Recap – User Centred Design

Good Design Is Not…

NOT just applying checklists and guidelines

- These can help, but NOT using oneself as the model user
- Know your real users; recognize variation in humans

NOT just common sense

- Knowing how to design a fire alarm so it will be heard over background noise is not something we all know
- The specialist knows where or how to get the information needed to answer design questions

User Centered Design

- A way to force yourself to identify and consider the relevant human factors in your design
- An approach that supports the entire development process with *user-centred* activities
  - create applications which are easy to use and are of added value to the intended users

UCD: 9 Step Overview

- 1. Define the Context
- 2. Describe the User
- 3. Needs Analysis and Task Analysis
- 4. Function Allocation
- 5. System Layout / Basic Design
- 6. Mockups & Prototypes
- 7. Usability Testing
- 8. Iterative Test & Redesign
- 9. Updates & Maintenance

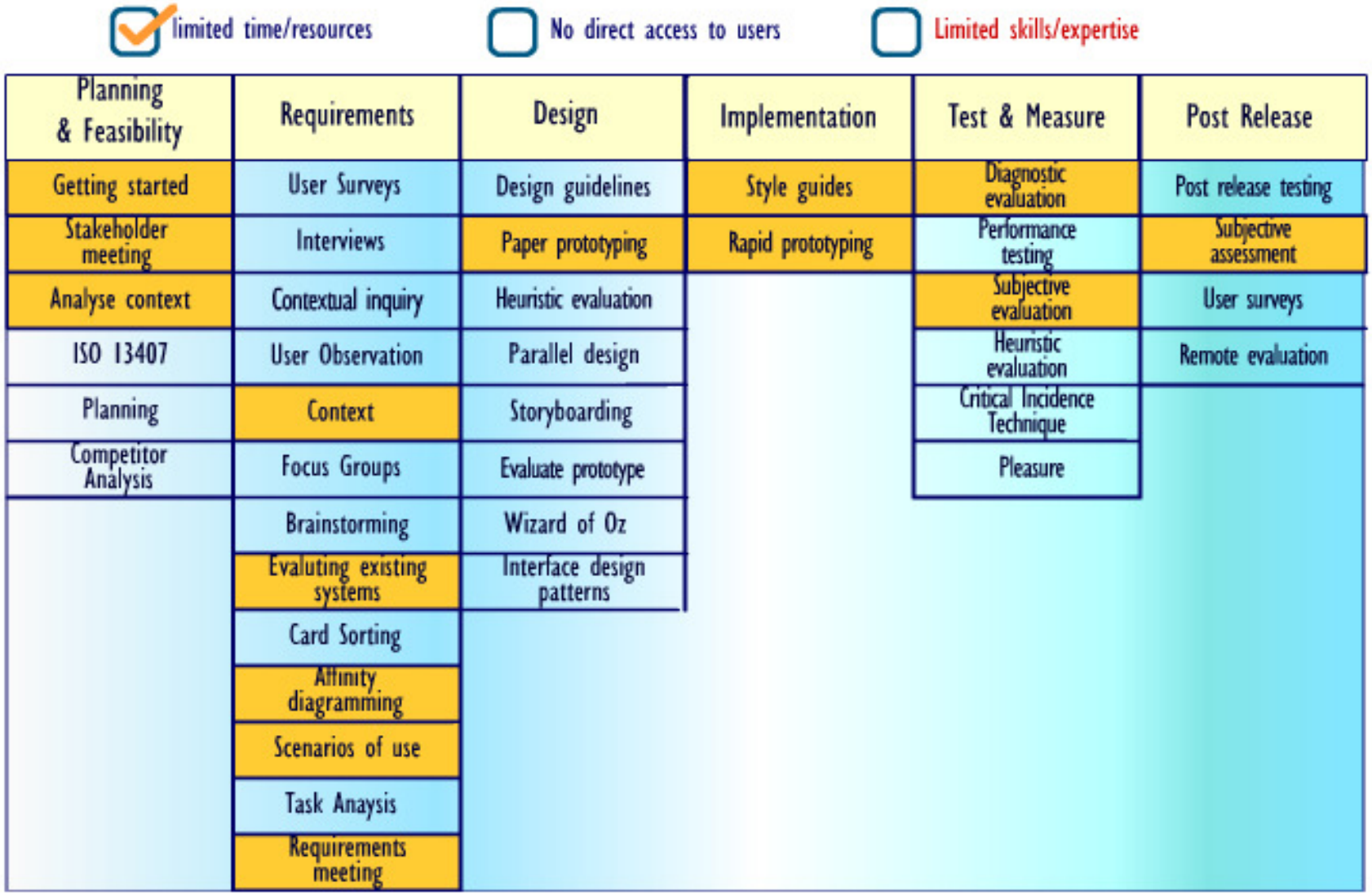
Is UCD always iterative?

