EA Frameworks &TOGAF

The Open Group Architecture Framework

Vorlesung IT-Unternehmensarchitektur

VL 06; Freitag 16. Novemver 2012;

Fachgebiet Software-Architekturen, Prof. Dr. Robert Hirschfeld
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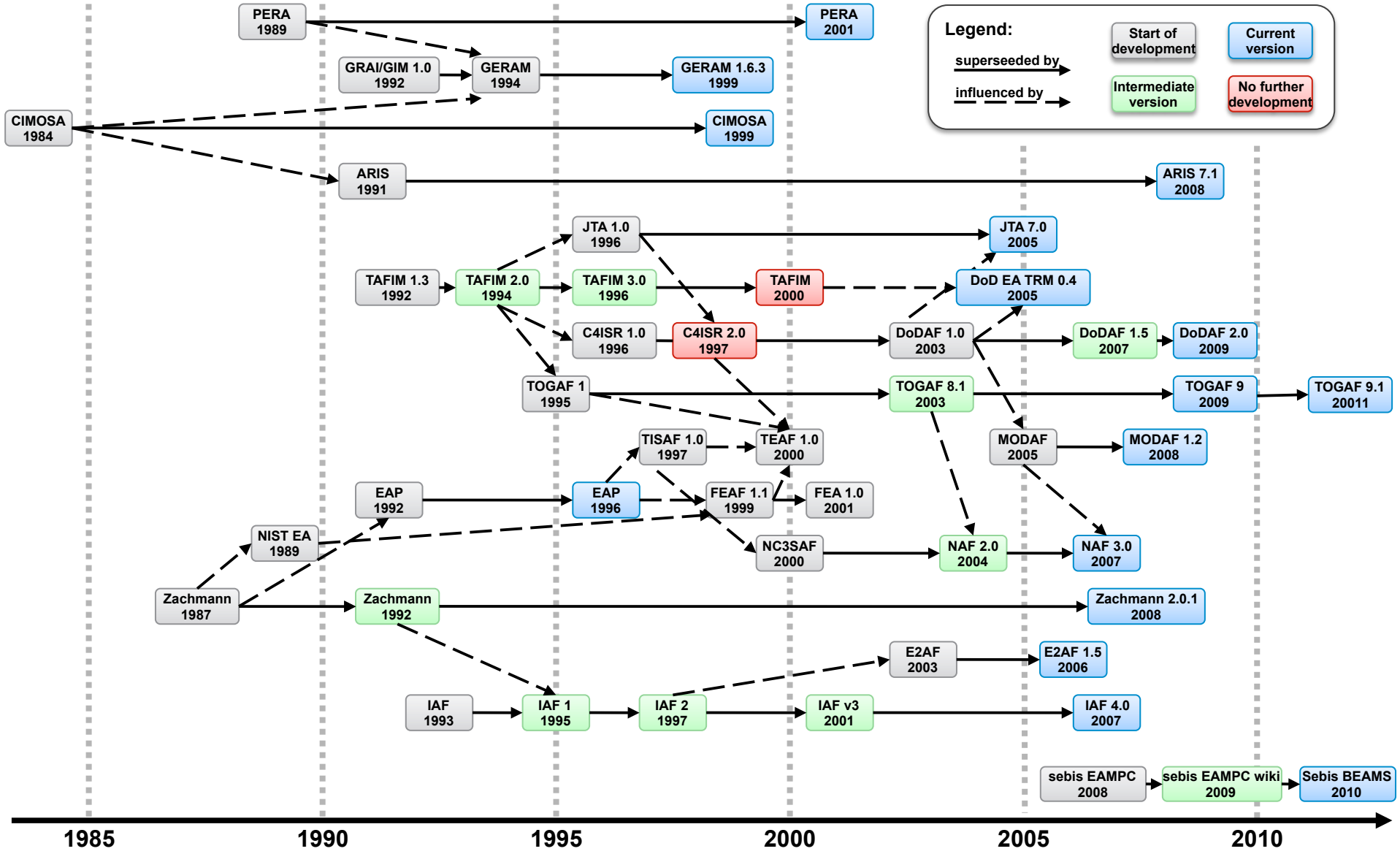
How to survive in the jungle of EA(M) Frameworks



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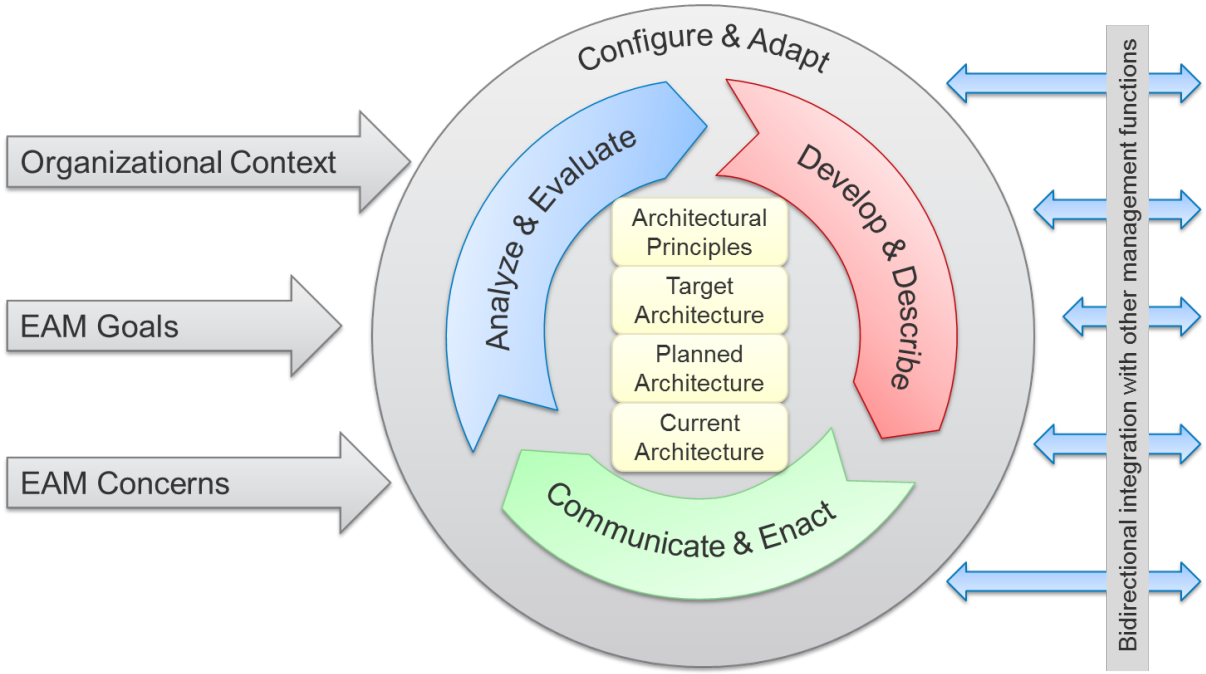
Classifying existing approaches and frameworks for EA(M) – from a method perspective

- Integration – unidirectional, bidirectional
- Develop & describe – current, planned, target, principle, question
- Communicate & enact – current, planned, target, principle, question
- Analyze & evaluate – current, planned, target, delta analysis
- Configure to – organizational context, scope & reach
- Adapt to – organizational context, scope & reach



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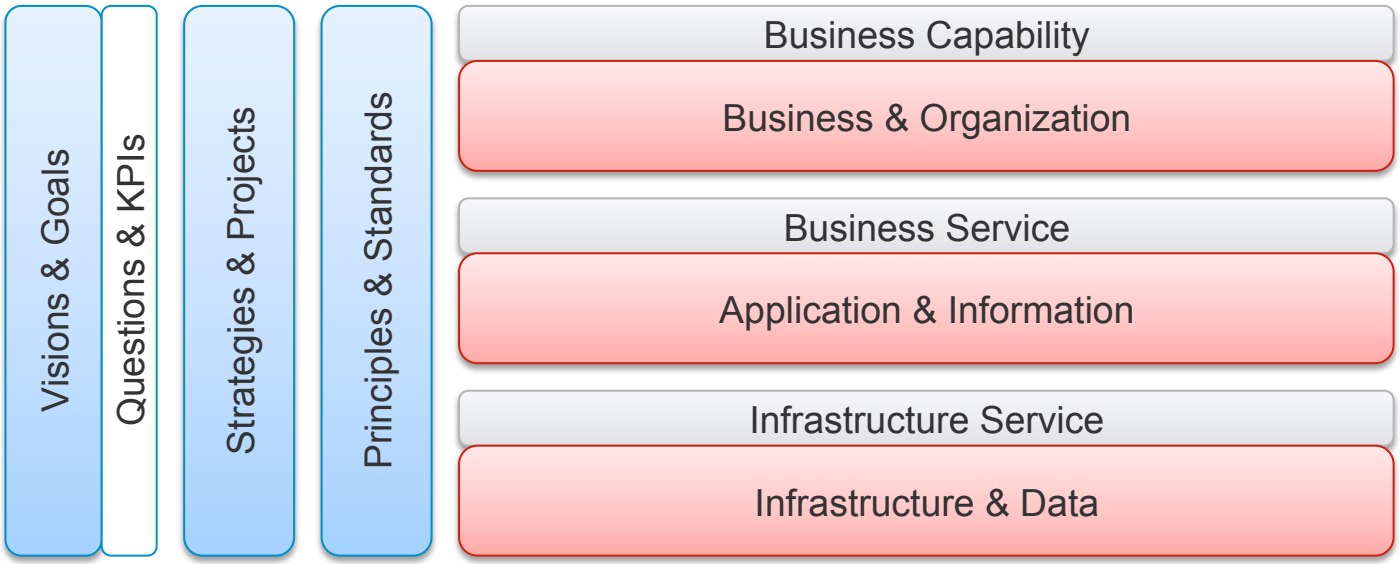
Classifying existing approaches and frameworks for EA(M) – from a language perspective

- Black-box perspective
- White-box perspective
- Strategies & Projects
- Visions & Goals
- Principles & Standards
- Questions & KPIs
- Configure & Adapt – initially, evolutionary



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Revisiting 22 approaches from academia and practice – Results from a method perspective

Integration	unidirectional			bidirectional	
Develop & Describe	current	planned	target	principle	question
Communicate & Enact	current	planned	target	principle	question
Analyze & Evaluate	current	planned	target	delta analysis	
Configure to	organizational context			Scope and reach	
Adapt to	organizational context			Scope and reach	

Addressed by at least 10 of the analyzed approaches

Addressed by at most 3 of the analyzed approaches

Buckl, Schweda: On the State-of-the-Art in Enterprise Architecture Management Literature (2011)

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Revisiting 22 approaches from academia and practice – Results from a language perspective

Black-box Perspective	business & organization	appliation & information	infrastructure & data
White-box Perspective	business & organization	appliation & information	infrastructure & data
Strategies & Projects	business & organization	appliation & information	infrastructure & data
Visions & Goals	business & organization	appliation & information	infrastructure & data
Principles & Standards	business & organization	appliation & information	infrastructure & data
Questions & KPIs	business & organization	appliation & information	infrastructure & data
Configure & Adapt	initially		evolutionary

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TOGAF in a Nutshell
Contents

- Flavors of Enterprise Architecture
  - Layers of Planning and Layers of Architectures
  - EA Frameworks in the World of IT Frameworks
- TOGAF
  - What's in it
  - what's not in it
- Example: TOGAF in a Telco
  - Relation between TOGAF and frameworx
  - Customizing TOGAF for your Telco / Opco

