Requirements Elicitation

Software Requirements & Project Management CITS3220
Lecture Overview

- What is requirements elicitation?
- Underlying difficulties
- Generic Techniques
- Specific Techniques
- Requirements Elicitation Guidelines
What is Requirements Elicitation?

The *process* through which the customers, buyers, users, regulators and any others who are *stakeholders* in the development of a software system discover, reveal, articulate and understand their requirements.
“Requirements is probably the most misused word in our industry.”

“Required means nonnegotiable, yet in almost every project we see changed, bartered, and negotiated requirements”

“I propose using the word “specification” instead. Specifications are changeable and are understood as the current state of our understanding.”


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Underlying Difficulties

- Articulation Problems
- Communication Barriers
- Knowledge and Cognitive Limitations
- Human Behaviour Issues
- Technical Issues
Generic Overview of Techniques

- Asking
- Observing and Inferring
- Discussing and Formulating
- Negotiating with respect to a standard set
- Studying and Identifying Problems
- Discovering through creative processes
- Postulating
A General Elicitation Procedure

- **Identify** relevant sources of requirements
- **Ask** them appropriate questions to gain an understanding of their needs
- **Analyse** the gathered information, looking for implications, inconsistencies or unresolved issues
- **Confirm** your understanding of the requirements with the users
- **Synthesize** appropriate statements of the requirements
What is a goal?

- An objective the system under consideration should achieve
- Goals are *optative* (express a wish) rather than *indicative* (stating a thing as fact)
  - “serve more passengers”
  - “acceleration command delivered on time”
- Notice the different levels of abstraction
“Vision Statement” (Royce 2005)

- “is a user need which captures the contract between the development group and the buyer or user”
- Represent it in a format that the user can understand
- Ad hoc format could include text, mockups, use cases, spreadsheets, use cases – all in user terms
Why are goals needed?

- Goals are a basic driving force (with scenarios) for identifying requirements
- Help achieve requirements completeness
- Help to avoid irrelevant requirements
- Explain requirements to stakeholders
- Explore alternatives
- Manage conflicts
- Separate stable and volatile requirements
  - the higher level the goal, the more stable it is
Where do goals come from?

- Stakeholders’ wishes
- Refinement of other goals
- but G-O works bottom up as well as top down

- Instrumenting elite athletes example
  - 5 whys
Scientific American 
Order Processing

- Problems: labour-intensive, slow, expensive, unreliable, unable to manage peak demands
- Solution 1: Replace Tab runs with automated master file processing and updating system
Problems with Solution 1

- Costs up
- Reliability and quality of service down
- More clerical staff required
- Employee morale down
- Employee turnover up

Why? Programming solution overlooked some key operational elements of the problem

To be continued …
Solution 2 - first ask some questions

1. What objectives is the user trying to satisfy?
2. What decisions do we control which affect those objectives?
3. What items dictate constraints on our range of choices?
4. What criteria should we use to evaluate candidate solutions?
5. What decision provides with the most satisfactory outcome with respect to those criteria?
Solution 2 – some answers

1. Objectives: increase subscription speed and reliability, reduce costs, staff level and turnover, and reduce customer complaints
   Need to Analyse: primary sources of costs, errors, delays, frustrations

2. Decisions we control: computers, PO sorting into post boxes
Solution 2 – some answers

3. Constraints: need to preserve audit trails

4. Criteria: cost of processing, time required to respond, errors rates, personnel levels and turnover

5. Best solution (according to these criteria)
   - Separate PO box numbers for different types of orders
   - Interactive terminal, immediate validation of entries
   - Service bureau processed tape cassettes of daily orders
A Caveat

“There is a significant difference between the human-economics approach to a problem and the classical material-economics approach”

Cautionary Tale:
An Urban School Attendance System
[Boehm, Software Engineering Economics]
Interviewing
Interviewing

- **An interview** is a systematic attempt to collect information from a person.

- **Interviewing success** depends on ability to identify:
  - work flows,
  - factors that influence the operations of systems, and
  - the elements (documents, procedures, policies, etc.) that make up systems.

- **Poorly performed interviews may**:
  - lead to systems which do not meet the needs of the organization
  - affect the attitudes of the users and have a negative effect on the entire project effort
5 Steps of the Interview Process

1. Preparing for the interview
2. Planning and scheduling the interview
3. Opening and closing the interview
4. Conducting the interview
5. Following up for clarification
Observation
An Introduction to Ethnography
Ethnography

- An analyst immerses him/herself in the working environment where the system will be used.
- Observes the day-to-day work and notes the actual tasks in which participants are involved.
- This helps discover implicit system requirements that reflect the actual rather than formal processes in which people are involved.
- Observer is detached: end-user based, non-judgemental, so not appropriate for discovering organisational or domain requirements.
Vineyard Sensor Network
Case Study

“… we looked at people’s roles across the entire value chain of wine production, with the belief that each role represents a different relationship with the vineyard and winery and different information and interaction needs.”
Joint Application Design
Joint Application Design (JAD)

- Technique for promoting co-operation, understanding and teamwork among buyers, users and developers
- The process facilitates the creation of a shared vision of what the system should be
- Work done in single workshop session (1 week)
- Developed at IBM in the late 1970s
JAD Activities

1. Project Definition
   JAD facilitator interviews managers and clients to determine objectives and scope.
   Forms a team of users, clients and developers; all stakeholders are represented; participants are able to make binding decisions

2. Research
   JAD facilitator interviews present and future users, gathers domain info and describes work flows
   Starts a list of *issues* to be addressed during the session
JAD Activities

3. Preparation
   Create the *Working Doc.*, a first draft of *Final Doc.*
   Make an *agenda* for the Session
   Make overheads, flip charts etc. to represent
   information gathered during 2. Research

4. Session
   Over 3-5 days guide teams in creating the system specification
   Teams define and agree on work flow, data elements, screens and reports
   All decisions documented by a scribe in JAD forms
JAD Activities

5. Final Document

- JAD facilitator prepares the Final Document from the draft and decisions made during Session 4.
- Final document distributed to session participants for review.
- Participants meet for a 1-2 hour meeting to discuss the reviews and finalise the document.
Figure 4-12. Activities of JAD (UML activity diagram). The heart of JAD is the Session activity during which all stakeholders design and agree to a system specification. The activities prior to the Session maximizes its efficiency. The production of the Final document ensures that the decisions made during the Session are captured.
Brainstorming
Brainstorming

- A simple group technique for generating ideas
- Allows people to suggest and explore ideas in an atmosphere free of criticism or judgement
- Works best with 4 to 10 people – 1 person to get the session started, but not constrain it
Brainstorming

- **Generation Phase**: participants encouraged to offer as many ideas as possible without discussion of the merits of ideas
- **Consolidation Phase**: ideas are discussed, revised and organised

Q: Which of the difficulties identified earlier will be addressed by brainstorming?
Pulling this all together
Some Guidelines
Sommerville & Sawyer
Elicitation Guidelines

1. Assess system feasibility
2. Be sensitive to organisational and political considerations
3. Identify and consult system stakeholders
4. Record Requirements Sources
5. Define the system’s operating environment
6. Use business concerns to drive requirements elicitation
Elicitation Guidelines (cont)

7. Look for Domain Constraints
8. Record Requirements Rationale
9. Collect Requirements from Multiple Viewpoints
10. Prototype poorly understood requirements
11. Use scenarios to elicit requirements
12. Define operational processes
13. Reuse requirements