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L2 – Elicitation

DAT232/DIT285 Advanced Requirements Engineering

Eric Knauss
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CHALMERS UNIVERSITY OF TECHNOLOGY | UNIVERSITY OF GOTHENBURG

2025-Sep-4

*Slides partly borrowed from other Professors, incl. Richard Berntsson Svensson, Soren Lauesen, Didar Zowghi

Image source: https://pixabay.com/en/lake-fish-swimmer-pose-water-905605/

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Visit **gosocrative.com** and enter room name REQENG

Lecture starts at 13:15

You are welcome to share a short break with us and discuss/ask questions

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Course representatives

Organizational

- A course representative collects experiences and improvement suggestions during the course and gives this feedback to the teachers
- All participants are encouraged to talk to the teachers about how the course works!
- Three meetings
  - One next week
  - One around halftime
  - One, when the Course evaluation is ready: the course representatives meet with the teaching team and program manager to discuss the course evaluation.

Consider to volunteer by messaging Eric.

We need 5 representatives, widely covering universities and programs. Remaining seats will be randomly assigned during next week.

Feedback from Socrative (1/2)

5. Please share one thing that you liked and one thing that you wished for.

Hide Answers | Show Names | 6/127 Students Answered

- I Liked the way lecturer explained everything very clerly.
- f
- More discussion since we will be mainly doing group work
- The lecture was very well structured and the interaction with us students during the lecture worked really well (in that it was a positive for the lecture), which is a rarity in Sweden. I don't really have a wish, the Thursday lecture is labeled as a workshop on timeedit.
- nice to have survey that will put us in groups without hassle of going around and asking, just hoping that its fair and everyone is competent. also would be nice to know more about project we are to make exactly in details and scope
- na

Feedback from Socrative (2/2)

6. In this course, I would like to learn more about...

Hide Answers | Show Names | 6/127 Students Answered

- I want to learn more about requirements and agile model and how to use them in real projects
- x
- Common problems and ways to "combat them". Also how to avoid a scenario where the requirements engineering gets too bogged down/overshadows and encumbers the project.
- Group work have more discussion time
- requirements engineering in real worlds scenarios not just academic
- elicitation

Role of supervisor

Organizational

No simple solution. The project missions you created are open-ended with a significant challenge in eliciting requirements with no obvious "correct" answer that you can get from your supervisor.

Coaching role. The project supervisor is a process guide and coach and you cannot expect that the supervisor can tell you what is "right" or "wrong" in the particular domain; you are supposed to become the domain experts of your project.

Study first. The project supervisors will assume that you have studied the techniques you use in literature, from lectures and exercises. It is not efficient at supervision meetings to engage in elaborate explanations of techniques.

Quality focus. The project supervisor has a main focus on discussing with you the quality of your results and your decisions in the way forward.

Make an effort. The more worked through your documents are, the better feedback you can get, and the better results you can achieve.

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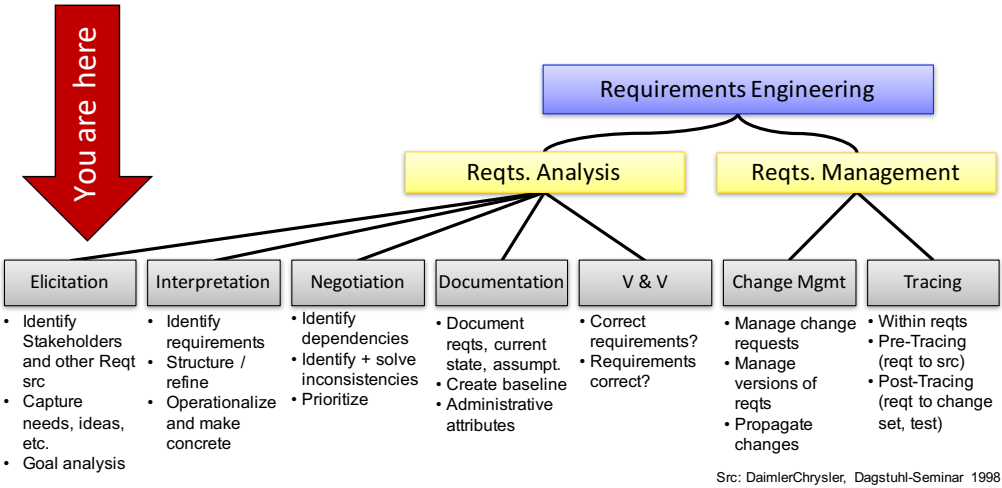
Topic of the day

Organizational



Src: DaimlerChrysler, Dagstuhl-Seminar 1998

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Learning Objectives

Knowledge	Skills	Judgement
K1 Identify a common RE challenge in a given software development context.	S1 Plan suitable RE practices in a team with respect to a given software development context.	J1 Assess new requirements engineering knowledge (challenge, principle, practice) and relate them to the framework in this course.
K2 Choose an appropriate RE practice in a given software development context.	S2 Effectively apply a suitable RE practice in a team in a given software development context.	J2 Suggest suitable actions to overcome a lack of requirements knowledge in a software development context.
K3 Compare suitability as well as advantages and disadvantages of given RE practices in a given software development context.	S3 Analyze the effect and quality of the outcome of a set of or individual RE practices in a given software development context.	J3 Consider inter-team, program level and social/ethical implications of a set of RE practices in a given software development context.
K4 Explain the current state of practice and research in requirements engineering.		J4 Critically assess the effectivity of a set of RE practices from the perspective of the student's master program (e.g. Software Engineering & Technology/Management, Interaction Design, Game Design, Data Science, ...)