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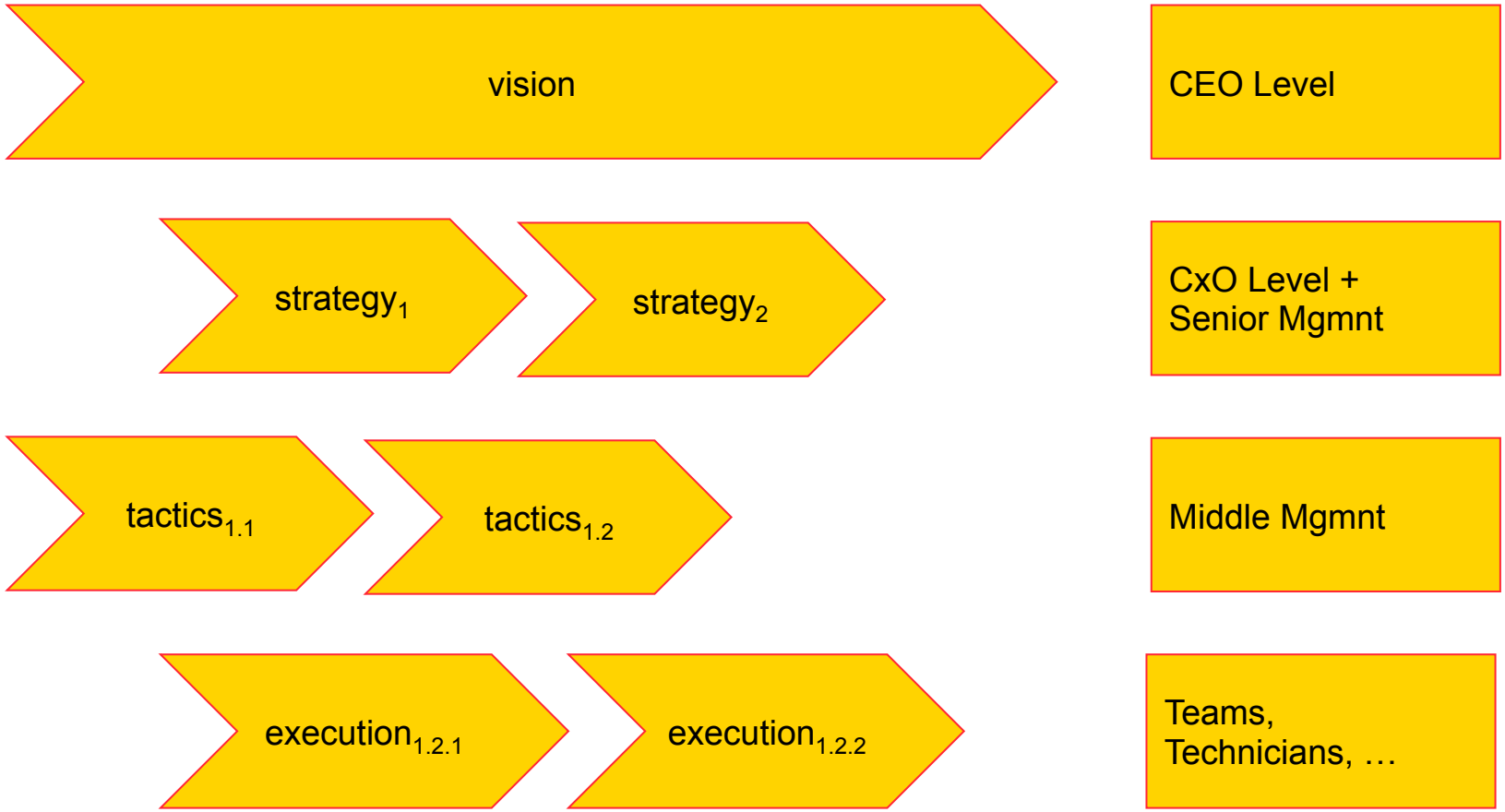
Layers of Enterprise Planning and Execution



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Term „Enterprise Architecture“ far from being defined unambigously

Layer / Term	Scope	Important Artifacts
Enterprise Architecture	• Define the Vision and Business Model of an Enterprise • Define the Business Strategy of an Enterprise • Architect the Organization & Processes • Use IT as one of many possible means to implement capabilities	Vision, Mission, Business Strategy, Business Model, Capabilities, Business Processes
Enterprise IT Architecture	• Define the IT Strategy how to support value creation using IT • Manage IT portfolios • Define target architectures • Enforce target architectures	IT-Strategy, Application Portfolio, TAM, Strategic IT-Plan, Enterprise Repository, ….

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Term „Enterprise Architecture“ far from being defined unambigously

Layer / Term	Scope	Important Artifacts
Large Scale Solution Architecture	• Design overall architecture for the enterprise application portfolio	Domain models, blueprints, target landscapes, large project architectures,
Solution architecture	• Design single application systems or clusters thereof	Package diagrams, Architectural views, Use Cases, Process Models, …

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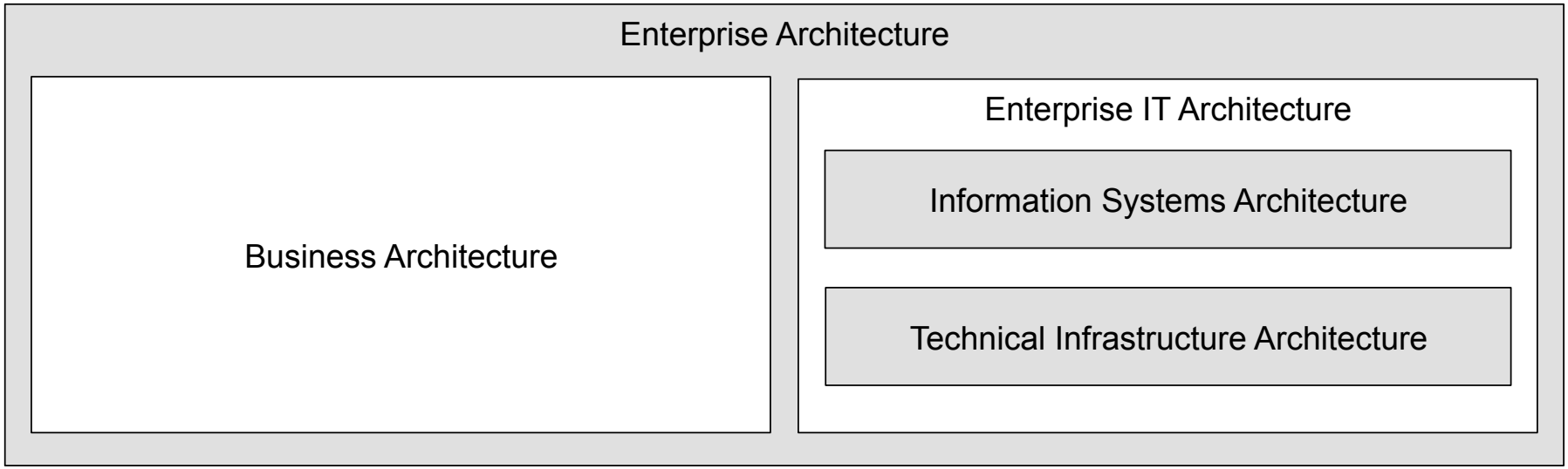
Different View on the same matter Static without the Management Processes



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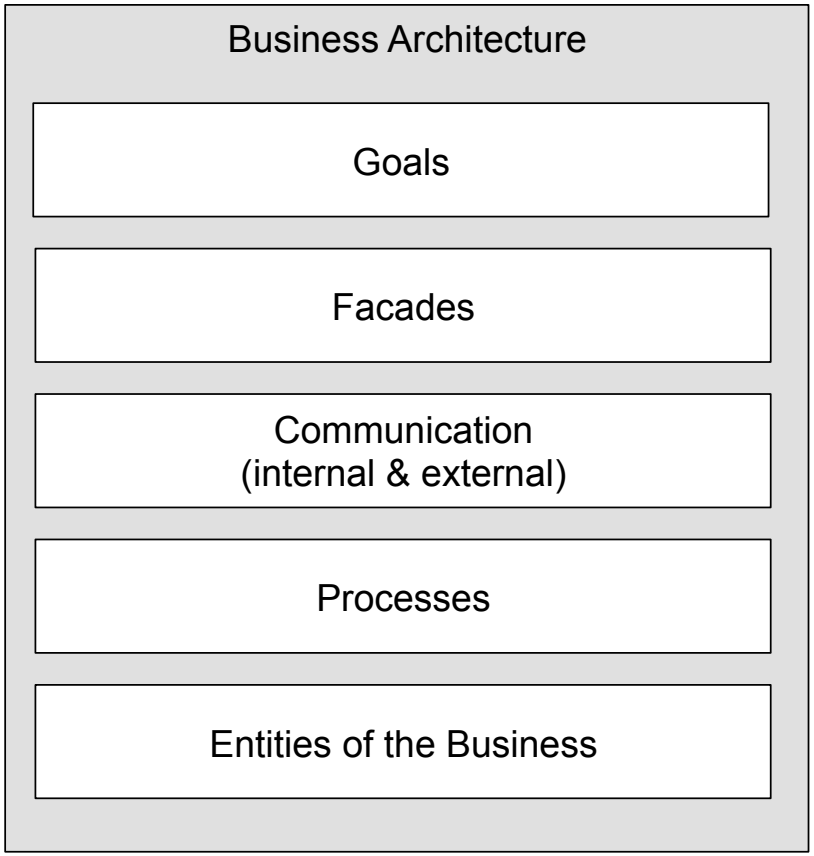
Business Architecture is an emerging Discipline – One Sample Model



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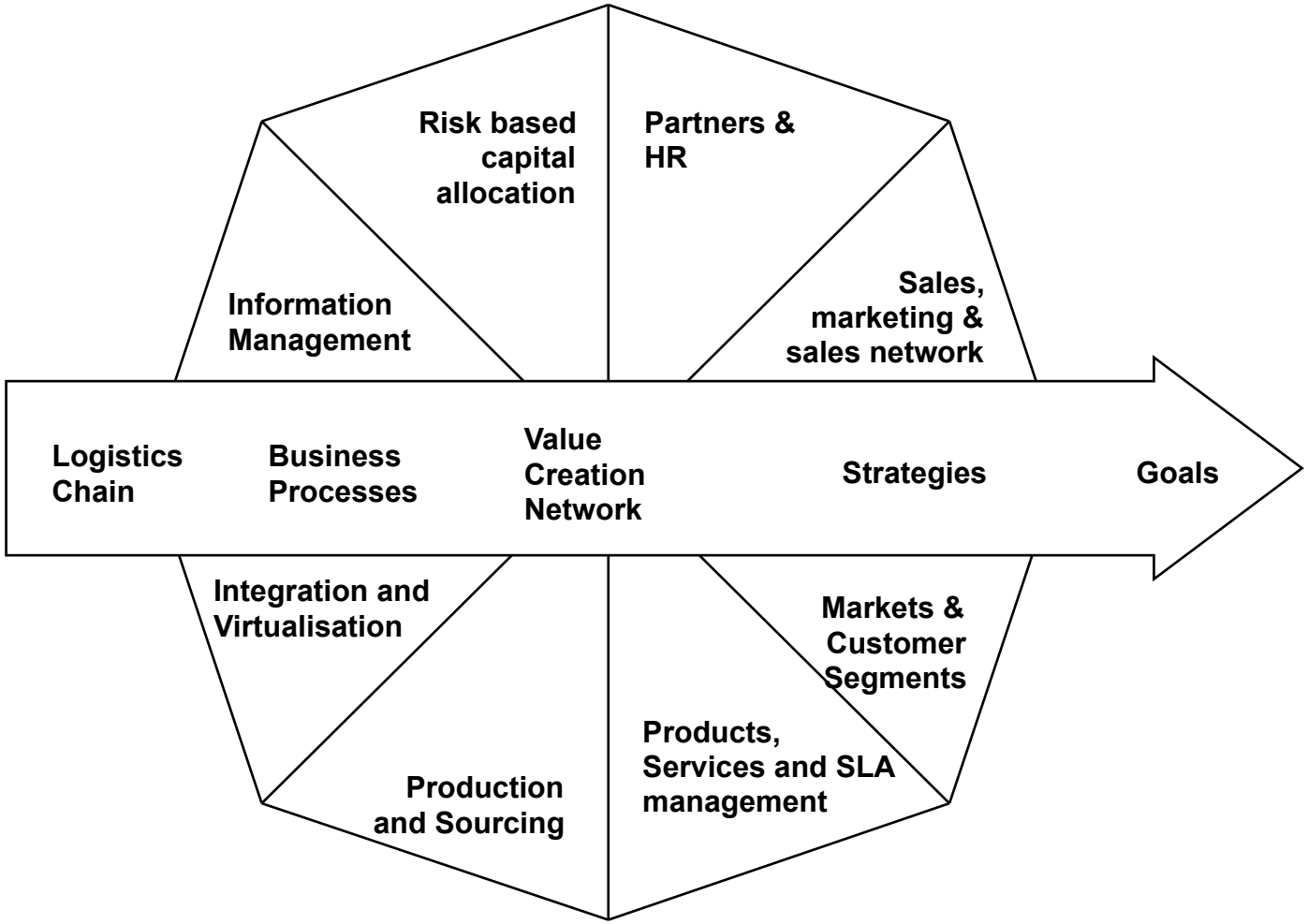

