Business Architecture Modeling

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Business Architecture

Business Architecture

Data Architecture

Application Architecture

Technology Architecture

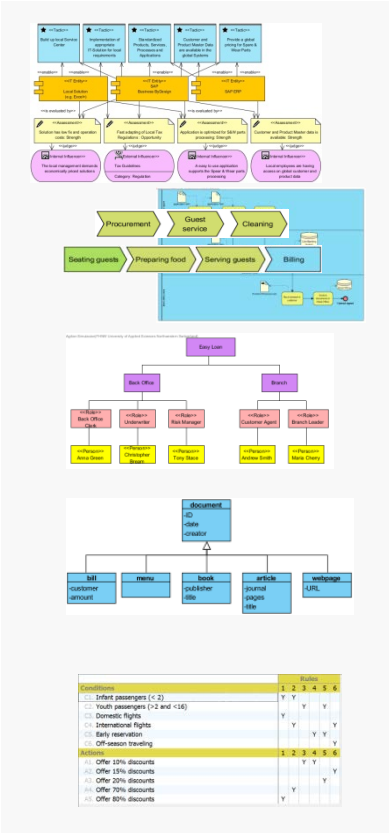
Modeling Business Architecture

- The Business Architecture comprises all the structures and relationships which are essential for the business
- It should help answer questions like:
  - Which *business processes* or *products* are critical for the company or for a particular environment in which it operates?
  - Which *business process* is responsible for which *business objects*?
  - Which *organisational structures* are relevant for the business?
  - Which *business processes* are assigned to which *business units*?
  - Which *business objects* are used in which manner (reading, creating, modifying) by which *business processes* or *business functions*?
  - How is the business changing in which business segment? Which *products, business processes or functionality* will be needed in future?

(Hanschke 2010, p. 70f)

Models of the Business Architecture

- We will learn how to model

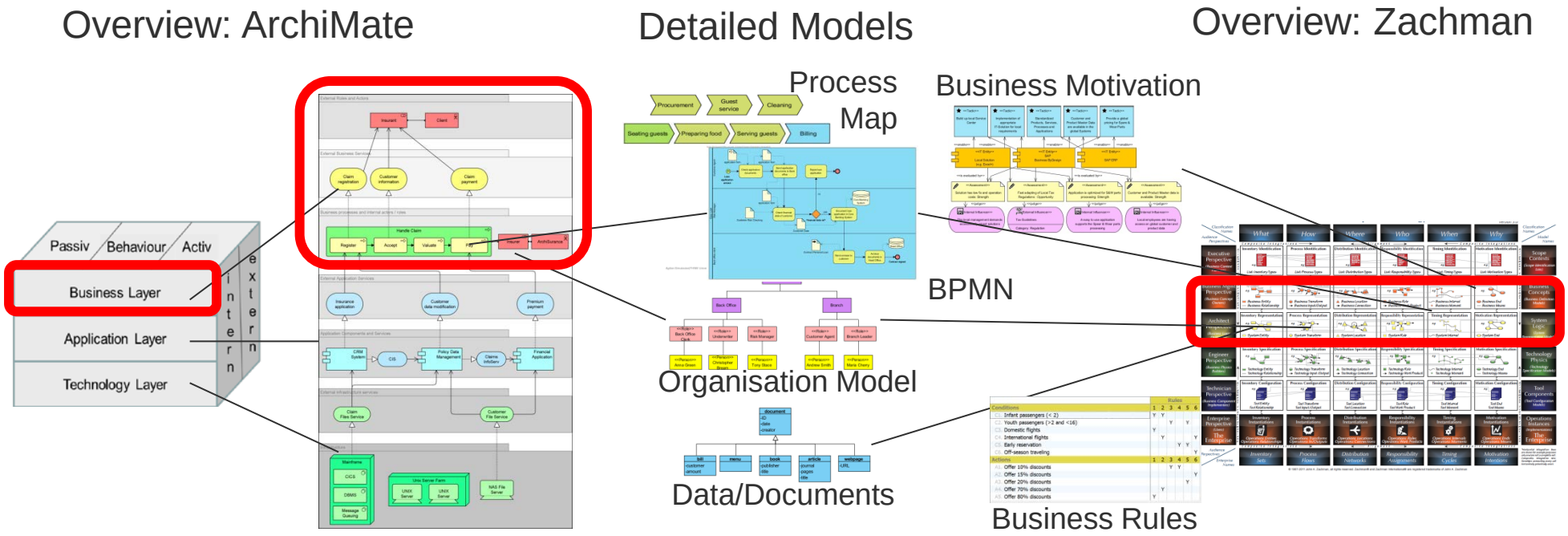


- ♦ Business Motivation (OMG Business Motivation Model)
- ♦ Business Processes (Process maps, BPMN)
- ♦ Organisation
- ♦ Data/Document (UML Class Diagrams)
- ♦ Products (UML Class Diagrams)
- ♦ Business Rules
- ♦ Applications

and the relations between them

Modeling Business Architecture

- Models and model elements can
  - be related to the cells of the Zachman Framework
  - represent details of elements in an ArchiMate model



Referencing Detail Models from the Business Perspective of the Zachman Framework

process maps

ArchiMate overview

data models

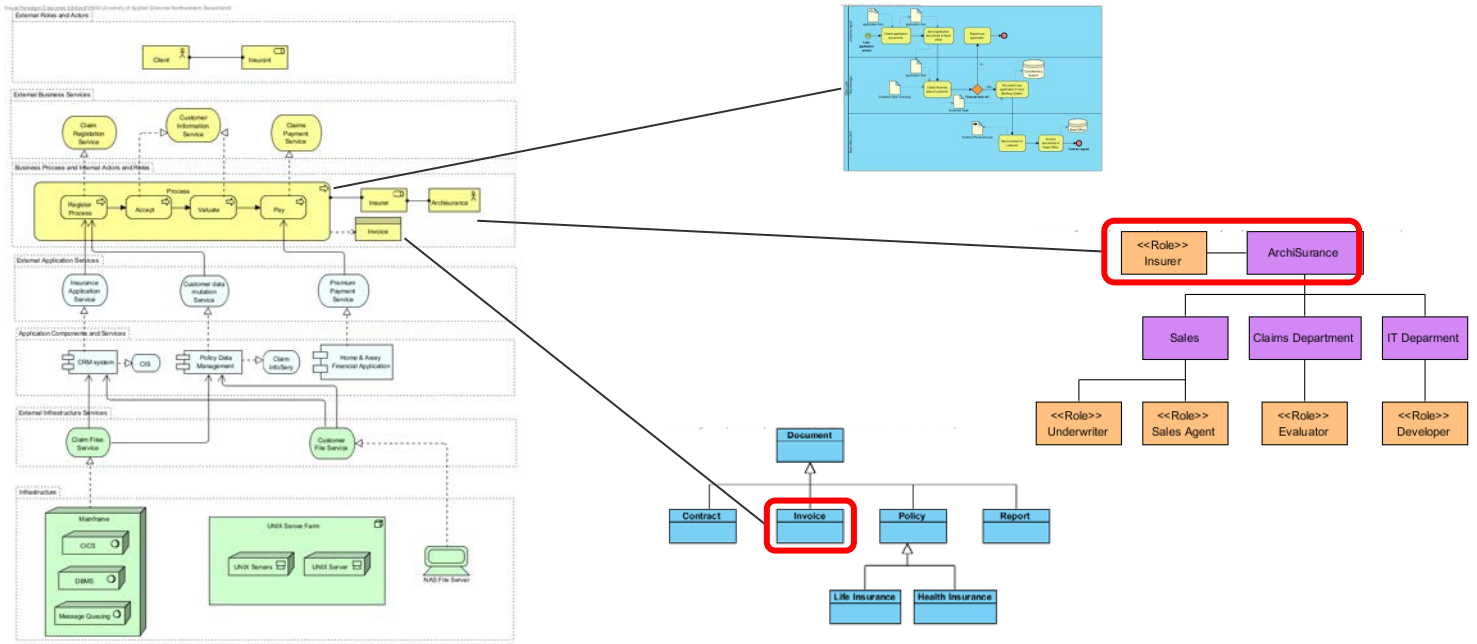
business process models

business motivation models

organisation models

Referencing Detail Models from ArchiMate

- ArchiMate represents an overall architecture
- Elements in an ArchiMate model can be
  - modeled more detailed in a separate model (e.g. modeling conditional flows and events of a business process in BPMN)
  - reference to elements in a model showing their context (e.g. actors and roles being part of an organisation model, business objects being part of a data model)



Relationships

- Dependencies can exist between elements of the business architecture
  - Example: a business unit is responsible for the business object "customer" and maintain customer data in the business process "customer management"
- Each model should represent only one abstraction: → primitives
- Composites are represented by relationships between models/elements of different columns

(Hanschke 2010, p. 71f)

Relations between Processes and other Aspects on the Business Perspective

process maps

data models

business process models

business motivation models

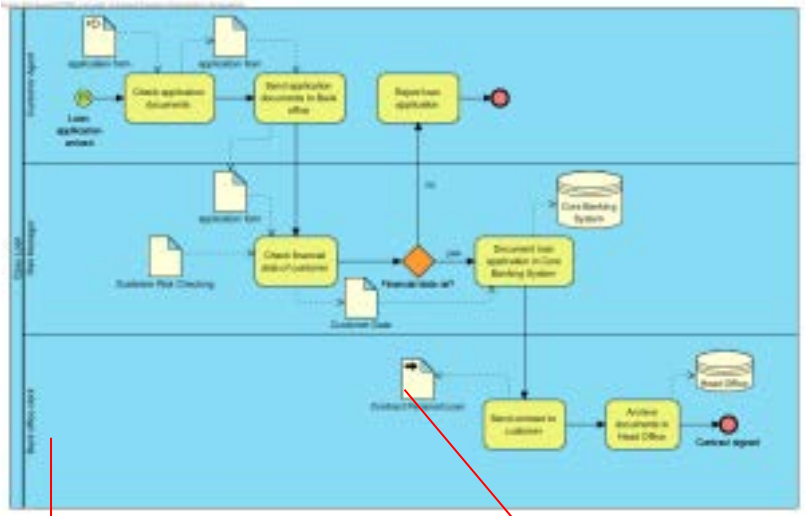
organisation models

Representing Relationships

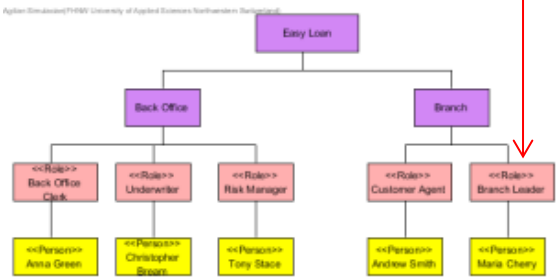
- Relationships can be represented in different ways and on different levels of granularity
  - **Business Conceptual Model**: References between models and model elements
  - **Mapping tables** present functional dependencies between two building blocks
  - **Landscape diagrams** representing dependencies between three building blocks

(Hanschke 2010, p. 71f)