- Not necessarily
  - *in principle* applicable to a 'waterfall' development
  - at its best in an *iterative* development environment
- Iteration can take place:
  - ‘in the small’
    - within each stage
  - ‘in the large’
    - the whole development cycle
- ‘Right first time’ concept is a dangerous myth!

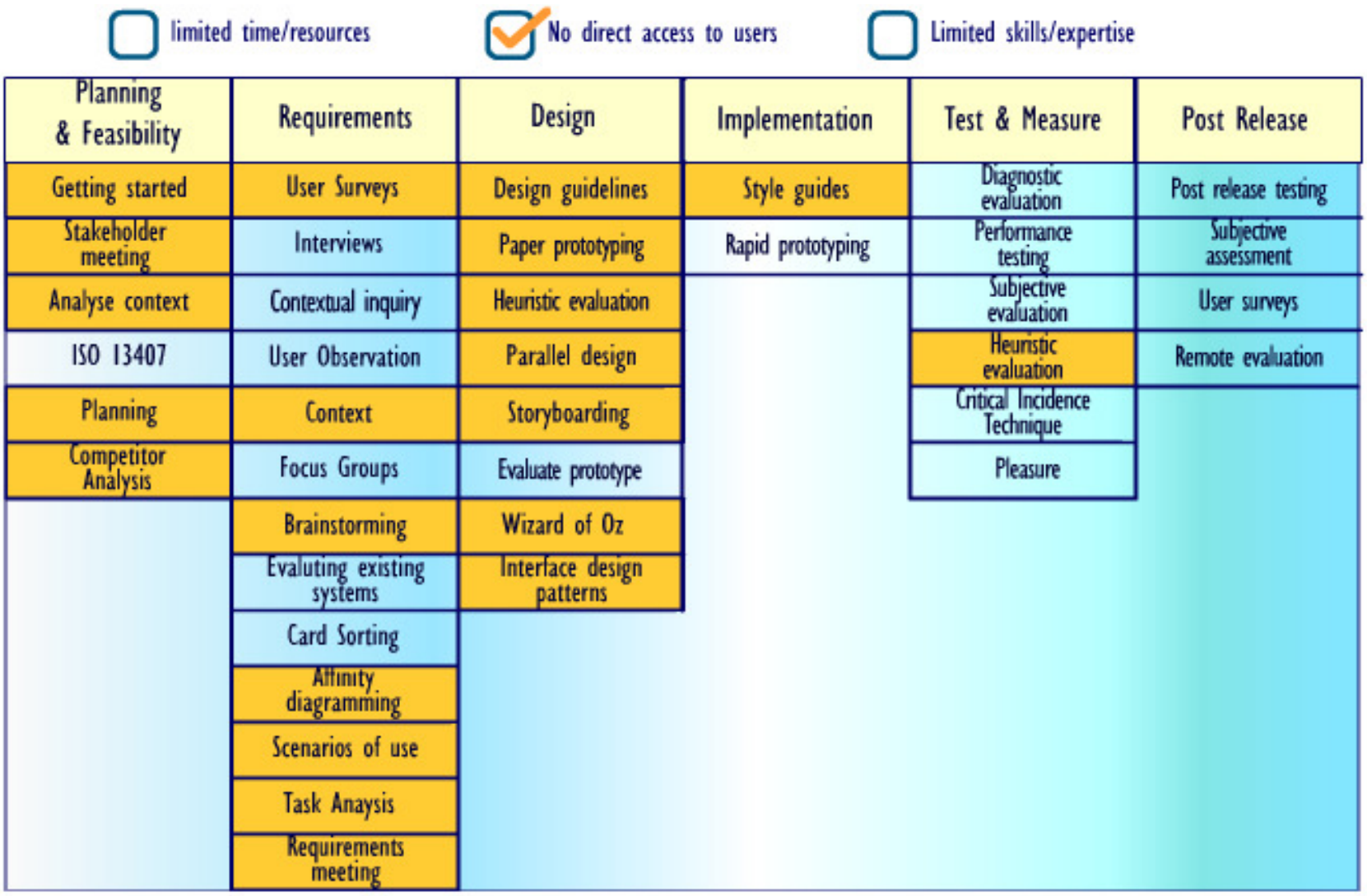
Usability Methods

