Requirements Elicitation
AGENDA

- Objectives & Problems w.r.t. Elicitation
- Stakeholder Analysis
- Communication Issues
- Interviews & Interview Effects
- Other Elicitation Techniques
- Summary
Main Activities in Requirements Engineering

Management

- Elicitation
- Documentation
- Validation & Negotiation
Recommended Elicitation Practices

Optimize system to support stakeholders in performing their tasks

Ascertain quality

Elicitation

- Consider implementation constraints
- Elicit technical environment
- Elicit tasks & processes
- Elicit non-functional requirements
- Define context & scope
- Elicit goals
- Elicit functional requirements
- Identify stakeholders & sources
OBJECTIVES & PROBLEMS WITH Elicitation
Objectives of the Elicitation Phase

- Knowledge acquisition (elicitation, acquisition) about:
  - involved persons and objectives
  - tasks
  - current state
  - expectations
  - the domain
Common Problems of Elicitation

- Consideration / identification of all relevant stakeholders
- Communication
- Inability of stakeholders to abstractly describe *what* they are doing, *why* they are doing it nor *what* they *need* to be able to do things
- Requests are too generic
- Presentation of new possibilities and their consequences
- Stakeholders like to stick to their old avenues of approach
- Conflicts
- Cause of power struggles
- Cause of opposition against changes
- Priorities / changes
- Stakeholders want too much
- Stakeholders continuously add new ideas
REQUIREMENTS ELICITATION

Stakeholder Analysis
Stakeholders

- Stakeholders are people / organizations with an interest in the product
  - They build it
  - They use it
  - They manage it
  - They are in some way affected by its use
Typical Stakeholders

What could be typical stakeholders?

Why are they important?
Stakeholder Elicitation by Means of Stakeholder Analyses

- A multitude of very diverse stakeholders are involved in the development of a product or in a project
  - Goal: identification of all potential product & process stakeholders

- Which of these stakeholders might be influenced positively and which negatively by a decision made during the project?
  - Goal: elicitation of the interests of all stakeholders, their importance, and their influence within the project, as well as identification of their relationships among each other
Benefit

- Identification of:
  - the interests of all stakeholders who may influence or be influenced by the project
  - potential conflicts and risks that may jeopardize the project
  - possible opportunities and alternatives that may have a positive influence on the project
  - groups whose participation in the project must be promoted actively
  - decisions that may reduce or even eliminate negative effects on weak or vulnerable groups
# Stakeholder Identification

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Interests in the Project</th>
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<tbody>
<tr>
<td>Developer</td>
<td>High productivity, error avoidance, little rework</td>
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<tr>
<td>Marketing Sales</td>
<td>High sales figures, increased customer satisfaction</td>
</tr>
<tr>
<td>Project Management</td>
<td>Budget reduction, adherence to schedule</td>
</tr>
<tr>
<td>Investor</td>
<td>Shorter time to market, faster workflows</td>
</tr>
<tr>
<td>Customer, User</td>
<td>Easier workflow, usability</td>
</tr>
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</table>
Importance and Influence (1/2)

**Importance**: condition that indicates how much the project results should please the stakeholder

**Influence**: capability of affecting the performance of concrete development activities

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Importance</th>
<th>Influence</th>
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<td>Developer</td>
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<td>Manager</td>
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Note: This is a fictional example
Importance and Influence (2/2)

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</table>

- **Customer** (B) |
- **Manager** (A) |
- **Developer** (C) |
- **Administrator** (D)
Quadrant A

- Stakeholders with **high importance** for the project, and with **strong influence** on concrete development activities
  - E.g., project manager

- **High communication & synchronization effort** needed between the stakeholders in this group

- **Common understanding & agreement about decisions** must continually be guaranteed
Quadrant B

- Stakeholders with **high importance** for the project, but with **little influence** on concrete development activities
  - E.g., user, customer

- Require **special initiatives for protecting their interests**
  - Continuously monitor the fulfillment and validity of their goals
  - Promote their involvement in the development
    - E.g., prototype workshops, review meetings
  - Name person responsible for the project in order to monitor the initiatives
Quadrant C

