User needs analysis – a precondition for validation planning

Elke-Maria Melchior

ACit – Advance Concepts for interactive technology GmbH
Overview

- Introduction
- User requirements analysis and related approaches
- Who needs the results? What for?
- Eliciting and analysing user requirements
- Exploit results from market research
- Benchmarking
- Types of user requirements
- Useful techniques to analyse user requirements
- Effectiveness of user requirements analysis
- Conclusions
Introduction

• The bottleneck of technology oriented enterprises

• in the past: to deliver products in time and with sufficient quality

• now: to face strong competition on the basis of price and quality

• → Develop products and services that meet the expectations of users and customers
Early feedback is more valuable
User-centred design

- Focus on users’ perspectives, needs and requirements, goals
- Iterations of design → test & evaluation → re-design cycles
  - Coupling of design and evaluation
  - Validation of design concepts & prototypes with users
- Allocation of functions between computer and user (e.g., minimize users’ workload)
- Interdisciplinary design team
  - Domain experts (users)
  - Usability experts
  - Technology experts
  - Authors and editors
  - Media experts
  - Designers
  - etc
Mobile applications

• Diverse products and services
  – Design, authoring and content management tools
  – Cross-media publishing tools
  – Virtual reality and personalisation tools and agents
  – Electronic information

• Variety of users
  – Technology users in the value chain and end users
  – Business users and individual consumers
  – ‘Design for all’

• Critical success factors and quality requirements are different for specific development projects
  ➔ Different methods for user-centred product creation and user validation may be appropriate
  ➔ VNET resources (www.vnet5.org) help with the selection of methods
• **User validation**
  - the assessment of the quality of use of a product or service for specified users who want to achieve specific goals in a specific environment
  - the user validation process consists of planning user validation and carrying out validation activities

• **Deviations from plan cannot be predicted**

• **However, with a plan they can be controlled.**

• **Advantages of having a user validation plan**
  - evaluate the initial plan before committing yourself to it
  - simulate different ways of performing user validation and compare these, until the most effective and efficient approach is found
  - formal schedules help to identify critical factors
  - the plan is a powerful persuader in engendering a commitment amongst the project participants or the development team
**Schematic Plan for User Validation**

**Define Vision**
- Objectives of the development project
  - Validation scenario
    - Users, tasks, context of use
      - Critical success & quality factors
        - Select appropriate methods & resources, set up validation plan
          - Do the validation, analyse data, report results
            - Goals achieved?
              - No
              - Yes, Archive information for reuse, reference values

**Analyze User Requirements**
- Design & Prototype
  - Analyse User Requirements
    - Design & Prototype
      - Evaluate
        - Goals achieved?
          - No
          - Yes

**Build & Implement**
User needs analysis and related approaches

- **Traditional requirements analysis does not necessarily lead to understanding the users**
  - Systems analysis
  - Requirements-gathering sessions including a user representative on the team
  - Focus on functionality rather than usability

- **User needs analysis**
  - Focus on demands of users for content, quality, non-functional requirements and functionality

- **Market analysis**
  - Focus on demands of customers, cost / benefit

- **Benchmarking**
  - Focus on strengths and weaknesses of existing products or services competing for the same users
Who needs the results? What for?

• Good products and services are achieved when all members in the development team understand the needs of prospective users as well as constraints of the technology

• Objectives of user needs analysis
  - To provide input to user requirements specification
  - To provide input to user interface design and development
  - To identify criteria for user validation
Eliciting and analysing user needs

Define vision
- confirm business goals
- involve stakeholders
- develop initial concept
- plan user validation

Market Research

User and Task Analysis, Contextual Inquiry

Analyze user needs and requirements
- users, context, tasks, scenarios
- usability and quality goals

Design and prototype
low fidelity > high fidelity

Evaluate
- test usability and quality against goals

Build and implement validated design
- user test & monitor (input for next release)
Exploit results from market research

- Use results from market research for relevant information about user needs & preferences
  - demand for functions; customer preferences
  - acceptable prices and thresholds; purchasing behaviour
  - demographic aspects

- Marketing provides the link between product creation and customers
  - initial requirements elicitation

- Marketing department may have information about real users which can be used to recruit users for:
  - user requirements analysis
  - user-centred design
  - test and validation
Benchmarking

- **Principle:** To measure and compare performance parameters, strengths and weaknesses of existing products competing for the same users
  - traditional information products
  - currently available electronic information products and services
  - all representative applications which are considered a major competition

- **Benchmarking results set goals for design**
  - Baseline
  - Indications for where better solutions may be needed

- **Time consuming and costly**
Types of user requirements

• Functional requirements
  – Goals users want to reach and tasks they want to perform
  – Information needs
  – Modes of access to information
  – Transactions, modifications, delivery

