ArchiMate 3 Core Framework

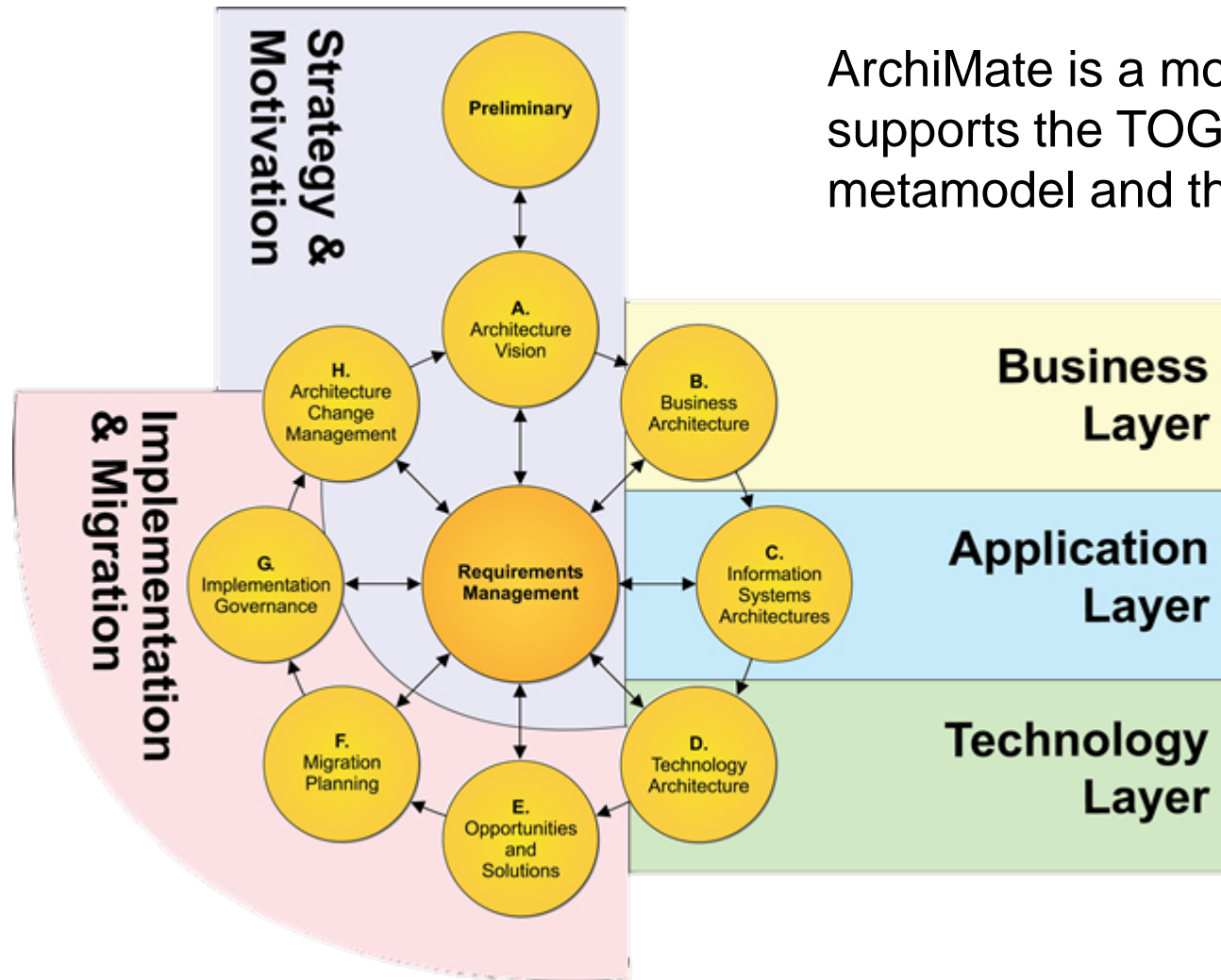*Knut Hinkelmann*

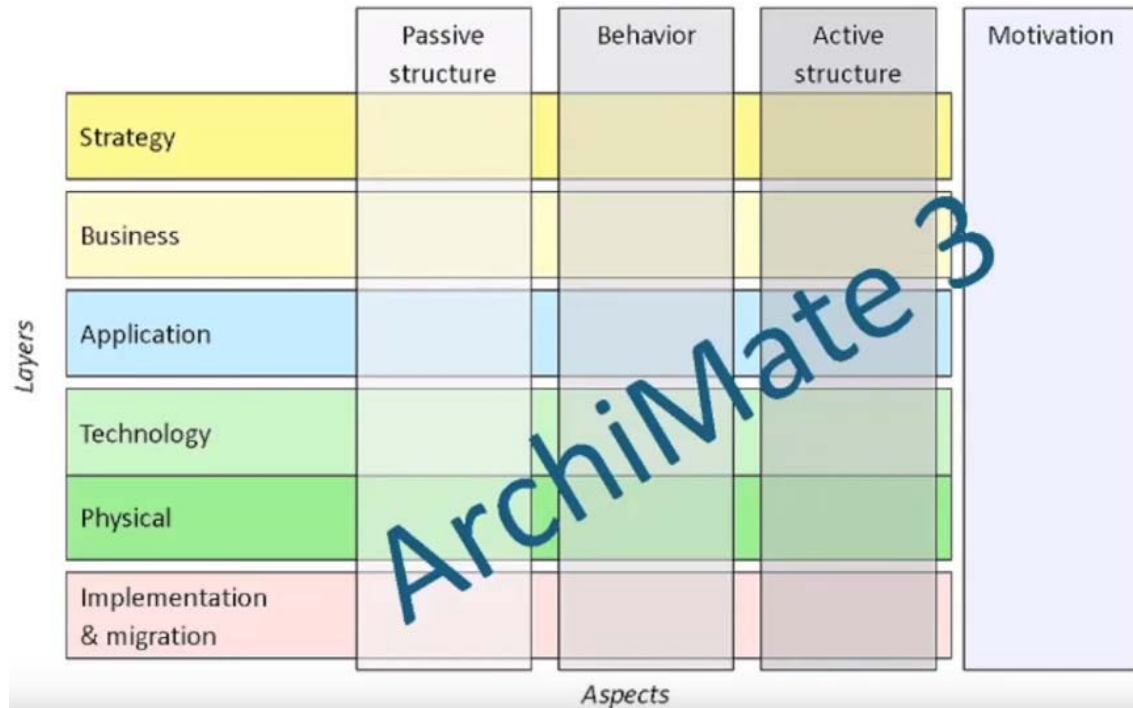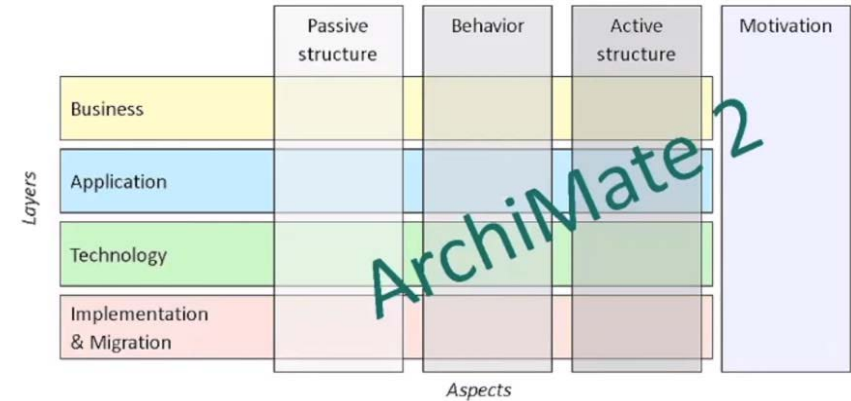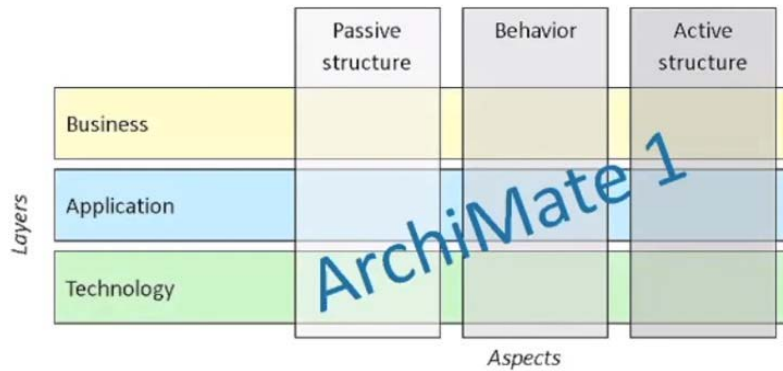Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