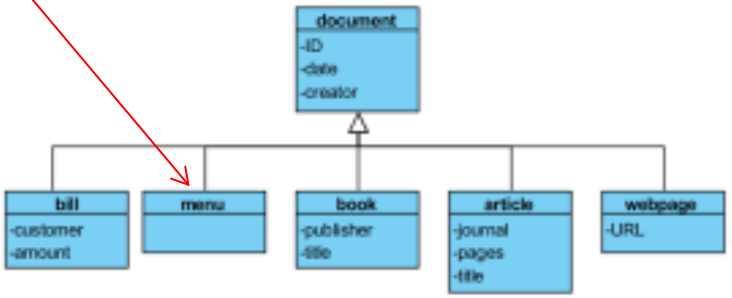
Relations between Models and Model Elements of different Abstractions



Lanes refer to elements in an organisational model



Data objects are linked to elements in da data model or document model



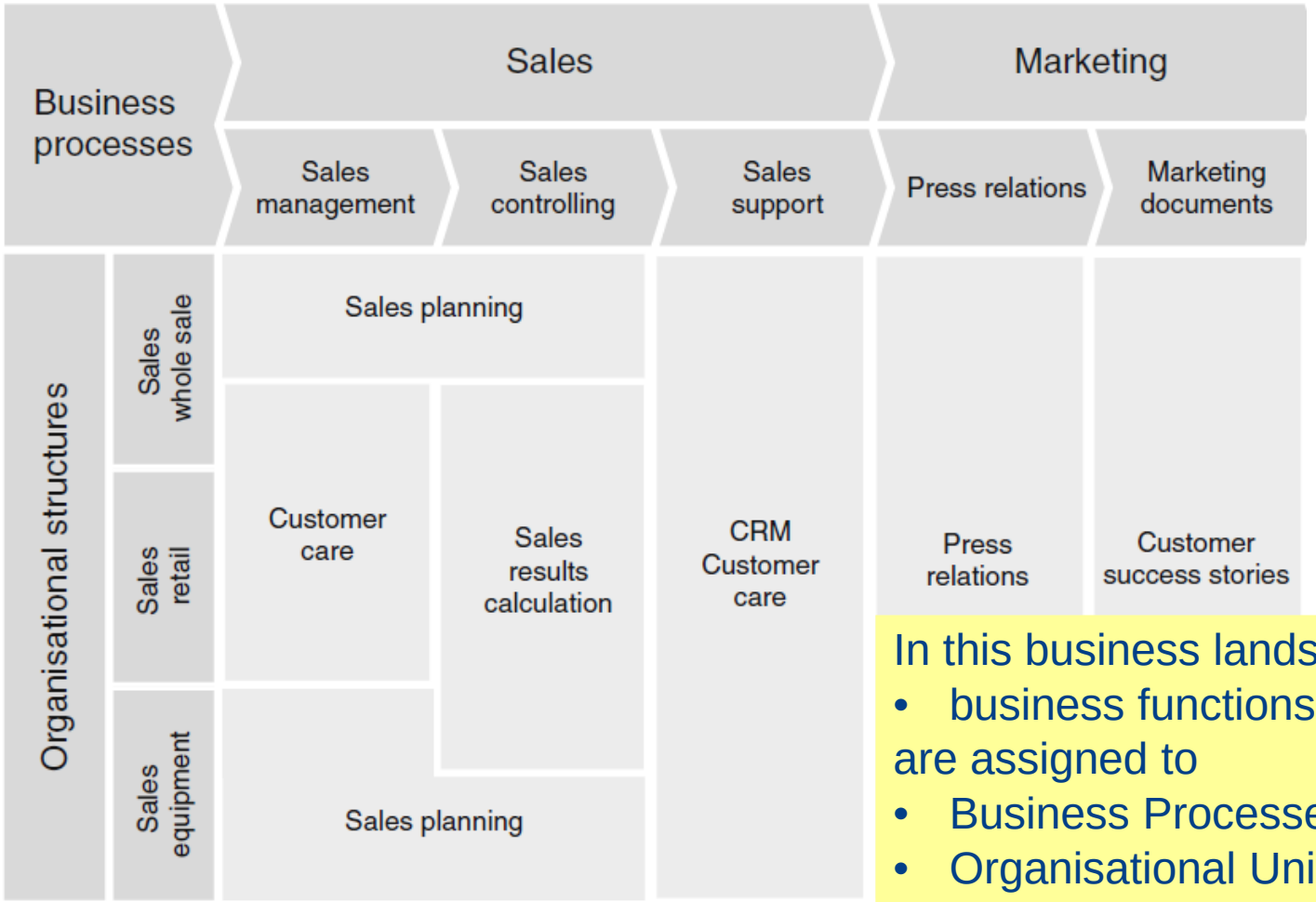
Representing Relationships with a Mapping Diagramm

This mapping table assigns business objects to business processes.
The mnemonic “CRUD” summarises the ways in which business objects are used in business processes

Business objects		Business processes				
		Disposition	Production management	Factory planning	Resource planning	...
		BP1	BP2	BP3	BP4	...
Sales order	BO1	R				
Production order	BO2	CUD	CUD	R		
Factory order	BO3			CUD	R	
Stock location	BO4	R	R	R		
Goods receipt doc.	BO5			R		
Storekeeper	BO6				R	
...	...					

CUD	Create, Update, Delete
R	Read

Example: Representing Relationships with a Business Landscape Diagramm



In this business landscape diagramm

- business functions (cells of the matrix)

are assigned to

- Business Processes (x-axis))
- Organisational Units (y-axis)

Business Processes and Their Context

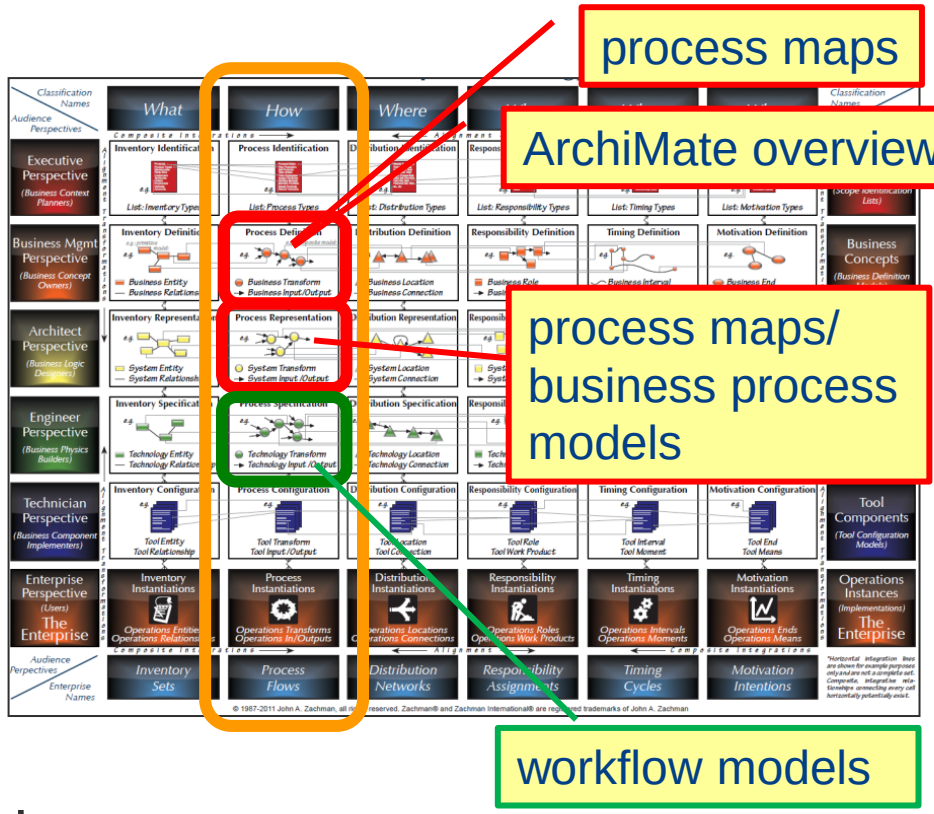
The Business Process Perspective on Enterprise Architecture

- From the *business process perspective*, enterprise architecture achieves enterprise integration through
  - capturing and describing processes, strategies, organisation structures, information and material flow, resources etc.
  - concentration on how to perform core business processes in an organisation
  - considering the information and material flow in the entire process
- In this sense, business process management (BPM) relies on enterprise architecture

(Bernus et al. 2003, p. 9f)

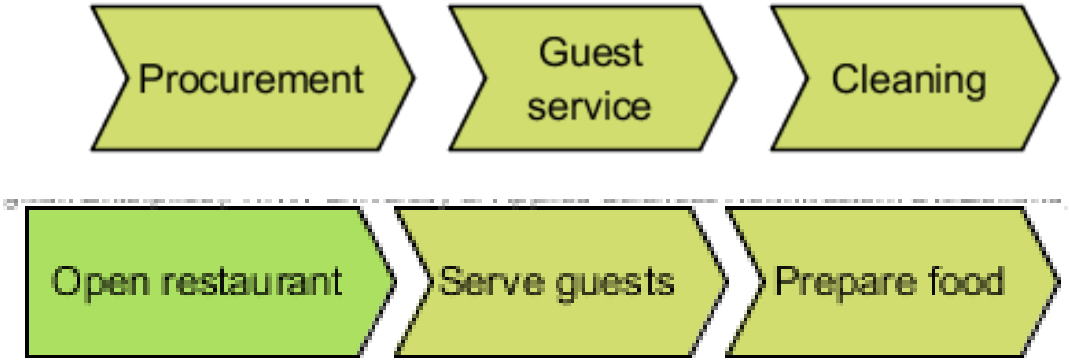
Zachman Framework: Business Processes in different Perspectives

- Vertical Relationships relate the business process represented in the different perspectives
  - A "process map" is an overview of the enterprise's business processes linking them to the value chain
  - A "business process model" is a process diagramm from the business perspective.
  - A "workflow model" or "process implementation" represents the process from the IT perspective