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Learning Objectives

Knowledge  Skills  Judgement 

Interpretation for Elicitation:

K1,K2,K3	Explain common challenges of elicitation, describe practices of elicitation and in which context they are useful (e.g. early, mid, late)
K4	Be aware of current research challenges in elicitation
S1-S3	Apply this knowledge to your project
J1-J3	Look out for opportunities to get beyond course literature
J4	Reflect on how your background changes your view on elicitation (typical stakeholders, practices, challenges)

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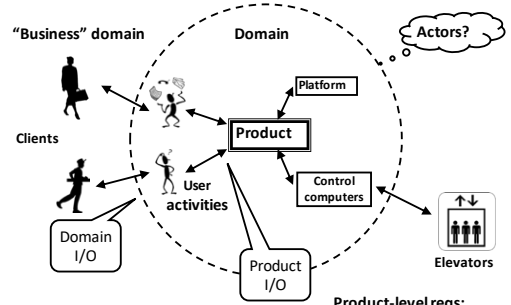
Scopes

Requirements and their sources

- Business case (or: goal-level) requirements
- User (or: domain-level) requirements
- System (or: product-level) requirements
- Design-level requirements

Fig 1.5A Domain and product level



From: Soren Lauesen: Software Requirements
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[Lauesen, 2002]

Scopes

Requirements and their sources

- Business case (or: goal-level) requirements
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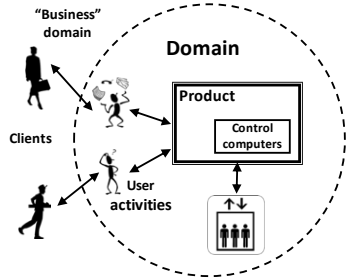
- Design-level requirements

Fig 1.5B Redefined limits



From: Soren Lauesen: Software Requirements
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[Lauesen, 2002]

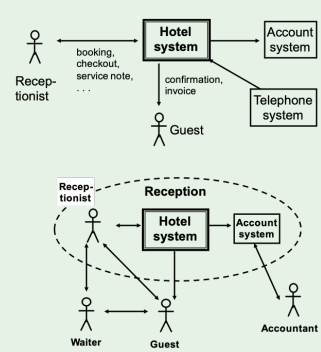
Note:
– The word "Domain" used for many different things
– Scoping decisions have big impact

Scopes

What is Requirements Engineering?

- Business case (or: goal-level) requirements
- User (or: domain-level) requirements
- System (or: product-level) requirements
- Design-level requirements

Example



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Scopes

Task: Classify requirements with respect to scope
→ socrative.com, Room REQENG, Q1-4

Example

Req1. Product shall have recording and retrieval functions for experience data

Req2. System shall have screen pictures as shown in app. xx

Req3. Our pre-calculations shall hit within 5

Req4. Product shall support cost recording and quotation with experience data

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Classification

- Product-level

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- Design-level

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Classification

- Product-level
- Design-level
- Goal-level

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- Design-level
- Goal-level
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Classification

- Product-level
- Design-level
- Goal-level
- Domain-level

- Which requirement to choose?
- As a supplier?
- As a customer, if supplier is vendor?
- As a customer, if supplier is a software house?

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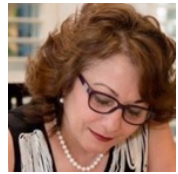
What is Requirements Elicitation?

- The process of seeking, uncovering, acquiring, and elaborating requirements for software systems.
- A complex process involving many activities with a variety of available techniques, approaches, and tools for performing them. The relative strengths and weaknesses of these determine when each is appropriate depending on the context and situation.
- A multifaceted, communication rich and iterative activity that relies heavily on the communication skills of requirements engineers and the commitment and cooperation of stakeholders.
- It is generally accepted that requirements are elicited NOT just captured or collected.



Thanks to Didar Zowghi!

Activities

What is Requirements Elicitation?

- Exploring and Understanding the domain/context
- Identifying and Characterising the stakeholders
- Selecting Elicitation Methods, Tools and Techniques
- Applying the Selected Method, Tool and Technique to Elicit the Requirements
- Organise, Review and Revise the Elicited Requirements (maybe)

Thanks to Didar Zowghi!

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You have to get out there!

What is Requirements Elicitation?

"You cannot sit in your office and produce requirements based on intuition and logic. You have to discover the non-trivial requirements from users and other stakeholders." [Lauesen, 2002, page 42]

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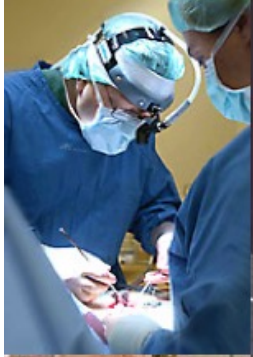

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Deep domain knowledge

...is critical to successful requirements engineering!!