- Methods to use along the way
  - Mentioned earlier
    - Analytic Evaluation
    - Expert (Heuristic) Evaluation
    - Observational Evaluation
    - Survey Evaluation
    - Experimental Evaluation
  - More methods, for different stages
    - NOTE: Not all are *evaluation* methods

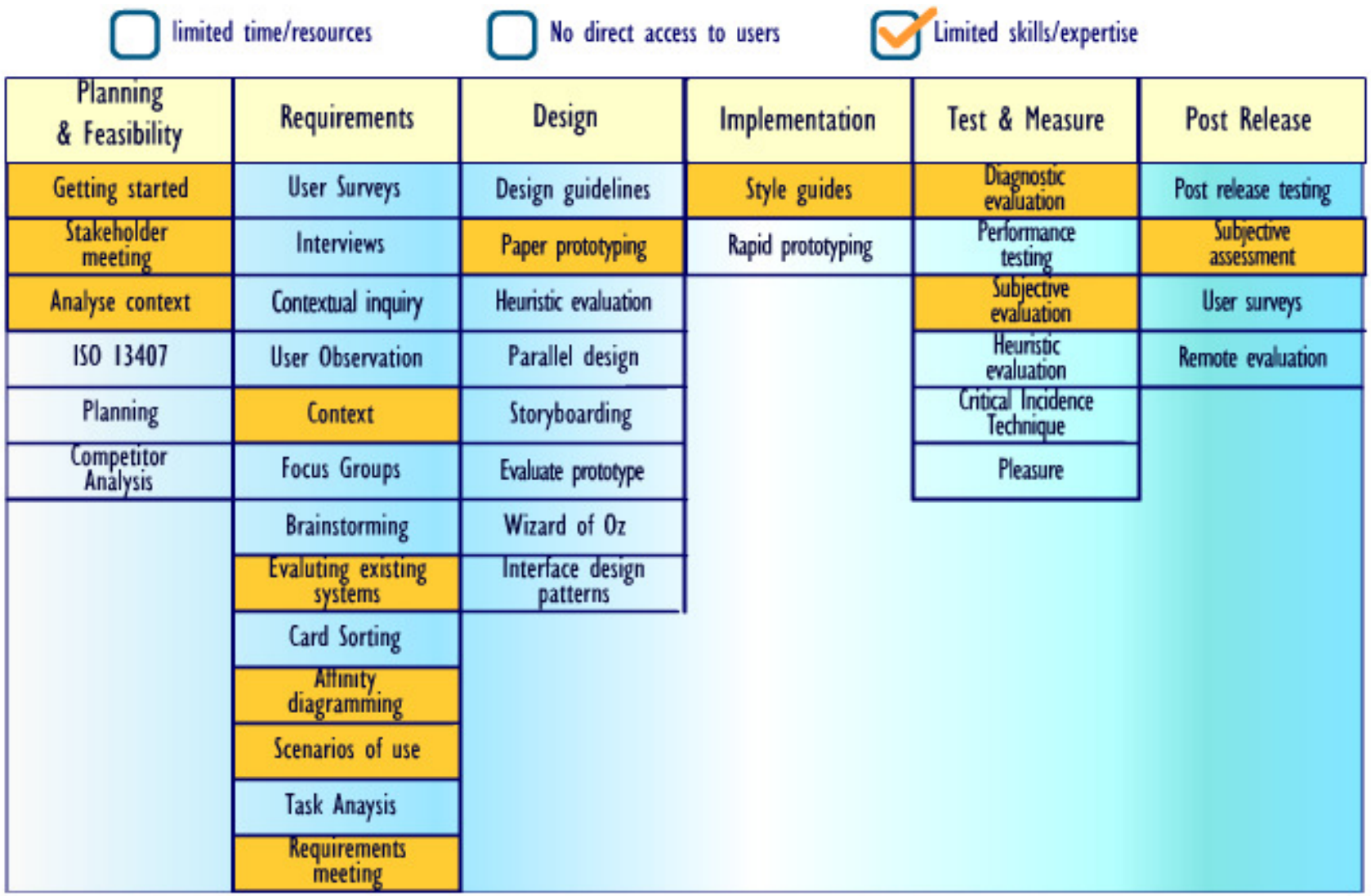
Methods Table 1/3
(here and further ©UsabilityNet 2006)