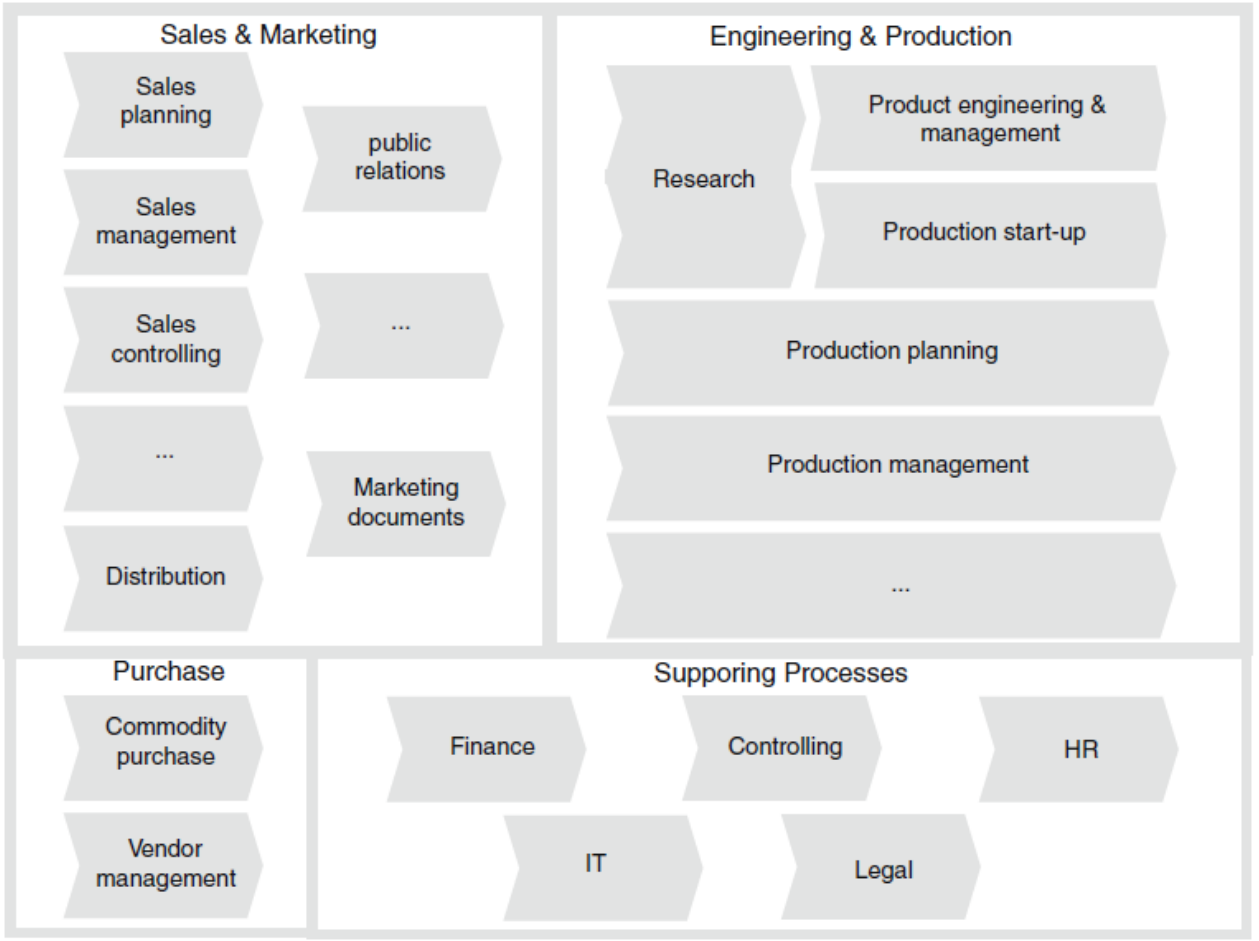
The Workflow Management Coalition defines "workflow" as the automation of a business process

Process Maps



- Process maps give an overview of the business processes on a high level of abstraction
- Each element of a process maps represents a business process
- Process maps represent relationships between processes
  - ♦ grouping processes
  - ♦ logical ordering (e.g. procurement → production → sales)
- But: process maps do not represent control flow, i.e. a predecessor does not necessarily trigger ist successor

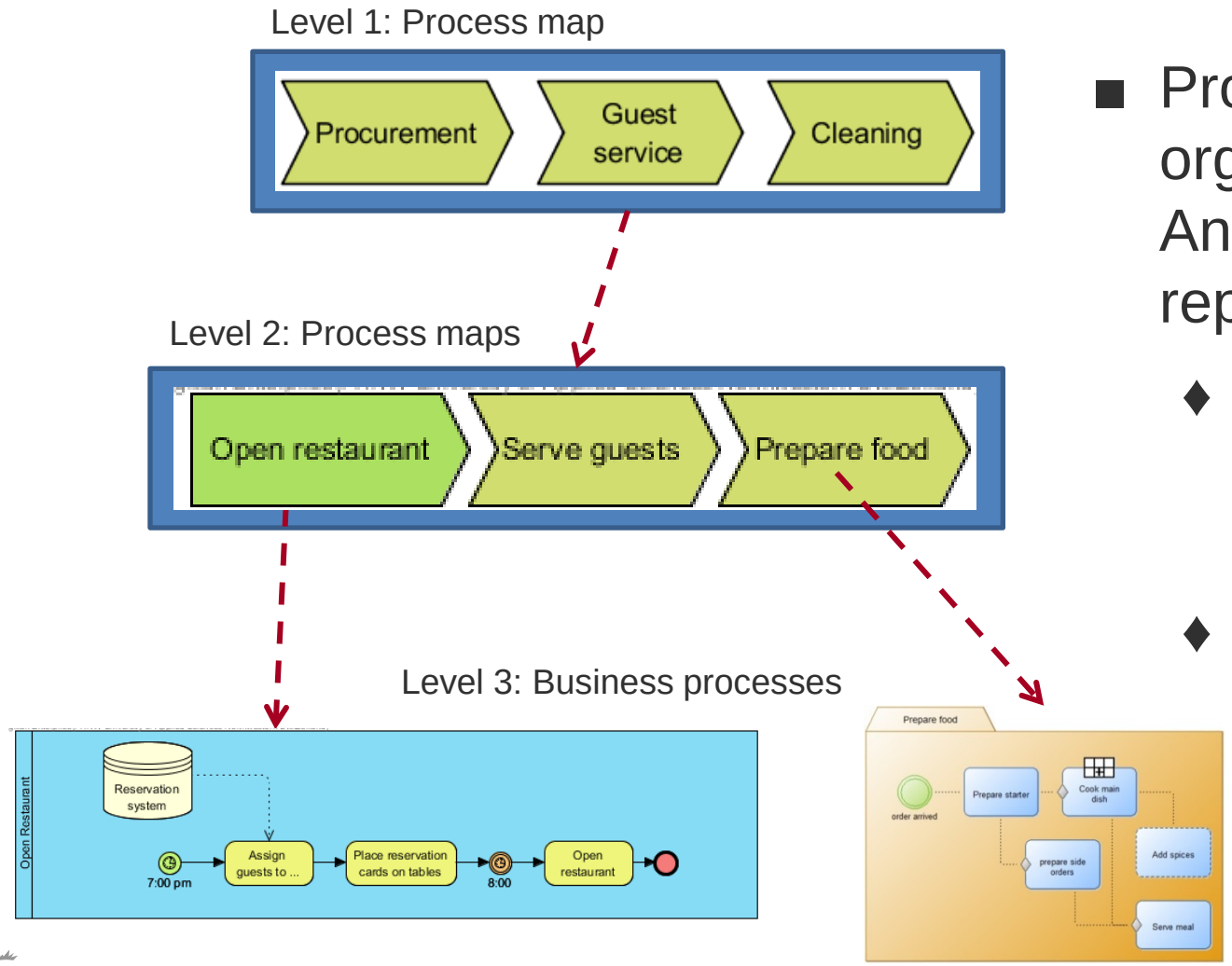
Example of a Process Map



- This example represents a process map as a cluster diagram.
- Business processes on the value-chain level create the “umbrella” clusters, each of which contains a set of sub-processes.
- For example, the sub-process “sales planning” is assigned to its parent process, “sales and marketing”.

(Hanschke 2010, p. 75)

Hierarchical Process Maps

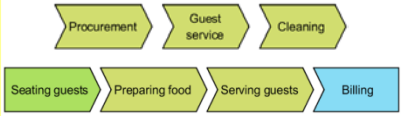


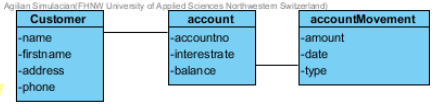
- Process maps can be organized hierarchically. An element either represents
  - another set of processes (i.e. a process map)
  - a business process (e.g. in BPMN or CMMN)

References in BPMN

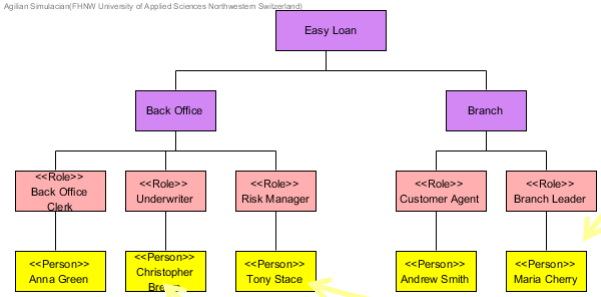
- Process models represent the flow of work.
- Processes are related to other aspects of business
- These are represented by references to other models.

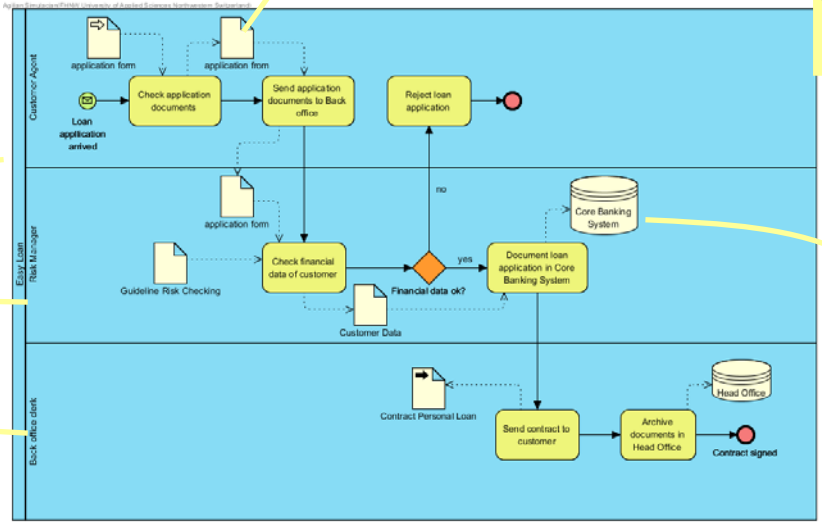
An element in a process map corresponds to a process diagramm





Data Objects can refer to
- *data models*
- *document models*





Data stores may refer to applications

Lanes refer to elements in an organisation model

Relationships from and to Business Process Diagrams

There are two kinds of relations from/to BPMN

- Relations **to process models** as a whole from
  - Process maps
  - Business motivations
- Relations **from process model elements** to elements in other models
  - data objects in document models and data models
  - organisation units or roles in organisation models
  - products in product models
  - applications and application services in IT models
  - business rules

References in BPMN

There are two important references from BPMN

- Data objects can represent different kinds of data
  - Structured data
  - Documents
  - Data store (applications)
- Lanes and pools represent organisational elements
  - Organisation units
  - Roles
  - People

Data and organisation are modeled in their own models; their elements can be referenced from BPMN

Organisation Models

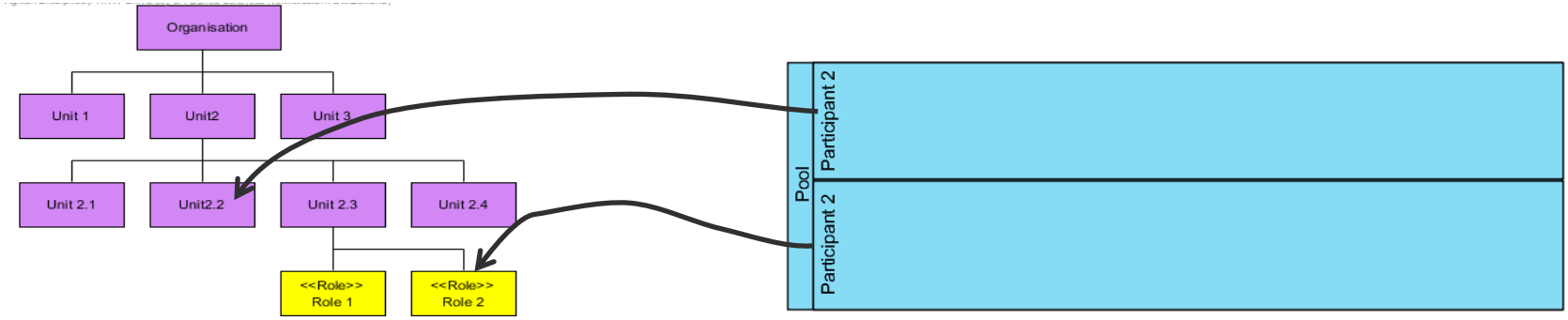
Literature

This chapter is mainly based on the following literature:

- Bridgeland David M.; Zahavi, Ron (2009): Business Modeling - A Practical Guide to Realizing Business Value. Morgan Kaufman Publishers. Chapter 4: Business Organization Models.

