Requirements Elicitation Techniques

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Based on book “Discovering Requirements” by I. Alexander and L. Beus-Dukic

Overview

- Requirements Elicitation Techniques
  - Interviews
  - Observations
  - Group Elicitation/Workshops
  - Prototyping
    - Use Cases

Interviews

- **Types:**
  - Structured: provide a set of questions
  - Open-ended: provide some questions and follow on with context-related new questions
- **Number of Interviewers**
  - Single vs. team
    - Listen
    - Think
    - Write (notes, models, sketches, processes, use cases…)
    - Ask follow up questions
- **Number of Interviewees**
  - Single vs. few
  - No boss in the group

Interviews

- **Advantages**
  - Engaging with stakeholders: direct attention
    - Individuals get attention
    - Their input becomes part of requirements
    - Requirements are translated into products/services
  - Dialogue and feedback
    - Immediate check of your understanding with interviewee
    - Obtain further feedback/clarifications
  - Follow up interview
    - Check understanding
    - Fill in gaps
    - Ask additional questions
- **Disadvantages**
  - Interviewees state only what they know:
    - “faster horses” vs. cars (not for innovative solutions)
    - Tacit knowledge: cannot tell, but could show (e.g., riding a bike)
  - Captures only one point of view at a time:
    - a lot of qualitative data that is hard to analyze
    - Interviewees cannot hear each other’s views/resolve conflicts

Interviews: How to

- **Plan:**
  - Plan in advance:
    - Find out about the interviewees
    - What questions will you ask
      - What, why, when, where, how and who?
    - Any similar systems/sketches/drawings
    - Start with easy questions, keep open-ended ones for the end
- **Allow flexible departure from plan**
  - Follow relevant leads
- **Record/take notes**
  - With permission
  - Switch off controlled by interviewee
- **Validate findings**
  - Check you understanding (e.g., feedback to summary, or re-visiting tricky points)
  - Validate notes by using these as input on other interviews
  - Validate notes with the interviewee after fact

Interview Extract

How much electricity/gas do you use?

RC: Do you know how much energy do you use?
KS: What do you mean, in terms of price ?
RC: Well how do you approach that? How do you perceive it? Because we want to understand what people think, how do they appreciate how much energy they use.
KS: Well, I probably think in terms of how much of gas and electric that I use, really. So I do try and be conscious of that, yes.
RC: In what terms do you think about gas and electricity?
KS: I think in terms of price, yes. And in terms of trying not use so much environment.
RC: But do you know how much you pay?
KS: Yes.
RC: Are you expecting a certain amount every month?
KS: yes, I pay £70 a months, which I think is too much, so I try and, you know, use … more trying to look for ways to use less. I pay £70 a months gas and electric.

Observation

"It is better to see once than to hear 10 times" e.g.: air traffic controllers work in a busy environment with lots of data and many people collaborating in fast, specialized language.

- Observer "immerses" into observed environment for some time along with the observed subjects

- **Types:**
  - Silent observation
  - Talked through observation
  - Apprentice
  - Also: Overt vs Covert
- **Advantages**
  - First-hand experience of context (what will/not work, how does it feel)
  - Reveals issues that no other technique can discover
- **Disadvantages**
  - Can be time consuming
  - Collected rich data can be hard to make sense of
  - Not inactive on effects of newly induced software
  - Danger of "going native"

Observation: How to

- **Plan**
  - Choose the observed subjects, time, and place
  - Obtain written permission
  - Prepare for recording/documenting
  - Explain observation (if open) to the subjects
- **Observe**
  - Observe in natural setting
  - No interference with observed subject carrying out his tasks
- **Record/take notes**
  - Notes, audio, video, photos, etc.
- **Validate findings**
  - Where possible, validate findings with those observed (e.g., do I understand that in this task you did X because of Y?)