Methods Table 2/3



Methods Table 3/3



1 out of 6: Planning and Feasibility

Requirements – Design – Implementation - Testing and measurement - Post release

- Stakeholder meeting
- Analyse the intended context of use
- Create a usability plan based on ISO 13407
- Competitor analysis

Stakeholder meeting

- Strategies
  - derive usability objectives from business objectives
  - gain commitment to usability
- Benefits
  - Collects information about the purpose of the system and its overall context of use
  - Identifies all relevant factors before design work starts
  - Brings together all the people relevant to the development
    - common vision

Stakeholder Meeting Example Qs

- Why is the system being developed? What are the overall objectives? How will it be judged as a success?
- Who are the intended users and what are their tasks? (Why will they use the system? What is their experience and expertise?)
- Who are the other stakeholders and how might they be impacted by the consequences of a usable or unusable system?
- What are the technical and environmental constraints? (What types of hardware will be used in what environments?)
- What key functionality is needed to support the user needs?
- How will the system be used? What are typical scenarios of what the users can achieve?
- What are the usability goals? (e.g. How important is ease of use and ease of learning? How long should it take users to complete their tasks? Is it important to minimise user errors? What GUI style guide should be used?)
- How will users obtain assistance?
- Are there any initial design concepts?
- Is there an existing or competitor system?

Analyse Context of Use

- Fewer people involved
- Information on
  - Who are the intended users and what are their task? (Why will they use the system? What is their experience and expertise?)
  - What are the technical and environmental constraints? (What types of hardware will be used in what organisational, technical and physical environments?)
- Maybe arrange for a field study to observe users
- Benefits
  - Identifies all relevant factors before design work starts
  - Provide a basis for designing later usability tests

Brainstorming

- One of the oldest known methods for generating group creativity
  - The first phase generates ideas
  - The second phase evaluates them
    - An experienced facilitator is useful
- Benefits
  - Everyone gains understanding of problem space
  - Also, feeling of common ownership of results
- Drawbacks (?)
  - Individuals working alone can generate more and better ideas than when working as a group

ISO 13407
ISO TR 18529

1	**Ensure HCD content in system strategy**
1.1	Represent stakeholders
1.2	Collect market intelligence
1.3	Define and plan system strategy
1.4	Collect market feedback
1.5	Analyse trends in users
2	**Plan and manage the HCD process**
2.1	Consult stakeholders
2.2	Identify and plan user involvement
2.3	Select human-centred methods and techniques
2.4	Ensure a human-centred approach within the team
2.5	Plan human-centred design activities
2.6	Manage human-centred activities
2.7	Champion human-centred approach
2.8	Provide support for human-centred design
3	**Specify the stakeholder and organisational requirements**
3.1	Clarify and document system goals
3.2	Analyse stakeholders
3.3	Assess risk to stakeholders
3.4	Define the use of the system
3.5	Generate the stakeholder and organisational requirements
3.6	Set quality in use objectives
4	**Understand & specify the context of use**
4.1	Identify and document user's tasks
4.2	Identify and document significant user attributes
4.3	Identify and document organisational environment
4.4	Identify and document technical environment
4.5	Identify and document physical environment
5	**Produce design solutions**
5.1	Allocate functions
5.2	Produce composite task model
5.3	Explore system design
5.4	Use existing knowledge to develop design solutions
5.5	Specify system and use
5.6	Develop prototypes
5.7	Develop user training
5.8	Develop user support
6	**Evaluate designs against requirements**
6.1	Specify and validate context of evaluation
6.2	Evaluate early prototypes in order to define the requirements for the system
6.3	Evaluate prototypes in order to improve the design
6.4	Evaluate the system to check that the stakeholder and organisational requirements have been met
6.5	Evaluate the system in order to check that the required practice has been followed
6.6	Evaluate the system in use in order to ensure that it continues to meet organisational and user needs
7	**Introduce and operate the system**
7.1	Management of change
7.2	Determine impact on organisation and stakeholders
7.3	Customisation and local design
7.4	Deliver user training
7.5	Support users in planned activities
7.6	Ensure conformance to workplace ergonomic legislation

