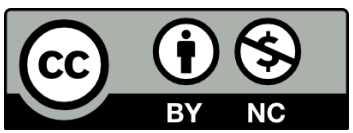
5 REQUIREMENTS ELICITATION

course “software requirements and architecture”

Oct 2021



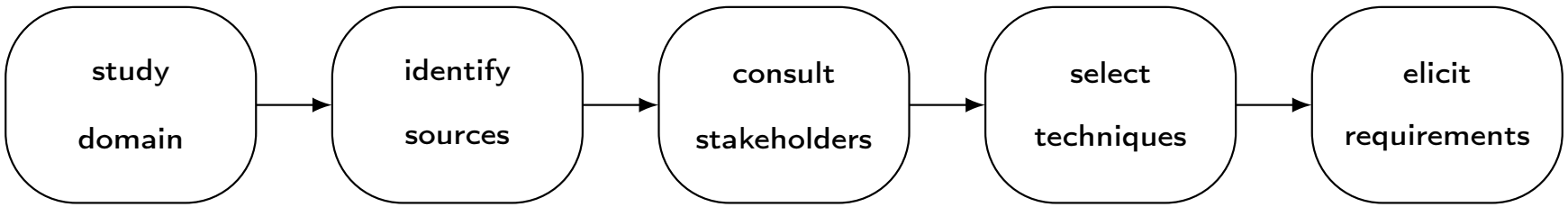
contents

contents

scope

- Requirements elicitation permits to understand what are the requirements of a given system.
- alternative designations: requirements discovery, capture, recollection, acquisition, extraction or crawling
- It allows comprehending the necessities and expectations that stakeholders have with respect to a given system.
- The activities have a communicational nature, which involves techniques related with the social sciences and organisational theory.

process



- The activities related to requirements should not be exclusive of the initial phases of the lifecycle.
- The development team must adopt an approach that addresses and favours handling the requirements in all the lifecycle.

types of activities

- Requirements engineers engage primarily in two types of activities:
  1. contact persons that know well the problem to identify all the restrictions that could limit the respective solution.
  2. prepare the requirements document that describe the behaviour and the characteristics that are expected for the system.
- The former is characterised by uncertainty and an increase of information and knowledge.
- The latter is characterised by the organisation of the ideas, the resolution of conflicting views, and the elimination of inconsistencies and ambiguities.

contents

stakeholder

- Stakeholders are one of the most important sources of information for the elicitation process.
- A system stakeholder is someone that can be materially affected by the implementation of that system.

stakeholder of a system: some person that has some type of legitimate interest in that system.

- The term person must be seen in a broad sense, including groups of persons and organisations.
- The notion of interest is also ample and can result from utilising, being affected by, or having some kind of responsibility in relation to a given system.

roles

- The number of stakeholders of a system is usually high (≥ 6).
- The identification of the various stakeholders can be performed through the characterisation of the roles or positions that exist in the organisation.
- Some persons can accumulate several roles, which requires one to distinguish the persons from the roles they have.
- Example: the director of a company that is also responsible for financial accounting.

ways for identifying

1. to ask the client;
2. to examine the organisation chart;
3. to compare with similar products;
4. to analyse the system context;
5. to consult the stakeholders that are commonly found in the majority of the systems.

system of lifts in a hotel

user

- The users must be clearly identified, since it is for them that the system is going to be developed.

user: any person that operates and interacts directly with the system, whenever it is in effective operation in its environment.

- The users are the persons that are in front of the computer screen to introduce data or observe the results.
- The driver and passengers of a car are users, despite their distinct responsibilities.
- One should give preference to the users that more frequently interact with the system.

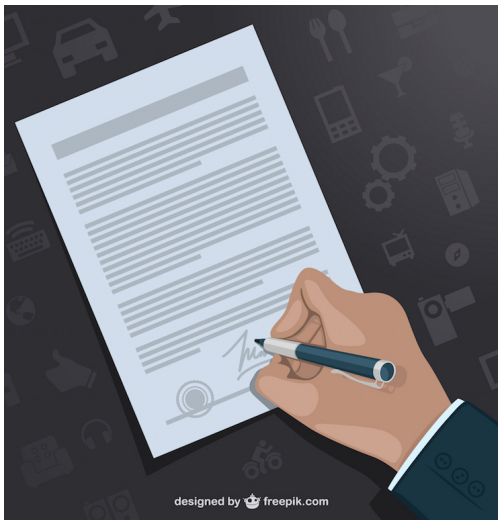
Images courtesy of graur razvan ionut and imagerymajestic at FreeDigitalPhotos.net

particularities of the users

It is recommended to collect informations to understand if there is any particularity to be recorded for some of the following groups of persons, while they interact with the system:

- disabled and handicapped persons;
- people with low literacy levels;
- those that do not dominate the languages used by the system;
- people with visual difficulties (users of glasses, colour-blind, or blind people);
- persons transporting or handling substances and objects;
- persons with reduced dexterity to interact with computer-based systems.

client



- The client is the entity that orders and pays for the development of a system.
- Normally, the order is made after negotiating the price with the producer.
- This relation is often formalised through a contract.
- The client should be provided with complete technical documentation, to permit the installation and maintenance of the system throughout its lifecycle.
- The client has the power to decide about several issues, namely the scope, functionalities, and cost.
- The clients are not always the users of the system.

Picture designed by Freepik.com

customer

- A customer is someone who pays for acquiring a system, whenever available.
- The customers are the ultimate consumers, for whom the system is rendered.
- In many cases, the names of the customers are known before the development starts.
- For a mass-market product, the customers are the persons that will acquire that product when available.
- The act of buying does not need to be associated with a financial transaction between the customer and the seller.

Images courtesy of stockimages at FreeDigitalPhotos.net

customer

"It is not the employer who pays the wages, but the customer."
Henry Ford (1863–1947), founder of the Ford Motor Company

"Listen to your customers, not to the HiPPO."
Ron Kohavi, engineer at Microsoft

HiPPO = Highest Paid Person's Opinion

market segment

- The characterisation of the necessities and common behaviours of the customers to which is oriented a given product defines its market segment.
- A group of customers represents a distinct market segment if:
  1. their necessities demand and justify a different offer;
  2. they are approached through different distribution channels;
  3. they need different types of relations;
  4. they have significantly distinct levels of profitability;
  5. they are willing to pay for different aspects of the offer.

Images courtesy of sheelamohan at FreeDigitalPhotos.net

negative stakeholder

- A negative stakeholder is someone that desires that the system is not developed.
- The attitude can vary from a peaceful opposition to an active hostility.
- The identification of the negative stakeholders allows to identify any attempt to sabotage the system development.
- Their presence in the requirements elicitation activities is relevant, to identify and comprehend the personal and political relations within an organisation.

