Kuldar Taveter

STSENAARIUMID
(SCENARIOS)
Goal-Scenario coupling

... initiate and influence the definition of ...

... classify ...

Goals

Scenarios

... illustrate satisfaction ...

... lead to the identification of new ...

... lead to revision of ...
Scenarios

- Scenario Types
- Usage Scenarios
- Goal-based Use Case Scenarios
- Rules for Documenting Scenarios
Scenarios

- **Scenario Types**
  - Scenario Kinds
  - Usage Scenarios
  - Goal-based Use Case Scenarios
  - Rules for Documenting Scenarios
Scenario Types

- Current state and desired state
- Positive and negative
- Misuse scenarios
- Descriptive, exploratory and explanatory
- Instance, type and mixed scenarios
- System-internal, interaction, and context scenarios
- Main, alternative, and exception scenario
Scenario Types

- **Current state and desired state**
  - Indicative scenarios
    - Used to document the current system usage.
  - Optative scenarios
    - Describe desired system usage, not yet implemented

- Positive and negative
- Misuse scenarios
- Descriptive, exploratory and explanatory
- Instance, type and mixed scenarios
- System-internal, interaction, and context scenarios
- Main, alternative, and exception scenario
Scenario Types

• Current state and desired state
• **Positive and negative**
  – Desired sequence of interactions leading to the satisfaction of a set of goals associated with the scenario
  – A sequence of interactions that fail to satisfy a goal or set of goals associated with the scenario

  • Can be *allowed* or *forbidden*

• Misuse scenarios
• Descriptive, exploratory and explanatory
• Instance, type and mixed scenarios
• System-internal, interaction, and context scenarios
• Main, alternative, and exception scenario
Scenario Types

- Current state and desired state
- Positive and negative
- **Misuse scenarios**
  - A sequence of interactions in which a hostile actor uses the system against the stakeholder intention
- Descriptive, exploratory and explanatory
- Instance, type and mixed scenarios
- System-internal, interaction, and context scenarios
- Main, alternative, and exception scenario
Scenario Types

- Current state and desired state
- Positive and negative
- Misuse scenarios

- Descriptive, exploratory and explanatory
  - Understanding the process operations, involved agents, triggering events, and other
    - Illustrate meaning of goals and requirements
  - Explore and evaluate possible, alternative solutions in order to support the selection of one alternative solution
    - Support decision making
  - Aims explaining a goal, an alternative solution or a sequence of interactions
    - Explain complex facts
Scenario Types

- Current state and desired state
- Positive and negative
- Misuse scenarios
- Descriptive, exploratory and explanatory
- **Instance, type and mixed scenarios**
  - Concrete sequence of interactions between concrete actors
  - Abstracts from the concrete actors, inputs, and outputs
- System-internal, interaction, and context scenarios
- Main, alternative, and exception scenario
Scenario Types

• Current state and desired state
• Positive and negative
• Misuse scenarios
• Descriptive, exploratory and explanatory
• Instance, type and mixed scenarios

• **System-internal, interaction, and context scenarios**
  – Only system-internal interactions; among different system parts
  – Interactions between the system and its actors
  – Interactions between the system and its actors as well as additional context that is relevant for the system usage or the system itself

• Main, alternative, and exception scenario
Scenario Types

- **Current state and desired state**
- **Positive and negative**
- **Misuse scenarios**
- **Descriptive, exploratory and explanatory**
- **Instance, type and mixed scenarios**
- **System-internal, interaction, and context scenarios**
  - Only system-internal interactions
  - Interactions between the system and its actors
  - Interactions between the system and its actors as well as additional context that is relevant for the system usage or the system itself
- **Main, alternative, and exception scenario**
Scenario Types

- Current state and desired state
- Positive and negative
- Misuse scenarios
- Descriptive, exploratory and explanatory
- Instance, type and mixed scenarios
- System-internal, interaction, and context scenarios

