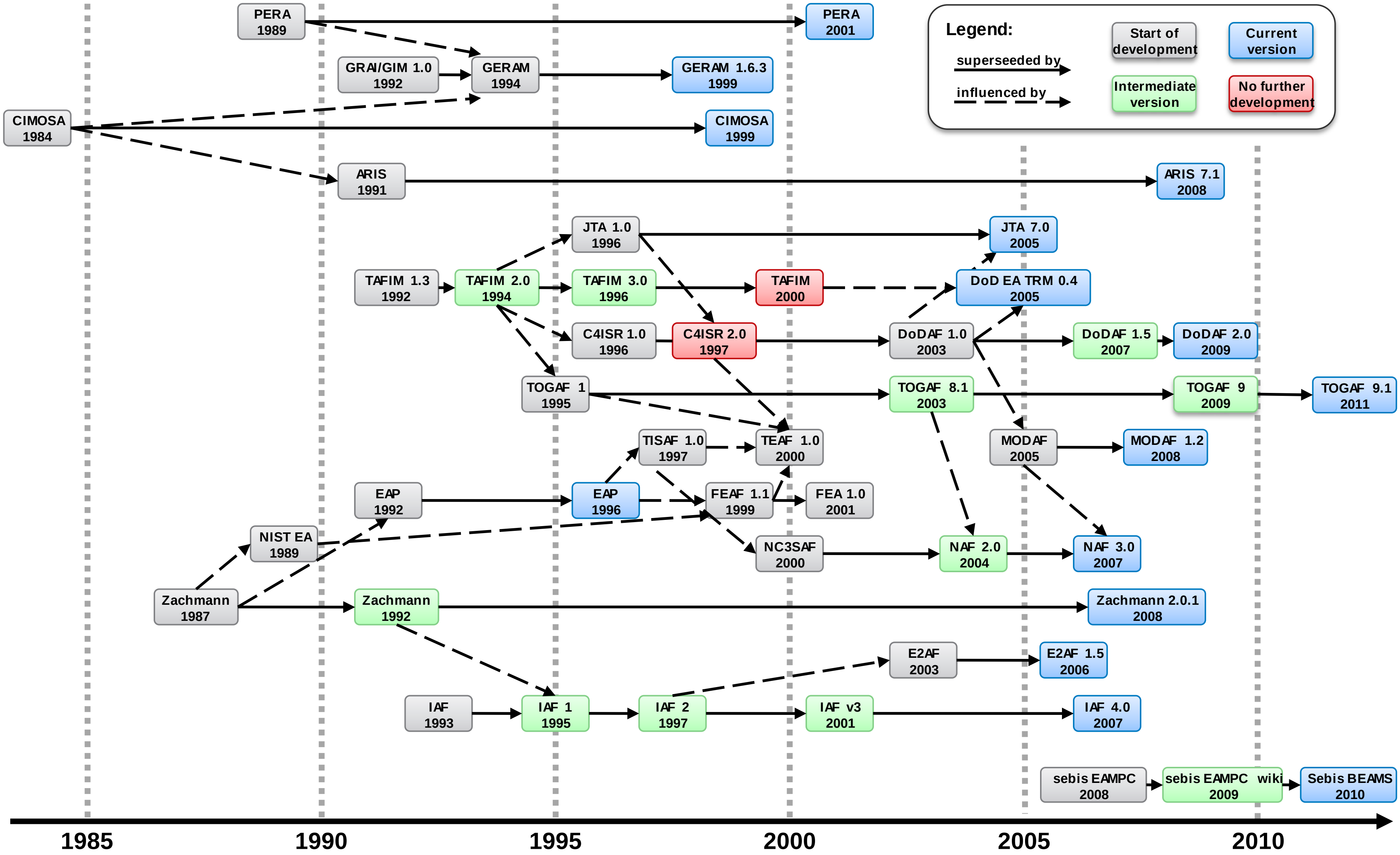
Software Engineering betrieblicher Informationssysteme (sebis)
wwwmatthes.in.tum.de

# Learning objectives of this unit

Students will be able to

- give a short historic overview of the development of EAM frameworks
- explain prominent enterprise architecture approaches found in the literature
- compare these approaches with the conceptual framework used in this lecture

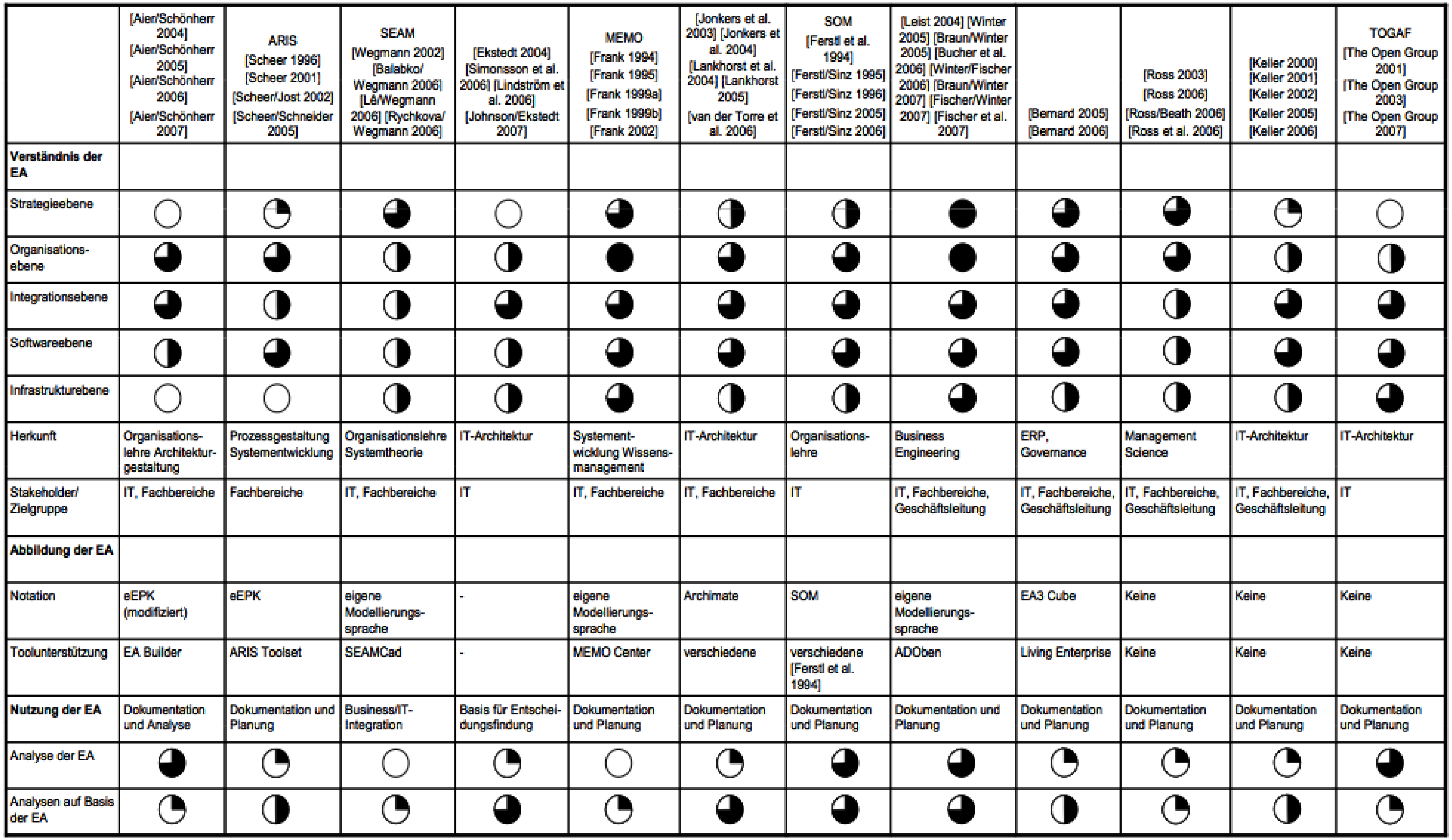
# The term Enterprise Architecture has a long history (1)



# The term Enterprise Architecture has a long history (2)

- Several frameworks for the Enterprise Architecture (EA Frameworks) have been developed over time
- Their level of detail differs strongly
  - Zachmann [Za87], [SoZa92] - “1” page
  - TOGAF (Version 9 "Enterprise Edition") [OG09] - “700+” pages
- Generalized Enterprise Reference Architecture and Methodology (GERAM) [IS00]
  - ISO Norm 15704
  - Guidelines for creating frameworks
  - (As of today) no well-accepted reference
- DoDAF (Department of Defense) and NAF (Nato Architecture Framework) are binding for IT in the military domain [Do04a] [Do04b]
- ARIS book of 1991 [Sc01] vs. ARIS method manual of the ARIS-Platform of 2007 [ID06]. Mainly relevant in D, A, CH (Europe).

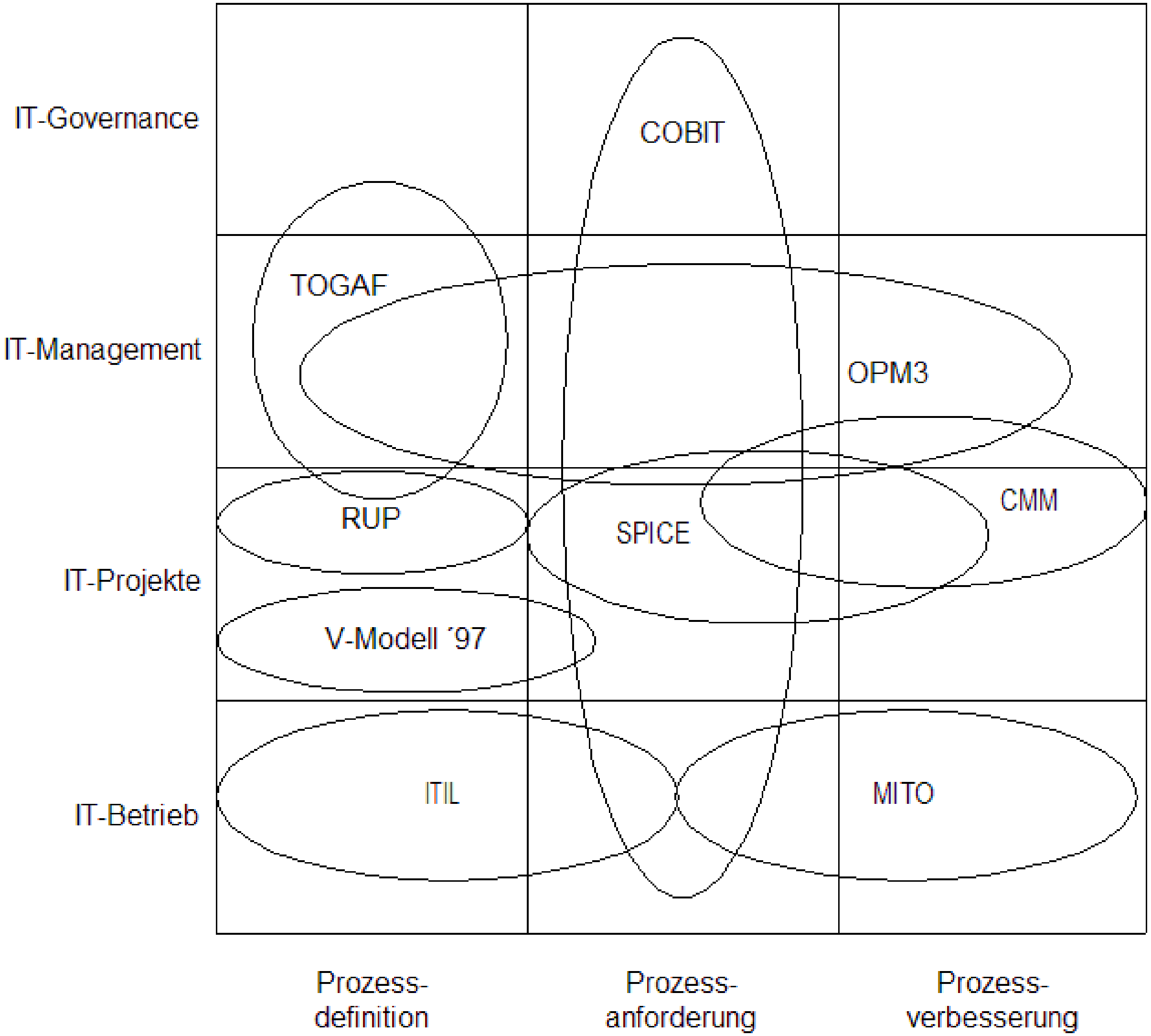
# EAM in academia: Often IT focused, scarcely stakeholder-oriented and organization-specific



| | [Aier/Schönherr 2004]<br>[Aier/Schönherr 2005]<br>[Aier/Schönherr 2006]<br>[Aier/Schönherr 2007] | ARIS<br>[Scheer 1996]<br>[Scheer 2001]<br>[Scheer/Jost 2002]<br>[Scheer/Schneider 2005] | SEAM<br>[Wegmann 2002]<br>[Balabko/Wegmann 2006]<br>[Lê/Wegmann 2006] [Rychkova/Wegmann 2006] | [Ekstedt 2004]<br>[Simonsson et al. 2006] [Lindström et al. 2006]<br>[Johnson/Ekstedt 2007] | MEMO<br>[Frank 1994]<br>[Frank 1995]<br>[Frank 1999a]<br>[Frank 1999b]<br>[Frank 2002] | [Jonkers et al. 2003] [Jonkers et al. 2004]<br>[Lankhorst et al. 2004] [Lankhorst 2005]<br>[van der Torre et al. 2006] | SOM<br>[Ferstl et al. 1994]<br>[Ferstl/Sinz 1995]<br>[Ferstl/Sinz 1996]<br>[Ferstl/Sinz 2005]<br>[Ferstl/Sinz 2006] | [Leist 2004] [Winter 2005] [Braun/Winter 2005] [Bucher et al. 2006] [Winter/Fischer 2006] [Braun/Winter 2007] [Fischer/Winter 2007] [Fischer et al. 2007] | [Bernard 2005]<br>[Bernard 2006] | [Ross 2003]<br>[Ross 2006]<br>[Ross/Beath 2006]<br>[Ross et al. 2006] | [Keller 2000]<br>[Keller 2001]<br>[Keller 2002]<br>[Keller 2005]<br>[Keller 2006] | TOGAF<br>[The Open Group 2001]<br>[The Open Group 2003]<br>[The Open Group 2007] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Verständnis der EA** | | | | | | | | | | | | |
| Strategieebene | ○ | ◔ | ◕ | ○ | ◕ | ◑ | ◑ | ● | ◕ | ◕ | ◔ | ○ |
| Organisations-ebene | ◕ | ◕ | ◑ | ◑ | ● | ◕ | ◕ | ● | ◕ | ◕ | ◑ | ◑ |
| Integrationsebene | ◕ | ◑ | ◑ | ◕ | ◕ | ◕ | ◕ | ◕ | ◕ | ◑ | ◕ | ◕ |
| Softwareebene | ◑ | ◕ | ◑ | ◑ | ◕ | ◕ | ◕ | ◕ | ◕ | ◑ | ◕ | ◕ |
| Infrastrukturebene | ○ | ○ | ◑ | ◑ | ◕ | ◑ | ◑ | ◕ | ◑ | ◑ | ◑ | ◕ |
| Herkunft | Organisations-lehre Architektur-gestaltung | Prozessgestaltung Systementwicklung | Organisationslehre Systemtheorie | IT-Architektur | System-entwicklung Wissens-management | IT-Architektur | Organisations-lehre | Business Engineering | ERP, Governance | Management Science | IT-Architektur | IT-Architektur |
| Stakeholder/ Zielgruppe | IT, Fachbereiche | Fachbereiche | IT, Fachbereiche | IT | IT, Fachbereiche | IT, Fachbereiche | IT | IT, Fachbereiche, Geschäftsleitung | IT, Fachbereiche, Geschäftsleitung | IT, Fachbereiche, Geschäftsleitung | IT, Fachbereiche, Geschäftsleitung | IT |
| **Abbildung der EA** | | | | | | | | | | | | |
| Notation | eEPK (modifiziert) | eEPK | eigene Modellierungs-sprache | - | eigene Modellierungs-sprache | Archimate | SOM | eigene Modellierungs-sprache | EA3 Cube | Keine | Keine | Keine |
| Toolunterstützung | EA Builder | ARIS Toolset | SEAMCad | - | MEMO Center | verschiedene | verschiedene [Ferstl et al. 1994] | ADOben | Living Enterprise | Keine | Keine | Keine |
| **Nutzung der EA** | Dokumentation und Analyse | Dokumentation und Planung | Business/IT-Integration | Basis für Entschei-dungsfindung | Dokumentation und Planung | Dokumentation und Planung | Dokumentation und Planung | Dokumentation und Planung | Dokumentation und Planung | Dokumentation und Planung | Dokumentation und Planung | Dokumentation und Planung |
| Analyse der EA | ◕ | ◔ | ○ | ◔ | ○ | ◔ | ◕ | ◕ | ◔ | ◔ | ◔ | ◕ |
| Analysen auf Basis der EA | ◔ | ◑ | ◔ | ◕ | ◔ | ◕ | ◕ | ◕ | ◑ | ◔ | ◑ | ◔ |

*Quelle: [Aier, Riege, Winter 2008]*

# A unified structure to compare different frameworks



IT-Governance
IT-Management
IT-Projekte
IT-Betrieb

COBIT
TOGAF
OPM3
RUP
SPICE
CMM
V-Modell ´97
ITIL
MITO

Prozess-definition
Prozess-anforderung
Prozess-verbesserung

Quelle: Marten Schönherr

# Outline of this unit

- Zachman Framework for Enterprise Architecture
- TOGAF 9 – Overview
- Hanschke – iteratec

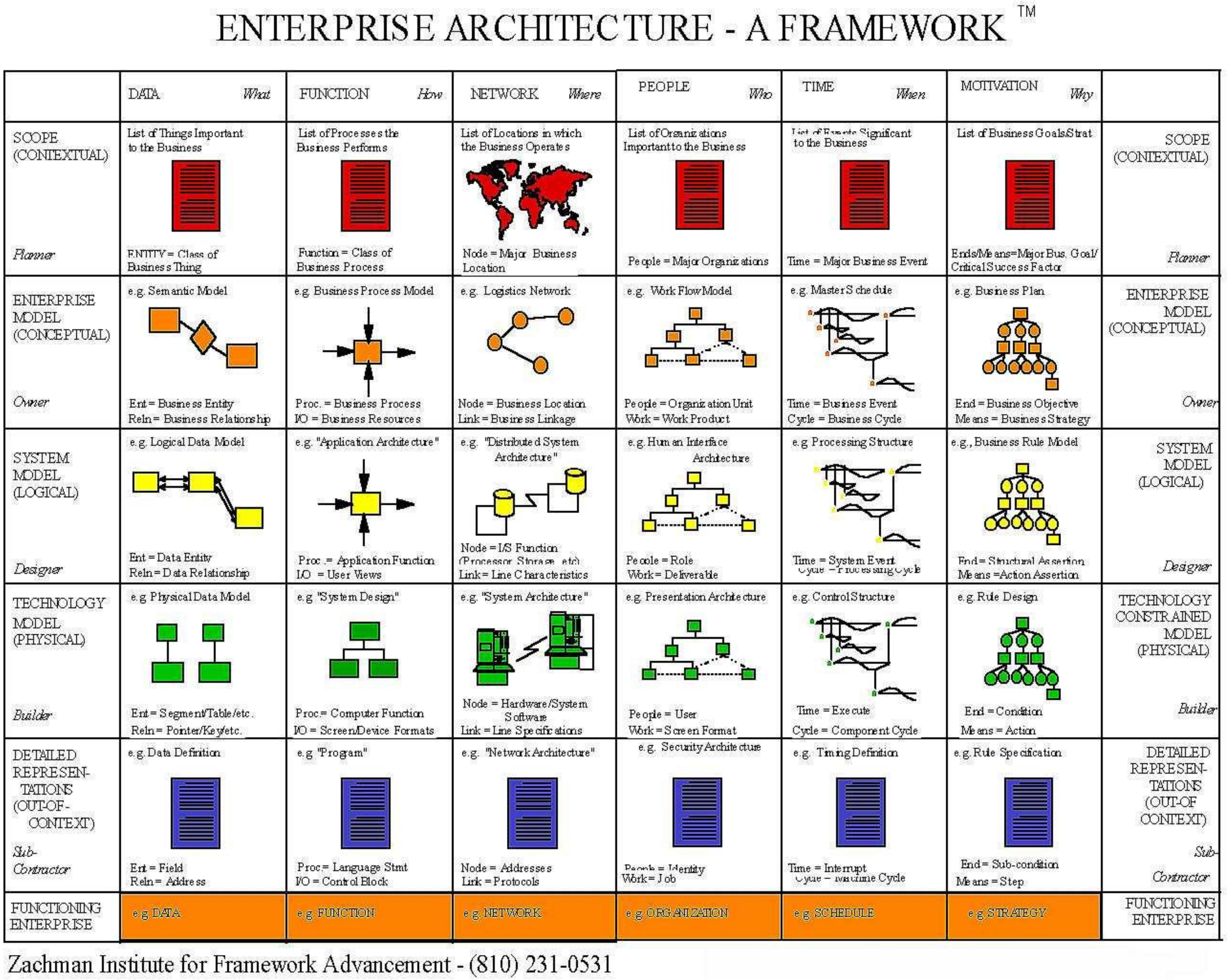
more detailed

- Keller – Processes for the IT enterprise architecture
- Dern – Management of IT architectures
- Schekkerman – Enterprise Architecture, Good Practices Guide
- Engels et al. – Quasar Enterprise

less detailed

# The Zachman Framework for Enterprise Architecture

Level of Detail



ENTERPRISE ARCHITECTURE - A FRAMEWORK ™

| | DATA *What* | FUNCTION *How* | NETWORK *Where* | PEOPLE *Who* | TIME *When* | MOTIVATION *Why* | |
|---|---|---|---|---|---|---|---|
| SCOPE (CONTEXTUAL)<br>*Planner* | List of Things Important to the Business<br>ENTITY = Class of Business Thing | List of Processes the Business Performs<br>Function = Class of Business Process | List of Locations in which the Business Operates<br>Node = Major Business Location | List of Organizations Important to the Business<br>People = Major Organizations | List of Events Significant to the Business<br>Time = Major Business Event | List of Business Goals/Strat<br>Ends/Means=Major Bus. Goal/ Critical Success Factor | SCOPE (CONTEXTUAL)<br>*Planner* |
| ENTERPRISE MODEL (CONCEPTUAL)<br>*Owner* | e.g. Semantic Model<br>Ent = Business Entity<br>Reln = Business Relationship | e.g. Business Process Model<br>Proc. = Business Process<br>I/O = Business Resources | e.g. Logistics Network<br>Node = Business Location<br>Link = Business Linkage | e.g. Work Flow Model<br>People = Organization Unit<br>Work = Work Product | e.g. Master Schedule<br>Time = Business Event<br>Cycle = Business Cycle | e.g. Business Plan<br>End = Business Objective<br>Means = Business Strategy | ENTERPRISE MODEL (CONCEPTUAL)<br>*Owner* |
| SYSTEM MODEL (LOGICAL)<br>*Designer* | e.g. Logical Data Model<br>Ent = Data Entity<br>Reln = Data Relationship | e.g. "Application Architecture"<br>Proc .= Application Function<br>I/O = User Views | e.g. "Distributed System Architecture"<br>Node = I/S Function (Processor, Storage, etc)<br>Link = Line Characteristics | e.g. Human Interface Architecture<br>People = Role<br>Work = Deliverable | e.g. Processing Structure<br>Time = System Event<br>Cycle = Processing Cycle | e.g., Business Rule Model<br>End = Structural Assertion<br>Means =Action Assertion | SYSTEM MODEL (LOGICAL)<br>*Designer* |
| TECHNOLOGY MODEL (PHYSICAL)<br>*Builder* | e.g. Physical Data Model<br>Ent = Segment/Table/etc.<br>Reln = Pointer/Key/etc. | e.g. "System Design"<br>Proc.= Computer Function<br>I/O = Screen/Device Formats | e.g. "System Architecture"<br>Node = Hardware/System Software<br>Link = Line Specifications | e.g. Presentation Architecture<br>People = User<br>Work = Screen Format | e.g. Control Structure<br>Time = Execute<br>Cycle = Component Cycle | e.g. Rule Design<br>End = Condition<br>Means = Action | TECHNOLOGY CONSTRAINED MODEL (PHYSICAL)<br>*Builder* |
| DETAILED REPRESEN- TATIONS (OUT-OF- CONTEXT)<br>*Sub- Contractor* | e.g. Data Definition<br>Ent = Field<br>Reln = Address | e.g. "Program"<br>Proc.= Language Stmt<br>I/O = Control Block | e.g. "Network Architecture"<br>Node = Addresses<br>Link = Protocols | e.g. Security Architecture<br>People = Identity<br>Work = Job | e.g. Timing Definition<br>Time = Interrupt<br>Cycle = Machine Cycle | e.g. Rule Specification<br>End = Sub-condition<br>Means = Step | DETAILED REPRESEN- TATIONS (OUT-OF CONTEXT)<br>*Sub- Contractor* |
| FUNCTIONING ENTERPRISE | e.g. DATA | e.g. FUNCTION | e.g. NETWORK | e.g. ORGANIZATION | e.g. SCHEDULE | e.g. STRATEGY | FUNCTIONING ENTERPRISE |

Zachman Institute for Framework Advancement - (810) 231-0531

[Za04]

# Zachman: From the very first…

Building construction

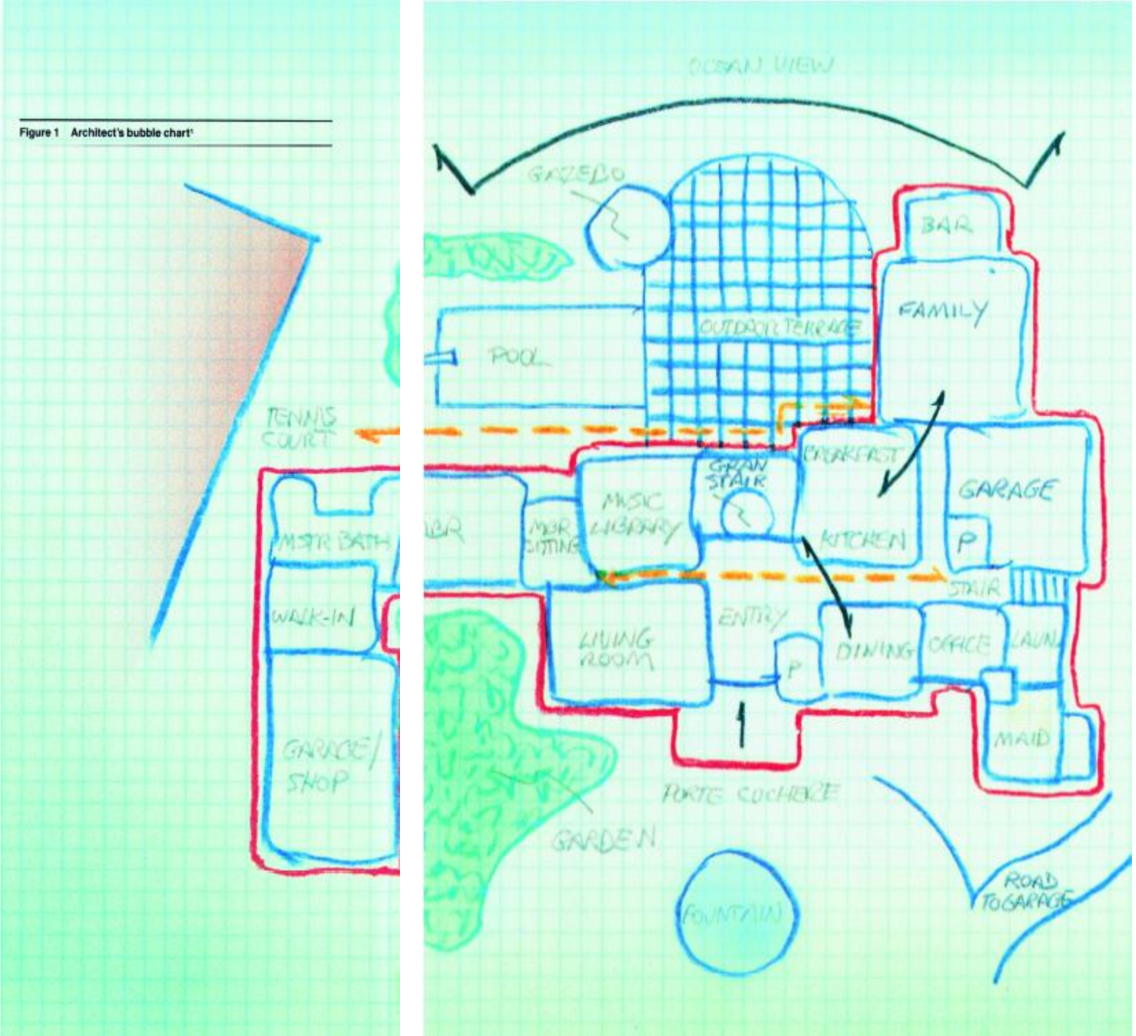


Figure 1 Architect's bubble chart¹

[Za87]

# Zachman: Different models depending on the stakeholder

- **Bubble charts**
  - Basic concepts for building
  - Gross sizing, shape, spatial relationships
  - Architect/owner mutual understanding
  - Initiate project

- **Architect‘s drawings**
  - Final building as seen by the owner
  - Floor plans, cutaways, pictures
  - Architect/owner agreement on building
  - Establish contract

- **Architect‘s plans**
  - Final building as seen by the designer
  - Translation of owner‘s view into a product
  - Detailed drawings – 16 categories
  - Basis for negotiation with general contractor

- **Contractor‘s plans**
  - Final building as seen by the builder
  - Architect‘s plans constrained by laws of nature and available technology
  - „How to build it“ description
  - Directs construction activities

- **Shop plans**
  - Subcontractor‘s design of a part/section
  - Detailed stand-alone model
  - Specification of what is to be constructed
  - Pattern

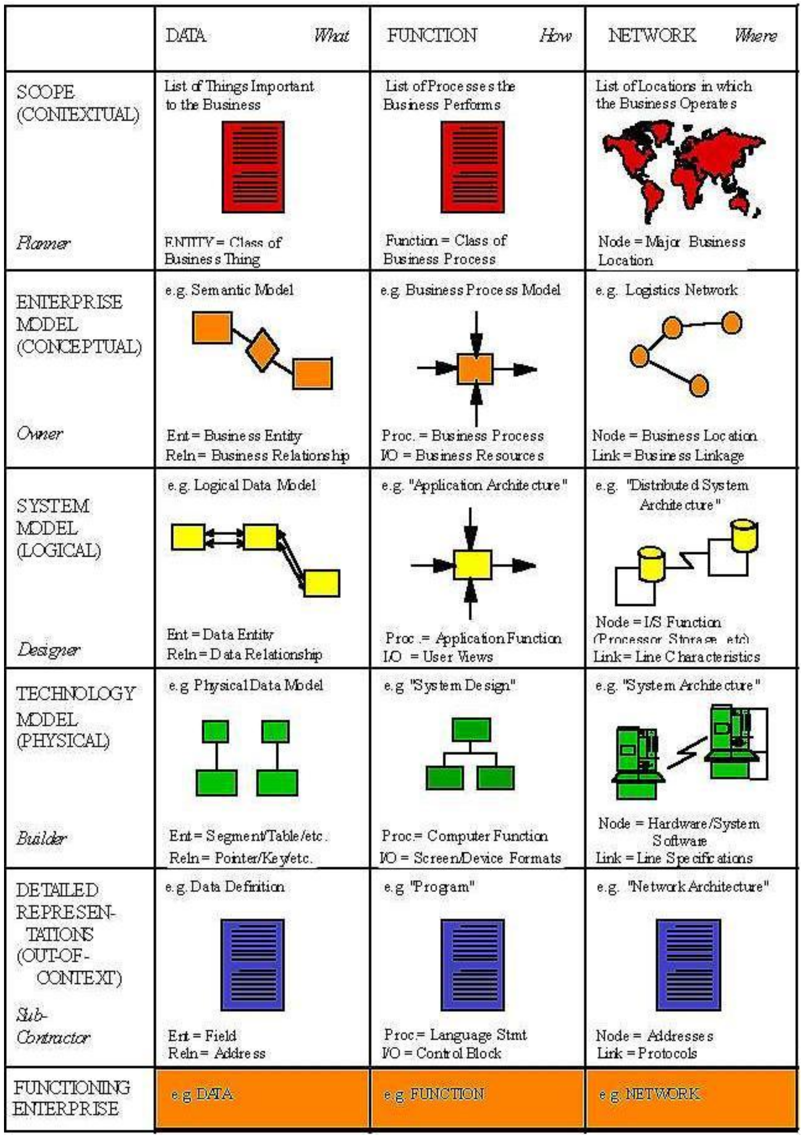
- **Building**
  - Physical building

[Za87]

# Zachman: Framework 1987

- **5 Levels**
  - Scope description (ballpark view)
  - Model of the business (owner‘s view)
  - Model of the information system (designer‘s view)
  - Technology model (builder‘s view)
  - Detailed description (out-of-context view)

- **3 perspectives**
  - Data description
  - Process description
  - Network description



| | DATA *What* | FUNCTION *How* | NETWORK *Where* |
|---|---|---|---|
| SCOPE (CONTEXTUAL)<br>*Planner* | List of Things Important to the Business<br>ENTITY = Class of Business Thing | List of Processes the Business Performs<br>Function = Class of Business Process | List of Locations in which the Business Operates<br>Node = Major Business Location |
| ENTERPRISE MODEL (CONCEPTUAL)<br>*Owner* | e.g. Semantic Model<br>Ent = Business Entity<br>Reln = Business Relationship | e.g. Business Process Model<br>Proc. = Business Process<br>I/O = Business Resources | e.g. Logistics Network<br>Node = Business Location<br>Link = Business Linkage |
| SYSTEM MODEL (LOGICAL)<br>*Designer* | e.g. Logical Data Model<br>Ent = Data Entity<br>Reln = Data Relationship | e.g. "Application Architecture"<br>Proc .= Application Function<br>I/O = User Views | e.g. "Distributed System Architecture"<br>Node = I/S Function (Processor, Storage, etc)<br>Link = Line Characteristics |
| TECHNOLOGY MODEL (PHYSICAL)<br>*Builder* | e.g. Physical Data Model<br>Ent = Segment/Table/etc.<br>Reln = Pointer/Key/etc. | e.g. "System Design"<br>Proc.= Computer Function<br>I/O = Screen/Device Formats | e.g. "System Architecture"<br>Node = Hardware/System Software<br>Link = Line Specifications |
| DETAILED REPRESEN-TATIONS (OUT-OF-CONTEXT)<br>*Sub-Contractor* | e.g. Data Definition<br>Ent = Field<br>Reln = Address | e.g. "Program"<br>Proc.= Language Stmt<br>I/O = Control Block | e.g. "Network Architecture"<br>Node = Addresses<br>Link = Protocols |
| FUNCTIONING ENTERPRISE | e.g. DATA | e.g. FUNCTION | e.g. NETWORK |

# Zachman: Framework 1987 – 2004

- Zachman Framework started in 1987
  - as „A framework for information systems architecture“!
  - with 5 levels and 3 perspectives

[Za87]

- In 1992 Zachman and Sowa
  - extended the framework with 3 new perspectives
    - Persons (Who?)
    - Time (When?)
    - Motivation (Why?)
  - Added a meta-model for the owner’s, designer‘s und builder‘s level
  - Defined 7 rules for the concretion of the framework

[SoZa92]

# Outline of this unit

- Zachman Framework for Enterprise Architecture
- TOGAF 9 – Overview
- Hanschke – iteratec

- Keller – Processes for the IT enterprise architecture
- Dern – Management of IT architectures
- Schekkerman – Enterprise Architecture, Good Practices Guide
- Engels et al. – Quasar Enterprise

# TOGAF: Scope & goals

**Scope**

TOGAF emphasizes business goals as architecture drivers, and provides a repository of best practices, including:

- TOGAF Architecture Development Method (ADM)
- ADM Guidelines & Techniques
- TOGAF Architecture Content Framework
- Enterprise Continuum
- TOGAF Reference Models
- TOGAF Capability Framework

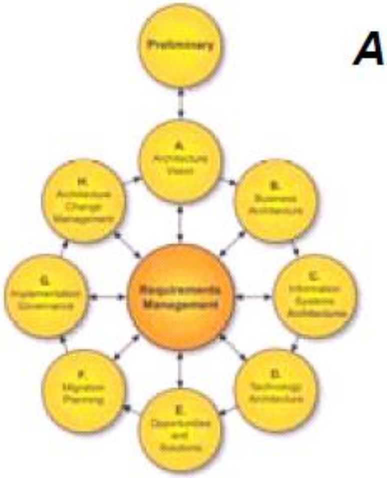
**Long-term goals**

- An industry standard, generic enterprise architecture method….
- ….usable on its own or in conjunction with frameworks having products relevant/specific to particular sectors.
  - Several frameworks are directly referenced:
    - Zachman, Spewak, DoD Framework, FEAF, TEAF, …
  - Almost complete focus on artefacts, not method
  - TOGAF and…. (not TOGAF or….)