Image courtesy of Ambro at FreeDigitalPhotos.net

contents

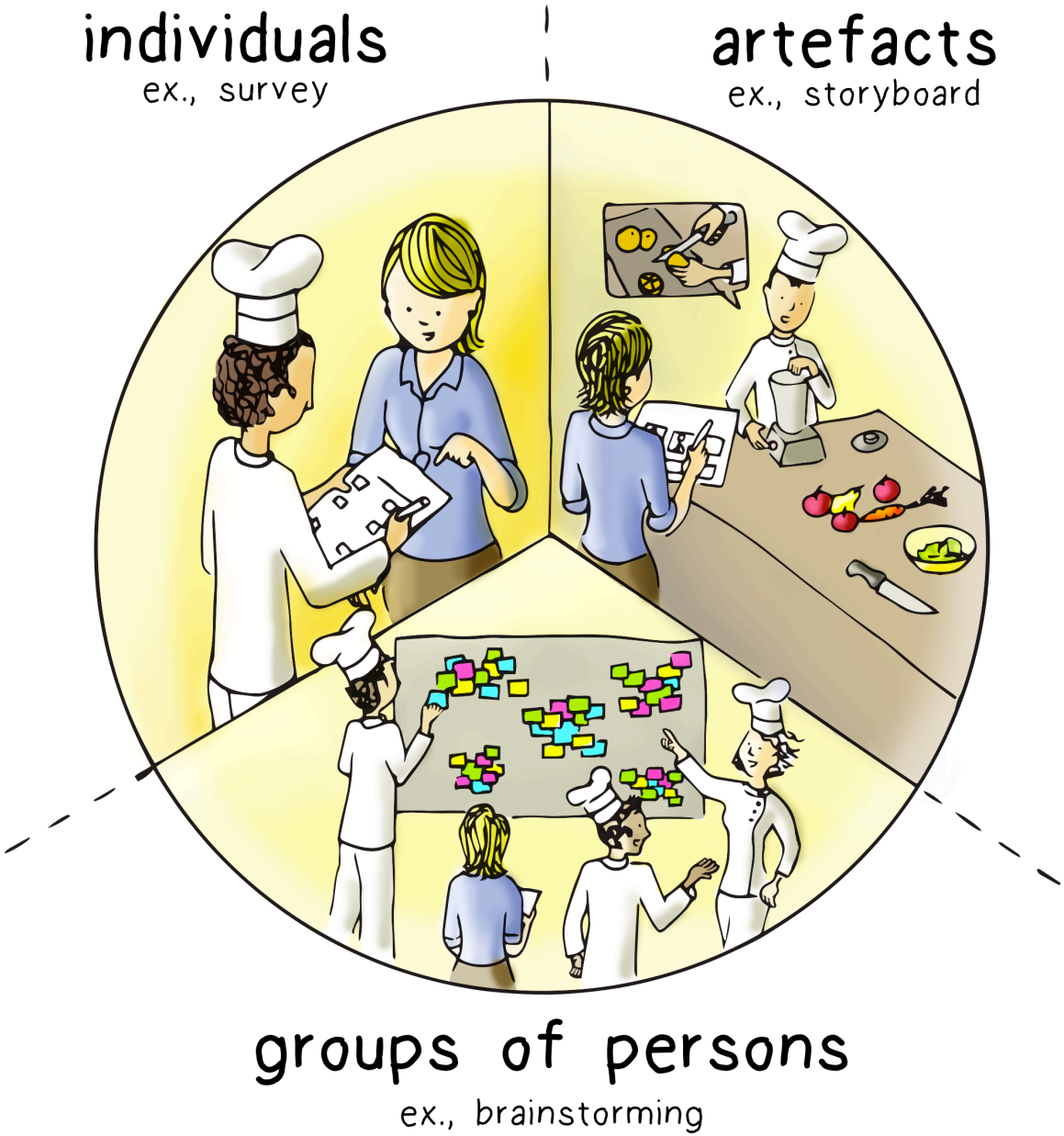
competencies

- The range of techniques for requirements elicitation that a requirements engineer should dominate is enormous.
- Generic competencies of the requirements engineer:
  - **questioning**: to ask questions about the requirements to the right persons;
  - **observing**: to witness the behaviour of the users of an existing product, system or process, to infer their necessities;
  - **discussing**: to argue with the users their necessities, with the aim of formulating an understanding about the requirements;
  - **negotiating**: to ease the negotiation among the users, to achieve agreed solutions about the requirements to be included, removed, or modified;
  - **supposing**: to anticipate functionalities that the users may need or desire, especially when new mass-market products are bring created.

groups of techniques

- **marketing**, where there is a special interest in requirements that contribute to the commercial success of the system;
- **psychology and sociology**, emphasising the satisfaction of the necessities of the users, the individuals and social agents;
- **participative design**, where there is an active involvement of the users in the definition of the requirements;
- **human factors and human-machine interaction**, whose focus is the interaction of the users with the system;
- **quality**, in which the principal interest consists in the relation between the requirements and the system quality;
- **formal methods** focused on the precision and mathematical rigour of the requirements specification.

groups of techniques

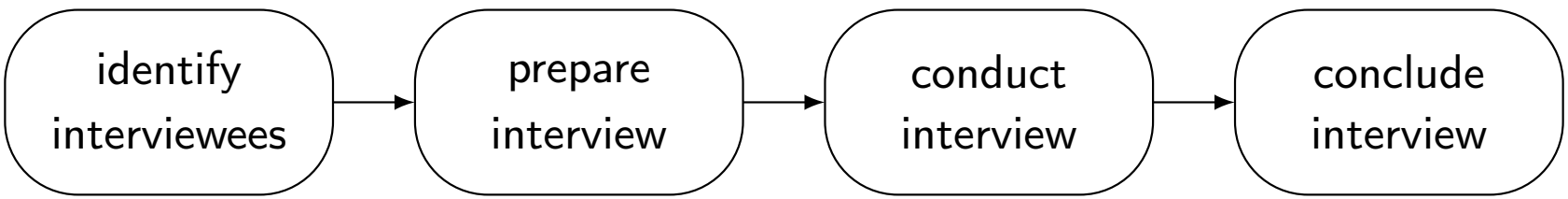


techniques to be presented

individuals	groups	artefacts
interview		**domain analysis**
survey	**group dynamics**	object-orientation
introspection	cooperative work	**prototyping**
ethnography		scenario
		goal modelling
		persona