Reference

- The ArchiMate 3 specification is available at
  http://pubs.opengroup.org/architecture/archimate3-doc/

- It is referenced in this presentation as ArchiMate 3

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

2

TOGAF ADM and ArchiMate

ArchiMate is a modeling language that supports the TOGAF content metamodel and the TOGAF ADM

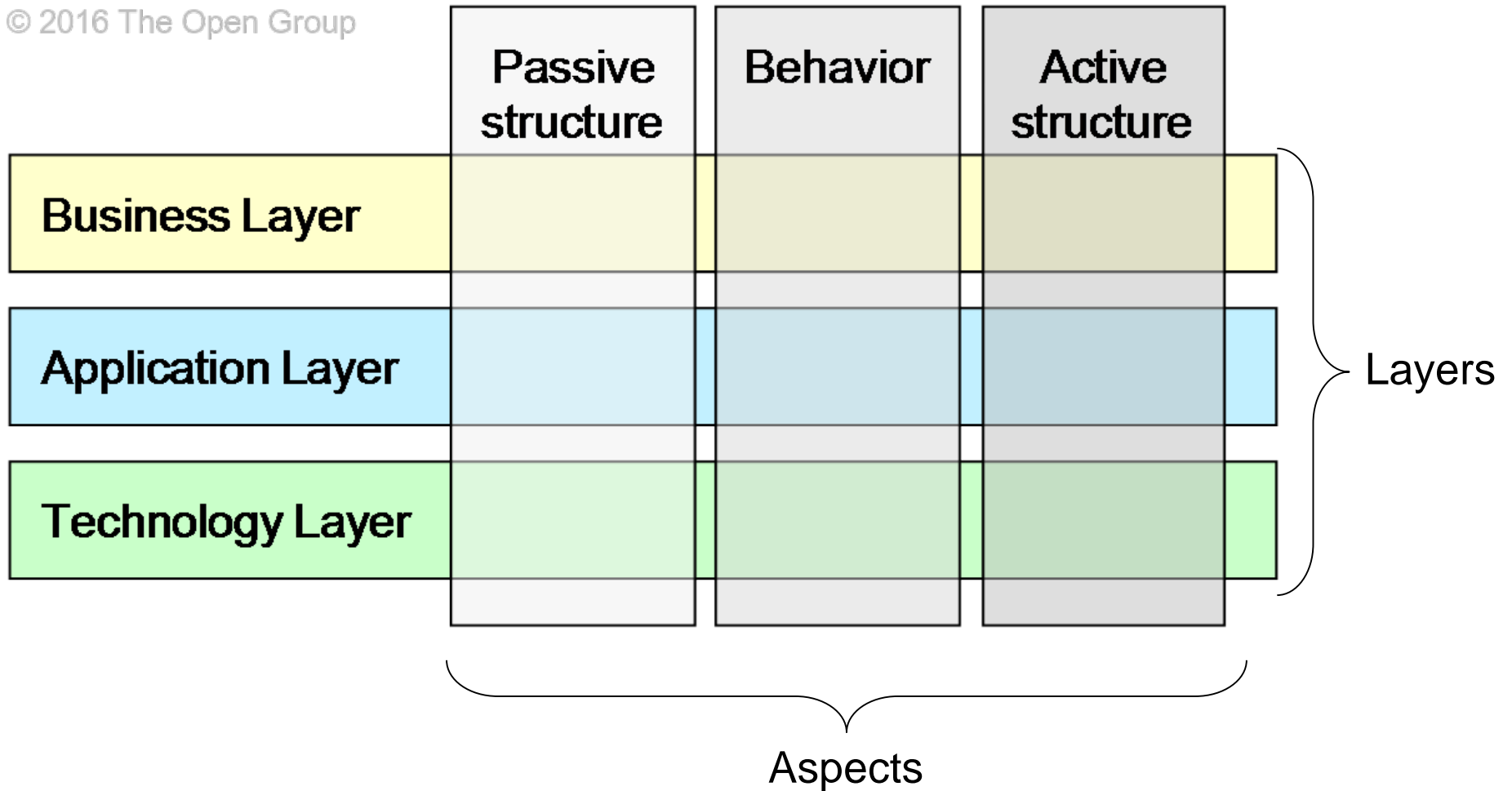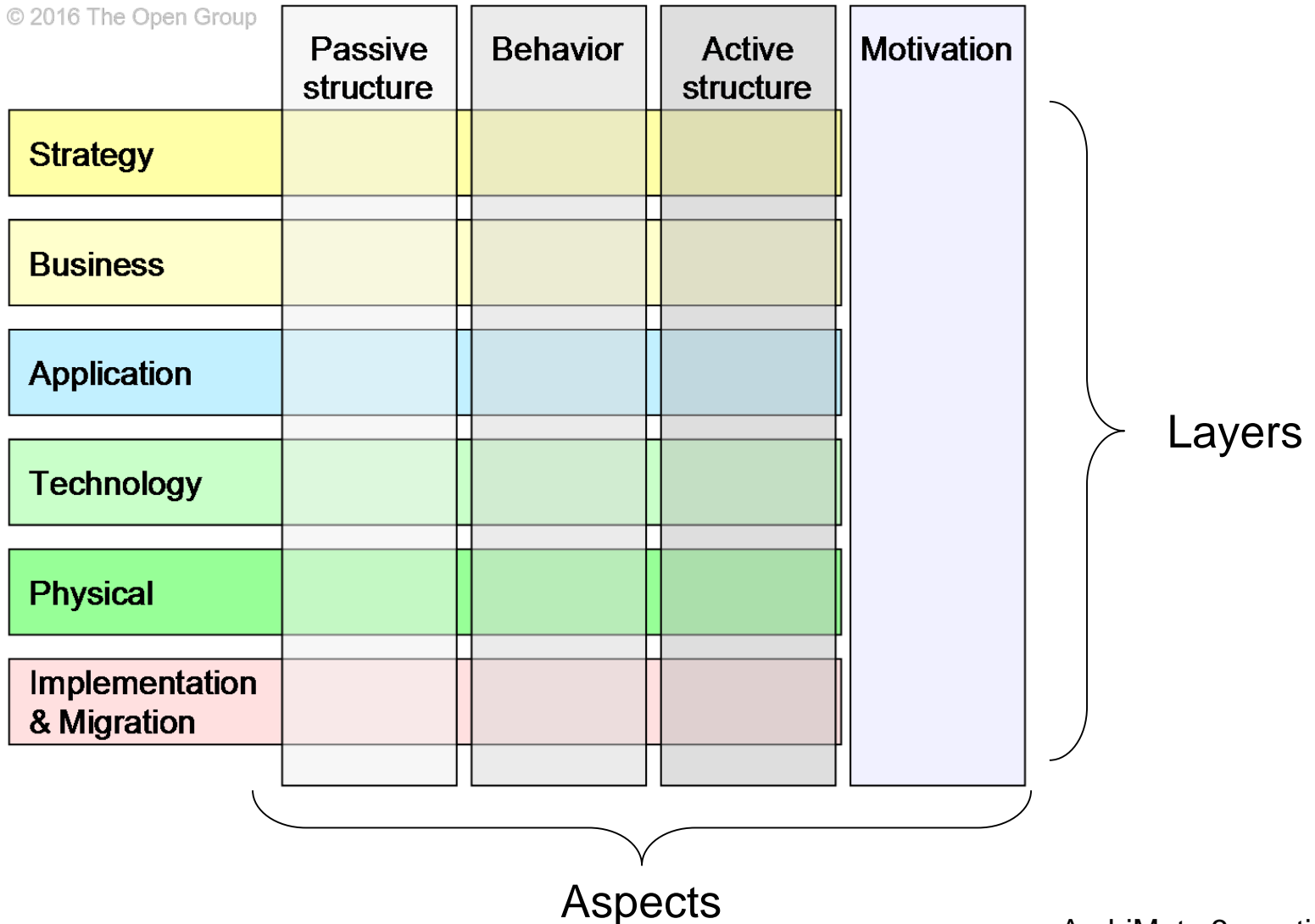Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Overview