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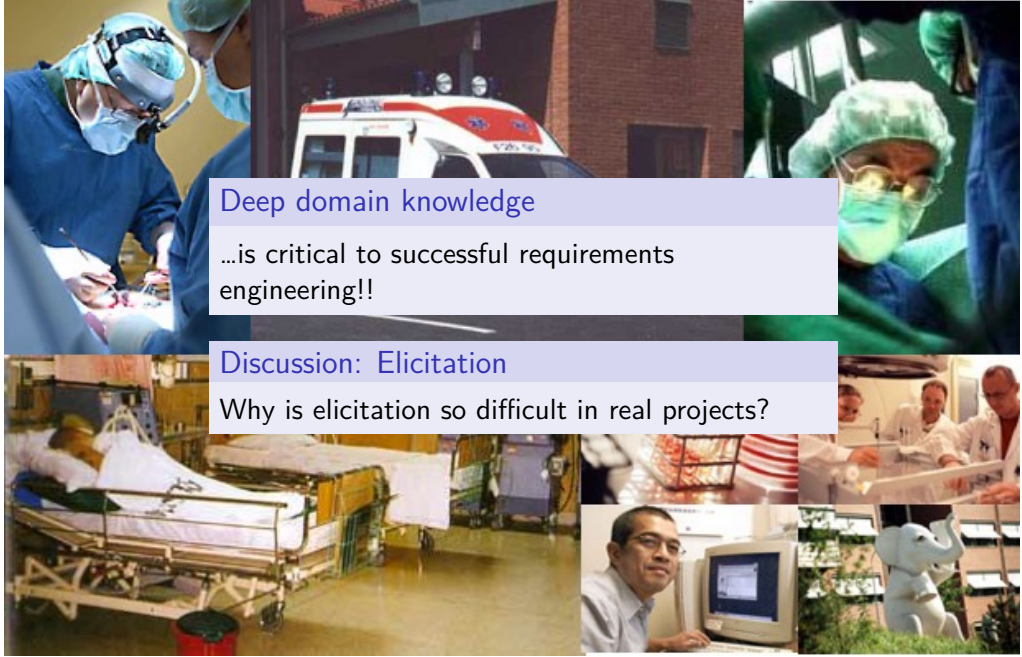

Deep domain knowledge

...is critical to successful requirements engineering!!

Discussion: Elicitation

Why is elicitation so difficult in real projects?

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Gulfs of understanding

Why is Elicitation difficult?

- Stakeholders from different domains
- Have never met
- Have different “language”

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Symmetry of Ignorance

Why is Elicitation difficult?

- Customer may know their problem or need, but do not know existing technology
- Supplier knows existing technology, but does not understand problem
- Neither of them can map potential solutions to problem
- Even together, it is not easy, since no common language exists

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Tacit knowledge

Why is Elicitation difficult?

- Tacit knowledge (as opposed to formal, codified or explicit knowledge) is the kind of knowledge that is difficult to transfer to another person by means of writing it down or verbalizing it. [1]

Example

For example, that London is in the United Kingdom is a piece of explicit knowledge that can be written down, transmitted, and understood by a recipient. However, the ability to speak a language, ride a bicycle, knead dough, play a musical instrument, or design and use complex equipment requires all sorts of knowledge that is not always known explicitly, even by expert practitioners, and which is difficult or impossible to explicitly transfer to other people.

[1] Source: https://en.wikipedia.org/wiki/Tacit_knowledge

Other knowledge problems

Why is Elicitation difficult?

- Situatedness (= The dependence of *meaning* (and/or *identity*) on the specifics of particular sociohistorical, geographical, and cultural concepts[2]
- Requirements relate to social world of stakeholders
- *Known* and *unknown* (un)knowns [Sutcliffe and Sawyer, 2013]

known knowns	unknown knowns
known unknowns	unknown unknowns

→ socrative.com, Room: REQENG, Question 5

[2] Source: https://www.oxfordreference.com/view/10.1093/acref/9780199568758.001.0001/acref-9780199568758-e-2501

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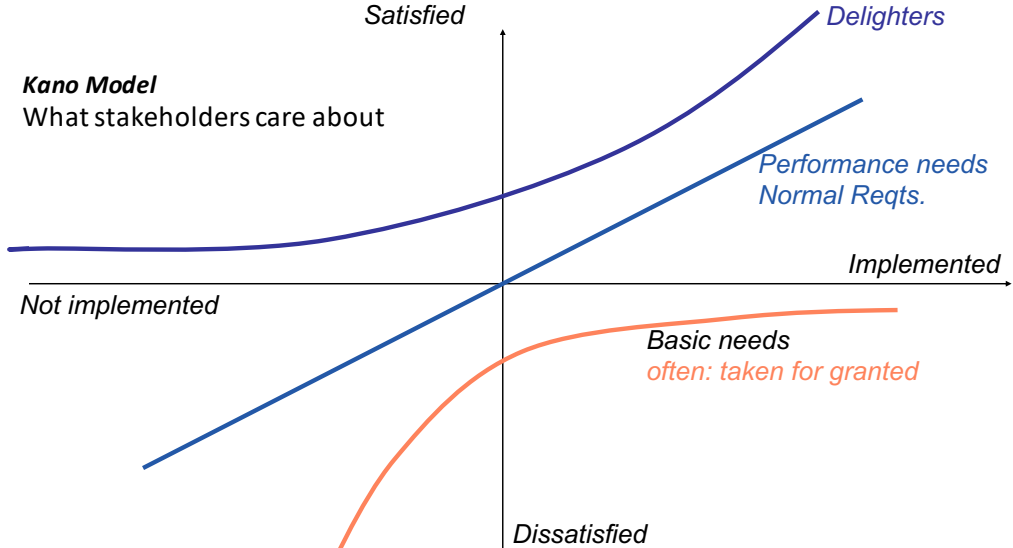
Kano model

Why is Elicitation difficult?

