Modelling Enterprise Architecture with ArchiMate: ArchiMate Core

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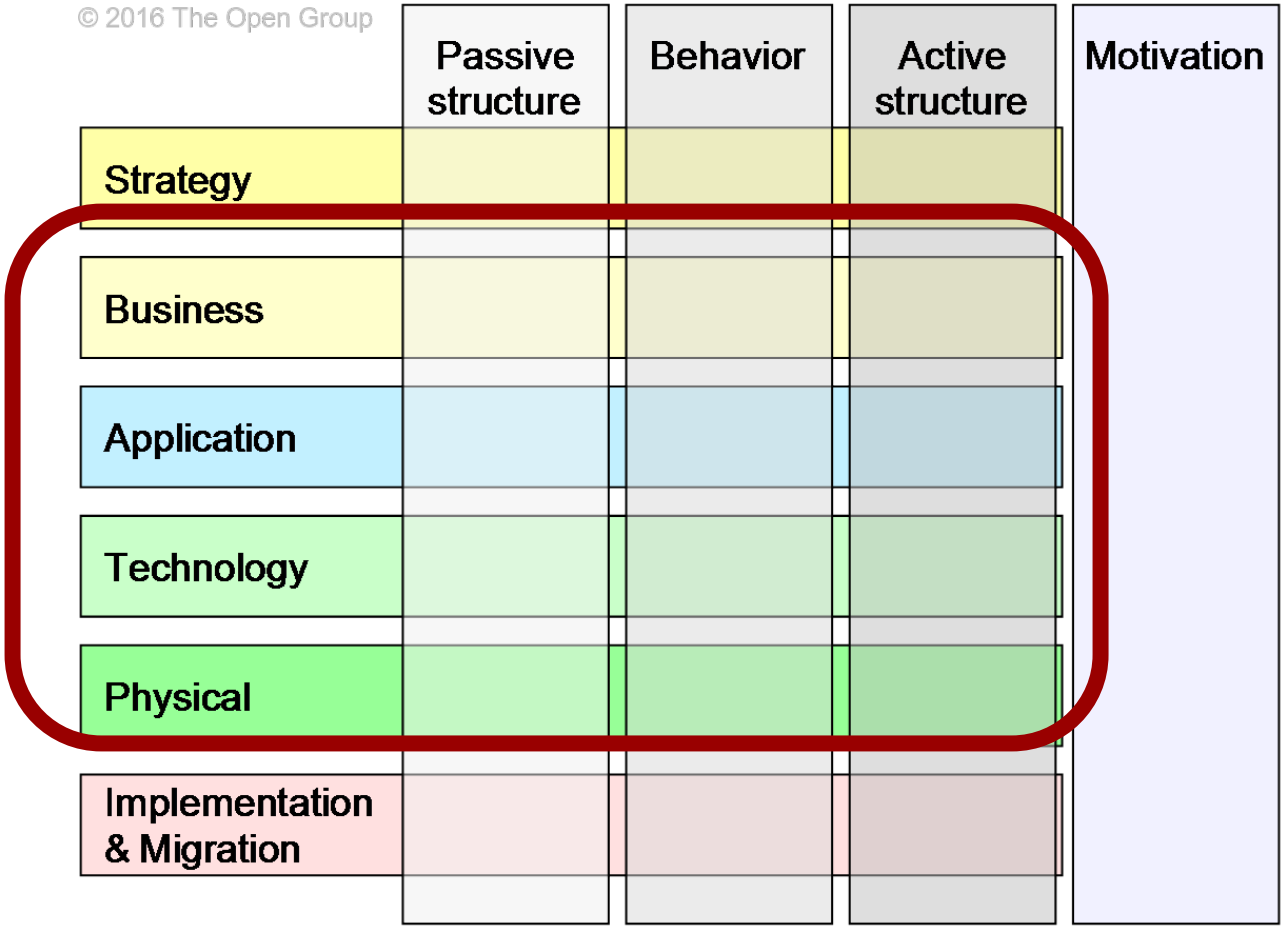
Frankfurt am Main, Hochhausrahmenplan © Jourdan & Müller

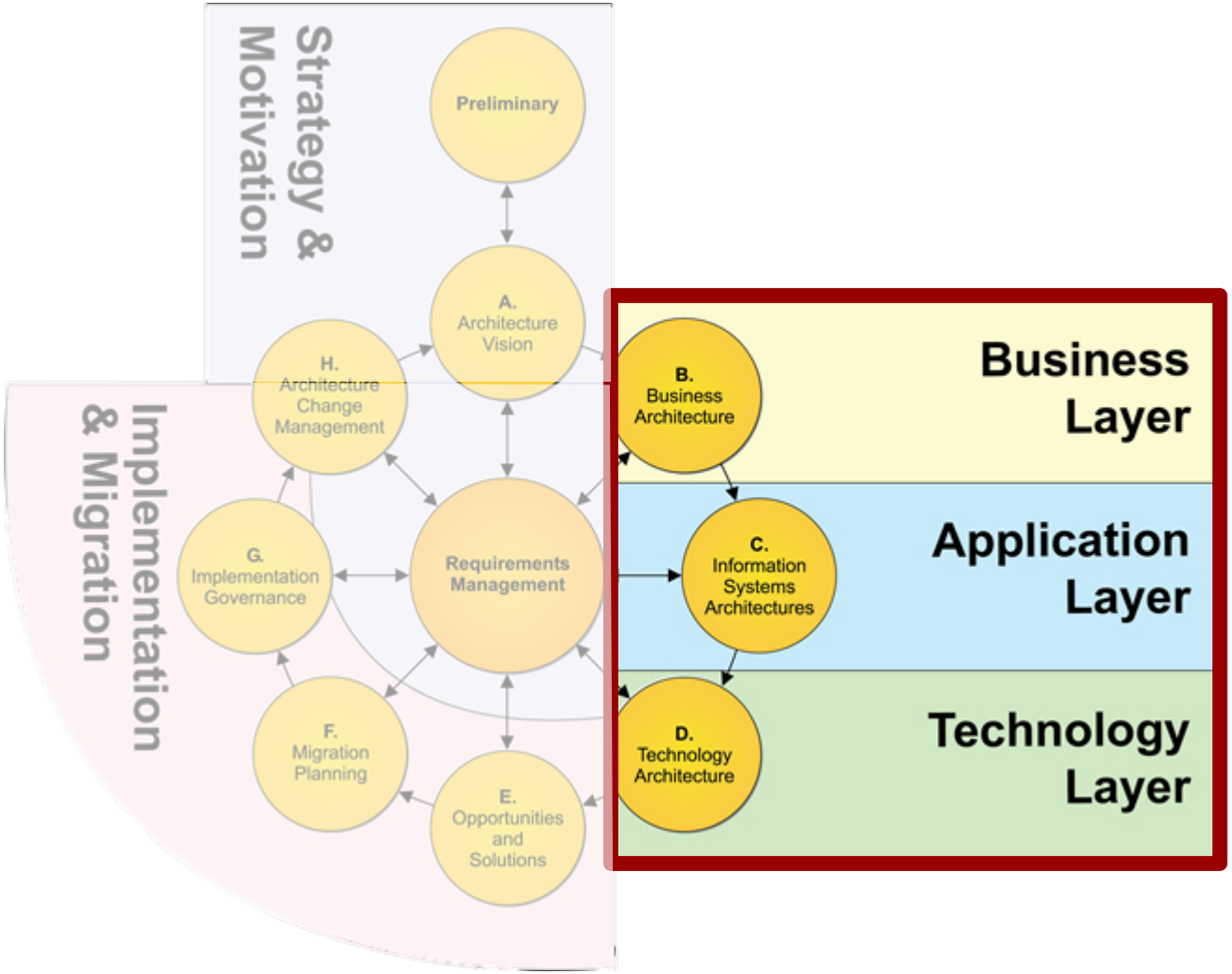
The ArchiMate 3 Core

ArchiMate Core covers elements and relationships for modelling thre subarchictures (Business, Application, Technology) and the Physical Layer