interview

- Interviews have no exact rules or formulas.
- The interviewer has great freedom in the conducting the interview.
- Often, it results in low-quality results.
- Interviews should be carried out in a structured way, since conversations completely open seldom produce good results.



interview

- The identification of the persons to be interviewed includes naturally some of the stakeholders.
- As a bottom line, one must interview the client and some users of the system.
- For a product, since one cannot interview all users, a sample that is representative of that community must be selected.
- The identification of the interviewees does not need to be closed before starting the interviews.
- It is acceptable that one adds other persons that should be interviewed, during the first interviews:
  1. "who shall I also interview?"
  2. "who else may use the system?"

interview

- Conducting an interview should follow some recommendations.
- The interviewer should put the interview in its context, explaining the aims, duration, issues to be addressed and how the collected information will be processed.

- Whenever available, the use case diagrams can be used as a reference for the interview.
- Models or figures can be used to encourage the interviewee to propose modifications.
- The terminology of the problem should be used, avoiding if possible the use of the solution domain jargon.

Image courtesy of Ambro at FreeDigitalPhotos.net

survey

- The use of surveys is common to elicit requirements, especially in the initial steps of the process.
- A survey is a technique that uses a questionnaire to handle the information gathered from multiple respondents.

survey

- A questionnaire (a set of questions) serves for collecting information.
- When the same questionnaire is used for all the persons, it becomes possible to handle statistically the collected answers.
- The success of the surveys is highly dependent on the way the questionnaire is conceived.
- Constructing a questionnaire that is a powerful and relevant source of information is not easy.
- If the questions are not focused, are poorly formulated or appear in the wrong order, the answers may be misleading.

Image courtesy of Jeroen van Oostrom at FreeDigitalPhotos.net

survey

- One should avoid the use of negative questions, since it is always difficult to know how to answer.
- Example: "don't you like chocolate?"
- It is also common to have questionnaires that are not totally answered and with answers poorly elaborated.
- The problem for unanswered questions can be tackled through the use of computer-based tools.
- This solution may not be desirable, since it forces the respondent to have access to a computer.
- The survey must be used as a preliminary technique that aids in the preparation of the interviews.

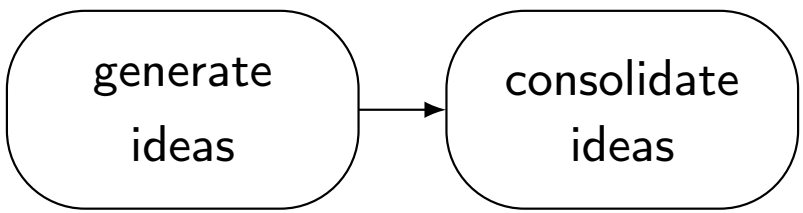
Image courtesy of Stuart Miles at FreeDigitalPhotos.net

introspection

- Introspection is the most basic, obvious, and rudimentary of all requirements elicitation techniques.
- The analyst defines the requirements for a given system based on what she thinks are the necessities of the stakeholders.
- The engineer must put herself in the role of the client or the users.
- She must reason based on premises of the type "if I were the client, I would like the product to ...".
- It is extensively used, namely when the requirements engineers have a deep knowledge about the problem domain.
- This technique can be used only as a starting point for the adoption of other requirements elicitation techniques.

brainstorming

- *Brainstorming* eases the generation of ideas.
- A brainstorming session congregates a group of 5 to 12 persons.
- The group suggests and explores as many ideas as possible, without criticising or judging those ideas.