Referencing Organisation Units from Business Processes

- The lanes of a BPMN models graphically show who performs which activities.
  - Each lane is named by the role or organization who performs the work. This role is called the participant of the lane.
- The roles (or organizations) represented by the lane are modeled in an organization model
  - There should be a reference from the lane to a role or organization in the organization model.



Organisations

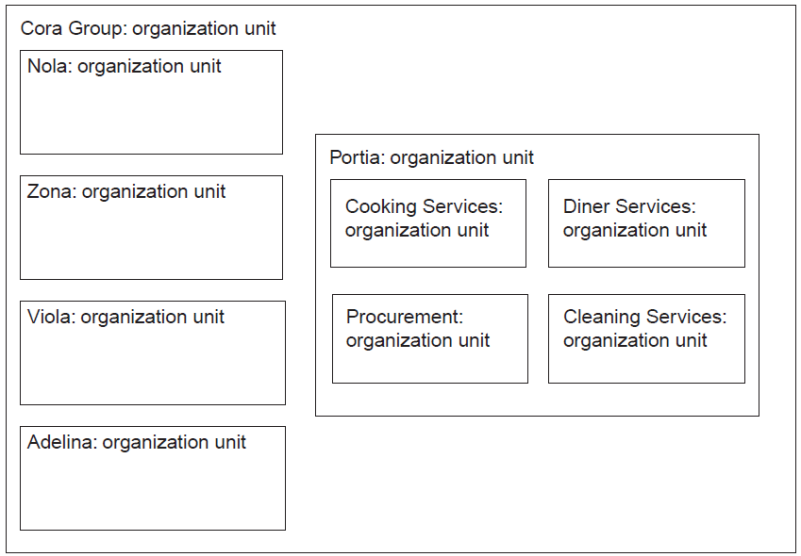
- An organization unit (or simply stated, an organization) is a collection of people who work together toward a common goal.
- An organization can be a commercial company, a nonprofit, or a government agency.
- An organization has a clear boundary. Some people are part of it and others are not.
- An organization can be a group of people within a larger organization.
  - An organization can be part of another organization and an organisation can have sub-organisations
  - In a corporate holding each company has its own management structure, its own performance goals, and its own budgets and resources. But their performance flows up to the holding company, and their goals are part of a larger plan.
  - An organization can even be temporary. A project team is an organization which exists while the project is performed and then disappears after the project is finished

Business Organisation Models

- A Business Organisation Model describes
  - how a company is organized – the business units, departments and working groups
  - the roles that people play in the company
  - the interactions – who interacts with whom to get the work done
  - the way the organisation interacts with other organisations
- When we model organizations,
  - we look at the way they are structured, the work they perform, and the way they are associated with other organizations.
  - we do **not** focus on **how** organisations perform their work (this is modeled as a business process)

Example of an Organisation Model

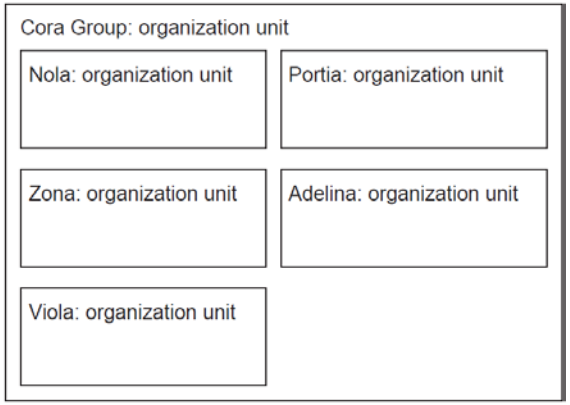
- This model shows Cora Group as composed of five restaurants.
- One of those five—Portia—has four organizations that are part of it: Diner Services, Procurement, Cooking Services, and Cleaning Services



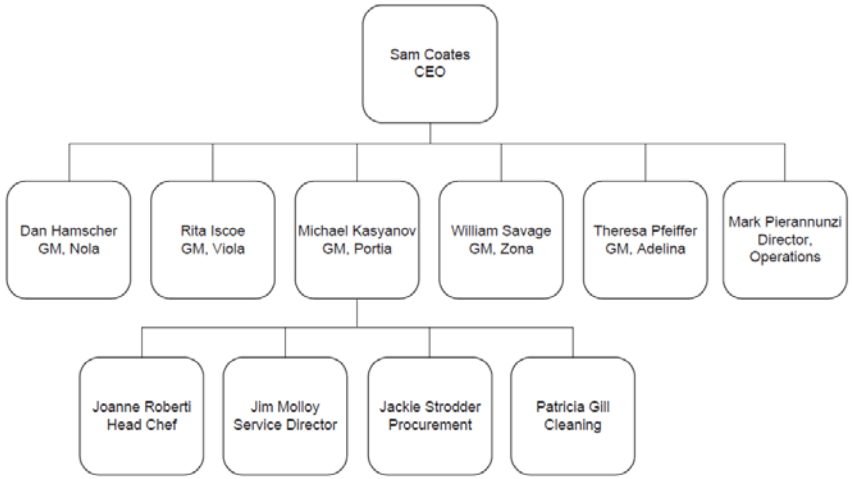
- Diner Services is responsible for all interactions with the customers of Portia: hosting, reservations, and serving food.
- Procurement is responsible for all interactions with external vendors and suppliers.
- Cooking Services is responsible for the creation of all meals.
- Cleaning Services is responsible for cleaning the facilities, including the dining area, bathrooms, and immediate restaurant surroundings

Organisation Model vs. Organisational Chart

Example of a Organisation Model:



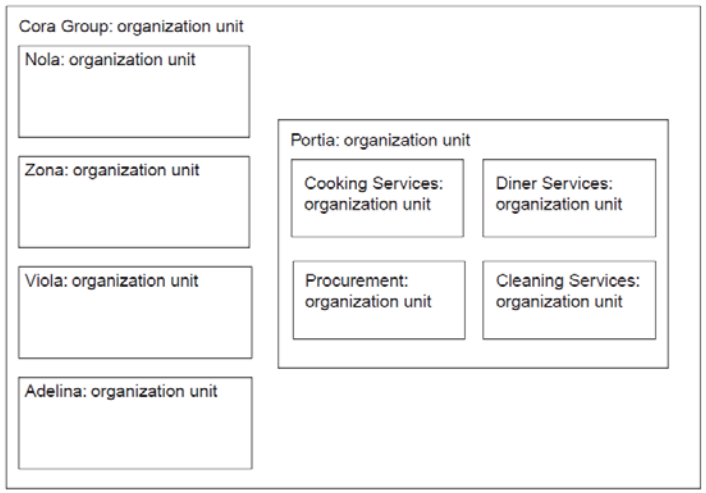
Example of an Organisational Chart:

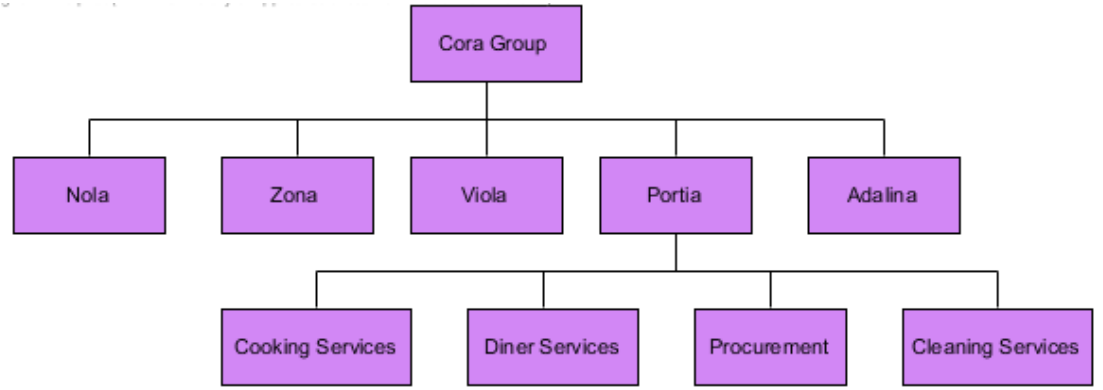


- Business organization models are different from organization charts.
  - An organization model is about groups of people (organizations and roles) while
  - Organization charts are about individual people within an organisation
- Example:
  - The business organization model (on top) shows us what organizations are part of Cora Group
  - The organisational chart shows the roles of individual people and the reporting relationships between people

Business Organisation Modeling

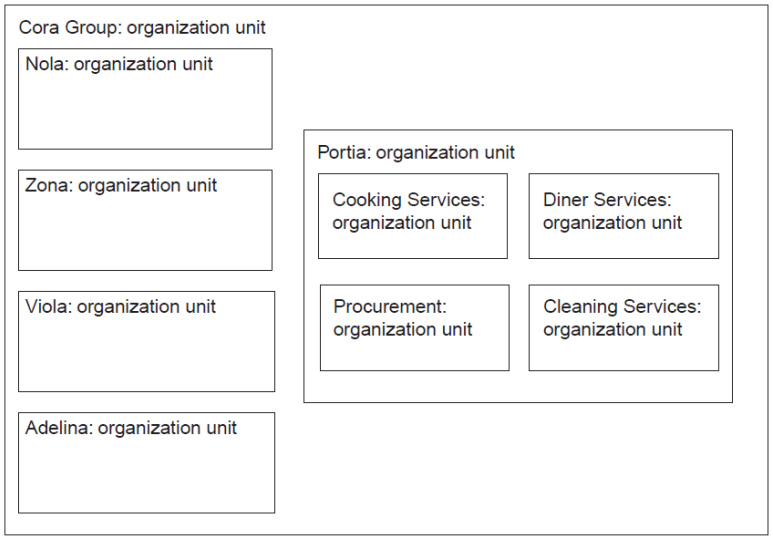
- There is no standard for organisation modeling
  - ♦ nearly every modeling tool has its own approach
- Here are two possible representations of an hierarchical organisation unit

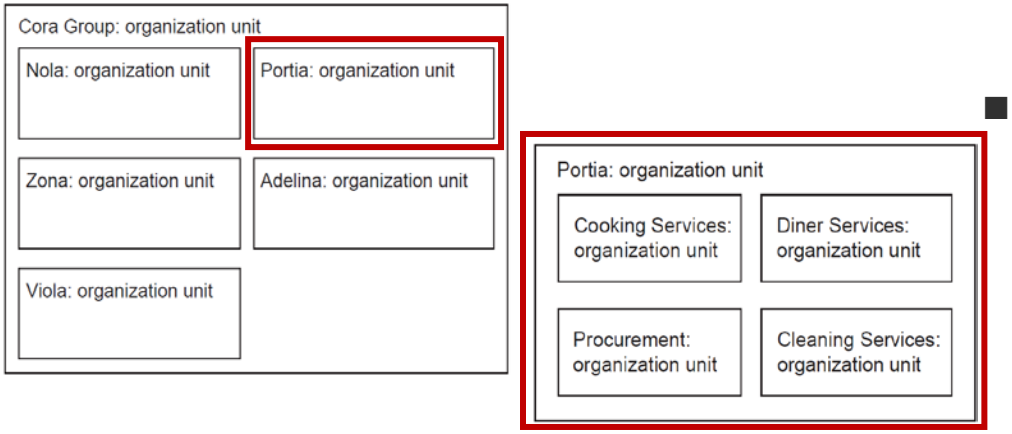




(Bridgeland & Zahavi 2009, p. 79f)