Table 1. Human-centred design processes and their base practices

Competitor analysis

- Identifies the strengths and weaknesses of competing products or services before starting work on prototypes
  - A 10 minute tour of each of 4 to 10 of the most popular products
  - The competitive advantages of each product are discussed
  - Short summary of the market position is generated
  - Alternatives: market surveys, lab tests of competitor products
- Benefits
  - Discover the strengths and weaknesses of competing products/services
  - Develop list of issues that need to be addressed in order to compete effectively
  - Gain consensus among a group of project stakeholders
  - May also result in a list of desirable features that the new product could include

2 out of 6: Requirements

- Ensure that user and usability requirements are well defined and integrated into relevant product requirements specification
  - Collect information about the user interface, users, tasks and environments
    - surveys, interviews, contextual inquiry or observation of users in a field study
    - user participation in context of use analysis, focus groups or brainstorming
    - evaluating an existing system
  - Structure information
    - card sorting or affinity diagramming, create scenarios of use
  - Agree what aspects should be formalised as requirements: requirements meeting

2 out of 6: Planning and feasibility – Requirements –

Design – Implementation - Testing and measurement - Post release

- Surveys
- Interviews
- Contextual inquiry
- Observation of users
- Context of use
- Focus groups
- Brainstorming
- Evaluating an existing system
- Card sorting
- Affinity diagramming
- Scenarios of use
- Task analysis
- Requirements meeting

User survey for design

- How is the software or web site likely to be used by a specific set of users?
- Who are these users likely to be?

- The answers user surveys provide must be relevant to the issues that are important to the *design* team
  - Traditionally carried out by post
  - Increasingly, over the internet

Interviews

- Discovering facts and opinions held by potential users of the system being designed

- Difficulties – Time
  - usually one interviewer speaking to one informant at a time
  - reports of interviews have to be carefully analysed and targeted to ensure they make their impact
    - Otherwise the effort is wasted
- Benefits
  - one-to-one nature: can address directly the user's concerns
  - mistakes and misunderstandings can be quickly identified

Contextual inquiry

- Specific type of interview for *field data* from users
- Usually done by one interviewer speaking to one interviewee (person being interviewed) at a time
- Gather as much data as possible from the interviews for later analysis
- Benefits
  - Interviewees are interviewed in their context, when doing their tasks, with as little interference from the interviewer as possible
  - Data should be gathered during interviews with little or no analysis, interview should result in raw data

User observation/field studies

- Investigator viewing users as they work; taking notes on the activity that takes place
  - Direct observation (investigator is actually present during the task)
  - Indirect observation (task is viewed by some other means such as through use of a video recorder)
- Useful early in user requirements stage for obtaining qualitative data
- Also useful for studying currently executed tasks and processes
- Benefits
  - View what users actually do in context
  - Direct observation: focus attention on specific areas of interest
  - Indirect observation: captures activity that would have gone unrecorded or unnoticed
- Drawbacks
  - Observation can be obtrusive
  - Observer effect
  - Co-operation of users is vital, so the interpersonal skills of the observer are important
  - Notes and videotapes need to be analysed *by the note-taker*:
    - time consuming
    - prevents the task being split up for analysis by a number of people.

