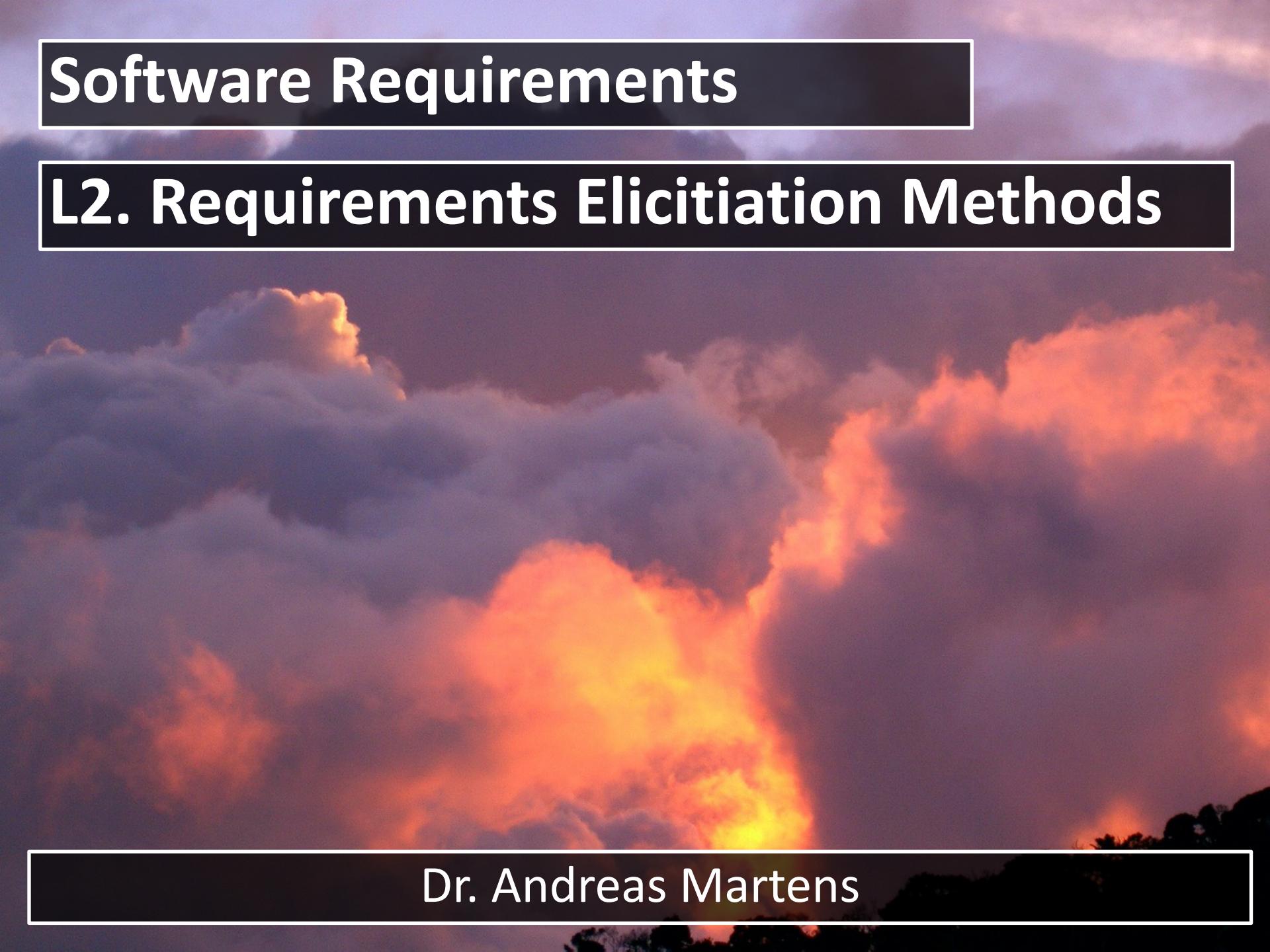


Software Requirements

L2. Requirements Elicitation Methods



Dr. Andreas Martens

Overview

1

Questions

2

Stakeholders

3

Qualitative Methods

4

Quantitative Methods

Communication with customer is difficult



Requirements elicitation is a challenging activity

People with different backgrounds must collaborate



Stakeholders
with the **solution**
domain
knowledge
(Developers,
designers, etc.)

Stakeholders
with the **problem**
domain
knowledge
(Clients, end-
users, domain
experts, etc.)



Requirements elicitation objectives

To acquire knowledge about...