**Main, alternative, and exception scenario**
- Normally executed
  - Satisfy a specific set of goals
- Can be executed instead of the main scenario
  - Result in the satisfaction of the goals that are associated with the main scenario
- Executed when an exceptional event occurs
  - Some goals of the main scenario cannot be satisfied
Scenarios

- Scenario Types
- Scenario Kinds
  - Usage Scenarios
  - Goal-based Use Case Scenarios
  - Rules for Documenting Scenarios
Two kinds of scenarios

• “Sociotechnical” scenarios: address interaction between active entities or agents: humans and function-specific technical components

• Use case scenarios: address interactions between actors and system
“SOCIOTECHNICAL”
SCENARIOS
Scenarios

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Supporting well-being of an older adult (Miller, Pedell, Lopez-Lorca, Mendoza, Sterling, & Keirnan, 2015)
Supporting well-being of an older adult (Miller, Pedell, Lopez-Lorca, Mendoza, Sterling, & Keirnan, 2015)
## SCENARIO 1

<table>
<thead>
<tr>
<th>Condition</th>
<th>Step</th>
<th>Activity</th>
<th>Roles involved</th>
<th>Quality goals</th>
<th>Emotional goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loop</td>
<td>1</td>
<td>The Older Person communicates that he/she is well (Scenario 2)</td>
<td>Older Person, In-touch Monitor</td>
<td>Accessible, Flexible, Invisible to others, Part of routine, Mobile, Attractive</td>
<td>Empowered, Independent, Engaged, In touch</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>The In-touch Monitor confirms that the communication has been registered</td>
<td>In-touch Monitor, Older Person</td>
<td></td>
<td>In touch</td>
</tr>
<tr>
<td>Option</td>
<td>3</td>
<td>The Carer/Relative acknowledges the communication by the Older Adult</td>
<td>Carer/Relative, In-touch Monitor</td>
<td></td>
<td>Cared about</td>
</tr>
<tr>
<td>Interleaved</td>
<td>4</td>
<td>Inform caregiver</td>
<td>Older Person, In-touch Monitor</td>
<td></td>
<td>In control</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Check on older person</td>
<td>Carer/Relative, Older Person</td>
<td></td>
<td>Reassured</td>
</tr>
<tr>
<td>Scenario</td>
<td>Goal</td>
<td>Initiator</td>
<td>Trigger</td>
<td>Description/Outline</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>---------------</td>
<td>--------------------</td>
<td>--------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Communicate</td>
<td>Older Person</td>
<td>Action by the Older Person</td>
<td>Indirect communication (looking at pictures) or direct communication (liking pictures and sending messages) by the Older Person with the Carer/Relative</td>
<td></td>
</tr>
</tbody>
</table>

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<tr>
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<td>The Older Person looks at pictures</td>
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</tr>
<tr>
<td></td>
<td>2</td>
<td>The Older Person likes pictures</td>
<td>Older Person, In-touch Monitor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>The Older Person sends a message to the Carer/Relative</td>
<td>Older Person, In-touch Monitor, Carer/Relative</td>
<td></td>
<td>Reassured</td>
</tr>
</tbody>
</table>
Variations (also resources, etc)

<table>
<thead>
<tr>
<th>SCENARIO N</th>
</tr>
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<tr>
<td>Trigger</td>
</tr>
</tbody>
</table>

**DESCRIPTION**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Step</th>
<th>Activity</th>
<th>Actors involved</th>
<th>Technologies applied</th>
<th>Quality goals</th>
<th>Emotional goals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td></td>
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<td>2</td>
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<td>3</td>
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</tbody>
</table>
USE CASE SCENARIOS
Narrative scenario

A driver assistance system includes a (sub-) system for avoiding rear-end collisions. This system comprises distance sensors, that permanently check the distance to the vehicle driving ahead in order to avoid an imminent rear-end collision. If the system detects that the distance falls below the safety distance yet is still outside the critical range, an acoustic warning signal sounds. Alternatively, a symbol or message maybe displayed on the driver display in the cockpit of the car. In the driver has not react to the warning after 2 s and the distance between two cars still decreases, the system reduces the speed of the car. If the distance (in meters) falls below one quarter of the driving speed (in km/h) at any time, the system initiates emergency breaking.