3

Evolution of the ArchiMate Framework

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Overview

4

The ArchiMate Core Framework

	Passive structure	Behavior	Active structure
Business Layer			
Application Layer			
Technology Layer			

Layers

Aspects

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Overview

ArchiMate 3, section 3.4

5

The ArchiMate Full Framework

	Passive structure	Behavior	Active structure	Motivation
Strategy				
Business				
Application				
Technology				
Physical				
Implementation & Migration				

Layers

Aspects

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Overview

ArchiMate 3, section 3.5

6

Layers in ArchiMate (1/2) – Core

- ### *Business Layer*
  - ♦ business services offered to customers, which are realized in the organization by business processes performed by business actors.

- ### *Application Layer*
  - ♦ application services that support the business, and the applications that realize them.

- ### *Technology Layer*
  - ♦ technology services such as processing, storage, and communication services needed to run the applications
  - ♦ computer and communication hardware and system software that realize those services.
  - ♦ Physical elements for modeling physical equipment, materials, and distribution networks (new in ArchiMate 3)

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Overview

ArchiMate 3, section 3.4

7

Layers in ArchiMate (2/2) - Extensions

- **_Strategy Layer_**
  - ♦ An approach or plan for configuring some capabilities and resources of the enterprise, undertaken to achieve a goal.
  - ♦ Capability, Resource, Course of Action.

- **_Physical Layer_**
  - ♦ overview of the physical elements and their relationships, derived from the ArchiMate Technology layer.
  - ♦ Equipment, Facility, Distribution network, Material.

- **_Implementation & Migration Layer_**
  - ♦ Focusing on the actual implementation of an EA and the migration process with work packages and dependencies.
  - ♦ Work package, Deliverable, Implementation event, Plateau, Gap

Aspects in ArchiMate

■ *Active Structure*

♦ represents the structural elements (the business actors, application components, and devices that display actual behavior).

■ *Behavior*

♦ represents the behavior (processes, functions, events, and services) performed by the actors.

♦ Structural elements are assigned to behavioral elements, to show who or what displays the behavior.

■ *Passive Structure*

♦ represents the objects on which behavior is performed. These are usually information objects in the Business Layer and data objects in the Application Layer.

■ *Motivation*

♦ used to model the motivations, or reasons, that guide the design or change of an Enterprise Architecture

Core Aspects in ArchiMate

■ Aspects correspond to a Subject-Verb-Object of sentences:
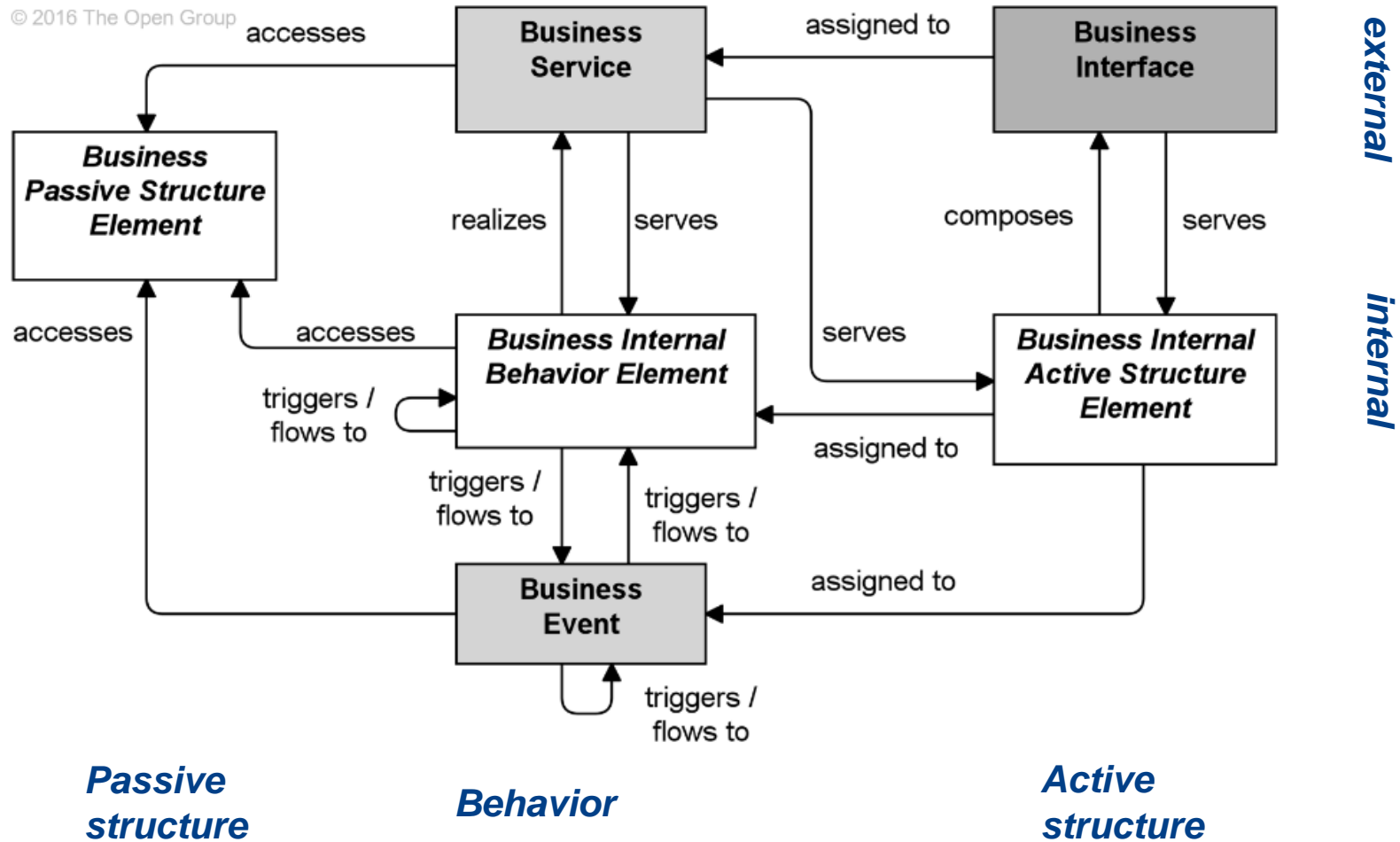
Passive structure	Behavior	Active structure
Book	Reads	John
Object	Verb	Subject
'What'	'How'	'Who'

