CS445 / ECE451 / CS645 / SE463

Software Requirements Specification & Analysis

Elicitation

Information to Elicit

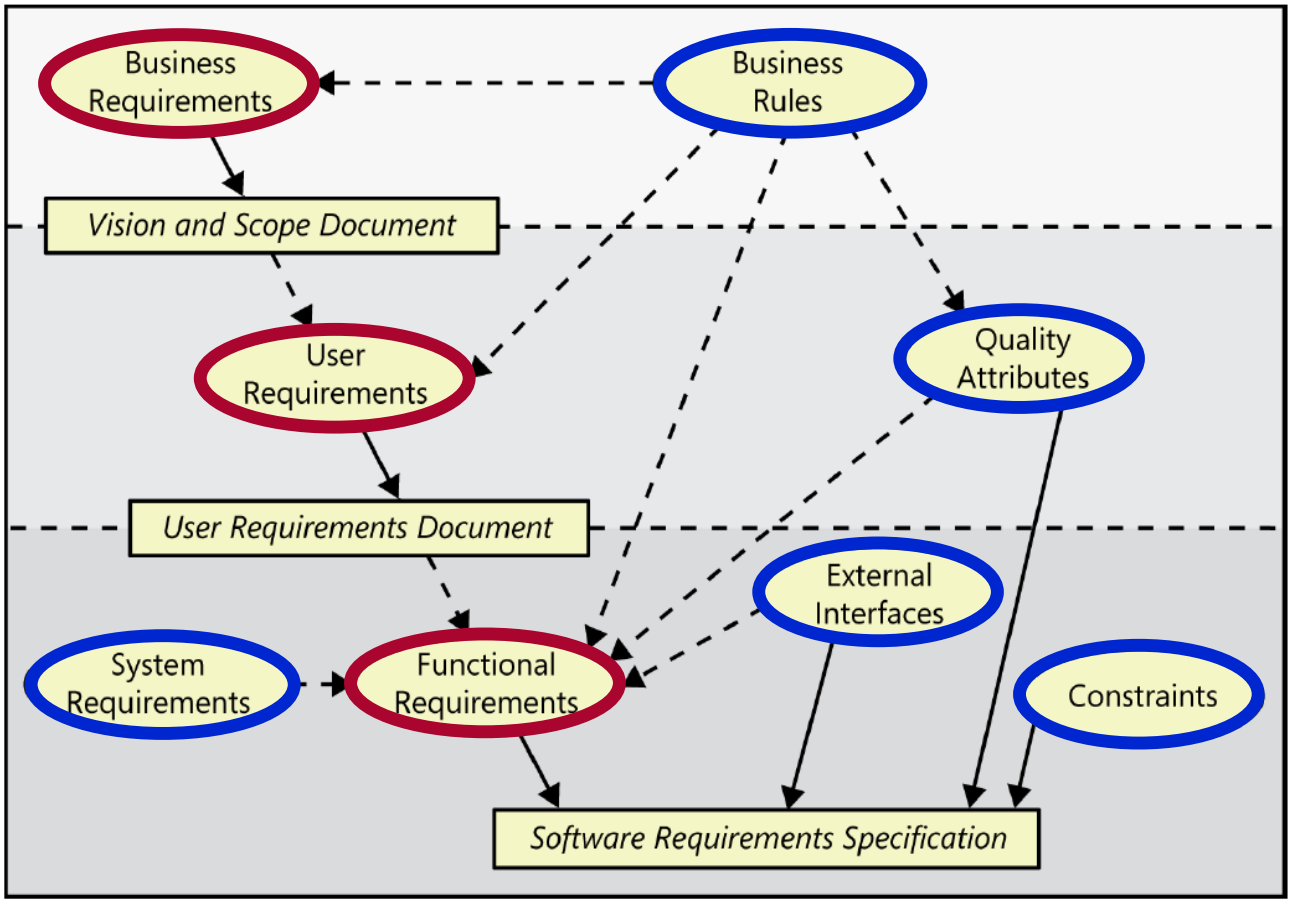

FIGURE 1-1 Relationships among several types of requirements information. Solid arrows mean "are stored in"; dotted arrows mean "are the origin of" or "influence."