Kano Model

What stakeholders care about



Domain expertise

Why is Elicitation difficult?

		Customer	
		Knowledgeable of domain/problem	*Ignorant of domain/problem*
Supplier	*Knowledgeable of domain/problem*	Focus on reducing cost	Focus on consulting
	Ignorant of domain/problem	Focus on specification	Focus on learning

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General rules

How to do Elicitation

- Genuinely care about your stakeholders' problems
- Focus on stakeholder not on you "looking good"
- Be human – admit weaknesses, become vulnerable, show humor
- Listen – eye contact, don't glaze over
- Expect changes
- Maintain a glossary – many req problems from simple misunderstandings/ miscommunication

"We have two ears and one mouth so that we can listen twice as much as we speak."
–Epictetus

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Stakeholder map

How to do Elicitation

Stakeholder

- A person or role (also: group)
- Affected by system under construction
- Should have influence on requirements

Stakeholder map

Systematic overview of stakeholders with important information, such as:

- Name (correct and customer terminology!)
- Relationship to system
- Representative and contact (name, phone, email)
- Often useful (but sensitive): power and sentiment

- Look for persons that will have advantages or disadvantages from the system or its development
- Look also for those that may only think that they have advantages or disadvantages

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Stakeholder map

How to do Elicitation

"If you want to drain a swamp, you don't ask the frogs for an objective assessment of the situation." –Wolfgang Schäuble

Example

Name	Relationship	Representative	Power/sentiment
Farmers	Potential customers	Eider Duck <eider.duck@disney.com>	Mid, will pay for land
Frogs	Swamp occupants	Kermit <kermit@the-frog.org>	Low(?), grumpy

→ socrative.com, Room: REQENG, Question 6

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Stakeholder analysis

How to do Elicitation

Typical in an in-house project [Sharp et al., 1999]:

- Sponsors want value for their money
- Users at different departments
- Managers at different departments
- Authorities, security managers, accountants etc.
- System management and support,
- Other indirect stakeholders that may provide valuable input.

Other example in product development:

- Distribution channels and retailers
- Solution providers building on your product
- Competitors

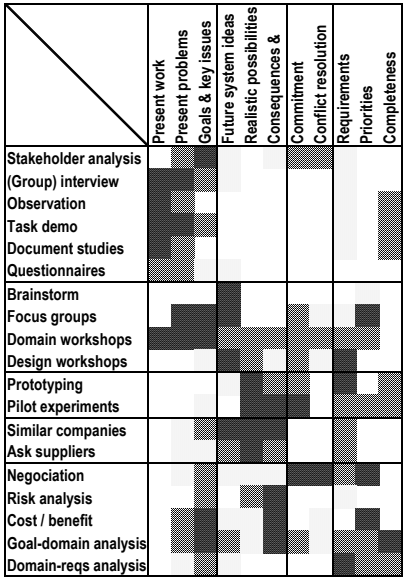
Overview of Elicitation methods

Explicit	*Reflective / introspective*	*Creativity / group consensus*
– Interviews	– Think-aloud	– Brainstorming
– Questionnaires	– Protocol analysis	– Focus groups
– Doc. analysis	– Laddering	– Reqts. workshops
– Archeology	– Card sorting	– JAD / RAD

Implicit / contextual	*Prototyping / refining*	*Model-driven*
– Ethnography	– Prototypes	– i*
– Observation	– Mashups	– Kaos
– Apprenticing	– Drawings	– Use cases
– Conversation analysis	– Diagramming	– CREWS

→ socrative.com, Room: REQENG, Question 7

Fig 8.2 Elicitation techniques



Studies with stakeholders or documents in different ways

Group-based

Execution of the system

Intelligence

Balance risks and analysis

From: Soren Lauesen:
Software Requirements
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Elicitation techniques – early

Technique	*Pro*	*Con*
Interviews	Know the present & future ideas, Uncover conflicts/politics	Goals & critical issues, Subjective
Group interviews/sessions	Stimulate & complement each other, many & diverse stakeholders	Censorship & domination, Group thinking
Observation	Actual current behavior, processes	Time consuming, misses exceptional/usability problems

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Elicitation techniques – mid

Technique	*Pro*	*Con*
Task demo	Clarify how work done	Presence & Qs influence, Critical issues seldom captured
Questionnaires	Info from many (statistics, views, opinions)	Hard to construct, Interpretation
Brainstorming	Many ideas (none rejected)	Many ideas (prioritization needed), Involvement

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Elicitation techniques – late

Technique	*Pro*	*Con*
Use cases / Scenarios	Concentration on specifics → accuracy	Solution-oriented, Premature design
Modeling, Data-flow Diagrams, ...	Communication, Organize info, Uncover missing/inconsistencies	Require tools, Time consuming, 'Cults'
Prototyping	Visualization, Stimulate ideas, Usability centered	Solution-oriented, Premature design, 'Already done?'