http://pubs.opengroup.org/architecture/archimate3-doc/



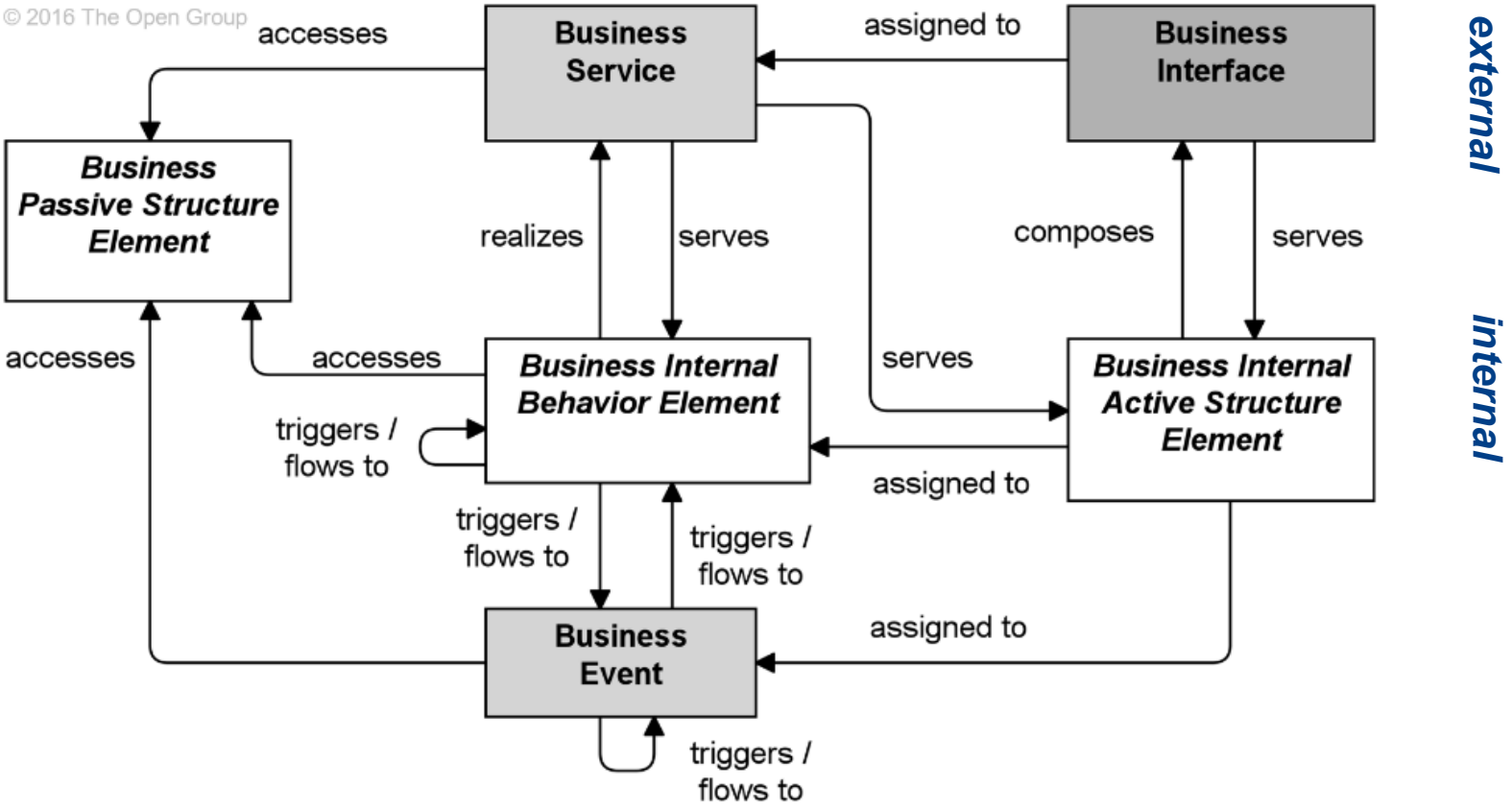
Enterprise Architecture Modeling in TOGAF



Enterprise Architecture Modeling in Zachman

ArchiMate 3, section 3.5

Business Layer Metamodel



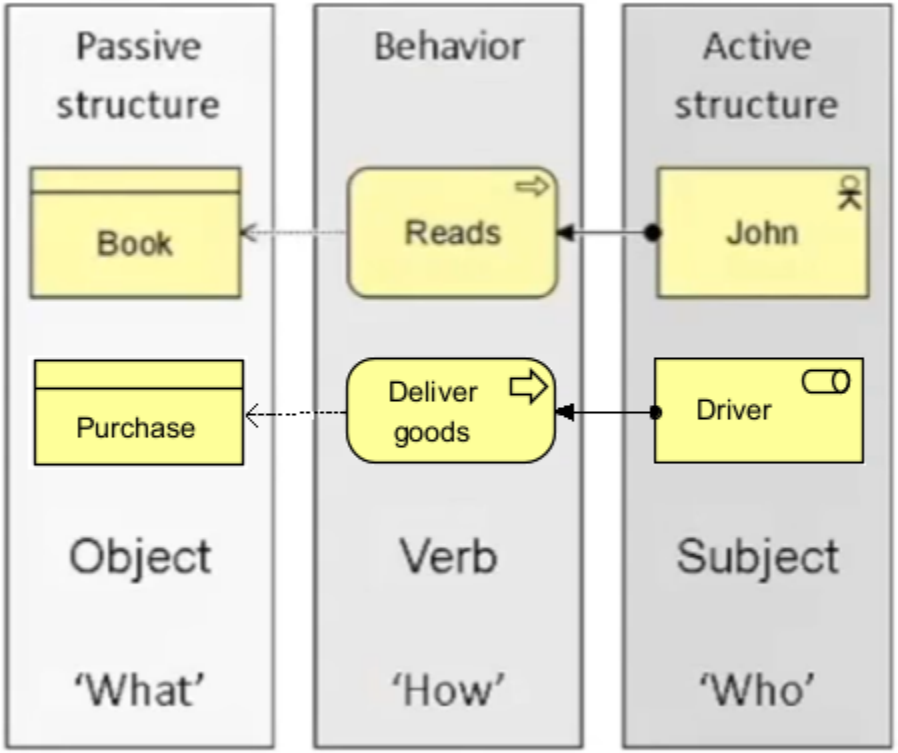
Abstractions in ArchiMate (1)

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

ArchiMate 3, section 3.6

Core Aspects in ArchiMate

- Aspects correspond to a Subject-Verb-Object of sentences:



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

Abstractions in ArchiMate (2a)

- External vs. internal behavior :
  - ***External view:*** *what* the system has to do for its environment
  - ***Internal view:*** *how* it does this

ArchiMate 3, section 3.6

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Which of the following elements represent internal behavior