The stakeholders



The expectations



Current state



System and context



The domain



The tasks



Requirements sources

- **Stakeholders**
 - User, Customer, Contractor, Manager, ...
 - Operator, Developer, Architect, Designer, Tester, ...
- **Documents**
 - Laws, Norms, Standards, ...
 - Concepts, Articles, Reports, Wiki, Blogs, Feedback...
- **Systems in production**
 - Previous systems
 - Systems within system environment
 - Competing system

Common types of questions...

Type	Example
What/Which	Which tools do developers use during a bug fixing task?
How	How do developers proceed to fix a bug?
Why	Why are agile methods popular in industry?
When	When are code clones useful?
How much	How frequently do developers need to know the steps to reproduce a bug?
How often	

Question types I

Existence:

- Does X exist?

Description & Classification

- What is X like?
- What are its properties?
- How can it be categorized?
- How can we measure it?
- What are its components?

Descriptive-Comparative

- How does X differ from Y?

Exploratory

Frequency and Distribution

- How often does X occur?
- What is an average amount of X?

Descriptive-Process

- How does X normally work?
- By what process does X happen?
- What are the steps as X evolves?

“Baserate”

Question types II

Relationship

- Are X and Y related?
- Do occurrences of X correlate with occurrences of Y?

Correlation

Design

- What is an effective way to achieve X?
- How can we improve X?

Design

Causality

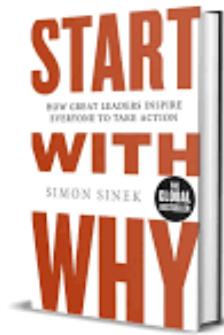
- Does X cause Y?
- Does X prevent Y?
- What causes X?
- What effect does X have on Y?

Causality-Comparative

- Does X cause more Y than does Z?
- Is X better at preventing Y than Z?
- Does X cause more Y than does under one condition but not others?
-

Causal Relationship

Common types of questions...

A thumbnail from a YouTube video. On the left, there is a graphic with the text 'START WITH WHY' in large red letters. To the right of the graphic is a black and white portrait of Simon Sinek, wearing glasses and a suit. In the bottom right corner of the thumbnail, there is a small black box containing the number '7:34'.

Why you should START WITH WHY - Lessons with Simon...

Rafael Guerra

131.883 Aufrufe • vor 3 Jahren

<https://www.youtube.com/watch?v=IPYeCltXpxw>

Empirical methods & question forms

Method	Question Form
Experiment	How, Why
Survey	Who, What, Where, How many, How much
Content analysis	Who, What, Where, How many, How much
History	How, Why
Field Study	How, Why
Interview	How, Why, How much, What, Where
Observation	Who, What, Where, How many, How much

Be concrete and precise!

Bad	Good
[NO questions!]	
How can we make software developments more efficient?	What is the impact of information dispersion on development productivity?
How do developers perceive tool integration?	How do developers assess tool integration as-is?

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Why?



- Stakeholders are the main source of the project goals and requirements!