• Sequence of interactions using natural language
Structured Scenario

• Enumeration of Scenario steps:

1. The driver activates the navigation system
2. The navigation system determines the current position of the car
3. The navigation system asks for the desired destination
4. The driver enters the destination
5. The navigation system identifies the relevant part of the map
6. The navigation system displays the map of the destination area
7. The navigation system asks for the routing options
8. The driver selects the desired routing option
9. The navigation system calculates the route
10....
Structured Scenario

- Tabular documentation of interaction sequence

<table>
<thead>
<tr>
<th>Driver</th>
<th>Navigation system</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The driver activates the navigation system</td>
<td>2. The navigation system determines the current position of the car</td>
</tr>
<tr>
<td>3. The navigation system asks for the desired destination</td>
<td></td>
</tr>
<tr>
<td>4. The driver enters the destination</td>
<td>5. The navigation system identifies the relevant part of the map</td>
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<tr>
<td>6. The navigation system displays the map of the destination area</td>
<td></td>
</tr>
<tr>
<td>7. The navigation system asks for the routing options</td>
<td></td>
</tr>
<tr>
<td>8. The driver selects the desired routing option</td>
<td>9. The navigation system calculates the route</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>
Scenarios

- Scenario Types
- Scenario Kinds
- Usage Scenarios
- **Goal-based Use Case Scenarios**
- Rules for Documenting Scenarios

Contains:
- Context information
- Main scenario
- Alternative scenario
- Exceptional scenario
Moving towards specification

• **What functions will the new system provide?**
  – How will people interact with it?
  – Describe functions from a user’s perspective

• **Use Cases**
  – Used to show:
    • the **functions** to be provided by the system
    • which **actors** will use which functions
  – Each Use Case is:
    • a pattern of behavior that the new system is required to exhibit
    • a sequence of related actions performed by an actor and the system via a dialogue

• **An actor:**
  – anything that needs to interact with the system:
    • a person
    • a role that different people may play
    • another (external) system
Use case diagram

- Capture the relationships between actors and Use Cases

- Campaign manager
  - Add a new client

- Staff contact
  - Change a client contact

- Accountant
  - Record client payment
Notation for Use Cases

![Diagram showing notation for Use Cases]

- **Actor**: Staff contact
- **Communication association**: Change client contact
- **System boundary**: Use case
**<<extends>>** and **<<includes>>**

- **<<extend>>**: one use case adds behaviour to a base case
  - used to model a part of a use case that the user may see as optional system behavior
  - also models a separate sub-case which is executed conditionally
- **<<include>>**: one use case invokes another (like a procedure call)
  - used to avoid describing the same flow of events several times
  - puts the common behavior in a use case of its own

![Diagram](image)
Another example
Identifying Actors

- **Ask the following questions:**
  - Who will be a **primary user** of the system? (primary actor)
  - Who will **need support** from the system to do her daily tasks?
  - Who will **maintain, administrate, keep the system working**? (secondary actor)
  - Which **hardware devices** does the system need?
  - With which **other systems** does the system need to interact with?
  - Who or what **has an interest** in the results that the system produces?

- **Look for:**
  - the users who directly use the system
  - also others who need services from the system
Finding Use Cases

• For each actor, ask the following questions:
  – Which **functions** does the actor require from the system?
  – What does the **actor need to do**?
  – Does the actor **need to read, create, destroy, modify, or store** some kinds of information in the system?
  – Does the actor **have to be notified** about events in the system?
  – Does the **actor need to notify** the system about something?
  – What do those events require in terms of system functionality?
  – Could the actor’s daily work be simplified or made more efficient through new functions provided by the system?
Scenarios

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Documenting Use Cases

• For each use case:
  – prepare a “flow of events”
  – document from an actor’s point of view
  – describe what the system must provide to the actor when the use case is executed

