Maastricht University

Department of Advanced Computing Sciences

Human Computer Interaction
User requirement extraction

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Overview of this lecture

What is "Requirement Elicitation"?

Who are the players (stakeholders)?

Requirement Extraction techniques

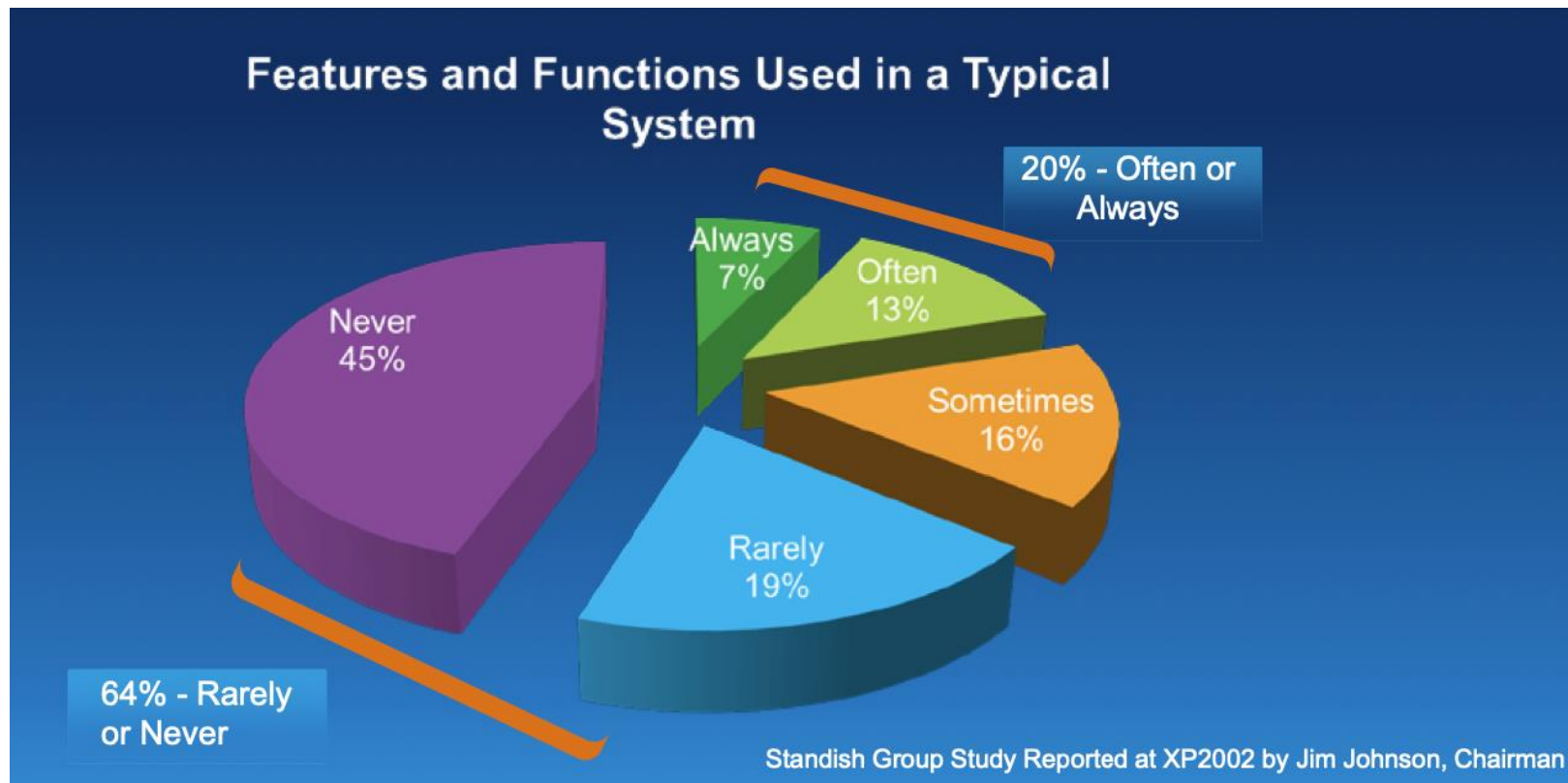## Why Requirements are Important?

