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# Requirements Analysis

Advanced Programming

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## Requirement analysis

- Understanding which **services** are required from the system and identifying the **constraints** on the system's operation and development

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## Requirements analysis

- 4 sub-activities of requirement analysis:
  - Feasibility study
  - Requirement specification: translate user requirements (goals) in specifications (solutions)
  - **Requirement elicitation and modelling**
  - Requirement validation (check for realism, consistency, and completeness)
- Not necessarily in this order ...

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## Elicitation and modelling

- Elicitation from the customer
  - Fact-finding, communication, and fact-validation
  - Output: **requirements' document**
    - Understood by **customers unambiguously**
- Modelling the above requirements document so that
  - Requirements are in a form understood **by software engineers unambiguously**

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## Requirement modelling

- Customer wish-lists
- Formal specifications
- Executable specifications and logic programming
- E-R (Entity-Relation) diagrams
- **Scenario-based techniques**
- Petri nets

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## Scenarios-Based R. Elicitation

- A scenario is:
  - "A narrative description of what people do and experience as they try to **make use** of computer systems and applications" (M. Carrol, Scenario-based Design, Wiley, 1995)
- Gathered by observing and interviewing **users**

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## Example of scenario

### A coffee machine

The user inserts a card into a slot. The machine memorizes the amount of credit. The machine displays the selection option. The user selects an item. That is selects coffee with milk and a given amount of sugar. The machine checks the item value against the credit. If the credit value is greater than the item value, then the machine starts the coffee procedure. The coffee is poured in a cup

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## Exercise

- Extract the scenario from

Date	Description	Check Number	Withdrawal	Deposit	Balance
1/1/2007	Starting Balance				\$213.79
1/1/2007	To SMSB		\$25.00		\$188.79
1/9/2007	Check	#1124	\$50.00		\$138.79
1/9/2007	Check	#1125	\$49.31		\$89.48
1/9/2007	Check	#1127	\$41.52		\$47.96
1/9/2007	Check	#1131	\$12.61		\$35.35
1/10/2007	Regular deposit	#Deposit		\$10.00	\$45.35
1/10/2007	Check	#1126	\$35.40		\$10.95
1/20/2007	Check	#1123	\$100.00		\$31.34

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## Requirement templates - Examples

- Use Case – A piece of functionality in the system that gives a user a result of value
  - Use of the system
- User Stories (we shall see them soon) in eXtreme Programming – same as Use Case in the agile context

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## Use Case example

Use Case Name	View transaction history
Short description	The user can select an interval of time or a type of transaction to view the list of transactions
Actors	Registered and logged-in user
Pre-conditions	The user must be registered and logged-in.
Main Flow (in steps)	<ol style="list-style-type: none"><li>1. The user insert the search criterion (interval of time or type of transaction)</li><li>2. A message of confirmation is presented to the user</li><li>3. The user confirms</li><li>4. The list of transactions is displayed</li></ol>
Alternate Flows	<p>2.a A message of error is presented to the user. The user is asked to cancel or try the search again</p> <p>2.b.1 The user cancels</p> <p>2.b.2 The user search again; go to 1.</p>
Author(s) Date Version	Barbara Russo, 2013.03.10, V1.1

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## User Story example

Title	ViewTransactionHistory
Priority	2
Story Points	1
Risk Level	1
Description	The user must be registered and logged in the service. The user can select an interval of time or a type of transaction to view the list of transactions. The user can cancel the search
Related User Stories	SelectTransaction;
Acceptance Test	ViewTransactionHistoryTest

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## Exercise

- Extract one requirement form the coffee machine scenario with User Stories templates

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## User Story Template

Title:		
Acceptance Test:	Priority:	Story Points:

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## Requirements Validation

- Usually after requirements analysis
- Ensuring the document clearly and accurately reflect actual requirements
- Validation checklists used as reminder of what to look

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## Exercise

- Check goodness of your requirements with the check list

Property	Yes/No
Understandable	
Non-prescriptive	
Correct and complete	
Concise	
Consistent language	
Consistent	
Unambiguous & testable	
Traceable	
Ranked for importance and stability	
Feasible	

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## RE & the three beasts

- Uncertainty
  - Difficult to formulate and document accurately and completely the desired system; volatility
- Irreversibility
  - Poor requirements are usually deeply embedded in the system; a lot of rework due to cascading effect
- Complexity
  - Having to deal with different stakeholders with different perspectives
- The beasts can be tamed by good requirement engineering practices

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## Next Lesson

- Agile Requirements Elicitation

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