Stakeholders with **low importance** for the project, and with **strong influence** on concrete development activities

- E.g., developer, quality assurance

- Possible “project killers”
- Are able to block the continuation of the project and jeopardize its success

- Need **permanent and intensive involvement in decision-making** activities by being given rationales and explanations

- Acceptance regarding decisions must be achieved
Quadrant D

- Stakeholders with **low importance** for the project, and with **little influence** on concrete development activities.
  - E.g., maintenance personnel, hotline service
- Still, their interests should **not be neglected** completely, since they are project and product stakeholders after all
  - E.g., handbooks, training
- Periodically communicate information about project or product decisions
Stakeholder Onion Model

The Product or Service

The Direct Environment

- Normal Operator
- Operational Support
- Maintenance Operator

The Indirect Environment

- Interlacing System
- Functional Beneficiary
- Product Manager

The Wider Environment

- Competitor (Negative Stakeholder)
- Director, Shareholder (Financial Beneficiaries)
- Developer
- Media Regulator
- Politician
- The Public

Stakeholders who only benefit indirectly from the system and only influence the system indirectly (including negative stakeholders)

The immediate operational environment of the system; stakeholders are in **direct contact with the system**

The indirect operational environment of the system; stakeholders **directly benefit from the system**
REQUIREMENTS ELICITATION

Communication Issues
Communication – Not As Easy ...

WIZARD OF ID

I WANT A POTION THAT WILL ADD FORTY YEARS TO MY LIFE!

TRY THIS

BY BRANT PARKER & JOHNNY HART

GLUCK GLUCK GLUCK

... LET ME REPHRASE THAT
Communication Model (Extended Version)

Stakeholder

Objective Reality → Perception

Perceived Reality → Representation

Expression → Interpretation

Personal Reality → Representation

Documented Expression

Requirements Engineer
Exercise

...a little game in between...
# Overview of Elicitation Techniques

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* p = possible  
  g = good  
  v = very good

[Source: Lauesen 2002]
REQUIREMENTS ELICITATION

Interviews & Interview Effects
Types of Interviews

- **Unstructured / open interview**
  - Open questions
  - Difficult to analyze the results
  - Requires good interviewing skills
  - Personality influences the results

- **Semi-structured interview**
  - Guided by predefined interview questions
  - Structured by predefined topics
  - Room for spontaneous extensions / variation

- **Structured interview**
  - High degree of objectivity
  - Easy to compare results between different interviews
  - Allows for quantitative evaluation
  - No freedom for the interviewer, very narrow
Procedure of an Interview (1/3)

1. Preparation

- Clarify goals and focus
- Review of existing documents (e.g., scenarios, previous work documents)
- Selection of interviewees / stakeholders
- Selection of interview type (open, semi-structured, structured)
- Elaboration of questions (create a guideline, with at least one domain expert)
- Date arrangements
- Preparation of the material (dictating machine, guideline, information material)
- Possible inclusion of a minute taker
2. Start of the conversation

- Create a pleasant and inspiring conversational situation (also w.r.t. noise and interruptions)
- Inform interviewee of the purpose and procedure of the interview, as well as of the usage of the results
- Assure confidentiality
- Clarify questions of the interviewee in advance

3. Conduction

- Start of the recording
- Conduct interview on the basis of the guiding questions
Procedure of an Interview (3/3)

4. End of the conversation
   - End of the recording
   - Informal talk
   - Inform interviewee of further steps
   - Interviewee has the last word

5. Follow-up
   - Elaboration of the answers
   - Submit the elaboration to the interviewee for reviewing
More Than Just Questions

- The outcomes of an interview can be influenced by many factors
  - Interpersonal behavior

- Interview effects bias both the interviewer and interviewee
  - Rosenthal effect
  - Social desirability
  - Halo effect
  - Recency effect
  - Sponsorship bias
  - ...
Interview Effect: Rosenthal Effect

Biased expectancies can affect reality and result in self-fulfilling prophecies

The interviewee tries to please the interviewer

"Just one more question: Do you currently own or have you ever owned a fur coat?"
Interview Effect: Social Desirability

When we know that other people are watching us, we tend to behave in a way that we believe is socially acceptable.