Example

- The CEO of a HealthTech start up has the following request: "We need a user-friendly UI for our AI system that tracks patient health. It should be simple and efficient, like what you see in modern health apps."

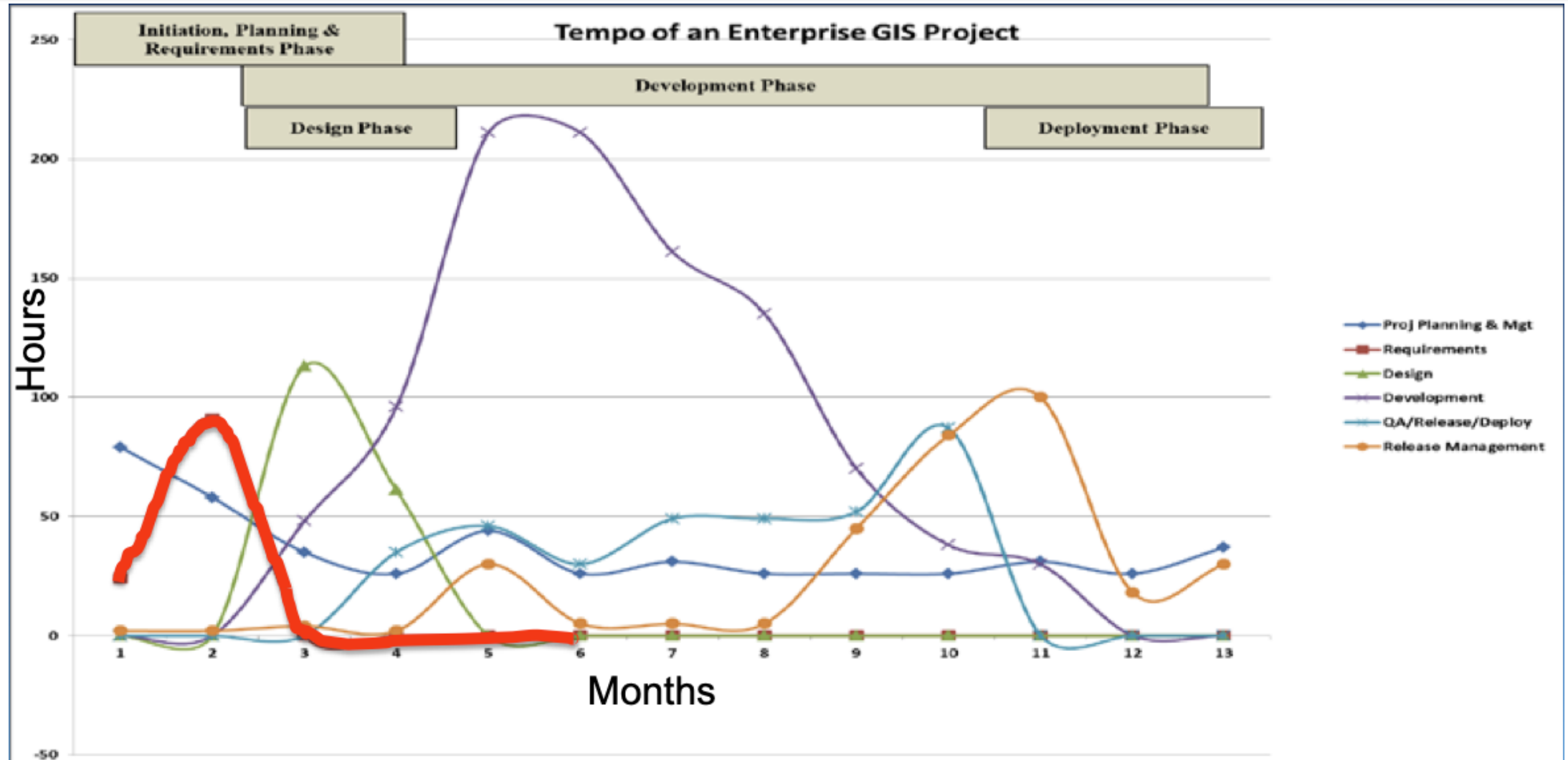- Do you have sufficient information to start the implementation?

Example

- The CEO of a HealthTech start up has the following request: "We need a user-friendly UI for our AI system that tracks patient health. It should be simple and efficient, like what you see in modern health apps."

