2. **UML in a use case modeling (2h)**

**Topics**

2.1. **An actor concept**

2.2. **A use case concept**

2.3. **A use case scenario (workflow)**

2.4. **Generalization/specialization relationships between actors**

2.5. **Relationships between use cases**
2.1. An actor concept

Business and its environment

„Nature”
Market trends
Nature
Demographic processes
Culture changes in a large scale

„Authority”
Government institutions
Local management
Owner(s)
Headquarters

„Fight”
Competitors
Adversaries

„Game”
Customers
Vendors
Banks
Service providers
Advisers
Insurance companies
Exchange/auctions
Mediators/agents
Stockholders
Example
Information system and its environment

An enterprise, a company, an institution

Other information systems

Other machines

Information system

Managers

Administrative staff

Workers
Example
**Business actor/system actor**

A **business or system actor** represents a role played in relation to the business or system by someone or something located in the business or system environment.

**Main business/system actor properties:**
- Name
- Brief description
- Characteristics
- Relationships to other elements

**Examples of potential business actors:**
- Customers
- Suppliers
- Partners
- Local authorities
- etc.
2.2. A use case concept

Business/system use case

A **business/system use-case** is a sequence of actions performed alternately by actors and business or system, which results in a concrete state (in achieving of an expected business/system's or actor's goal).

The use-case has the **goal**.

**Main business/system use case properties:**

- Name
- Brief description
- Supporting business goals
- Scenario (workflow)

...
Association between an use case and an actor

An association between the business/system and the actor is described by a solid undirected or directed line connecting the actor and the use-case symbols.

The association represents the fact that the actor is in an interaction with a business/system – the actor uses the business/system in order to achieve its goal.
Modeling business or system – actor interaction
2.3. A use case scenario (workflow)

A use-case scenario is a specification of an interaction between an actor and a business or system related to the use case. It is given in a particular language – professional dialect.
Languages (notations) commonly used in business use case specification

a) natural languages (professional dialect)

1. C: Request an offer.
2. B: Send the offer to the customer.
3. C: Analyze the offer and negotiate delivery conditions.
4. B: Prepare an agreement and send it to the customer.
5. C: Sign the agreement, prepare an order and send it.
6. B: Prepare and ship a delivery.
7. C: Accept the delivery.
8. B: Send an invoice to the customer.

b) UML activity diagrams

```
[Diagram of UML activity diagrams showing the same sequence of steps as described in natural language]
```
The use cases have pre- and postconditions:

- **precondition**: a condition that should be satisfied in order to start a sequence
- **postcondition**: a condition that is true after completing a sequence.

Example for “Provide with a product”:

“Needed product is in stock and there is a correct order”

“The product delivered”
There are two types of scenarios:
- **basic path**: is a sequence that is normally performed
- **alternative path**: is a sequence that corresponds to abnormal situations
An example
2.4. Generalization/specialization relationships between actors

A relationship between more general and more specific actor

Generalization/specialization relationship
**Multilevel hierarchy of actors**

Generalization actor has all those features that are common to all specialization actors

Specialization actors inherit all features of the generalization actor
An example

Choose worker
An example
2.5. Relationships between use cases

Use case model structuralization

Use case model structuralization consists in:

1) getting new use cases from existing ones,
2) establishing relationships between use cases
   - inclusions,
   - extensions,
   - generalizations/specializations.
Inclusion

A business/system use case A includes a business/system use case B if the last one is an obligatory sub-process of the business/system use case A

```
Use Case A
<--include-->
Use Case B
```
We extract sub-process from the given use case and create a new use case if we expect that it might be an **obligatory sub-process** also of other use cases.
An example

![Diagram showing a business object model with actors and actions]

- Actor A
  - Order a book
- Actor B
  - Prolong
- Authorization

«include»
A business/system use case A extends a business/system use case B if it is an **optional sub-process** of the business/system use case B
We extract an optional sub-process from the given use case and create a new use case if we expect that it might be an optional or obligatory sub-process of other use cases.
An example (Internet shop)

Only for registered customers
Generalization/specialization

A business/system use case A generalizes a business/system use case B if it has more general workflow than the business/system use case B.
A hierarchy of use cases

- Rent a car
- Borrow a book
- Borrow money
- Borrow something
Summary

1. A use case model represents a functionality of a business or a system from actors point of view.

2. The functionality of a business or a system is given in an interaction between a business or a system and its actors.

3. The use case model can be structured. That means that use cases are interconnected.

4. Relationships between use cases are: inclusion, extension and generalization/specialization.