Do you smoke less than 10, 10 to 20 or more than 20 cigarettes per day?

Umm... 15!

That’s a fair average!
Interview Effect: Halo Effect

A property of an individual biases the judgment of other properties. Attractive people are often judged as having a more desirable personality and more skills than someone of average appearance.

Attractive = rich = intelligent
Interview Effect: Recency Effect

A recent stimulus, observation or experience influences the next

Given a list of items to remember, we will tend to remember the last few things more than those things in the middle
Interview Effect: Sponsorship Bias

Interviewees base their response on the interviewer’s goal (or what they think that goal is)

Views and opinions are not expressed as freely (often unconsciously)

Interviewees may try to give appropriate and acceptable answers

Will they reduce the manpower of our department?

Is this effective?
Best Practices for Interviews (1/2)

- Questions
  - Start with rather general question, then get more specific
  - Mixture of open and closed questions
  - No leading questions
  - No suggesting of yes / no answers
  - No complicated, nested or ambiguous questions
  - No multi-questions or question alternatives
  - No technical jargon
  - Encourage the interviewee to provide depictions in own words
  - Important topics that have not yet been addressed should be introduced as new topic at the end
Best Practices for Interviews (2/2)

- “Active listening”
  - **Show interest** and attention
  - **Paraphrasing** without asking explicit (W-)questions
  - Endure **pauses** for thought, do not ask the next question right away
  - Regard **non-verbal aspects**
- If possible, do not interrupt
  - **Interrupt only digressions** and streams of words that seem to go nowhere
- **Withhold personal opinion**
- For eliciting the **context**: avoid questions about rationale (“**Why?**”)
  - Better: “How did it happen? What happened next?”
- For wishes / **requirements**: **probe deliberately!**
  - Get beyond too generic answers
REQUIREMENTS ELICITATION

Other Elicitation Techniques
Focus Groups

PURPOSE: To understand how people feel or think about an issue, product, service or idea.

Six to eight people selected because they have something in common.

Skilled Moderator

Comfortable, permissive environment
Focus Groups

- Special form of a workshop
- Ideally 6–8 participants
- Preparation and professional moderation are essential for success

1. Collect problems and their reasons
   - E.g., map collection, visualization (flip chart, moderation cards)
2. Focus on optimal solution
   - Not only opposites of the problem

- Advantages (compared to interviews)
  - Different perspectives on the topic of interest
  - Direct resolution of conflicts possible
Prototyping (1/2)

- Especially suited for elicitation and validation in situations where stakeholders have only a vague understanding of the system
  - Allows them to experience what they will get
  - Detect unconscious and subconscious requirements
    - “…but I had something different in mind”
    - “I know it when I see it” (IKIWISI) phenomenon

- Different purposes of prototypes
  - Demonstration prototype
  - Identification of user tasks
  - Decision prototype
  - Evaluation of alternatives
  - Learn prototype (understand a problem or new technique better)
Prototyping (2/2)

- Paper prototypes
- “Wizard of Oz” Prototype
  - User input in a graphical user interface is sent to an operator, who then simulates the systems behaviour and produces the appropriate output
- Software prototypes
  - E.g., realized in Visual Basic

- Other terms
  - Wireframes, mock-ups
  - By degree of detail (high-fidelity vs. low-fidelity)
  - By prototype lifetime (evolutionary vs. throw-away)
Site Visits (1/2)

- Observation of stakeholders in their environment
- Can be done by observer, camera or computer monitoring

- Objectives
  - Identify fundamental knowledge that nobody will express (implicit knowledge)
  - Find hidden requirements / causes
  - Obtain a better understanding of the real situation on the side of the requirements engineer

- Suitable for the development of new products & new market segments
Site Visits (2/2)

- 1–2 interviews per day and team
- Analyze the data within 48 hours
  - Team debriefing very important

Disadvantages
- Large amounts of irrelevant data
- Time-consuming
- Only observing the as-is situation and possible problems
Other Methods / Sources for Information

- Analysis of existing documents
- Analysis of (legacy and competing) products
- “Creation” of requirements through creativity workshops
Creativity in Requirements Engineering

- Idea / requirements generation is at least as important as requirements elicitation!