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Types of Architectures assigned to Layers

	Enterprise Architecture	Enterprise IT Architecture	Large Scale Solution Architecture	Solution Architecture	Good Coding Practices
vision	■	◧			
strategy	■	■	◧		
tactics	◧	◧	■	■	
execution					■

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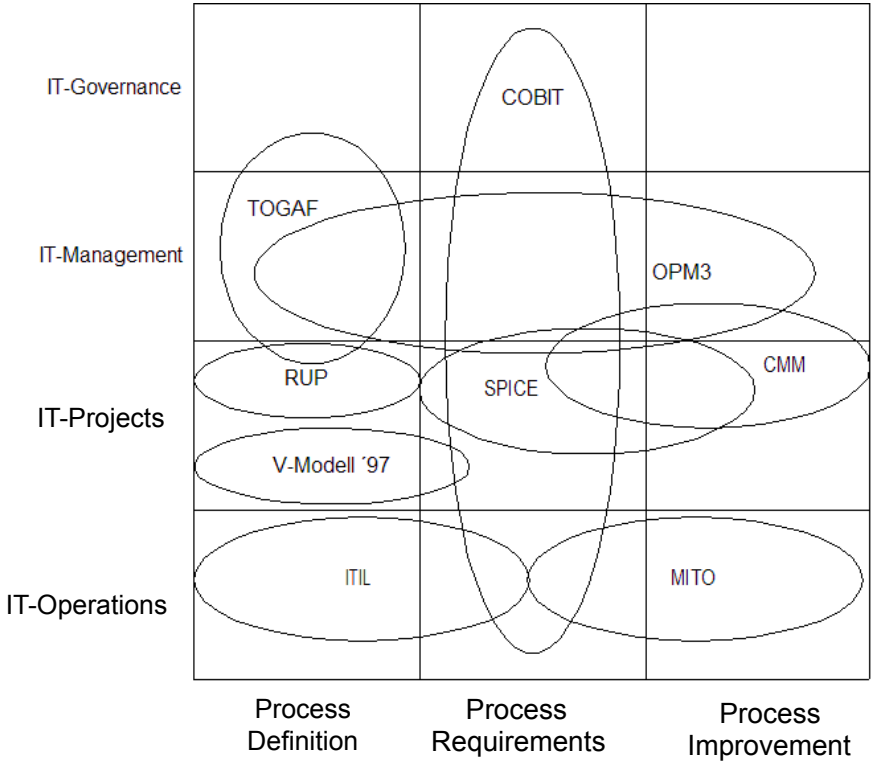
Please observe: There are far more IT Frameworks than just EAM Frameworks



- Please note that there is no such thing as one uniform classification scheme for IT frameworks of EA frameworks
- The scheme on the left side is one of many attempts

Source: Marten Schönherr, Technische Universität Berlin

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Please observe: There are far more IT-frameworks than just EAM frameworks

- TOGAF is one of more than 50 EAM Frameworks
  - They provide methods and processes for architecture development and architecture management
- eTOM / SID / TAM are so called Domain Architecture frameworks
  - They provide content for a specific industry
  - They do not provide processes for developing architectures

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Please observe: There are far more IT-frameworks than just EAM frameworks

- Apart from that there are more „classes“ of IT frameworks
  - IT Management Frameworks
    - COBIT 5.0 (includes ValIT, RiskIT)
  - IT Operations Frameworks
  - Development Methods
    - RUP, V-Model XT, ...

- People often mix up categories of

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What is TOGAF?

The **O**pen**G**roup **A**rchitecture **F**ramework

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Who‘s the OpenGroup

The Open Group is a vendor and technology-neutral industry consortium, currently with over four hundred member organizations.[1] It was formed in 1996 when X/Open merged with the Open Software Foundation. Services provided include strategy, management, innovation and research, standards, certification, and test development. The Open Group is most famous as the certifying body for the UNIX trademark,[2] and its publication of the Single UNIX Specification technical standard,[3] which extends the POSIX standards and is the official definition of a UNIX system. The Open Group also develops and manages the TOGAF standard, which is an industry standard enterprise architecture framework.[4] The Open Group members include a range of IT buyers and vendors as well as government agencies, for example Capgemini, Fujitsu, Oracle, Hitachi, HP, Orbus Software, IBM, Kingdee, NEC, SAP, US Department of Defense, NASA and others.

Source: wikipedia

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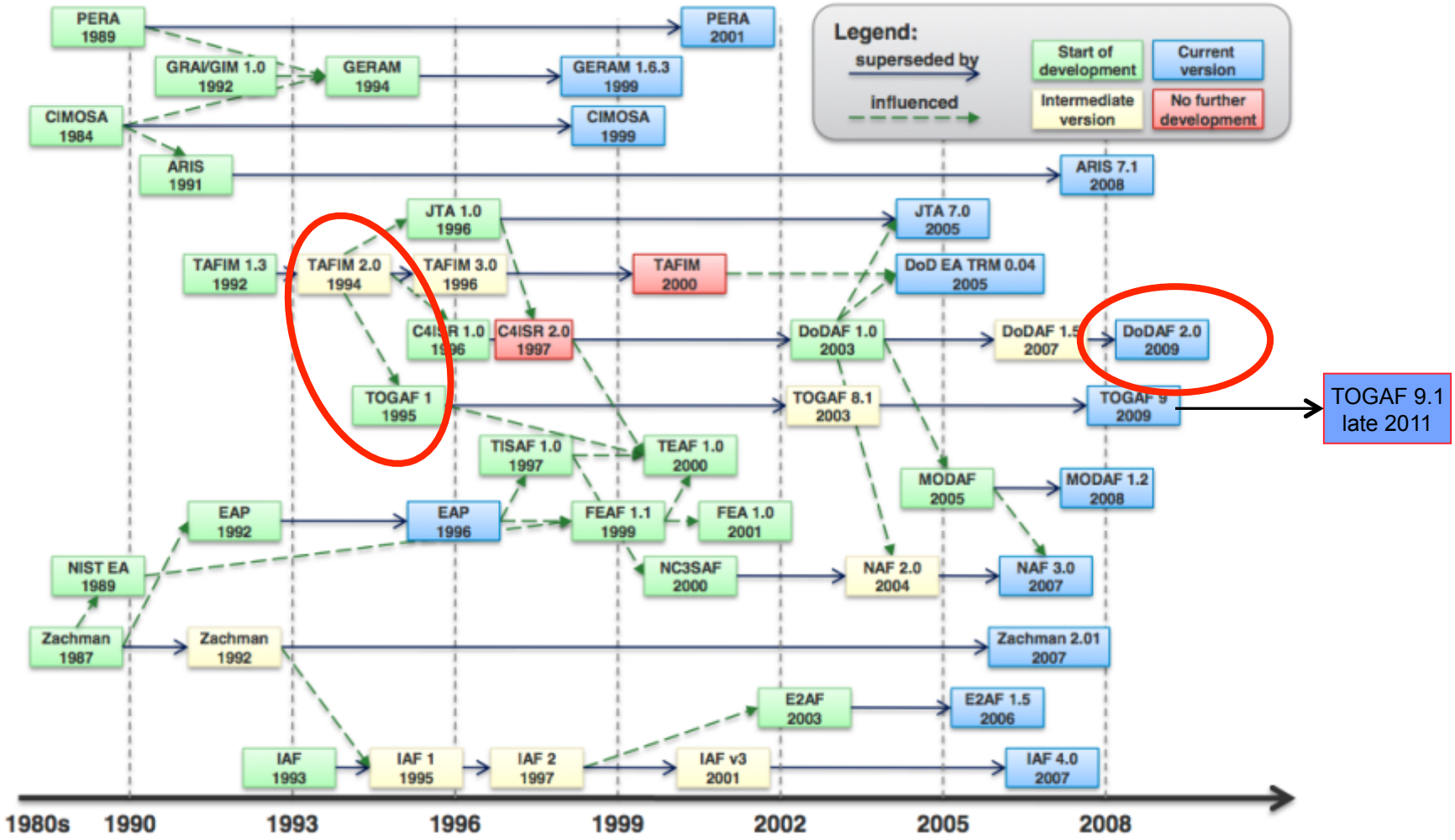
Some History of EAM Frameworks



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What does TOGAF cover

Layer / Term	Extent of Coverage by TOGAF	Remarks
Enterprise Architecture		TOGAF concentrates on IT architecture
Enterprise IT Architecture		TOGAF covers some Enterprise IT Architecture Topics
Large Scale Solution Architecture		One of the cores of TOGAF (the ADM (architecture development method) has been explicitly designed for large scale solution architecture
Solution architecture		Small scale solution architecture needs more artifacts than the ones defined in TOGAF (UML-style artifacts)

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Evolution of TOGAF towards an Enterprise IT Architecture Framework

	TAFIM TOGAF 1.0 1993, 94	TOGAF 8.1 Enterprise 2002, 2003	TOGAF 9.x 2009, 2011
Architecture Development Method	■	■	■
Enterprise Continuum		■	■
Content Meta Model			■

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Structure of the TOGAF 9.x Document

Part I: Introduction

- Core Concepts; Definitions;

Part II: ADM (Architecture Development Method)

Part III: ADM Guidelines and Techniques

- Various aspects of EA work like: Iterating the ADM, Security, ...