https://www.youtube.com/watch?v=ULl9lf0OZco&

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Overview

10
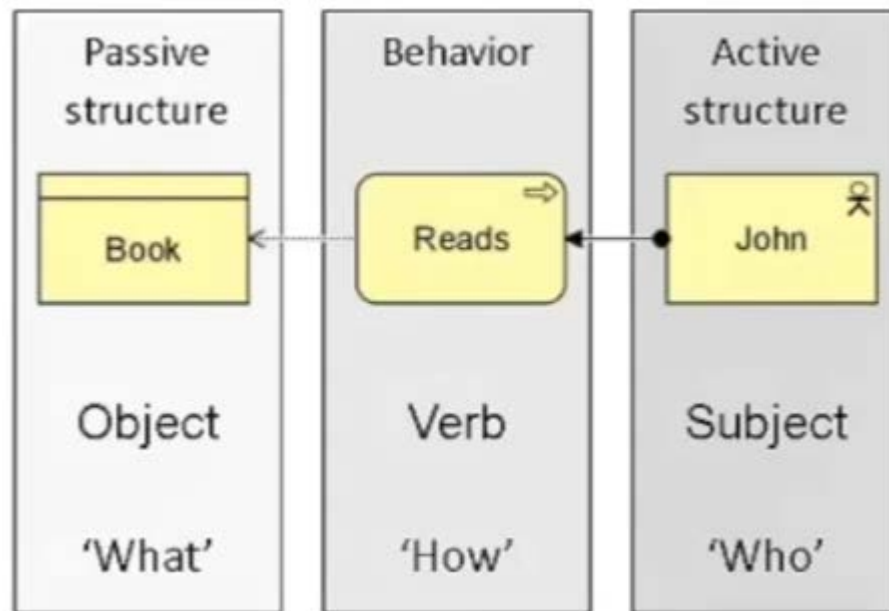
Abstractions in ArchiMate (1)

■ Separate Behavior from active structure

- ♦ ***Behavior***:   *what* the system must do and *how* the system does it

- ♦ ***Active structure***:   the system constituents (people, applications, and infrastructure) that do it

■ External vs. internal behavior :

- ♦ ***External view:***   *what* the system has to do for its environment (e.g. a service)

- ♦ ***Internal view:***   *how* it does this (e.g. the process or application realising the service)

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Overview

ArchiMate 3, section 3.6

11

Abstractions in ArchiMate (2)

- Conceptual, logical, and physical abstraction levels
  - *conceptual elements* represent the information the business finds relevant;
  - *logical elements* provide logical structure to this information for manipulation by information systems;
  - *physical elements* describe the storage of this information; for example, in the form of files or database tables.
- In the ArchiMate language, this corresponds with business objects, data objects, and artifacts, and the realization relationships between them

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Overview

ArchiMate 3, section 3.6

12

Top-Level Hierarchy of ArchiMate Concepts

© 2017 The Open Group

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Overview

13
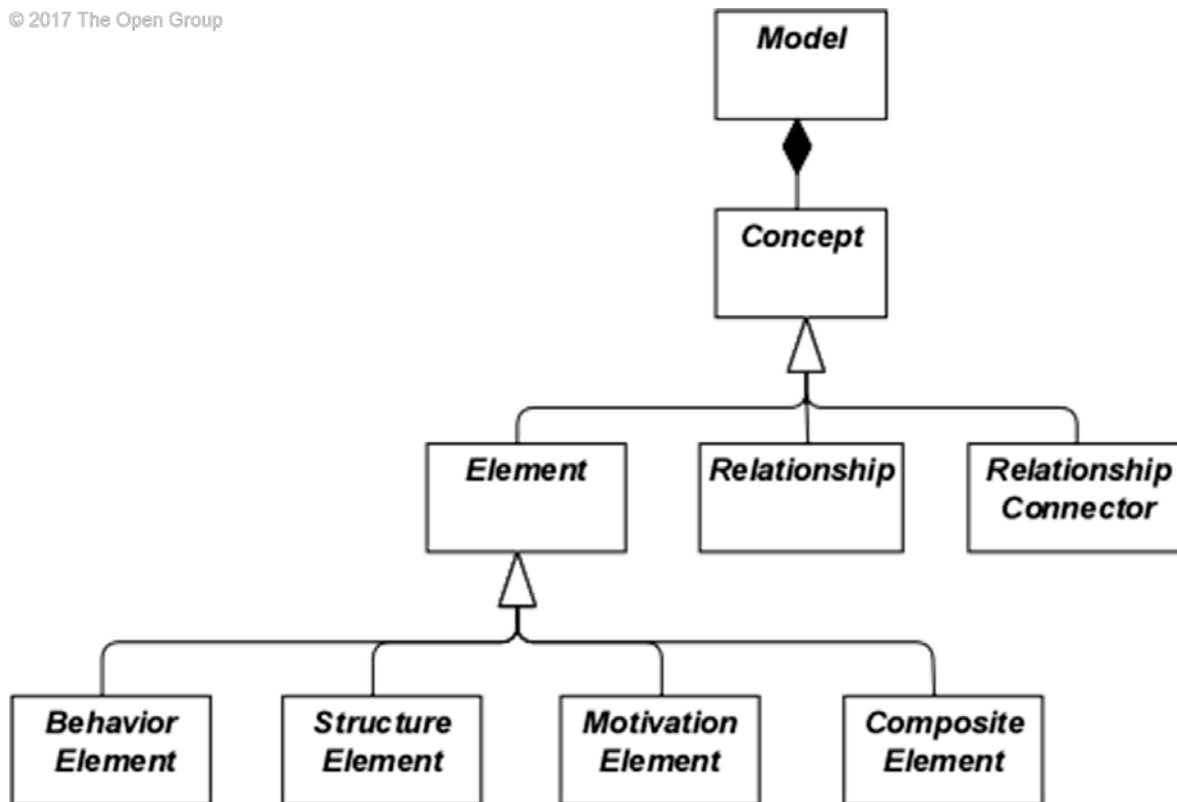
Hierarchy of Behavior and Structure Elements