Stakeholders

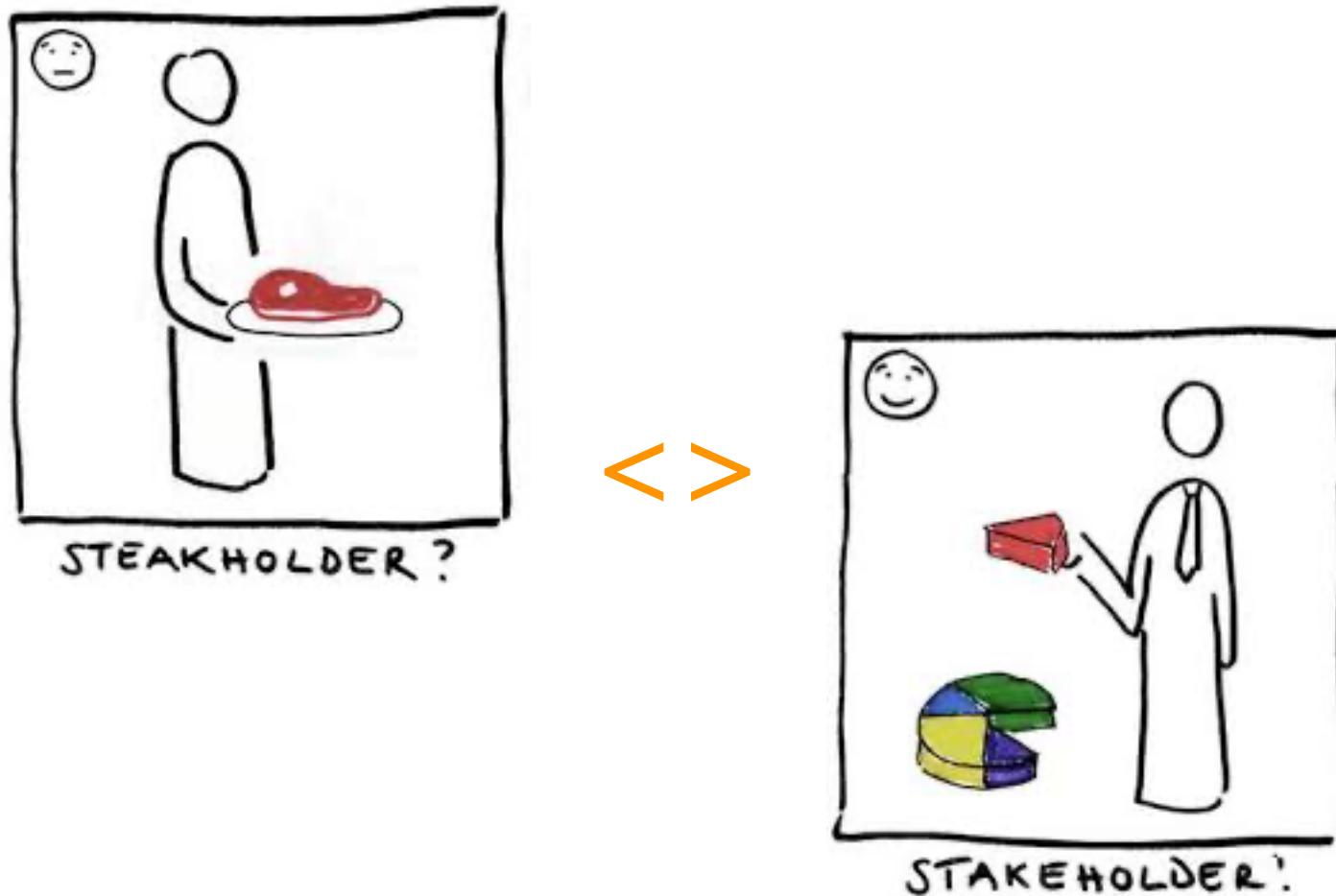


Bild Source: <https://www.klartext-jura.de/2015/05/22/steakholder-vs-stakeholder/>

Stakeholders

- Stakeholders are people actively **involved** in the project, or are **affected** by its execution
 - They build the project
 - Use it
 - Manage it
 - Are in some way affected by it

Role of requirements engineers and the stakeholders (in a perfect world)

Stakeholder

- Introduces the domain
- Provides requirements
- Takes decision on time
- Validates documented requirements
- Communicates changes on time
- Complies to the agreed requirements management process
- ...



Requirements Engineer

- Talks the language of the stakeholders
- High project involvement
- Creates a requirements specification document
- Presents ideas and alternatives
- Communicates in a respectful manner
- ...

A close-up photograph of a pile of tropical fruit. In the foreground, there are several ripe mangoes with a reddish-orange hue. Behind them are bunches of bananas at different stages of ripeness, from green and unripe to yellow and ripe. Some bananas have brown spots and stems attached. The fruit is piled together, creating a textured and colorful composition.

BUT: the world is not perfect!

What?



- Identify, collect information, manage your stakeholder!

Identify, collect information, manage



How?

?

- Be creative, with help of some useful method

Stakeholder identification



“Show me your list of stakeholders, and I will tell you what is your project about”

Stakeholder list template

- Template
 - Name
 - Role
 - Further personal and contact information
 - Availability
 - Importance
 - Domain knowledge
 - Relationship to other stakeholders