Analyse context of use (again)

- Collect and agree detailed information about
  - Who are the intended users
  - What are their tasks?
    - Why will they use the system? What is their experience and expertise?
- What are the technical and environmental constraints?
  - What types of hardware will be used in what organisational, technical and physical environments?
- Essential input to requirements and the planning of other usability methods
- May be collected at an early stage during planning and feasibility, or in more detail as part of the usability requirements.
- Benefits
  - Ensure that all factors that relate to use of the system are identified before design work starts.
  - Provide a basis for designing later usability tests

Focus groups

- Informal assembly of users whose opinions are requested about a specific topic
- The goal is to elicit perceptions, feelings, attitudes, and ideas of participants about the topic
- Focus groups are generally NOT appropriate for evaluation
- Benefits
  - Individuals come together and express diverse views on the topic
    - find the range of views, but also for the participants to learn from each other, and to generate a sense of social cohesion.

Brainstorming…

Evaluate existing system

- Evaluation of an earlier version or competitor system to identify usability problems and to obtain baseline measures of usability
- Benefits
  - Identifies problems to be avoided in the design of the new system
  - Provides measures of effectiveness, efficiency and satisfaction which can be used as a baseline for the new system
- Method
  - Select the most important tasks and user groups to be tested (based on the context of use study). If possible, evaluate the system using the method for usability testing

Card sorting

- Discover the latent structure in an unsorted list of statements or ideas
- The investigator writes each statement on a small index card and requests six or more informants to sort these cards into groups or clusters, working on their own
- The results of the individual sorts are then combined and if necessary analysed statistically
- Benefits
  - If the informants are representative of the user population for whom the application is being designed, then the result will reflect the structure in which the users expect the ideas or concepts should be presented

Affinity diagramming

- Sort large amounts of data into logical groups
- Existing items and/or new items identified by individuals are written on sticky notes which are sorted into categories as a workshop activity
- Affinity diagramming can be used to
  - analyse findings from field studies
  - identify and group user functions as part of design
  - analyse findings from a usability evaluation
- Benefits
  - simple and cost effective technique for soliciting ideas from a group and obtaining consensus on how information should be structured
- Method: Planning
  - Arrange a meeting of participants with the relevant expertise that will last one to two hours
  - Write any existing items on sticky notes.
  - Use a room where you can fix flip chart paper to the wall using Blue Tack
  - Different colours of sticky notes

Scenarios of use (Use cases) 1

- Specify how users carry out their tasks in a specified context
- Provide examples of usage as an input to design
- Provide a basis for subsequent usability testing
- User- and task-oriented use cases
- Benefits
  - Encourages designers to consider the characteristics of the intended users, their tasks and their environment
  - Usability issues can be explored at a very early stage in the design process (before a commitment to code has been made)
  - Can help identify usability targets and likely task completion times
  - Promotes developer buy-in and encourages a UCD approach
  - Scenarios can also be used to generate contexts for evaluation studies
  - Only minimal resources are required to generate scenarios
  - Can be used by developers with little or no human factors expertise

Scenarios of use (Use cases) 2

- Method
  - An experienced moderator is recommended for the sessions in which the scenario is explored
  - Gather together the development team and other relevant stakeholders
  - Identify intended users, their tasks and the general context
    - This information will provide the basis for the scenarios to be created by the development team
  - Functionally decompose user goals into the operations needed to achieve them
  - Consider which activities should be performed by the user and which by the computer
  - Create an outline of the users' activities, goals and motivations for using the system being designed, and the tasks they will perform
  - To maintain design flexibility, scenarios should not specify what product features are used
  - Assign task time estimates and completion criteria as usability targets
  - The session can be videotaped for later review or transcribed for wider distribution
  - The results from scenario building sessions can be used to plan user-based evaluations

3 out of 6: Planning and feasibility – Requirements – Design – Implementation - Testing and measurement - Post release

- Design guidelines
- Create and develop design ideas using multidisciplinary input.
- If necessary allocate tasks between humans and machines
- Visualise design ideas using sketches, models and simulation/dynamic prototypes
- Consider using parallel design.
- Evaluate design ideas with a few typical users. Get them to carry out typical simulated/real tasks, using methods that may include storyboarding or wizard of oz.
- Expert or heuristic evaluation may also be used.
- Feed the results back into the design process quickly.
- Iterate the process of design - evaluation until design objectives are fulfilled.