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Overview

ArchiMate 3, section 4.1

14
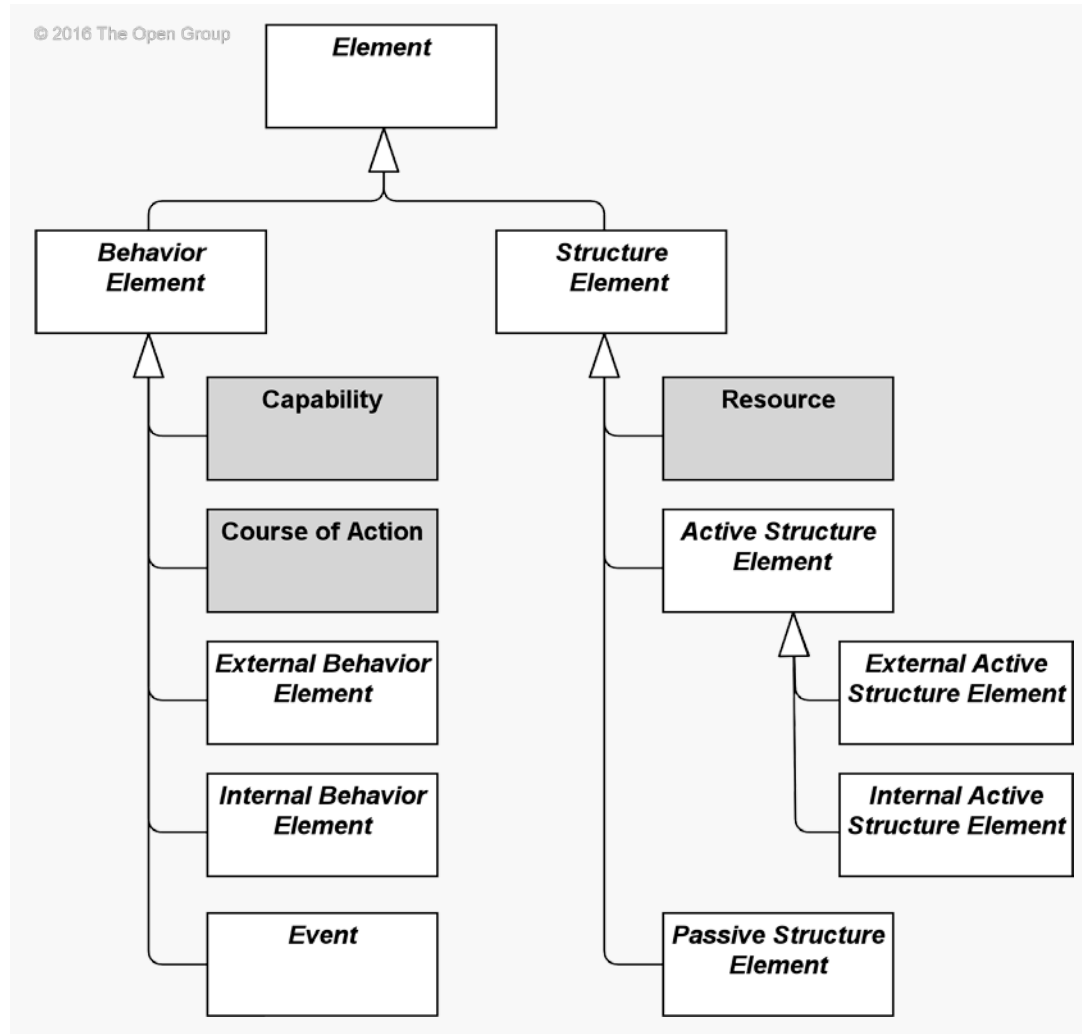
Overview of Relationship

© 2017 The Open Group

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Overview

15
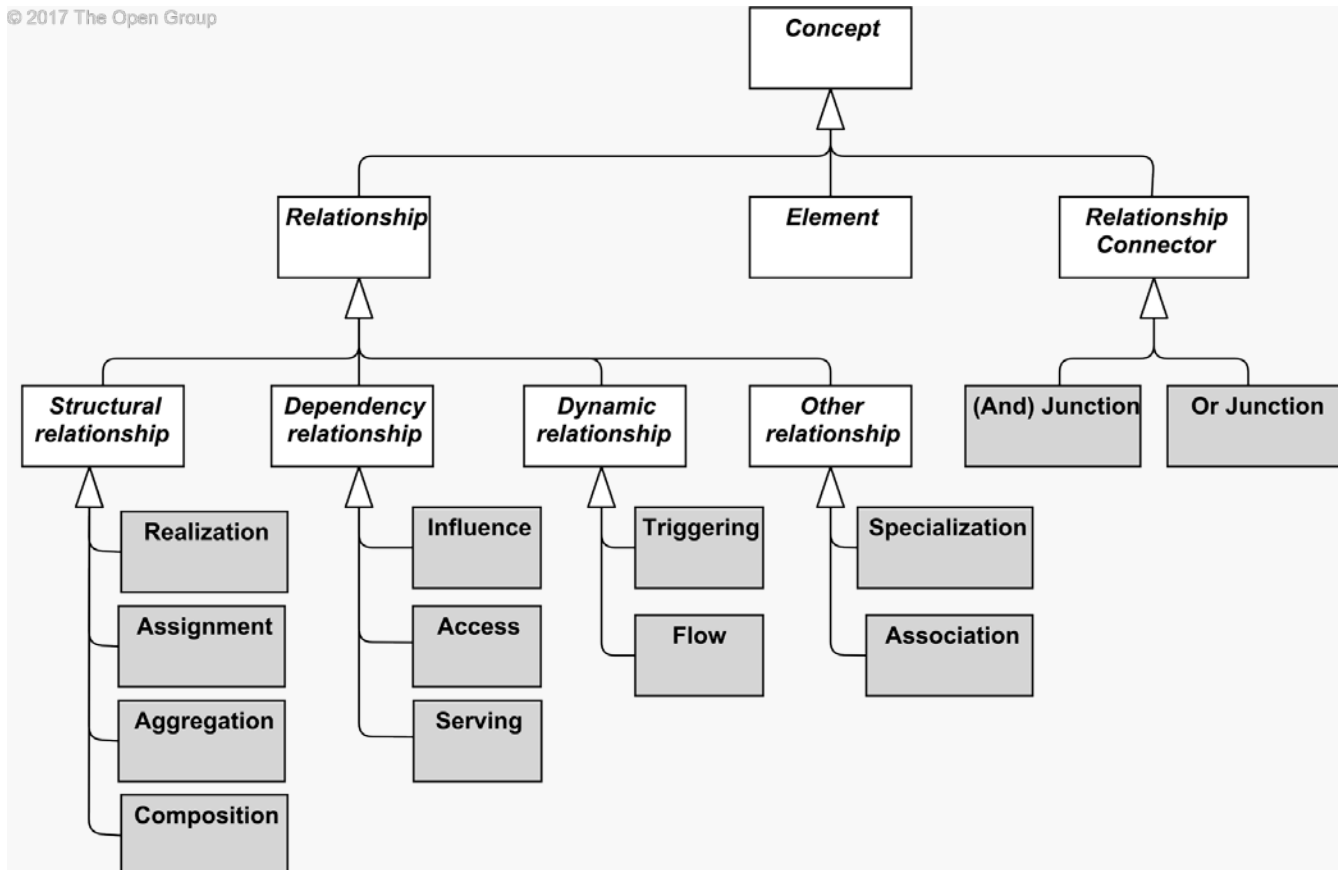
The ArchiMate Framework

This presentation gives an overview of the elements of the ArchiMate Core Framework (Business, Application, Technology) and the Physical Layer

© 2016 The Open Group

	Passive structure	Behavior	Active structure	Motivation
Strategy				
Business				
Application				
Technology				
Physical				
Implementation & Migration				

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

16

Notational Encodings in ArchiMate 3

Although not strictly enforced, ArchiMate 3 comes with a set of 'notational best-practices'

- **Color-encoding of Layers**
  - ♦ Yellow for the Business Layer
  - ♦ Blue for the Application Layer
  - ♦ Green for the Technology Layer

- **Shape-encoding of Aspects**
  - ♦ Square corners are used to denote structure elements.
  - ♦ Round corners are used to denote behavior elements.
  - ♦ Diagonal corners are used to denote motivation elements.