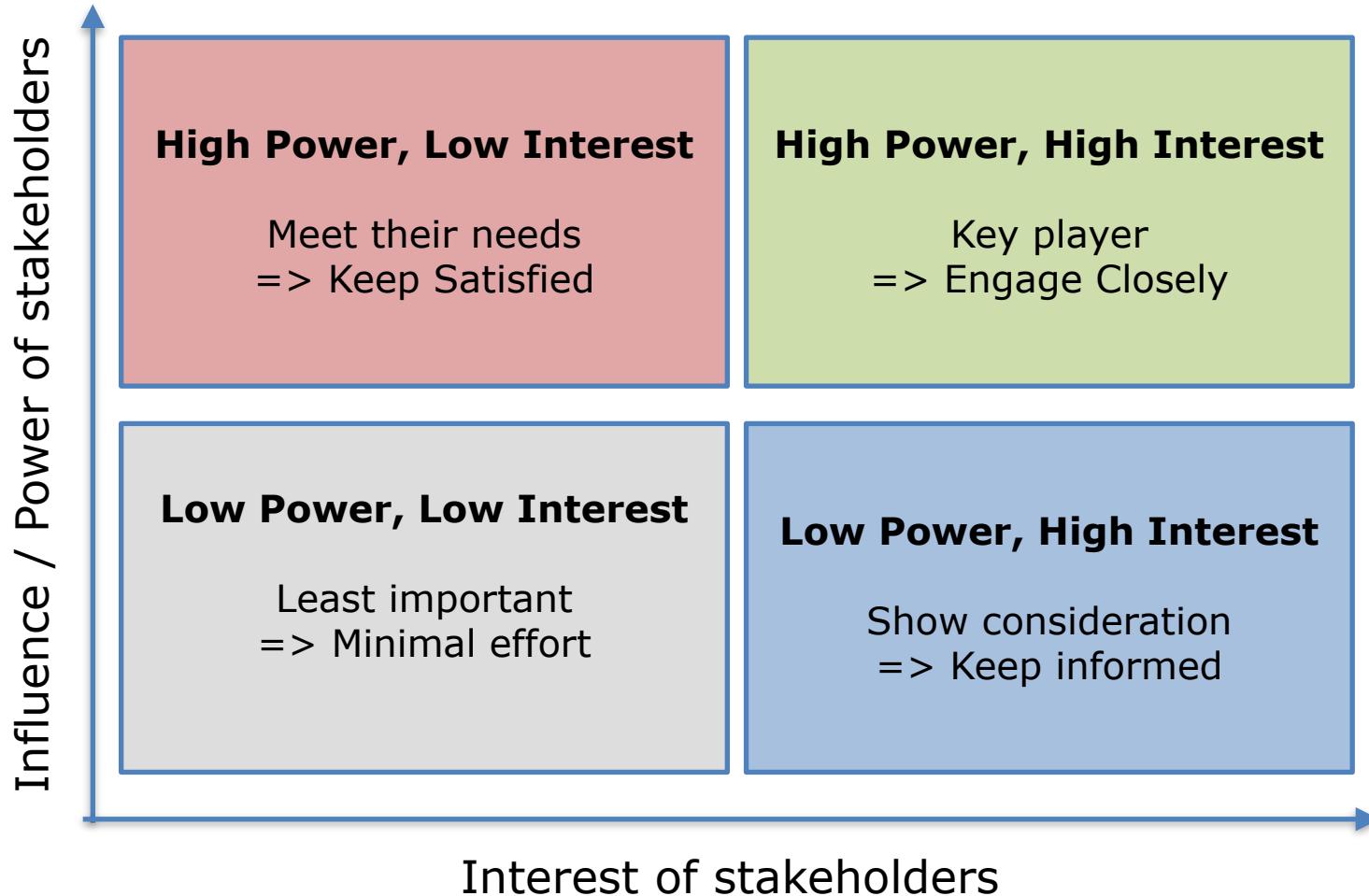
Example of an item in the stakeholder list

Name	Hans Mustermann
Role	Developer
Contact information	hans@mustermann.com
Availability	Available from Monday to Thursday in his office
Importance	Low
Domain Knowledge	Electronic shopping, Secure Transactions
Relationship to other Stakeholders	Good colleague with Test Manager