[OG09]

# TOGAF components (1)

*ADM*


Preliminary
A. Architecture Vision
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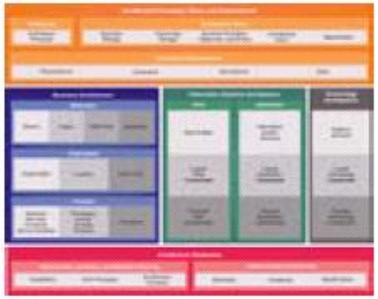
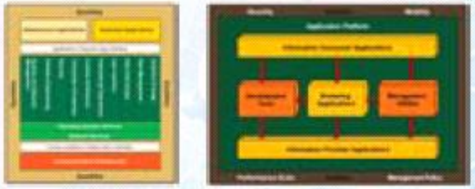
D. Technology Architecture
E. Opportunities and Solutions
F. Migration Planning
G. Implementation Governance
H. Architecture Change Management
Requirements Management

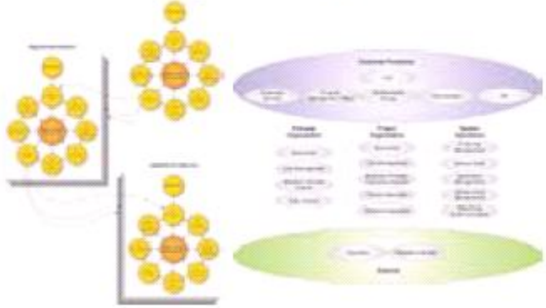
*Architecture Content Framework*



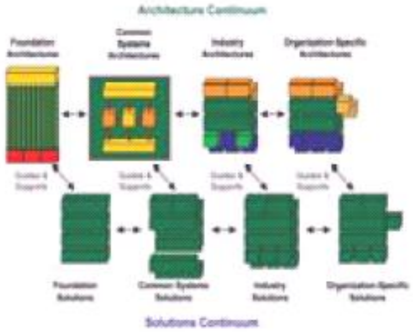
*Reference Models*



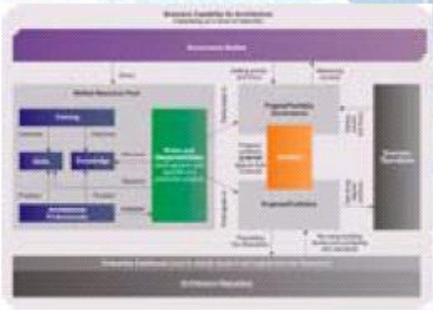
*ADM Guidelines & Techniques*



*Enterprise Continuum*



*Architecture Capability Framework*



[OG09]

# TOGAF components (2)

### Architecture Development Method (ADM)

- An iterative sequence of steps to develop an enterprise-wide architecture

### ADM Guidelines and Techniques

- Guidelines and techniques to support the application of the ADM

### Architecture Content Framework

- A detailed model of architectural work products, including deliverables, artifacts within deliverables, and the Architecture Building Blocks (ABBs) that deliverables represent

### The Enterprise Continuum

- A model for structuring a virtual repository and methods for classifying architecture and solution artifacts

[OG09]

# TOGAF components (3)

## TOGAF Reference Models

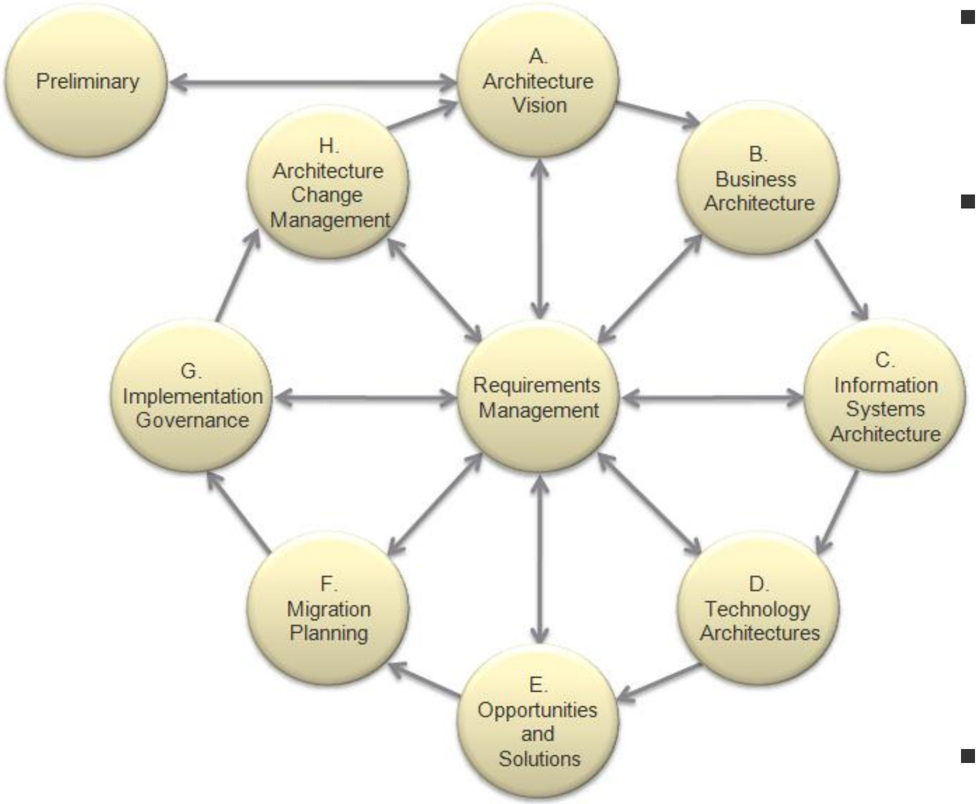
- The TOGAF Technical Reference Model (TRM)
- The Integrated Information Infrastructure Reference Model (III-RM).

## The Architecture Capability Framework

- A structured definition of the organizations, skills, roles and responsibilities to establish and operate an Enterprise Architecture

[OG09]

# TOGAF Architecture Development Method (ADM)


Preliminary
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H. Architecture Change Management
Requirements Management

- An iterative method, over the whole process, between phases and within phases
- Each iteration = new decisions:
  - Enterprise coverage
  - Level of detail
  - Time horizon
  - Architecture asset re-use:

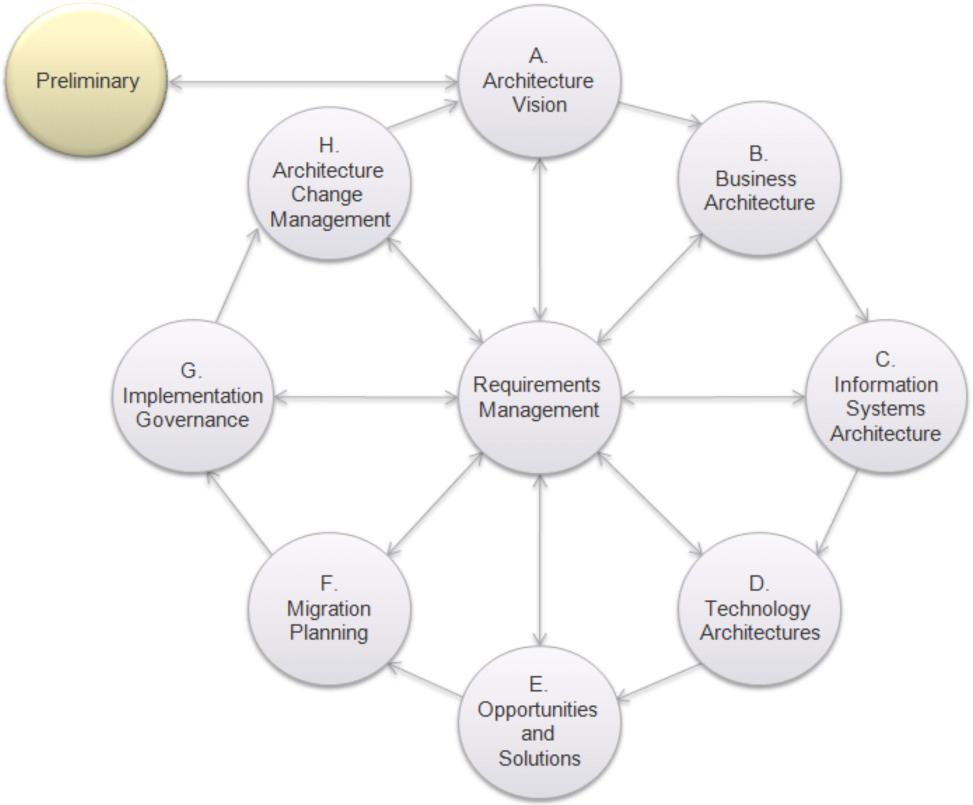
    previous ADM iterations

    other frameworks, system models, industry models,…
- Decisions based on:
  - Competence / resource availability
  - Value accruing to the enterprise.

**Remark:** Every phase is validated against and validates the current requirements of the business

[OG09]

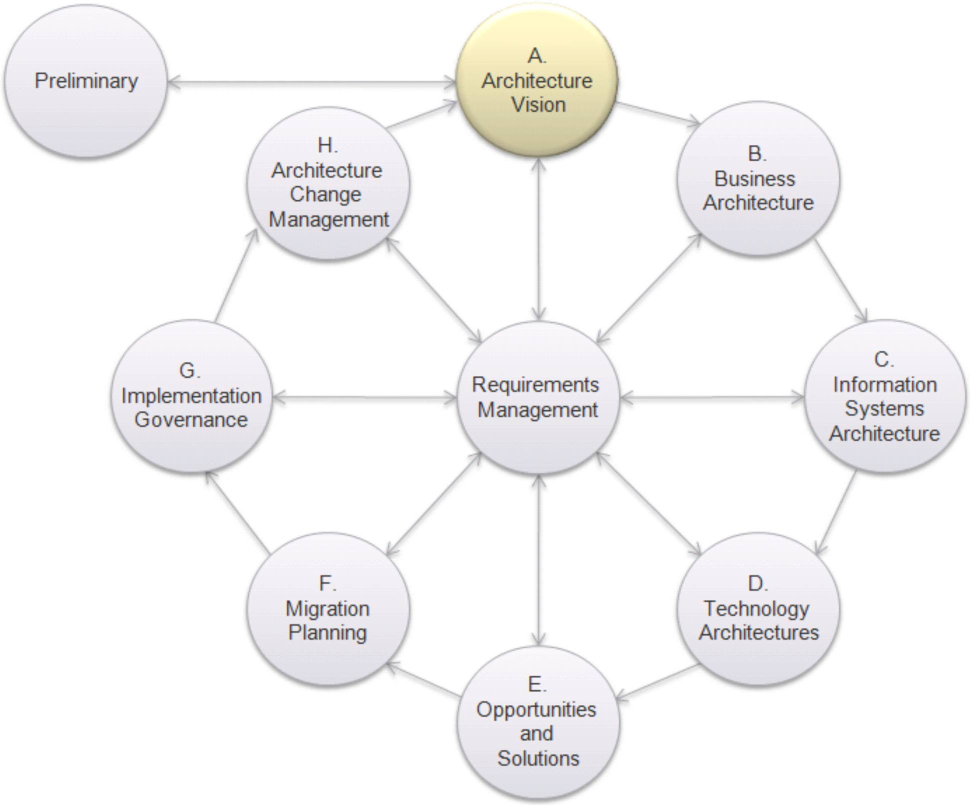
# Preliminary Phase


Preliminary
A. Architecture Vision
H. Architecture Change Management
B. Business Architecture
G. Implementation Governance
Requirements Management
C. Information Systems Architecture
F. Migration Planning
D. Technology Architectures
E. Opportunities and Solutions

- This phase prepares the organization for undertaking successful EA projects
  - Understand business environment
  - High level management commitment
  - Agreement on scope
  - Establish principles
  - Establish governance structure
  - Agree on method to be adopted

[OG09]

# Phase A – Architecture Vision


Preliminary
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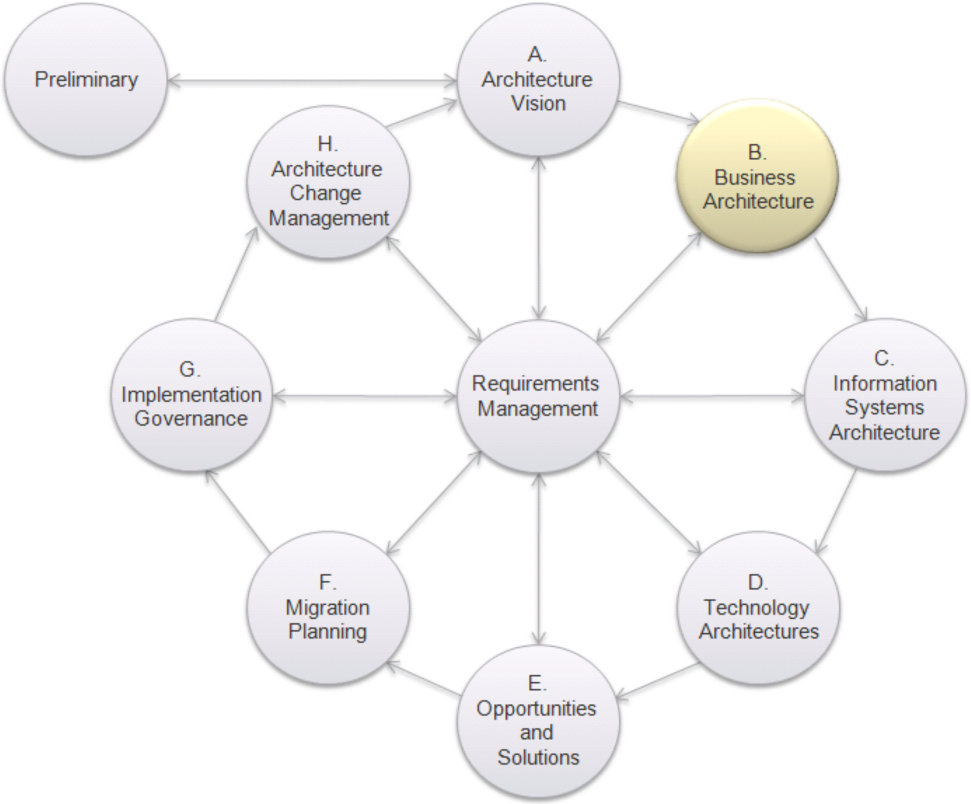
Requirements Management

- Initiates one iteration of the architecture process
  - Sets scope, constraints, expectations
  - Required at the start of every architecture cycle
- Creates the Architecture Vision
- Validates business context
- Creates Statement of Architecture work

[OG09]

# Phase B – Business Architecture


Preliminary
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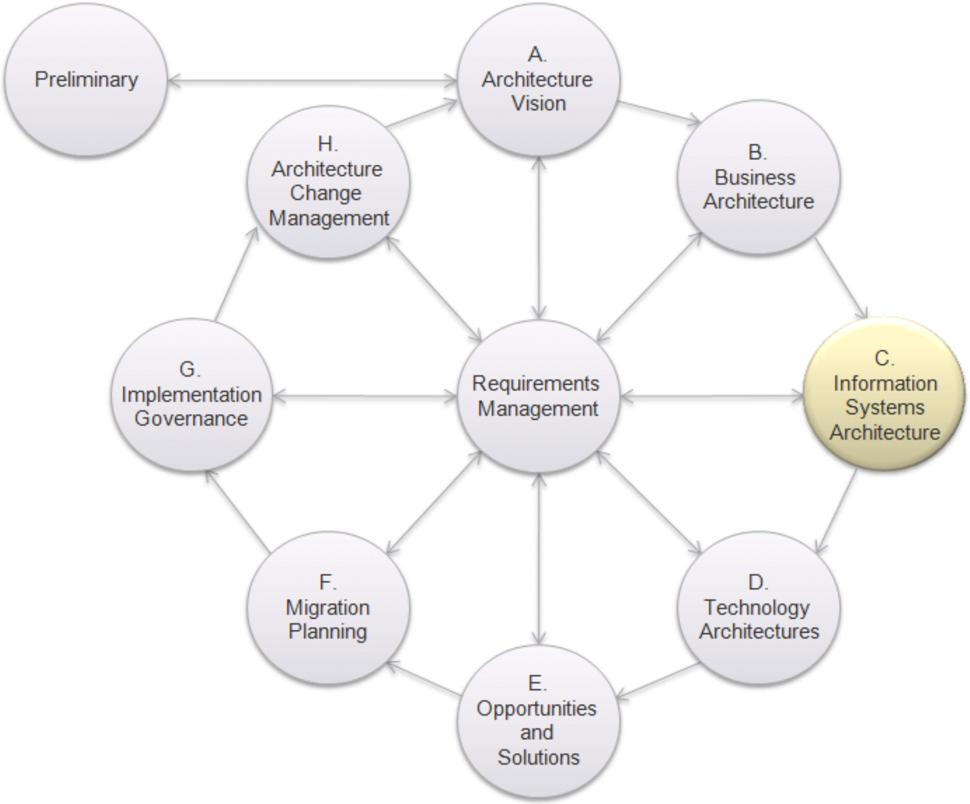
H. Architecture Change Management
Requirements Management

- Describe current business architecture
- Develop target business architecture
- Perform gap analysis
- Define roadmap for transforming the business architecture
- Select and adapt relevant architecture viewpoints
- Create architecture definition document

[OG09]

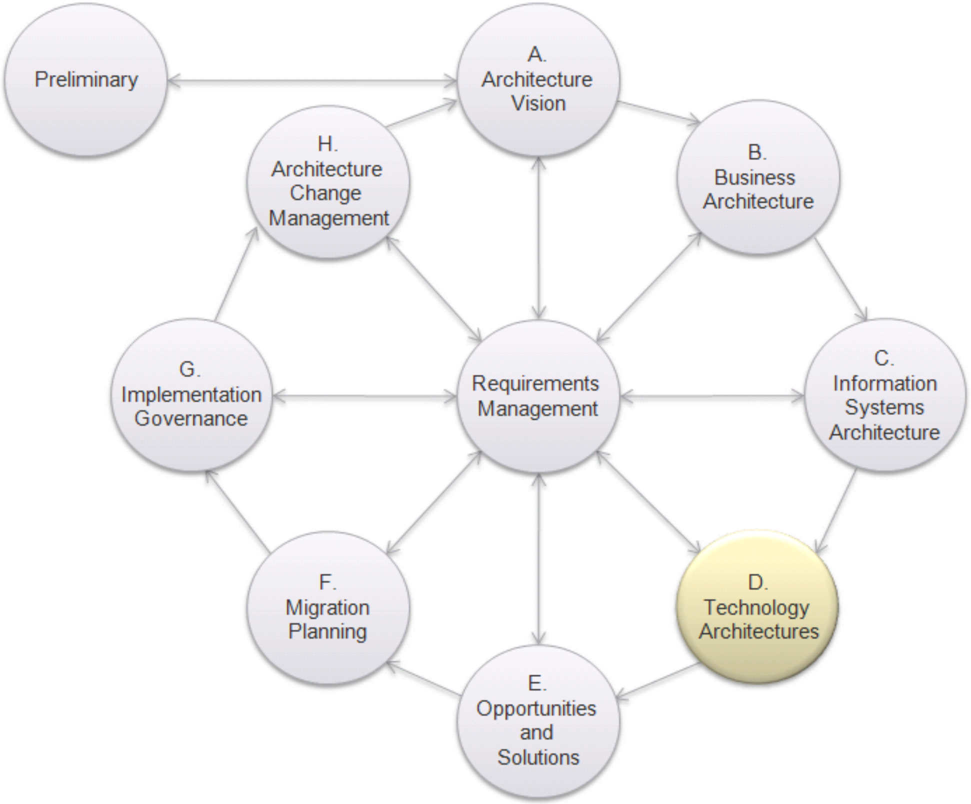
# Phase C – Information Systems Architecture


Preliminary
A. Architecture Vision
H. Architecture Change Management
B. Business Architecture
G. Implementation Governance
Requirements Management
C. Information Systems Architecture
F. Migration Planning
D. Technology Architectures
E. Opportunities and Solutions

- This phase is detailed in data architecture and application architecture
    - Describe current data/application architecture
    - Develop target data/application architecture
    - Perform gap analysis
    - Define roadmap for transforming the data/application architecture
    - Select and adapt relevant architecture viewpoints
- Create architecture definition document

[OG09]

# Phase D – Technology Architectures


Preliminary
A. Architecture Vision
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C. Information Systems Architecture
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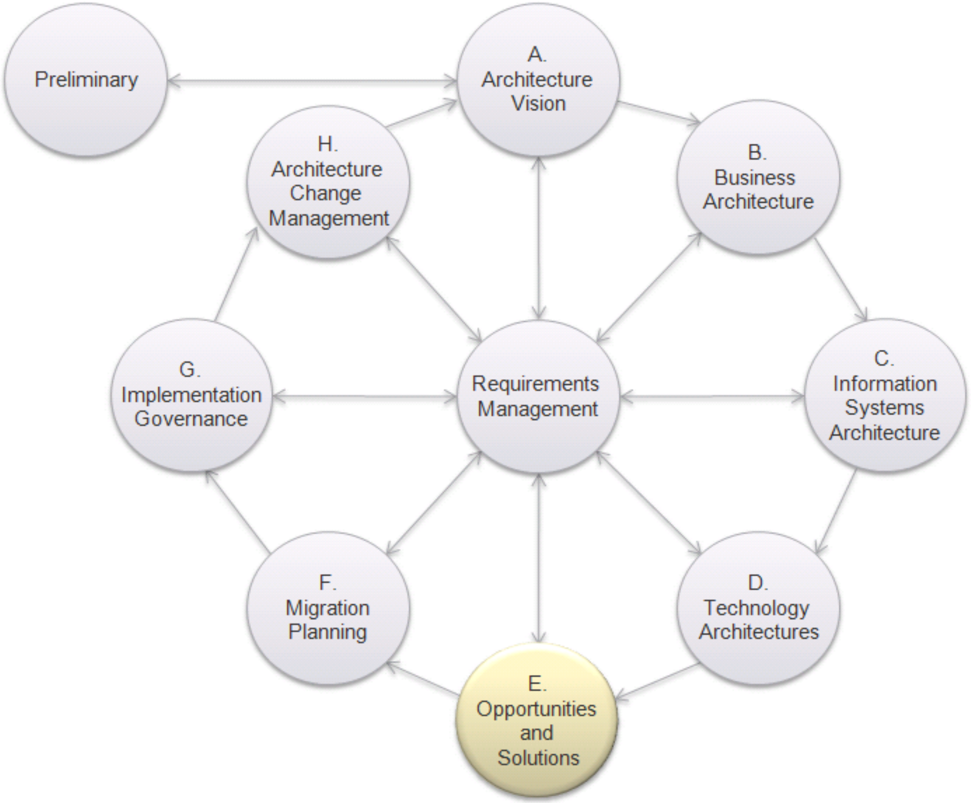
H. Architecture Change Management
Requirements Management

- Describe current technology architecture
- Develop target technology architecture
- Perform gap analysis
- Define roadmap for transforming the technology architecture
- Select and adapt relevant architecture viewpoints
- Create architecture definition document

[OG09]

# Phase E – Opportunities and Solutions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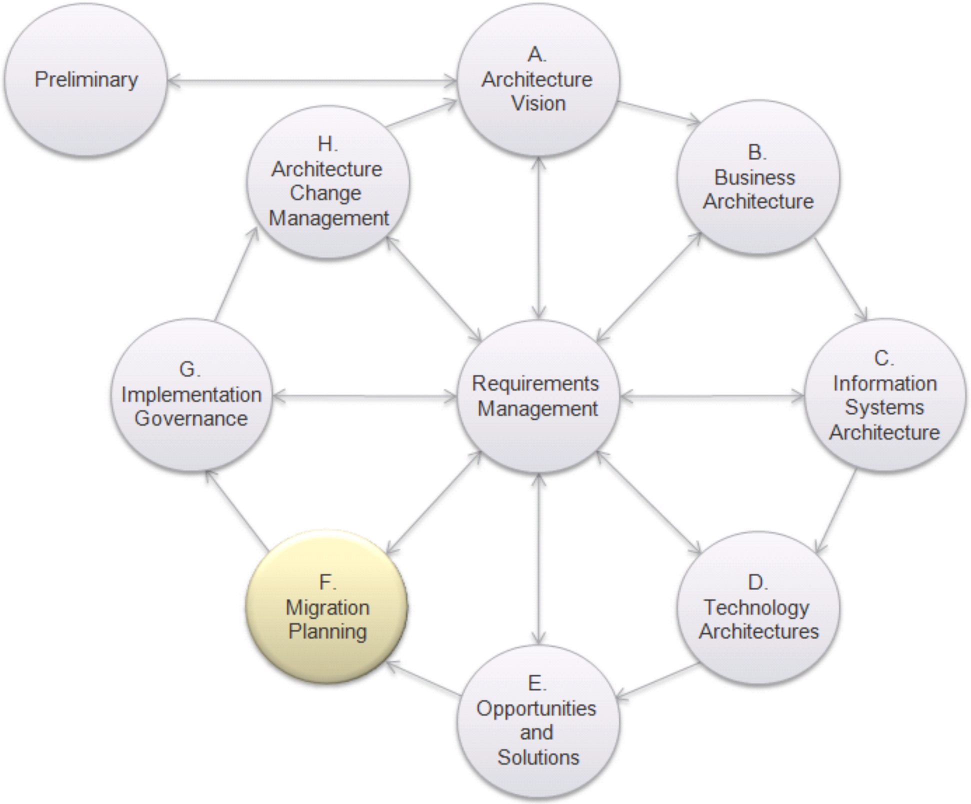
Requirements Management

- Analyze existing culture of the enterprise
- Consolidate gaps identified in phases B to D
- Perform initial implementation planning (including dependencies)
- Identify the major implementation projects
- Group projects into Transition Architectures
- Decide on approach
  - Make v Buy v Re-Use
  - Outsource
  - COTS
  - Open Source
- Assess priorities

[OG09]

# Phase F – Migration Planning


Preliminary
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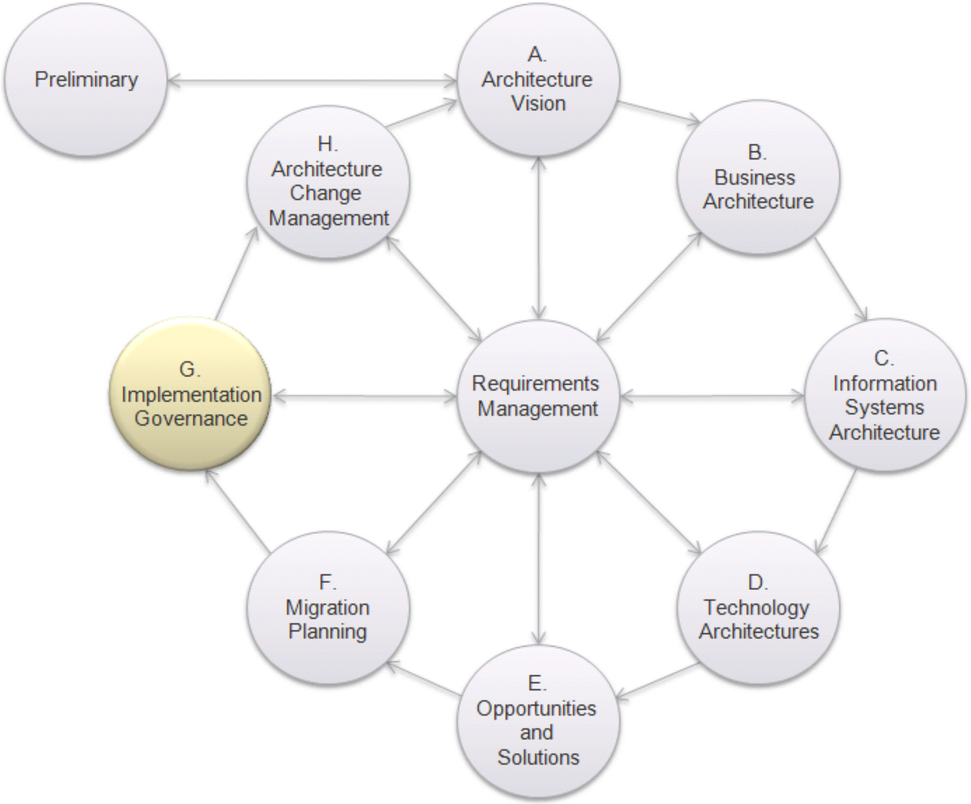
Requirements Management

- For projects identified in Phase E perform
  - Cost/benefit analysis
  - Risk assessment
- Develop a detailed Implementation and Migration Plan (roadmap)

[OG09]

# Phase G – Implementation Governance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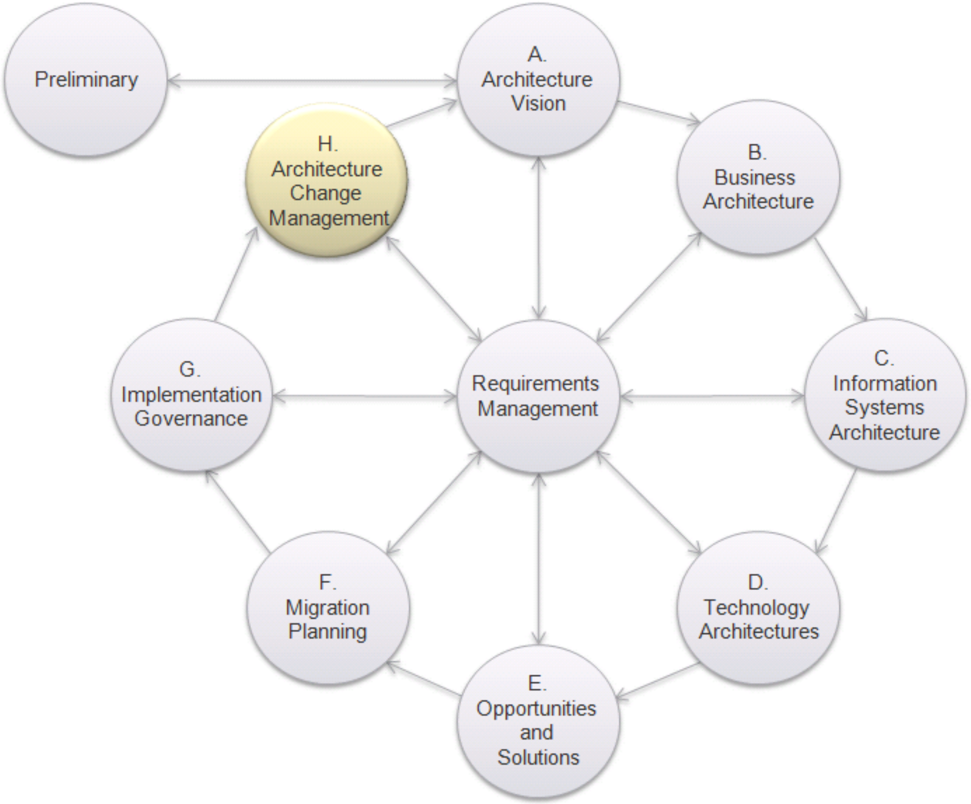
Requirements Management

- Provide architectural oversight for the implementation.
- Defines architecture constraints on implementation projects
- Architecture contract
- Monitors implementation work for conformance
- Realize EA compliance reviews
- Produce a Business Value Realization.