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core   17

Core Concepts and Relations

external

internal

Passive structure

Behavior

Active structure

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

ArchiMate 3, section 4.1

18
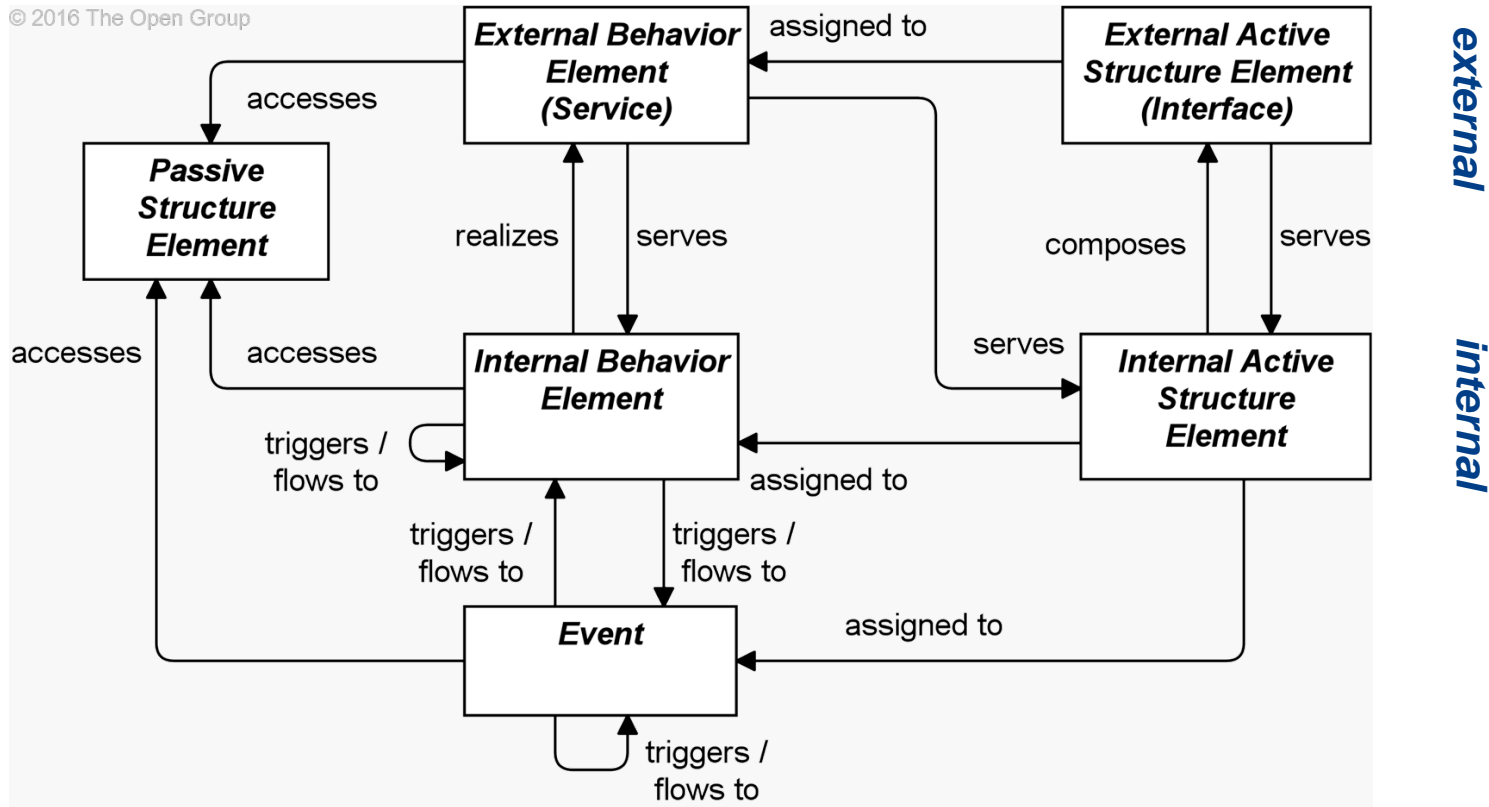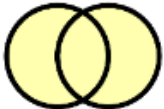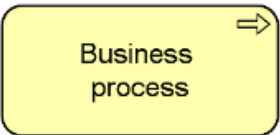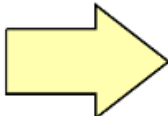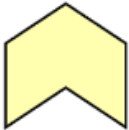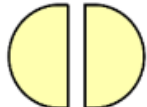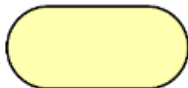
Business Layer Metamodel

© 2016 The Open Group

external

internal

Passive structure

Behavior

Active structure

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

ArchiMate 3, section 8

19
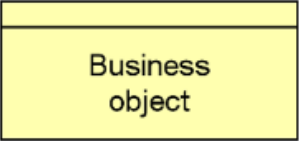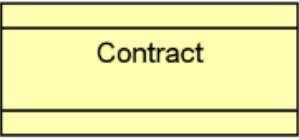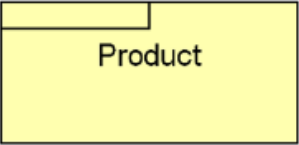
Business Layer Concepts (I) – Active Structure

Element	Description	Notation
Business actor	A business entity that is capable of performing behavior.	
Business role	The responsibility for performing specific behavior, to which an actor can be assigned, or the part an actor plays in a particular action or event.	
Business collaboration	An aggregate of two or more business internal active structure elements that work together to perform collective behavior.	
Business interface	A point of access where a business service is made available to the environment.	

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

ArchiMate 3, section 8

20

Business Layer Concepts (II) - Behavior

Business process	A sequence of business behaviors that achieves a specific outcome such as a defined set of products or business services.	Business process
Business function	A collection of business behavior based on a chosen set of criteria (typically required business resources and/or competences), closely aligned to an organization, but not necessarily explicitly governed by the organization.	Business function
Business interaction	A unit of collective business behavior performed by (a collaboration of) two or more business roles.	Business interaction
Business event	A business behavior element that denotes an organizational state change. It may originate from and be resolved inside or outside the organization.	Business event
Business service	An explicitly defined exposed business behavior.	Business service

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

ArchiMate 3, section 8

21

Business Layer Concepts (III) – Passive Structure

Business object	A concept used within a particular business domain.	Business object
Contract	A formal or informal specification of an agreement between a provider and a consumer that specifies the rights and obligations associated with a product and establishes functional and non-functional parameters for interaction.	Contract
Representation	A perceptible form of the information carried by a business object.	Representation
Product	A coherent collection of services and/or passive structure elements, accompanied by a contract/set of agreements, which is offered as a whole to (internal or external) customers.	Product