Cooperation with Stakeholders



Stakeholder importance / interest matrix



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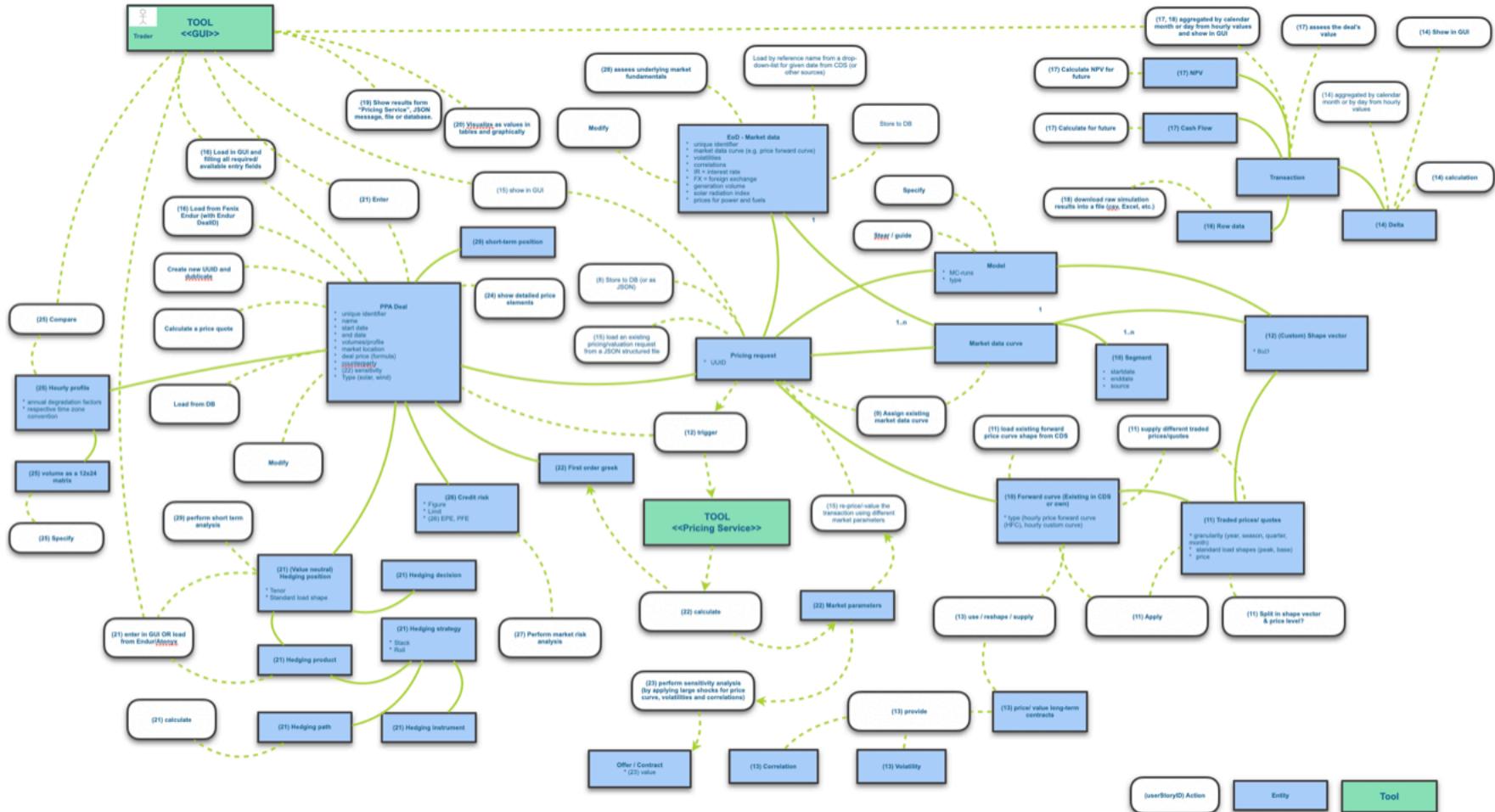
Quantitative Methods

New comer in business domain?



Source: Fotolia_78622839_XS

Energy trading business domain



Qualitative methods

- Gather an in-depth **understanding** of human behavior and the **reasons** that govern such behavior
- Characteristics of qualitative methods
 - Unstructured data
 - Small sample size
 - Categorization and summary
 - Subjective conclusion

Methods

- **Interviews, Workshops, Focus Groups, Case studies, (Observations)**

Interview

- Includes open questions
- Interviews are rather...
 - Subjective
 - Qualitative
 - Exploratory
 - Involve users!
- A conventional method for requirements elicitation



Interview guideline

- Prepare questions and first drafts
- Iterate
- Make dry runs
- Do not influence subjects
- Stay in scope
- Listen actively and suggest ideas

Spend 45 to 60 minutes for one session!



How many subjects do you need?

Workshops and focus groups

- Might include open and closed questions and other tasks
- Are rather...
 - Subjective
 - Qualitative
 - Involve users!
- A conventional method for requirements elicitation



Photo © Je-joy.org

What is a workshop?

- A structured meeting
- Carefully selected group of stakeholders who work together e.g. to define, create, refine, and reach closure on deliverables
 - e.g., requirements, models, releases etc.
- Include often several types of stakeholders
 - e.g. users, developers, testers