Observation: Further Notes

- **Objectivity**
  - Not looking for objective truth, but local behaviours, values, structures, interactions
  - Focus is on subjective/local
    - Requirements and their validation are thus subjective and contextual
- **Utility**
  - "Simplified" observations often used in software evaluation
    - Measurement of bodily functions - e.g. heartbeat, respiration
    - Studies of non-verbal interactions (e.g. gestures, gaze)
    - Video analysis of prototype use
  - Can also be used for social analysis, e.g., if we intend to automate some functions, use:
    - Time-motion study: noting people's location at each given time/stage of the task they are doing.
    - Communication audit: observe who talks to whom and what about

Group Elicitation

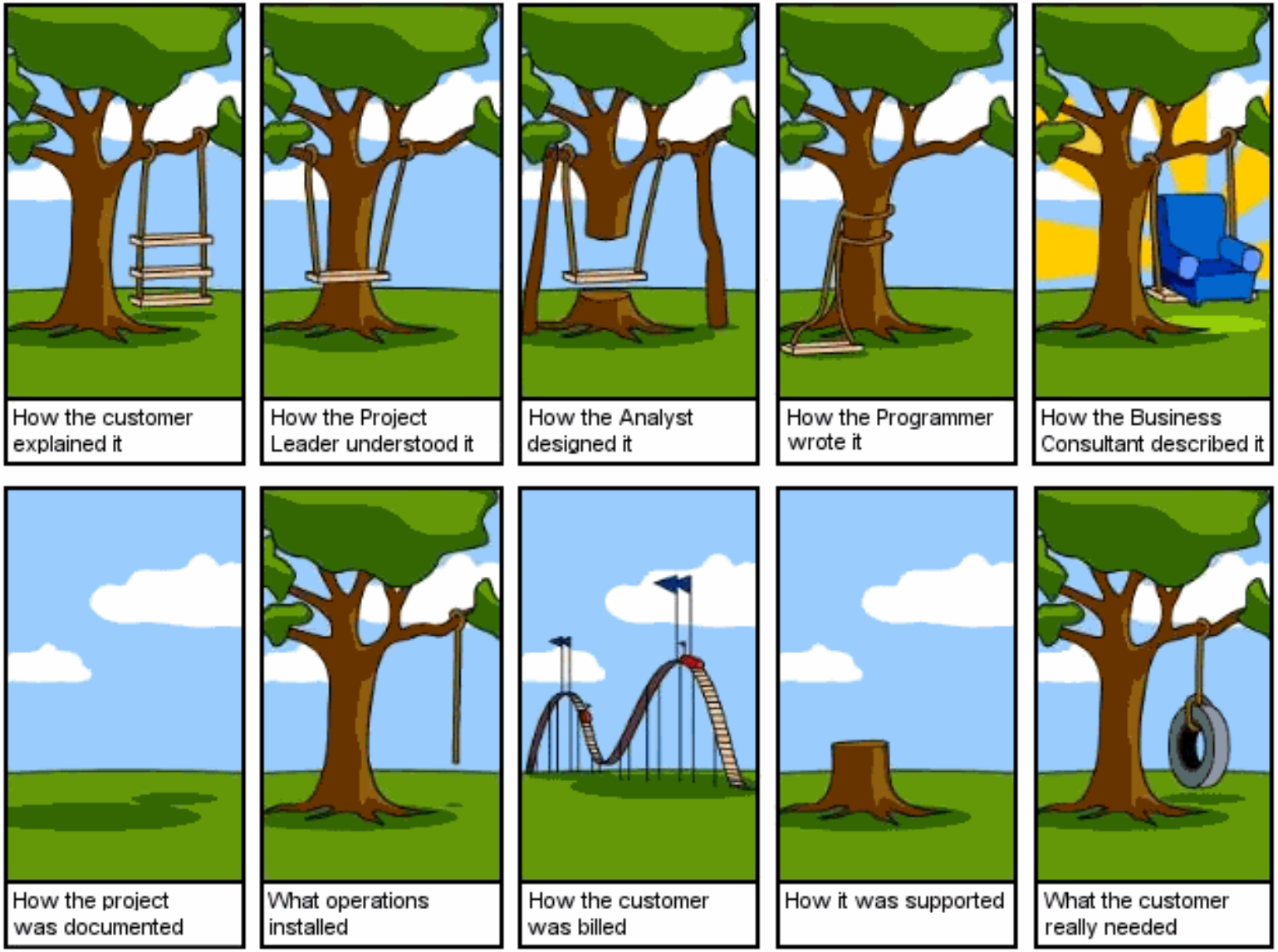
- **Types:**
  - Focus Groups
  - Brainstorming/workshops
- **Advantages**
  - Bring a several sources of information together
  - Refine collective understanding
  - Identify and resolve conflicts/inconsistencies
  - Reach agreement
- **Disadvantages**
  - May not be a “Balanced Sample” of representatives
  - Participant Discomfort (e.g., agree with boss)
  - Danger of loss of focus or joint poor decision
  - Dependency of facilitator’s skills