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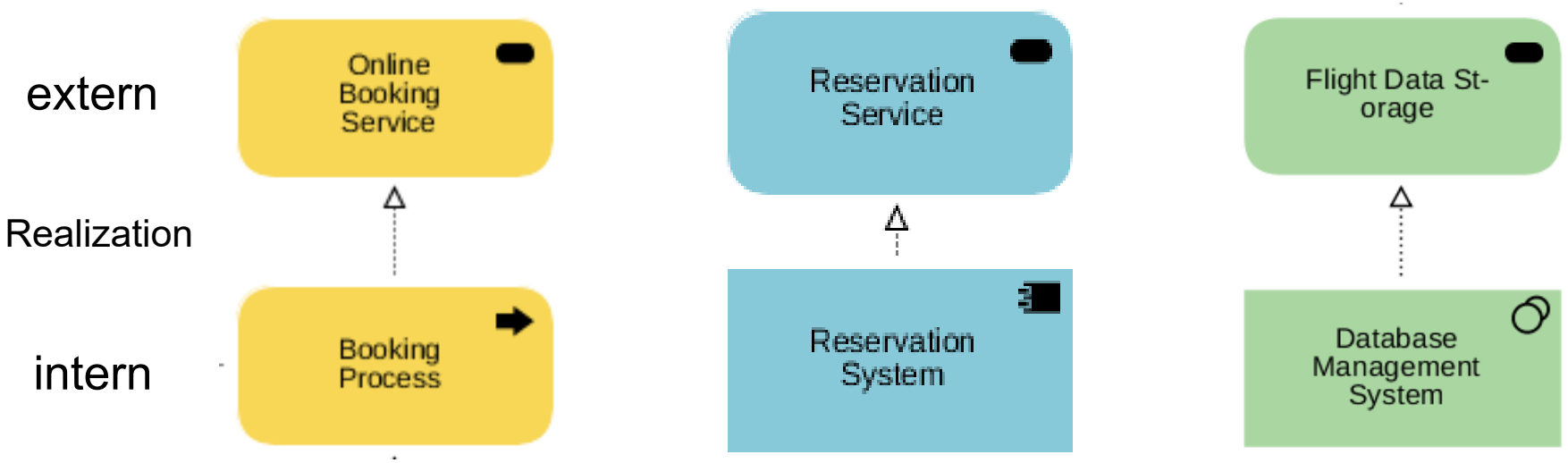
Internal and External Behavior in ArchiMate

- 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)



ArchiMate 3, section 3.6

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Which of the following relations are correct?

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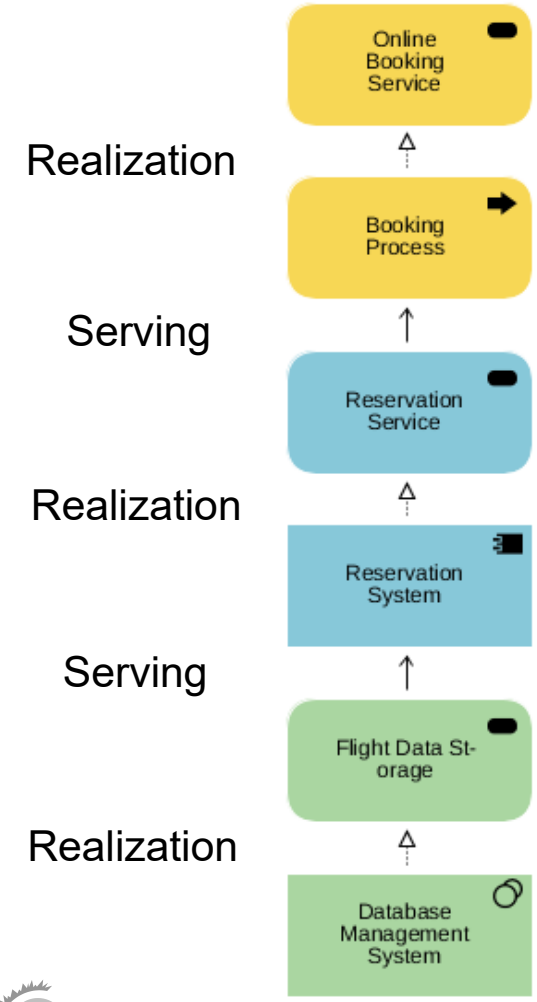
Internal and External Behavior in ArchiMate (2)



- Internal and external behaviour connects layers
- Relations:
  - ***Realization***
  - ***Serving***

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Why does the distinction between internal and external behavior make sense

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Some Reasons, why the Distinction of external and internal Behavior makes sense

- External behavor (what to do) is more stable than internal behavior (how to do it)
- Internal behavior can be changed without changing external behavior: No change for service of consumers
- “Consumers" are not interested in internal detail. For example, a process owner needs information about what service is automated, but not about the concrete application
- External behavior is part of functional requirements: When internal behavior is (ex)changed it is explicit which external services must be delivered

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What is the relationship between Artifact (technology layer), Data Object (application layer) and Business Object (business layer)?

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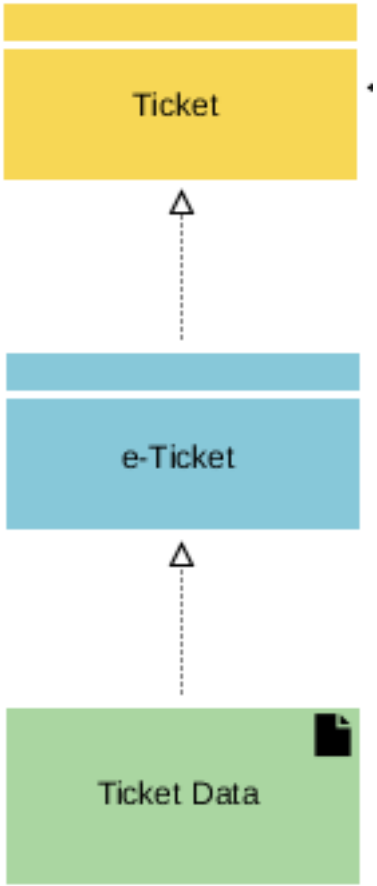
Abstractions in ArchiMate (3)