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Interviews

How to do Elicitation

- One or more stakeholders are interviewed by a requirements engineer (aka analyst)
- Probably the most common elicitation method.
- But: Interview $\neq$ interview:
  - Individual or group interviews?
  - Structured: prepared questions and perhaps also response alternatives
  - Semi-structured: some Q prepared, but freedom in order and depth
  - Unstructured: no preconceived closed questions; open questions to start off: "What is your view on the system?"

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Interviews

How to do Elicitation

- Be prepared!

Be prepared!

What do we need to know?

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Interviews

How to do Elicitation

- Be prepared!
- Time of interviewee is very precious!

Precious time of interviewee

- Why do we need to interview this person?
- How will this person benefit from us interviewing them?

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Interviews

How to do Elicitation

- Be prepared!
- Time of interviewee is very precious!
- Interview is official activity

Official activity

- Introduce yourself
- Introduce interviewee
- Describe goal of interview
- Aim for open problem description
- Follow up on new information! Do not hesitate to ask!

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Interviews

How to do Elicitation

- Be prepared!
- Time of interviewee is very precious!
- Interview is official activity
- Be flexible

Be flexible

Many things are mentioned before you even ask? Skip the question then.

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Interviews

How to do Elicitation

- Be prepared!
- Time of interviewee is very precious!
- Interview is official activity
- Be flexible
- Take notes!

Take notes!

- Different roles: one person asks questions, one takes notes
- Allow the interviewee to sketch things, use models and figures
- You can record, but ask for permission (and record answer!)
- But: Introduces bias, not clear what will be done with recording...

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Interviews

How to do Elicitation

Closed questions

Do only allow for a small set of specific answers (e.g. yes/no)
Use if a clear decision is needed

Open questions

Do not lead interviewee, give control to interviewee

Plan ahead!

- Start with open questions
- Paraphrase (2-steps-1-back: did I understand you correctly? Are you implying that??)
- At important points: close questions, decide
- At the end: discuss next steps, announce sharing of protocol (And deliver it in good time!)

Ask "Why"

How to do Elicitation

Example

Neural Diagnostics System shall have mini keyboard with start/stop button, ...
Why?
Possible to operate it with "left hand".
Why?
Both hands must be at the patient.
Why?
Electrodes, bandages, painful ...

(Example taken from [Lauesen, 2002, Fig1.6B])

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Example

Measuring neural response is a bit painful to the patient. Electrodes must be kept in place ...So both hands should be at the patient during a measurement. — Domain / why?

R1: It shall be possible to perform the commands start, stop, ...with both hands at the patient.

Might be done with mini keyboard (wrist keys), foot pedal, voice recognition, etc. — Example / how?

(Example taken from [Lauesen, 2002, Fig1.6C])

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Strategies for Elicitation

Strategy	*Description*
Scenario Building	Asking a user to imagine or construct a scenario in his/her domain, and respond as he/she would in that situation
Conditionalizing	Use 'if-then' to limit or clarify applicability of an assertion
Elaborating with examples	Asking a user to illustrate a point by providing examples
Hedging	Asking a user to design contingency plans or fallback positions

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Strategies for Elicitation

Strategy	*Example*
Scenario Building	"Describe the most unusual customer you have ever had. How did you respond in that situation?"
Conditionalizing	"If the project is finished as planned, then what does that mean for the customer?"
Elaborating with examples	"Can you provide some examples of what you mean?"
Hedging	"What would you do if this action would not give the desired result?"

Strategies for Elicitation

Strategy	*Description*
Generating Counterargument	Asking a stakeholder to argue against the conclusion he/she first reached
Generating Arguments	Asking for more or different arguments favoring a position
Feedback	Asking for or giving feedback, either verbally or in writing / on notes
Summarization	Asking for or giving a summary

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Strategies for Elicitation

Strategy	*Description*
Generating Counterargument	"Why might the system not work as well as you say it will?"
Generating Arguments	"Can you think of an analogy that would help clarify what you are saying?"
Feedback	"Let me recap what I have noted down from our conversation and you can see if you agree?"
Summarization	"Can you summarize what you have said so far?"

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Common interview mistakes

The following slides are based on [Donati et al., 2017]. Two of the authors have kindly provided me with slides and advice.


Thanks to Alessio Ferrari and Paola Spoletini

The same group has continued to create and evaluate training material [Ferrari et al., 2019], the excellent material can be found here: `https://doi.org/10.5281/zenodo.2625706`

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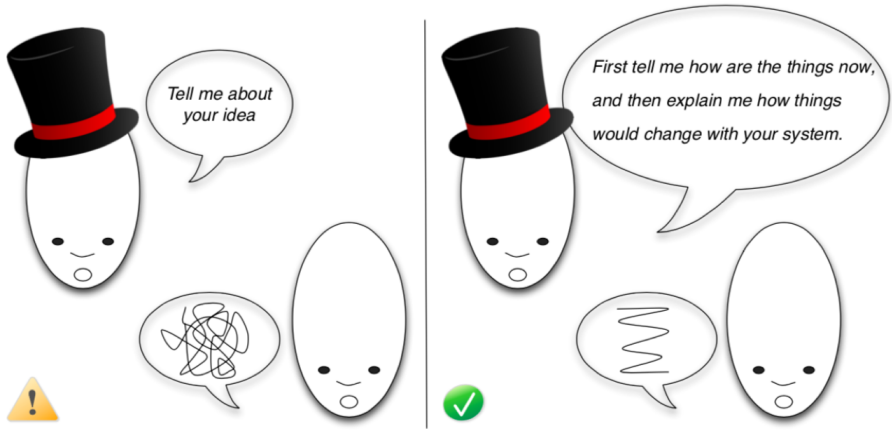
1 - Wrong Opening