Part IV: Architecture Content Framework

Part V: Enterprise Continuum and Tools

Part VI: Reference Models

Part VII: Architecture Capability Framework

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TOGAF Architecture Development Method

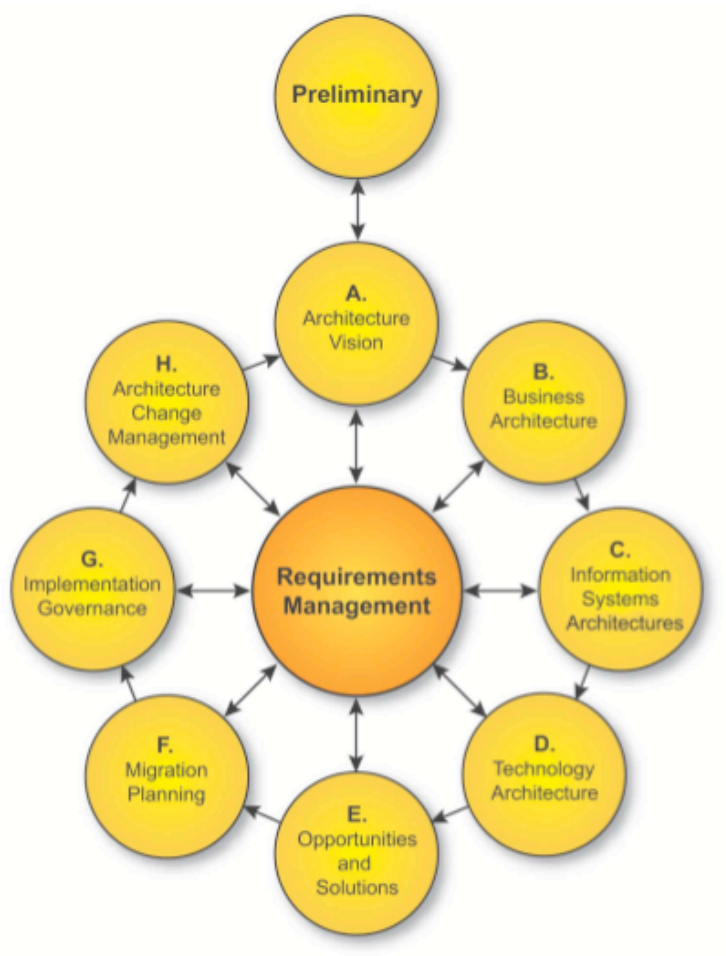

Figure 5-1 Architecture Development Cycle

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Deeper Dive into Sections of ADM Short Exercise – 20 mins (+10 discussion)

- Please read TOGAF Chapter 8 – Phase B Business Architecture (pages 79 thru 91)
- Please make a guess why your faculty would characterize TOGAF with „WHAT – NOT HOW“
- What does that mean for a tailoring of TOGAF for your organization?
- Have your ideas ready for a 2 min presentation

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TOGAF Content Metamodel
Top Level Diagram

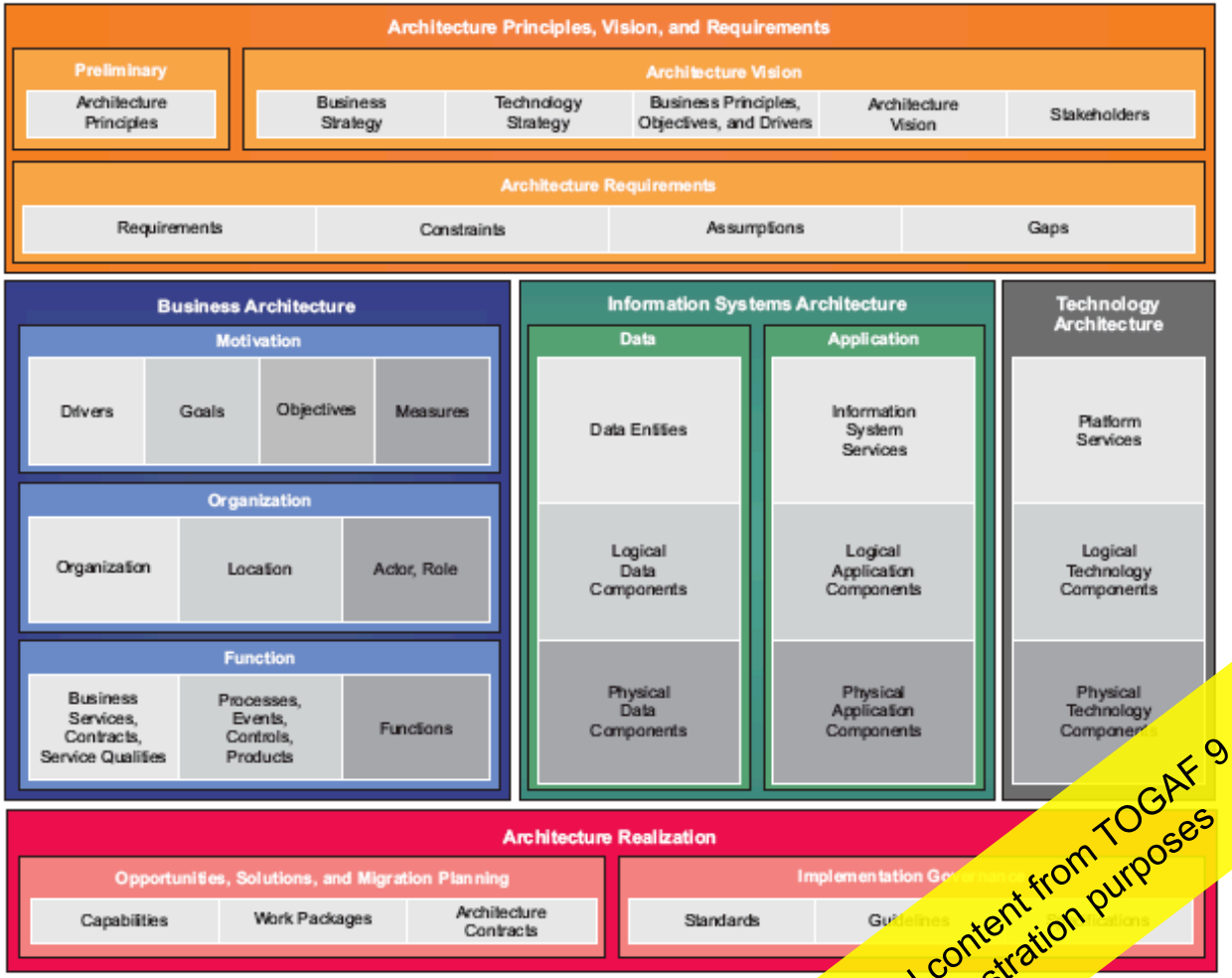

Figure 33-3 Content Metamodel O

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for demonstration purposes

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TOGAF Foundation Architecture

34.5 Content Metamodel Entities

The following table lists and describes the entities within the content metamodel.

Metamodel Entity	Description
Actor	A person, organization, or system that has a role that initiates or interacts with activities; for example, a sales representative who travels to visit customers. Actors may be internal or external to an organization. In the automotive industry, an original equipment manufacturer would be considered an actor by an automotive dealership that interacts with its supply chain activities.
Application Component	An encapsulation of application functionality aligned to implementation structure. For example, a purchase request processing application. See also *Logical Application Component* and *Physical Application Component*.
Assumption	A statement of probable fact that has not been fully validated at this stage, due to external constraints. For example, it may be assumed that an existing application will support a certain set of functional requirements, although those requirements may not yet have been individually validated.
Business Service	Supports business capabilities through an explicitly defined interface and is explicitly governed by an organization.
Capability	A business-focused outcome that is delivered by the component of one or more work packages. Using a capability-based planning approach, change activities can be sequenced and grouped in order

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TOGAF CMM – How „does it feel“ Relations List

Source Entity	Target Entity	Name	Extension Module
Actor	Event	Generates	Process
Actor	Event	Resolves	Process
Actor	Function	Interacts with	Core
Actor	Function	Performs	Core
Actor	Location	Operates in	Infrastructure Consolidation
Actor	Organization Unit	Belongs to	Core
Actor	Process	Participates in	Core
Actor	Role	Performs task in	Core
Actor	Service	Consumes	Core
Actor	Actor	Decomposes	Core
Actor	Data Entity	Supplies/Consumes	Core
Capability	Work Package	Is delivered by	Core
Contract	Service	Governs and Measures	Governance
Contract	Service Quality	Meets	Governance

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TOGAF CMM – How „does it feel“ Attribute List

34.6 Content Metamodel Attributes

The following table shows typical attributes for each of the metamodel entities described previously.

Metamodel Entity Attribute	Description	
All Metamodel Entities	ID	Unique identifier for the architecture entity
	Name	Brief name of the architecture entity
	Description	Textual description of the architecture entity.
	Category	User-definable categorization taxonomy for each metamodel entity.
	Source	Location from where the information was collected.
	Owner	Owner of the architecture entity.
Capability	Business value	Describes how this capability provides value to the enterprise.
	Increments	Lists possible maturity/quality levels for the capability.
Constraint	No additional attributes	This metamodel entity has only basic attributes.
Gap	No additional attributes	This metamodel entity has only basic attributes.

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TOGAF „Enterprise Continuum“ At a Heading Level – Tough to Define

The simplest way of thinking of the Enterprise Continuum is as a view of the repository of all the architecture assets. It can contain architecture descriptions, models, building blocks, patterns, viewpoints, and other artifacts — that exist both within the enterprise and in the IT industry at large, which the enterprise considers to have available for the development of architectures for the enterprise.

Contents consist of

- Chapter 38: Introduction (2 pages)
- Chapter 39: Enterprise Continuum (12 pages)
- Chapter 40: Architecture Partitioning (6 pages)
- Chapter 41: Architecture Repository (8 pages)
- Chapter 42: Tools for Architecture Development (2 pages)

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What else will you find in TOGAF? (and what‘s it good for?)

- Reference Models
  (How to name various stuff)
  - Foundation Architecture: Technical Reference Model
  - Integrated Information Infrastructure Reference Model
- Architecture Capability Framework
  (Aspects to set up Architecture Governance)
  - Establishig an Architecture Capability
  - Architecture Board
  - Architecture Compliance
  - Architecture Contracts
  - Architecture Governance
  - Architecture Maturity Models
  - Architecture Skills Frameworks

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TOGAF Foundation Architecture Top Level Diagram

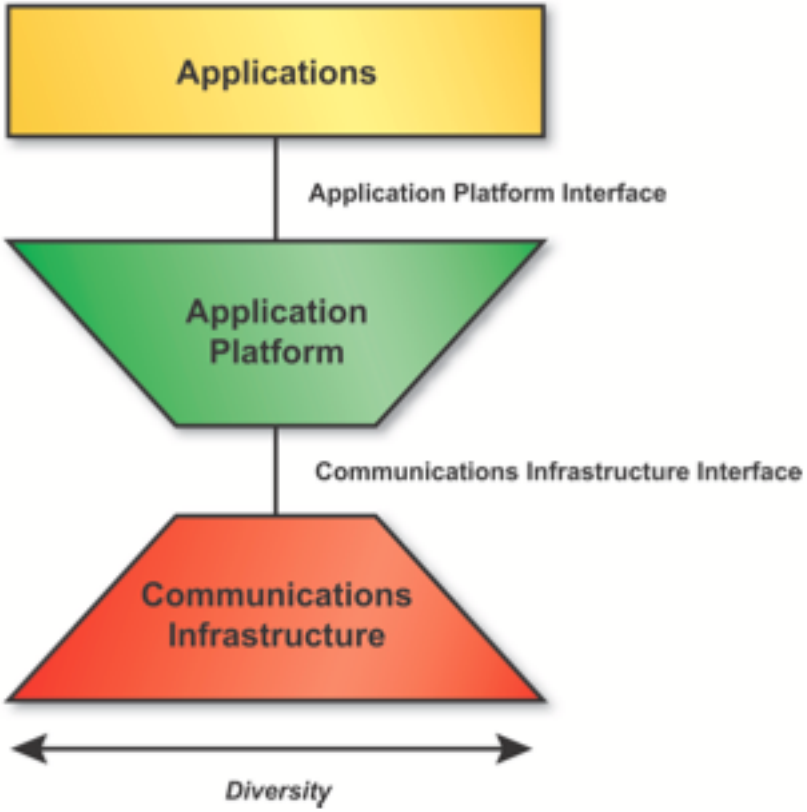

Figure 43-1 Technical Reference Model — High-Level View

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TOGAF Foundation Architecture
Some more Details