Group Elicitation: How to

- **Plan**
  - Define the workshop aim (e.g., create scenarios for a given product)
  - Select invitees: include only and all relevant roles
  - Set agenda with time per each activity
  - Set up and check the room and *equipment*
- **Consider options for departure from plan**
- **Rehearse**
  - Try out group activities
  - Think through activities' sequence and relevance
- **Record**
  - Notes, sketches, or even video
- **Validate**
  - Get participants to review notes/reprot

Why to do Prototyping?

Use prototypes in interviews and workshops to discuss with users



Prototyping

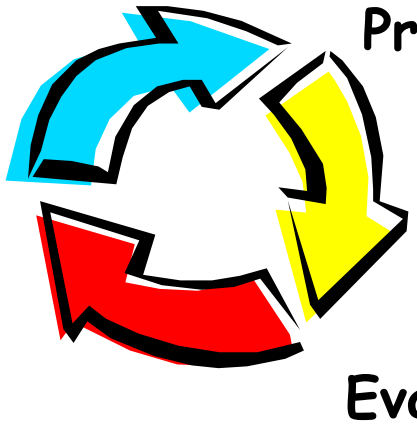
"Users don't know what they want until you show it to them" Ken Beck.

RE prototypes – artifacts used to facilitate elicitation of requirements

- **Advantages**
  - Easy and cheap to create
  - Induces feedback due to visual and/or useable nature
  - An abstract requirements can be "placed" in context
- **Disadvantage**
  - Could give impression that system is already designed
  - Could set out unrealistic expectations