- Do you have sufficient information to start the implementation?

  - Lack of Specificity – What exact features should the UI have?

  - Target Users Are Unclear – Is it for doctors, nurses, or patients?

  - No Defined Data Inputs – What health metrics need to be displayed?

  - Aesthetic Expectations Are Vague – What does "modern health apps" mean to them?

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Why Requirements are Important?

- Early mistakes lead to costly fixes

Features and Functions Used in a Typical System

- Always 7%
- Often 13%
- 20% - Often or Always
- Never 45%
- Sometimes 16%
- Rarely 19%
- 64% - Rarely or Never

Standish Group Study Reported at XP2002 by Jim Johnson, Chairman

Requirements evolve all the time

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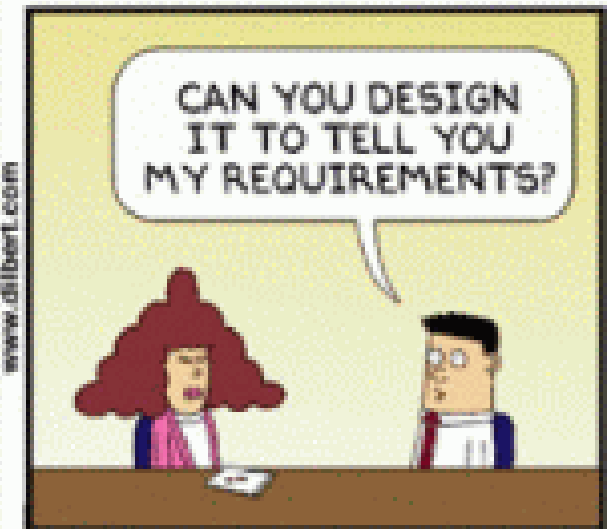
What are user requirements

- Users rarely know what is feasible and what is not
- Users, possibly, are not in a position to describe what they want, from a technological point of view
- Developers, possibly, are not in a position to understand what users want, from a practical point of view
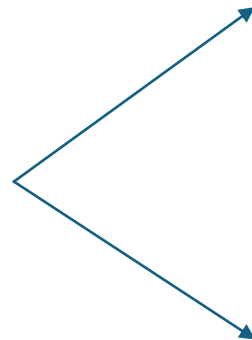
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Eliciting user requirements

Current practices to be taken into account

Don't make the users turn their back on what they already know

Project management software

Requirement: The users should be able to create lists and allocate tasks in each list

OR (?)

Requirement: The tool should incorporate predifined lists and the users can allocate tasks in each list

Current practice: Teams are accustomed to organizing tasks into lists and assigning them to team members.

Eliciting user requirements

Current practices to be taken into account

Consider possible future changes

Project management software

Requirement: Add a time tracking functionality for each task

Current practice: Teams are accustomed to organizing tasks into lists and assigning them to team members. The users express a desire for better collaborations and time management

Eliciting user requirements

Current practices to be taken into account

Try to improve the way the users work

Project management software

Requirement: To feature a Gannt Chart view in order to visualize project timelines and dependencies

Current practice: Teams are accustomed to organizing tasks into lists and assigning them to team members. Teams express frustration with the lack of visibility into project timelines and dependencies

Eliciting user requirements

People find it hard to leave

Unwillingness to change

Project management software

Requirements ??
user-friendly interface,
automated tracking capabilities
customizable reporting features

Current practice: A company uses a basic spreadsheet-based system for tracking employee work hours and project allocations. Despite its limitations, employees are comfortable with the familiarity of the spreadsheet and are resistant to change.

Eliciting user requirements

Good presentation skills needed to convince them to change

People find it hard to leave

Project management software

A well-designed presentation procedure will help users understand their real needs

Current practice: A company uses a basic spreadsheet-based system for tracking employee work hours and project allocations. Despite its limitations, employees are comfortable with the familiarity of the spreadsheet and are resistant to change.

Eliciting user requirements

▶ Evaluation of **alternatives** needs to be done with
   ▶ Real end-users
   ▶ Similar end-users

▶ Designers and Computer Scientists to check
   ▶ Technical feasibility

▶ Based on UX criteria
   ▶ Define KPIs well in advance. Check frequently

who are the *stakeholders*?