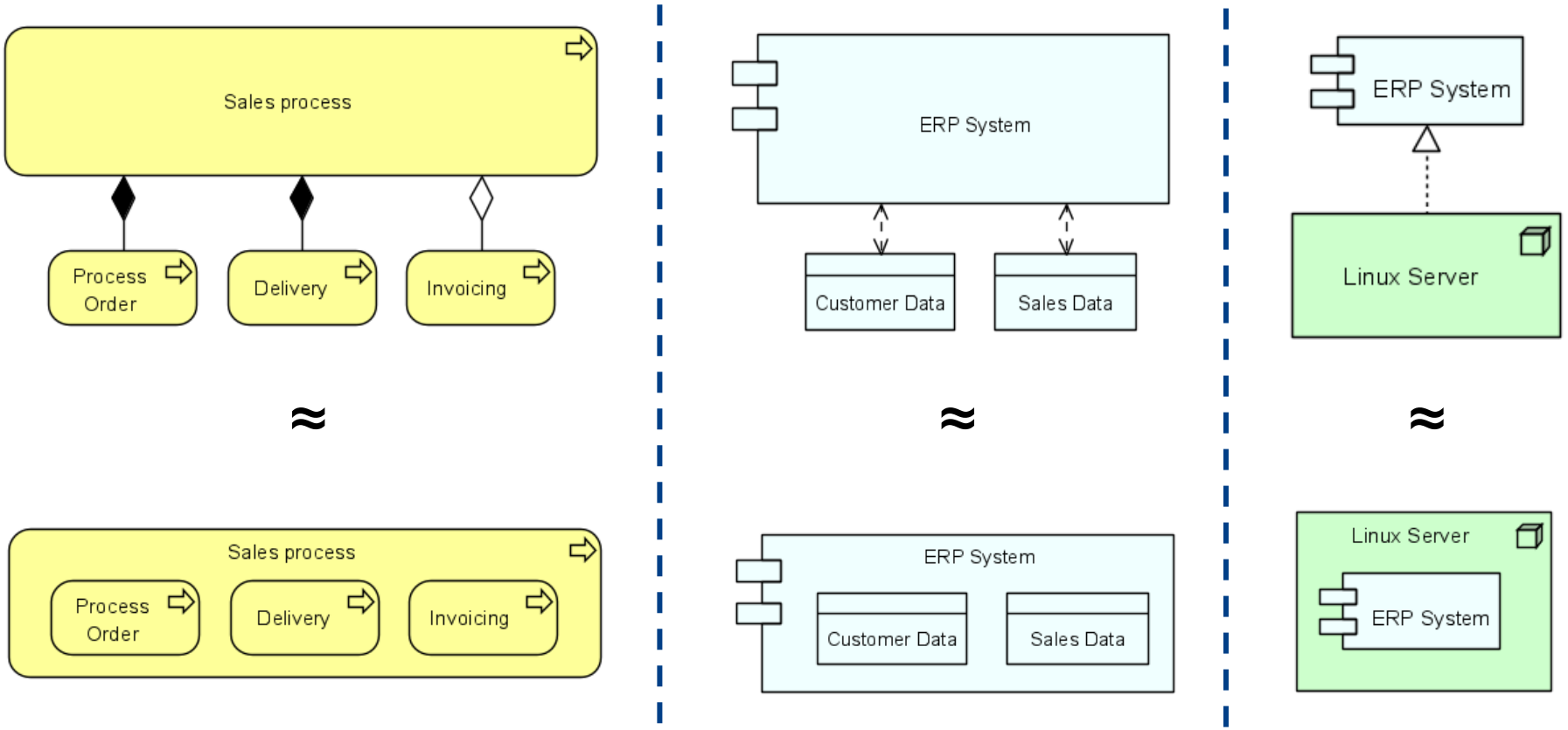


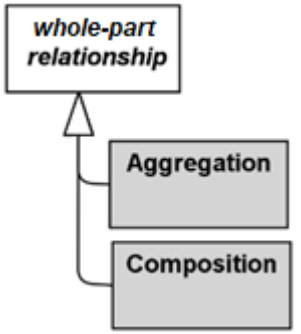
- Conceptual, logical, and physical abstraction levels
  - ***conceptual elements*** represent the information the business finds relevant;
    - **Business Object, Product, Contract**
  - ***logical elements*** provide logical structure to this information for manipulation by information systems;
    - **Data Object**
  - ***physical elements*** describe the storage of this information; e.g. in the form of files or database tables.
    - **Artefact**
- Relation:
  - ***Realization***

ArchiMate 3, section 3.6

Appearance of Relationships

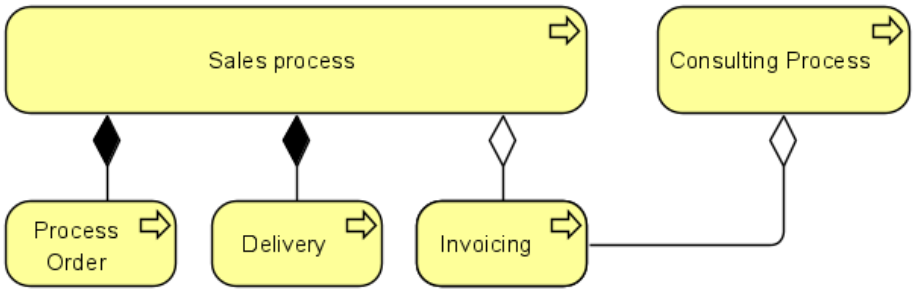
Relationships can be represented explicitly with lines or as nested elements





Aggregation vs. Composition

- Aggregation and Composition must be used **only** for "whole to its parts" relationships: One element is part of another
  - **Aggregation:** The child can outlive its parent
  - **Composition:** The child's lifecycle is dependent on the parent's lifecycle



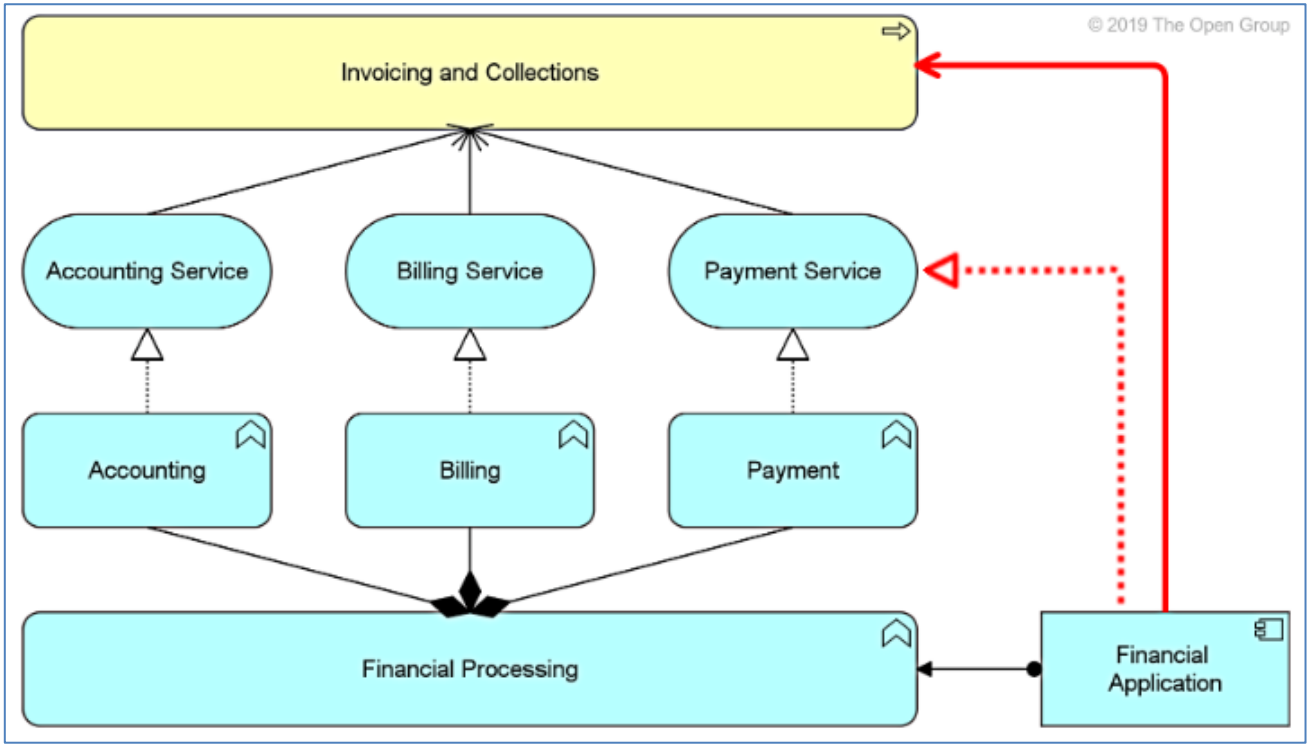
- Process Order and Delivery or sub-processes of the Sales process and would not be needed/available without a sales process.
- Invoicing is used in two processes and thus would still be existent, even if a parent process is not existent.

- Here aggregation makes sense, because without a comapny there cannot be any department

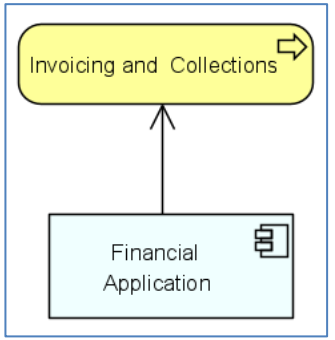
Derivation of Relationships

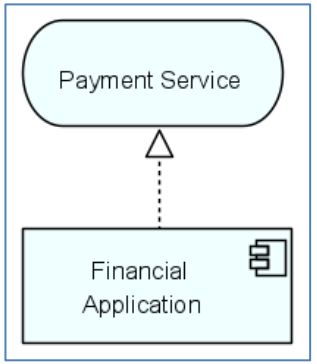
- Derivation of relationships is intended as a way to create abstractions of detailed models by removing details.
- This can be used to make models for stakeholders (e.g. managers) that do not need the details.