Prototyping: How To

1. Choose Users
2. Select Tasks (e.g., use cases)
3. Draft a Design
4. Check the Design



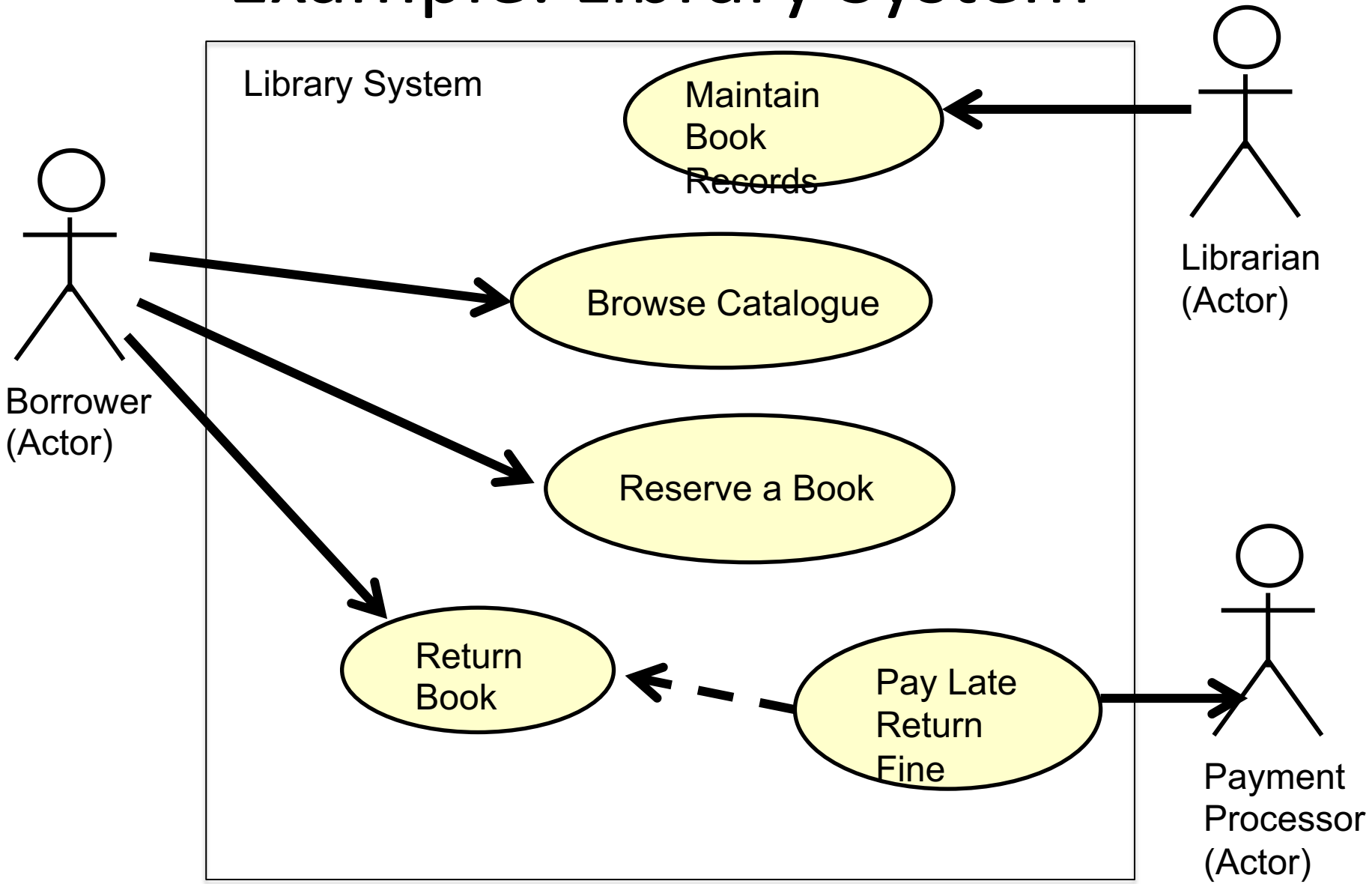
5. Prototype

6. Demonstrate
    - 6.1. Evaluate with different stakeholders
    - 6.2. Record Feedback
7. Iterate

Use Cases

- A use case captures functional requirements of a system:
  - what a system should do in response to an action
  - Who are the actors for a given functionality
- Use cases are used for
  - Identification of Functional Requirements
  - Communication with Others
  - Testing System

Example: Library System



Example Use Case Description

Use Case: Browse Catalogue

Basic Flow

The use case begins when a customer wants to browse the catalogue.

1. The customer selects view catalogue option,
2. The system displays the set of listed categories (such as author, keyword, title, subject area) and a text box.
3. The customer inputs the search text and chooses a category.
4. The customer presses Search button.
5. The catalogue displays the list of all available items under the selected category.
6. …