Karl E. Wiegers and Joy Beatty. *Software Requirements, 3ed.* Microsoft Press, 2013.

Elicitation Techniques

- Document studies
- Similar companies
- Norms
- Domain analysis
- Requirements taxonomies

Artefact-based

- Modelling
- Analysis patterns
- Mockups & prototyping
- Pilot experiments

Model-based

- Stakeholder analysis
- Questionnaires
- Interviews
- Observation
- Task Demo
- Ask suppliers
- Domain workshop
- Personas

Stakeholder-based

- Systemic Thinking
- Brainstorm
- Creativity workshop
- Constraint relaxation

Creativity-based

Artefact-based Elicitation

Idea: learn from documentation, systems, artifacts, etc. before asking for stakeholders' time

Artefact-based

- *Document studies*
- *Similar companies*
- *Norms*
- *Domain analysis*
- *Requirements taxonomies*
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Documents

System documentation

e.g., existing requirements specifications, design documents, bug reports, change requests user manuals, work procedures, usage statistics, marketing data, performance figures

Environment documentation

e.g., organization charts, business plans, policy manuals, financial reports, minutes of important meetings

Domain analysis

e.g., textbooks, surveys, standards, regulations, the Web

Norms

Build a better Quest

Build a better WaterlooWorks

Build a better Waterloo Portal

Build a better Watcard system

Build a better LEARN

Build a better Workday

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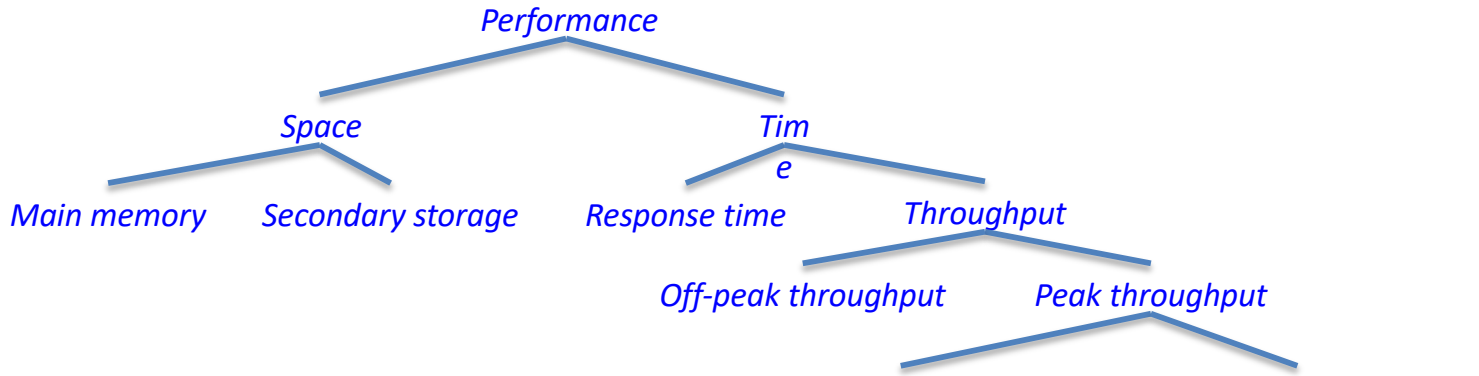
Requirements Taxonomies

Requirements taxonomy — classification of requirements; the classification can act as a checklist of details to be elicited.

Example: Domain-*dependent* taxonomy for information systems:

PIECES ≡ **P**erformance, **I**nformation and data, **E**conomy, **C**ontrol, **E**fficiency, and **S**ervices

Example: Domain-*independent* taxonomy for performance-related NFRs



Stakeholder-based Elicitation

Idea: Acquire detailed information that is problem specific or stakeholder specific

- Document studies
- Similar companies
- Norms
- Domain analysis
- Requirements taxonomies
- Modelling
- Analysis patterns
- Mockups & prototyping
- Pilot experiments

- *Stakeholder analysis*
- *Questionnaires*
- *Interviews*
- *Observation* *Stakeholder-based*
- *Task Demo*
- *Ask suppliers*
- *Domain workshop*
- *Personas*

- Systemic Thinking
- Brainstorm
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- Constraint relaxation

Study Current Users

To understand the problem, analyze existing "system" if possible:

- Questionnaires
- Interviews
- Observe current users/apprenticeship

The goal is to find out:

- What is used, what isn't, what's missing.
- What works well, what doesn't.
- How the system is used, how it was intended to be used, what new ways we want it to be used.