Detailed Model:



Abstracted Models:

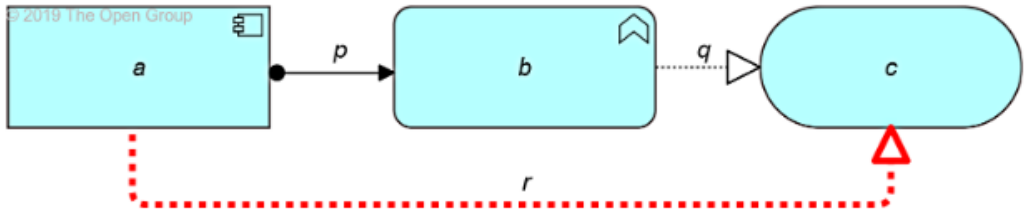




(Archimate 3, Appendix B)

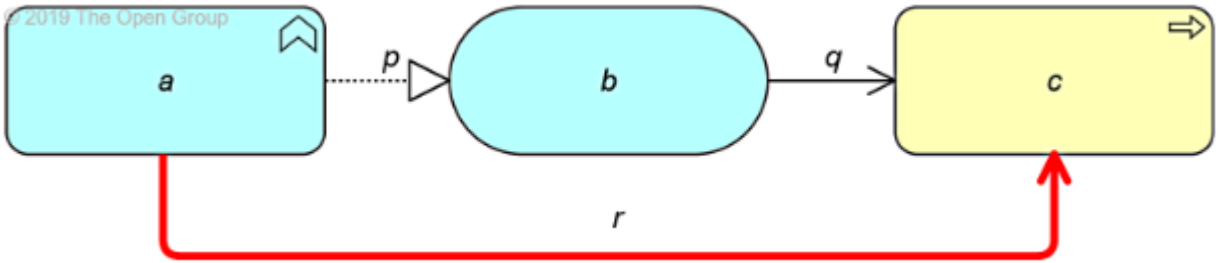
Derivation Rule for Structural Relationships

- Two structural relationships that join at an intermediate element under specific conditions can be combined and replaced by the weaker of the two.
  - Realization (weakest)
  - Assignment
  - Aggregation
  - Composition (strongest)



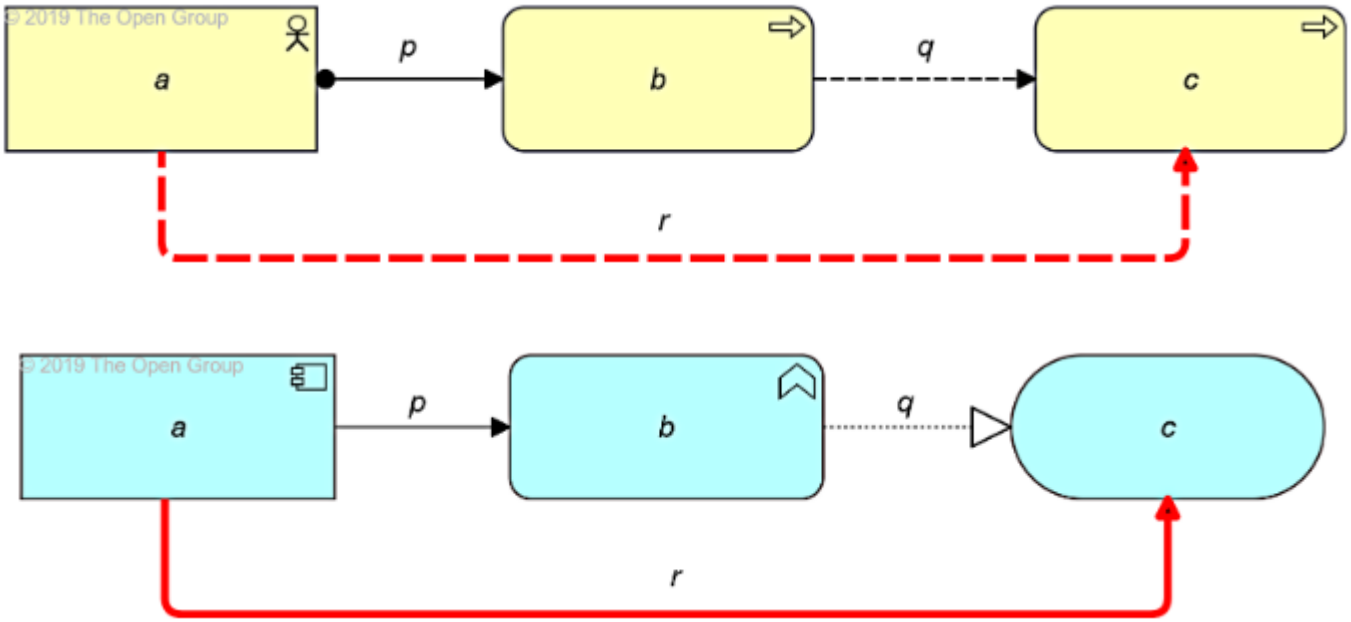
Derivation Rule for Dependency Relationships

- A structural relationship and a dependency relationship that join at an intermediate element under certain conditions can be combined and replaced by the dependency relationship



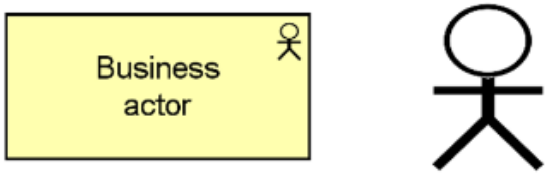
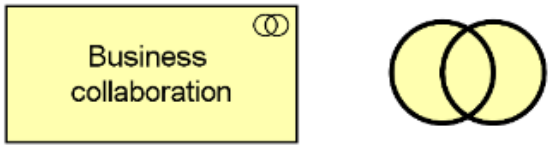
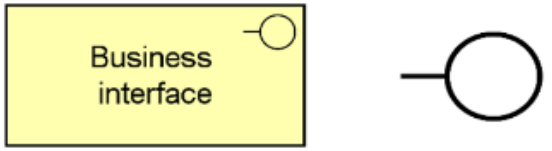
Derivation Rule for Dynamic Relationships

- A structural relationship and a dynamic relationship that join at an intermediate element under certain conditions can be combined and replaced by the dynamic relationship.

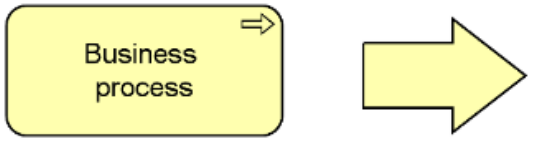
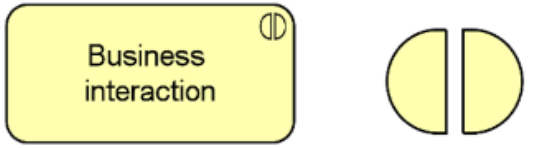


Catalogue of Concepts and Relationships

Business Layer Concepts (I) – Active Structure

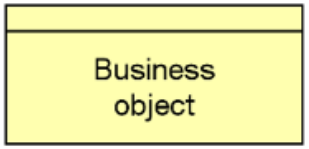
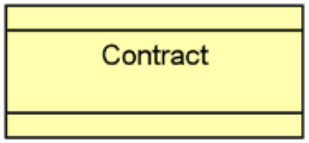
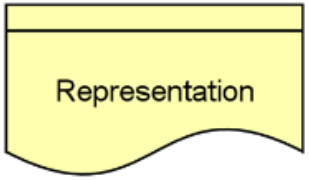
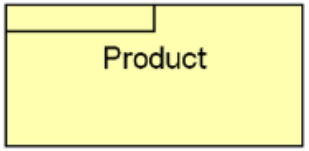
Element	Description	Notation
Business actor	A business entity that is capable of performing behavior.	
Business role	The responsibility for performing specific behavior, to which an actor can be assigned, or the part an actor plays in a particular action or event.	
Business collaboration	An aggregate 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.	