• Typical contents
  – How the use case starts and ends
  – Normal flow of events
  – Alternate flow of events
  – Exceptional flow of events

• Documentation style
  – Textual use case description
  – Sequence diagrams
# Use case scenario template

(Wiegers, 2004; Cocburn, 1997)

<table>
<thead>
<tr>
<th>Use Case ID:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Use Case Name:</td>
<td></td>
</tr>
<tr>
<td>Created By:</td>
<td>Last Updated By:</td>
</tr>
<tr>
<td>Date Created:</td>
<td>Date Last Updated:</td>
</tr>
</tbody>
</table>

- **Use Case ID**: a unique integer sequence number identifier
- **Use Case Name**: a concise, results-oriented name for the use case
- **Created By**: the name of the person who initially documented this use case
- **Date Created**: the date on which the use case was initially documented
- **Last Updated By**: the name of the person who performed the most recent update to the use case description
- **Date Last Updated**: the date on which the use case was most recently updated
Use case scenario template (2)
(Wiegers, 2004; Cockburn 1997)

- **Description**: the reason for and outcome of this use case, the sequence of actions and the outcome of executing the use case
- **Goal**: the goal of the use case
- **Primary Actor**: a person or other entity external to the software system being specified who interacts with the system and initiates the use case
- **Secondary Actor**: a person or other entity external to the software system being specified who interacts with the system and directly or indirectly responds in the use case
- **Trigger**: the event that initiates the use case
Use case scenario template (3)
(Wiegers, 2004; Cockburn, 1997)

<table>
<thead>
<tr>
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</tr>
</tbody>
</table>

- **Preconditions**: list any activities that must take place, or any conditions that must be true, before the use case can be started
- **Post-conditions**: the state of the system at the conclusion of the use case execution
- **Normal Flow**: a detailed description of the user actions and system responses that will take place during execution of the use case under normal, expected conditions
- **Alternative Flows**: other, legitimate usage scenarios that can take place
Use case scenario template (4)
(Wiegers, 2004; Cockburn, 1997)

<table>
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</table>

**Description:**

- **Goal:**
- **Primary Actor:**
- **Secondary Actor:**
- **Trigger:**
- **Preconditions:**
- **Post-conditions:**
- **Normal Flow:**
- **Alternative Flows:**
- **Exceptions:**
- **Includes:**
- **Quality Requirements:**
- **Assumptions:**
- **Notes and Issues:**

- **Exceptions:** any anticipated error conditions that could occur during execution of the use case
- **Includes:** any other use cases that are included (“called”) by this use case
- **Quality Requirements:** quality requirements aka non-functional requirements that are relevant for this use case
- **Assumptions:** any assumptions that were made in the analysis that led to accepting this use case
- **Notes and Issues:** any additional comments
**Use Case ID:** CR_ID  
**Use Case Name:** Checking on older person  
**Created By:** Kuldar Taveter  
**Date Created:** 28.02.2020  
**Last Updated By:**  
**Date Last Updated:** 28.02.2020

**Description:** This use case allows a Carer/Relative to check that everything is OK with an older person.

**Goal:** Check on older person

**Primary Actor:** Carer/Relative

**Secondary Actor:** Older Adult

**Trigger:** Request by Carere/Relative

**Preconditions:**
1. Carer/relative must have an account
2. Carer/relative must have successfully logged in

**Post-conditions:**
1. The system reports that everything is OK with the older person based on his/her activities and energy consumption patterns
   OR
1. The system raises an alert

**Normal Flow:**
1. Carer/relative selects the option for wellbeing check
2. The system reports that everything is OK
3. The system shows the track of routine activities and energy consumption patterns forming evidence for step 2.
4. Carer/Relative indicates that he/she is reassured

**Alternative Flows:**
2a. Irregularities in the daily routine or energy consumption patterns of the older adult are detected
   i. The system raises an alert
4a. Carer/relative asks for more detailed information about the daily routines and/or energy consumption patterns of the older adult
   i. The system displays the more detailed information requested
   ii. The use case continues from step 4