Design Guidelines

- “Visibility, Feedback, Constraints, Consistency, Affordances”
- Heuristic rules (e.g., from B. Shneiderman or from J. Nielsen)
- Design guidelines for the Web
- Accessibility guidelines
- …

Design Guidelines for the Web

- Site Structure and content
  - What information content does the user need at what level of detail?
  - Use terminology familiar to the user
  - Card sorting to design appropriate structure
- Support Navigation
  - Follow conventions, consistency
  - Home links, buttons, colour for links
  - Meaningful page titles(!)
- Page Design
  - Good home page, no scrolling
  - Minimize file sizes (min. load time)
  - Set image dimensions (easier page rendering)
  - No flashing, no animation, no sound on loading (!)
  - Check how it prints on “US Letter” and on A4 paper sizes

Accessibility guidelines: Web

- In detail: http://www.w3.org/TR/WAI-WEBCONTENT/full-checklist.html
- **Images & animations:** Use **alt** attribute to describe each visual
- **Image maps.** Use the client-side **map** and text for hotspots
- **Multimedia.** Provide captioning and transcripts of audio, and descriptions of video
- **Hypertext links.** Use text that makes sense when read out of context. For example, avoid "click here"
- **Page organization.** Use headings, lists, and consistent structure. Use **CSS** for layout and style where possible.
- **Graphs & charts.** Summarize or use the **longdesc** attribute
- **Scripts, applets, & plug-ins.** Provide alternative content in case active features are inaccessible or unsupported
- **Frames.** Use the **noframes** element and meaningful titles
- **Tables.** Make line-by-line reading sensible. Summarize

Paper prototyping

- (1)Clarify requirements and (2)Enable draft interaction designs and screen designs to be rapidly simulated and tested
- Up to 4 stages
  - concept design: to explore different metaphors and design strategies
  - interaction design: to organise the structure of screens or pages
  - screen design: for initial design of each individual screen
  - screen testing: to refine the screen layout
- Benefits
  - Usability problems can be detected at a very early stage in the design process before any code is written
  - Communication between designers and users is promoted
  - Paper prototypes are quick to build and refine
    - rapid design iterations
  - Only minimal resources and materials are required

Heuristic evaluation

- Specialists judge whether each element of a user interface follows a list of established usability heuristics
  - Usually 2–3 analysts evaluate system, noting down their observations and often ranking them in order of severity
    - The analysts are usually experts in human factors or HCI
    - But ‘non-experts’ have also been shown to report valid problems
  - Can be conducted at various stages of the development
    - preferable to have already performed context analysis to help experts focus on actual / intended usage
    - beneficial on early prototypes before actual users are brought in to help with further testing
  - Usability problems found are normally restricted to aspects of the interface that are reasonably easy to demonstrate: use of colours, lay-out and information structuring, etc.

- Benefits
  - Quick and relatively cheap feedback to designers; good ideas for improving UI
  - Good estimate of how much the user interface *can* be improved
  - Problems found by inspection methods and by performance measures overlap to some degree, although both approaches *will find problems not found by the other*
  - NOTE: The method can seem overly ‘critical’
    - designers may only get feedback on the problematic aspects of the interface
    - method is normally not used for the identification of the ‘good’ aspects

Parallel design

- Alternative designs, often interface designs, created by 2–4 design groups at the same time
- The design groups work independently of each other
  - No communication until after each presents a draft design in a design workshop
- Final design may be one of the designs or a combo of designs, taking the best features from each
- Benefits
  - Might *seem* like an expensive approach
    - BUT the many ideas are generated *without implementing* them
    - Allows a range of ideas to be generated quickly and cost effectively
  - Parallel nature of the approach allows several approaches to be explored at the same time, thus compressing the concept development schedule
  - Final solution can have benefits from *all* ideas proposed
  - Only minimal resources and materials are required to convey product feel
  - The technique can be utilised by those with little or no human factors expertise
- Limitations
  - Requires a number of design team members to be available at the same time to produce the concepts
  - Requires a lot of time to be invested over a short period for the design work to be carried out
  - Time must be allocated to compare parallel design outputs properly