Business Layer Concepts (II) - Behavior

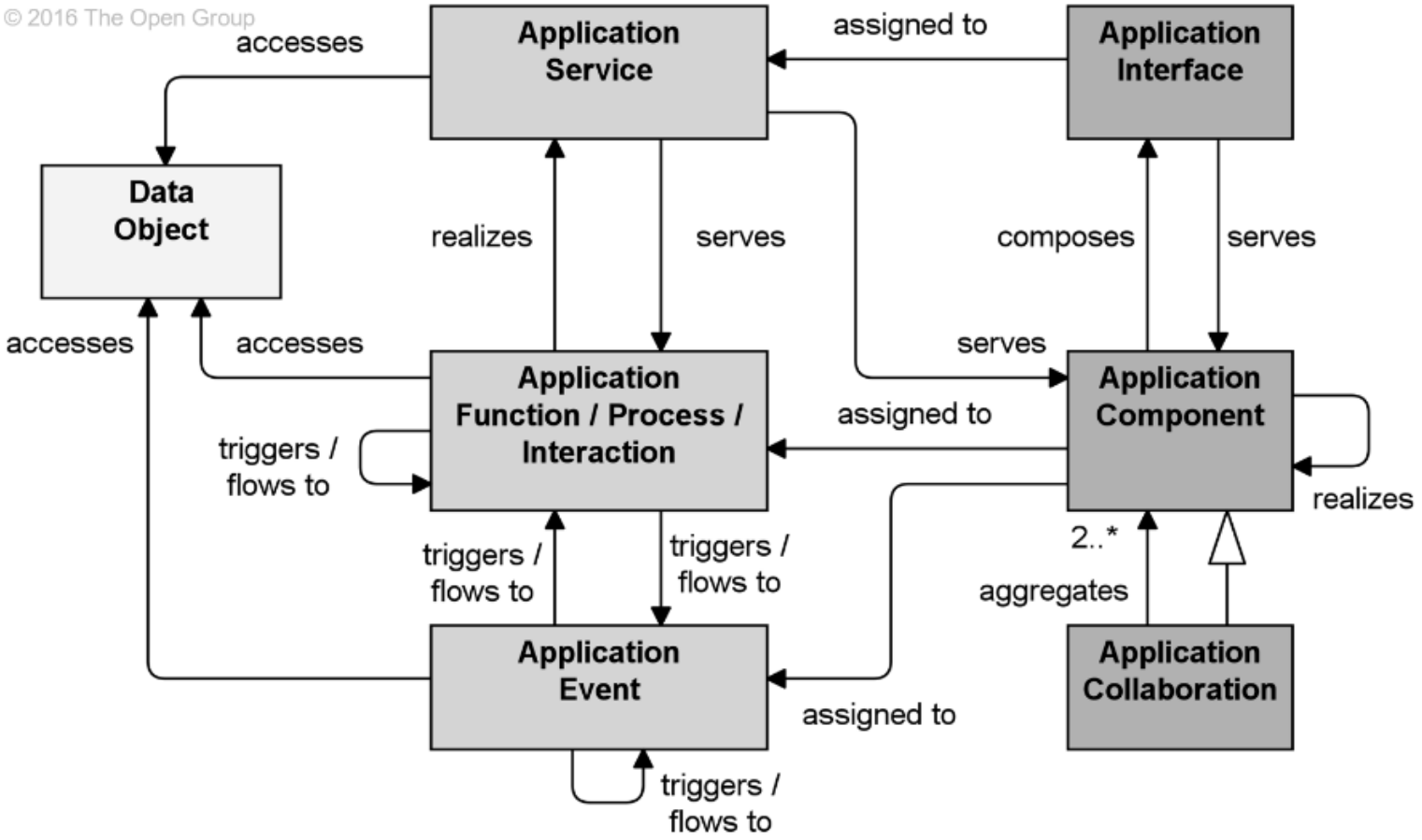
Business process	A sequence of business behaviors that achieves a specific outcome such as a defined set of products or business services.	
Business function	A collection of business behavior based on a chosen set of criteria (typically required business resources and/or competences), closely aligned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

ArchiMate 3, section 8

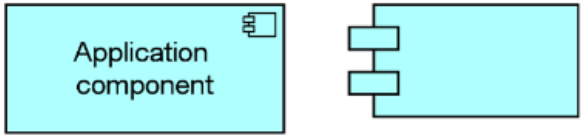
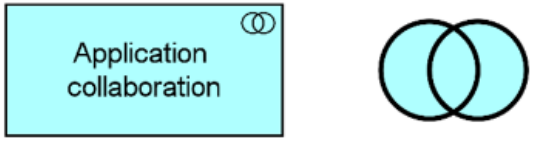
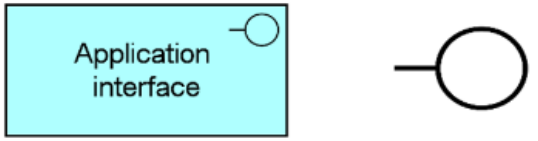
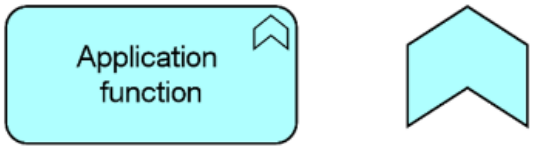
Business Layer Concepts (III) – Passive Structure

Business object	A concept used within a particular business domain.	
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.	
Representation	A perceptible form of the information carried by a business object.	
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.	

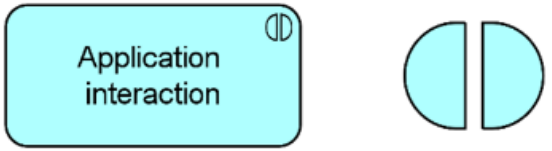
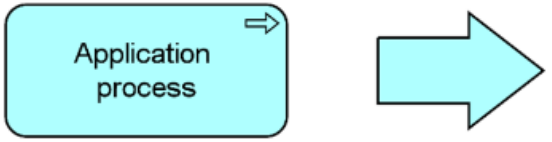
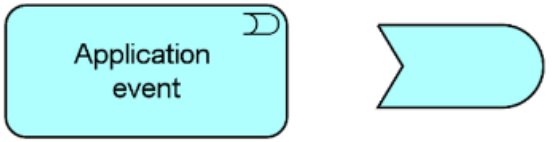
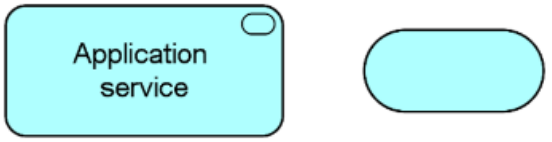
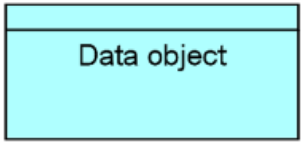
Application Layer Metamodel