**Exceptions:** None

**Includes:**
1. Retrieve user profile
2. Keep a log on activities carried out by the user

**Quality Requirements:**
1. The system should be Accessible
2. The system should be Flexible
3. The system should be Invisible to others

**Assumptions:**
1. The users (both Carer/Relative and Older Adult) understand the English language as the means of communication

**Notes and Issues:**
1. The maximum time system should stay active after the usage should be defined
Scenarios

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• Rules for Documenting Scenarios
Documenting Scenario

![Entity Relationship Diagram](image-url)
1. Each scenario has a unique identifier and a unique name

2. For each scenario, one or multiple scenario steps of the type interaction have to be defined

3. For each scenario, arbitrary number of pre- and post-conditions must be defined

4. Exactly one scenario type is assigned to each scenario

5. Exactly two actors participate in each interaction
Rule 1:
Use the present tense when documenting scenario

• The user entered his name and password into the system. The system checked the correctness of the entered data
• The user enters his name and password into the system. The system checks the correctness of the entered data
Rule 2:
Use the active voice when documenting scenario

- The user name and password are entered and validated
- The user enters his user name and password into the system. The system validates the correctness of the entered data
Rule 3:
Use the subject-predicate-object sentence structure

• By the means of the user database, the system validates the user data
• The system validates the user data by the means of the user database
Rule 4: Avoid modal verb

- The system *should check* the user data
- The system *checks* the user data
Rule 5:
Clearly separate each interaction from other interactions

Rule 6:
Number each scenario step

• The user submits a search query to the online shop, selects an item from the list of search results, and adds the item to the shopping cart.

  1. The user submits a query to the online shop.
  2. The system displays a list of search results
  3. The user selects an item from the list
  4. The user adds the item to his shopping cart
  5. The user iterates steps 1-4 until he has finished shopping
Rule 7:
Only one interaction sequence per scenario

10. The user enters his data into the system
11. The user data is incorrect -> continue with step 41.
11. System displays “incorrect user data, please retry”

…
31. System displays “incorrect user data – transaction cancelled”
32. System returns credit card
41. System displays “user data correct”.

…

10. User enters data into the system
11. System displays “user data correct”
12. System asks the user for the amount of money to withdrawn

Alternative scenario:
If 10. is unsuccessful:
11a.1. System displays “incorrect user data, please retry”.
11a.2. System asks the user for entering his data.
11a.3. The user enters his user data into the system
Rule 8:
Describe scenario from the perspective of an outsider

1. The system receives the user name and password
2. The system encrypts the user data
3. The system logs on to the user server
4. The system transfers the user data to the user server
5. The user server decrypts the user data
6. The user server checks the user data by means of the user database
7. The user server transmits that the user data is correct
8. The system logs off from the user server
9. The system informs the user that the login was successful

1. The user logs on with his user data
2. The system checks the data
3. The system informs the user about the successful login
Rule 9: Explicit name of the actor involved

1. The user logs on to the system
2. The system reports that there is no connection to the network
3. The system restarts
4. The connection to the network is re-established
5. The user logs on to the system

1. The user logs on to the system
2. The system reports that there is no connection to the network
3. The user reboots the system
4. The system establishes the connection to the network
5. The user logs on to the system
Rule 10:
Explicitly state the goal of the scenario

1. An unauthorised user boots the system
2. The system displays status reports about the boot procedure
3. The system displays a successful boot on the screen
4. The system asks the user to enter his user name and password
5. The unauthorised user enters different, random chosen user names an passwords
6. After 5 unsuccessful login attempts, the system logs the login functionality for 30 min.

Goal: Protecting the system against the unauthorised access

The unauthorised user tries to log on to the system with a randomly chosen user name and password
After five unsuccessful login attempts, the system locks the login functionality for 30 min.
Rule 11:
Focus on illustrating how the goal is satisfied by the scenario
Message to Take Home

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