Surveys and Questionnaires

Questionnaires are useful when information has to be gathered from a large number of people, particularly users.

- Closed-ended questions (to gather opinions)
- Open-ended questions (to gather suggestions)

Not recommended as the only stakeholder-based technique to employ.

Interviews

Interviews are useful for learning

- Elicit stakeholder-specific problems
- Elicit details that only the stakeholder can answer
- Useful for isolating and identifying conflicts

Want to phrase questions as open-ended questions, to elicit more details from the stakeholder

- who, what, when, where, ***why***

Good listening skills means focusing on what the stakeholder is actually saying; giving the stakeholder some time to articulate an answer

Ethnographic Analysis

Ethnographic analysis is direct, first-hand observation of user behaviour

- An attempt to discover the social/human factors in a system.
- Studies have shown that work is often richer and more complex than suggested by simple system models derived by interviews alone.
- Can identify the used and critical existing features
- But focuses on existing solutions

© 2002 Michael Neugebauer

Apprenticeship

Apprenticing is based on the idea of masters and apprentices

- The apprentice sits with the master craftsman (the user) to learn the job
  - By observation, asking questions, doing some of the job under the master's supervision.
- While working, the user can:
  - describe the task precisely
  - explain why the task is done this way
  - list the exceptions that can occur

© 1940 Walt Disney

Model-based Elicitation

Idea: To re-express the requirements in a different language, which can raise new questions.

- Document studies
- Similar companies
- Norms
- Domain analysis
- Requirements taxonomies
- *Modelling*
- *Analysis patterns*
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- *Pilot experiments*

Model-based

- Stakeholder analysis
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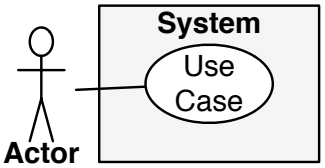
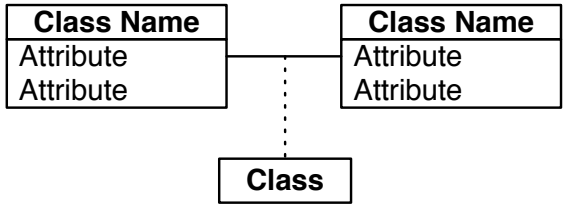
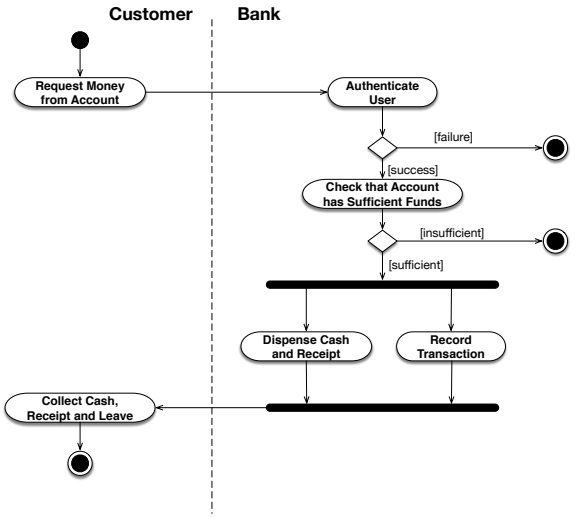
Requirements Models