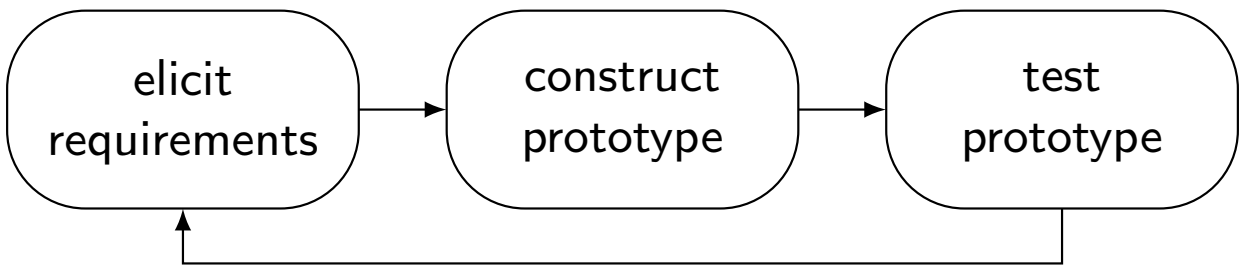


domain analysis

- Analysing documentation and studying existing systems is a good source of requirements.
- It presupposes analysing the upstream and downstream systems, as well as examining systems with similar purposes.
- This technique is important to obtain a larger knowledge about the problem domain.
- The objective is examining the domain in which the system is located, to identify the common elements of all systems in that domain.
- Analysing documents is a technique based on searching requirements in documents, reports, and manuals.
- The use of this technique will be possible in the future, if the artefacts for the current projects are stored.

prototyping

- Sometimes, the client just defines some generic objectives for the system, not indicating with detail its functioning.
- A prototype-based approach can be the most adequate choice to support the requirements elicitation process.
- This approach assumes an iterative process.



- The prototype serves simply as a mechanism for capturing the requirements.
- As soon as one considers that the requirements of the client are clearly understood, the prototype is abandoned.

personas

- The persona technique is common in the advertising area and recently has gained popularity for requirements engineering.
- A persona is a fictitious person that represents an important type of the users of the product under development.
- A persona is an archetype of the persons that are part of the target audience.
- A persona should be conceived to represent those persons, in what is essential and distinctive.
- The personas are a technique of market segmentation.

a persona

Susan Taylor, the always-connected bank clerk

Age: 28 years old
Civil state: single
Academic qualifications: Graduated in economics from University of Exeter
Profession: bank clerk
Salary: EUR 1.500/month
Residence: 1-room house, located in Slough (32 km west of central London)

Life style: Susan likes to go out in the evening with her friends, especially during the weekends. She loves going to the cinema and shopping. In particular, she cannot resist buying new shoes, having more than one hundred pairs in the wardrobe. Some pairs were only used once or twice. She would like to move to a more chic area with more educated neighbours than those that now she puts up with. She is professionally punctual, but rarely arrives on time in her personal meetings, since she takes a lot time to ready. She is looking for a boyfriend for a serious relationship, since she wishes to be a mother before 32 years old.
Context of using the product: Susan cannot live without her smartphone and she is constantly reading and writing email messages and consulting the pages of her friends in the social networks. She uses applications for the smartphone that allows her to be aware of the most recent songs in market. She likes to hear the current *hits* and knowing which concerts will be organised in the coming weeks. She already attended with her girl friends some summer festivals and she would like to repeat the experience.
Objetives:

1. be informed about concerts that include artists that she appreciates;
2. be able to forward those informations to her friends through the social networks;
3. to receive suggestions about recent songs that can please her, based on her tastes.

Image courtesy of stockimages at FreeDigitalPhotos.net

personas


identify problem
create personas
introduce personas
use personas
evaluate personas

Summary

- Requirements elicitation involves various activities that allow to identify which are the requirements for a given system.
- The requirements engineering techniques cover essentially the analysis phase.
- Requirements engineers dedicate their efforts to contact the persons that know well the problem:
  1. to identify all the restrictions that can limit the solution,
  2. to decide how to organise the requirements document.
- The identification of the stakeholders is an important task.
- A system stakeholder is a person that has some sort of legitimate interest in that system.
- The analyst must dominate a large set of technique and to be able to select and apply those that best adapt to each project.

bibliography

- Fernandes JM and Machado RJ; *Requirements in engineering projects*, Springer, Lecture Notes in Management and Industrial Engineering series, ISBN 978-3-319-18596-5, 2016. [chapter 5]

  `http://www.springer.com/978-3-319-18596-5`