• Non-functional requirements
  – Aesthetics and branding of product
  – Characteristics of users
  – Context of use, environment
  – New business and payment models, cost
  – Legal issues, intellectual property rights
  – Security, privacy
  – Trust and safety
  – Personalisation, customisation
Users, Tasks, Context of Use

• Who will use the service / product ?
  – end users, users of technology, other stakeholders
  – identify relevant characteristics of prospective users
  – special needs of users (“design for all”)

• Who will make the purchase decision ?
  – customers may not use the service / product

• What will they use it for?
  – identify the goals and tasks users want to achieve
  – scenarios, workflows, use cases
  – tasks vs procedures, task frequency, sequential/parallel execution

• Where will they use it ?
  – at the workplace, in public places, at home, ...
  – noisy environment, lighting conditions, ...
  – hw / sw platform
User analysis

- **Identify user profiles:** specific descriptions of relevant characteristics of the intended user population
  - Consider users and other stakeholders
  - Application proficiency; IT knowledge
  - (Task) Domain knowledge and experience
  - Education
  - Special needs

- **User Profiles can be determined empirically**
  - Establish agreement about high priority users

- **Methods for user analysis**
  - Checklists, questionnaires, observation, interview, focus group analysis
Task analysis

- **Distinction between tasks and activities is crucial**
  - Tasks: goals the user wants to achieve
  - Activities: user procedures (e.g., command sequences)
  - Using descriptions of action sequences for the design of innovative products or services is often misleading.

- **Tasks analysis involves understanding and abstraction of:**
  - Why does the user perform certain activities?
  - Current workflow and collaboration with other individuals
  - What are the constraints and user preferences?
  - Trade-offs between different products or services (time vs. cost)

- **Methods for task analysis**
  - Hierarchical Task Analysis (HTA); Task Analysis for Error Identification (TAFEI);
    Scenarios, Use Cases
What to ask? ... results may comprise ...

- Why ... ? ... to understand the underlying goals
- How ... ? ... to understand the steps in carrying out tasks; process direction: input from or output to user; process discreteness: separate steps or actions
- When ... ? ... to understand what triggers the task; locus of control: user or process driven
- How often ... ? ... to identify frequent and infrequent activities; frequency of use; processing rate: transactions per interval
- What do you call that? ... to discover terminology used
- What errors typically occur? How do you discover and correct these errors? ... operational risk: consequences of error or failure
- Are there any exceptions to normal procedures? ... process variability: unpredictability or ad hoc
- What things would you most like changed?
- Do you have any specific ideas for design / improvement?
Concreate vs abstract results

- Scenarios are concrete, specific, but “typical” or representative descriptions
  
  Michael Williams connects to the internet, keys the URL “www.vnet5.org”, clicks to “members login”, gets “enter user id and password” prompt and keys “micky” and “vnet5x”

- Generic use cases describe generic scenarios, specific interaction with a given user interface
  
  VNET5 member keys URL, selects login link, reads prompt, keys ID and password

- Generalised use cases describe abstract interaction
  
  Request VNET5 support, identify self, access information
Context of use analysis

• **Physical constraints**
  - Location / portability
  - Ambient noise
  - Lighting
  - Vibration
  - Contaminants

• **Interface device constraints**
  - Limitations or constraints in input and display hardware
  - Keypad limits
  - Screen size and resolution; monocrome display
  - Platform

• **Methods**
  - Checklists, questionnaires
Overview of useful methods

Informal approaches

- Observation
- Interview
- Document analysis
- Focus group techniques
- Questionnaires
- Checklists (e.g. for context of use)
- Story boarding
- Paper prototyping
- Scenario requirements analysis (SCRAM)
- Server log analysis

Formal approaches

- Hierarchical Task Analysis (HTA)
- Task Analysis for Error Identification (TAFEI)
- Use Cases
- Positioning / Customer analysis

- Contextual analysis & design (ethnographic approach)
Effectiveness of requirements analysis

- Effectiveness depends on the type of project

**Consumer products**
- Consumers have no real understanding of the innovative product or service
- They find it difficult to predict and express their needs
- Creativity of designers is required
- Much effort is required with high risk of failure

**Professional applications**
- Professionals are available for thorough task & work flow analysis

**Safety critical applications**
- Precise definition of tasks and procedures before building new tools

**Administration and governments**
- Standards are of importance; determine minimum requirements

**Mobile applications**
Conclusions

- User needs analysis is an error prone part of the development process
  (people don't really know what they want until they try it!)

- User needs not elicited at an early stage in the development process may lead to expensive failures of products or services later

→ Verify user needs with design solutions and prototypes