[OG09]

# Phase H – Architecture Change Management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Requirements Management

- Provide a continual monitoring and a change management process
- Ensures that changes to the architecture are managed in a cohesive and architected way
- Establishes and supports the EA to provide flexibility to evolve rapidly in response to changes in the technology or business environment
- Monitors the business and capacity management.
- Management of the governance structures (quality gates)

[OG09]

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- Zachman Framework for Enterprise Architecture
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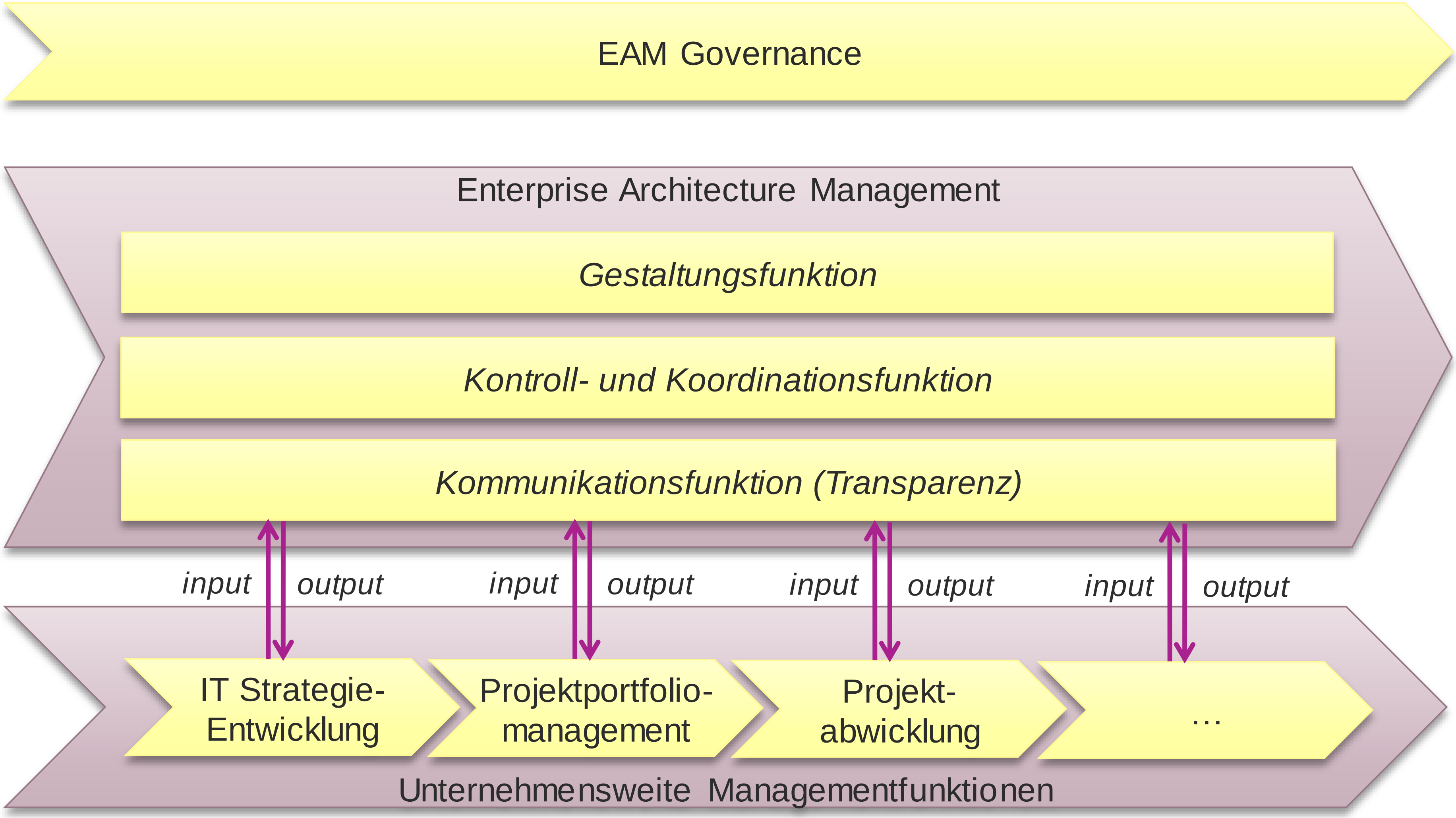
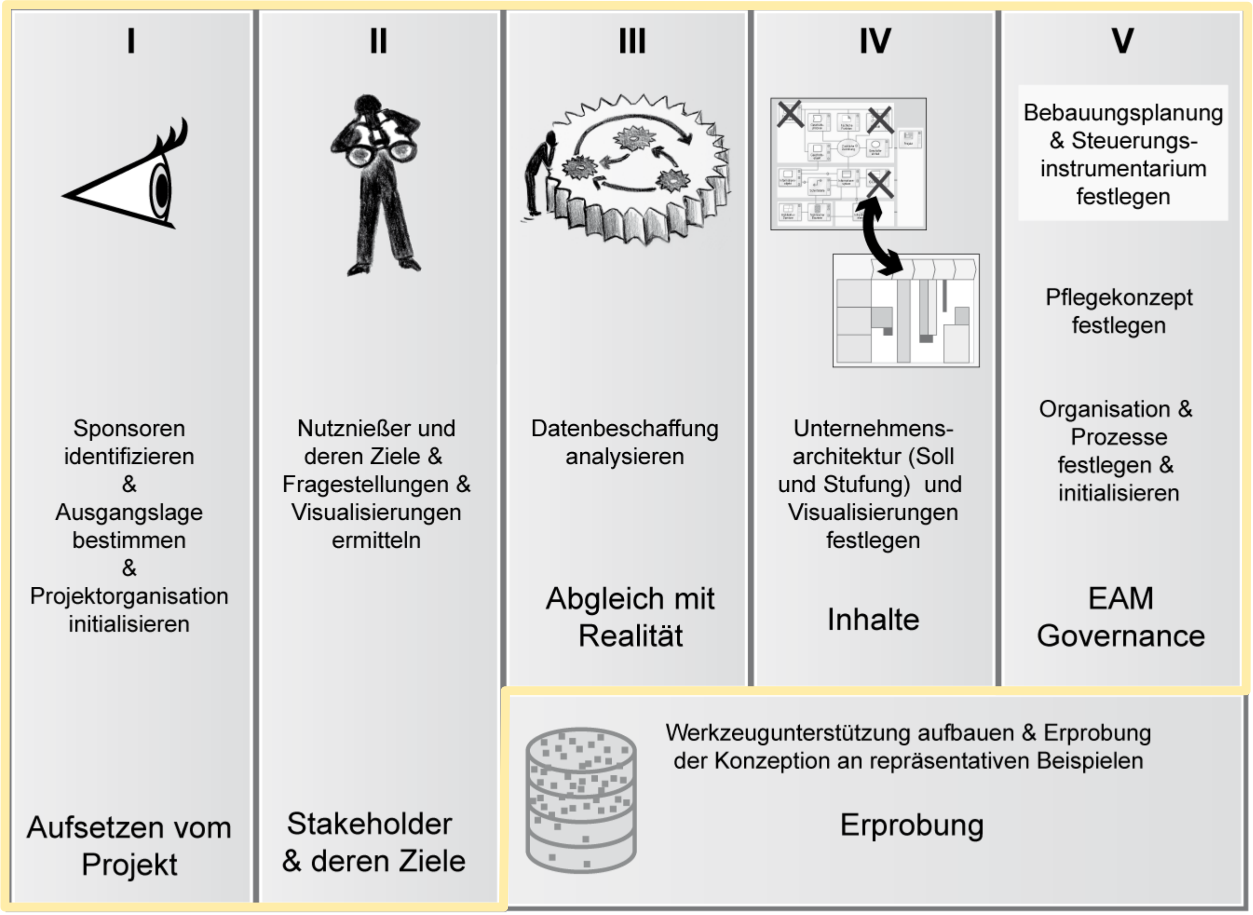
- Engels et al. – Quasar Enterprise

# EAM im Unternehmenskontext


EAM Governance
Enterprise Architecture Management
*Gestaltungsfunktion*
*Kontroll- und Koordinationsfunktion*
*Kommunikationsfunktion (Transparenz)*
*input*
*output*
*input*
*output*
*input*
*output*
*input*
*output*
IT Strategie-Entwicklung
Projektportfolio-management
Projekt-abwicklung
…
Unternehmensweite Managementfunktionen

# Vorgehensweise EAM Governance: Konzeption, Pilotierung & Optimierung



I

Sponsoren identifizieren & Ausgangslage bestimmen & Projektorganisation initialisieren

Aufsetzen vom Projekt

II

Nutznießer und deren Ziele & Fragestellungen & Visualisierungen ermitteln

Stakeholder & deren Ziele

III

Datenbeschaffung analysieren

Abgleich mit Realität

IV

Unternehmens-architektur (Soll und Stufung) und Visualisierungen festlegen

Inhalte

V

Bebauungsplanung & Steuerungs-instrumentarium festlegen

Pflegekonzept festlegen

Organisation & Prozesse festlegen & initialisieren

EAM Governance

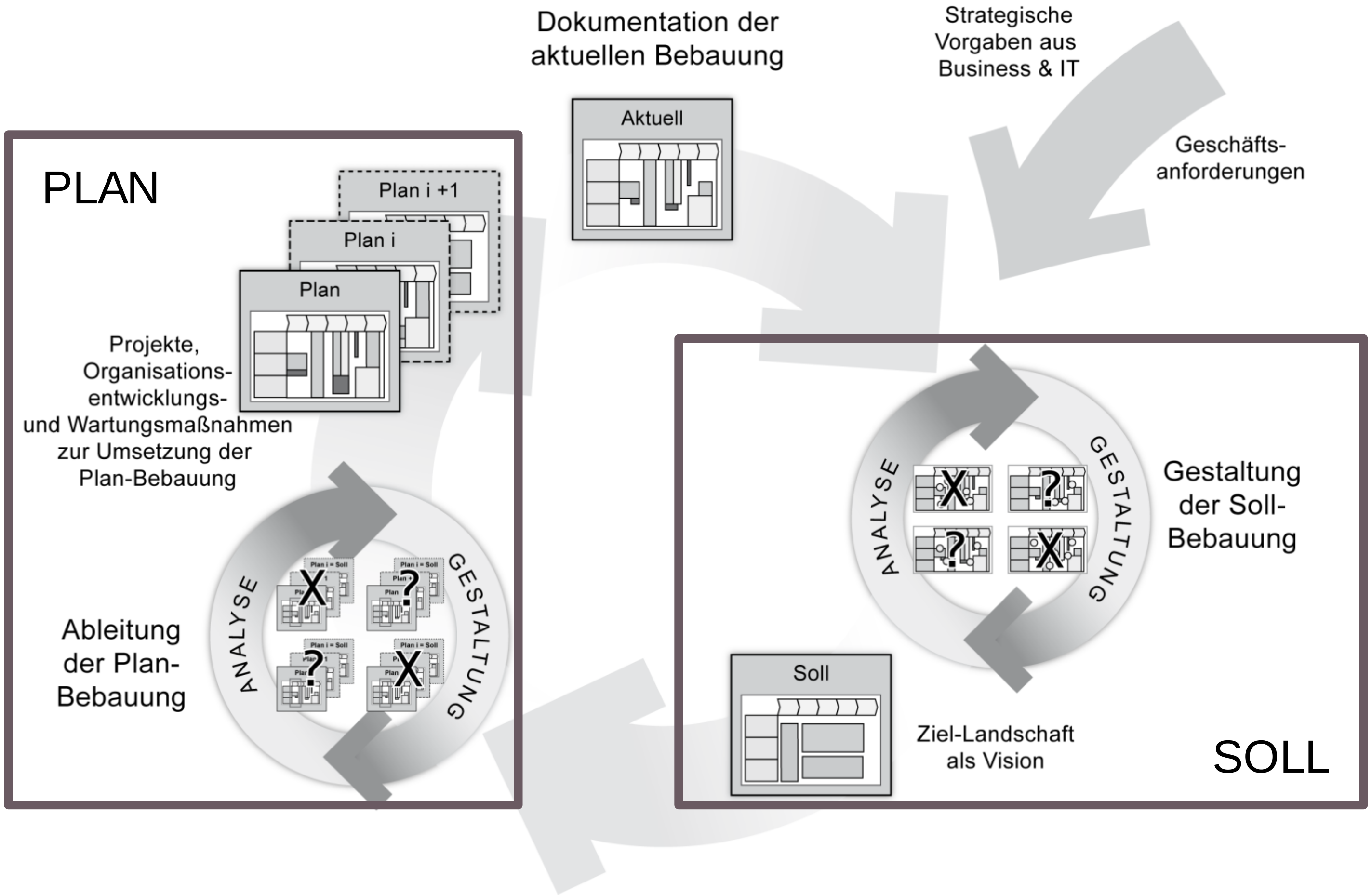
Werkzeugunterstützung aufbauen & Erprobung der Konzeption an repräsentativen Beispielen

Erprobung

Konzeption (Optimierung)

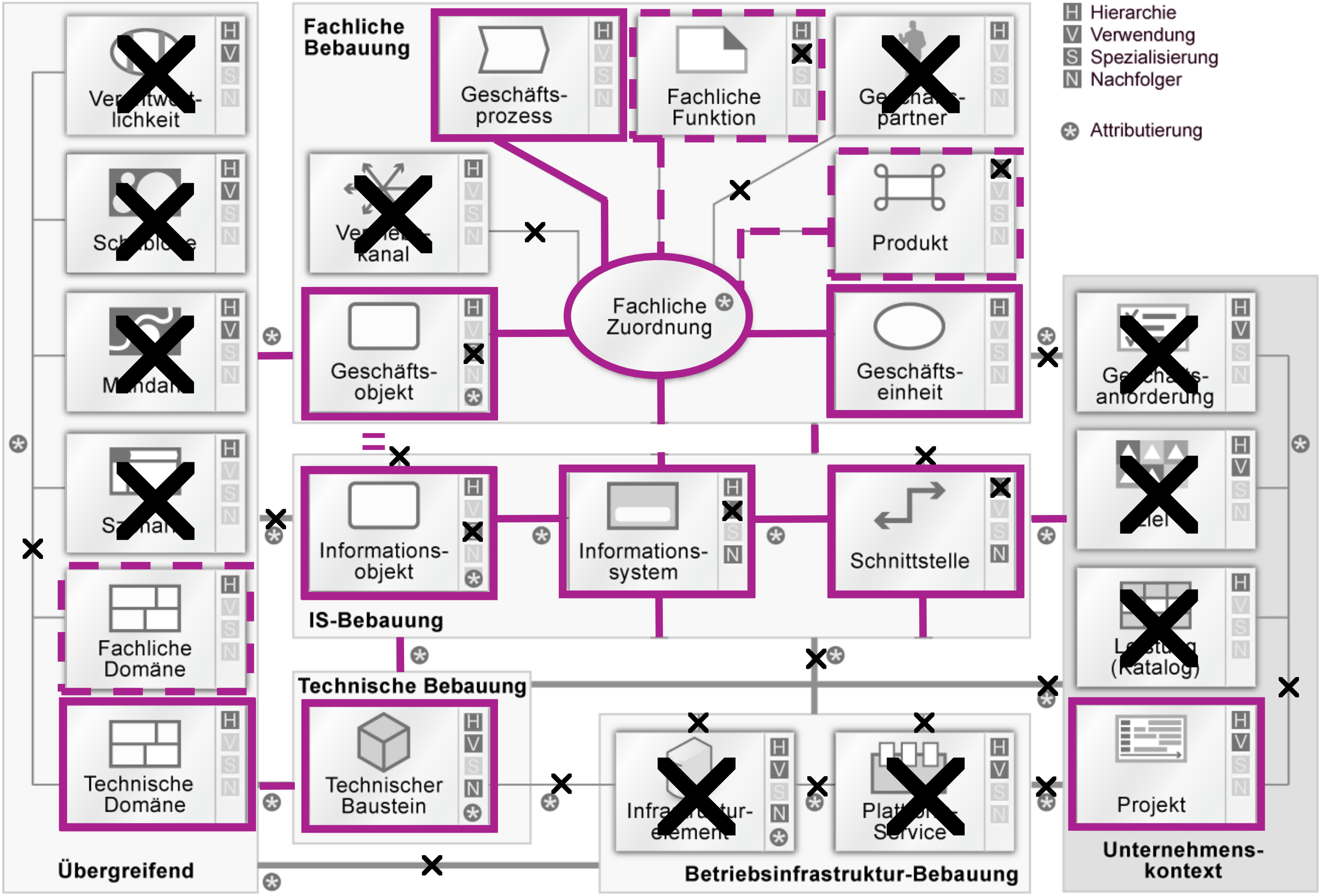
□ optional (abhängig von Ausgangslage)

# Prozesse des EAM


Dokumentation der aktuellen Bebauung
Aktuell
Strategische Vorgaben aus Business & IT
Geschäfts-anforderungen
PLAN
Plan i +1
Plan i
Plan
Projekte, Organisations-entwicklungs- und Wartungsmaßnahmen zur Umsetzung der Plan-Bebauung
ANALYSE
GESTALTUNG
Ableitung der Plan-Bebauung
X
?
?
X
Gestaltung der Soll-Bebauung
Soll
Ziel-Landschaft als Vision
SOLL

Wesentlich sind ein methodisches und lösungsorientiertes Vorgehen für konkrete Anforderungen.

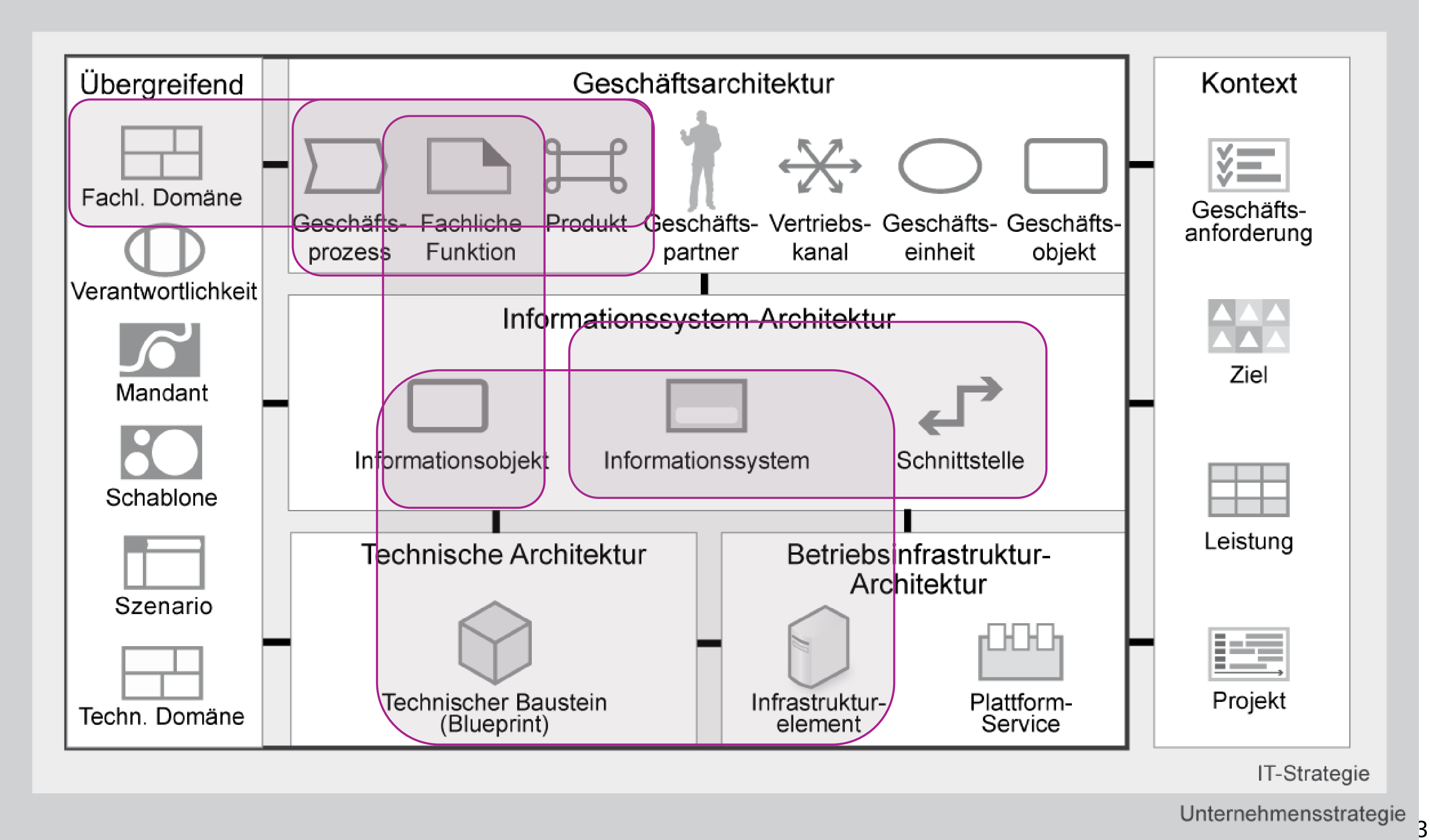
# Best Practice Informationsmodell von iteratec erlaubt unternehmensspezifische Anpassungen



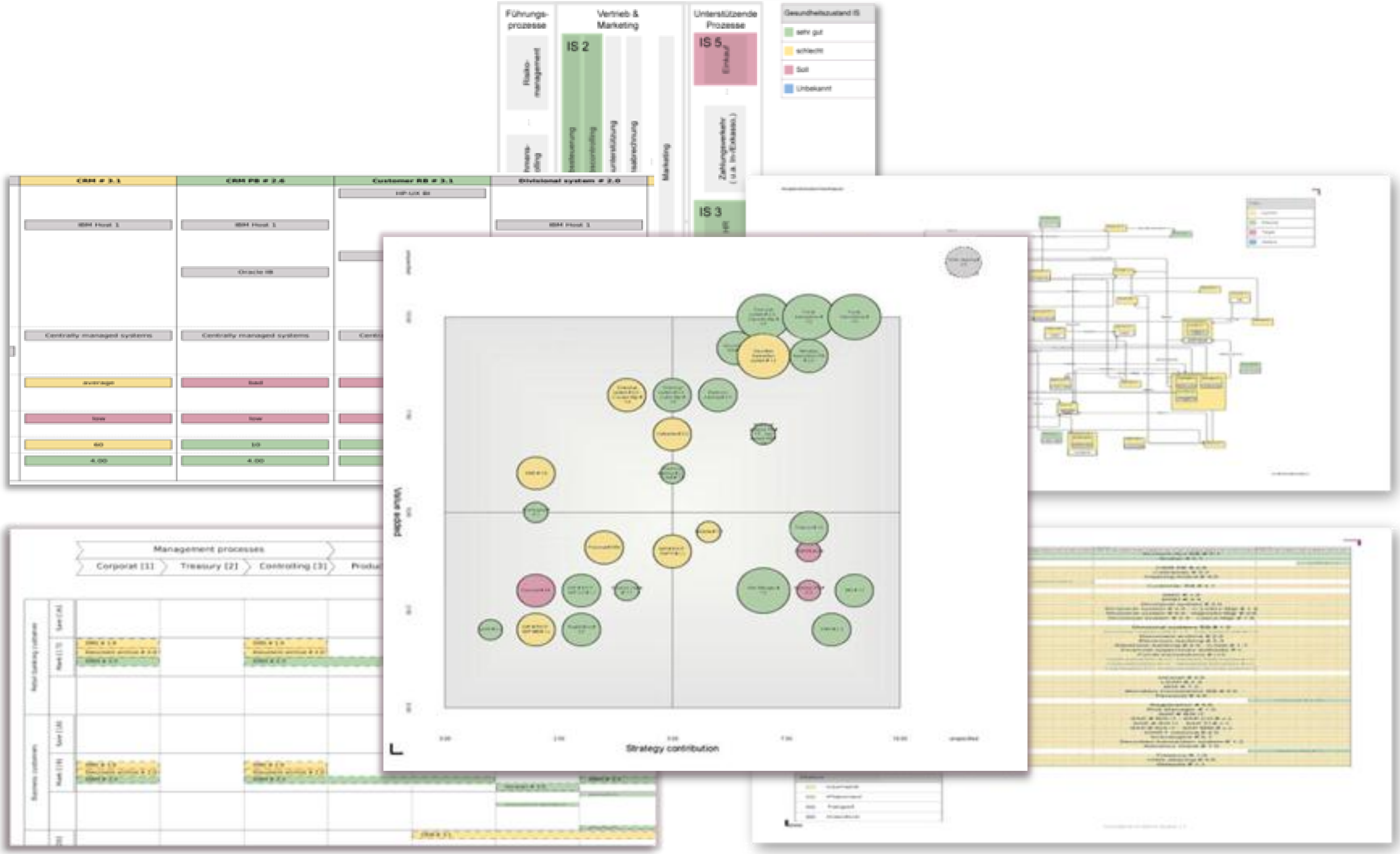
**Legende:**

- □ Architektur-element 1 .Stufe
- — Beziehung 1 .Stufe
- ⬚ Architektur-element > 1 .Stufe
- - - Beziehung > 1 .Stufe
- ✗ Architektur-element nicht benötigt

# Motivation: unterschiedliche Stakeholder haben unterschiedliche Anliegen an die EA…



# Unterschiedliche Stakeholder bilden unterschiedliche Modelle der EA aus verschiedenen Blickwinkeln



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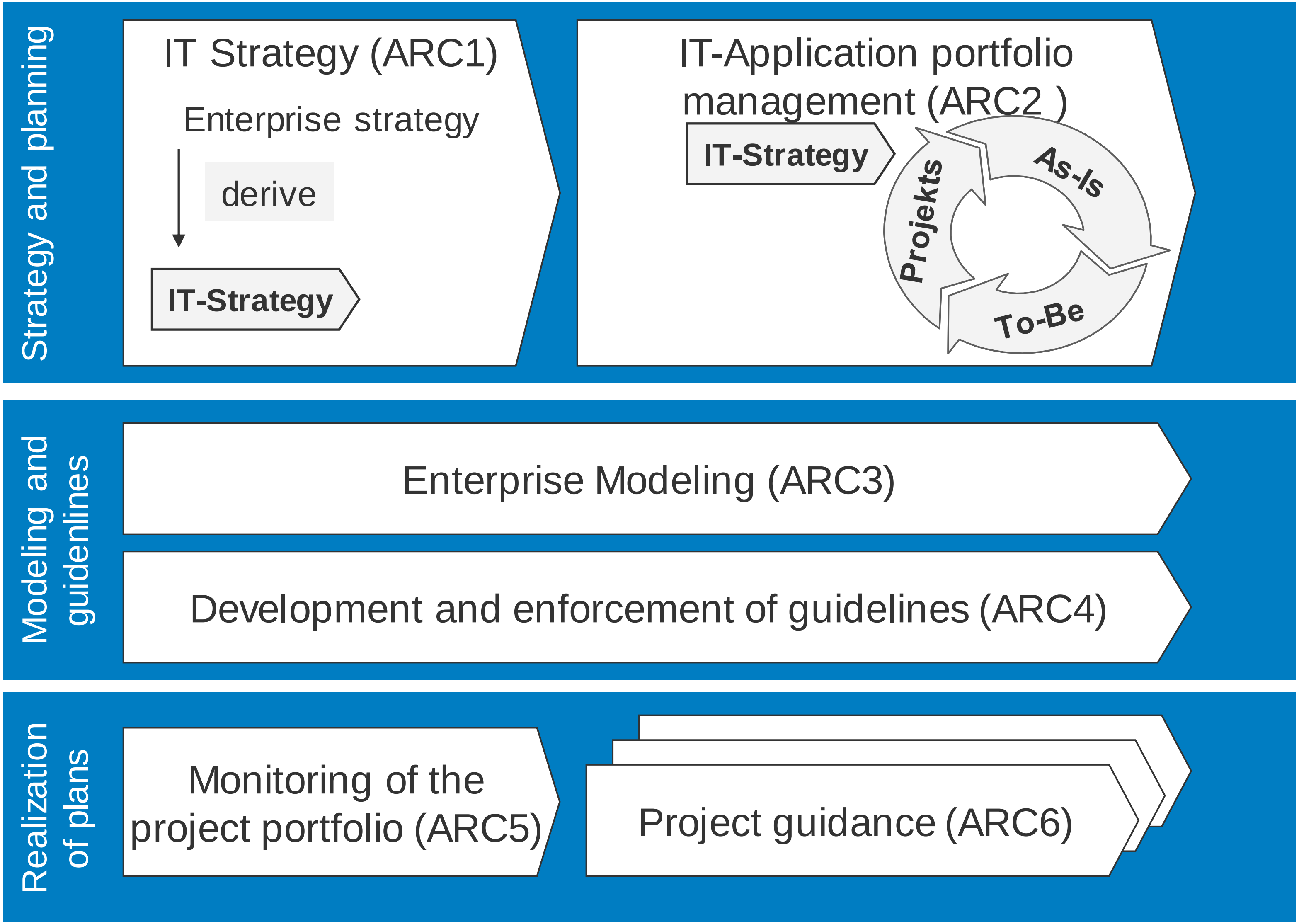
# Keller: Processes for the Enterprise IT Architecture



Strategy and planning

IT Strategy (ARC1)

Enterprise strategy

derive

IT-Strategy

IT-Application portfolio management (ARC2 )

IT-Strategy

Projekts

As-Is

To-Be

Modeling and guidelines

Enterprise Modeling (ARC3)

Development and enforcement of guidelines (ARC4)

Realization of plans

Monitoring of the project portfolio (ARC5)

Project guidance (ARC6)

[Ke07a]

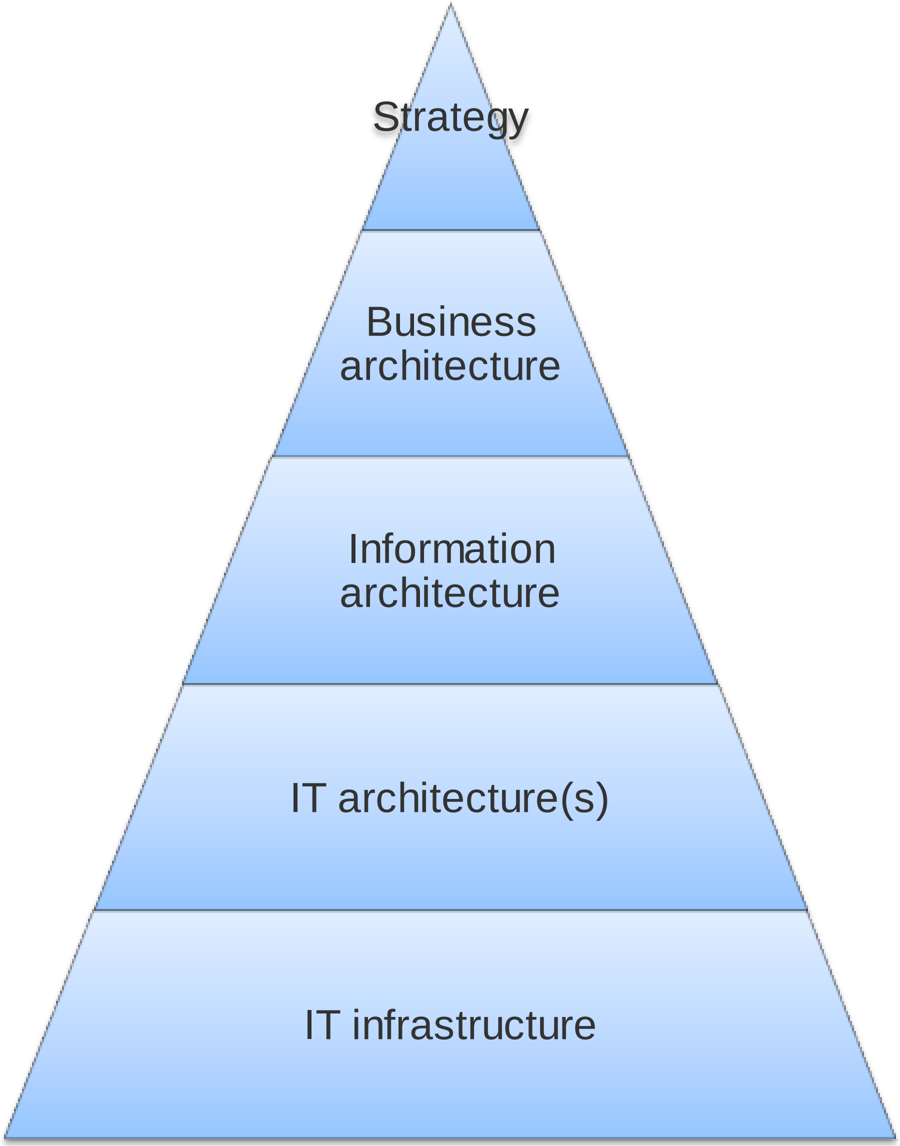
# Dern: Management of IT architectures

Proposition:

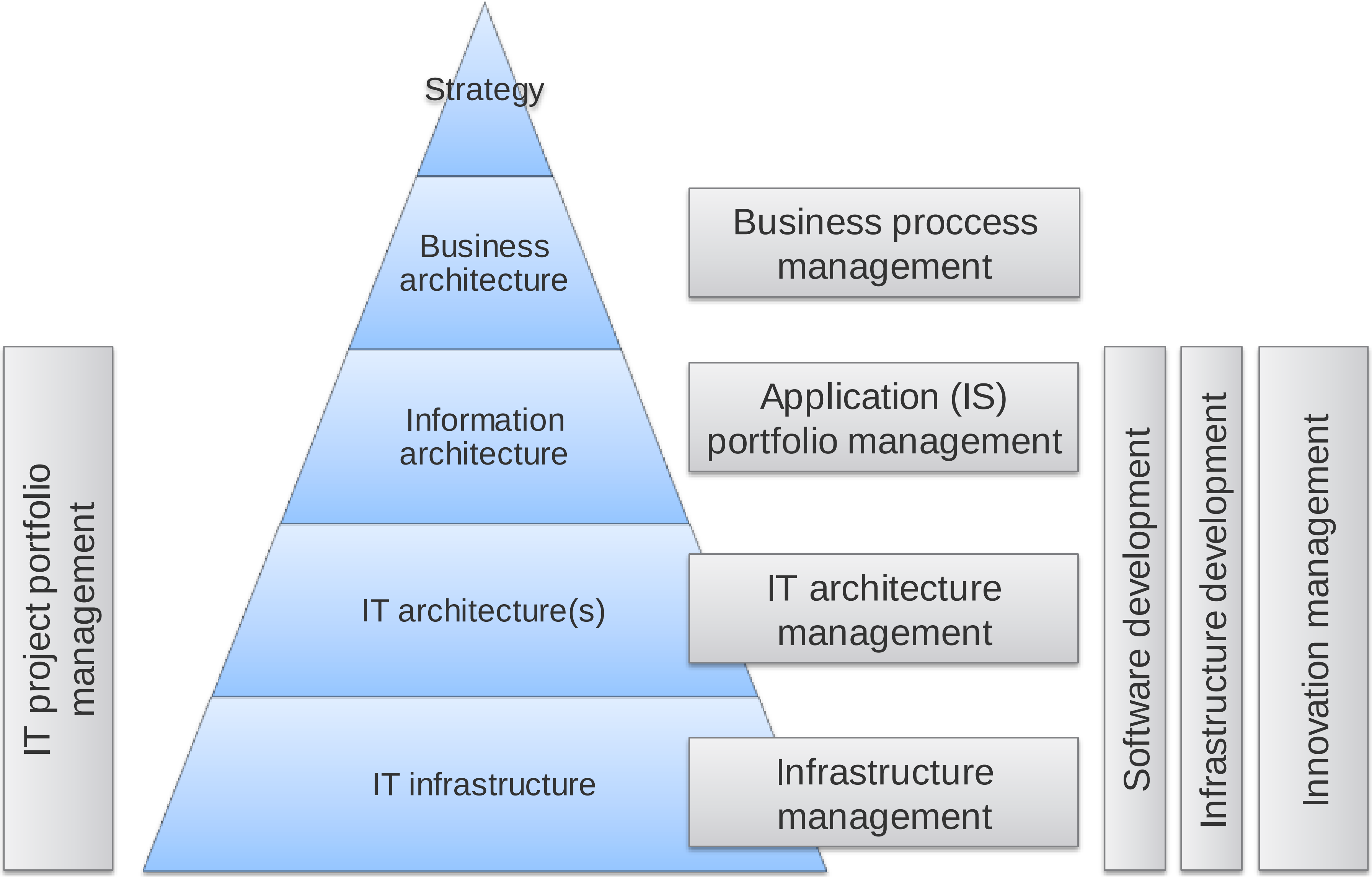
„There is no single all-embracing architecture. There are many of them, which are aligned by reference architectures and architecture principles. "

- **Business architecture**
  Formal description of the business idea and strategy
- **Information architecture**
  Principles and guidelines for designing the application landscape and its application systems
- **IT architectures**
  Abstract description of current or future application systems
- **IT infrastructure**
  Hardware- and software components, which make up the run-time and/or development environment for the application systems

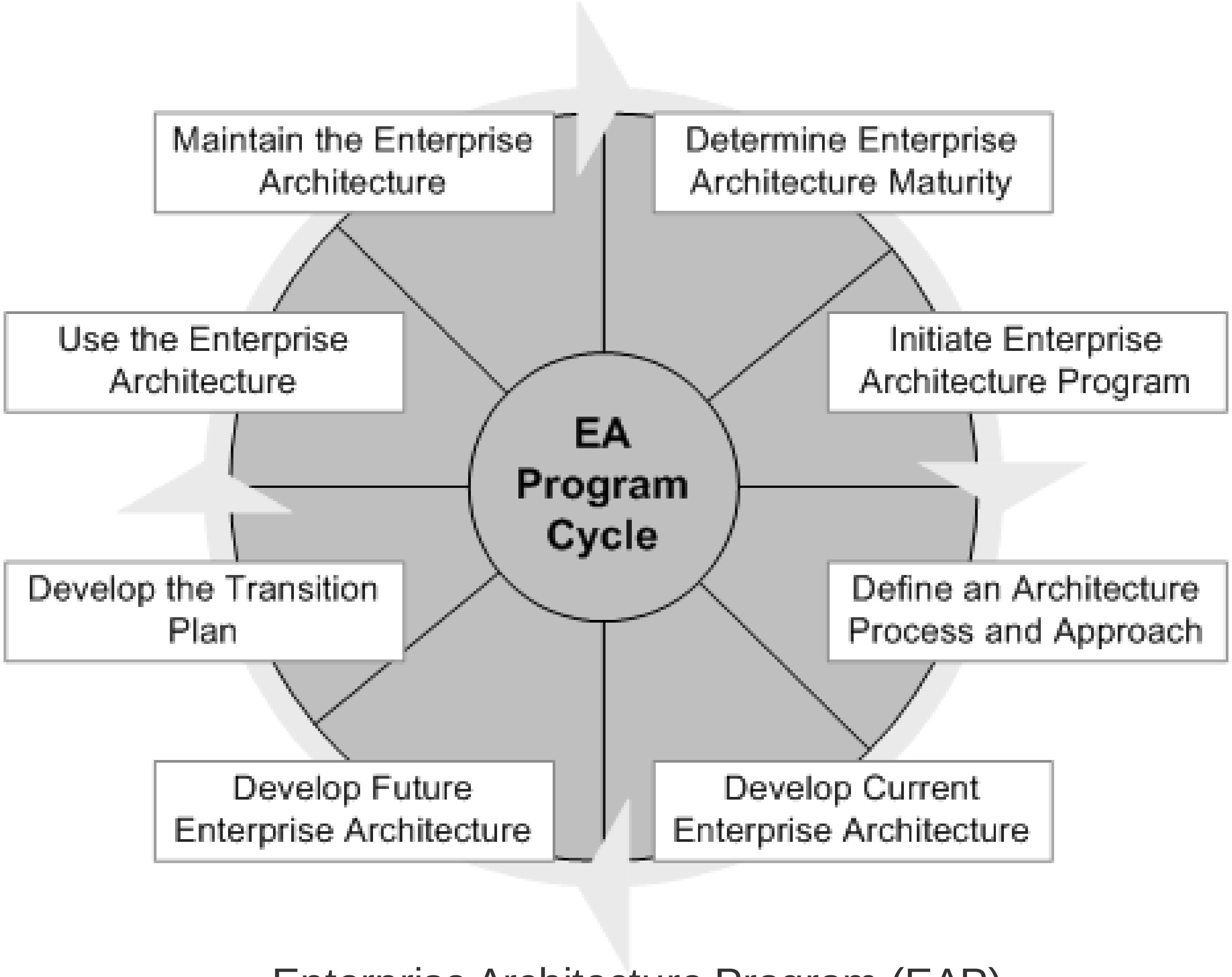
[De06]



# Dern: The architecture pyramid and the related processes


Strategy
Business architecture
Information architecture
IT architecture(s)
IT infrastructure
Business proccess management
Application (IS) portfolio management
IT architecture management
Infrastructure management
IT project portfolio management
Software development
Infrastructure development
Innovation management

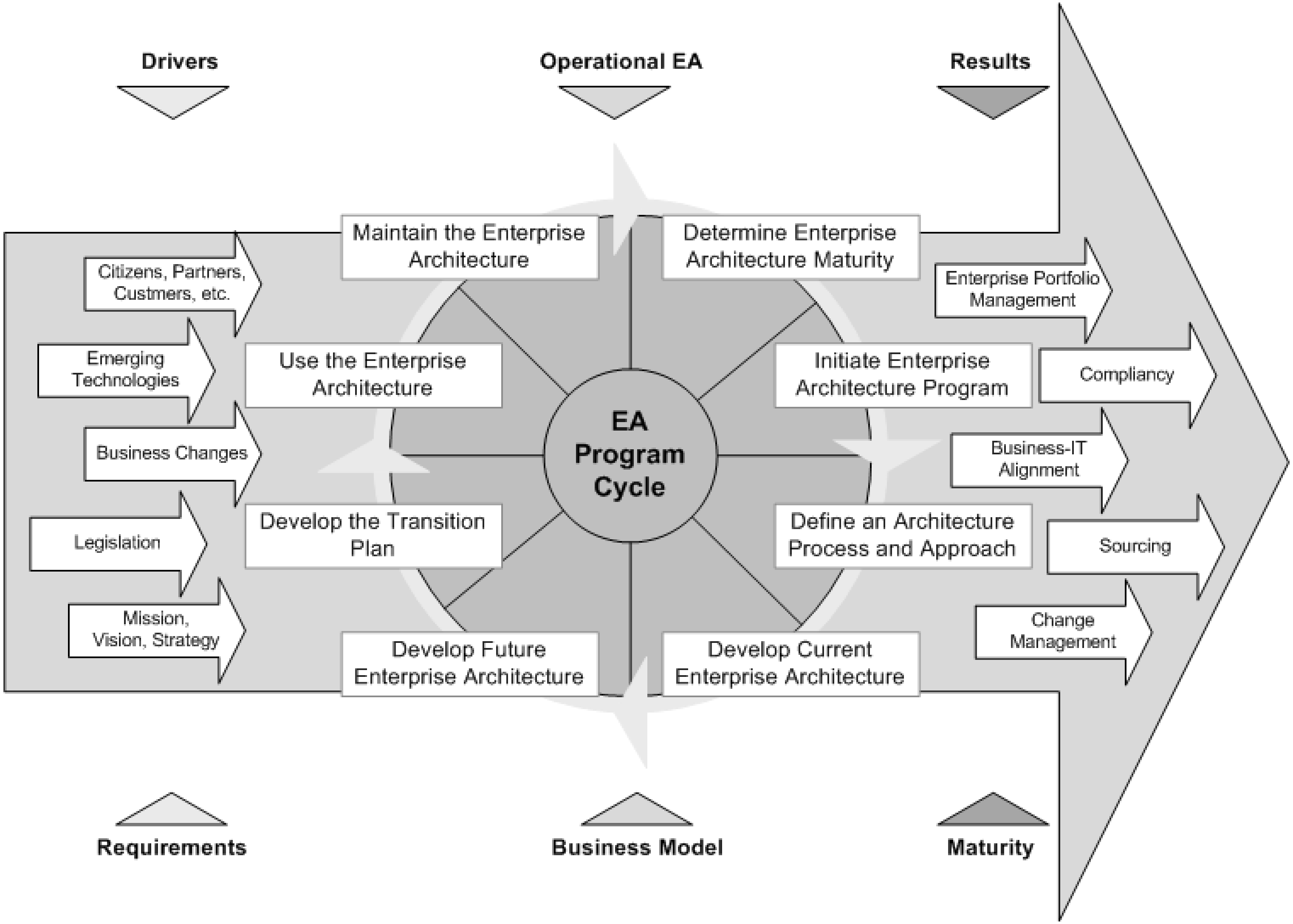
# Schekkerman: Enterprise Architecture – Good Practices Guide


Maintain the Enterprise Architecture
Determine Enterprise Architecture Maturity
Use the Enterprise Architecture
Initiate Enterprise Architecture Program
EA Program Cycle
Develop the Transition Plan
Define an Architecture Process and Approach
Develop Future Enterprise Architecture
Develop Current Enterprise Architecture

Enterprise Architecture Program (EAP)

[Sc08]

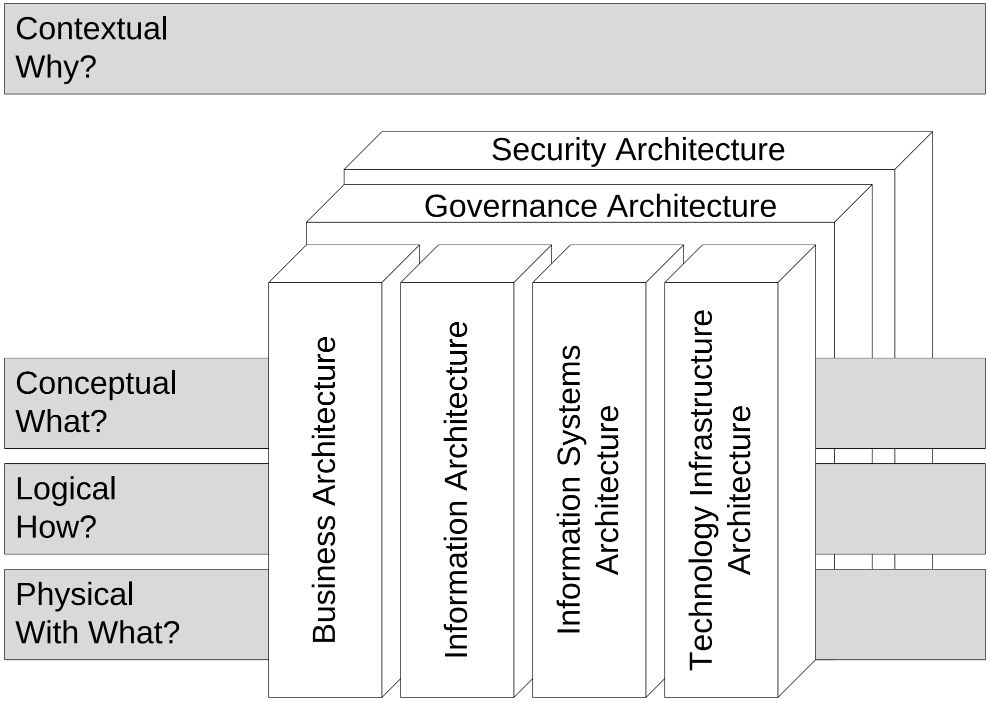
# Schekkerman: Drivers of the business & impact on EA maturity and results


Drivers
Operational EA
Results
Citizens, Partners, Custmers, etc.
Emerging Technologies
Business Changes
Legislation
Mission, Vision, Strategy
Maintain the Enterprise Architecture
Determine Enterprise Architecture Maturity
Use the Enterprise Architecture
Initiate Enterprise Architecture Program
EA Program Cycle
Develop the Transition Plan
Define an Architecture Process and Approach
Develop Future Enterprise Architecture
Develop Current Enterprise Architecture
Enterprise Portfolio Management
Compliancy
Business-IT Alignment
Sourcing
Change Management
Requirements
Business Model
Maturity

[Sc08]

# Quasar Enterprise: Macro-structure of the Integrated Architecture Framework (IAF) (1)

- The basic structure of Capgemini can be divided into two dimensions
  - **Architecture aspects**: Different architectures of an enterprise
  - **Architecture layers**: contextual, conceptual, logical und physical layer of each architecture aspect



Macro-structure of the Integrated Architecture Framework (IAF)

[Vo07]

# Quasar Enterprise: Macro-structure of the Integrated Architecture Framework (IAF) (2)

- **Business architecture** – Structures the business processes and business services in order to match the business goals and to model the organization of the enterprise

- **Information architecture** – Structures the information required in the business architecture

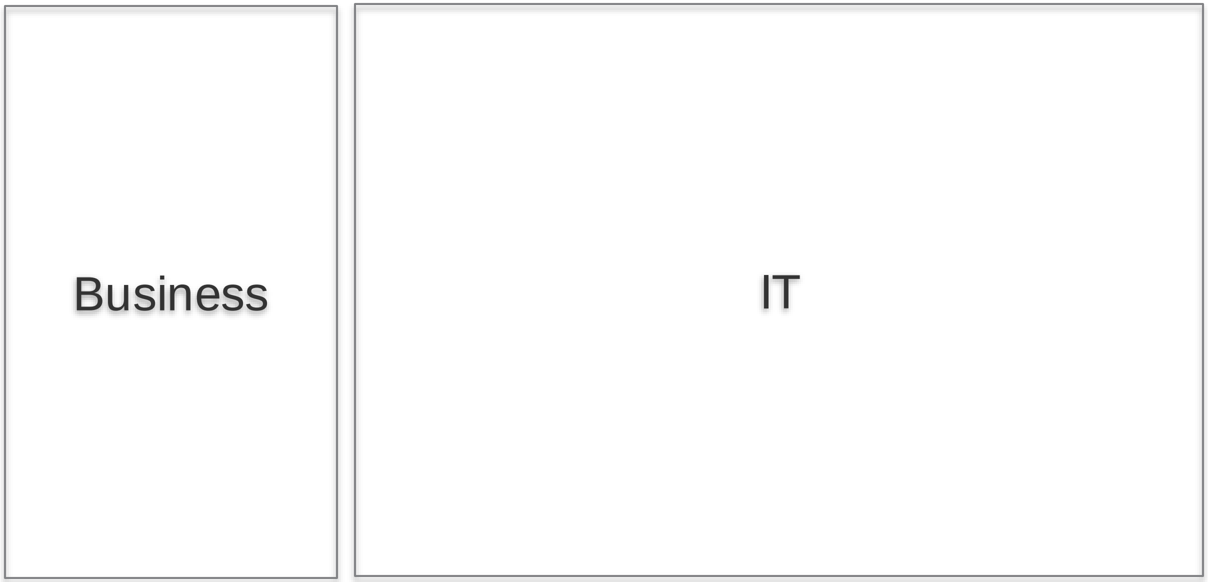
- **Information systems architecture** – Structures the application landscape from a business perspective

- **Technology infrastructure architecture** – Structures the used technical platforms and system software components

[Vo07]

# Creation of a regulation framework (1)

- Creation of a regulating framework for questions, which should be addressed in the context of an enterprise architecture
- Everything starts with a clear separation between business and IT



[Vo07]

# Creation of a regulation framework (2)

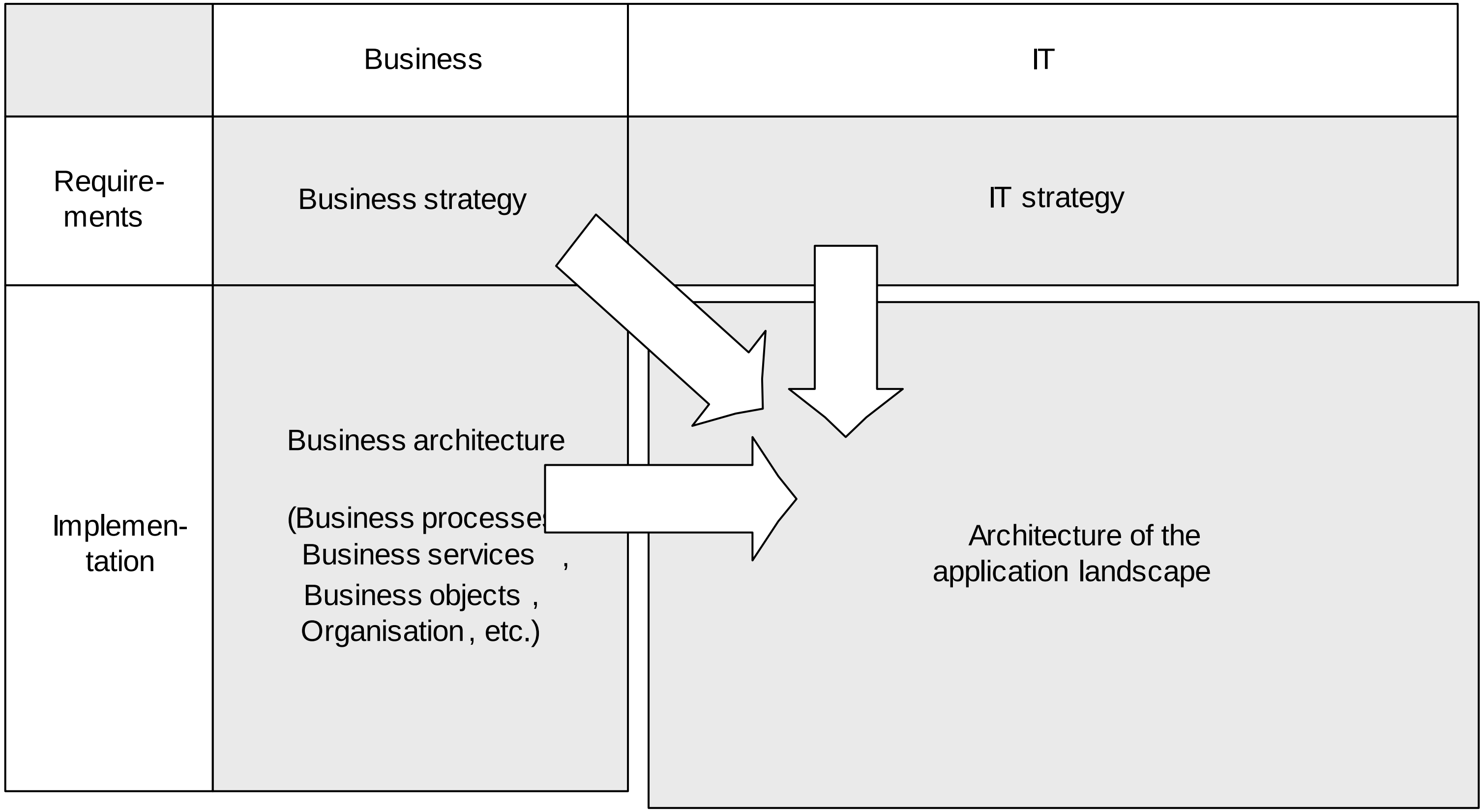
- Afterward it is important to distinguish between requirements and implementation

| | Business | IT |
|---|---|---|
| Require-ments | Business strategy | IT strategy |
| Implemen-tation | Business architecture<br>(Business process, Business services, Business objects, organizations, etc.) | Architecture of the application landscape |

[Vo07]

# Creation of a regulation framework (3)

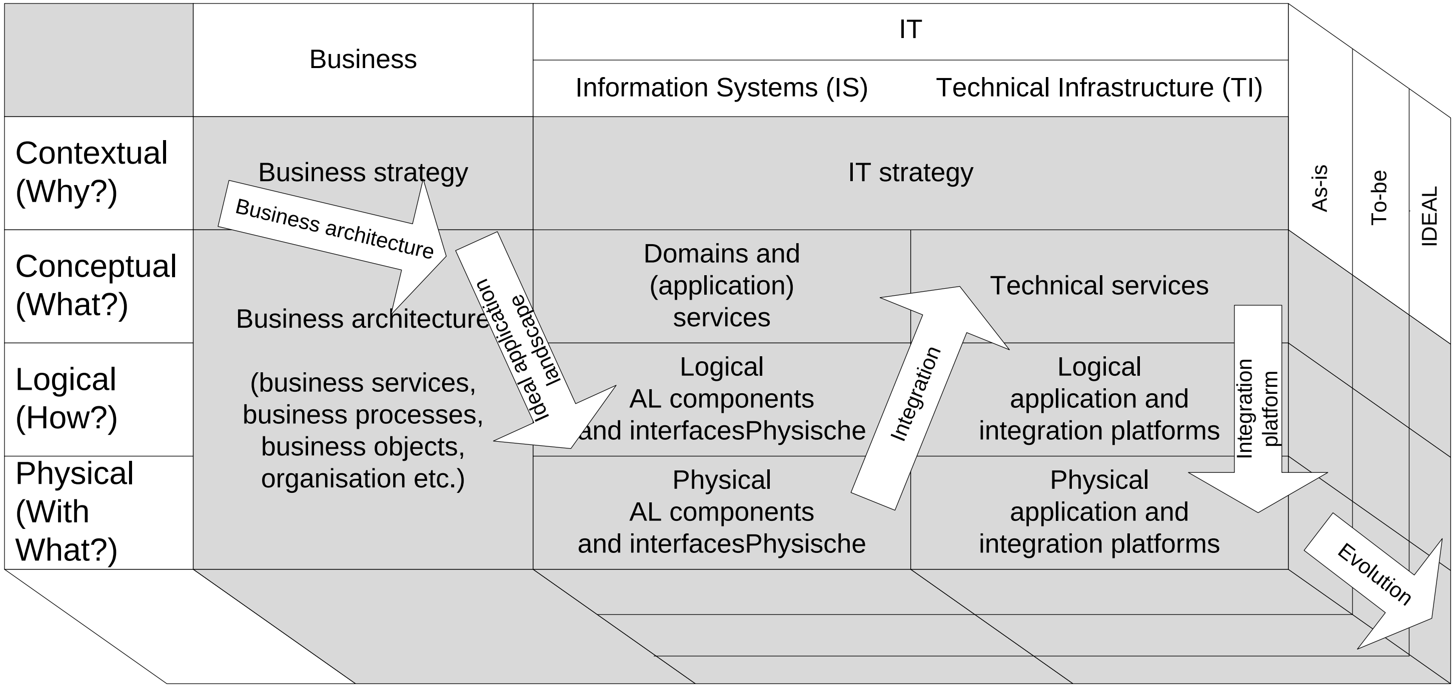
- Business strategy, quality criteria and business architecture are driving the design of the application landscape


Business
IT
Require-ments
Business strategy
IT strategy
Implemen-tation
Business architecture
(Business processes, Business services , Business objects , Organisation , etc.)
Architecture of the application landscape

[Vo07]

# Map of Quasar Enterprise

- Creation of an unique view on the business architecture. On the part of the IT, the IAF architecture aspects and -layers are respected



|  | Business | IT |  |
|---|---|---|---|
|  |  | Information Systems (IS) | Technical Infrastructure (TI) |
| Contextual (Why?) | Business strategy | IT strategy |  |
| Conceptual (What?) | Business architecture<br>(business services, business processes, business objects, organisation etc.) | Domains and (application) services | Technical services |
| Logical (How?) |  | Logical AL components and interfacesPhysische | Logical application and integration platforms |
| Physical (With What?) |  | Physical AL components and interfacesPhysische | Physical application and integration platforms |

[Vo07]

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# Bibliography (2)

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# TOGAF* als Framework für Enterprise Architecture Management

Einführung in TOGAF 9

*) TOGAF is a trademark of The Open Group

# The Open Group und das EAM-Framework TOGAF

**TOGAF beschreibt den Prozess und grundlegende Elemente, mit denen die Unternehmensarchitektur geplant und gesteuert werden kann.**

**Was darf von TOGAF erwartet werden?**

## TOGAF als Enterprise Architecture Framework

TOGAF ist als Framework entwickelt worden, um

- bei der Entwicklung und Pflege unterschiedlichster Architekturen für verschiedene Unternehmenstypen zu unterstützen
- bei der Bewertung und Handlungsfeldanalyse konkreter Architekturen zu helfen
- die jeweils passende Architektur für ein Unternehmen auszuwählen und den Implementierungserfolg zu unterstützen.

TOGAF ist mehr als eine Klassifikationshilfe für Architekturelemente.
Es enthält darüber hinaus:

- Prozesse, Methoden, Referenzen und Standards
- entstand aus den Best Practices von über 300 Unternehmen weltweit und wird kontinuierlich von diesen weiterentwickelt.

# The Open Group und das EAM-Framework TOGAF

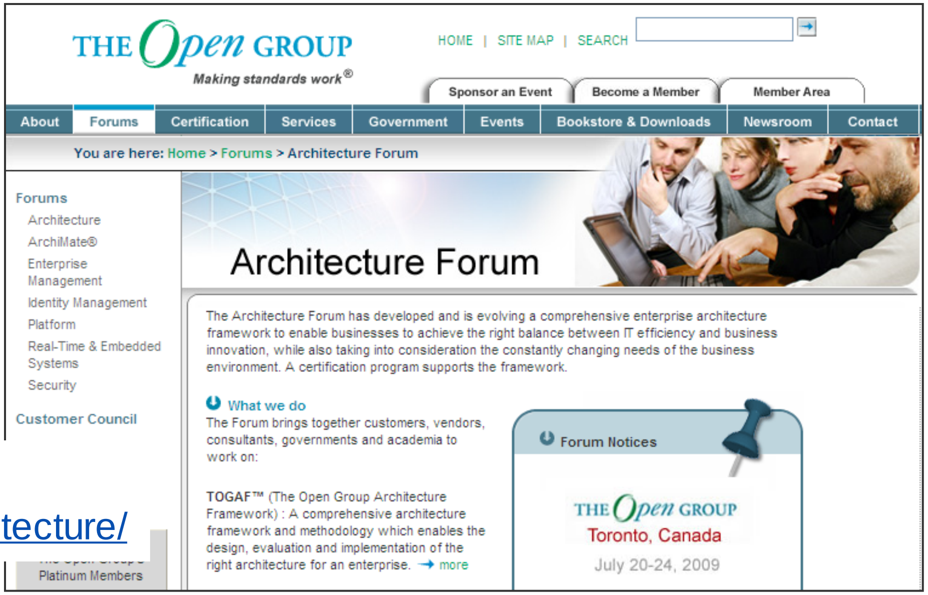
**TOGAF wird durch die Mitglieder des Architekturforums der Open Group gemeinsam weiterentwickelt.**

**Was darf von TOGAF erwartet werden?**

## TOGAF als Framework der Open Group

Das Open Group Architekturforum beschäftigt sich neben der Weiterentwicklung von TOGAF mit den folgenden Themen:

- TOGAF Zertifizierung
- Entwicklung der IT Architektur Praxis
- Architekturwerkzeuge



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Making standards work®

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- Identity Management
- Platform
- Real-Time & Embedded Systems
- Security

Customer Council

Platinum Members

Architecture Forum

The Architecture Forum has developed and is evolving a comprehensive enterprise architecture framework to enable businesses to achieve the right balance between IT efficiency and business innovation, while also taking into consideration the constantly changing needs of the business environment. A certification program supports the framework.