- system will have many stakeholders with potentially conflicting interests
- stakeholder is anyone effected by success or failure of system
  - primary - actually use system
  - secondary - receive output or provide input
  - tertiary - no direct involvement but affected by success or failure
  - facilitating - involved in development or deployment of system

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Stakeholders in conflict

- designers need to meet as many stakeholder needs as possible
  - usually in conflict so have to prioritise
  - often priority decreases as move down categories e.g. primary most important
  - not always

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Stakeholders in conflict

- **Scenario**: A company is developing an **intelligent virtual assistant** for customer support in an e-commerce platform.

- **Primary stakeholders**: The **customers** who will use the virtual assistant to get help with their orders, product recommendations, or refunds.

- **Secondary stakeholders**: The **company's customer service team,** who benefit indirectly by saving resources, reducing workload, and improving efficiency.

Can you think of a potential conflict?

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Stakeholders in conflict

- **Primary stakeholder need (customers)**: The customers want the virtual assistant to provide fast, accurate, and personalized responses. They expect human-like interaction, quick resolutions, and clear communication for their inquiries.

- **Secondary stakeholder need (company/management)**: The company, aiming to reduce operational costs, wants the virtual assistant to handle as many interactions as possible without escalating to human agents. They focus on automating a wide range of customer queries, sometimes prioritizing efficiency over depth of personalization.

Stakeholders in conflict

- Customers may become frustrated if the virtual assistant is overly automated and rigid in its responses, especially when handling complex or unusual queries. They may feel the interface lacks the human touch and fails to address their unique issues, which could lead to dissatisfaction.

- On the other hand, the company may resist adding too many advanced features that increase operational costs, such as more personalized responses, more training data for nuanced questions, or integrating human agents earlier in the process.

Resolution?

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Stakeholders in conflict

- A compromise could involve designing the user interface with an option to escalate more complex cases to human agents when necessary, meeting both customer satisfaction and efficiency goals.

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Requirements Elicitation Techniques

- Individual Interviews
- Group Meetings
- Storyboarding / Prototyping
- Questionnaires
- Observation / Ethnography / User-centered design
- Perform research
- Joint Application Development (JAD)

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Interviews

- User
- Buyer
- Expert

Structured
Unstructured
Semi-structured

Interviews with end users are often helpful. It's good to come prepared and think thoroughly otherwise it can be a back-and-forth discussion of what they want and what the developer can do.

Permission

Same as the one where the final product is going to be used in

Good Question: "What features or functionalities would you like to see in the new system that are currently lacking in the current one?"

Bad Question: "Would you prefer if we made the new system faster and easier to use?"

The key idea is that: can we translate the question or the answer to that question to a UI element or a meaningful requirement?

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Interviews

Pros:
- Richest form of information expression and capture
- Get customer buy-in

Cons:
- Time-intensive
- Social tensions – burnout, personality conflict, control
- Single-source of information

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Group Meetings

- customers

- cross-functional teams

- buyers

- experts

- focus groups

- etc

Semi-structured
- Want structured activities to facilitate unstructured conversations!
- The "workshop" concept vs. the "brainstorming" concept
- May be facilitated by groupware

Plan the meeting environment
Break-out rooms
Collaborative tools
Information capture tools
Distribute meeting notes
Consider assigning action items (if possible)
Consider establishing smaller followups – online tools?