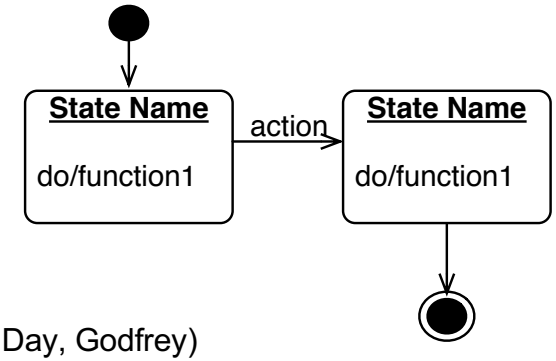
Model: a simplified representation of something complex used in analyzing and solving problems or making predictions







Display Available Numbers	ID: O12	Importance: D
Overview: Display all of the available phone numbers		
Inputs: requestor:Administrator		
Preconditions: requestor has authenticated, there is no data lock on phones (set of Phone)		
Modifies: *none*		
Postconditions: returns all num ∉ phones.phoneNumber; numbers are displayed in numerical order		
Exceptions: There is a data lock on phones, and error code "operation failed" is returned		
References: Meeting #3: R7		



context Membership **inv**
self.transactions->collect(points)->sum = self.points

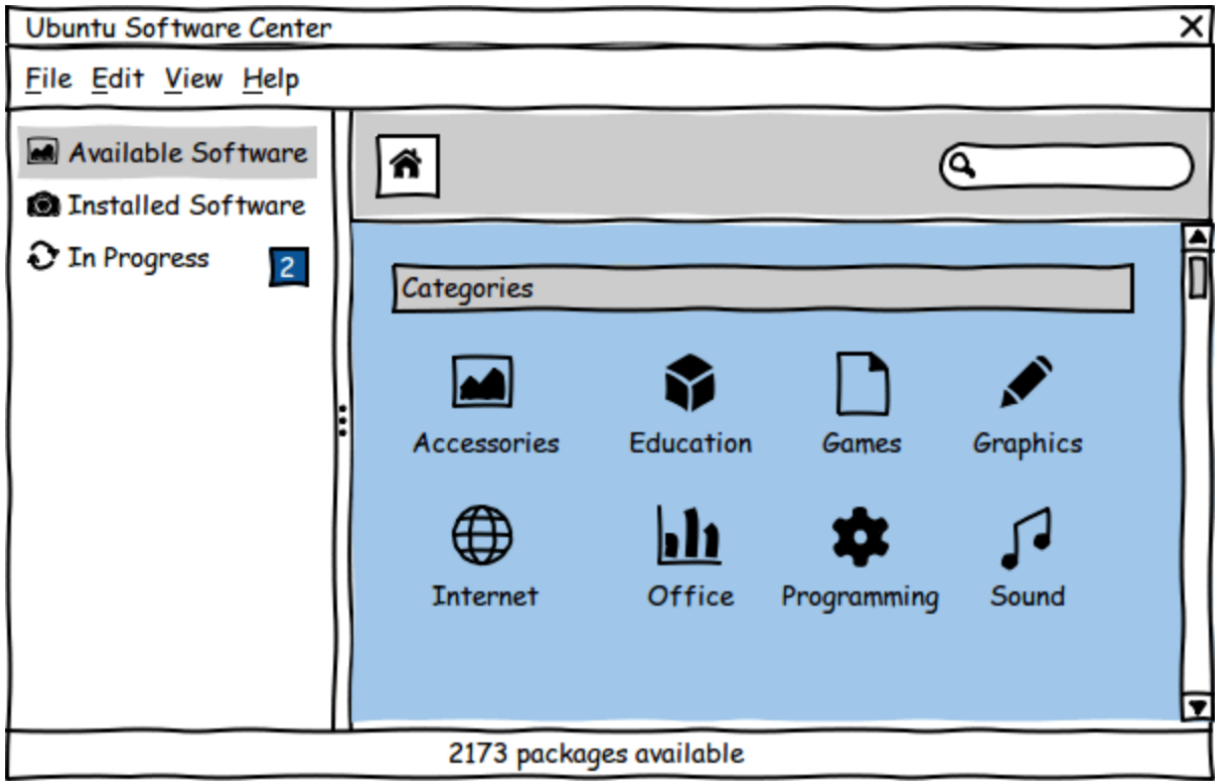
Using Models in Elicitation

The act of re-expressing the owner's work or requirements as models often reveals "holes" in our understanding

- Ideally, models are simple enough that stakeholders are encouraged to comment on and modify them
- Completeness of models provide measure of progress

Mockups and Prototypes

Sketch the essence of a solution, and use to bait stakeholders into providing new requirements details



Creativity-based Elicitation

Idea: To invent undreamed-of requirements that bring about innovative change and competitive advantage.