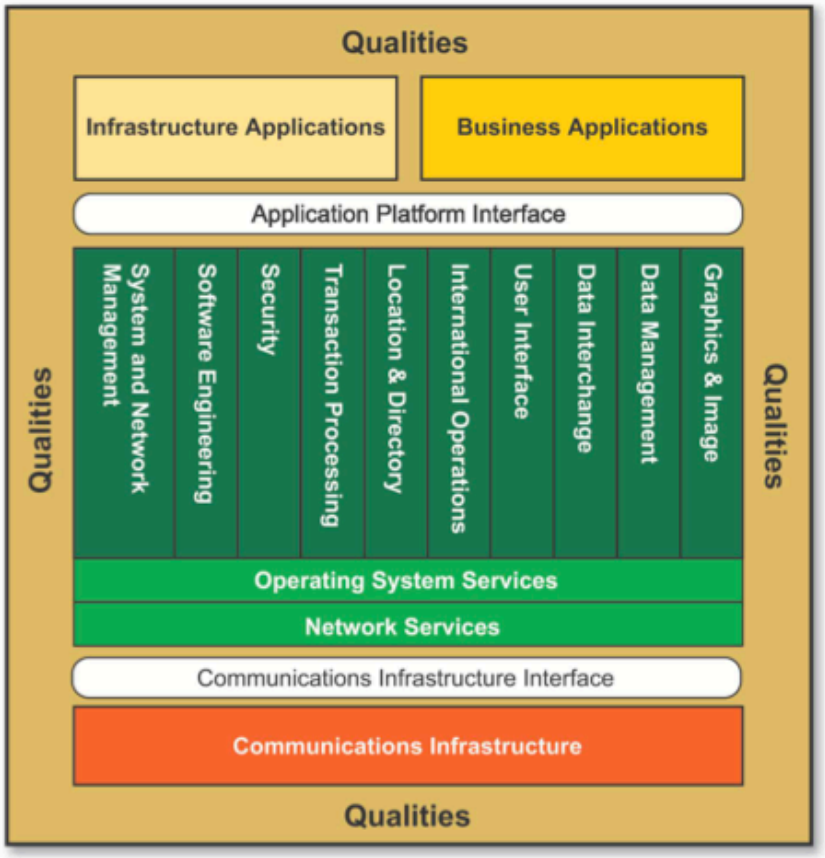

Figure 43-2 Detailed Technical Reference Model (Showing Service Categories)

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TOGAF Foundation Architecture Sample Definition

43.5.7 Operating System Services

Operating system services are responsible for the management of platform resources, including the processor, memory, files, and input and output. They generally shield applications from the implementation details of the machine. Operating system services include:

- **Kernel Operations** provide low-level services necessary to:
  - Create and manage processes and threads of execution
  - Execute programs
  - Define and communicate asynchronous events
  - Define and process system clock operations
  - Implement security features
  - Manage files and directories
  - Control input/output processing to and from peripheral devices

  Some kernel services have analogues described in Section 43.5.13, such as concurrency control services.
- **Command Interpreter and Utility** services include mechanisms for services at the operator level, such as:
  - Comparing, printing, and displaying file contents
  - Editing files
  - Searching patterns

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TOGAF Integrated Information Infrastructure Reference Model - Top Level Diagram

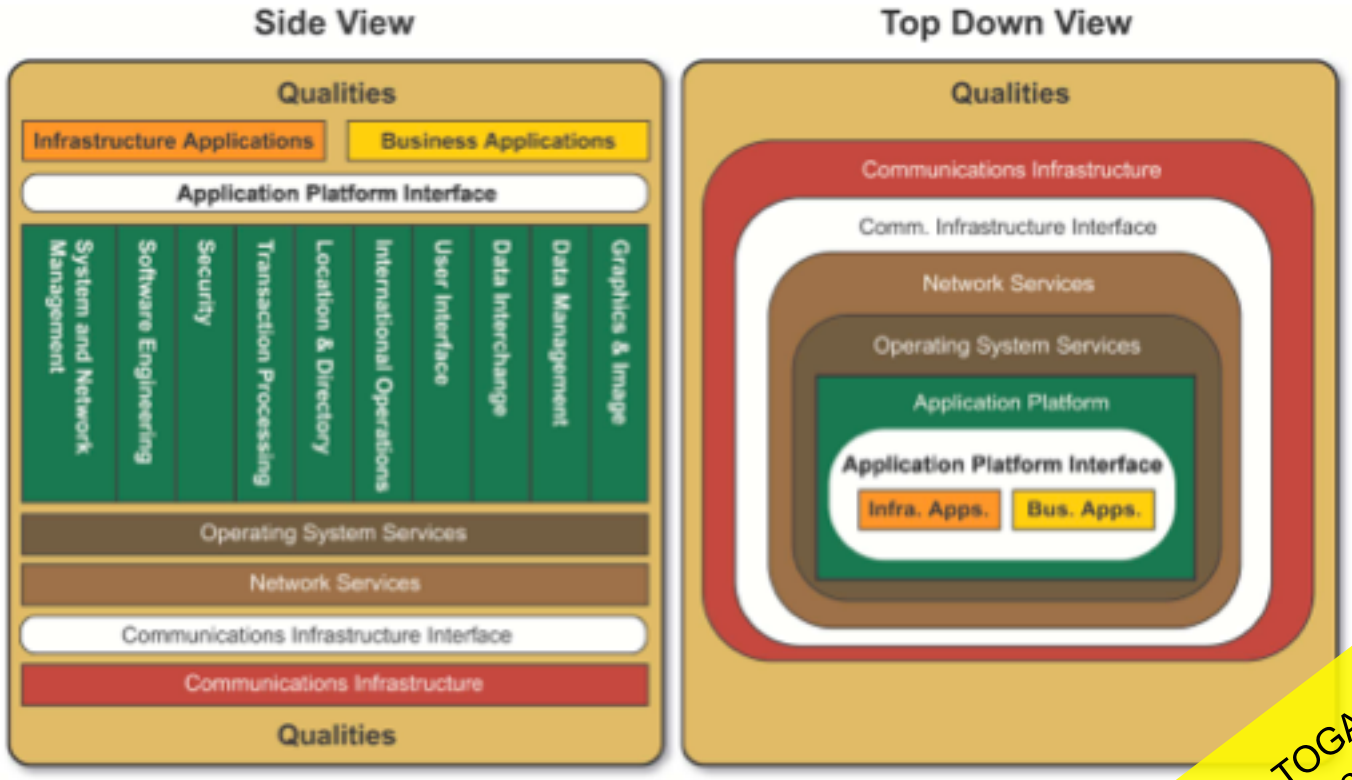

Figure 44-2 TOGAF TRM Orientation Views

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TOGAF Integrated Information Infrastructure Reference Model – Sample Description

44.3.3.1 Development Tools

The Development Tools component of the model comprises applications that take the form of tools for modeling, designing, and constructing the integrated information infrastructure. Specifically, it includes tools for business, process, and data modeling, as well as the traditional application construction tools that transform the business model into software that automates the business processes revolving around information.

Note that each set of tools will be logically connected through a directory, allowing one tool to be driven by data from another. The following sections describe the requirements for components of Development Tools. The tool set also includes a repository.

Business Modeling Tools

This category covers tools for the modeling of business rules and business process rules.

Business modeling describes and documents the business in a comprehensive knowledge base. It establishes a consensus among general management of the business direction, organization, processes, information requirements, and the current environment of the business. Perhaps most importantly, this understanding is documented in a common, business-oriented format to be utilized for subsequent enhancement.

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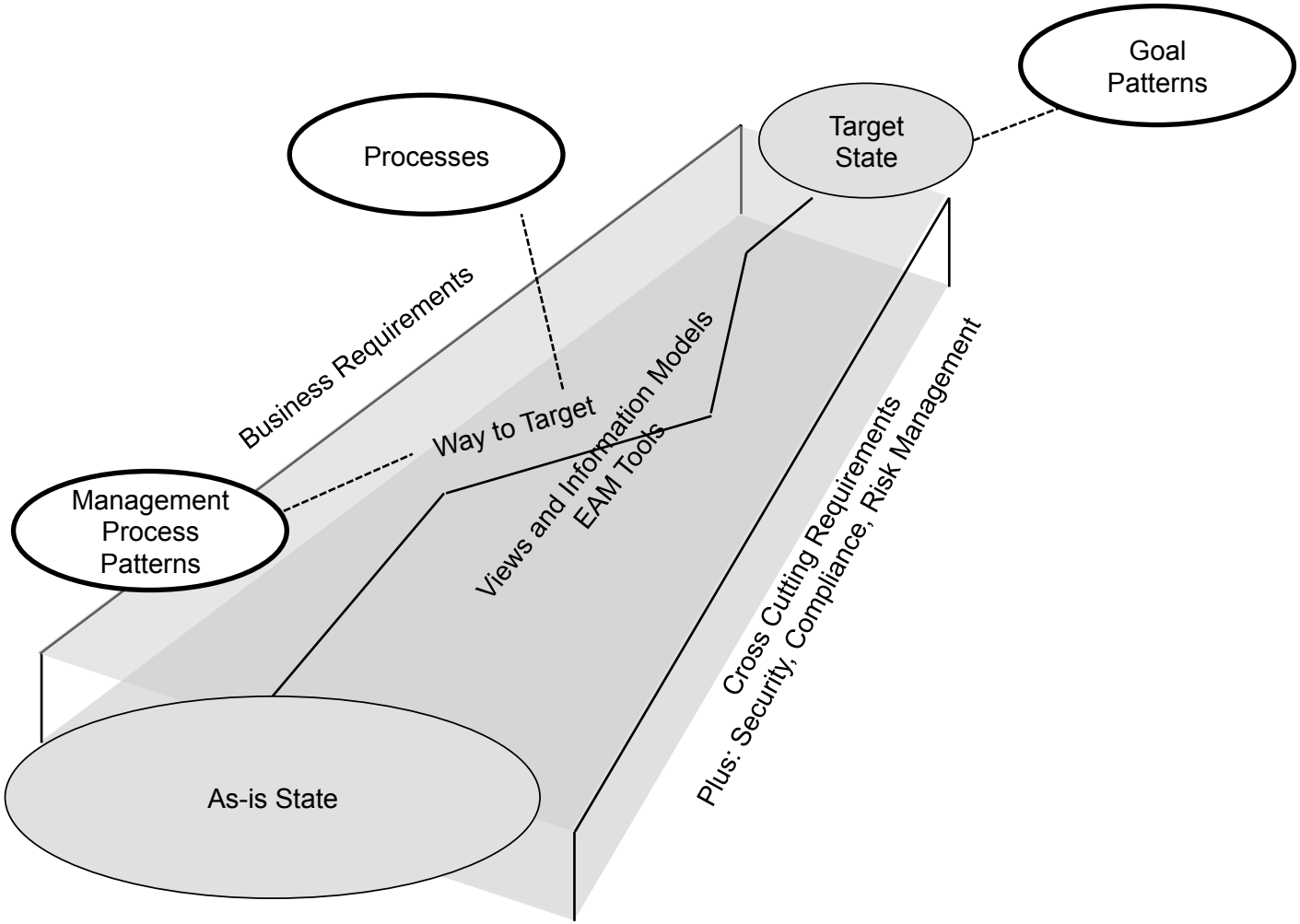
What you need to **MANAGE** Enterprise IT Architecture