[Donati et al., 2017]

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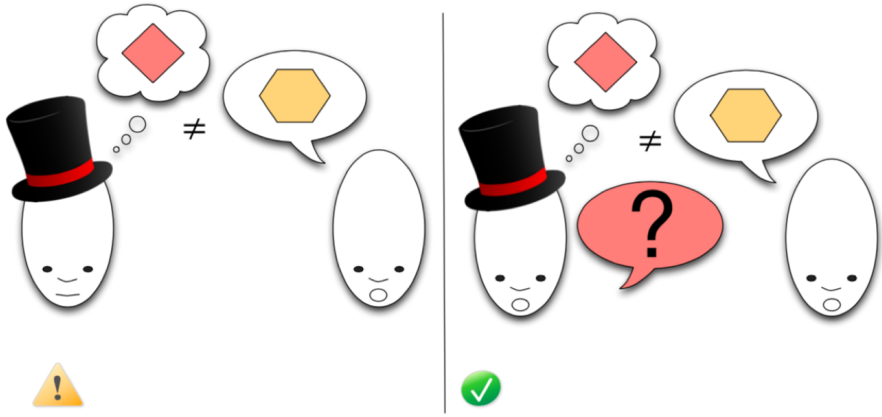
2 - Ambiguity Not Leveraged



[Donati et al., 2017]

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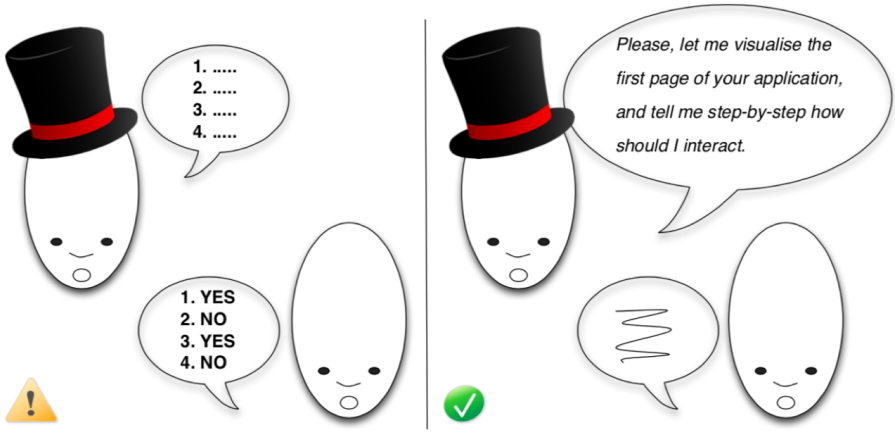
3 - Interrogatory-like Interviews



[Donati et al., 2017]

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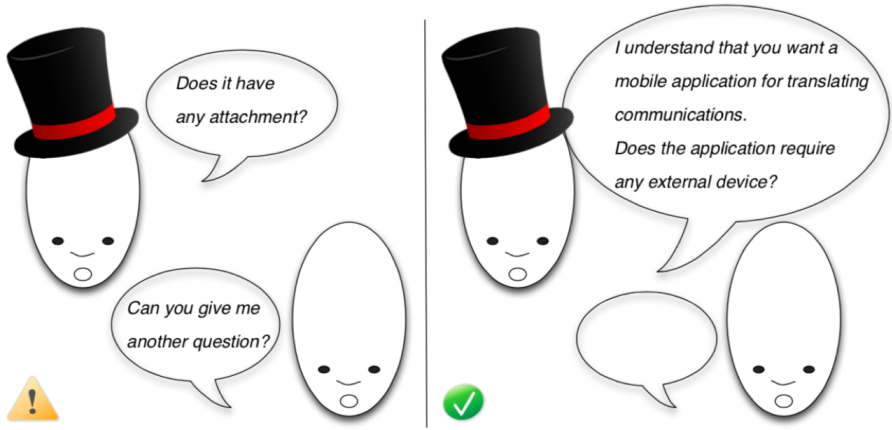
4 - Problems in Phrasing Questions



[Donati et al., 2017]

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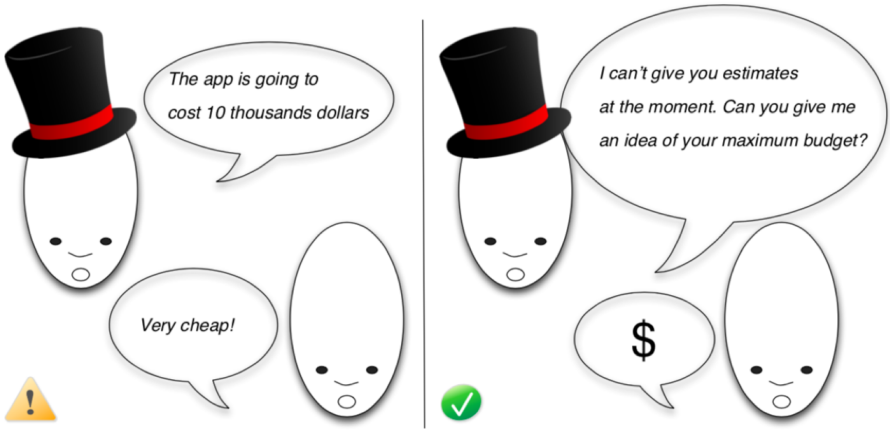
5 - Problems with Costs