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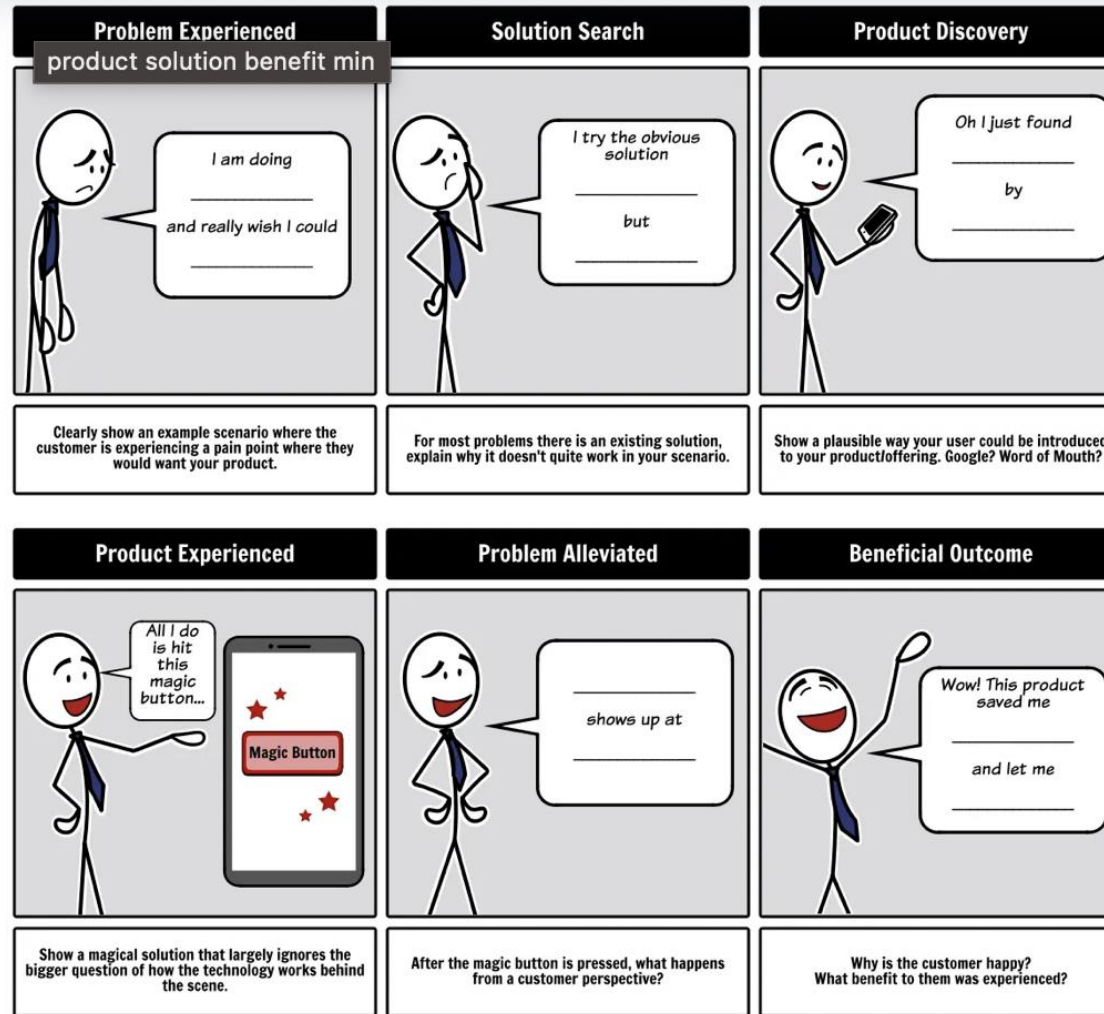
Group Meetings

Pros:
- Groups can be self-reinforcing, build consensus
- "Real-time" requirements validation

Cons:
- More complex to schedule and administer
- Social dynamics – who controls the meeting

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Storyboarding / Prototypes

https://careerfoundry.com/en/blog/ui-design/best-storyboard-examples/

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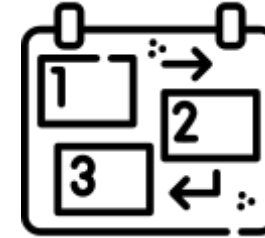Sciences, Konstantia Zarkogianni, IUI

Storyboarding / Prototypes

Modality:
- 2-way
- Participants are end-users
- Provides a structure for individual or group interaction
  - Storyboarding more conducive to small group interaction

How-to:
- Develop functionality based on vague requirements
  - Throw-away code!
- Present to end user for direct feedback
- Robustness of prototype needs only to be "sufficient to facilitate effective user feedback"
- Technology base is chosen based on Rapid Application Development (RAD) framework

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Storyboarding / Prototypes

Pros:

- Making the solution "visible" provides you a precise means of agreeing on things with the user
- May also facilitate your design and test cases

Cons:

- Cost to develop (need a RAD framework)
- May pigeon-hole user into early requirements commitments
- May pigeon-hole developers into early design commitments
- Throw-away solution becomes a big ball of mud

Questionnaires

- Determine your distribution list
- Repeat questions to ensure consistency
- Use careful vocabulary
- Validate questions and answers – try not to show bias
- Anonymity
- Ensure results are quantifiable

Good question: Please rate your level of agreement with the following statement: "Having real-time collaboration features in the new software is important for improving team productivity."