Fill all of the roles



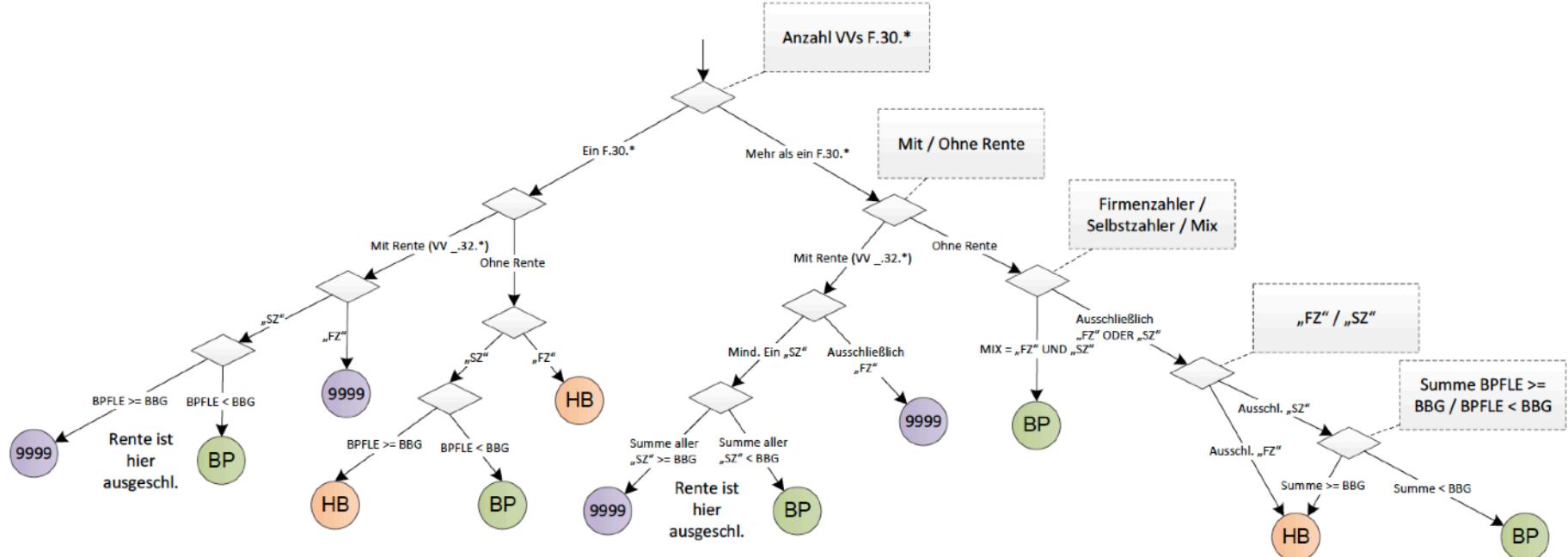
Workshop guideline

- Be timely
- Have a clear idea
- Plan an agenda
- Timebox discussions
- Use flip charts to capture ideas for later consideration
- Keep the team small but include the right stakeholders
- ...

Workshop Example

- Main goal: Decision Engine for invoice calculation
- Time slot: 9:00 - 10:00
- Participants: Max, Maria, Andreas
- Agenda:
 - Andreas: Short introduction (5 Min)
 - Andreas: Presentation of our idea (10 Min)
 - All: Discussion (35 min)
 - Summary of the results (10 Min)

Result of a workshop



BP

- * BPFLE aller Selbstzahler-VVs werden summiert => „Arbeitsentgelt“ in 21c
----- optional, falls vorhanden -----
- Einnahmen aus Firmenzahler-VVs werden nicht migriert.
- * Rente in dem VV _32.* => „EinnahmeÜberMaxBemessung“ in 21c (Email von Hr. Bockholt am 16.12.2016)

9999

- * Arbeitsentgelt = 9999 Euro Gesamteinnahmen aus dem VV werden als „Arbeitsentgelt“ migriert
- * Rente in dem VV _32.* => „EinnahmeÜberMaxBemessung“ in 21c (Email von Hr. Bockholt am 16.12.2016)

HB

- * Direkeinstufung: Höchstbeitrag

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Quantitative elicitation methods

Characteristics

- “Large” sample size
- Structured data
- Statistically significant results
- Generalizable (to some extend)

Methods

- **Surveys, Observations, Experiments, Data Analysis, Content Analysis, Simulation,...**

Questionnaires

Are rather...

- Subjective
- Quantitative
- Evaluative

Involve MANY users



Use likert or semantic scales!

<i>When I am trying to understand other's code I need to know...</i>						I don't know
	Never/ Rarely	Seldom ≈ monthly	Often ≈ weekly	Usually ≈ daily		
What was the coder's intention as he wrote this	<input type="radio"/>					

Problems encountered due to missing knowledge	Frequency				Often - Usually Count (%)	Mode
	Never (rarely)	Seldom (monthly)	Often (weekly)	Usually (daily)		
Understanding other's code (e.g. for review or documentation)					(59,6%)	Often
What is the program supposed to do					1190 (85,0%)	Usually
What was the developer's intention when writing this code					1025 (73,5%)	Often
Why was this code implemented this way					733 (52,4%)	Seldom
Who has experience with this code **					677 (48,5%)	Seldom
Who wrote this piece of code					538 (38,5%)	Seldom

Perfection your questions!

**1. Remove unclear
questions!**

**2. Put the least
important last!**



**3. Match questions
with answers**

**4. Think about
the outliers**

Motivate and give incentives

1. Share results



3. Show personal benefits



2. Gifts



4. Show the importance of your research



Observation

Is rather...