Representing Organisations and Suborganisations





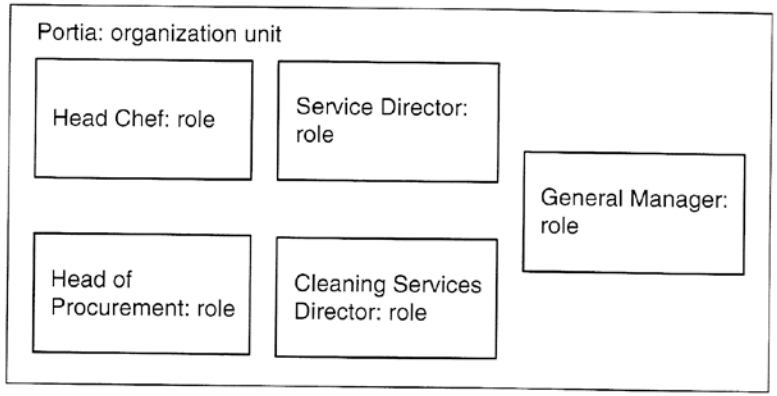
- Business organisation models are inherently hierarchical
  - An organisation is composed of several other organisation which are again composed of other organisation
- The hierarchy can be represented
  - in one model or
  - in several models
- Example: The top diagram shows three levels. If we a diagram becomes too complex, one can show the organizations within a unit as a separate diagram (see second diagram)

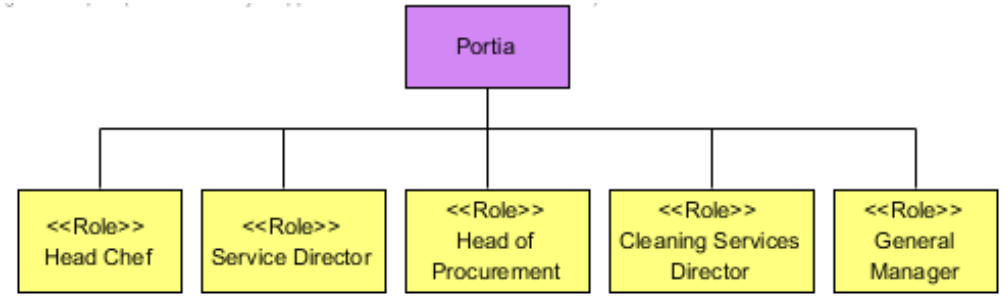
(Bridgeland & Zahavi 2009, p. 81ff)

Organisation with Roles

- Organisations contain roles
- A role is a responsibility a person assumes when he or she holds a position in an organisation
- People can at the same time play multipe roles

Organisation Model with roles



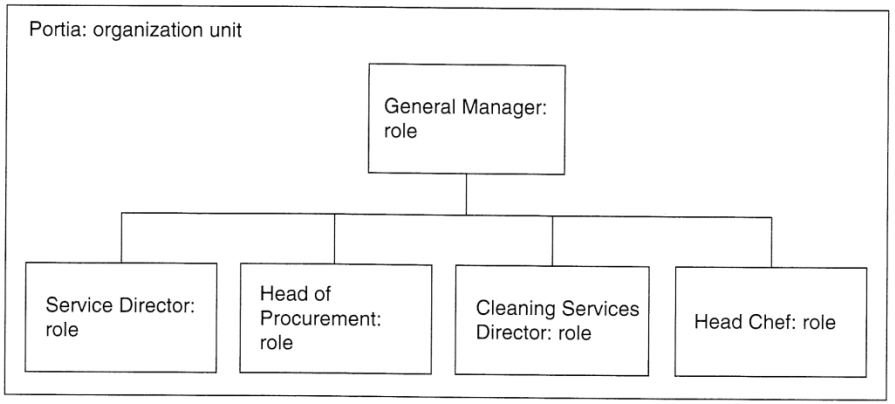


(Bridgeland & Zahavi 2009, p. 82ff)

Reporting Relationships

- It can be useful to model the reporting relationships that exist between roles (not between individual persons)
- The supervising role can tell the reporting role what to do and when to do it
- Reporting only occurs between two roles, a role cannot report to an organisation

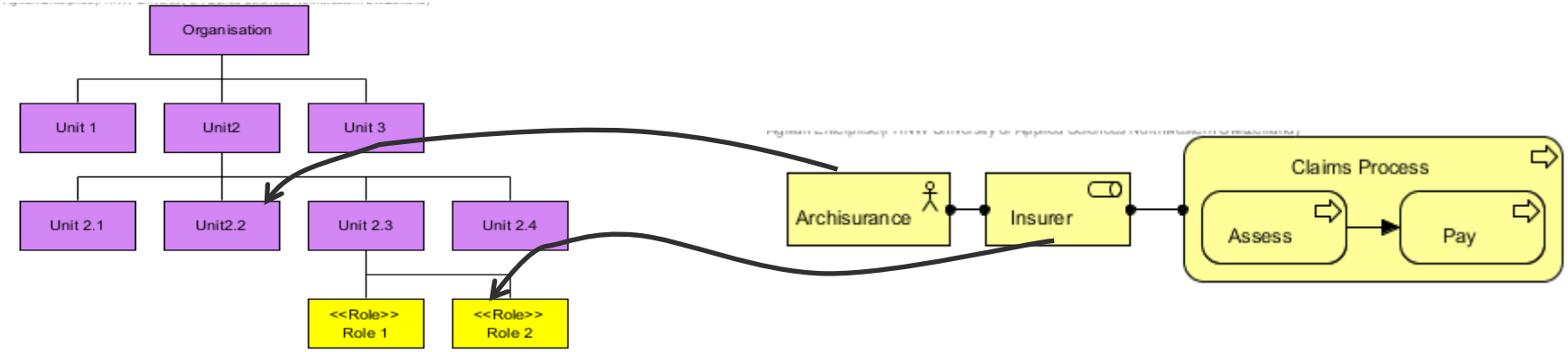
Organisation Model with reporting relationships



(Bridgeland & Zahavi 2009, p. 82ff)

Referencing Organisation Units from ArchiMate

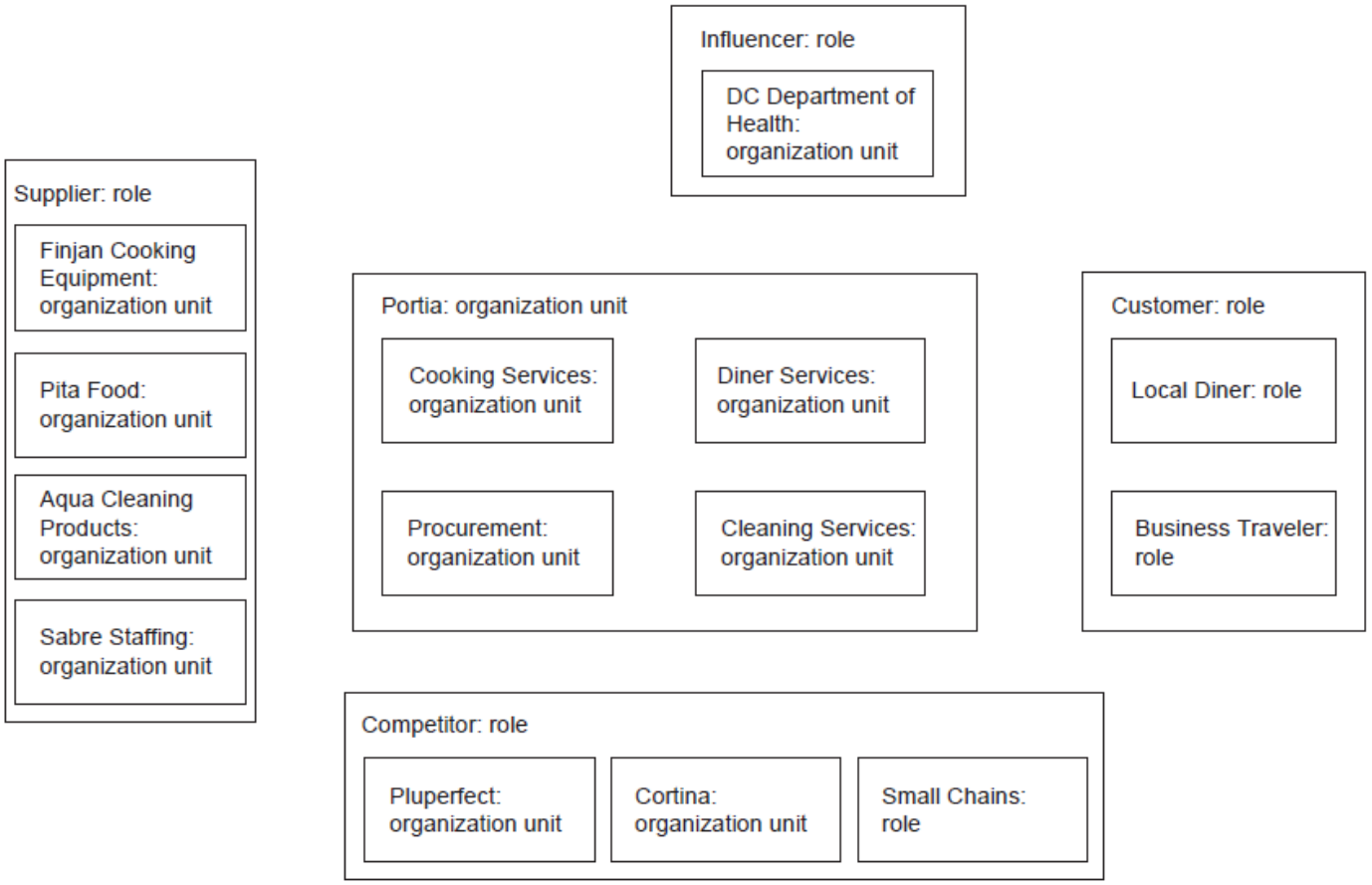
- The business layer of ArchiMate contains Business Roles and Business Actors.
- The Business Actors and Business Roles are modeled in an organization model
  - Actors correspond to organisations
  - Business Roles are roles



Interactions

External Organisations and External Roles

Sometimes it can make sense to model also external roles



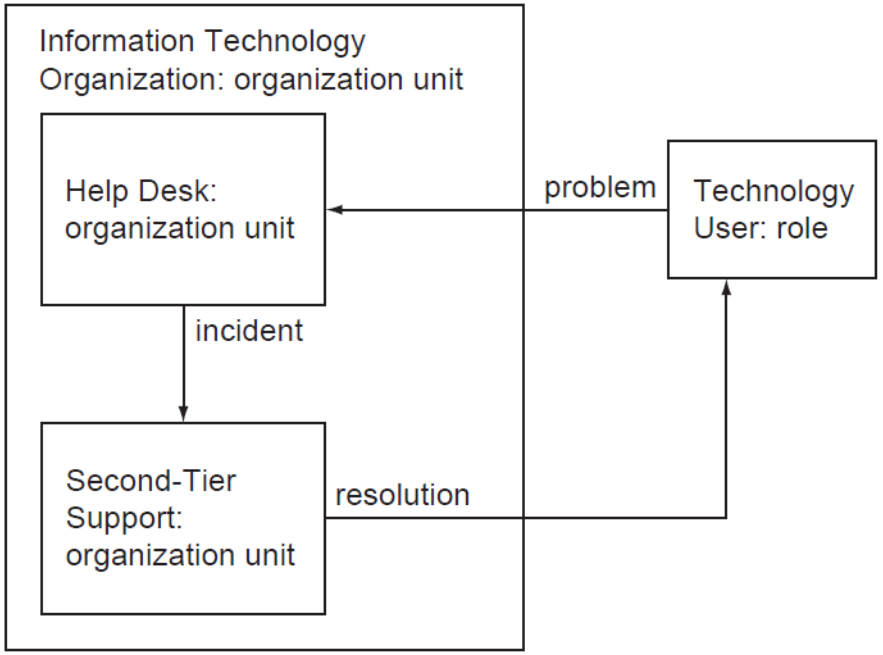
A role inside a role means the the inner role plays the role of the outer role, i.e. a Local Diner is also a Customer

When an organization is represented as part of a role, it means that the organization plays that role, i.e. Cortina plays the role of a Competitor.