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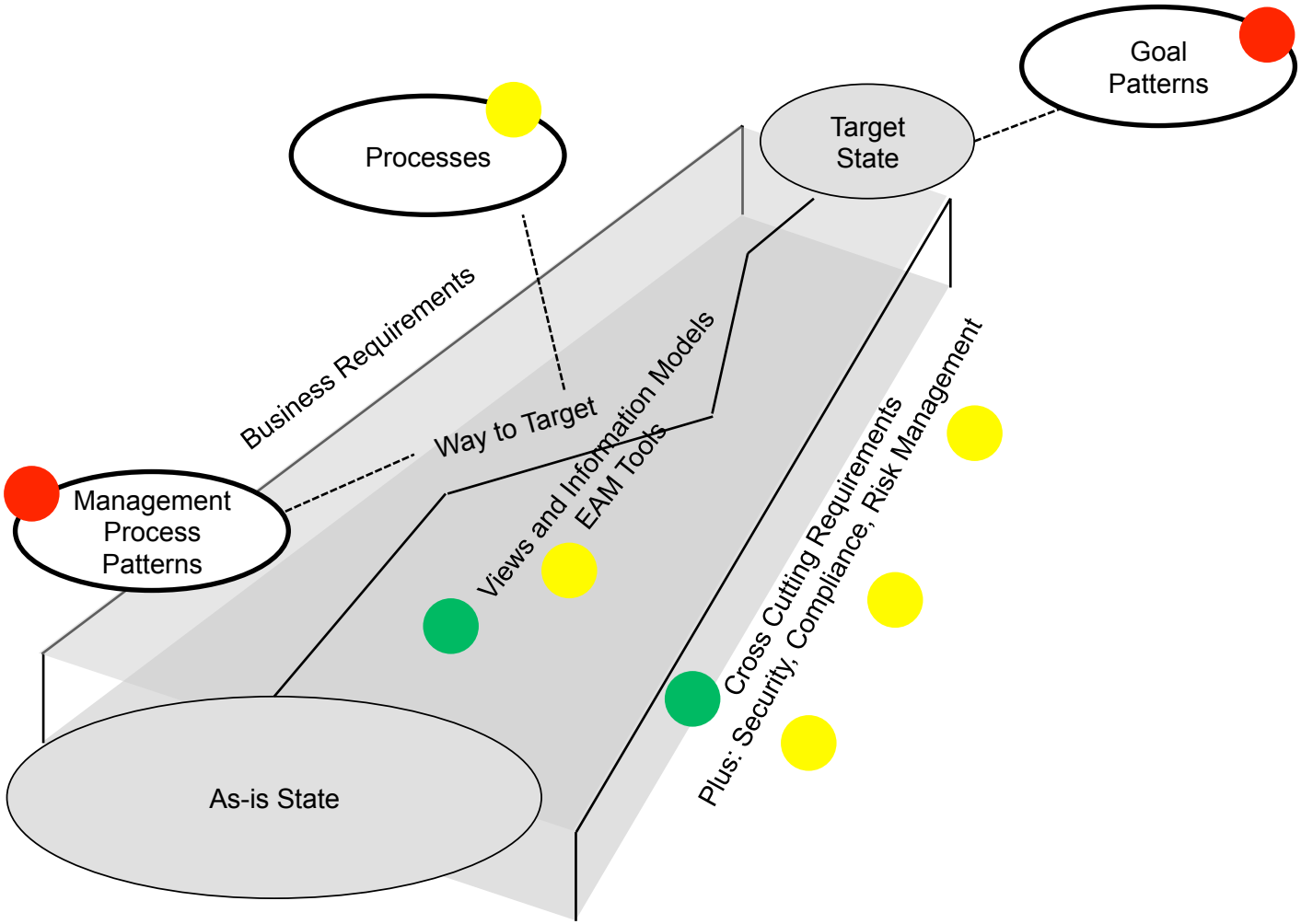

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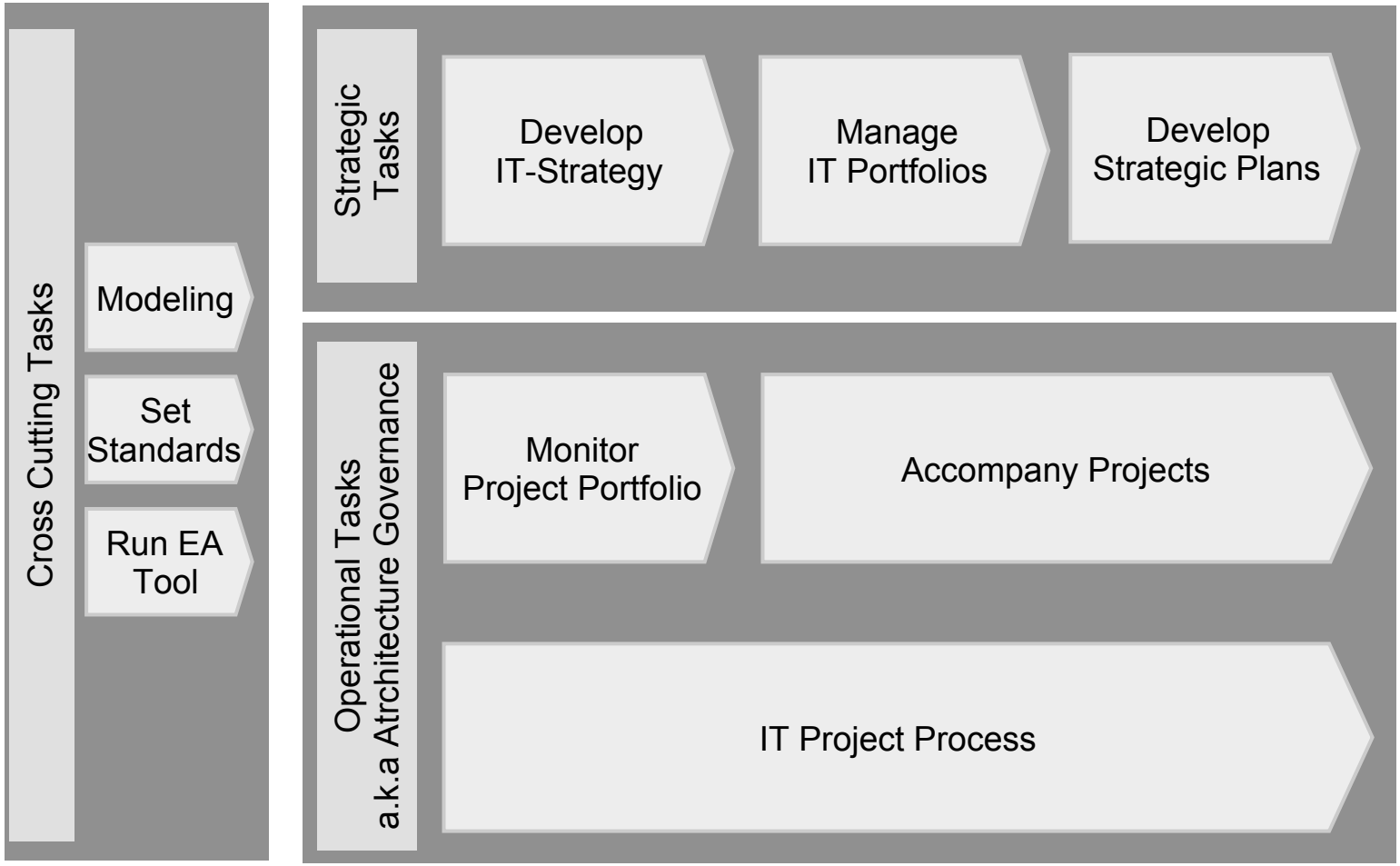
A E(IT)AM Process Map



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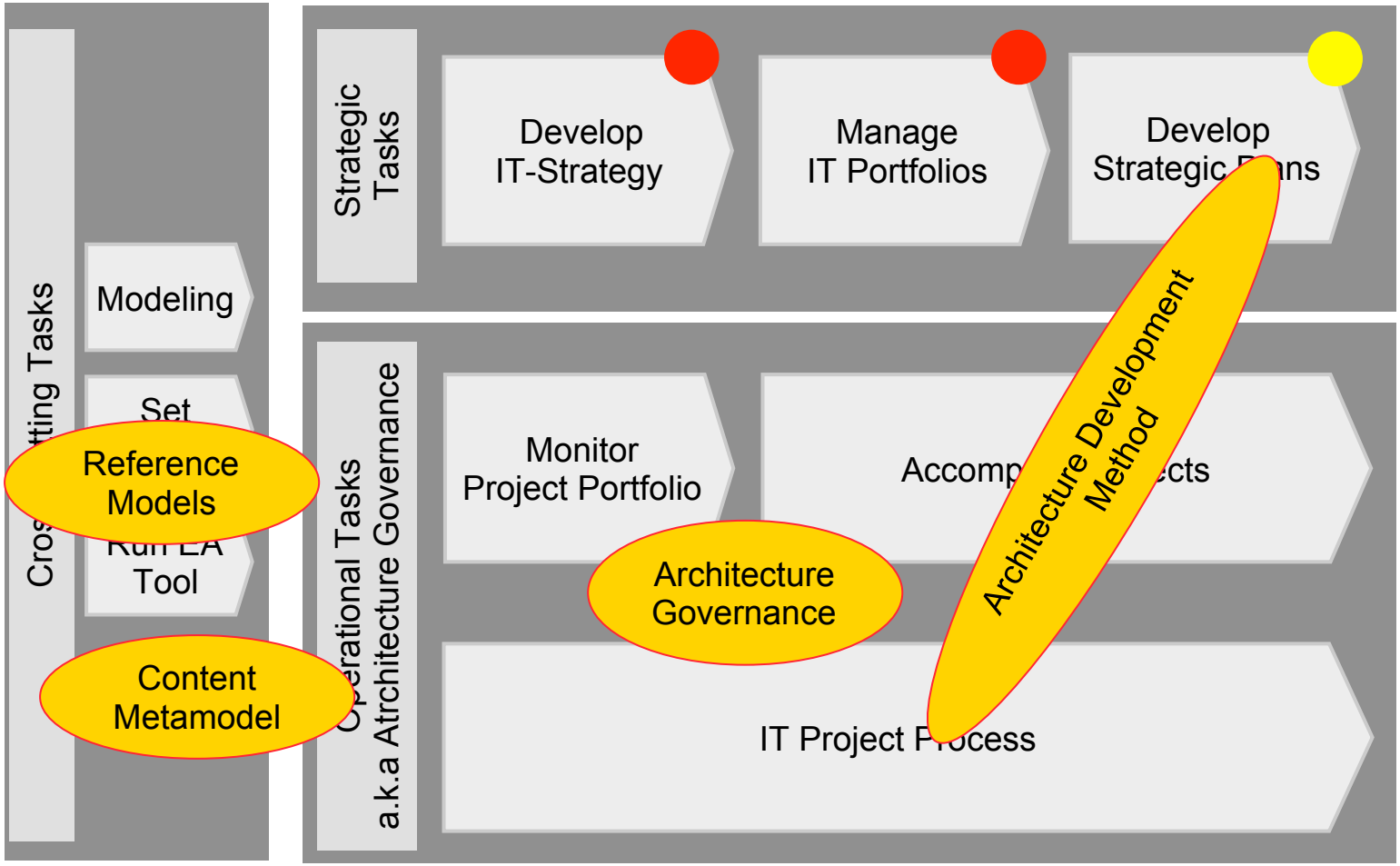

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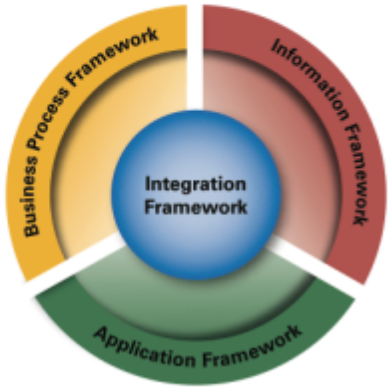
We need to have a look at the possible relations between the TMFs 4 frameworx and TOGAF

FRAMEWORX COMPONENTS

Frameworx enables a service oriented, highly automated and efficient approach to running a service providers business through the following components:



The Business Process Framework – Efficient, clear and effective business processes are critical to delivering innovative services quickly, at the least possible cost. The Business Process Framework provides a comprehensive, industry agreed, multi-layered view of the key business processes a service provider requires to run their business. Aligned to ITIL, and supported by off-the-shelf tools, the Business Process Framework provides:

- A comprehensive, multi-layered catalog of the business processes required to run a service provider business
- Guidelines and standard process flows ensuring your processes are efficient and effective across the enterprise
- Business-to-Business (B2B) processes giving you standardized processes across a value-chain of partners

The Information Framework – End-to-end service management requires a consistent use of data across the enterprise. The Information Framework provides a comprehensive, industry agreed definition for information that flows through the enterprise and between service providers and their business partners. Supported by off-the-shelf tools, the Information Framework provides a common information model, reducing complexity and allowing for the definition of standardized integration points. The Framework enables business agility through:

- An agreed enterprise information model for end-to-end service management, defined using business-oriented UML models
- An extensible, proven and flexible information model supporting federation, enabling rapid introduction and management of new technologies and services
- A clear, common language between buyer and supplier and business partners

The Application Framework – Understanding how your business processes are implemented in your software architecture is paramount to success. This Framework provides a model for grouping processes and their associated information into recognizable applications. It provides a common language and identification system between buyer and supplier for all application areas. When implemented, it gives you:

- A coordinated systems map showing how your business processes are implemented across applications
- Support for enterprise architecture design through understanding of your current systems architecture versus a standardized map
- Support for procurement through a consistent definition of an application, the functions it should perform and the information it requires.