What we do

The Forum brings together customers, vendors, consultants, governments and academia to work on:

TOGAF™ (The Open Group Architecture Framework) : A comprehensive architecture framework and methodology which enables the design, evaluation and implementation of the right architecture for an enterprise. → more

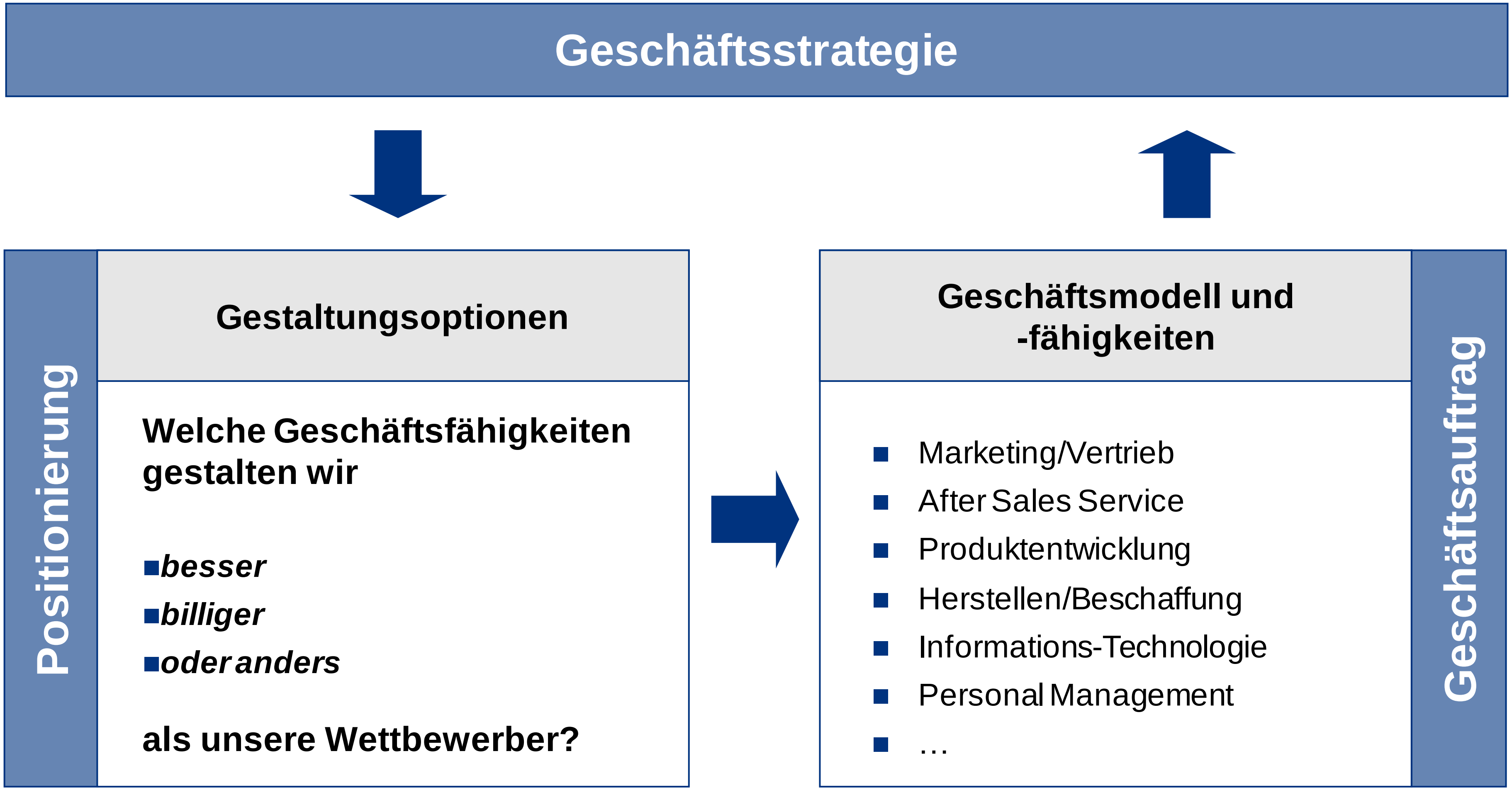
Forum Notices

THE Open GROUP
Toronto, Canada
July 20-24, 2009

Mehr unter:
http://www.opengroup.org/architecture/

# TOGAF als Business Transformation Framework

**Durch die spezifische Ausgestaltung ihrer Geschäftsfähigkeiten können Unternehmen und Institutionen Wettbewerbsvorteile aktiv entwickeln und ausbauen.**



## Geschäftsstrategie

Positionierung

### Gestaltungsoptionen

**Welche Geschäftsfähigkeiten gestalten wir**

- ***besser***
- ***billiger***
- ***oder anders***

**als unsere Wettbewerber?**

### Geschäftsmodell und -fähigkeiten

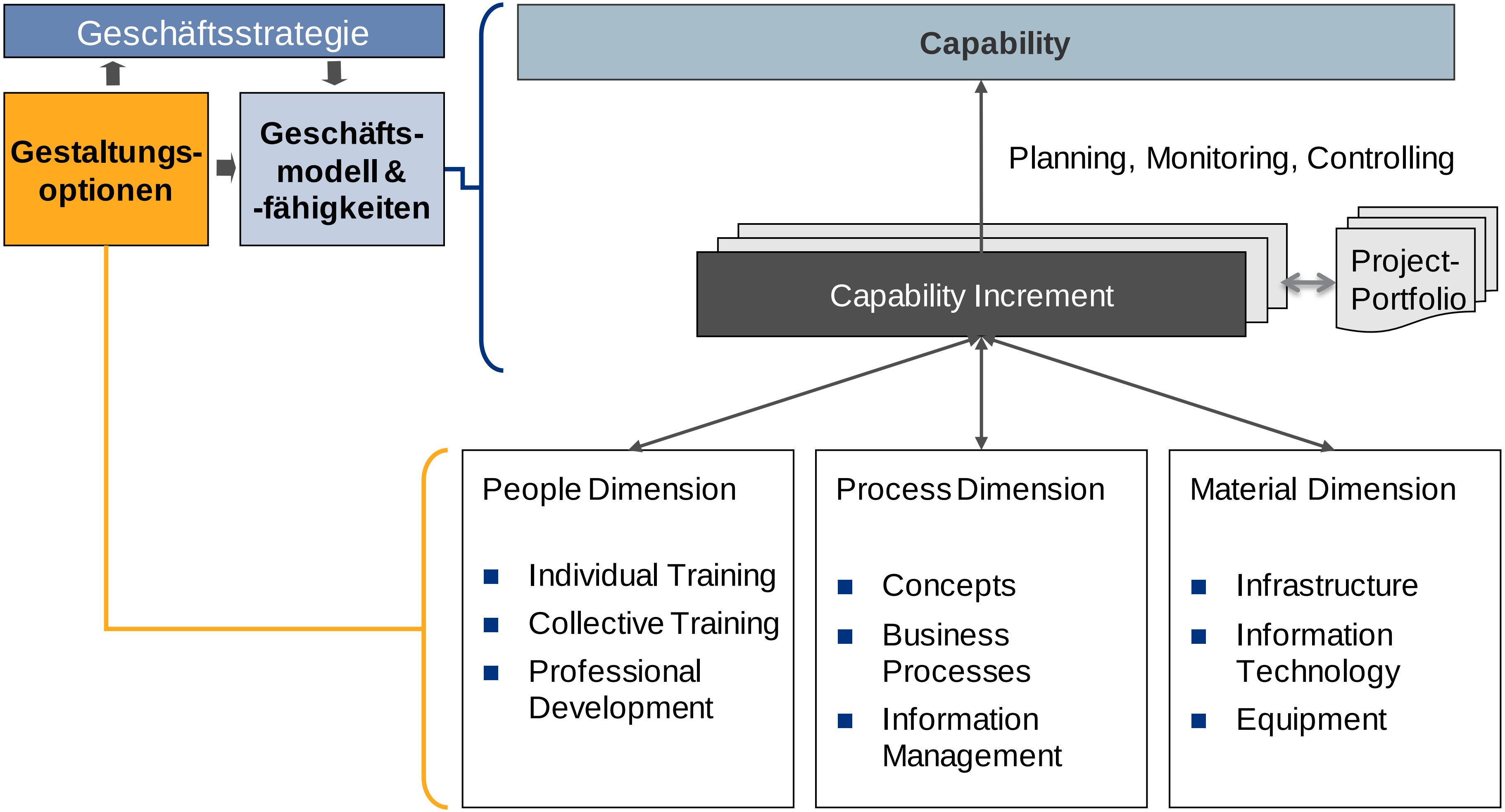
- Marketing/Vertrieb
- After Sales Service
- Produktentwicklung
- Herstellen/Beschaffung
- Informations-Technologie
- Personal Management
- …

Geschäftsauftrag

*Detecon, nach Michael E. Porter, "What is Strategy?", HBR On Point*

# TOGAF als Business Transformation Framework

**Die Dimensionen der Capabilities können mit dem Konzept Capability-Based Planning gezielt beplant und in KPIs gemessen werden.**



Geschäftsstrategie

Gestaltungsoptionen

Geschäftsmodell & -fähigkeiten

Capability

Planning, Monitoring, Controlling

Capability Increment

Project-Portfolio

People Dimension

- Individual Training
- Collective Training
- Professional Development

Process Dimension

- Concepts
- Business Processes
- Information Management

Material Dimension

- Infrastructure
- Information Technology
- Equipment

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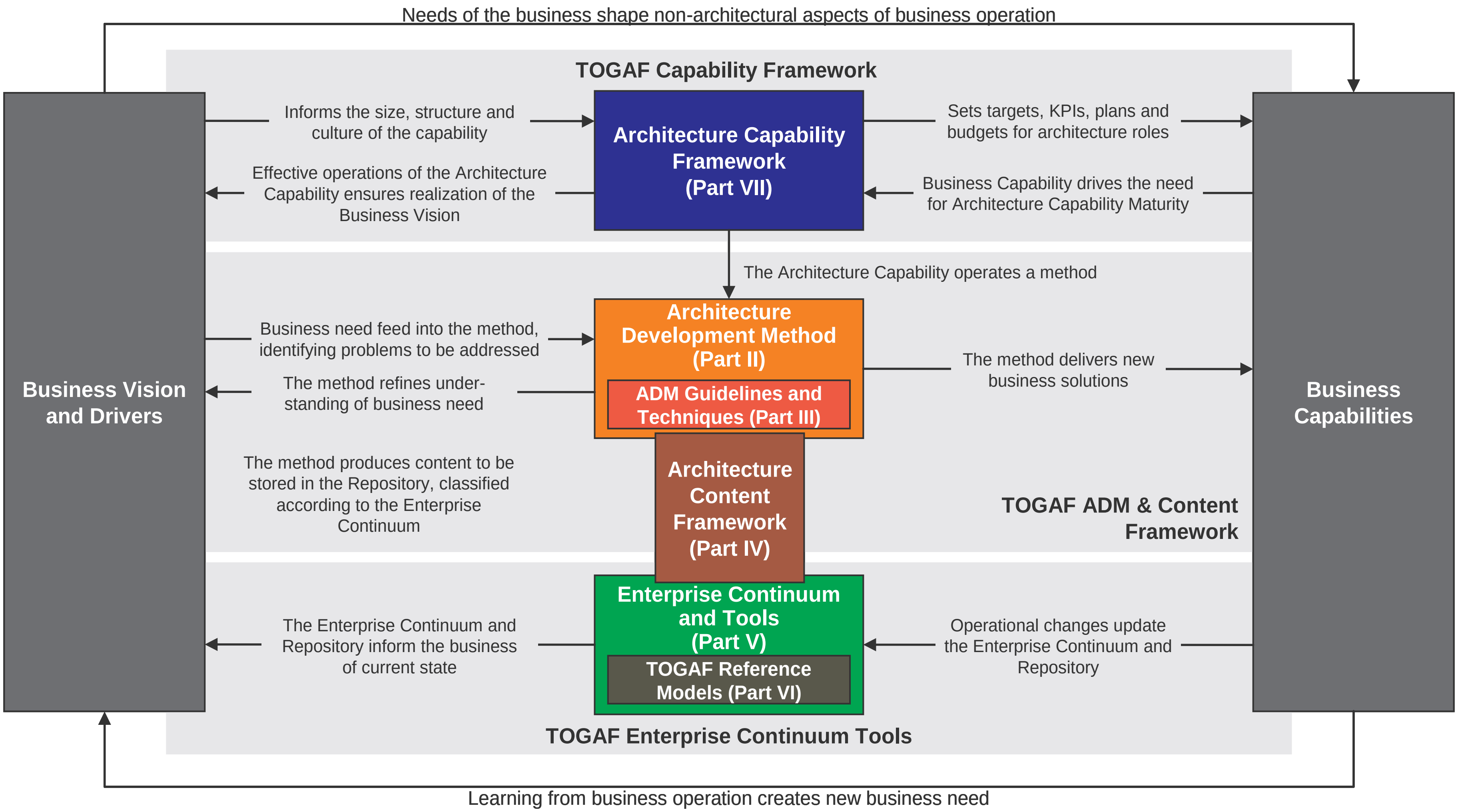
# TOGAF als Business Transformation Framework

**Die aktuelle Version 9 von TOGAF bietet eine gute Basis zur Entwicklung des eigenen Business Transformation Frameworks.**



Needs of the business shape non-architectural aspects of business operation

TOGAF Capability Framework

Business Vision and Drivers

Informs the size, structure and culture of the capability

Architecture Capability Framework (Part VII)

Sets targets, KPIs, plans and budgets for architecture roles

Effective operations of the Architecture Capability ensures realization of the Business Vision

Business Capability drives the need for Architecture Capability Maturity

The Architecture Capability operates a method

Business need feed into the method, identifying problems to be addressed

Architecture Development Method (Part II)

ADM Guidelines and Techniques (Part III)

The method refines understanding of business need

The method delivers new business solutions

Business Capabilities

The method produces content to be stored in the Repository, classified according to the Enterprise Continuum

Architecture Content Framework (Part IV)

TOGAF ADM & Content Framework

The Enterprise Continuum and Repository inform the business of current state

Enterprise Continuum and Tools (Part V)

TOGAF Reference Models (Part VI)

Operational changes update the Enterprise Continuum and Repository

TOGAF Enterprise Continuum Tools

Learning from business operation creates new business need

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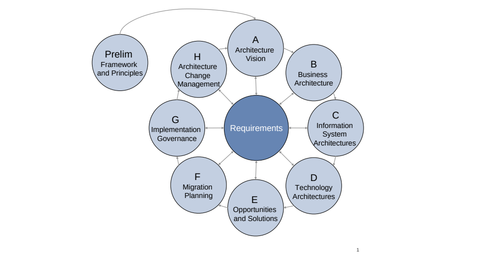
# TOGAF Kernelemente in Version 9

**Der Aufbau der TOGAF 9 Spezifikation orientiert sich an der Struktur und den Inhalten einer Enterprise Architecture Capability im Unternehmen.**

**Part I: Introduction**

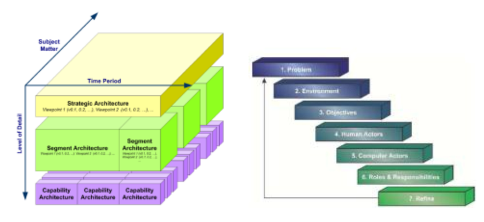
Einführung in die **Kernkonzepte** der Unternehmensarchitektur und insbesondere des TOGAF Ansatzes. Beinhaltet außerdem **Definitionen** zu den wichtigsten Begriffen und die Release Notes mit wesentlichen Unterschieden zu früheren TOGAF Versionen.

**Part II: Architecture Development Method (ADM)**


Prelim Framework and Principles
A Architecture Vision
B Business Architecture
C Information System Architectures
D Technology Architectures
E Opportunities and Solutions
F Migration Planning
G Implementation Governance
H Architecture Change Management
Requirements
1

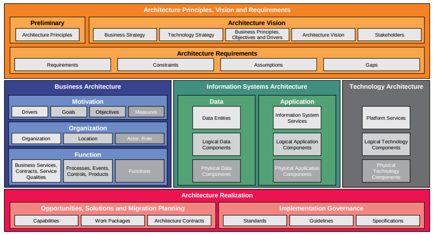
Der Kern von TOGAF beschreibt die TOGAF Architecture Development Method (ADM) – einen phasenbasierten Ansatz für die **Entwicklung einer Unternehmensarchitektur**.

**Part III: ADM Guidelines and Techniques**



Diese **Sammlung** enthält eine Reihe von **Anleitungen und Methoden**, die bei der Anwendung von TOGAF und der TOGAF ADM helfen.

**Part IV: Architecture Content Framework**



Architecture Principles, Vision and Requirements

Preliminary: Architecture Principles

Architecture Vision: Business Strategy, Technology Strategy, Business Principles, Objectives and Drivers, Architecture Vision, Stakeholders

Architecture Requirements: Requirements, Constraints, Assumptions, Gaps

Business Architecture

Motivation: Drivers, Goals, Objectives, Measures

Organization: Organization, Location, Actor, Role

Function: Business Services, Contracts, Service Qualities; Processes, Events, Controls, Products; Functions

Information Systems Architecture

Data: Data Entities, Logical Data Components, Physical Data Components

Application: Information System Services, Logical Application Components, Physical Application Components

Technology Architecture: Platform Services, Logical Technology Components, Physical Technology Components

Architecture Realization

Opportunities, Solutions and Migration Planning: Capabilities, Work Packages, Architecture Contracts

Implementation Governance: Standards, Guidelines, Specifications

Dieser Teil beschreibt das **TOGAF Content Framework**. Dieses beinhaltet u. a. ein strukturiertes **Metamodell** für Architektur-Artefakte, wieder verwendbare Architekur-Bausteine und typische Ergebnisse der Architekturarbeit.

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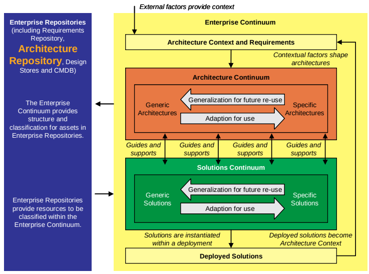
# TOGAF Kernelemente in Version 9 (cont.)

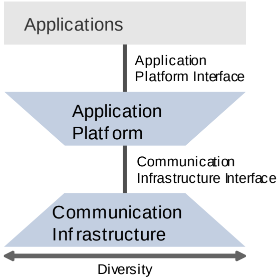
**Der Aufbau der TOGAF 9 Spezifikation orientiert sich an der Struktur und den Inhalten einer Enterprise Architecture Capability im Unternehmen.**

## Part V: Enterprise Continuum and Tools


External factors provide context
Enterprise Repositories (including Requirements Repository, Architecture Repository, Design Stores and CMDB)
The Enterprise Continuum provides structure and classification for assets in Enterprise Repositories.
Enterprise Repositories provide resources to be classified within the Enterprise Continuum.
Enterprise Continuum
Architecture Context and Requirements
Contextual factors shape architectures
Architecture Continuum
Generic Architectures
Generalization for future re-use
Adaption for use
Specific Architectures
Guides and supports
Guides and supports
Guides and supports
Guides and supports
Solutions Continuum
Generic Solutions
Generalization for future re-use
Adaption for use
Specific Solutions
Solutions are instantiated within a deployment
Deployed solutions become Architecture Context
Deployed Solutions

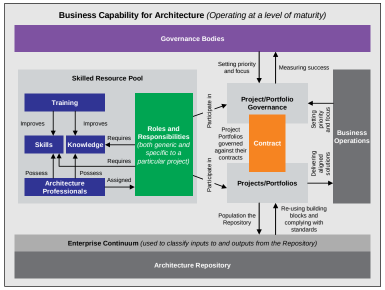
Dieser Teil behandelt die notwendige **Taxonomie und Tools**, die zur **Kategorisierung und Speicherung** der Ergebnisse der Architekturarbeit im Unternehmen benötigt werden.

## Part VI: TOGAF Reference Models


Applications
Application Platform Interface
Application Platform
Communication Infrastructure Interface
Communication Infrastructure
Diversity

Eine Auswahl an **Referenzmodellen**, u. a. das **TOGAF Technical Reference Model (TRM)**, und das **Integrated Information Infrastructure Reference Model (III-RM)**.

## Part VII: Architecture Capability Framework

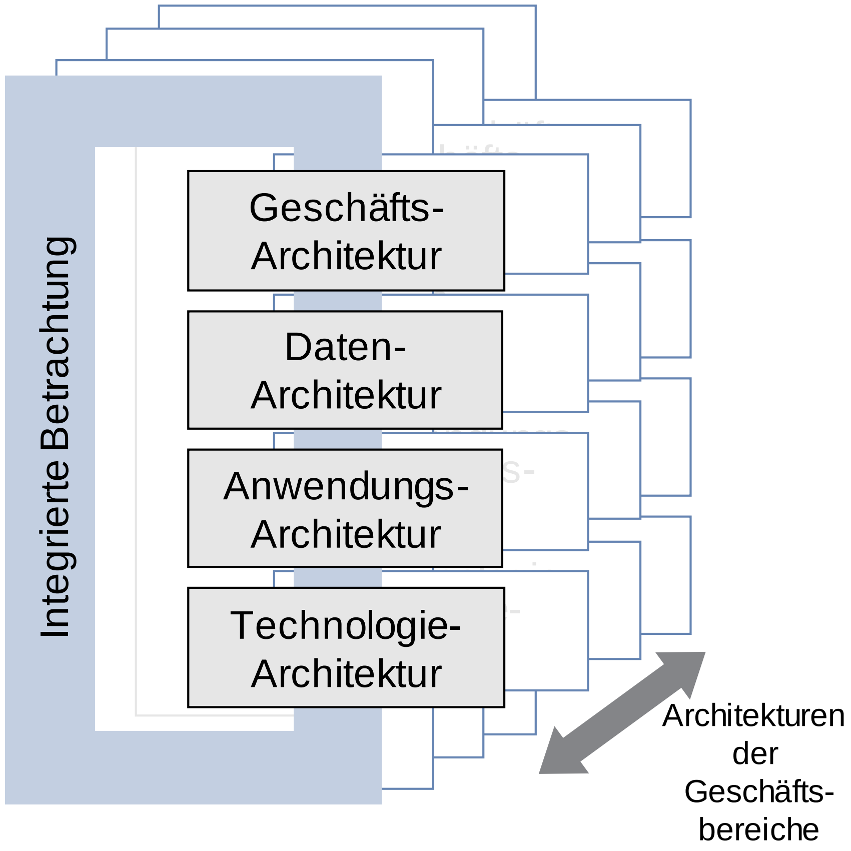

Business Capability for Architecture (Operating at a level of maturity)
Governance Bodies
Setting priority and focus
Measuring success
Skilled Resource Pool
Training
Improves
Improves
Skills
Knowledge
Requires
Requires
Possess
Possess
Assigned
Architecture Professionals
Roles and Responsibilities (both generic and specific to a particular project)
Participate in
Participate in
Project/Portfolio Governance
Project Portfolios governed against their contracts
Contract
Projects/Portfolios
Setting priority and focus
Delivering aligned solutions
Business Operations
Population the Repository
Re-using building blocks and complying with standards
Enterprise Continuum (used to classify inputs to and outputs from the Repository)
Architecture Repository

Die für die Implementierung und den Betrieb der **Architektur-Funktion** eines Unternehmens benötigte **Organisation, Prozesse, Skills, Rollen und Verantwortlichkeiten**.

# TOGAF Basiskonzepte: Architekturebenen

**TOGAF strukturiert das grundlegende Architekturmodell in vier Ebenen, die entkoppelt voneinander, aber auch in ihrem Gesamtzusammenhang betrachtet werden können.**

## Architekturmodell des Unternehmens



## Architekturebenen

### Geschäftsarchitektur

- Produkt- oder Service-Strategie, Organisation, Prozesse, fachliche Funktionen, Standorte

### Datenarchitektur

- Geschäftsobjekte, Geschäftsdaten, deren Typen und Ressourcen (CRUD)

### Anwendungsarchitektur

- IT-Unterstützung fachlicher Funktionen, Informationsflüsse

### Technologiearchitektur

- Plattformen, Komponenten, technische Elemente

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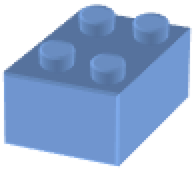
# TOGAF Basiskonzepte: Architektur- und Lösungsbausteine

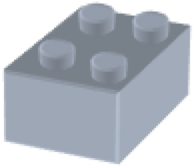
**Die getrennte Betrachtung von Architektur- und Lösungsbausteinen ermöglicht besseres Life-Cycle-Management durch die unabhängige Planung von Technologie und Hersteller.**

**Architekturbausteine (ABB)** werden als Ergebnis aus dem Durchlaufen der ADM definiert oder wiederverwendet:



- Beschreiben Funktionalität implementierungsunabhängig
- Erfassen geschäftliche und technische Anforderungen
- Berücksichtigen vorhandene Technologie
- Planungs- und Steuerungsinstrument für Lösungsbausteine

**Lösungsbausteine (SBB)** werden entweder beschafft oder entwickelt.

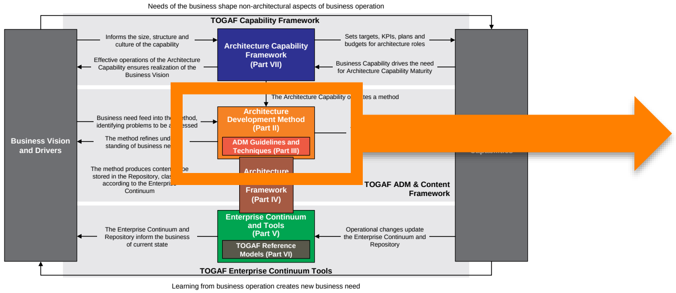


- Plattformen, Applikationen und Komponenten mit implementierter Funktionalität
- Erfüllen die Geschäftsanforderungen
- Berücksichtigen konkrete Produkt- und Lieferantenstrategien

# Architekturentwicklung mit TOGAF: Architecture Development Method - ADM

Die Architecture Development Method (ADM) als Kern von TOGAF beschreibt einen phasenbasierten Ansatz für die Entwicklung von Architekturen.

## TOGAF 9 Struktur


Needs of the business shape non-architectural aspects of business operation
TOGAF Capability Framework
Informs the size, structure and culture of the capability
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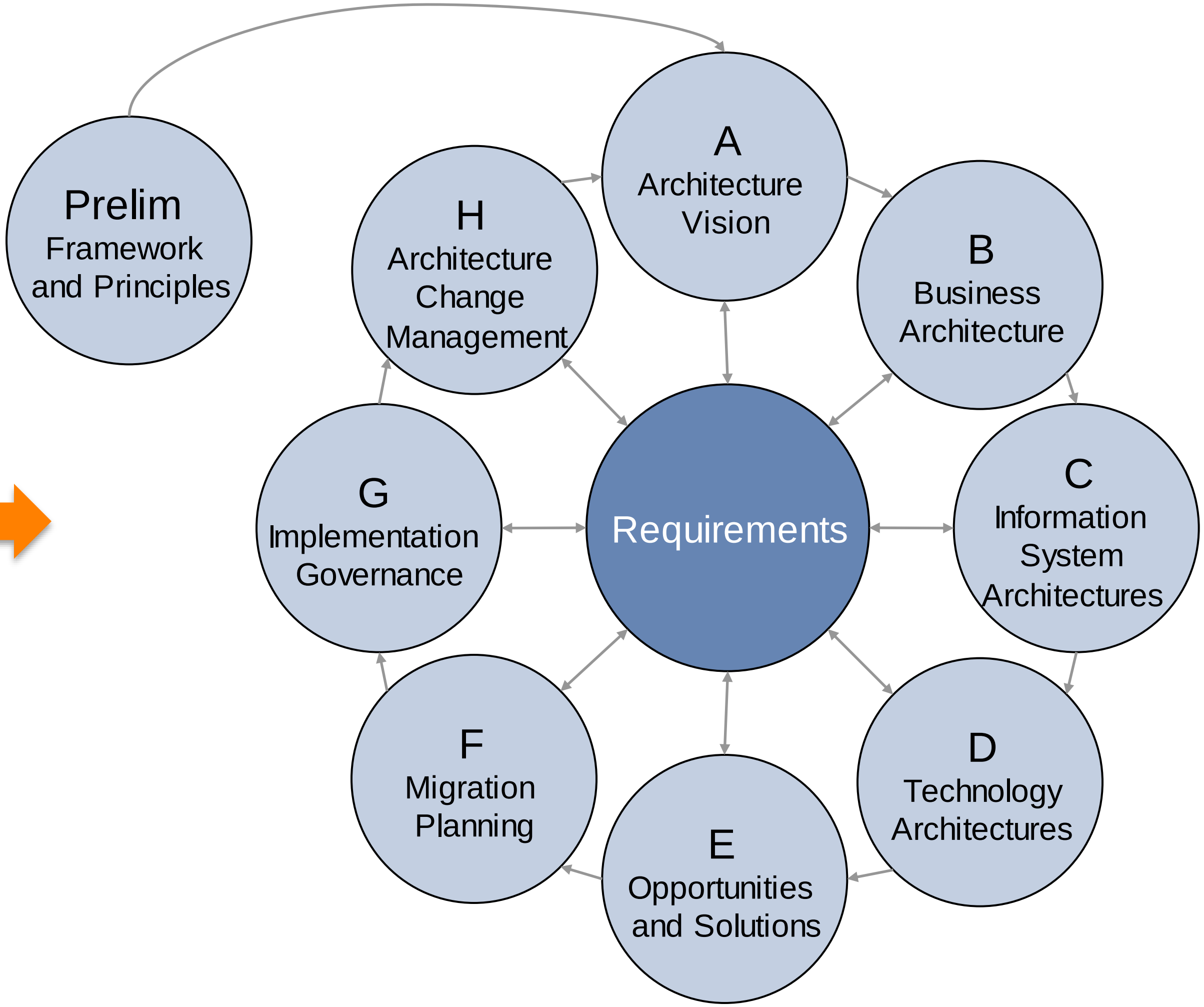
Business Capability drives the need for Architecture Capability Maturity
The Architecture Capability o tes a method
Business need feed into th thod, identifying problems to be a ssed
Architecture Development Method (Part II)
ADM Guidelines and Techniques (Part III)
Business Vision and Drivers
The method refines und standing of business ne
The method produces conten be stored in the Repository, clas according to the Enterprise Continuum
Architecture Framework (Part IV)
TOGAF ADM & Content Framework
Enterprise Continuum and Tools (Part V)
TOGAF Reference Models (Part VI)
The Enterprise Continuum and Repository inform the business of current state
Operational changes update the Enterprise Continuum and Repository
TOGAF Enterprise Continuum Tools
Learning from business operation creates new business need



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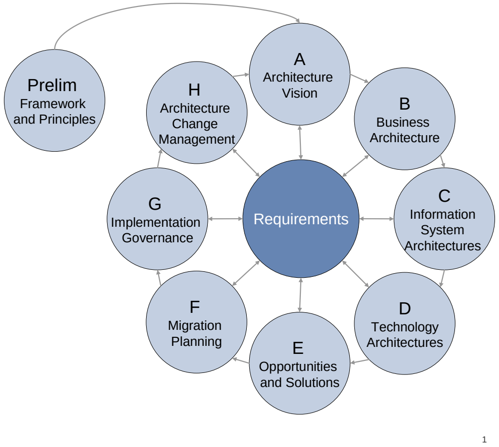
# Architekturentwicklung mit TOGAF: Architecture Development Method - ADM

**Die Architecture Development Method (ADM) kann (muss nicht) an spezifische Anforderungen angepasst werden.**

.

## Überblick und wesentliche Eigenschaften der ADM

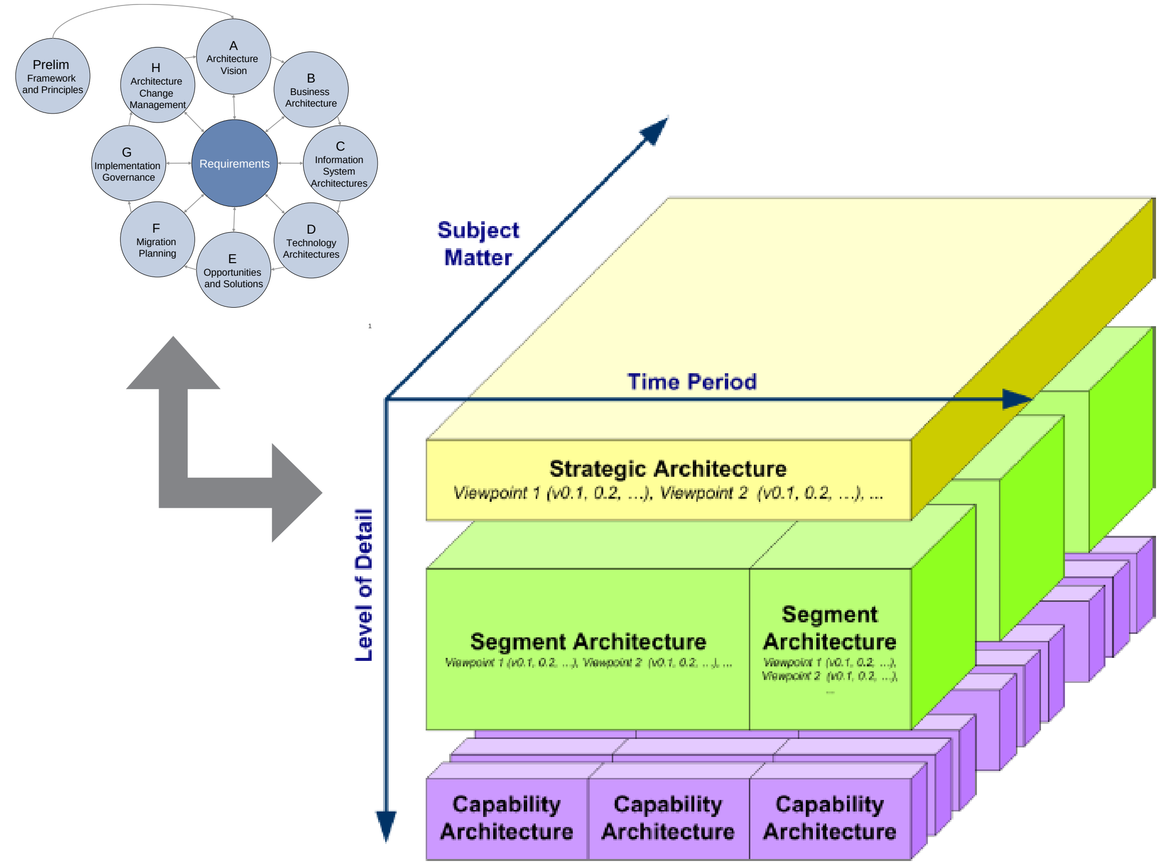
- Die ADM ist **iterativ**:
  Innerhalb eines ADM-Durchlaufs kann in vorherige Phasen zurückgesprungen werden. Auch wird die ADM in der Regel mehrfach mit unterschiedlichem Wirkungsbereich (Scope) und Detailgrad durchlaufen.
- Benötigt einen **klaren Wirkungsbereich** pro Phase und Durchlauf:
  - Unternehmensbereiche und Detailgrad
  - Zeithorizont und Meilensteine
  - Architekturelemente
- Für das Scoping relevante **Kriterien**:
  - verfügbaren Ressourcen und Kompetenzen
  - erwarteter Nutzen
- ADM ist **generisch**, d. h. unabhängig vom Industriebereich anwendbar



# Architekturentwicklung mit TOGAF: Architecture Development Method - ADM

**TOGAF ermöglicht es, Architekturen mit unterschiedlichem Wirkungsbereich, Granularität und Zeitbezug im Gesamtkontext, unternehmensweit koordiniert zu entwickeln.**

## Klassifikationsmodell für Architekturlandschaften



Prelim Framework and Principles

A Architecture Vision

B Business Architecture

C Information System Architectures

D Technology Architectures

E Opportunities and Solutions

F Migration Planning

G Implementation Governance

H Architecture Change Management

Requirements

Subject Matter

Time Period

Level of Detail

Strategic Architecture
*Viewpoint 1 (v0.1, 0.2, …), Viewpoint 2 (v0.1, 0.2, …), ...*

Segment Architecture
*Viewpoint 1 (v0.1, 0.2, …), Viewpoint 2 (v0.1, 0.2, …), ...*

Segment Architecture
*Viewpoint 1 (v0.1, 0.2, …), Viewpoint 2 (v0.1, 0.2, …), ...*

Capability Architecture

Capability Architecture

Capability Architecture

## Kommentare

- Die TOGAF ADM kann auf den verschiedenen Ebenen des Unternehmens eingesetzt werden
- Aufgrund der Komplexität und der unterschiedlichen Interessen der Stakeholder ist eine allumfassende Architekturentwicklung in einem Modell nicht zielführend
- TOGAF nennt weitere mögliche Dimensionen für die Klassifikation von Architekturen und Lösungen

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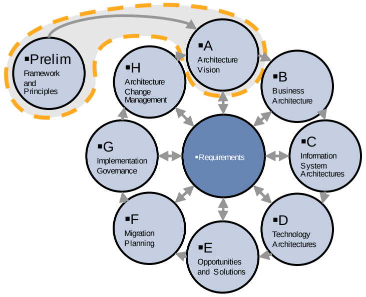
# Architekturentwicklung mit TOGAF: Architecture Development Method - ADM

## Projektbeispiel: ADM als stringente Vorgehensweise für die Umsetzung von Anforderungen in eine Architektur-konforme Lösung.