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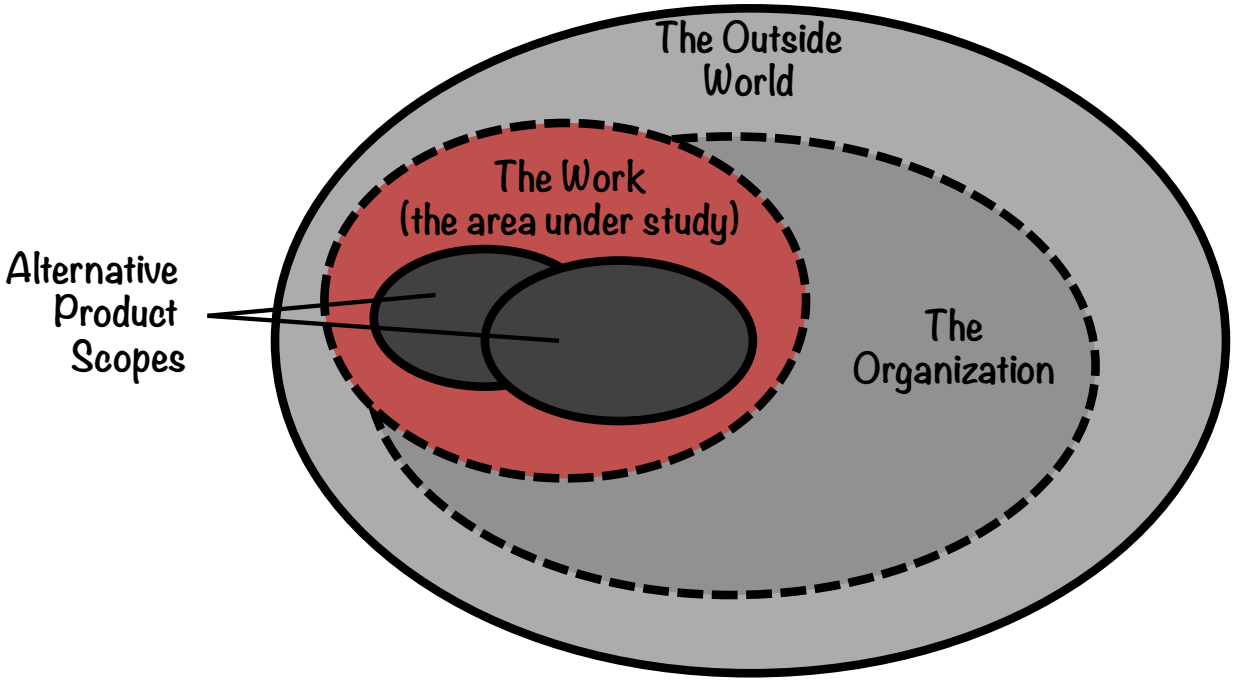
- *Creativity workshop*
- *Constraint relaxation*