(Bridgeland & Zahavi 2009, p. 86f)

Interactions

- Interactions shows who works with whom
- An interaction is represented as an arrow between organisations and roles
- An interaction is labeled with the name of the deliverable, which can be information, a physical good, a service or money

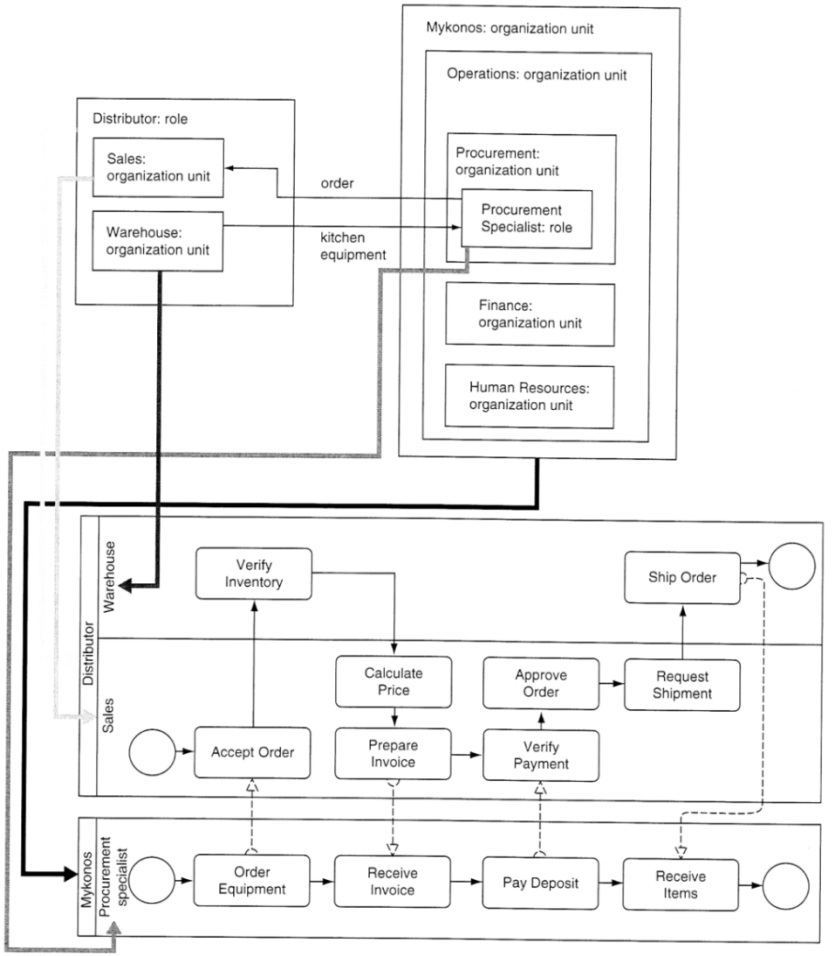


- The interaction between the role Technology User and the organization Help Desk is labeled with the deliverable: problem. The interaction is directional. This means that the technology user delivers the problem to the help desk, rather than vice versa.
- There also is an interaction between Help Desk and Second-Tier Support. The help desk organization provides second-tier support with an incident, a written description of the problem recorded and tracked.
- The resolution of the problem is a third interaction, one between Second- Tier Support and Technology User. That interaction delivers a resolution to the user.

009, p. 88ff)

Business Processes, Organisations, and Interactions

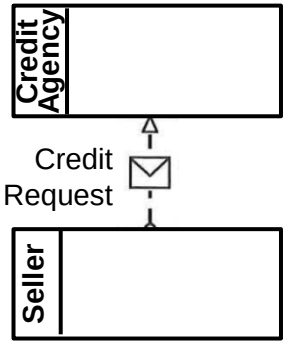
- A pool contains a process
  - The pool is labeled with the participant who manages this process
- A lane in a process model is labeled with the participant who performs the action
  - an role or organisation in the pool
- Interactions to external roles/organisations are modeled as message flows in a process



(Bridgeland & Zahavi 2009, p. 130f)

Interaction Diagrams in BPMN

Collaboration (between pools):



Choreography:

Two diagrams for interactions:

- Collaboration
- Choreography

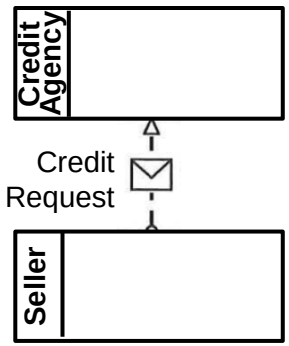
Common elements of interaction diagrams:

- Participants are the interacting agents
  - Businesses, departments, people, IT
- Messages are sent between Participants
  - These can be informational or physical, including physical things that do not carry information, such as cars or furniture.

White, S.A. and Bock, C. (2011): New Capabilities for Process Interaction in BPMN 2.0. In: Fischer, L. (ed.): BPMN 2.0 Handbook, Future Strategies Inc.

Collaboration Diagrams

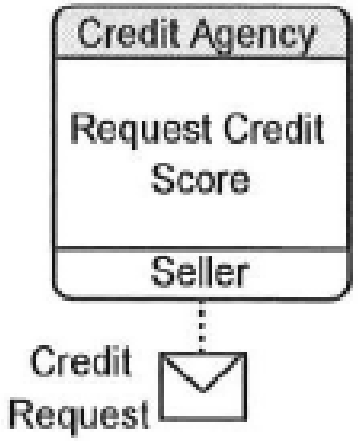
Collaboration (between pools):



- participants are elements of their own (pools)
- Message Flows appear as dashed arrows with Messages optionally overlaid on them.
- Collaboration diagrams are useful when relationships between Participants are the primary concern.

Choreography Diagrams

Choreography:

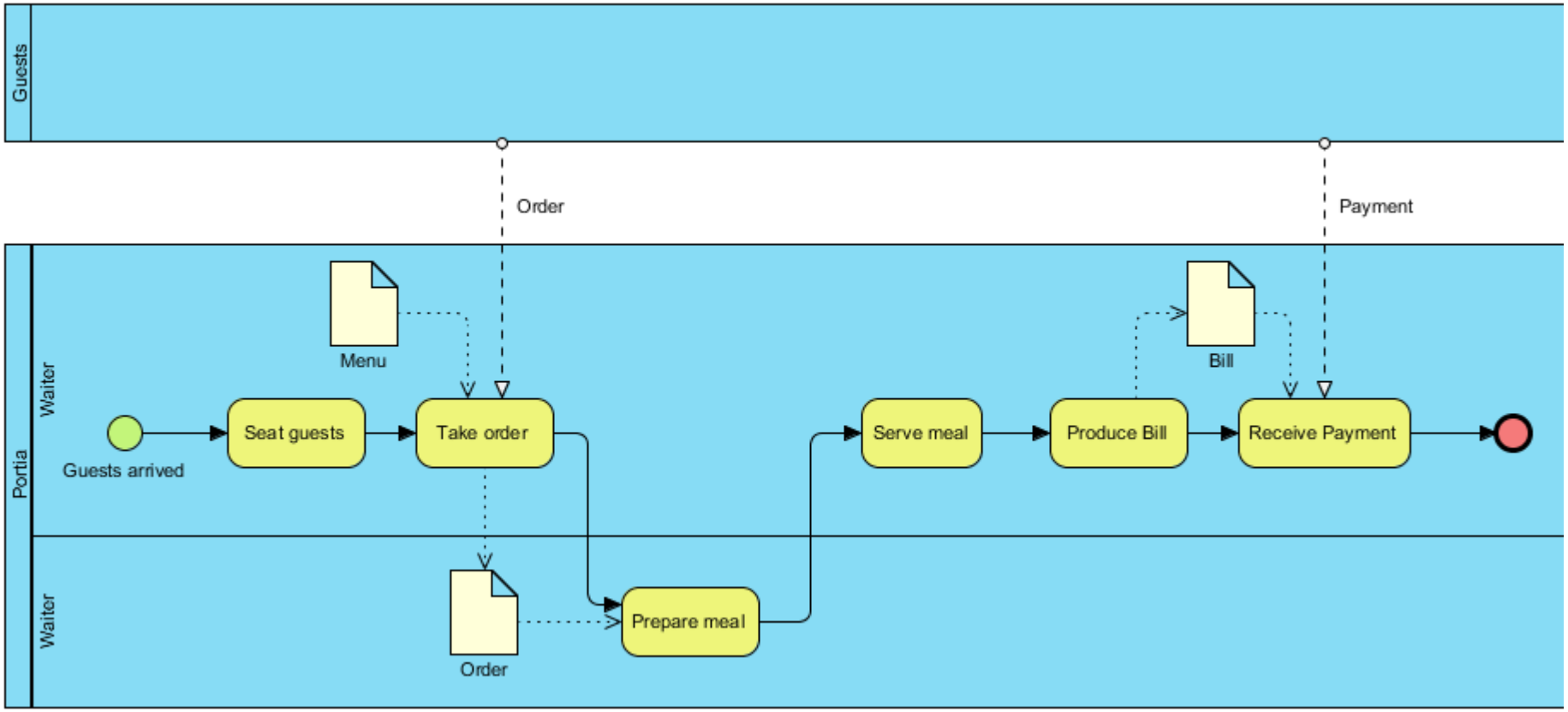


- Message Flows are shown as Choreography Activities
  - Messages are linked to them by dotted lines called Associations.
  - participants are shown as bands inside a Choreography Activity
    - unshaded bands are Participants sending the Message
    - shaded bands are the Participantsreceiving them.
- Choreography diagrams are useful when interaction activities are the primary concern

Modeling Data and Documents

An Example Process

- This is a simplified version of the process for serving guests
- There are three data objects. Can you see a difference between these data objects?