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What TMF says about this …

TOGAF

TOGAF 9 is a detailed method and set of resources for developing an Enterprise Architecture. Developed by The Open Group's Architecture Forum, TOGAF offers a comprehensive, open method for Enterprise Architecture for any enterprise.

Frameworx provides the detailed business process, information and application models built and hardened for service provider businesses for TOGAF's Architecture Development Method (ADM). Using Frameworx and TOGAF together enables service providers to deploy an Enterprise Architecture specifically designed for a service provider's business structure and needs.

TM Forum works closely with The Open Group to identify synergies between the two standards, delivering benefits in future versions of each standard. To help with the implementation of TOGAF and Frameworx together, the two organizations have jointly produced a report mapping TOGAF's Architecture Development Framework to each of the components of Frameworks.

Source: tmforum Frameworx introduction;
http://www.tmforum.org/browse.aspx?linkid=39465&docid=13120

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TOGAF and TMF frameworx
TOGAF and ...

- .. the Information Framework (aka SID)
- .. the Business Process Framework (aka eTOM)
- .. the Application Framework (aka TAM)
- .. and the Integration Model

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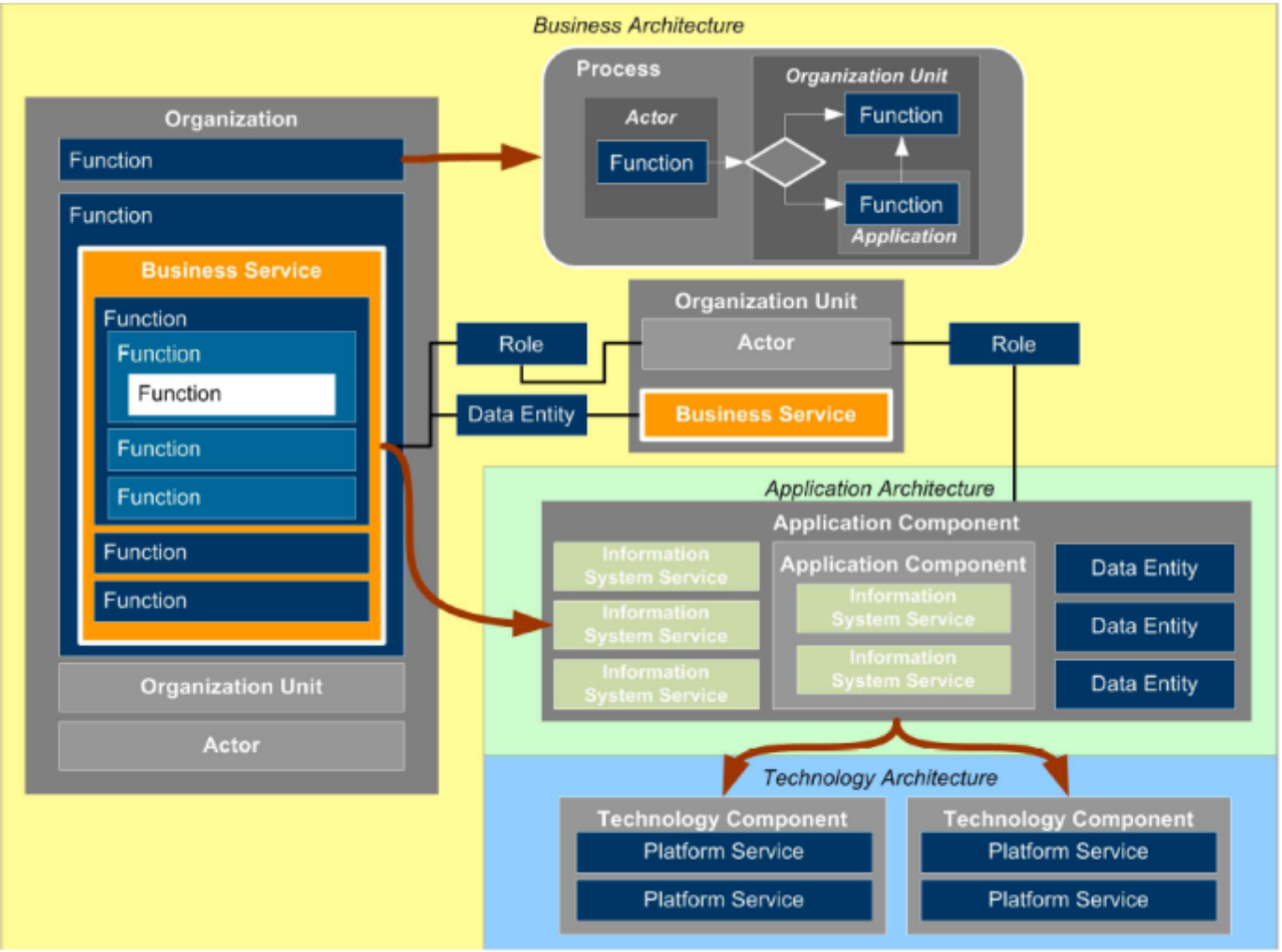
What is SID in relation to TOGAF?
Short look at TOGAF Content Metamodel



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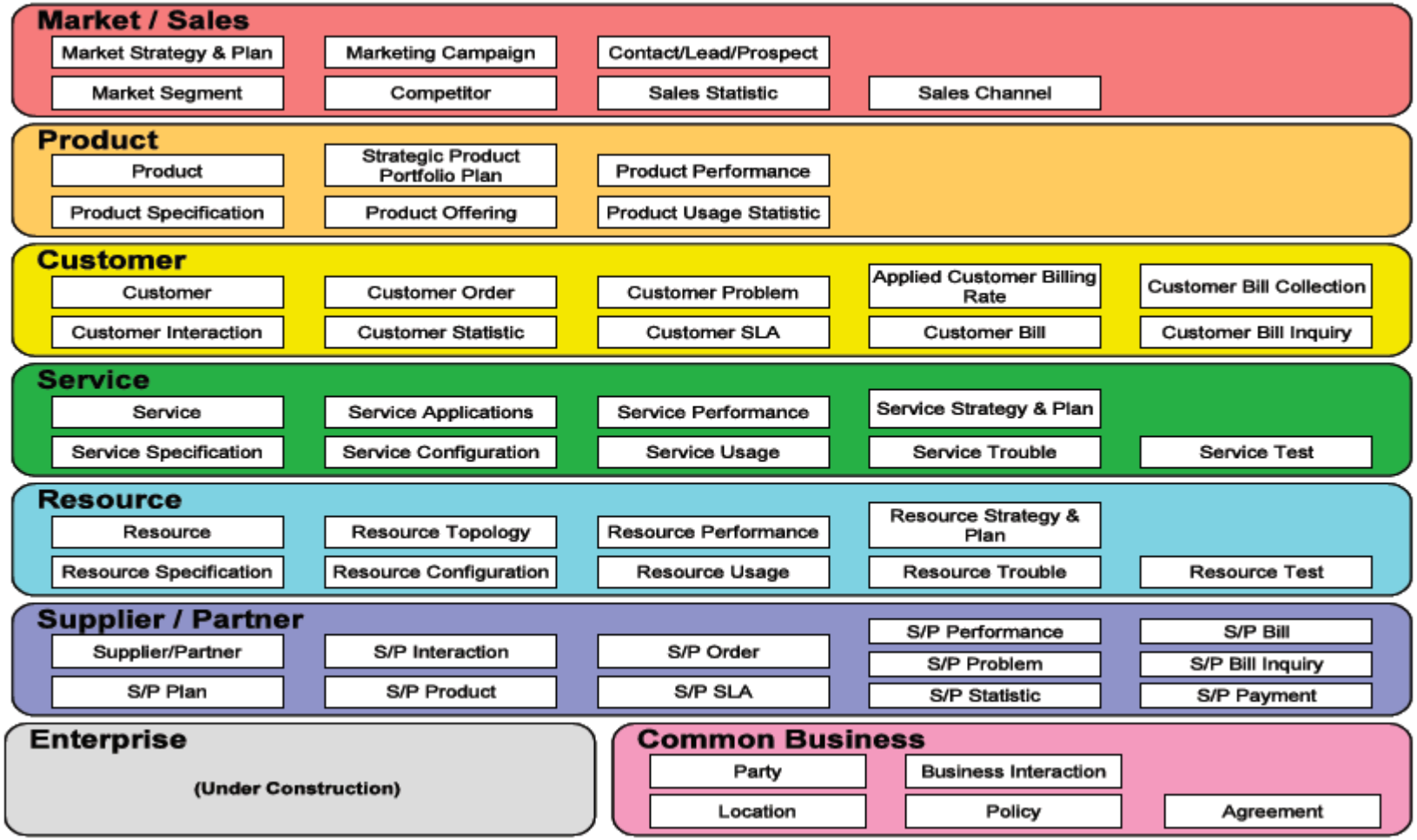
What is SID in relation to TOGAF? Short look at SID



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What is SID in relation to TOGAF? Possible Model Relations …

Meta Meta Level	TOGAF Content Metamodel
Meta Level	SID (unchanged)
	SID in your Enterprise (tailored)
Instance Level	Your Enterprise

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TOGAF and TMF frameworx
TOGAF and ...

- .. the Information Framework (aka SID)
- .. the Business Process Framework (aka eTOM)
- .. the Application Framework (aka TAM)
- .. and the Integration Model

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What is eTOM in relation to TOGAF?

- eTOM is a Business Process Framework
  - Set of Reference Business Processes
- eTOM Processes could hence be transformed and stored in a Repository based on a TOGAF Content Metamodel (CMM)
  - First, you need to extend the TOGAF CMM in order to handle process definitions

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TOGAF CMM needs to be extended in order to „store“ business process descriptions?