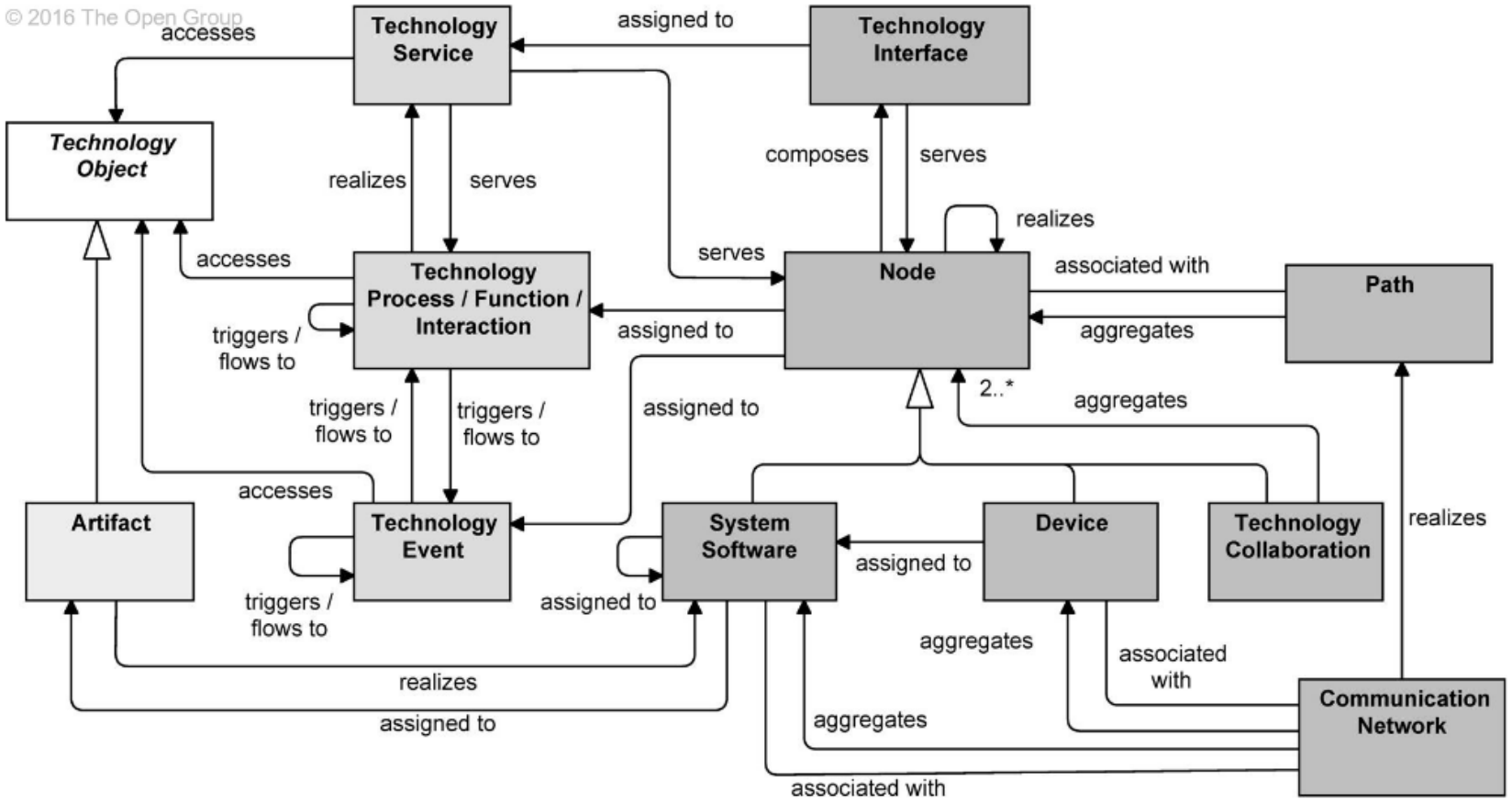
Application Layer Concepts (I)

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 collaboration	An aggregate of two or more application components that work together to perform collective application behavior.	
Application interface	A point of access where application services are made available to a user, another application component, or a node.	
Application function	Automated behavior that can be performed by an application component.	

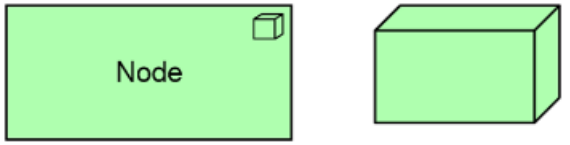
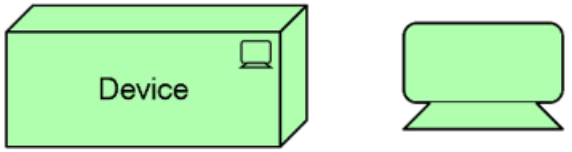
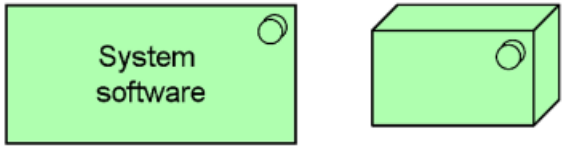
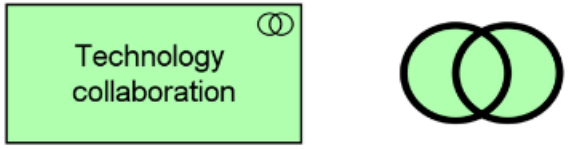
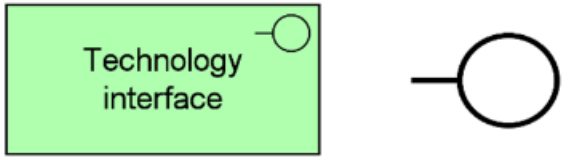
Application Layer Concepts (II)

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

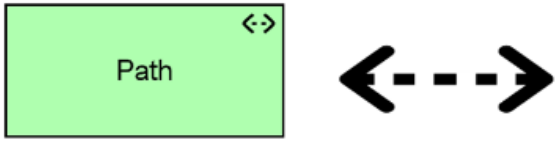
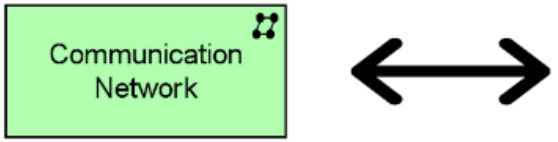
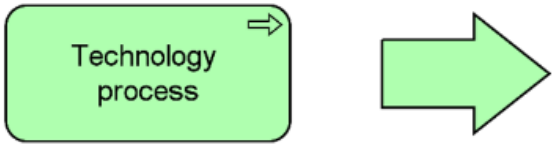
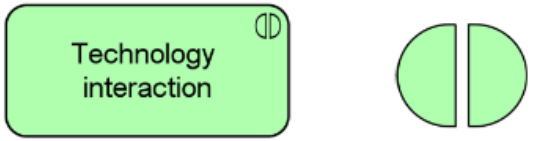
Technology Layer Metamodel



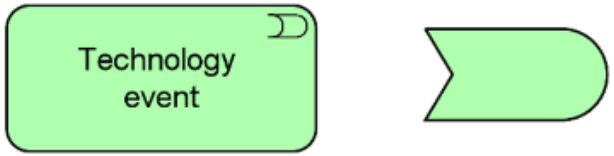
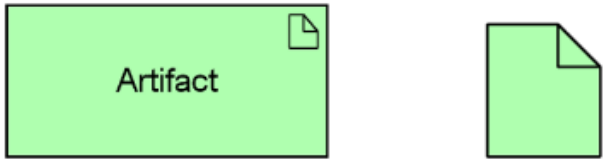
Technology Layer Concepts (I)