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

ArchiMate 3, section 8

22

Application Layer Metamodel

© 2016 The Open Group
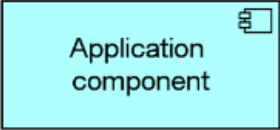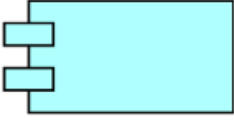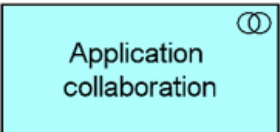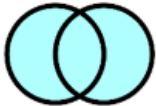
Passive structure **Behavior** **Active structure**

external

internal

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

ArchiMate 3, section 9

23
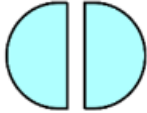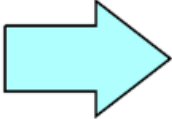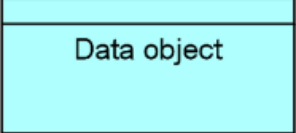
Application Layer Concepts (I)

Element	Definition	Notation
Application component	An encapsulation of application functionality aligned to implementation structure, which is modular and replaceable. It encapsulates its behavior and data, exposes services, and makes them available through interfaces.	Application component
Application collaboration	An aggregate of two or more application components that work together to perform collective application behavior.	Application collaboration
Application interface	A point of access where application services are made available to a user, another application component, or a node.	Application interface
Application function	Automated behavior that can be performed by an application component.	Application function

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3, section 9

ArchiMate 3 - Core

24
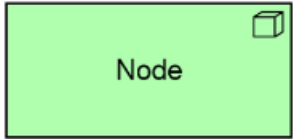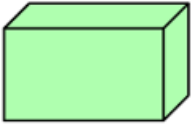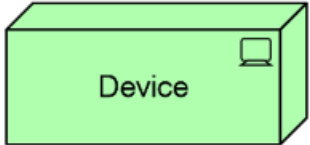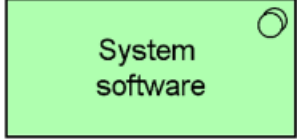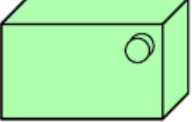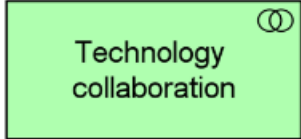
Application Layer Concepts (II)

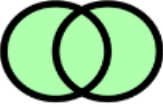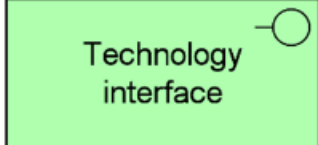|			
Application interaction	A unit of collective application behavior performed by (a collaboration of) two or more application components.	Application interaction	
Application process	A sequence of application behaviors that achieves a specific outcome.	Application process	
Application event	An application behavior element that denotes a state change.	Application event	
Application service	An explicitly defined exposed application behavior.	Application service	
Data object	Data structured for automated processing.	Data object	

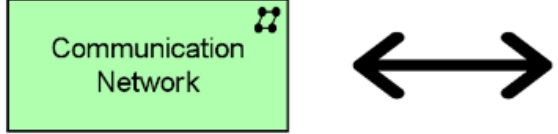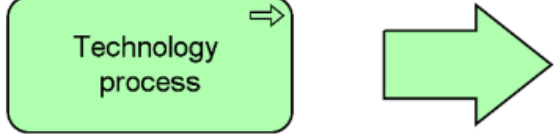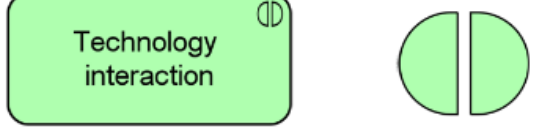Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

ArchiMate 3, section 9

25
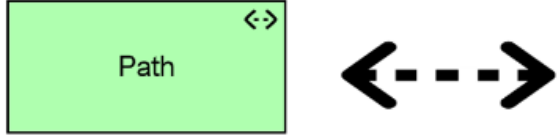
Technology Layer Metamodel

© 2016 The Open Group

Passive structure

Behavior

Active structure

external

internal

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

ArchiMate 3, section 10

26
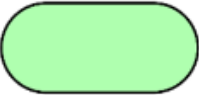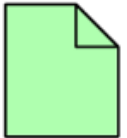
Technology Layer Concepts (I)

Element	Definition	Notation
Node	A computational or physical resource that hosts, manipulates, or interacts with other computational or physical resources.	Node
Device	A physical IT resource upon which system software and artifacts may be stored or deployed for execution.	Device
System software	Software that provides or contributes to an environment for storing, executing, and using software or data deployed within it.	System software
Technology collaboration	An aggregate of two or more nodes that work together to perform collective technology behavior.	Technology collaboration
Technology interface	A point of access where technology services offered by a node can be accessed.	Technology interface

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

ArchiMate 3, section 10

27

Technology Layer Concepts (II)

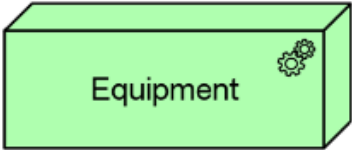|			
Path	A link between two or more nodes, through which these nodes can exchange data or material.	Path ‹·›	⬅- - -➤
Communication network	A set of structures and behaviors that connects computer systems or other electronic devices for transmission, routing, and reception of data or data-based communications such as voice and video.	Communication Network	⬅➤
Technology function	A collection of technology behavior that can be performed by a node.	Technology function	
Technology process	A sequence of technology behaviors that achieves a specific outcome.	Technology process ⇒	
Technology interaction	A unit of collective technology behavior performed by (a collaboration of) two or more nodes.	Technology interaction	

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

ArchiMate 3, section 10

28

Technology Layer Concepts (III)
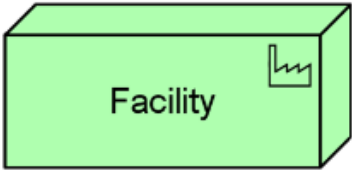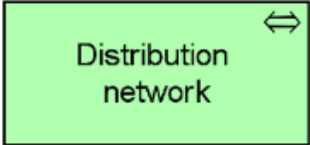
Technology event	A technology behavior element that denotes a state change.	Technology event	
Technology service	An explicitly defined exposed technology behavior.	Technology service	
Technology object	A passive element that is used or produced by technology behavior.	Abstract element	
Artifact	A piece of data that is used or produced in a software development process, or by deployment and operation of a system.	Artifact	