[Donati et al., 2017]

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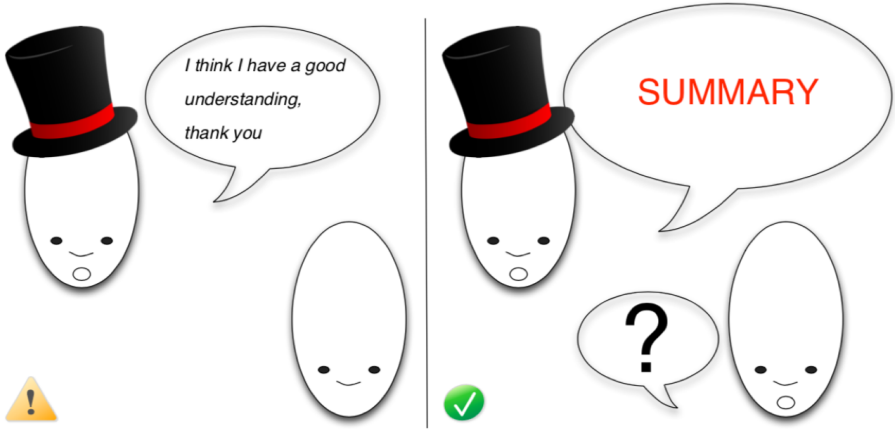
6 - Wrong Closing



[Donati et al., 2017]

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Other Mistakes

- 7 - **Implicit Goals**
  - Asking for context can help
  - Make goals explicit
- 8 - **Implicit Stakeholders**
  - Ask yourself: *Does the project depend on the contribution of some other entity apart from me, the customer, and the users?*
  - Ask the customer: *If this interview was a group meeting to discuss the project, who, besides us, do you think should participate to the meeting?*
- 9 - **Non-functional requirements not elicited**
  - Interrogatory-like questions are fine in this case
  - *Development time? User base? Version compatibility? Availability? Security? Loading Speed?*

[Donati et al., 2017]

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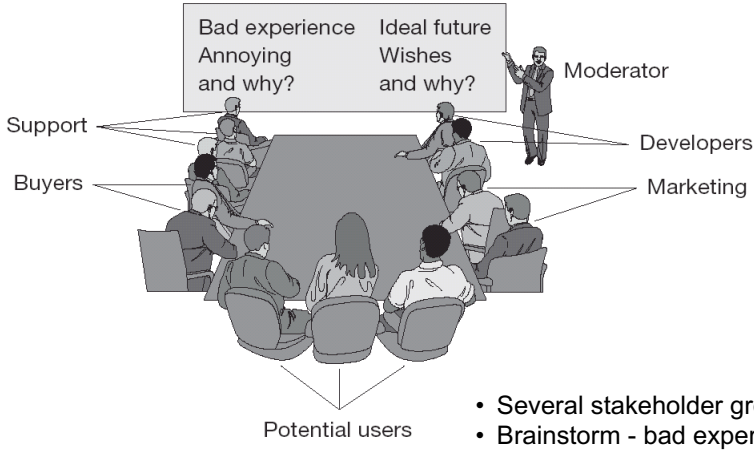
Fig 8.4 Focus groups



- Several stakeholder groups
- Brainstorm - bad experience
- Brainstorm - wishes & ideal future
- Each group selects top ten issues
- A few days later: Decide.
- Each group must get something

From: Soren Lauesen: Software Requirements

Fig 8.5 Business goals

Shipyard goals. Business administration
A1. Replace outdated platform (P)
A2. Integrate order documents and database (P)
A3. Use experience data for quotation (D)
A4. Support systematic marketing (D)
A5. Faster capture of cost data (Q)
A6. Speed up invoicing (Q)

Hospital goals. Payroll and roster planning
B1. Reduce IT costs

Personnel department
B2. Automate some tasks
B3. Remove error sources
B4. Observe deadlines
B5. Less trivial work and less stress

Hospital department
B6. Reduce over- and undertime payment
B7. Faster roster planning
B8. Improve roster quality

Noise source location.
New product
D1. Marketing plan.
Demand, competitors ...