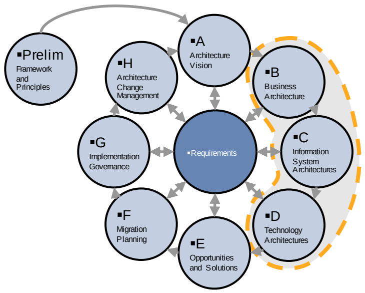
### Strategie und Handlungsfelder entwickeln



Prelim Framework and Principles
H Architecture Change Management
A Architecture Vision
B Business Architecture
G Implementation Governance
Requirements
C Information System Architectures
F Migration Planning
E Opportunities and Solutions
D Technology Architectures

- Geschäftsstrategie-analyse zur Identifikation der strategischen Treiber
- Entwicklung gemeinsamer Sprache und Modelle, z.B. Domänen
- Identifizierung der Haupthandlungsfelder
- Definition der Architekturprinzipien

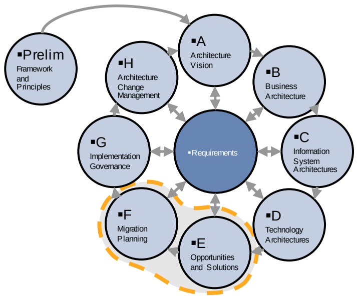
### Enterprise Architecture entwickeln



Prelim Framework and Principles
H Architecture Change Management
A Architecture Vision
B Business Architecture
G Implementation Governance
Requirements
C Information System Architectures
F Migration Planning
E Opportunities and Solutions
D Technology Architectures

- Strategie-konforme Entwicklung der detaillierteren Architekturen für Geschäfts-, Informationssystem- und Technologiearchitektur

### Ziellösungen finden und Migration planen



Prelim Framework and Principles
H Architecture Change Management
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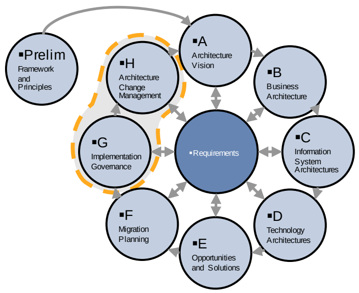
B Business Architecture
G Implementation Governance
Requirements
C Information System Architectures
F Migration Planning
E Opportunities and Solutions
D Technology Architectures

- Bewertung verschiedener Szenarien für die Umsetzung des Zielbilds und Treffen der Entscheidung
- Entwicklung einer Migrationsstrategie

### Umsetzung kontrollieren und Veränderungen überwachen



Prelim Framework and Principles
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Requirements
C Information System Architectures
F Migration Planning
E Opportunities and Solutions
D Technology Architectures

- Etablieren der notwendigen Governance-Strukturen, um die Architektur-konforme Umsetzung zu überwachen
- Etablierung eines Prozesses, um die Auslöser für die Neugestaltung der Planung zu identifizieren

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# TOGAF und andere EAM-Frameworks

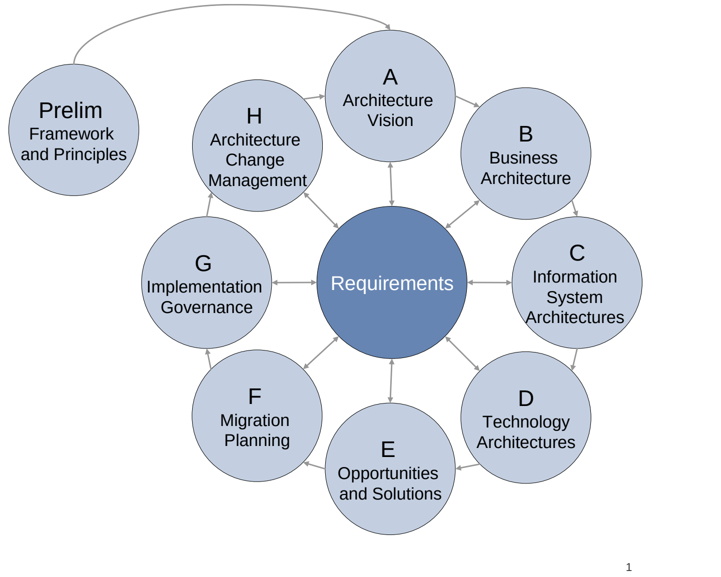
**Während Frameworks wie Zachman die Ergebnisse der Architekturarbeit klassifizieren, beschreibt TOGAF ergänzend eine Methode für die Architekturentwicklung.**

## Enterprise Architecture Frameworks

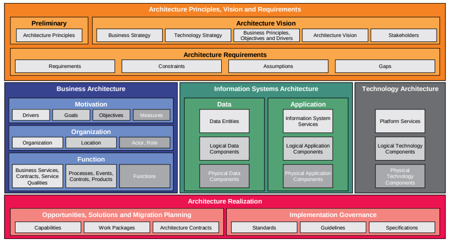
Eine Beschreibung der Methode, mit der die Ergebnisse erzeugt werden

Definition und Klassifizierung der Ergebnisse, welche Architekturarbeit produzieren sollte

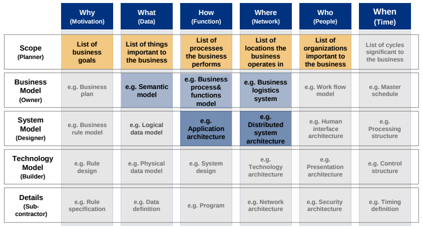
### Architecture Development Method (ADM)



### TOGAF Content Framework (Metamodell)



### Andere Frameworks (z.B. Zachman)



| | Why (Motivation) | What (Data) | How (Function) | Where (Network) | Who (People) | When (Time) |
|---|---|---|---|---|---|---|
| Scope (Planner) | List of business goals | List of things important to the business | List of processes the business performs | List of locations the business operates in | List of organizations important to the business | List of cycles significant to the business |
| Business Model (Owner) | e.g. Business plan | e.g. Semantic model | e.g. Business process& functions model | e.g. Business logistics system | e.g. Work flow model | e.g. Master schedule |
| System Model (Designer) | e.g. Business rule model | e.g. Logical data model | e.g. Application architecture | e.g. Distributed system architecture | e.g. Human interface architecture | e.g. Processing structure |
| Technology Model (Builder) | e.g. Rule design | e.g. Physical data model | e.g. System design | e.g. Technology architecture | e.g. Presentation architecture | e.g. Control structure |
| Details (Sub-contractor) | e.g. Rule specification | e.g. Data definition | e.g. Program | e.g. Network architecture | e.g. Security architecture | e.g. Timing definition |

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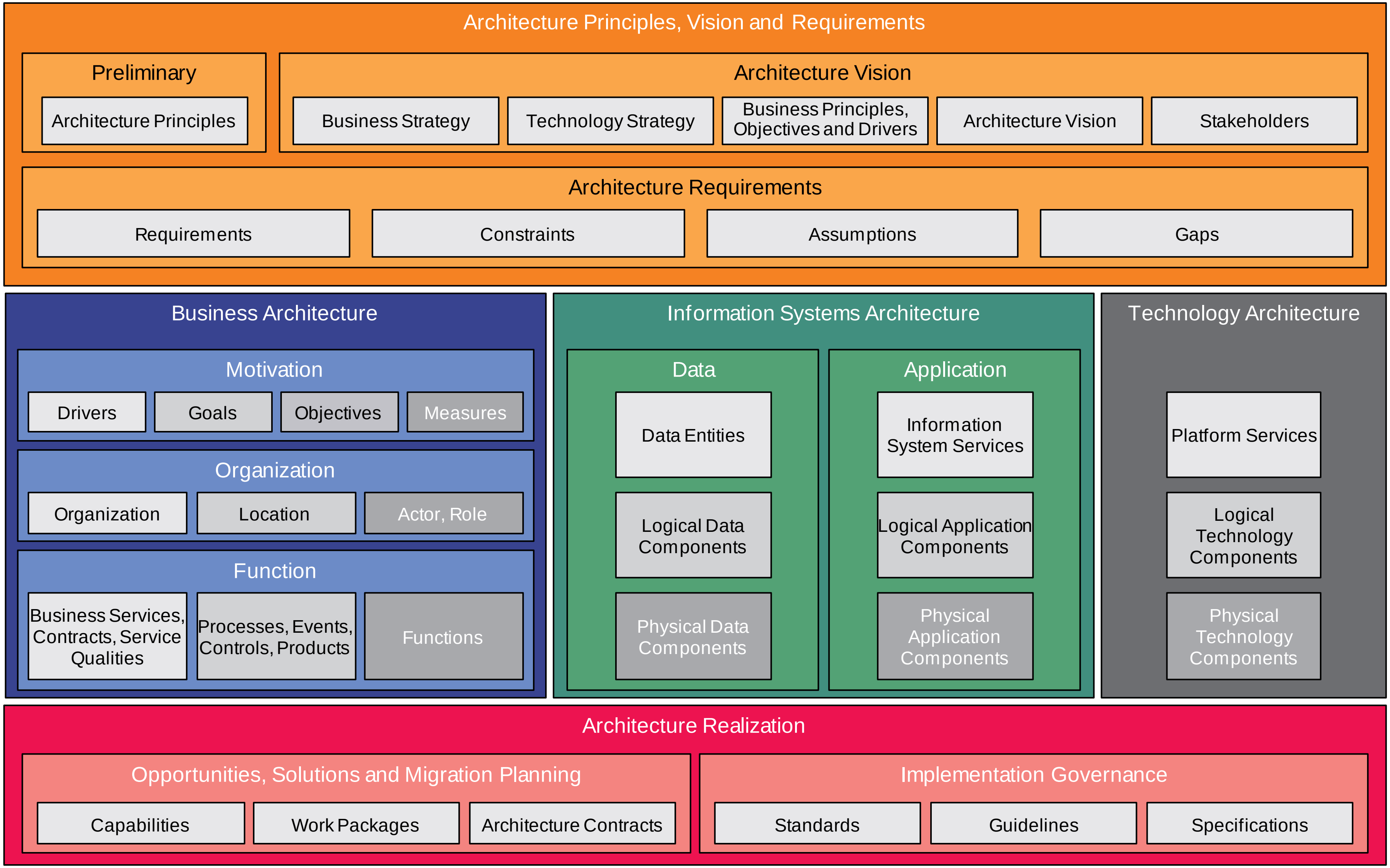
# EA-Metamodell: Architecture Content Framework



Architecture Principles, Vision and Requirements

Preliminary
- Architecture Principles

Architecture Vision
- Business Strategy
- Technology Strategy
- Business Principles, Objectives and Drivers
- Architecture Vision
- Stakeholders

Architecture Requirements
- Requirements
- Constraints
- Assumptions
- Gaps

Business Architecture

Motivation
- Drivers
- Goals
- Objectives
- Measures

Organization
- Organization
- Location
- Actor, Role

Function
- Business Services, Contracts, Service Qualities
- Processes, Events, Controls, Products
- Functions

Information Systems Architecture

Data
- Data Entities
- Logical Data Components
- Physical Data Components

Application
- Information System Services
- Logical Application Components
- Physical Application Components

Technology Architecture
- Platform Services
- Logical Technology Components
- Physical Technology Components

Architecture Realization

Opportunities, Solutions and Migration Planning
- Capabilities
- Work Packages
- Architecture Contracts

Implementation Governance
- Standards
- Guidelines
- Specifications

# 5 EAM tools: State-of-the-Art

Vorlesung Strategisches IT Management & EAM

**Dr. Sabine Buckl**
Software Engineering betrieblicher Informationssysteme (sebis)

wwwmatthes.in.tum.de

# Learning objectives of this unit

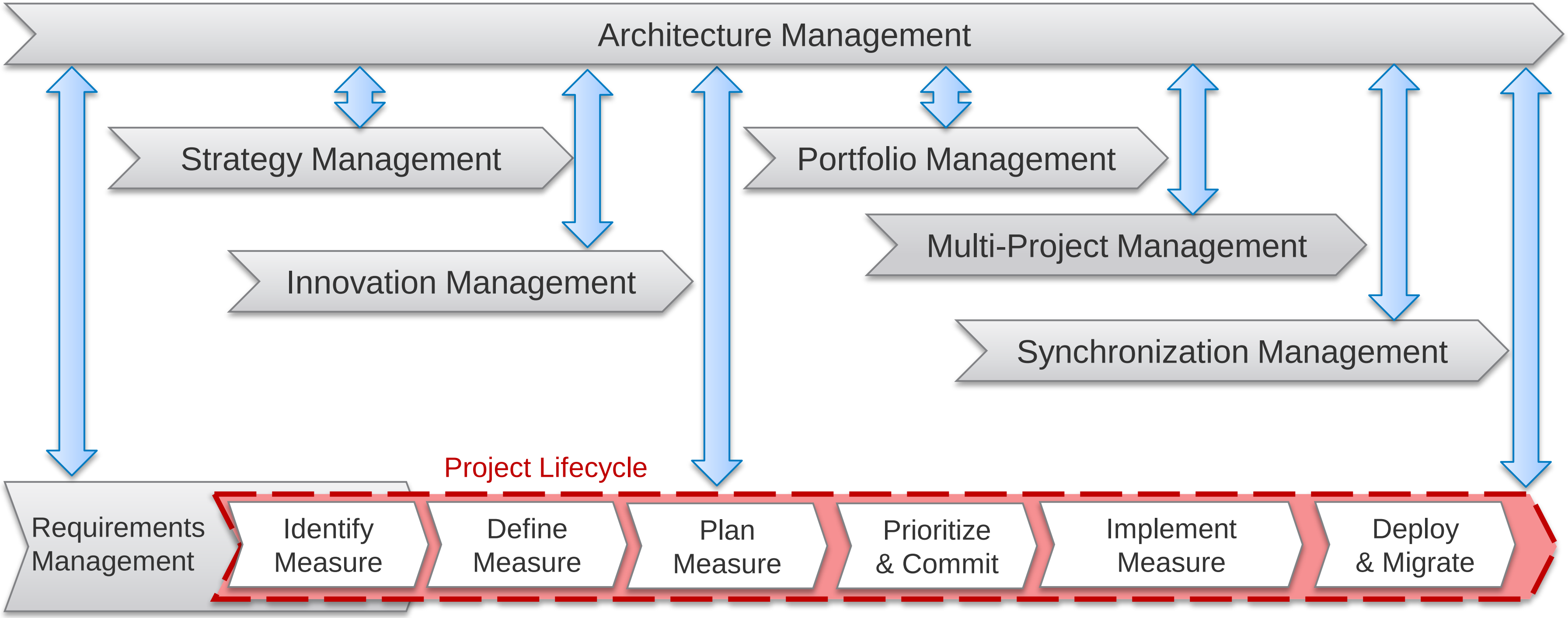
- Knowing what requirements for an EA management tool exist from a practitioners point of view
- Understanding how different EA management tools can be evaluated
- Being capable of detailing on the different approaches and origins of EA management tools
- Obtaining a general idea of how a generic approach to select an EA management tool looks like

# Outline of this unit

- Origin and background: Approaches of EAM tools
- The Enterprise Architecture Management Tool Survey 2008
  - Questionnaire
  - Scenarios
  - Results
- What happened since the survey
- How to introduce an EAM tool

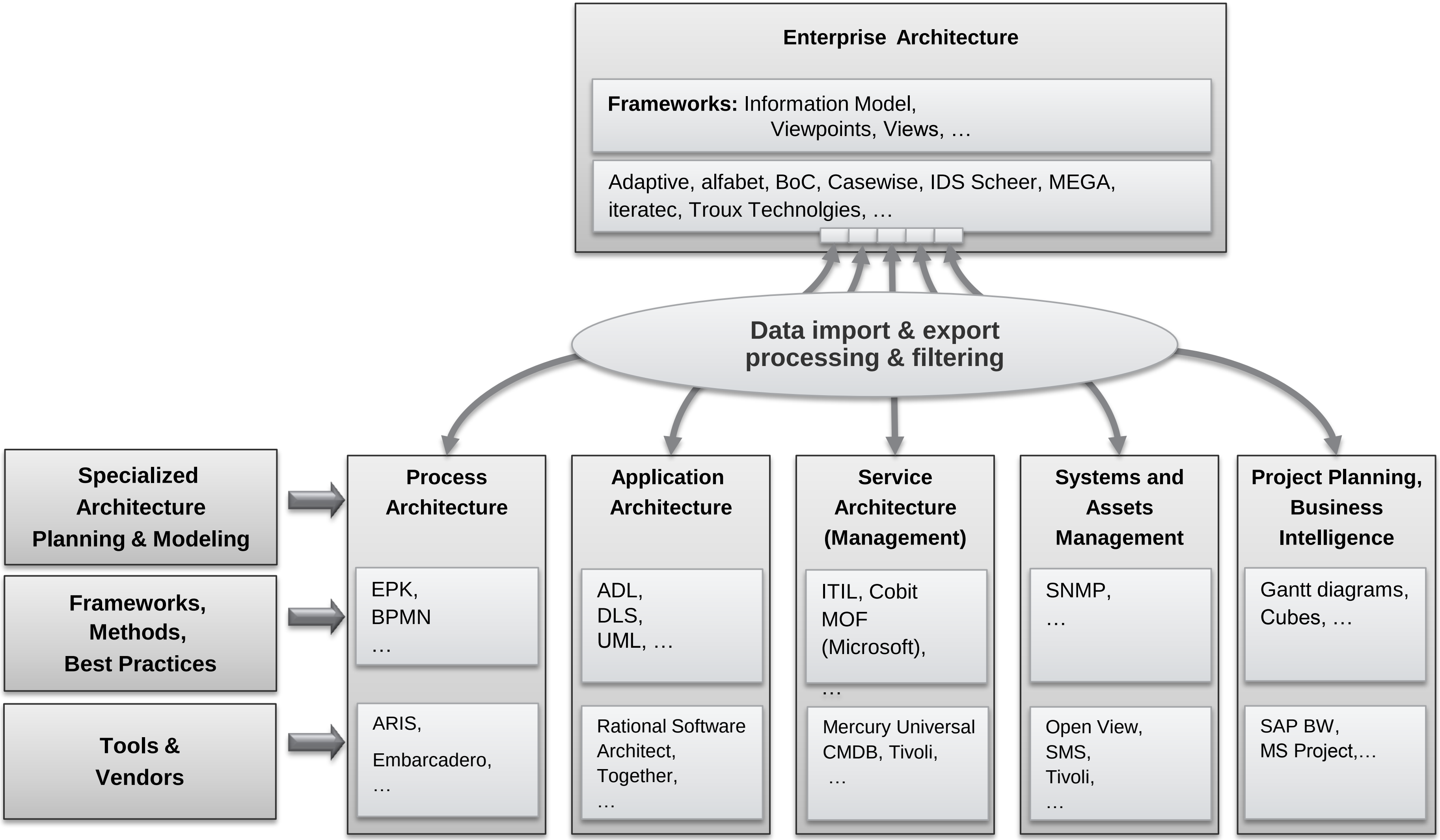
# Challenges for EAM tools (1)

## The „glue“ between different managment functions



# Challenges for EAM tools (2)

## Be connected to different information sources



**Enterprise Architecture**

**Frameworks:** Information Model, Viewpoints, Views, …

Adaptive, alfabet, BoC, Casewise, IDS Scheer, MEGA, iteratec, Troux Technolgies, …

**Data import & export processing & filtering**

**Specialized Architecture Planning & Modeling**

**Frameworks, Methods, Best Practices**

**Tools & Vendors**

**Process Architecture**

EPK,
BPMN
…

ARIS,
Embarcadero,
…

**Application Architecture**

ADL,
DLS,
UML, …

Rational Software Architect,
Together,
…

**Service Architecture (Management)**

ITIL, Cobit
MOF
(Microsoft),
…

Mercury Universal CMDB, Tivoli,
…

**Systems and Assets Management**

SNMP,
…

Open View,
SMS,
Tivoli,
…

**Project Planning, Business Intelligence**

Gantt diagrams,
Cubes, …

SAP BW,
MS Project,…

# Approaches of EAM tools (1)

EAM-Tools have different approaches

- *Flexibility vs. Guidance* regarding process, method, and information model for supporting EA management
- *Preconfigured vs. Customization* regarding the functionality provided by the tool out of the box – two approaches exist: EA management *solution* vs. EA management *platform*
- *Integration vs. Single-Point-of-Truth* regarding the information base of the tool, which in the one approach is collected from a variety of sources, while in the other approach being under data sovereignty of the tool itself
- (Framework-driven)

These approaches are not disjoint!

- Combinations of different approaches are possible
- Tools follow partially several approaches with variable degree of coverage

Attention: Mostly no exact matching between tools and approaches is possible!

# Approaches of the tools (2)

Flexibility vs. Guidance:

- Meta model driven approach:
  - Customers can adapt the information model to their needs
  - Reports and visualizations have to be adapted to the changed information model
  - Mightiness of the tools at changing the information model is heavily variable; From small proprietary solutions up to MOF compliant solutions
- Methodology driven approach:
  - Predefined and documented methodology (methodology manual)<br>➔ How to use which models?<br>➔ Which elements belong to which models?
  - Only small or no changes to the information model, methodology remains
  - Reports and visualizations are coupled to the information model
- Process driven approach:
  - Methodology is expanded with a management processs<br>➔ The “what” and “how” of the methodology ist extended by the “when”
  - Process connects different modules in a process model

# Approaches of the tools (3)

## Preconfigured vs. Customization

- EA Management Solutions (Preconfigured)
  - Preconfigured functionality for typical EA Management tasks are provided by delivery
  - “Misuse“ is aggravated
  - Rampant learning curve  (Training, Consulting necessary)
- EA Management Platforms (Customization)
  - At delivery only basic functionality is provided
  - Implementation of a company specific EA Management approach is possible
  - At the beginning of the implementation of the tool a customer specific adaption is necessary

# Approaches of the tools (4)

Integration vs. Single-point-of-truth

- Single-point-of-truth
  - Data of EA are stored centrally in the EAM Tool
  - Replication is done „manually“ via imports
    ➔ conflict resolution strategy is necessary
  - High data consistency, clear data sovereignty
- Integration
  - EAM-Tool acts as „Data Warehouse“
  - Main target of these EAM-Tools is the maintenance of the relation information
  - Reuse of different data sources
  - Linking, integration and aggregation of different sources in one model
  - Demands sophisticated transformation possibilities
  - Is also called „Metadata Integration“
    ➔ Data consistency and data sovereignty may be problematic

# Classification of different EAM tools

| EAM Tool | Meta model driven | Methodology driven | Process driven | EAM solution | EAM platform | Integration ("EAM Warehouse„) | Single-point-of-truth |
|---|---|---|---|---|---|---|---|
| adaptive EAM 5.0 | ✓ □ | □□ | □□ | ✓ □ | | ✓ □ | □□ |
| planningIT 3.1 | □□ | □□ | ✓ □ | ✓ □ | □□ | □□ | ✓ □ |
| ADOit 3.0 | ✓ □ | | □□ | □□ | ✓ □ | □□ | ✓ □ |
| Embarcadero EA/Studio 1.5 | □□ | ✓ □ | □□ | ✓ □ | □□ | □□ | ✓ □ |
| ARIS IT Architect 7.0.2 | □□ | ✓ □ | □□ | ✓ □ | | □□ | ✓ □ |
| iteraplan | □□ | ✓ □ | □□ | ✓ □ | | □□ | ✓ □ |
| MEGA Modeling Suite 2007 | ✓ □ | | □□ | ✓ □ | | □□ | ✓ □ |
| Metastorm ProVision 6.0 | ✓ □ | □□ | □□ | ✓ □ | | □□ | ✓ □ |
| System Architect 11.0 | ✓ □ | □□ | □□ | ✓ □ | | □□ | ✓ □ |
| Troux 7 | ✓ □ | □□ | □□ | □□ | ✓ □ | ✓ □ | □□ |

# Example of a combination of approaches

Methodology driven and metamodel driven approach

- Tool owns methodology manual and
- Tools allows definition of customized information model

**Variant 1:**

- Information model is customized and the given model is changed (not only extended!)
- Consequence: Predefined methodology has to be replaced partially!
- Remark: This is often done, when the tool has good meta modeling capabilities and the methodology does not fit.

**Variant 2:**

- Predefined information model is only extended slightly
- Consequence: Predefined methodology has to be extended!
- Remark: This is often done, when the tool has a good methodology but the company specifications are not yet defined.

# Example of an unusual approach

- Meta model of the tool cannot be customized but the methodology is bended.
  - The information model is implicitly redefined
  - Existing models of the tool are redefined using a self-developed method manual
- Consequences: An own method manual has to be written
- Remark:
  - If a tool is already applied in an enterprise, which is (politically) set, or no funds are available for the purchasing of a new product, this method is chosen frequently
  - Even UML-tools are used!

# Outline of this unit

- Origin and background: Approaches of EAM tools
- The Enterprise Architecture Management Tool Survey 2008
  - Questionnaire
  - Scenarios
  - Results
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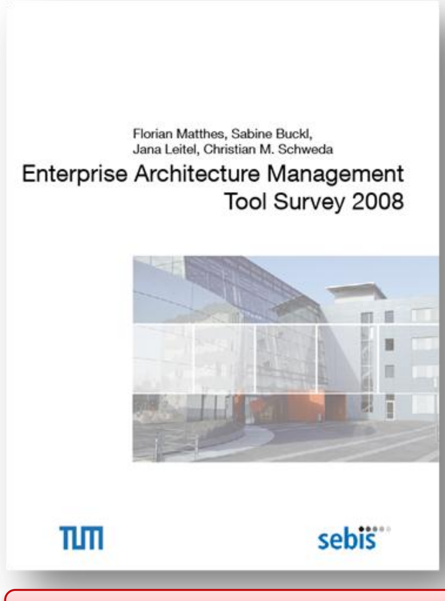
- How to introduce an EAM tool

# The Enterprise Architecture Management Tool Survey (EAMTS)

Several tools with

- different origins,
- different approaches,
- different goals, and
- different strenghts and weaknesses.



Florian Matthes, Sabine Buckl,
Jana Leitel, Christian M. Schweda

Enterprise Architecture Management Tool Survey 2008

TUM

sebis

- Adaptive, Ltd.: Adaptive EAM
- Agilense, Inc.: EA WebModeler
- alfabet AG: planningIT
- ASG, Inc.: ASG Enterprise Management/Rochade
- BEA AquaLogic: Enterprise Repository
- BiZZdesign: BiZZdesign Architect, BiZZdesigner
- BOC GmbH: ADOit/ADOxx
- Casewise Ltd.: Corporate Modeler Suite, IT Architecture Accelerator
- Embarcadero: EA/Studio
- Future Tech Systems Inc.: ENVISION VIP
- Hewlett Packard: Mercury Project and Portfolio Management Center
- IBM: Rational Software Architect
- IDS Scheer AG: ARIS Toolset
- MEGA International SA: MEGA Modeling Suite
- Primavera: ProSight
- process4.biz: process4.biz
- Proforma Corp.: ProVision Modeling Suite
- pulinco: TopEase Suite
- Telelogic AB: System Architect
- Troux Technologies, Inc: Metis Architect, Metis Server, Metis Collection

The survey can be downloaded at http://wwwmatthes.in.tum.de/pages/1wdia0twywb0w/EAMTS2008

# Partners and sponsors of the EAMTS2008

## Users

Fraport

BMW

MINI

Nokia Siemens Networks

schufa
Wir schaffen Vertrauen

KUEHNE+NAGEL

EWE

Postbank

World of TUI

Die Bahn DB

HVB Information Services
Member of UniCredit Group

P&G

SEB

FIDUCIA
Ihr IT-Partner

HSH NORDBANK

Team!Bank
Simply one step ahead

T

WACKER

B/S/H/

Deutsche Bank

O2

LVM Versicherungen

Antriebs- und Fahrwerktechnik ZF

Allianz

Münchener Rück
Munich Re Group

zollner

SIEMENS

## Consultants

SYRACOM
The Business and IT Architects

act!