- Types of ideas needed for successful system development
  - Technical (e.g., new features)
  - Quality-related (e.g., make system more efficient)
  - Organizational (how to improve business processes)

- Creativity techniques can be used during requirements elicitation to create these ideas
The 5 Components of Creativity Workshops

- Skilled Moderator
- Idea Generator: Customer
- Idea Generator: Tech. Competence
- Idea Evaluator (Benefit): Customer
- Idea Evaluator (Feasibility / Scope): Tech. Competence
Principles of Creativity

Preexisting Associations

- Free Association
- Structured Association
- Intuition-Triggered

New Associations

- Alienation
- Analogy
- Induction
- Transfer
- Adaption
- Analysis
- Abstraction
- Reduction

Transformation

- Inference
- Reformulation
- Forgetting

Combination

- Concept Formation
- Abstraction
- Reduction
- Analysis
- Argumentation
- Confrontation
- Empirical Evaluation

Exploration

Evaluation
Exemplary Techniques in the Phases

- Exploration:
  - Classical Brainstorming
  - Lotus Blossom
  - 6-3-5 Brainwriting
  - Brainstorming paradox

- Combination:
  - Force Fit Combination
  - Remember the Future

- Transformation:
  - Osborn Checklist
  - Morphological Forced Connections

- Convergence:
  - Product Ideas
  - Product Box

- Evaluation:
  - Buy a Feature
  - Checklist
  - SWOT Analysis
IESE’s Creativity Process (1/3)

1. Generate initial ideas
   - Brainstorming
   - Provocation
   - Brainwriting
   - Pin Cards
   - Bug Listing

2. Structure the problem
   - Mind Mapping
   - Comparison Tables
   - Kepner and Tregoe
   - Strategic Options Development and Analysis (SODA)
   - Goal Orientation

Specified problem

3. Incubation phase

4. Desired degree of innovation
IESE’s Creativity Process (2/3)

4. Desired degree of innovation

5a. Generate unusual / crazy ideas
   • Provocation
   • Morphological Forced Connections
   • Problem Reversal
   • Relational Words
   • Super Heroes
   • SCAMMPERR

5b. Generate usual / unusual ideas
   • Six Thinking Hats
   • Synectics
   • Attribute Listing
   • Concepts Fan
   • KJ-Method
   • Cherry Split
   • SCAMPER
   • Circle of Opportunity

Unusual ideas
Usual ideas

Innovative ideas

6. Illumination phase
IESE’s Creativity Process (3/3)

6. Illumination phase

7. Shape and evaluate the solution
   - SWOT Analysis
   - Listing Pros and Cons
   - Progressive Hurdles
   - Dimensional Analysis
   - Implementation Checklists
   - Panel Consensus

8. Fulfilled requirements
   - Yes
   - No (improve implementation)
   - No (generate more ideas)

Final product
# List of Creativity Techniques

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Creativity Technique: 6-3-5 Brainwriting
Creativity Technique: Lotus Blossom
Creativity Technique: Storyboarding
Creativity Technique: Remember the Future
Creativity Technique: Morphological Box
Creativity Technique: Clustering
Creativity Technique: Product Box
Elicitation Summary

- **Interviews**
  - Time-consuming
  - Require explicit integration of standpoints
  - Allow for adaptation to interviewee’s background

- **Workshops / Focus groups**
  - Frequently used and take relatively little time
  - Fundament for team creation
  - Allows for discussing the rationale behind requirements / conflicts
  - Problems with social structures, focus on hot spots

- **Observations / Site visits**
  - Good for capturing the as-is situation
  - Least impact of presumptions

- **Creativity techniques**
  - Help to “generate” ideas & requirements
Recommended Elicitation Practices (Summary)

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<th>Elicit technical environment</th>
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<td>Elicit tasks &amp; processes</td>
<td>Elicit non-functional requirements</td>
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<td>Define context &amp; scope</td>
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<td>Elicit functional requirements</td>
<td>Identify stakeholders &amp; sources</td>
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Questions

Elicitation?