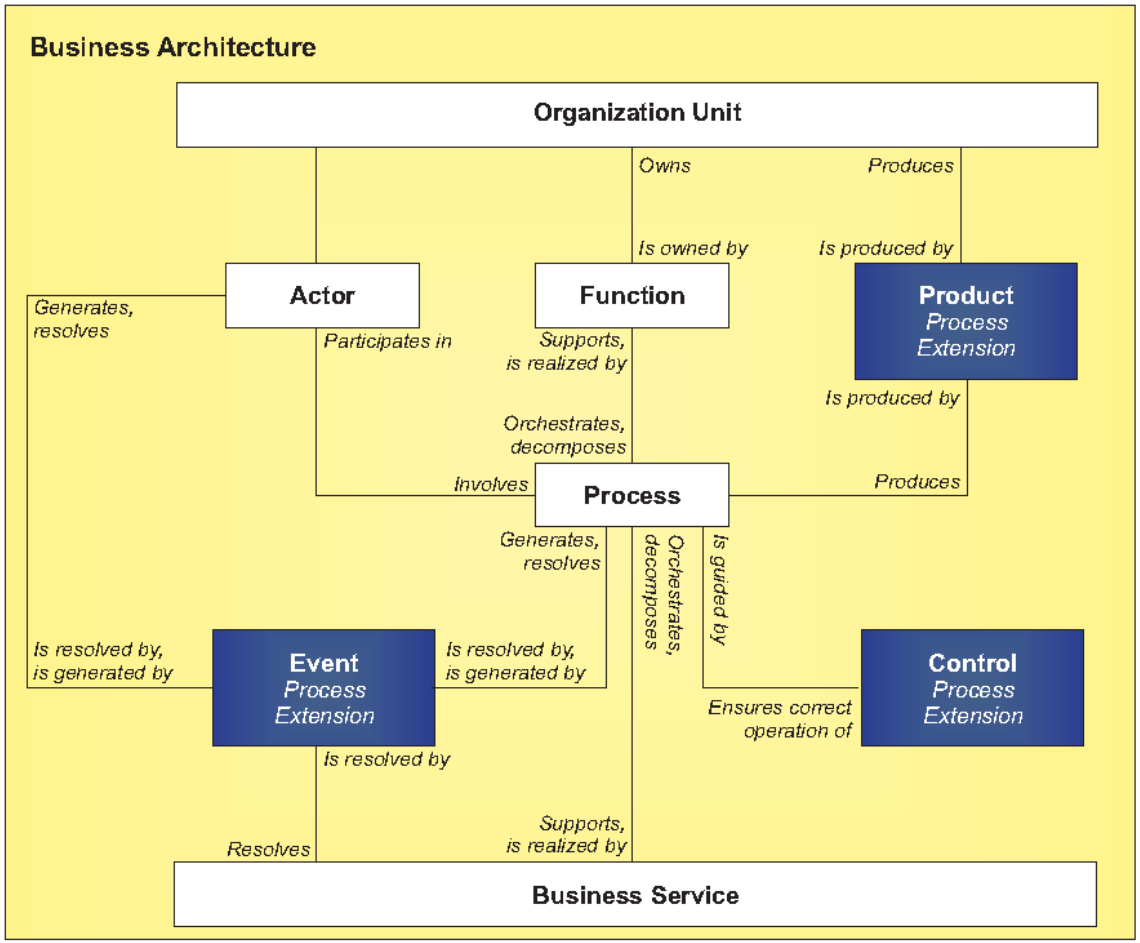

Figure 34-13 Process Modeling Extensions: Changes to Metamodel

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You could the „populate“ your EA repository with eTOM process

Meta Level	TOGAF Content Metamodel (enhanced – see above)
Reference Processes	eTOM processes (unchanged)
Your company’s Process Definitions	eTom processes (tailored)
Your company’s Process Instances	Concrete Process Instances e.g. Provisioning of XYZ for customer V

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TOGAF and TMF frameworx
TOGAF and ...

- .. the Information Framework (aka SID)
- .. the Business Process Framework (aka eTOM)
- .. the Application Framework (aka TAM)
- .. and the Integration Model

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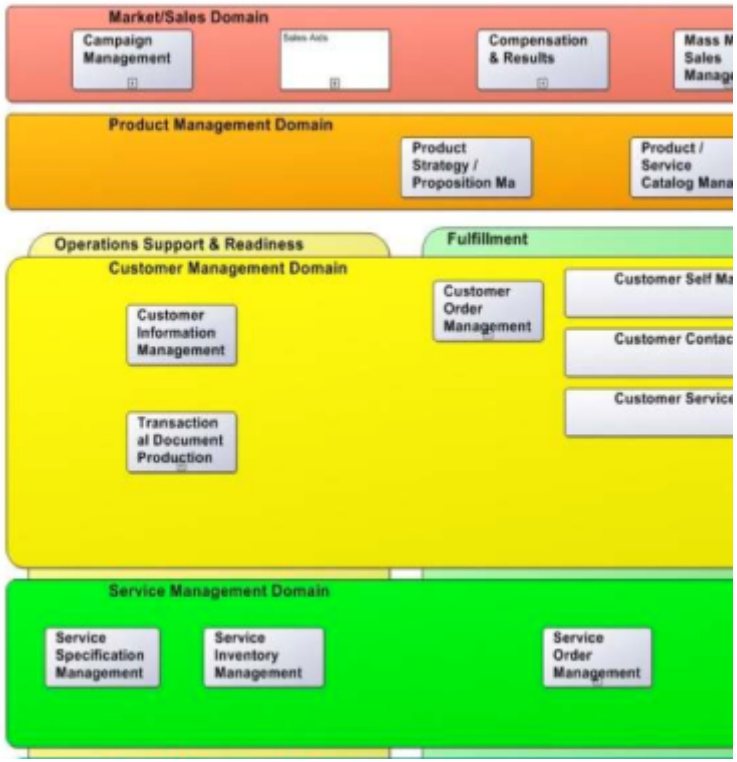
Remember the TAM overview



- This is only a piece of TAM (as you know already)
- You could store your applications in the TOGAF applications model part

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TOGAF in a Nutshell
Contents

- Flavors of Enterprise Architecture
  - Layers of Planning and Layers of Architectures
  - EA Frameworks in the World of IT Frameworks
- TOGAF
  - What's in it
  - what's not in it
- Example: TOGAF in a Telco
  - Relation between TOGAF and frameworx
  - Customizing TOGAF for your Telco / Opco

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How would you customize TOGAF for your Telco / Opco

What could be customized	How could it be customized
ADM	Analogous to Customizing e.g. a RUP or the V-Modell XT
TOGAF Content Metamodel	Select the areas of your interest – almost nobody will implement a meta model with hundreds of meta entities
Architecture Capability Framework	Decide on your specific implementation of Architecture Governance

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Customizing the ADM Process

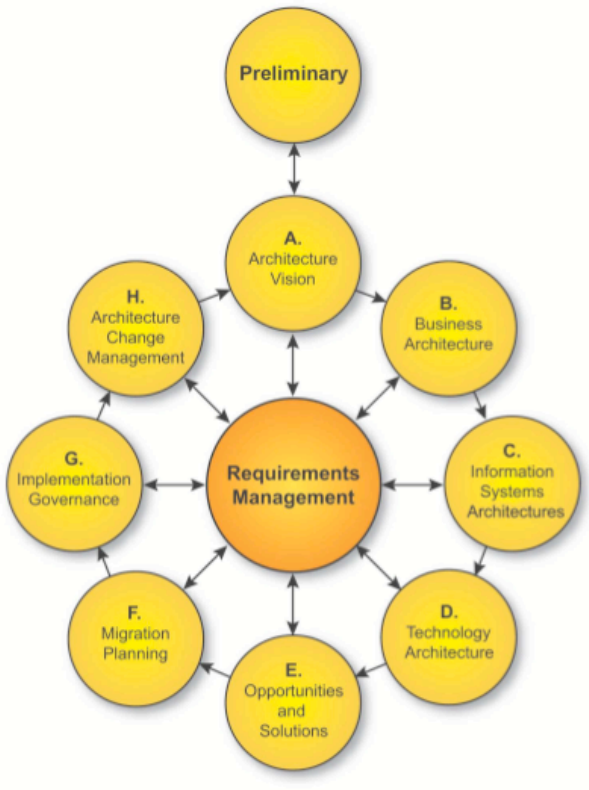

Figure 5-1 Architecture Development Cycle

- Simple: You can see the phases of the ADM cycle as checklists and use them without any customizing
- More sophisticated: You can roll a customized version
  - Remove steps you consider unnecessary
  - Add steps that might be necessary in your organization

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Define (Customize) ADM Artifacts

3. Customizing TOGAF Documentation

The list of inputs and outputs for each phase of the ADM is quite extensive. Consider, the inputs and outputs for phase G: Implementation Governance.

The best way to customize TOGAF documentation is to view the list of deliverables for each phase of the ADM as a grocery list. Only take what you really need.

TOGAF also outlines the basic structure of each of the ADM deliverables. It's recommended to use this as the basis of your document templates. They can be used as-is (if you mark the least critical parts as optional).

- You might want to remove or add document types
- You need to define document templates for each document you consider necessary

Source: http://simplicable.com/new/how-to-customize-TOGAF

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Customizing the TOGAF Content Metamodel

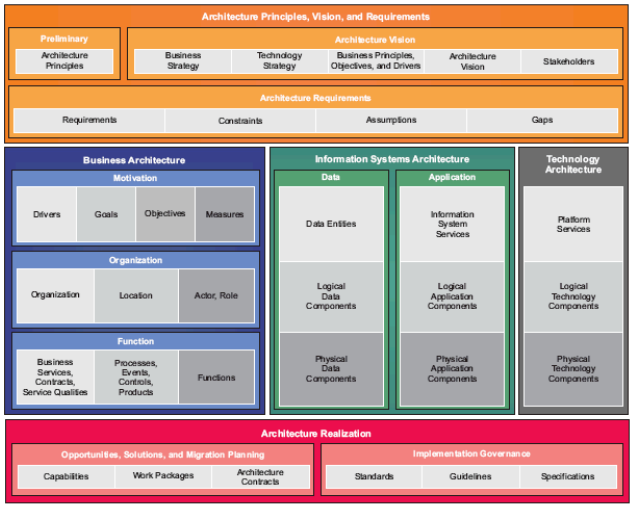

Figure 33-3 Content Metamodel Overview

- Define your areas of interest out of the whole scope of the metamodel
- Choose appropriate metamodel snippets
- Integrate them into a repository

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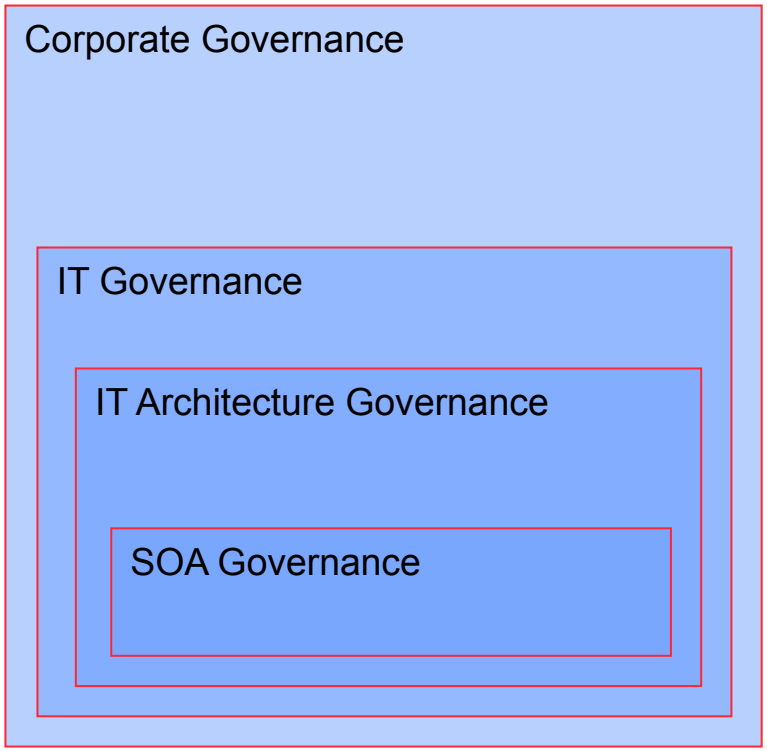
Customizing the Architecture Capability Framework



- Is identical to installing a system of IT Architecture Governance
- Must be consistent with overall IT Governance of your enterprise
- Should be complemented with an appropriate SOA Governance System

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Some advice on customizing TOGAF and frameworx …

- Please customize TOGAF and frameworx ONCE for a group the likes of Telekom Austria
- Avoid country specific versions whereever possible

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