- Objective
- Quali-/quantitative
- Exploratory

With users and >1
researchers!



Use an observation template!

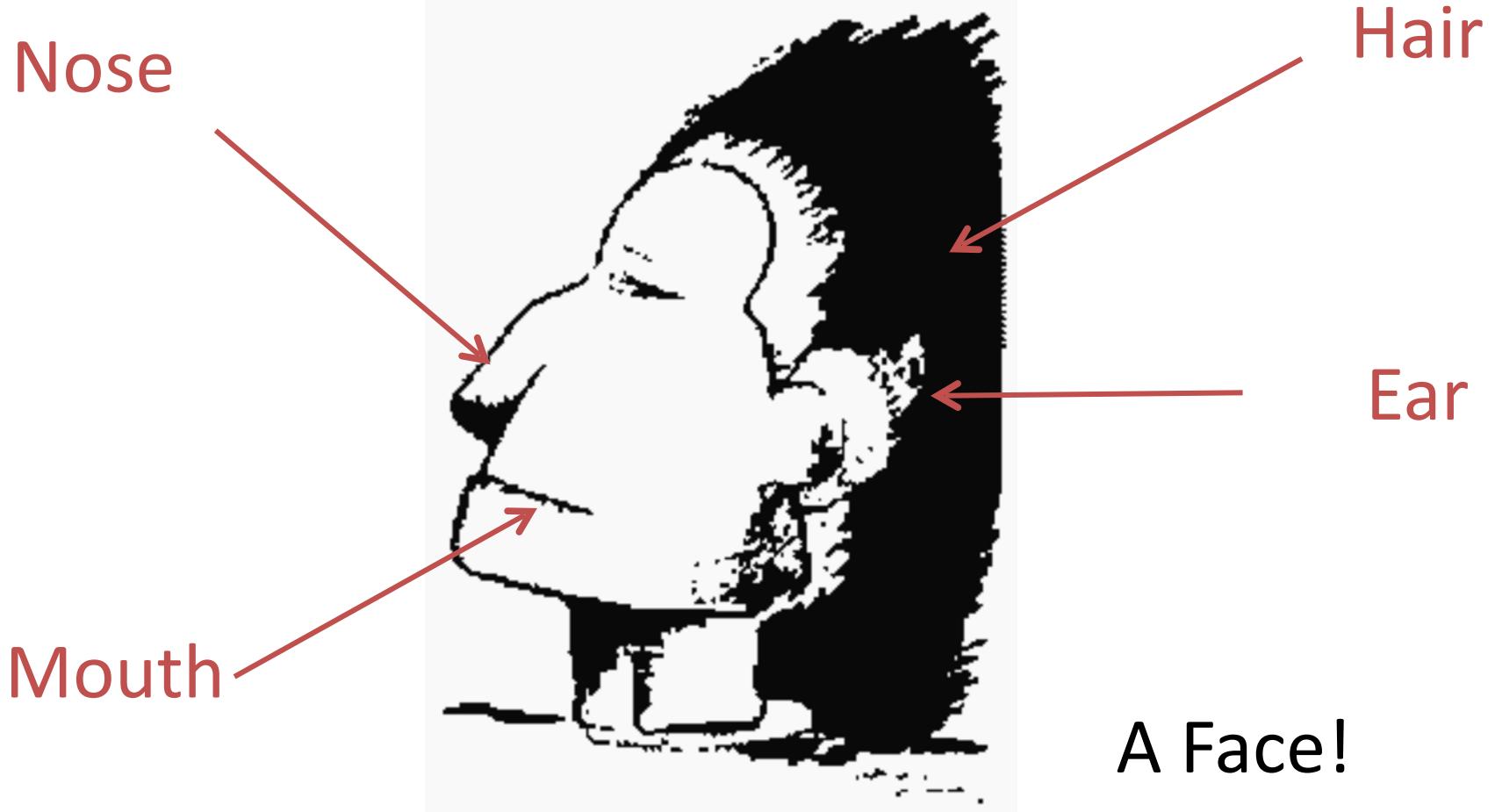
Table II. Excerpt from the Observation Protocol of Participant P5 (Observational Study)

Daytime	Relative time	Observation/ Quote	Postponed questions
...
10:19	00:27	Read Jira ticket Comment: "this sounds like the ticket from yesterday"	What information considered?
10:20	00:28	Refresh source code repository	
10:24	00:32	Publish code to local Tomcat	
10:26	00:34	Debug code in local Tomcat	Why debugging?
10:28	00:36	Open web application in browser and enter text into form fields	
10:29	00:37	Change configuration in XML file content.xml Exclamation: "not this complicated xml file again"	How known what to change?
10:30	00:38	Publish changes to local Tomcat	
10:31	00:39	Debug local Tomcat	
...