Consulting
DETECON

sd&m
A Company of Capgemini

# Identifying the mayor players (as of 2007)

| Nr | Name of Vendor | Name of Tool(s) | Relevance for "Short List“ (Points 1-low to 3-high) | Total | | | Short List |
|---|---|---|---|---|---|---|---|
| 1 | AB+ Conseil | SOLU-QIQ | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 24 | \|\|\|\|\|\|\|\|\|\|\|\|\|\| | | |
| 2 | Acceptsoftware | Accep360 | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 24 | \|\|\|\|\|\|\|\|\|\|\|\|\|\| | | |
| 3 | Adaptive | Adaptive EAM | 3 1 1 2 3 1 2 1 3 1 3 2 2 2 1 1 2 2 2 1 1 1 1 3 | 42 | | \|\|\|\| | x |
| 4 | Agilense | EA WebModeler | 1 1 1 2 1 1 1 1 2 1 3 2 1 1 1 1 1 2 3 2 1 1 1 2 | 34 | \|\|\|\| | | |
| 5 | alfabet AG | planningIT | 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 3 2 2 3 | 69 | | \|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\| | x |
| 6 | ASG | ASG Enterprise Management/Rochade | 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 3 1 1 3 1 2 | 30 | \|\|\|\|\|\|\|\| | | |
| 7 | Avolution | ABACUS | 1 1 1 1 1 1 2 1 1 2 1 2 3 1 1 1 1 3 1 1 1 1 1 2 | 32 | \|\|\|\|\|\| | | |
| 8 | BEA AquaLogic | Enterprise Repository | 1 1 1 2 3 1 2 2 2 2 1 1 2 1 1 2 1 3 1 2 1 1 2 1 | 37 | \| | | |
| 9 | BiZZdesign | BiZZdesign Architect, BiZZdesigner | 1 1 1 1 1 1 3 1 1 1 1 1 2 1 1 1 1 2 1 1 1 1 1 1 | 28 | \|\|\|\|\|\|\|\|\|\| | | |
| 10 | BOC | ADOit/ADOxx | 3 1 3 1 3 1 2 1 3 1 3 1 2 1 1 1 2 2 3 1 2 1 3 2 | 44 | | \|\|\|\|\|\| | x |
| 11 | BTM Corporation | BTM 360 Product Suite | 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 2 | 26 | \|\|\|\|\|\|\|\|\|\|\|\| | | |
| 12 | CA | Clarity | 1 1 1 2 1 1 1 2 1 3 1 1 1 2 3 3 1 2 1 1 1 1 1 2 | 35 | \|\|\| | | |
| 13 | Casewise | Corporate Modeler Suite, IT Architecture Accelerator | 1 1 1 3 3 2 2 1 3 1 3 3 3 2 2 1 2 3 3 2 1 1 1 3 | 48 | | \|\|\|\|\|\|\|\|\|\| | x |
| 14 | Comma Soft | infonea | 2 1 1 1 1 2 1 1 3 2 1 1 1 3 1 2 1 3 2 1 1 1 1 1 | 35 | \|\|\| | | |
| 15 | Embarcadero | EA/Studio | 1 1 1 1 1 1 2 1 1 2 3 1 2 1 1 1 1 1 3 1 1 1 1 3 | 33 | \|\|\|\|\| | | |
| 16 | Enterprise Elements | Elements Repository | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 | 25 | \|\|\|\|\|\|\|\|\|\|\|\|\| | | |
| 17 | Framework Software | Structure | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 24 | \|\|\|\|\|\|\|\|\|\|\|\|\|\| | | |
| 18 | Future Tech Systems | ENVISION VIP | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 | 25 | \|\|\|\|\|\|\|\|\|\|\|\|\| | | |
| 19 | GoAgile | GoAgile MAP | 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 2 2 1 1 1 1 2 | 28 | \|\|\|\|\|\|\|\|\|\| | | |
| 20 | Hewlett Packard | Mercury Project and Portfolio Management Center | 1 1 2 3 1 1 1 2 2 2 3 2 3 3 3 2 1 3 2 3 1 3 2 2 | 49 | | \|\|\|\|\|\|\|\|\|\|\| | x |
| 21 | IBM | Rational Software Architect | 2 3 2 3 3 1 2 2 2 1 3 2 3 1 1 2 1 1 1 3 3 1 2 1 | 46 | | \|\|\|\|\|\|\|\| | x |
| 22 | IDS Scheer | ARIS IT Architect | 3 3 3 3 3 3 3 2 3 2 3 3 3 3 3 3 3 3 3 3 3 3 1 3 | 68 | | \|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\| | x |
| 23 | IDS Scheer | ARIS ArchiMate Modeler | 3 1 2 2 3 1 3 2 3 1 1 2 3 3 2 3 3 2 3 3 3 2 1 1 | 53 | | \|\|\|\|\|\|\|\|\|\|\|\|\|\|\| | x |
| 24 | INOVA Engineering | MERGE-Tool | 1 1 1 1 1 1 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 26 | \|\|\|\|\|\|\|\|\|\|\|\| | | |
| 25 | Intelligile | Map Suite | 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 | 26 | \|\|\|\|\|\|\|\|\|\|\|\| | | |
| 26 | Knotion Consulting | SYNAP-C Solution | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 24 | \|\|\|\|\|\|\|\|\|\|\|\|\|\| | | |
| 27 | LogicLibrary | LogiScan & Logidex | 1 1 1 1 1 1 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 26 | \|\|\|\|\|\|\|\|\|\|\|\| | | |
| 28 | MEGA International | MEGA Modeling Suite | 1 1 2 2 3 2 3 1 3 3 1 3 1 1 1 1 2 3 3 1 2 1 1 3 | 45 | | \|\|\|\|\|\|\| | x |
| 29 | NetViz | NetViz | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 | 25 | \|\|\|\|\|\|\|\|\|\|\|\|\| | | |
| 30 | Orbus Software | iServer for EA iServer | 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 2 | 27 | \|\|\|\|\|\|\|\|\|\|\| | | |
| 31 | Primavera | ProSight | 1 3 1 2 1 1 1 1 1 2 1 1 2 1 1 3 1 1 2 1 1 1 1 2 | 33 | \|\|\|\|\| | | |
| 32 | process4.biz | process4.biz | 1 1 1 1 3 1 3 1 3 1 1 1 1 1 1 1 1 2 2 1 1 1 1 2 | 33 | \|\|\|\|\| | | |
| 33 | Proforma | ProVision Modeling Suite | 1 3 1 3 1 2 3 1 2 1 1 2 1 1 2 1 1 2 2 1 1 1 1 3 | 38 | | | x |
| 34 | pulinco | TopEase Suite | 1 1 1 1 1 1 2 1 1 1 1 1 2 1 1 1 1 1 3 1 1 3 1 1 | 30 | \|\|\|\|\|\|\|\| | | |
| 35 | QualiWare | EAM Suite | 1 1 1 2 1 1 3 1 3 2 1 1 1 1 1 1 1 2 3 1 1 1 2 1 | 34 | \|\|\|\| | | |
| 36 | Select Business Solutions | Select Component Architect | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 24 | \|\|\|\|\|\|\|\|\|\|\|\|\|\| | | |
| 37 | Sparx Systems | Enterprise Architect | 1 1 3 2 1 1 1 1 2 1 1 1 1 1 1 3 1 1 1 3 1 1 1 1 | 32 | \|\|\|\|\|\| | | |
| 38 | Sybase | PowerDesigner | 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 | 26 | \|\|\|\|\|\|\|\|\|\|\|\| | | |
| 39 | Telelogic | System Architect | 2 1 1 3 3 2 3 1 3 3 3 3 2 2 2 3 2 3 3 3 3 3 3 3 | 60 | | \|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\| | x |
| 40 | Troux Technologies | Metis Architect, Metis Server, Metis Collection | 3 3 3 2 1 2 3 2 3 3 3 1 1 1 2 1 3 3 3 3 3 1 2 3 | 55 | | \|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\|\| | x |
| 41 | Visible Systems Corporation | Visible Enterprise Products | 1 1 1 2 1 1 2 1 1 1 1 1 1 1 1 1 1 1 3 2 1 1 1 2 | 30 | \|\|\|\|\|\|\|\| | | |

# Tools sorted based on interest of sponsors & partners

| | Vendor | Tool |
|---|---|---|
| | alfabet AG | planningIT |
| | IDS Scheer | ARIS IT Architect |
| | Telelogic | System Architect |
| | Troux Technologies | Metis Architect, Metis Server, Metis Collection |
| * | IDS Scheer | ARIS ArchiMate Modeler |
| * | Hewlett Packard | Mercury Project and Portfolio Management Center |
| | Casewise | Corporate Modeler Suite, IT Architecture Accelerator |
| * | IBM | Rational Software Architect |
| | MEGA International | MEGA Modeling Suite |
| | BOC | ADOit/ADOxx |
| | Adaptive | Adaptive EAM |
| ⬆ | Proforma | ProVision Modeling Suite |
| ⬆ | Embarcadero | EA/Studio |
| | BEA AquaLogic | Enterprise Repository |
| | CA | Clarity |
| | Comma Soft | infonea |
| | Agilense | EA WebModeler |
| | QualiWare | EAM Suite |
| | Primavera | ProSight |
| ⬇ | process4.biz | process4.biz |
| | Avolution | ABACUS |
| | Sparx Systems | Enterprise Architect |
| | ASG | ASG Enterprise Management/Rochade |
| | pulinco | TopEase Suite |
| | Visible Systems Corporation | Visible Enterprise Products |
| | … | … |

Short List

* Tool unaccounted for evaluation

# Online questionnaire EAMTS2008

- Categories
  - Vendor data
  - Tool data
  - General tool architecture
  - Collaboration support
  - Internationalization / Localization
  - Integration with related domains
  - Methodology
  - Integration with other modeling tools

# Outline of this unit

- Origin and background: Approaches of EAM tools
- The Enterprise Architecture Management Tool Survey 2008
  - Questionnaire
  - Scenarios
  - Results
- What happened since the survey
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# EAMTS2008 scenarios

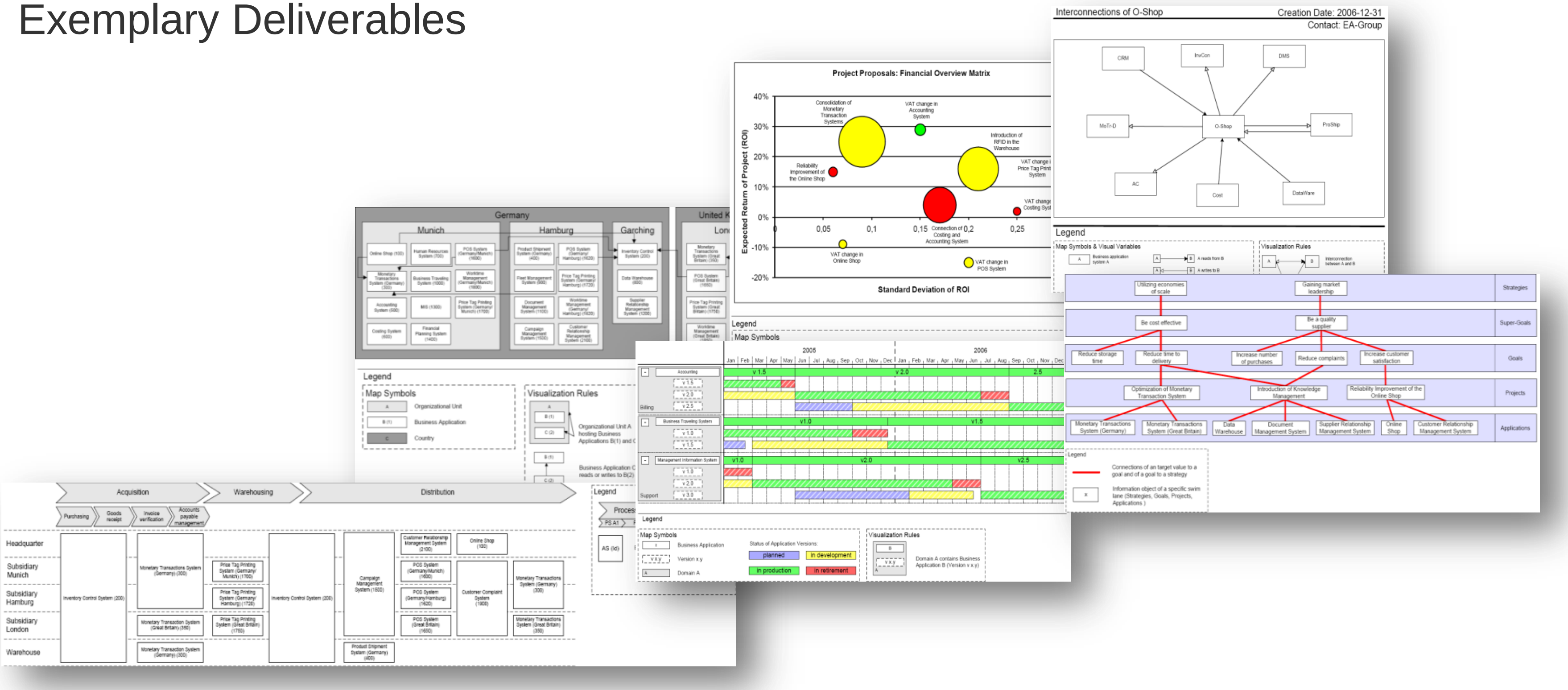
- Scenarios for Analyzing Specific Functionalities
  - Importing, Editing, and Validating Model Data
  - Creating Visualizations of the Application Landscape
  - Interacting with and Editing of Visualizations of the Application Landscape
  - Annotating Visualizations with Certain Aspects
  - Supporting light weight Access
  - Editing Model Data using an external Editor
  - Adapting the Information Model
  - Handling large scale Application Landscapes
  - Supporting multiple Users and collaborative Work
- Scenarios for Analyzing EA Management Support
  - Landscape Management
  - Demand Management
  - Project Portfolio Management
  - Synchronization Management
  - Strategies and Goals Management
  - Business Object Management
  - SOA Transformation
  - IT Architecture Management
  - Infrastructure Management

# Scenario: Creating visualizations of the application landscape

Concerns of this scenario

- The department store SoCaStore wants to get an overview of its application landscape and its EA. This should be accomplished by the creation of six different visualizations for different aspects of the application landscape: a cluster map, a process support map, a time interval map, and a graphlayout map as well as a swimlane diagram and a portfolio matrix.

Exemplary Deliverables



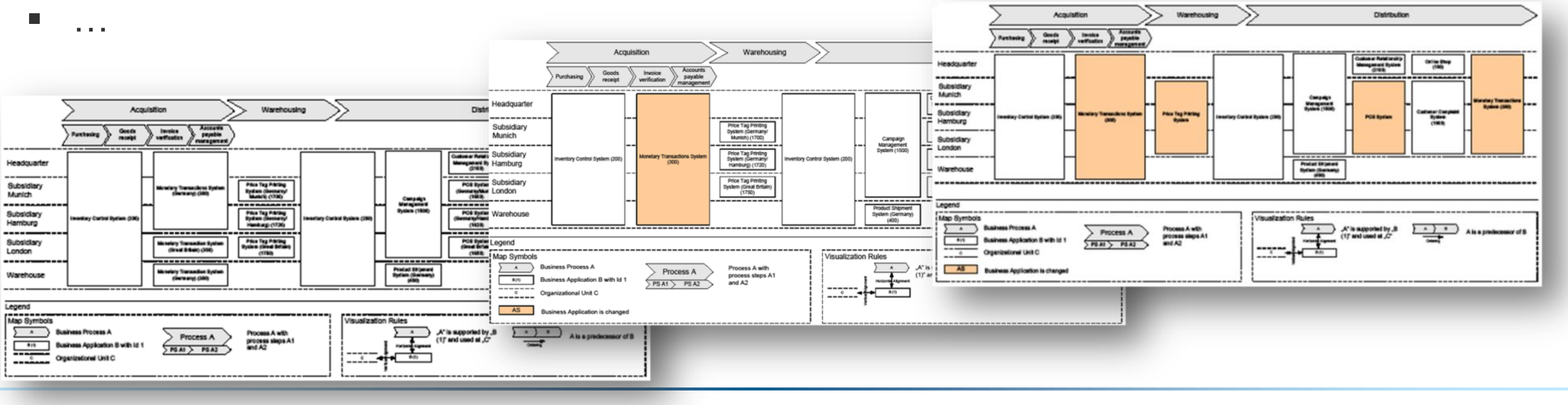
# Scenario: Landscape management

Concerns of this scenario

- Information about the application landscape should be stored in the tool. Starting with the information about the current landscape, potential development variants should be modeled. The information about the current application landscape and future states should be historicized in the tool to enable comparisons.
- Chosen versions of the application landscape, e. g. current, planned, and target landscapes should be analyzed and compared using different visualizations and reports.

Typical questions to be answered

- What does the current application landscape look like today?
- What is, according to the plan of 01-01-2009, the application landscape going to look like in January 2010?
- What does the target landscape look like?
- …



Acquisition
Warehousing
Distribution
Purchasing
Goods receipt
Invoice verification
Accounts payable management
Headquarter
Subsidiary Munich
Subsidiary Hamburg
Subsidiary London
Warehouse
Inventory Control System (200)
Monetary Transactions System (300)
Price Tag Printing System
Campaign Management System (1500)
Customer Relationship Management System (2100)
Online Shop (100)
POS System
Customer Complaint System (1900)
Product Shipment System (Germany) (400)
Legend
Map Symbols
Business Process A
Business Application B with Id 1
Organizational Unit C
AS
Business Application is changed
Process A
PS A1
PS A2
Process A with process steps A1 and A2
Visualization Rules
„A" is supported by „B (1)" and used at „C"
A is a predecessor of B

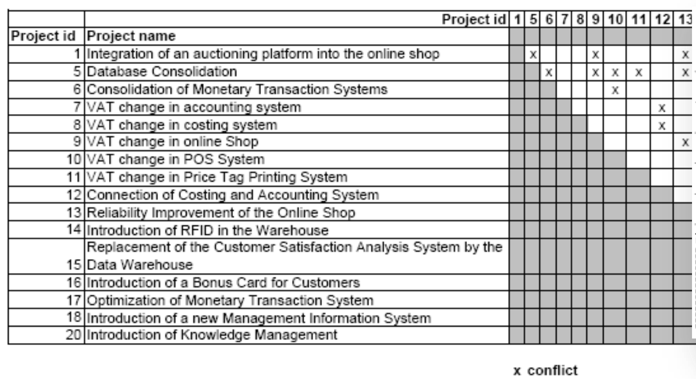
# Scenario: Project portfolio management

Concerns of this scenario

- The IT department of the SoCaStore department store has received numerous project proposals. In consideration of the processes, organizational units, and application systems affected by the project proposals a selection of the project proposals should be made. The available budget for projects is 5 million EUR.

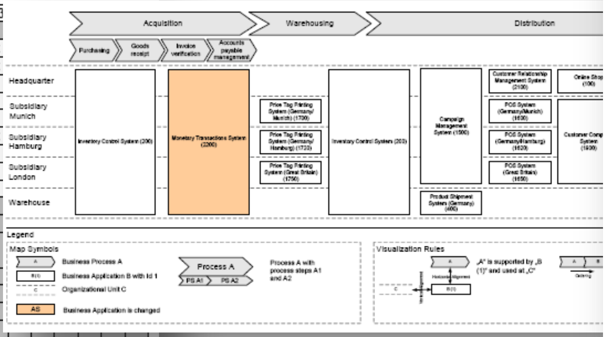
Typical questions to be answered

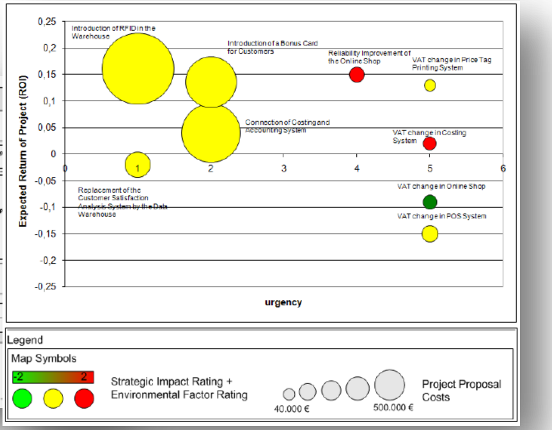
- Which project proposals have been received?
- What costs are calculated for which project proposal?
- What is the expected return of investment of which project proposal?
- Which processes/organizational units are affected by the changes as they use the application systems modified by the project proposals?
- Which projects should be accomplished in any case?



| | Project id | 1 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Project id | Project name | | | | | | | | | | |
| 1 | Integration of an auctioning platform into the online shop | | x | | | | x | | | | x |
| 5 | Database Consolidation | | | x | | | x | x | x | | x |
| 6 | Consolidation of Monetary Transaction Systems | | | | | | | x | | | |
| 7 | VAT change in accounting system | | | | | | | | | x | |
| 8 | VAT change in costing system | | | | | | | | | x | |
| 9 | VAT change in online Shop | | | | | | | | | | x |
| 10 | VAT change in POS System | | | | | | | | | | |
| 11 | VAT change in Price Tag Printing System | | | | | | | | | | |
| 12 | Connection of Costing and Accounting System | | | | | | | | | | |
| 13 | Reliability Improvement of the Online Shop | | | | | | | | | | |
| 14 | Introduction of RFID in the Warehouse | | | | | | | | | | |
| 15 | Replacement of the Customer Satisfaction Analysis System by the Data Warehouse | | | | | | | | | | |
| 16 | Introduction of a Bonus Card for Customers | | | | | | | | | | |
| 17 | Optimization of Monetary Transaction System | | | | | | | | | | |
| 18 | Introduction of a new Management Information System | | | | | | | | | | |
| 20 | Introduction of Knowledge Management | | | | | | | | | | |

x conflict


Acquisition
Warehousing
Distribution
Purchasing
Goods receipt
Invoice verification
Accounts payable management
Headquarter
Subsidiary Munich
Subsidiary Hamburg
Subsidiary London
Warehouse
Inventory Control System (200)
Monetary Transactions System (2200)
Price Tag Printing System (Germany/ Munich) (1700)
Price Tag Printing System (Germany/ Hamburg) (1720)
Price Tag Printing System (Great Britain) (1750)
Inventory Control System (203)
Campaign Management System (1500)
Product Shipment System (Germany) (400)
Customer Relationship Management System (2100)
POS System (Germany/Munich) (1600)
POS System (Germany/Hamburg) (1620)
POS System (Great Britain) (1650)
Online Shop (100)
Customer Comp System (1900)
Legend
Map Symbols
Business Process A
Business Application B with Id 1
Organizational Unit C
AS
Business Application is changed
Process A
PS A1
PS A2
Process A with process steps A1 and A2
Visualization Rules
„A" is supported by „B (1)" and used at „C"



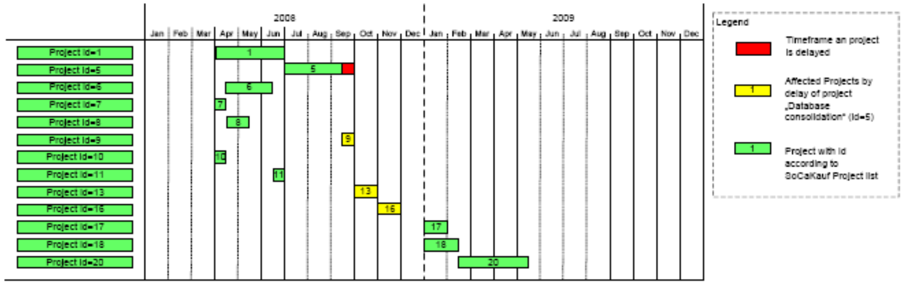
# Scenario: Synchronization management

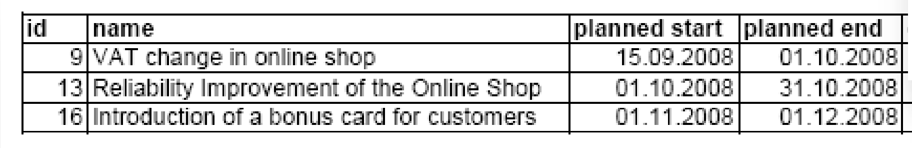
Concerns of this scenario

- To support the management of ongoing projects and to plan future projects, there has to be the possibility to model and manage project interdependencies or to derive them from affected elements of the EA.
- It should be possible to analyze the project timeline using Gantt-like diagrams. This timeline shall than be updated and annotated to reflect delays of a single project as well as to identify projects, that depend on it and might also be delayed.

Typical questions to be answered

- Which projects affect the same organizational unit?
- Which dependencies exist among projects?
- What happens, if a particular project is delayed? Which schedules have to be adapted and how?
- …





| id | name | planned start | planned end | | |
|---|---|---|---|---|---|
| 9 | VAT change in online shop | 15.09.2008 | 01.10.2008 | | |
| 13 | Reliability Improvement of the Online Shop | 01.10.2008 | 31.10.2008 | 15.10.2008 | 15.11.2008 |
| 16 | Introduction of a bonus card for customers | 01.11.2008 | 01.12.2008 | 15.11.2008 | 15.12.2008 |

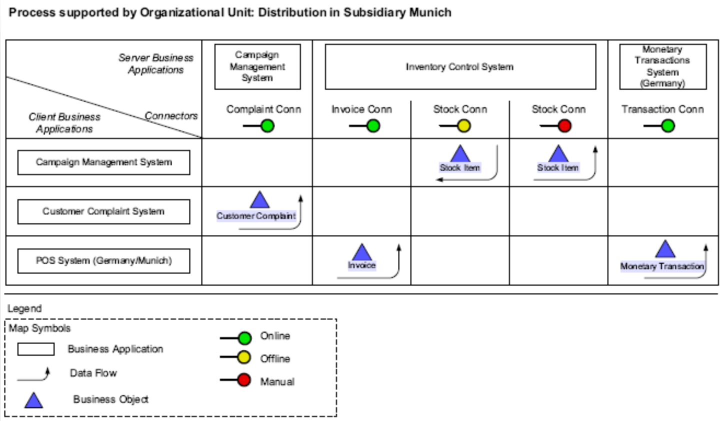
# Scenario: Business object management

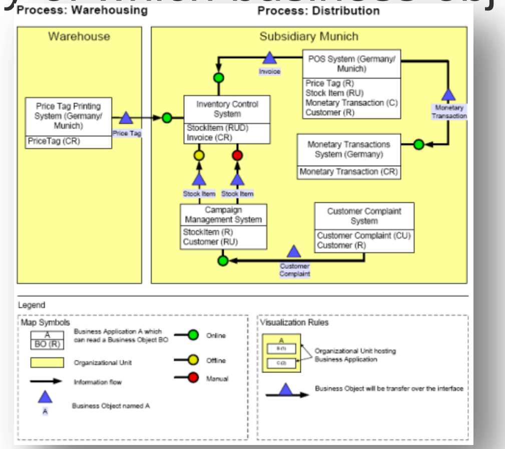
Concerns of this scenario

- The department store SoCaStore wants to get an overview of the business objects involved and exchanged in the execution of the business processes. Therein, especially the data flow between the application systems performing operations on the business objects should be modeled and the kind of operation performed in a specific application system should be detailed.

Typical questions to be answered

- Which business objects are created, modified, or deleted by which application systems during the execution of which business process?
- Which application systems exchange business objects via which interface?
- Which application system holds the master copy of which business object?
- …


Process supported by Organizational Unit: Distribution in Subsidiary Munich
Server Business Applications
Client Business Applications
Connectors
Campaign Management System
Inventory Control System
Monetary Transactions System (Germany)
Complaint Conn
Invoice Conn
Stock Conn
Stock Conn
Transaction Conn
Campaign Management System
Stock Item
Stock Item
Customer Complaint System
Customer Complaint
POS System (Germany/Munich)
Invoice
Monetary Transaction
Legend
Map Symbols
Business Application
Data Flow
Business Object
Online
Offline
Manual



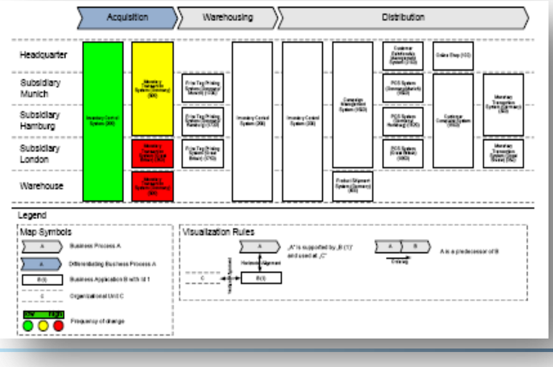
# Scenario: SOA transformation

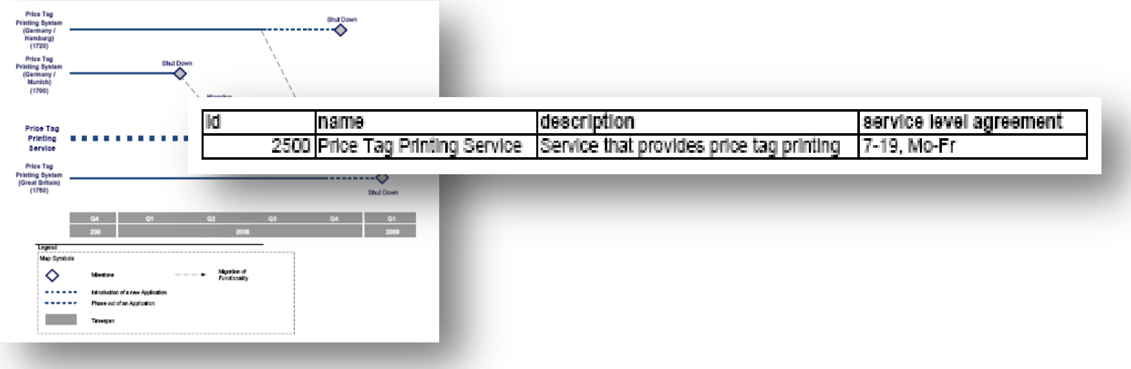
## Concerns of this scenario

- An enterprise wants to transform its architecture into a service oriented one, with a top-down and bottom-up approach to identify the possible candidates for reusable services. The top-down approach starts identifying services from the business objects perspective within the conduction of different business processes. The bottom-up approach starts with technical functionalities currently provided by business applications. The services should not only be identified but also the effects of the transformation should be modeled.

## Typical questions to be answered:

- Does the business application support a differentiating or a standardized business process?
- Which business functions supported by the current landscape are used within numerous domains?
- What would a service oriented target architecture aligned to business needs look like?




Price Tag Printing System (Germany / Hamburg) (1720)
Shut Down
Price Tag Printing System (Germany / Munich) (1700)
Shut Down
Price Tag Printing Service
Price Tag Printing System (Great Britain) (1750)
Shut Down
Q4
Q1
Q2
Q3
Q4
Q1
200
2008
2009
Legend
Map Symbols
Milestone
Migration of Functionality
Introduction of a new Application
Phase out of an Application
Timespan

| id | name | description | service level agreement |
|---|---|---|---|
| 2500 | Price Tag Printing Service | Service that provides price tag printing | 7-19, Mo-Fr |

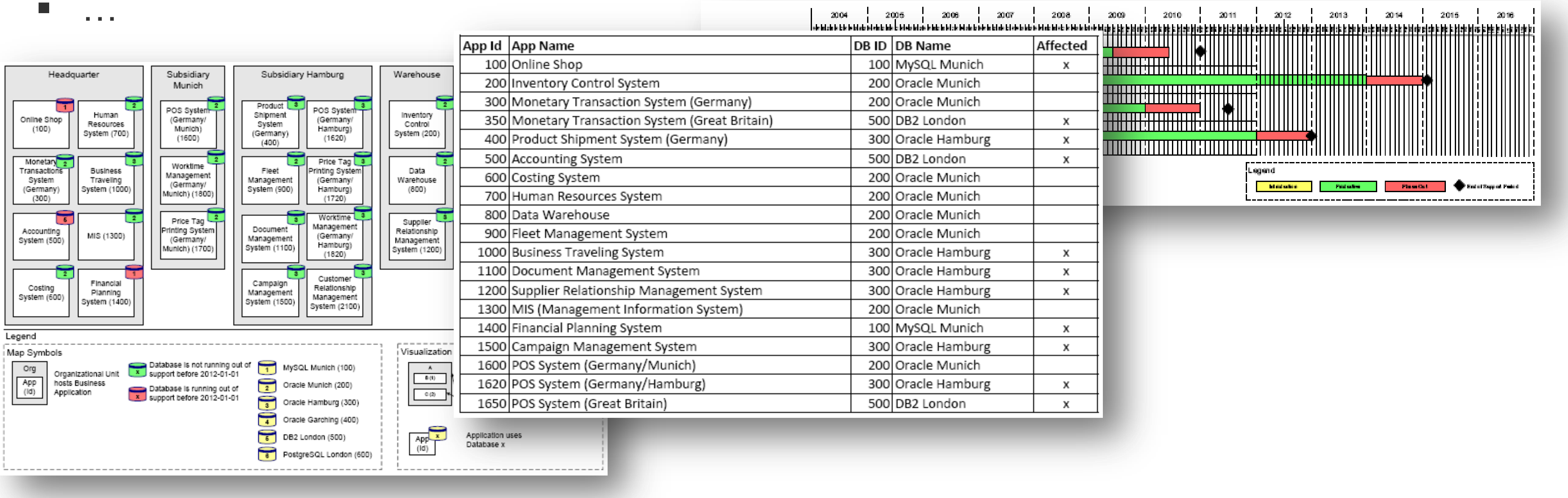
# Scenario: Infrastructure management

Concerns of this scenario

- The department store of SoCaStore intends to consolidate its database systems to decrease the costs for maintenance and licening. Also, expected support periods offered by the database vendors should be considered.