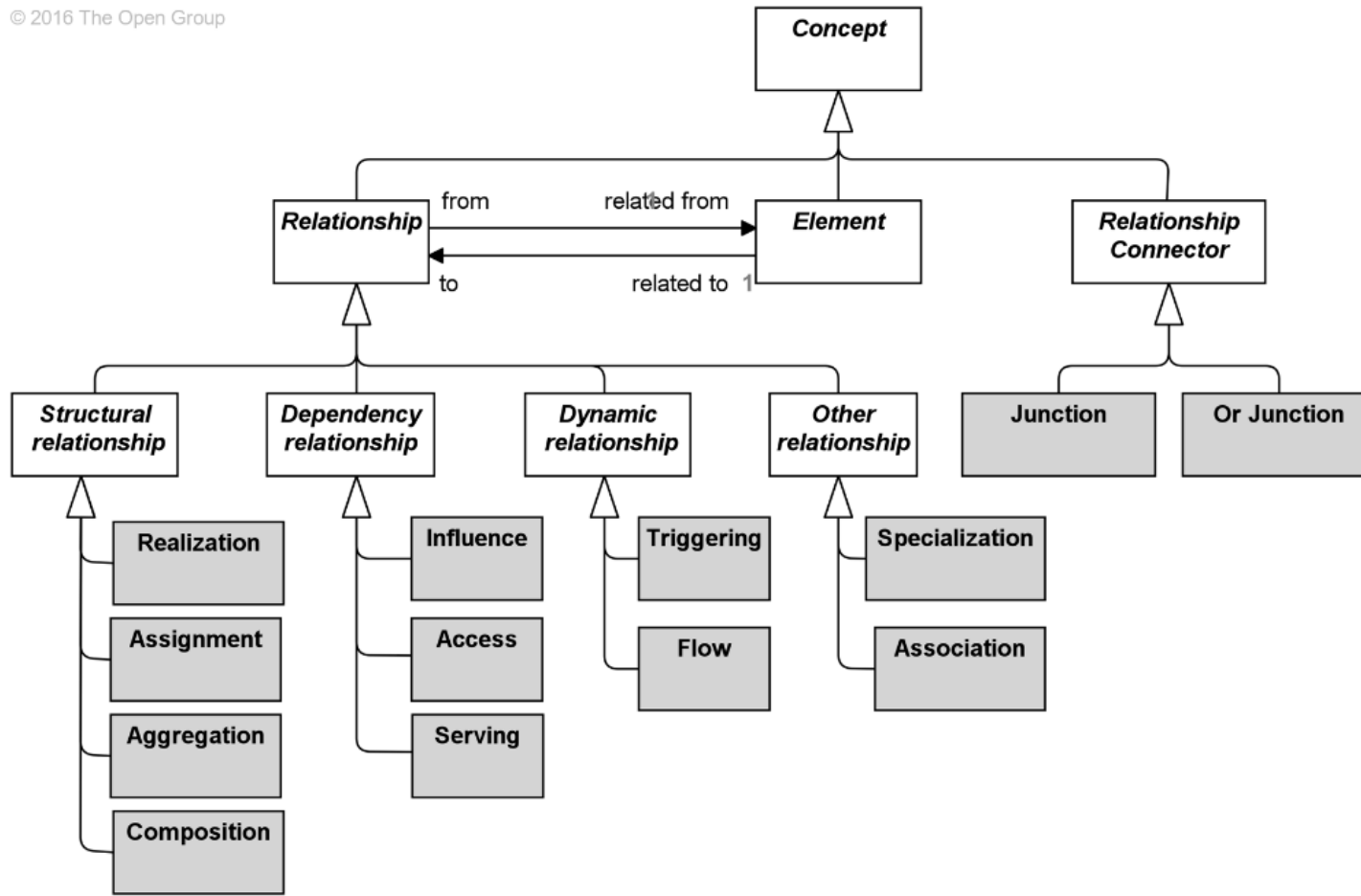Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

ArchiMate 3, section 10

29

Physical Elements Metamodel

© 2016 The Open Group

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

30
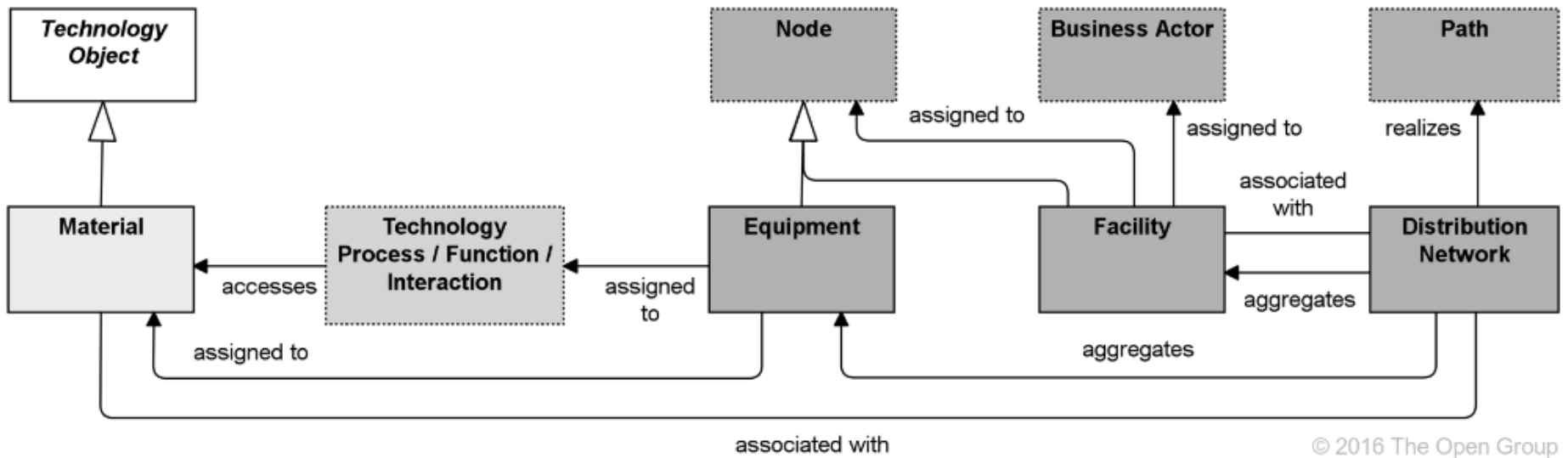
Physical Elements

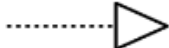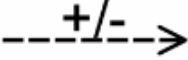| Element	Definition	Notation
Equipment	One or more physical machines, tools, or instruments that can create, use, store, move, or transform materials.	Equipment
Facility	a physical structure or environment.	Facility
Distribution network	A physical network used to transport materials or energy.	Distribution network
Material	Tangible physical matter or physical elements.	Material

Relationships

© 2016 The Open Group

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

ArchiMate 3, section 5

32
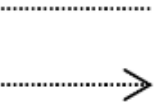
Relationships

Structural Relationships		Notation
Composition	Indicates that an element consists of one or more other elements.	◆————
Aggregation	Indicates that an element groups a number of other elements.	◇————
Assignment	Expresses the allocation of responsibility, performance of behavior, or execution.	●———▶
Realization	Indicates that an entity plays a critical role in the creation, achievement, sustenance, or operation of a more abstract entity.	·······▷

ArchiMate 3, section 5

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

33

Relationships

Dependency Relationships		Notation
Serving	Models that an element provides its functionality to another element.	⟶
Access	Models the ability of behavior and active structure elements to observe or act upon passive structure elements.	┈┈┈┈ ┈┈┈⟩ ⟨┈┈┈⟩
Influence	Models that an element affects the implementation or achievement of some motivation element.	‒‒+/‒‒⟶

Prof. Dr. Knut Hinkelmann
knut.hinkelmann@fhnw.ch

ArchiMate 3 - Core

ArchiMate 3, section 5

34

Relationships

Dynamic Relationships		Notation
Triggering	Describes a temporal or causal relationship between elements.	⟶
Flow	Transfer from one element to another.	⇢
Other Relationships		**Notation**
Specialization	Indicates that an element is a particular kind of another element.	⟶▷
Association	Models an unspecified relationship, or one that is not represented by another ArchiMate relationship.	⎯⎯
Junction	Used to connect relationships of the same type.	● (And) Junction ○ Or Junction

ArchiMate 3, section 5