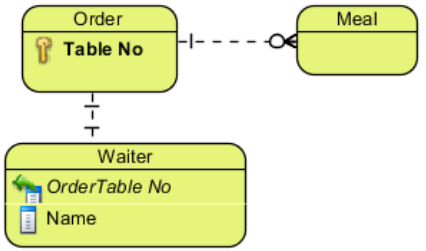
Modelling Data

- Data objects in BPMN can represent different kinds of data
  - **structured data**
  - **documents**
- Documents themselves either represent
  - **a document class** represents a generic documents for which a specific instance exists for each process instance
    - Example: The bill
  - a **specific document**
    - Example: The menu which the guests get to choose their meals
    - Hint: For a specific document we can specify a file name or a URL
- Another example: An application form is a specific document while an application would be represented as a class

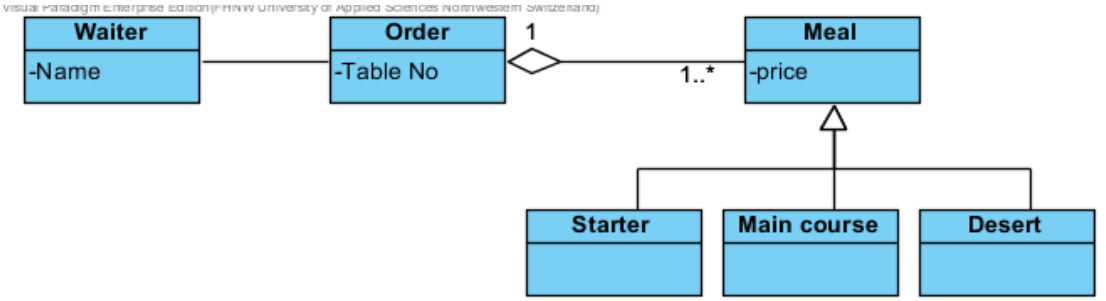
Modelling Structured Data

- Structured data can be represented for example as
  - ♦ Entity Relationship Diagram
  - ♦ UML Class Diagram/Object Diagrams
- Data models represent
  - ♦ entities/classes
  - ♦ columns/attributes
  - ♦ relations/associations

ERD:

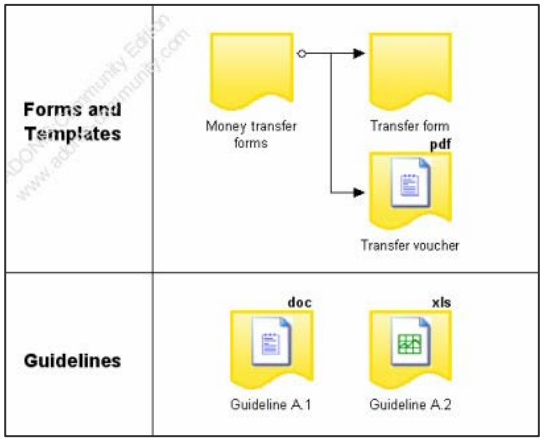


UML Class Diagram:



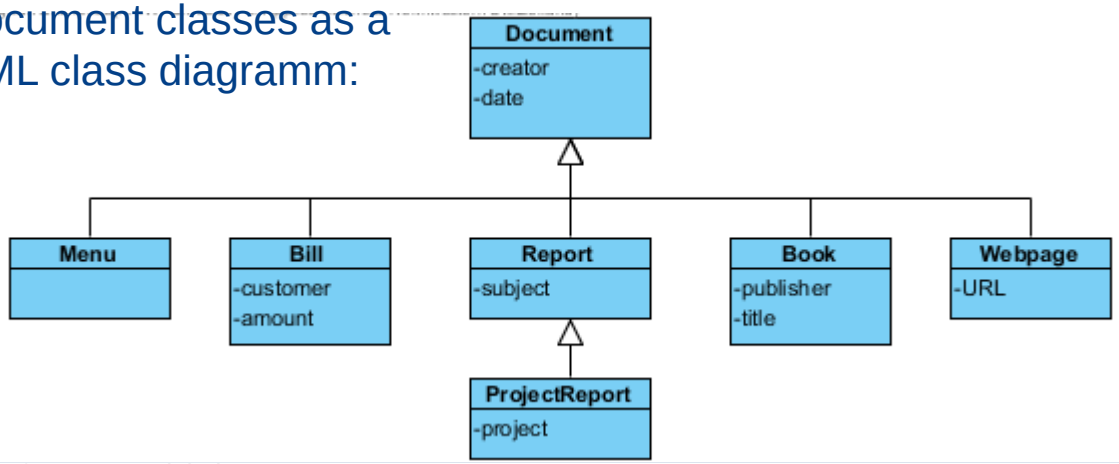
Document modeling

ADONIS document model:

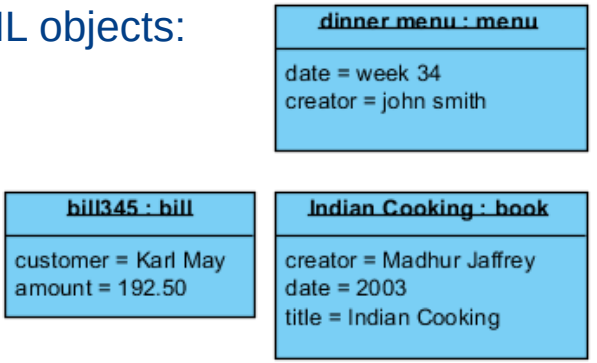


- Although some tools like ADONIS have a model type for documents, there is no standard for modeling documents
- However, we can use UML class diagrams and object diagrams to model documents [1)]
  - A document class is represented as a class object with attributes describing the meta-data
  - A specific document is an object (i.e. an instance of a class)

Document classes as a UML class diagramm:



Specific documents as UML objects:

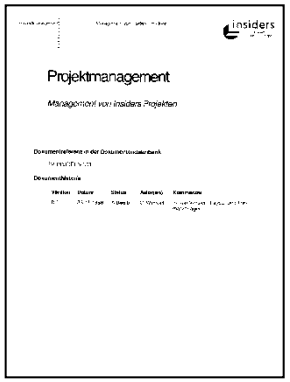


Document Models

- Documents can be grouped into ***document classes*** (also called document types) according to their usage:
  - Examples: invoice, application, menu, report
- There can be specialisations of document classes.
  - Example: There can be special kinds of reports like project report, expert opinions, or reviews.
- ***Metadata*** are attribute values which describe documents.
  - Example: a report might have an creator, a creation date and a subject.
- There are standards for metadata like the Dublin Core Metadata Initiative (http://dublincore.org)

Data and Meta-data – Examples

user data (document)

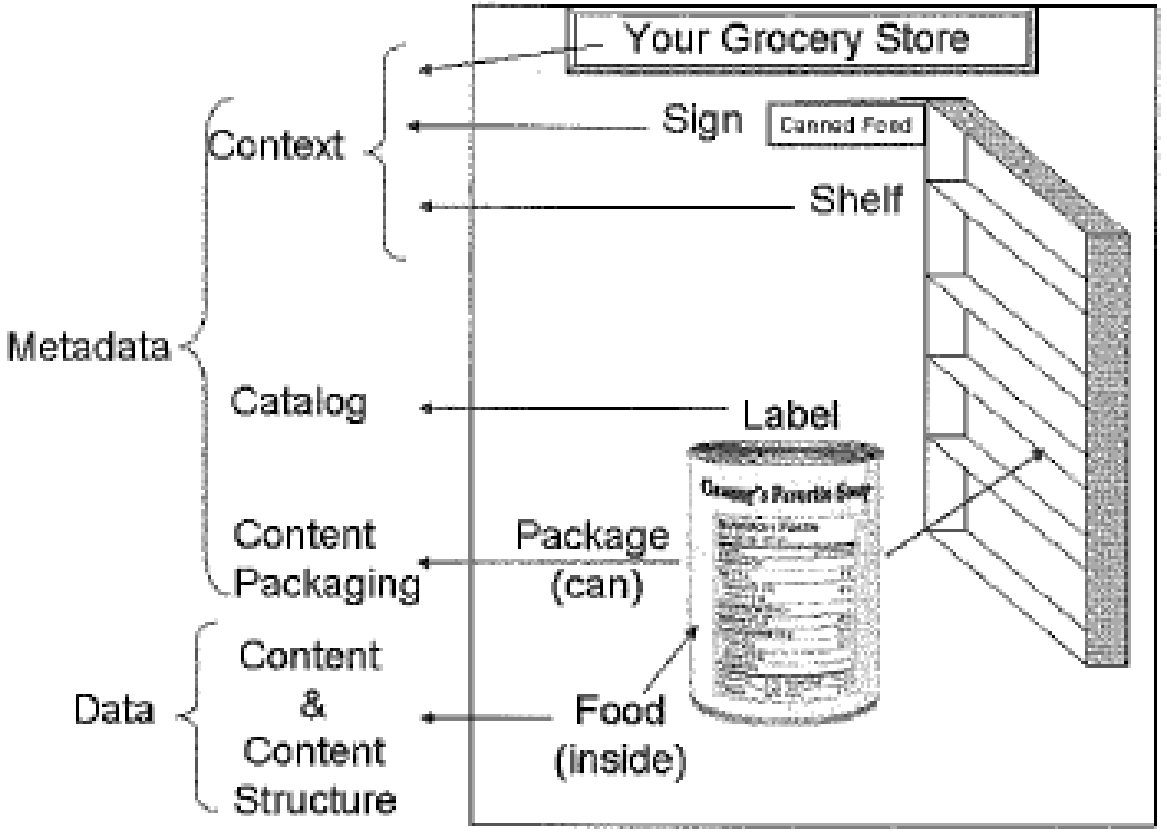


meta-data

name:	ELENA-Ber
creation:	18.3.2001
modification:	25.6.2001
format:	Word
document type:	project report
recipient:	All Life Insurance Inc.
author:	Smith

- Each document consists of the
  - usage data (document itself, content)
  - meta-data
- Kinds of meta-data
  - General metadata
    - can be used for any kind of information
    - Examples: author, date of creation, subject
  - Application-specific metadata
    - Examples:
      - For a letter: sender and recipient
      - For a report: project name
  - Meta-data are structured data and can easily be modeled in UML