From: Soren Lauesen: Software Requirements

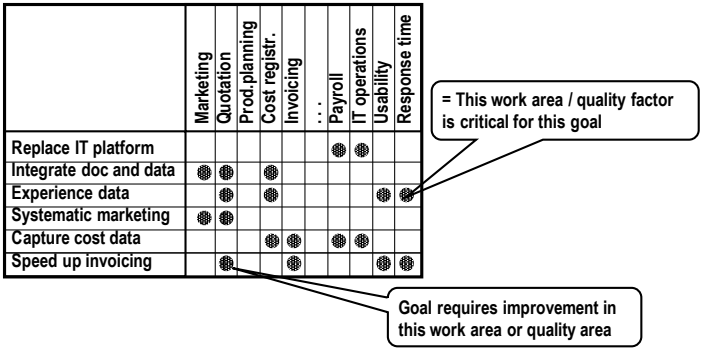
Fig 8.6 Cost/benefit analysis

Shipyard	NPV	Y0	Y1	Y2	Y3	Y4
Hard benefits	m$					
Avoided losses	6.5		0.2	1.0	4.0	4.0
More orders	2.5		0.4	1.0	1.0	1.0
Hard costs						
Supplier's price	-0.4	-0.4				
Hardware	-0.6	-0.6				
Staff training	-0.3	-0.3				
Enter exp. data	-0.4	-0.1	-0.1	-0.1	-0.1	-0.1
Net value	**7.3**	-1.4	0.5	1.9	4.9	4.9

Soft factors	**Now**	**Future**	(Scale 0-5)
IT flexibility	0	3	
Customer comm.	3	4	
Stress absence	1	3	
Total points	**4**	**10**	

From: Soren Lauesen: Software Requirements

Fig 8.7A Goal-domain tracing - critical areas



For each business goal: which work area / quality factor supports to fulfil it?
For each work area / quality factor: what is its purpose with respect to business goal?

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Group reflection

Group discussion in breakout rooms

If time permits, we can discuss in breakout groups:

- Which elicitation techniques are applicable in your group work,
- which do you want to apply,
- challenges that you anticipate, and
- strategies to mitigate those challenges.

Otherwise, consider doing that in the coming days!

→ socrative.com, Room: REQENG, Question 8, 9

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#	Aggregation result	(1)	(2)	Comments
1	Structured interviews gather more information than unstructured interviews	[3,11,63,67]	---	---
2	Unstructured interviews gather more information than sorting and ranking techniques	[10,16,20,80]	[5]	---
3	Unstructured interviews appear to gather more information than thinking aloud techniques	[13,16,20]	[22]	• The evidence given in [16] is confusing, but suggests that interviews are better than thinking aloud techniques. • The quality of the study [22] can be qualified as being on the low side
4	Elicitation techniques do not appear to provide specific types of information, that is, there is not enough evidence to support differential information access depending on what elicitation technique is used	[10,11,13,22,78]	[16]	• The quality of the study [22] can be qualified as being on the low side.
5	Analyst experience does not appear to be a relevant factor during information acquisition, at least using interviews as an elicitation technique.	[3,63,74]	[34]	---
6	The use of visual aids or prototypes focuses the discussion on the displayed artifact and does not generally help to discover new requirements.	[41,68]	---	• Not a lot of evidence is available as yet, although other studies (not covered by this review), like [30], support this finding.

[Davis et al., 2006]

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TABLE 13
Guidelines Derived from Aggregation Results

Guideline	Description	Evidence for	Evidence against
G1	Unstructured interviews (although it is reasonable to assume that the same applies to structured interviews), are equally as or more effective than introspective techniques (such as protocol analysis) and sorting techniques.	AG01, AG04, AG05	AG06, AG08
G2	Unstructured interviews (although it is reasonable to assume that the same applies to structured interviews) output more complete information than introspective techniques (such as protocol analysis), sorting techniques and Laddering.	AG28, AG29, AG34, AG30	
G3	Unstructured interviews (although it is reasonable to assume that the same applies to structured interviews) are less efficient than sorting techniques and Laddering, but as efficient as introspective techniques (such as protocol analysis).	AG10, AG11, AG12, AG16, AG17, AG18, AG22, AG23, AG24	
G4	The introspective techniques (such as protocol analysis) are the worst of all the tested techniques in all the dimensions (effectiveness, efficiency, completeness), and are outperformed by unstructured interviews (although it is reasonable to assume that the same applies to structured interviews), and sorting techniques and laddering.	AG04, AG07, AG10, AG13, AG16, AG19, AG20, AG22, AG25, AG26, AG28, AG31, AG32	AG14
G5	Laddering is preferable to sorting techniques (as well as introspective techniques).	AG06, AG15, AG20, AG21, AG26, AG27, AG23, AG33	AG14

[Dieste and Juristo, 2010]

Other hot topics

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- AB testing and automated experimentation, e.g. [Mattos et al., 2017],
- Derive features from customer ratings on market places, e.g. [Guzman and Maalej, 2014, Dalpiaz, 2019]
- Special stakeholder groups, e.g. Children [Horkoff et al., 2018]
- Agile teams and customer interaction about value [Kasauli et al., 2017]
- RE conversations [Spijkman et al., 2022]
- Capture expert domain knowledge for ML-heavy systems [Heyn et al., 2025]

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Todo

- → `https://socrative.com`, REQENG, Question 10, 11
- Read Lau:2
- Work in the project
  - Submit project mission
  - Book meeting with supervisor via email for next week
  - Start creating a stakeholder map
  - Decide on which elicitation techniques to use
- Tomorrow: ICC lecture with Becky Bergman
  (Part of WS1! Crucial for your group work! Interactive! You should attend!)
- Next week:
  - 13:15, L3: Requirements Documentation
  - 15:15, WS1 ctd: Discuss project in detail
- Volunteer as course representative!

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