Creativity-based

Systemic Thinking



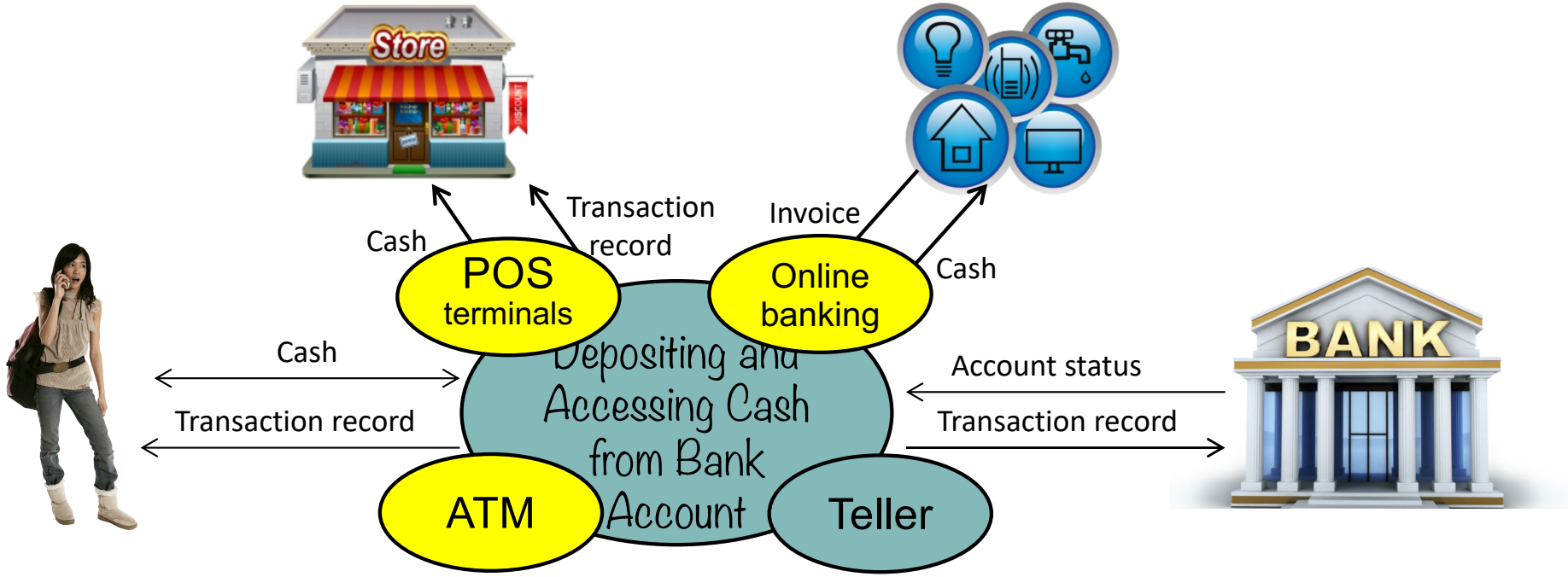
Robertson, Robertson, Mastering the Requirements Process, 2012, Figure 3.3.

Enlarging the scope under study, and thinking about all of the Work (and not just the future software system)

Systemic Thinking

The Work to be studied must include anything that

- you are permitted to change
- you need to understand to decide what to change
- can be affected by your product



Brainstorming

Brainstorming is a group creativity technique designed to generate a large number of new ideas

Goals:

- Want to hear ideas from everyone, especially unconventional ideas.
- Creativity to be encouraged

Part I — Idea Generation

- Goal is to generate as many ideas as possible.
  - Quantity, not quality, is goal at this stage
  - Look to combine or vary ideas already suggested
- Write down all ideas so that all can see them
  - e.g., whiteboard, paper taped to wall
  - Without attribution

Part II — Assessment

As a separate activity, possibly involving a different set of stakeholders…

- Go over the list and explain ideas more carefully
  - Review, consolidate, combine, clarify, expand.
- Rank ideas and choose winners
- Be careful about time
  - Creative / technical meetings tend to lose focus after 90 min.
  - Take breaks or reconvene later.