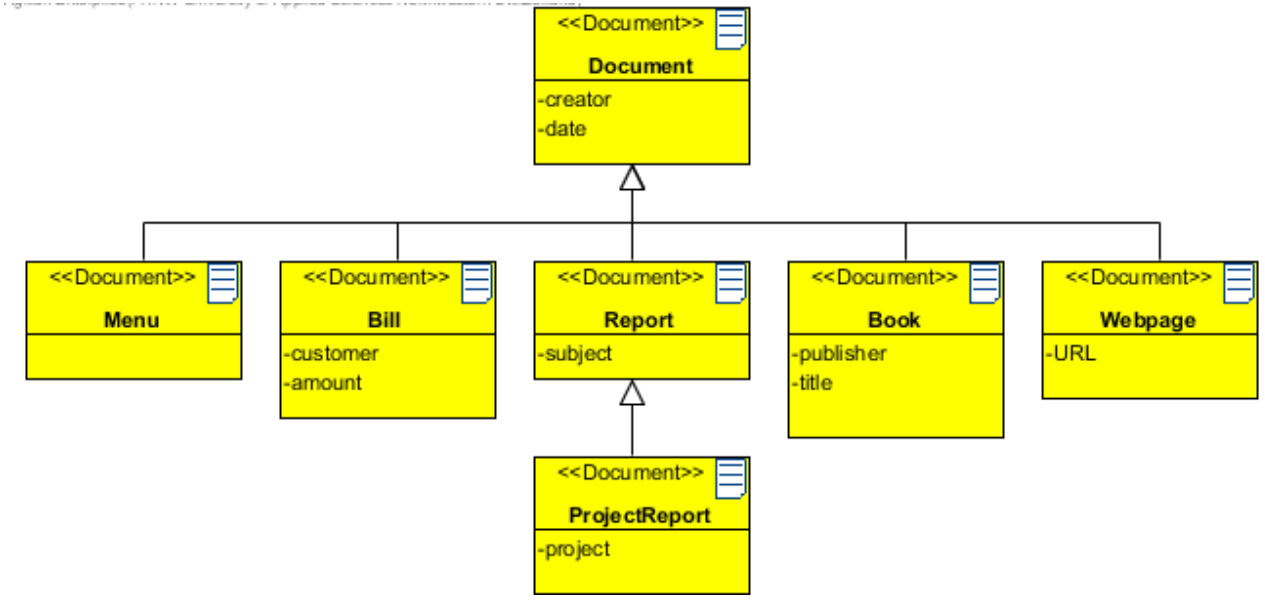
Information as product



Michael C. Daconta: Information as Product, 2007

Modeling Documents in ArchiMetric

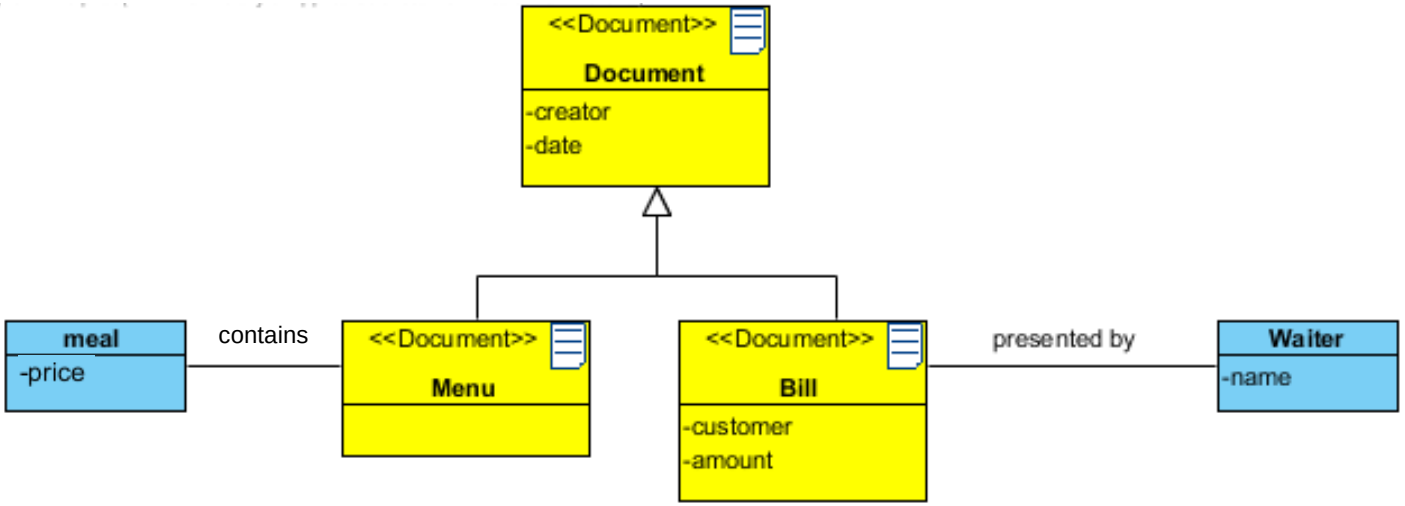
- If we do not have a document model, we can use UML Class Diagrams to define a domain-specific language.
- In the ArchiMetric tool we can use stereotypes to specialize UML class diagrams for modeling documents.
- We can define a new stereotype "Document" and
  - change color
  - add an icon



Combining Document and Data Modeling

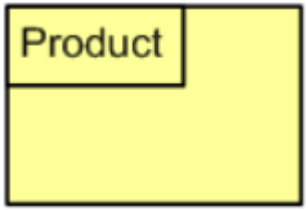
Information about Documents and Data can be combined in one model

- Document classes
- Objects
- Structured Data
- Associations



Modeling Products

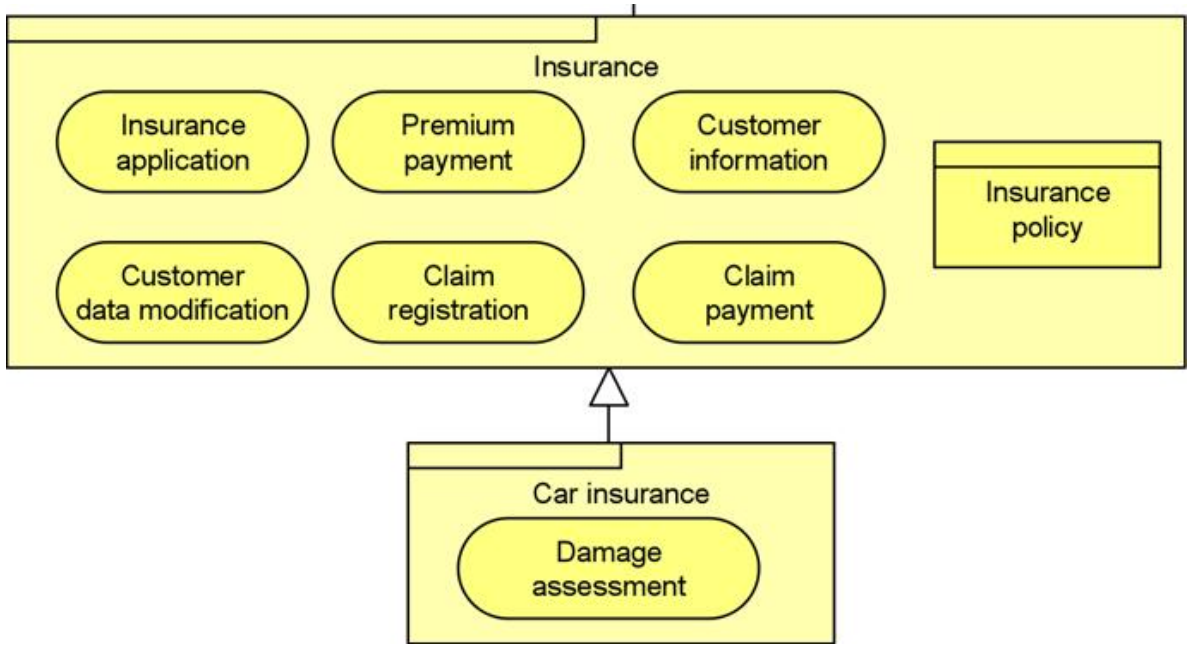
Product Models



- Products are another aspect that can be modeled in the business layer of an Enterprise Architecture (c.f. ArchiMate).
- Products can be physical products, financial products, information products orservices.
- Product models list products (goods or services) created by processes.
- Products can be composed of other products or components.
- In a product model we do not model individual products but product types.
- There are no standard model types for products or services.

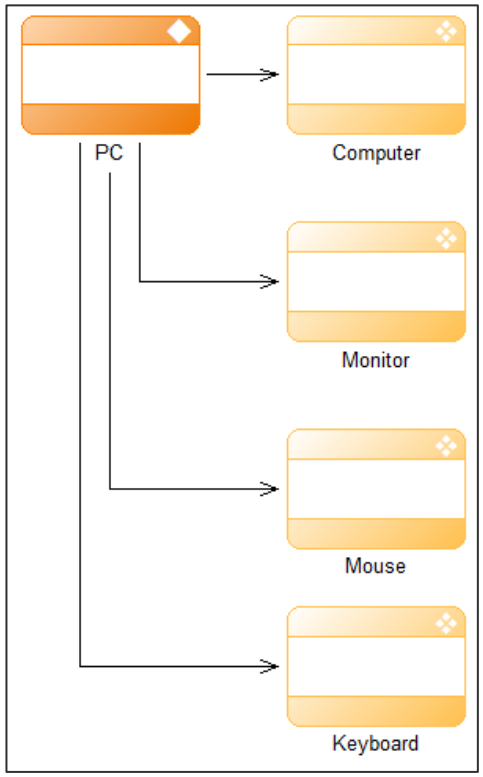
Products in ArchiMate

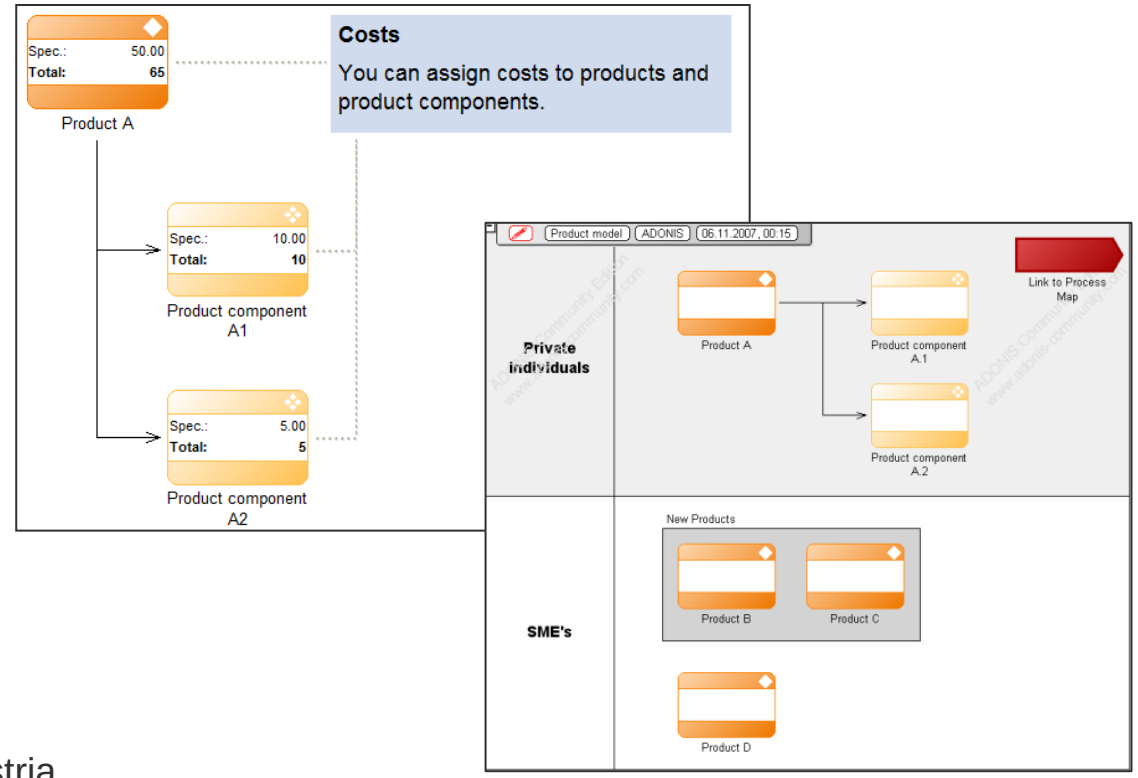
- In ArchiMate a product may aggregate business services or application services, as well as a contract
- This is an example showing two products and the services they consist of. The insurance policy is a contract for the Insurance product.



Product Models in ADONIS

- These are examples of product models as the are modeled in ADONIS*)
- The modeling elements are represents products and product components





*) ADONIS is a tool from BOC GmbH, Austria

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Product Models as Class Diagrams

- If we do not have an model type for products, we can use UML class diagrams to model products (similar as for documents)
- In ArchiMetric we can again define specific sterotypes