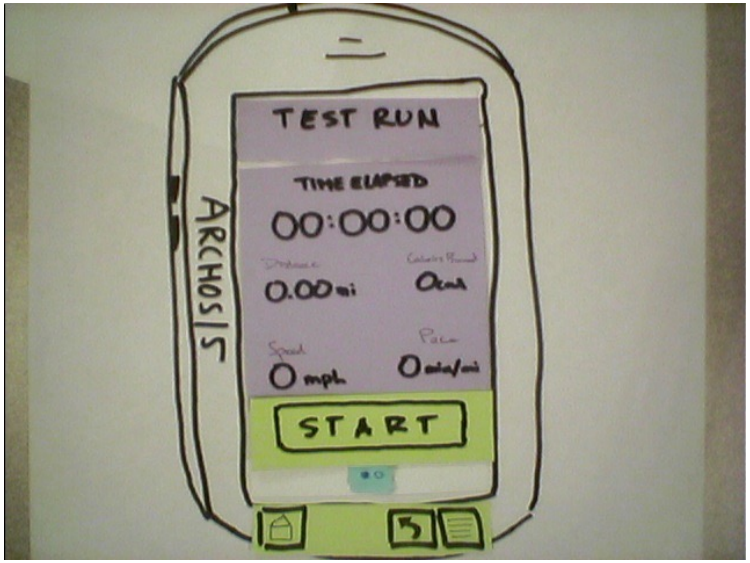
Alternative Flows

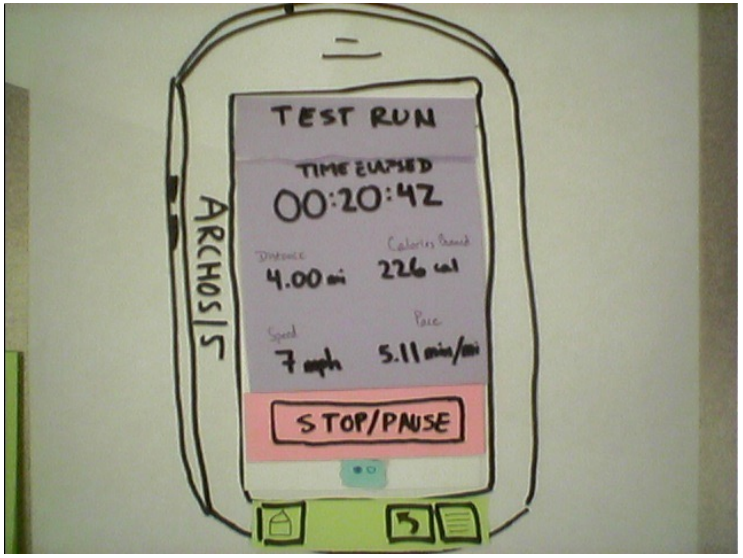
No items available, or connection to the library catalogue fails….

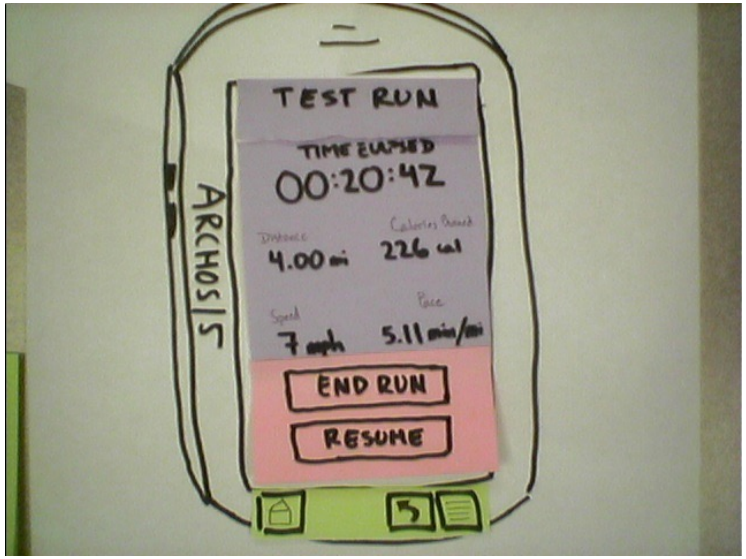
Example Test Case Definition (Black Box)

Test Case for Browse catalogue: Inputs	Expected Output	Observed Output
Input Text “Philosopher’s Stone” category “keyword”	Harry Potter and the Philosopher’s Stone	
Input Text “J. K. Rowling” Category “author”	Harry Potter and the Philosopher’s Stone	
…		

Example: Running App







Evaluation: Against Use Case Tests

Test Case for Browse catalogue: Inputs	Expected Output	Observed Output
Input Text “Philosopher’s Stone” category “keyword”	Harry Potter and the Philosopher’s Stone	Harry Potter and the Philosopher’s Stone
Input Text “J. K. Rowling” Category “author”	Harry Potter and the Philosopher’s Stone	“no such author”
…		

Conclusions

- **Use a combination of RE techniques**
  - Interview or observation for initial requirements gathering
  - Prototyping for confirmation and elaboration of requirements
  - Observation for evaluation of prototypes
- **Other techniques**
  - Participatory Design: users directly involved with each stage of the project
  - Joint Rapid Application Development: a multi-day workshop with 3-5 stakeholder participants working as a team
  - Focus groups: experts debating/discussing a problem…
- Each Technique has its own advantages and disadvantages: **no single perfect choice for all cases**