Creativity Workshop Strategies

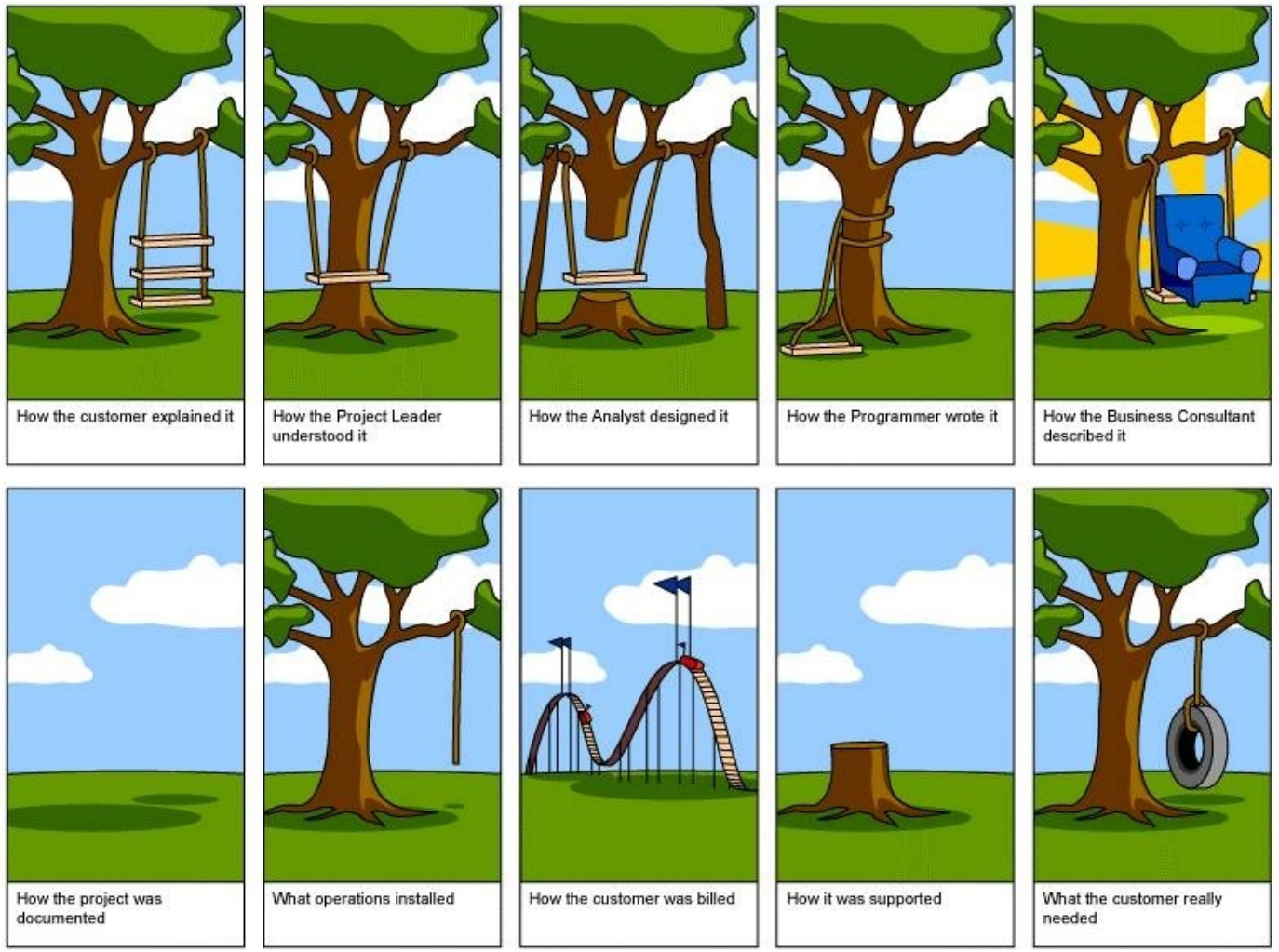
Additional creativity-based elicitation techniques include

- Constraint relaxation
  - exploring new possibilities that can be considered if a constraint were relaxed
- Analogical reasoning
  - exploring analogies to a related problem
- Combining ideas

Managing Expectations

© Dave Miller, Back40 Design, 2012
https://www.linkedin.com/pulse/20140826174348-7746425-dealing-with-client-expectations

Focus on the User's Needs



Origins unknown. Variations have circulated since the 1960s.

References

Karl E. Wiegers and Joy Beatty. *Software Requirements, 3ed.* Microsoft Press, 2013.

- Chapter 7: “Requirements elicitation”

Robertson, S. and Robertson, J., Mastering the Requirements Process, 3ed., 2012.

- Chapter 7 "Understanding the Real Problem"