Typical questions to be answered:

- What DBs are in danger of running out of support?
- Which DBs are currently in use?
- Which application systems use which DB?
- What are the costs for operating and licensing which DB?
- …


Headquarter
Online Shop (100)
Human Resources System (700)
Monetary Transactions System (Germany) (300)
Business Traveling System (1000)
Accounting System (500)
MIS (1300)
Costing System (600)
Financial Planning System (1400)
Subsidiary Munich
POS System (Germany/ Munich) (1600)
Worktime Management (Germany/ Munich) (1800)
Price Tag Printing System (Germany/ Munich) (1700)
Subsidiary Hamburg
Product Shipment System (Germany) (400)
POS System (Germany/ Hamburg) (1620)
Fleet Management System (900)
Price Tag Printing System (Germany/ Hamburg) (1720)
Document Management System (1100)
Worktime Management (Germany/ Hamburg) (1820)
Campaign Management System (1500)
Customer Relationship Management System (2100)
Warehouse
Inventory Control System (200)
Data Warehouse (800)
Supplier Relationship Management System (1200)
1
2
3
5
Legend
Map Symbols
Org
App (Id)
Organizational Unit hosts Business Application
x
Database is not running out of support before 2012-01-01
x
Database is running out of support before 2012-01-01
1
MySQL Munich (100)
2
Oracle Munich (200)
3
Oracle Hamburg (300)
4
Oracle Garching (400)
5
DB2 London (500)
6
PostgreSQL London (600)
Visualization
A
B (1)
C (2)
App (Id)
x
Application uses Database x
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Legend

| App Id | App Name | DB ID | DB Name | Affected |
|---|---|---|---|---|
| 100 | Online Shop | 100 | MySQL Munich | x |
| 200 | Inventory Control System | 200 | Oracle Munich | |
| 300 | Monetary Transaction System (Germany) | 200 | Oracle Munich | |
| 350 | Monetary Transaction System (Great Britain) | 500 | DB2 London | x |
| 400 | Product Shipment System (Germany) | 300 | Oracle Hamburg | x |
| 500 | Accounting System | 500 | DB2 London | x |
| 600 | Costing System | 200 | Oracle Munich | |
| 700 | Human Resources System | 200 | Oracle Munich | |
| 800 | Data Warehouse | 200 | Oracle Munich | |
| 900 | Fleet Management System | 200 | Oracle Munich | |
| 1000 | Business Traveling System | 300 | Oracle Hamburg | x |
| 1100 | Document Management System | 300 | Oracle Hamburg | x |
| 1200 | Supplier Relationship Management System | 300 | Oracle Hamburg | x |
| 1300 | MIS (Management Information System) | 200 | Oracle Munich | |
| 1400 | Financial Planning System | 100 | MySQL Munich | x |
| 1500 | Campaign Management System | 300 | Oracle Hamburg | x |
| 1600 | POS System (Germany/Munich) | 200 | Oracle Munich | |
| 1620 | POS System (Germany/Hamburg) | 300 | Oracle Hamburg | x |
| 1650 | POS System (Great Britain) | 500 | DB2 London | x |

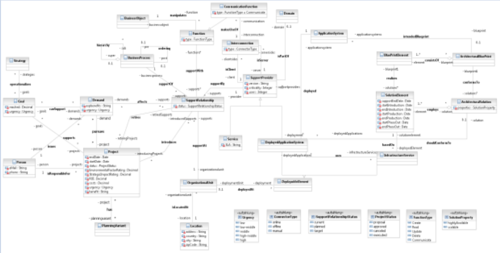
# Outline of this unit

- Origin and background: Approaches of EAM tools
- The Enterprise Architecture Management Tool Survey 2008
  - Questionnaire
  - Scenarios
  - Results
- What happened since the survey
- How to introduce an EAM tool

# What is SoCaStore?

- Simulation is based on a fictitious department store, called SoCaStore.
- Information model of SoCaStore consists of
  - Business Processes
  - Organizational Units
  - Application Systems
  - Domains
  - Projects
  - ….
- Information objects are maintained in an Excel sheet

# SoCaStore: A set of reference data for evaluating EA management tools

| SoCaStore Model | SoCaStore Metamodel | Utilities |
|---|---|---|
| |  | Generated data for „handling large scale application landscapes“<br>… |
| Microsoft Excel Files<br>total<br>ca. 200 instances,<br>ca. 700 links (using foreign keys) | UML / Ecore<br>ca. 25 classes,<br>ca. 30 associations,<br>ca. 90 attributes | 3 different sizes<br>total<br>ca.1000/5000/10000 instances<br>with each<br>ca. 70 attribute values<br>and ca. 15 links |

# Overview on the evaluation process and its criteria

9 Tools are evaluated by 3 teams

**Functional Criteria**

- Online questionnaire for every vendor
- Simulation of functional scenarios with every tool

➔ Documentation of the functional aspects and the evaluation results in simulation

**EA Management Task Criteria**

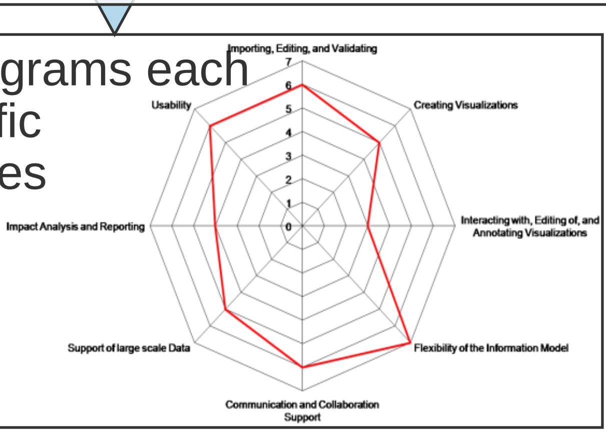
- Simulation of typical EA Management tasks with every tool
- One scenario per EA Management task

➔ Documentation of the evaluation results in simulation

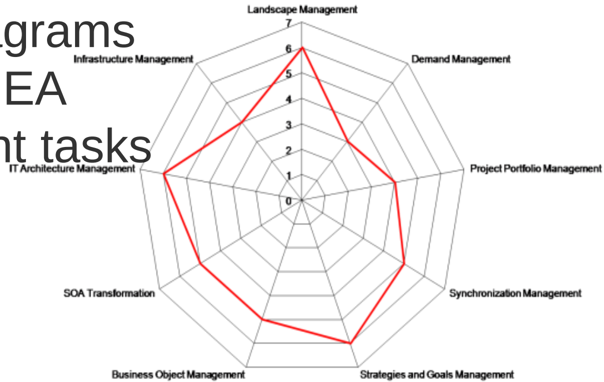
Final evaluation based on the results documented

➔ Each evaluation criterion is assigned an ordering of tools reflecting their specific support

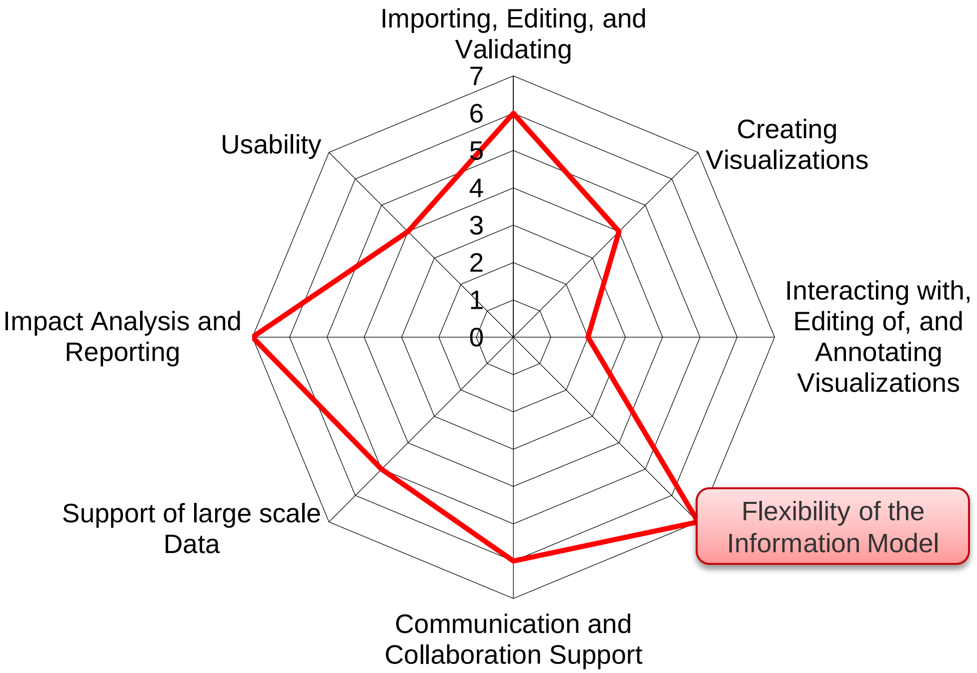
9 Spider diagrams each with 8 specific functionalitites



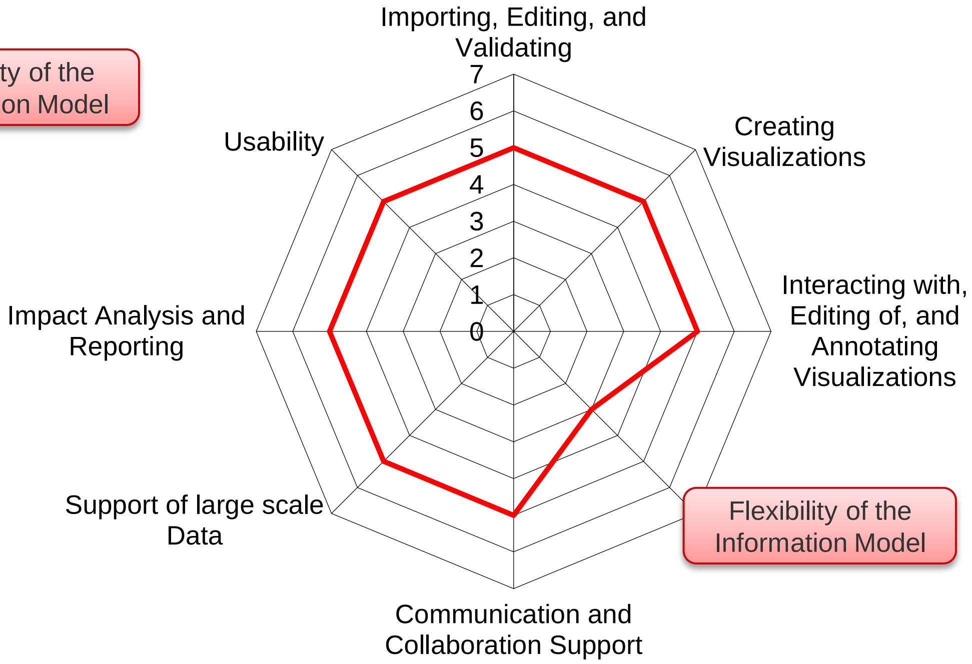
8 Spider diagrams each with 9 EA management tasks



# Test: What do you think are the approaches of the following two tools?



Flexibility of the Information Model

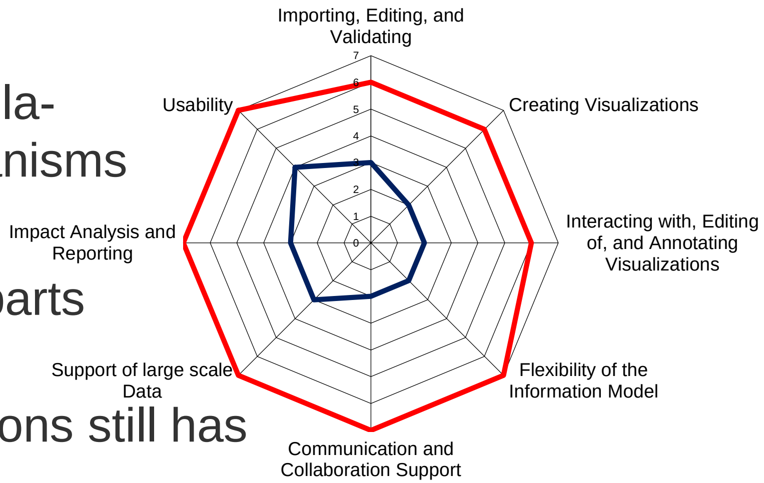


Flexibility of the Information Model

# Analyzing specific functionalities – General results of the evaluation

*Communication und Collaboration Support*

- Well supported with interesting features for collaboration,e.g. workflows and notification mechanisms



*Creating Visualizations*

- Different approaches to visualizing the EA or parts thereof - retaining potential for improvement
  - (Semi)-Automatic generation of visualizations still has its limitations
  - Flexible models without predefined semantics are not supported out-of-the-box and mostly have to be created manually

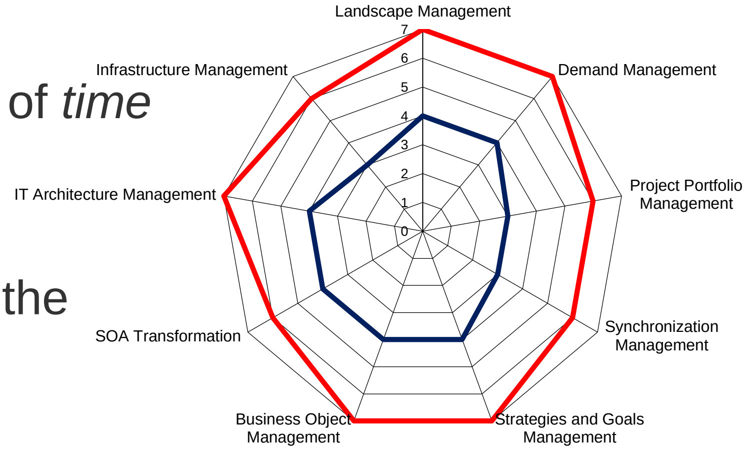
*Interacting with, Editing of, and Annotating Visualizations*

- Interaction is mostly „drawing“ – semantic changes could provide an improvement towards graphical modeling

*Importing, Editing, and Validating*

- No standard exchange format for EA models
- No common information model or core concepts thereof exist

# Analyzing EA management support – General results of the evaluation



*Landscape Management*

- Different levels of support for the concept of *time*
- Versioning application landscapes retains potential for improvement
- Not all tools provide methods for deriving the planned landscape from the planned project portfolio

*Synchronization Management*

- No tool directly supports the concept of *project delay*

*SOA Transformation Management*

- Tool support for indentifying services retains potential for improvement

*Infrastructure Management*

- Not all tools provide concepts for lifecycle aspects of infrastructure components

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- Origin and background: Approaches of EAM tools
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- How to introduce an EAM tool

# What happened since the survey…

The first study was conducted from January to September 2005, the recent results were gathered from October 2007 to April 2008.

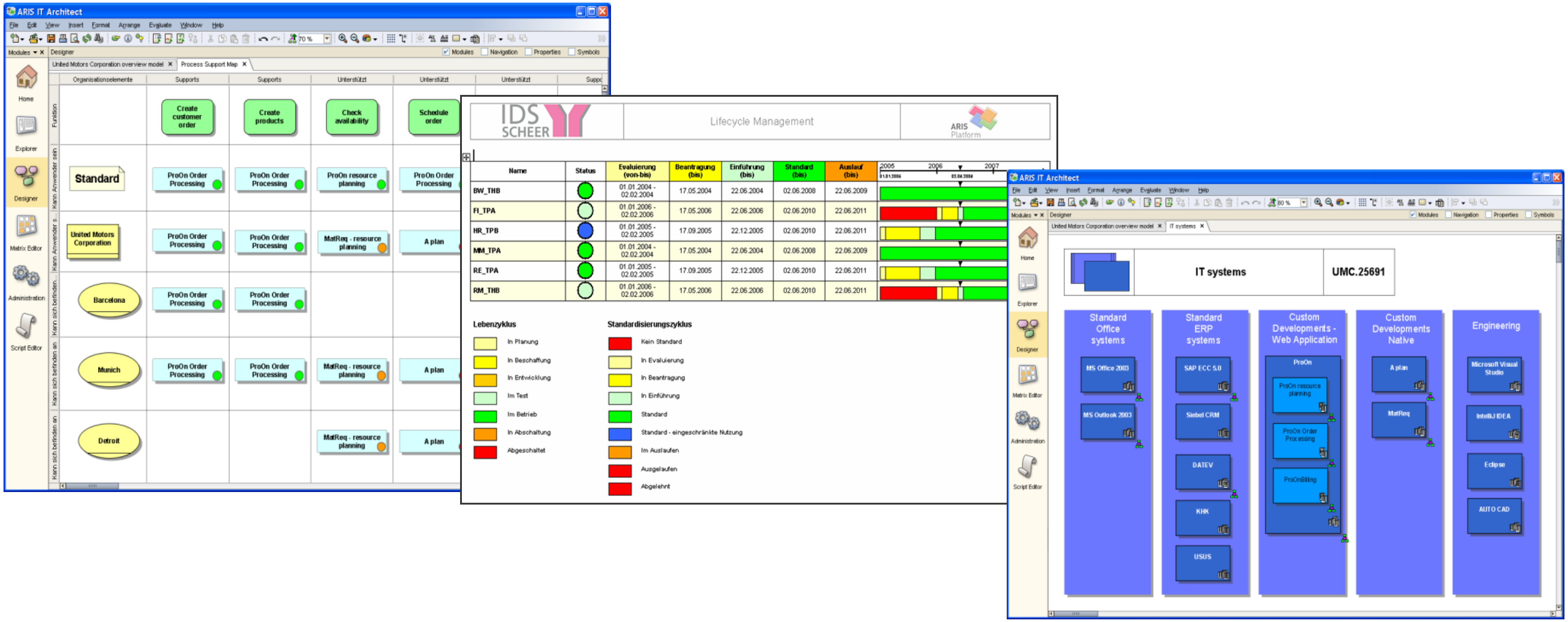
The market of EA Management Tools is still moving.

Some vendors included the advices and critics from the survey of 2008.

# Tool vendors added software maps (1)

Example ARIS Toolset from IDS Scheer AG

- Process Support Map in ARIS 7
- Time interval map in ARIS 7
- „Object-in-Object“-Functionality for Cluster Maps in ARIS 7


ARIS IT Architect
File Edit View Insert Format Arrange Evaluate Window Help
70 %
Modules
Designer
☑ Modules □ Navigation □ Properties □ Symbols
United Motors Corporation overview model
Process Support Map
Home
Explorer
Designer
Matrix Editor
Administration
Script Editor

| | Organisationselemente | Supports | Supports | Unterstützt | Unterstützt |
|---|---|---|---|---|---|
| Funktion | | Create customer order | Create products | Check availability | Schedule order |
| Kann Anwender sein | Standard | ProOn Order Processing | ProOn Order Processing | ProOn resource planning | ProOn Order Processing |
| Kann Anwender s... | United Motors Corporation | ProOn Order Processing | ProOn Order Processing | MatReq - resource planning | A plan |
| Kann sich befinden... | Barcelona | ProOn Order Processing | ProOn Order Processing | | |
| Kann sich befinden an | Munich | ProOn Order Processing | ProOn Order Processing | MatReq - resource planning | A plan |
| Kann sich befinden an | Detroit | | | MatReq - resource planning | A plan |

| Name | Status | Evaluierung (von-bis) | Beantragung (bis) | Einführung (bis) | Standard (bis) | Auslauf (bis) |
|---|---|---|---|---|---|---|
| BW_THB | ● | 01.01.2004 - 02.02.2004 | 17.05.2004 | 22.06.2004 | 02.06.2008 | 22.06.2009 |
| FI_TPA | ○ | 01.01.2006 - 02.02.2006 | 17.05.2006 | 22.06.2006 | 02.06.2010 | 22.06.2011 |
| HR_TPB | ● | 01.01.2005 - 02.02.2005 | 17.09.2005 | 22.12.2005 | 02.06.2010 | 22.06.2011 |
| MM_TPA | ● | 01.01.2004 - 02.02.2004 | 17.05.2004 | 22.06.2004 | 02.06.2008 | 22.06.2009 |
| RE_TPA | ● | 01.01.2005 - 02.02.2005 | 17.09.2005 | 22.12.2005 | 02.06.2010 | 22.06.2011 |
| RM_THB | ○ | 01.01.2006 - 02.02.2006 | 17.05.2006 | 22.06.2006 | 02.06.2010 | 22.06.2011 |

**Lebenzyklus**

| | |
|---|---|
| 🟨 | In Planung |
| 🟨 | In Beschaffung |
| 🟧 | In Entwicklung |
| 🟩 | Im Test |
| 🟩 | Im Betrieb |
| 🟧 | In Abschaltung |
| 🟥 | Abgeschaltet |

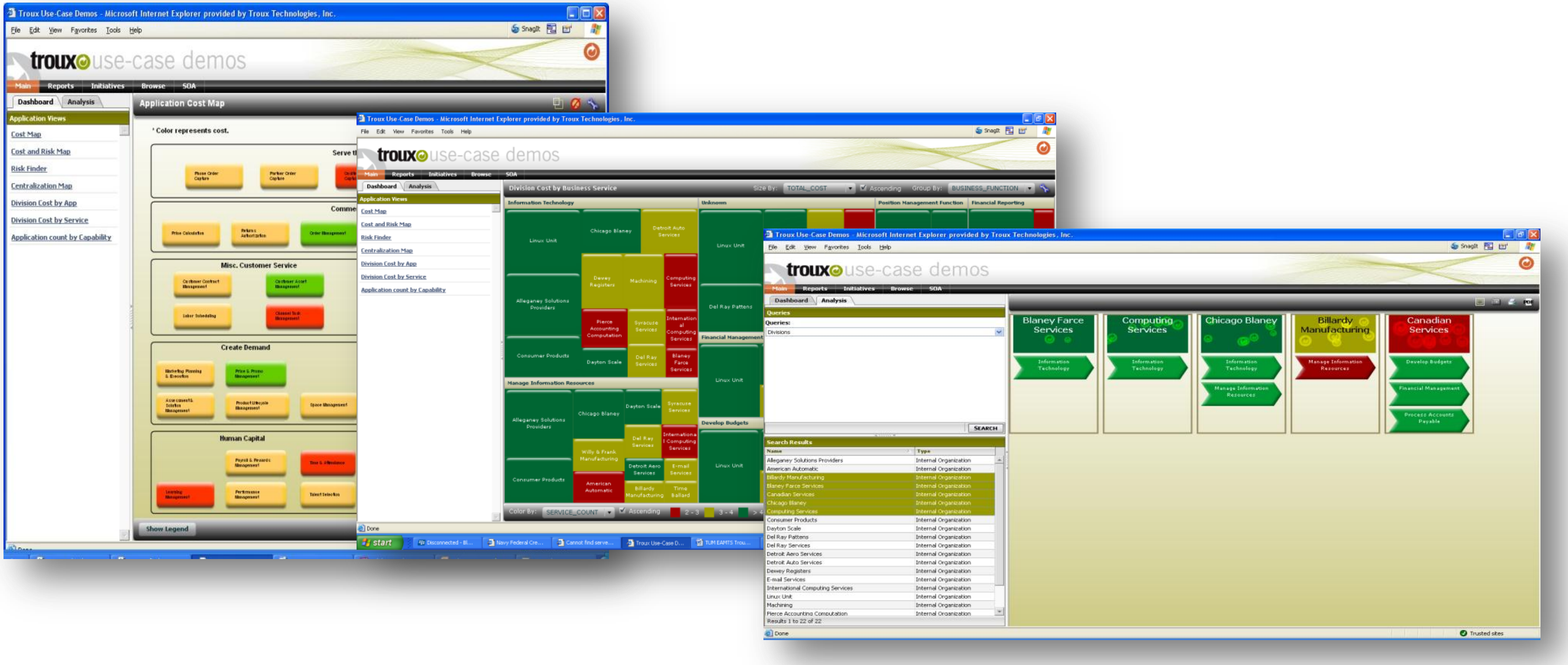
**Standardisierungszyklus**

| | |
|---|---|
| 🟥 | Kein Standard |
| 🟨 | In Evaluierung |
| 🟨 | In Beantragung |
| 🟩 | In Einführung |
| 🟩 | Standard |
| 🟦 | Standard - eingeschränkte Nutzung |
| 🟧 | Im Auslaufen |
| 🟥 | Ausgelaufen |
| 🟥 | Abgelehnt |

# Tool vendors added software maps (2)

Example Troux 7.1 from Troux Technologies

- Automatic Cluster Maps
- Visualization of metrics („Heat-Maps“)
- SOA Transformation Methodology



SEARCH

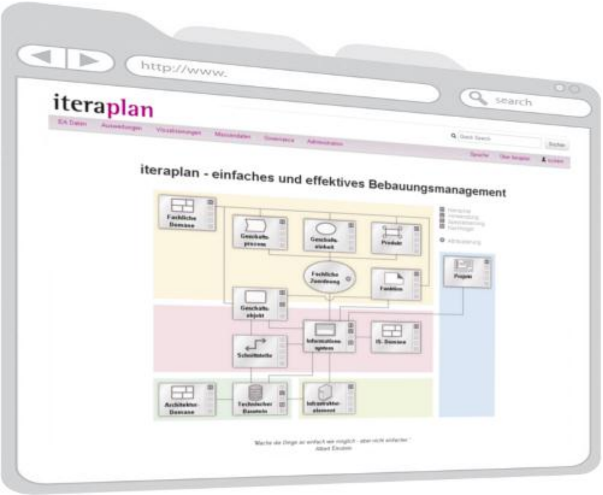
Search Results

| Name | Type |
|---|---|
| Alleganey Solutions Providers | Internal Organization |
| American Automatic | Internal Organization |
| Billardy Manufacturing | Internal Organization |
| Blaney Farce Services | Internal Organization |
| Canadian Services | Internal Organization |
| Chicago Blaney | Internal Organization |
| Computing Services | Internal Organization |
| Consumer Products | Internal Organization |
| Dayton Scale | Internal Organization |
| Del Ray Pattens | Internal Organization |
| Del Ray Services | Internal Organization |
| Detroit Aero Services | Internal Organization |
| Detroit Auto Services | Internal Organization |
| Dewey Registers | Internal Organization |
| E-mail Services | Internal Organization |
| International Computing Services | Internal Organization |
| Linux Unit | Internal Organization |
| Machining | Internal Organization |
| Pierce Accounting Computation | Internal Organization |

Results 1 to 22 of 22

# Open Source Tools for EA Management

- iteraplan
  (see [www.iteraplan.de](http://www.iteraplan.de))



- essential project
  (see [www.enterprise-architecture.org](http://www.enterprise-architecture.org))

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# Generic tool selection process (1)

1

### Create List of Criteria

- Collecting demands for tool support from stakeholders
- Consolidate demands in a list of criteria
- Define „must have“ criteria in order to speed up the selection process
- Weighting the criteria
- Define scales for the evaluation of the tools

2

### Create Long List

- Analyze the market for existing tools
- Analysts, like e.g. Gartner, may be a source for a list of existing tools
    - Be aware that they do not list all available tools!
- Studies for EAM tools may be another source for available tools

3

### Reduce to Short List

- Apply list of criteria on long list in order to select 2-3 tools, which will be further evaluated
    - Looking for „must have“ criteria speeds up the selection process
    - No complete objective evaluation possible

[Ke07b]

# Generic tool selection process (2)

4

**„Test-Drive“ the Tools**

- The 2-3 selected tools should be evaluated in depth (workshop with vendor and stakeholders) and possibly do a „test-drive“ in the context of a test installation

5

**Decide**

- Decide for one of the tools of the short list in cooperation with the stakeholders
- Preferably in a workshop
- Involving the stakeholders prevents for subsequent criticism

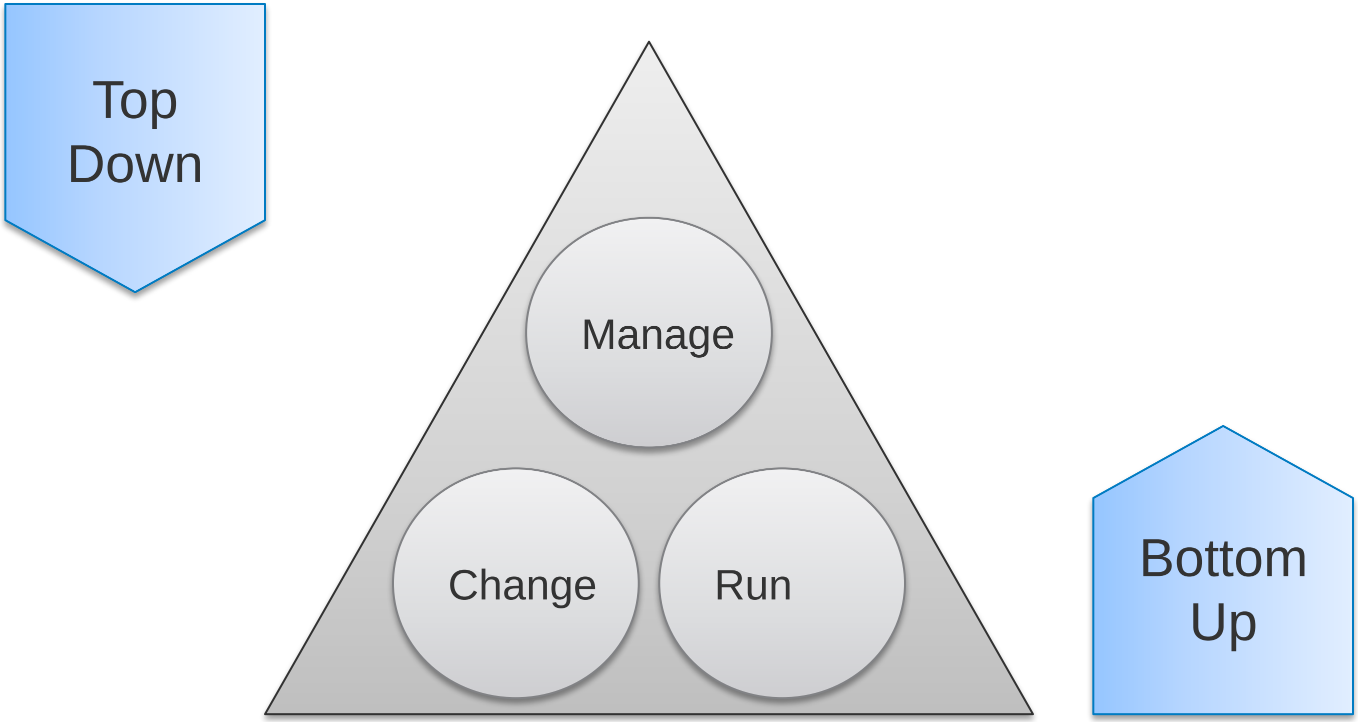
6

**Re-negotiation and Buying Decision**

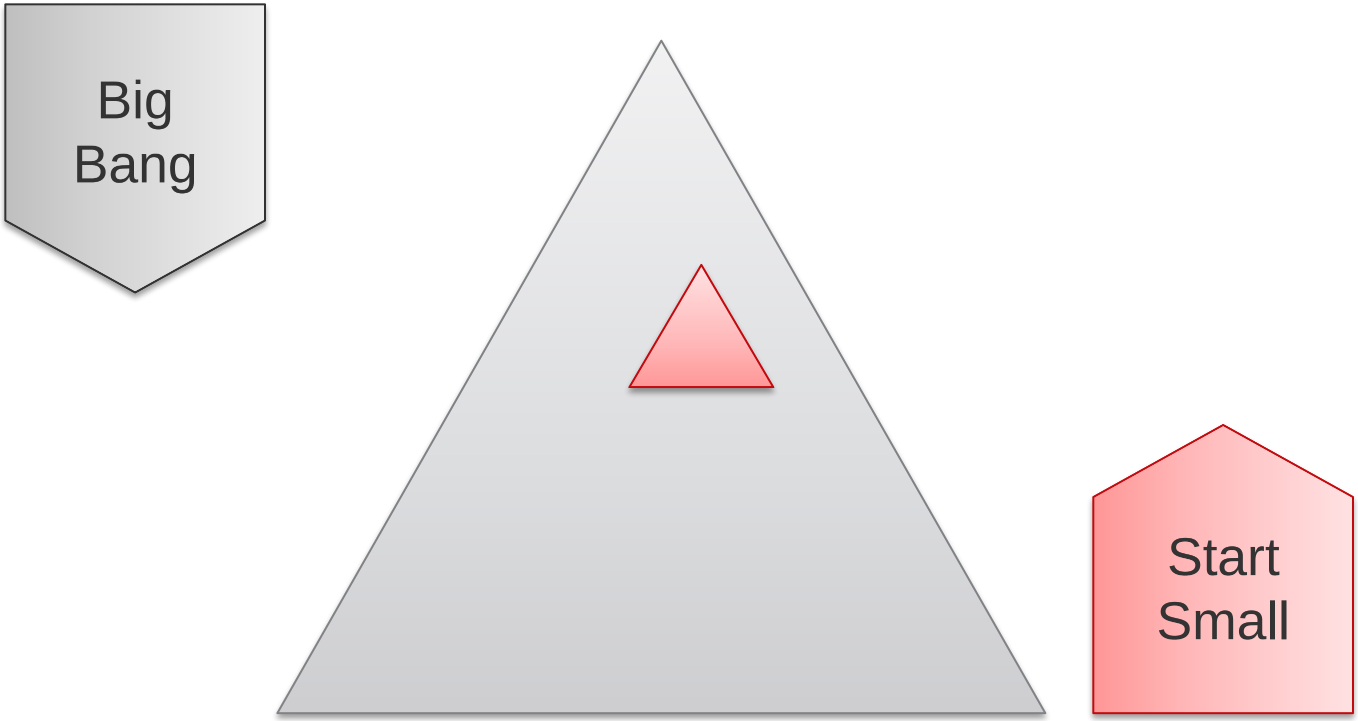
- Do another price negotiation with tool vendor
- Afterwards make buying decision or possibly go back some of the steps

[Ke07b]

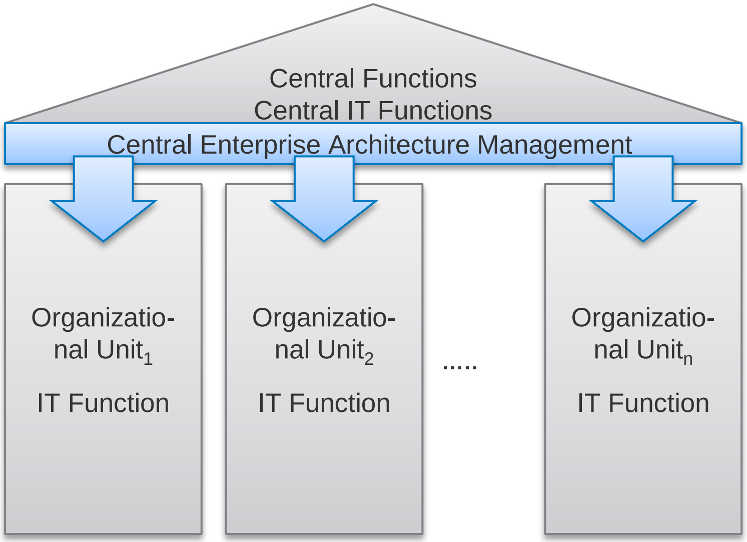
# Where to start? Change, run, manage



# How to start
# Big bang vs. quick & small



# Decentralized or centralized Organizations offer different degrees of freedom



Central Functions
Central IT Functions

Central Enterprise Architecture Management

Organizational Unit$_1$

IT Function

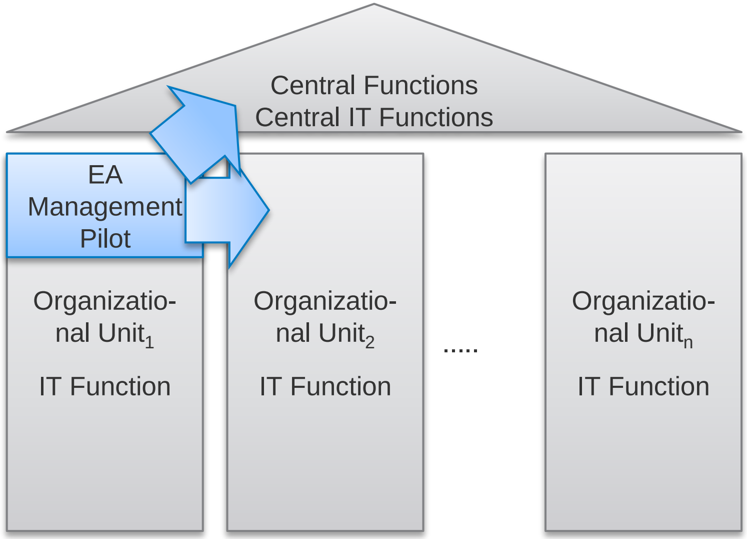
Organizational Unit$_2$

IT Function

.....

Organizational Unit$_n$

IT Function



Central Functions
Central IT Functions

EA Management Pilot

Organizational Unit$_1$

IT Function

Organizational Unit$_2$

IT Function

.....

Organizational Unit$_n$

IT Function

# Boundary conditions

Big Bang approaches are rarely successfull

➔ Typically a big bang approach is only used, if there is no other chance to achieve the defined goal or if you are in an emergency case.
Examples

- In Sweden the obligation to drive on the right was introduced as big bang approach
- Euro conversion at the 1st of January 2001

Nevertheless, small approaches are in the danger of being stuck.

# Bibliography

[Ma08] Matthes, F.; Buckl, S.; Leitel, J.; Schweda, C. M.: *Enterprise Architecture Management Tool Survey 2008.* Technische Universität München, Munich, Germany.