Prepare codes for observations!



What is this?



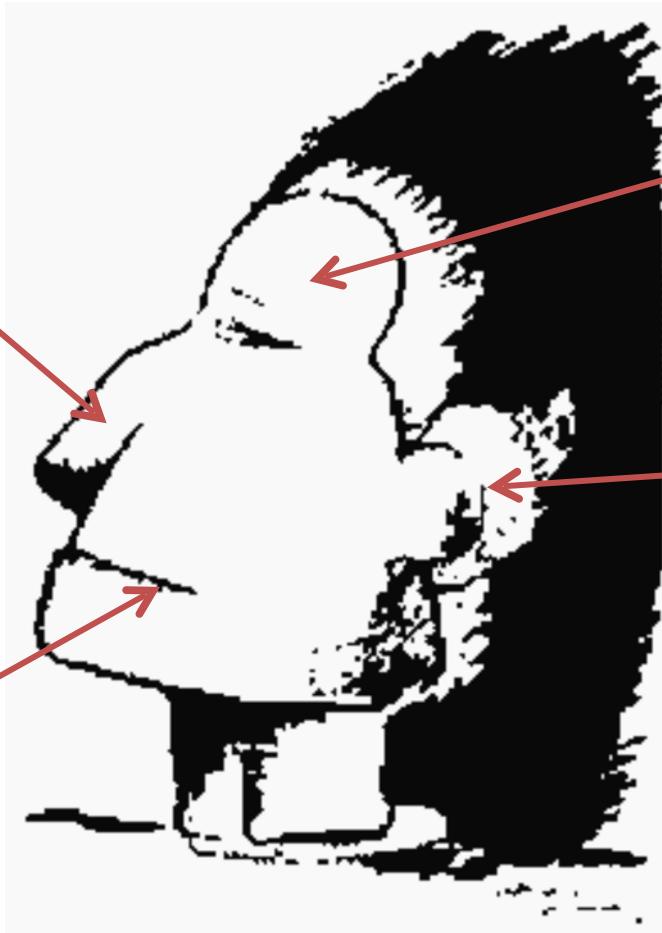
Let's try again!

Elbow

Head

Coat

Arm



An Eskimo
Entering a Cave!

Talk about your observation (peer debriefing)!

- This helps to identify the relevant observations and to group observation
- Avoid talking to subjects during observation



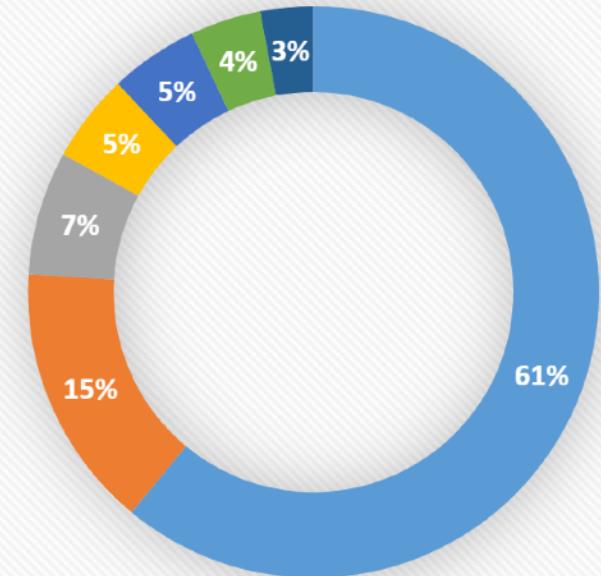
Data Analysis

- Data Profiling
- Clustering, creation of SSOGs (Same State Object Groups)
- Analysis of workflow states and their frequency
- Analysis of business processes

Example of Data Analysis

SSOGs of the Business Class "Payment Request"

- SSOG 1: (61%) Obsolete
- SSOG 2: (15%) Compensated with cash flows
- SSOG 3: (7%) Partially compensated with cash flows
- SSOG 4: (5%) Non-compensated without cash flows
- SSOG 5: (5%) In a pending state
- SSOG 6: (4%) Disputed
- SSOG 7: (3%) Of poor data quality



Summary

1

Communication with stakeholders is difficult as they have different backgrounds and the access to them is limited

2

Requirements elicitation is about identifying the right people and asking the right (types of) questions

3

Qualitative methods (e.g. interview or focus groups) help to gather ideas, understand stakeholders, and their rationale

4

Quantitative methods (e.g. survey or observation) help to make requirements concrete, quantify facts, and decide

Question

- Q&A session follows
- martens@qurix.tech