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

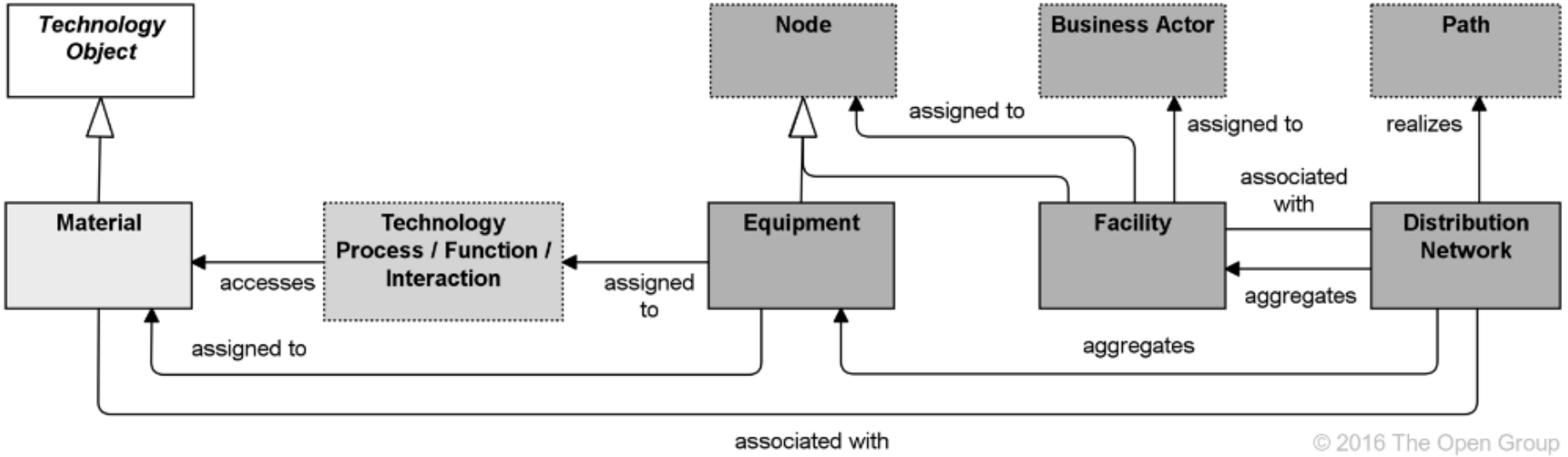
Technology Layer Concepts (II)

Path	A link between two or more nodes, through which these nodes can exchange data or material.	
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.	
Technology function	A collection of technology behavior that can be performed by a node.	
Technology process	A sequence of technology behaviors that achieves a specific outcome.	
Technology interaction	A unit of collective technology behavior performed by (a collaboration of) two or more nodes.	

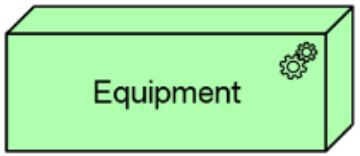
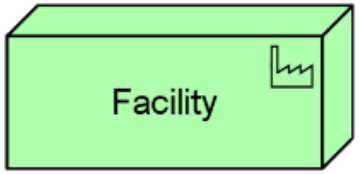
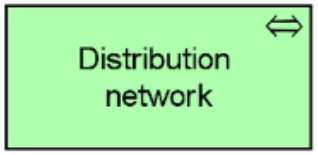
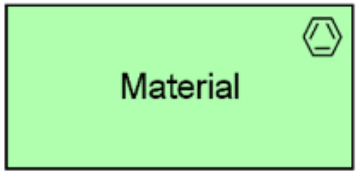
Technology Layer Concepts (III)

Technology event	A technology behavior element that denotes a state change.	
Technology service	An explicitly defined exposed technology behavior.	
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.	

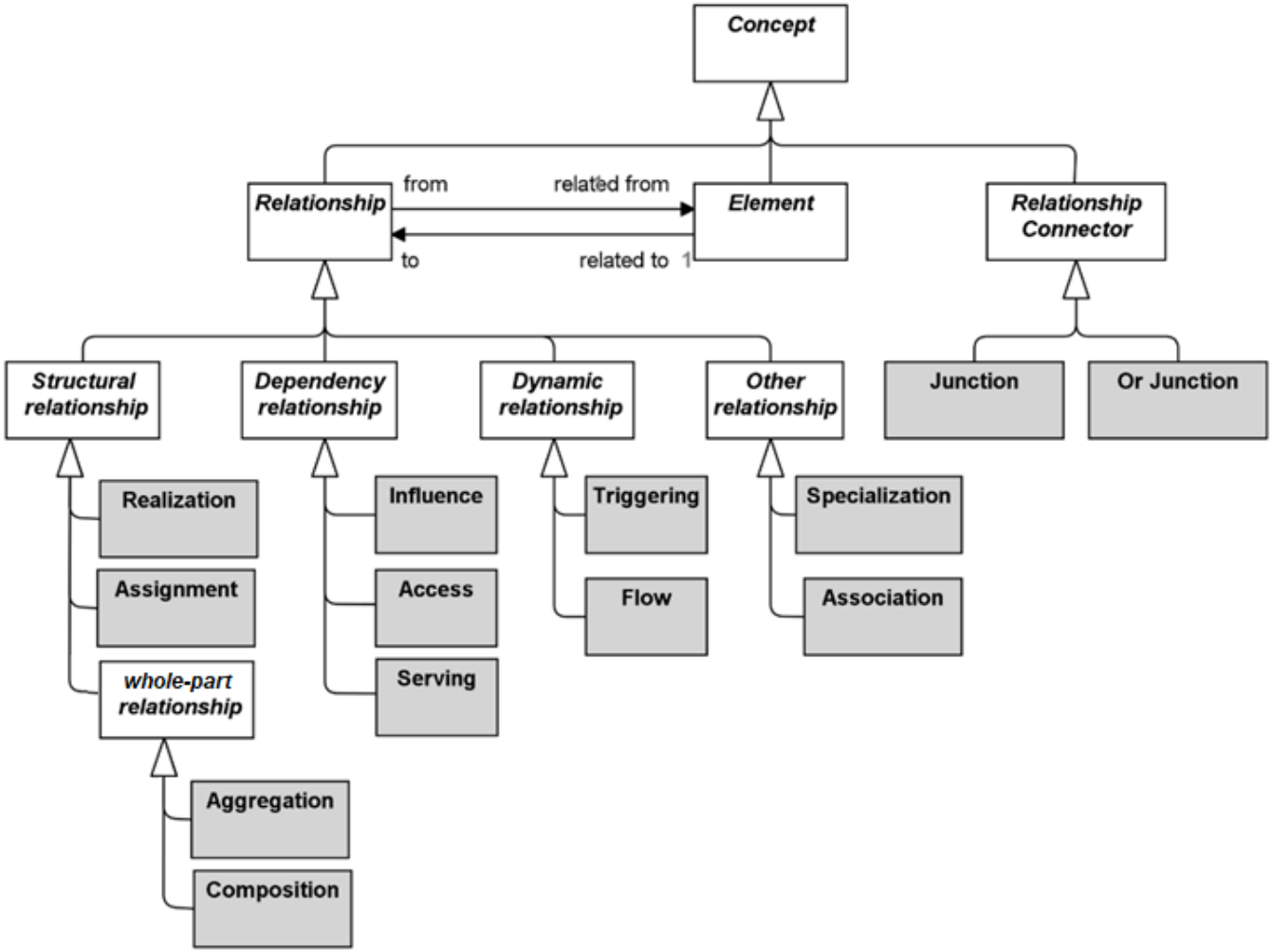
Physical Elements Metamodel



Physical Elements

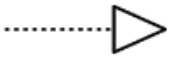
Element	Definition	Notation
Equipment	One or more physical machines, tools, or instruments that can create, use, store, move, or transform materials.	
Facility	a physical structure or environment.	
Distribution network	A physical network used to transport materials or energy.	 
Material	Tangible physical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

Relationships

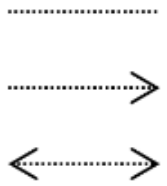
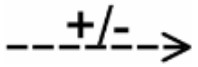


Based on ArchiMate 3, section 5

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.	

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 motion element.	

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