Bad question: "Would you prefer if the new system had more features?"

This is a bad question, because the answer will almost always end up being a "yes" without much thought behind it.

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Questionnaires

‣ Question types
  ‣ YES/NO
  ‣ Scale
    ‣ Likert
    ‣ Ranking
  ‣ Multiple choice
  ‣ Free text entry

‣ Easy to enter and analyze almost all question types

‣ Very useful when:
  ‣ Implementation is at a mature level and specific information/requirements is needed
  ‣ Large numbers of users are involved, in different locations.

Online questionnaires

- Rapid responses

- Lower cost

- Storage and processing
  - Easier
  - Faster
  - More accurate

- Can change easily

What is the main disadvantage of online questionnaires?

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Perform research

Information resources
- Market surveys
- Industry studies – association groups, market research, technical standards organizations, research community

Be aware of the "Google factor"
- Get expert guidance!
- Research as a team for common understanding

Taxonomies in technical and market space
(example: software project management)

Deployment Method
- Cloud-based
- On-Premises
- Hybrid

Platform Compatibility
- Windows
- Mac
- Linux
- Mobile (iOS, Android)

Industry Focus
Information Technology
Healthcare
Education
Finance
Manufacturing

Perform Research

Pros:
- 0-way means it can be planned and executed individually (or in small teams)
- Immediate understanding of current practices

Cons:
- May build a bias toward one solution space
  - You are not supposed to write your own requirements!
- Time to tackle the learning curve

- Again, goal is to learn enough to facilitate communication using one of the other methods, not to write your own requirements!

Observation

Also called "ethnography"

Modality:
- 1-way communication
- Real-time vs. video capture vs. event capture
- Staged environment versus real environment

How-to:
- Determine modality – will you observe live or capture via video or some other technology
- Review organizational & regulatory policies, NDAs, etc.
- Embed into environment with minimal intrusion

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Observation how to (cont)

- The Goetz and LeCompte (1984) framework:
  Who is present?
  What is their role?
  What is happening?
  When does the activity occur?
  Where is it happening?
  Why is it happening?
  How is the activity organized?

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Observation

Pros:

- Observing how customer works allows you to see how the technology can assist.

Cons:

- Time-consuming
- Persons being observed will not behave "naturally" (Hawthorne effect)
- Could disrupt others' work
- To Note:
  - Ethnography is a well-known elicitation technique in research circles, and may be suitable for inception
  - Requirement elicitation using ethnography is often too time-consuming, too disruptive – simply too awkward

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Joint Application Design

Modality
- Multi-way: customers, users, designers, and experts
- A cross between group meetings and prototypes
- The stakeholders are part of the development team

How-to:
- Carefully assemble a team
- JAD sessions require a clear statement of the purpose of the session and its goals.
- JAD sessions are usually run by a facilitator who keeps the participants focused.
  - Can have observers, but observers must remain silent according to the rules of JAD.
- Ensure roles are blurred – everyone is a peer and everyone's opinions are important. Design is not just for the designers

Joint Application Design

Pros:

- Workshop-type feel facilitates participation
- All stakeholders feel ownership and teamwork
- All concerns laid out on the table

Cons:

- Requires a skilled facilitator
- Social issues – some individuals may dominate
- Consensus building can be difficult in a large group

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Which technique to choose

▶ Depends on the stage of the design/maturity of prototype
▶ Disposable time
  ▶ Of the users
  ▶ Of the designers
▶ Disposability of physical location
▶ Depends on the design strategy
  ▶ Sequential
  ▶ Overlapping steps
▶ Type of information required
  ▶ Details
  ▶ Accuracy
  ▶ Volume
▶ Depends on the designers themselves

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General guidelines

▶ Place emphasis on users/stakeholders needs
  ▶ Analyze all types of users and stakeholders
  ▶ More than one representative per group

▶ Always ideal to conduct more than one researches of different type
  ▶ Having users interact with prototypes is always a good strategy: comments and feedback are more targeted

▶ Always test the technique (e.g. whether online system works as desired from the very beginning to the very end)

▶ When time or resources dictate a compromise in the amount or depth of data collection or analysis, it should be logical and must not allow high statistical errors.

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