Parallel design – Method

- Define the boundaries for the parallel design
  - Goal of system, tasks that it should support, user characteristics, etc
  - Each design team should receive the same set of requirements before start
  - Agree on the criteria by which the designs will be assessed
- Design teams should have roughly equivalent skills
- Each design teams may use whatever media they prefer to present their designs
  - Low level of prototyping is recommended
  - No extra points should be given for ‘sophisticated’ prototypes
- Decide beforehand how much time to allocate to the design work
  - set a clear time limit. 10–20 hours per group is often sufficient
- Allow sufficient time to carry out a fair comparison of the designs produced
  - Design workshop
  - Discuss each design separately
  - Then discuss how different aspects of the designs may be combined

Storyboarding

- Low fidelity prototype consisting of a series of screen sketches
- Used by designers to illustrate and organize their ideas and obtain feedback
- Particularly useful for multi-media presentations
- Benefits
  - Provides an overview of the system
  - Demonstrates the functionality of the storyboard elements
  - Demonstrates the navigation scheme
  - Can check whether the presentation is accurate and complete
  - Can be evaluated by users

Storyboarding – Method

- Use context of use and scenarios as input
- Brainstorm ideas, this may include lists, charts, doodles, and quick notes
- Select the best ideas
  - re-consider the project requirements, time&resource constraints, and the target audience and end users
- Select the top ideas and try to get feedback from others involved
- Sketch each screen, and describe any pictures, images, animations, sound, music, video or text

Evaluate prototype

- Participative user-based evaluation of a paper or machine prototype to identify usability problems, where the user is probed to explain their expectations and problems
- Storyboards or wizard of oz prototypes can also be evaluated
- Benefits
  - Potential usability problems can be detected at an early stage before development is complete
  - A deeper understanding of the users' expectations and impressions of the system

Evaluate prototype – Method

- Before
  - Select most important tasks and user group(s) to be tested (e.g. the most frequent or the most critical); 3–5 users are sufficient to identify the main issues
  - Consider using user-defined tasks
  - Produce task scenarios and input data and write instructions for the user
  - Invite developers to observe the sessions if possible OR videotape the sessions
- During
  - Do not give any hints or assistance unless the user is unable to complete the task
  - Observe the interaction and note any problems encountered
  - For a paper prototype, as the user selects options on each screen, the designer explains what happens, and either points to the next screen or presents the next screen to the user
  - The user may be prompted for their impressions of a page design, what they think different elements may do, and what they expect the result of their next action to be. The user may also be asked to suggest how individual elements could be improved
  - Interview the user to gain general opinions, and to ask about specific problems encountered
- After
  - Produce a list of usability problems, categorised by importance (use sticky notes to sort the problems), and an overview of the types of problems encountered

Wizard of Oz

- Enables unimplemented technology to be evaluated by using a human to simulate the response of a system
- Method
  - The "wizard" sits in a back room, observes the user's actions, and simulates the system's responses in real-time
  - For input device testing the "wizard" will typically watch live video feeds from cameras trained on the participant's hand(s), and simulate the effects of the observed manipulations
  - Often users are unaware (until after the experiment) that the system was not real
  - The "wizard" has to be able to quickly and accurately discern the user's input, which is easiest for simple for voice input or hand movements. The output must also be sufficiently simple that the "wizard" can simulate or create it in real time
- Benefits
  - This technique can be used to test device concepts and techniques and suggested functionality before it is implemented
  - find out the kinds of problems people will have with the devices and techniques
  - investigate aspects of the products form such as visual affordance (whether the product shows how it can be used)

Task allocation

- Allocation of tasks between humans and machines
- Identify which tasks can only be allocated to either the machine or human (mandatory allocation)
- Then provisionally allocate tasks on either a permanent and dynamic basis
  - Provisional allocation should then be evaluated and revised if necessary
- Benefits
  - Tasks should be allocated to humans and machines in a way that best combines human skills with automation to achieve task goals, while supporting human needs.

Task allocation – Method

- Before
- Context analysis and task analysis
  - task structure and demands, the knowledge needed to perform the tasks, environmental constraints, functional and safety requirements etc.
- Mandatory allocation
  - to humans due to technical infeasibility or ethical or safety considerations
  - to machines due to demands exceeding human capabilities or a hostile environment
- Provisional allocation
  - *Permanently allocate* tasks based on factors such as task criticality, cost, training or knowledge requirements, or task unpredictability
  - *Dynamically allocate* tasks based on factors such as human workload, the need for cognitive support, individual differences in users, changing capacity of the user, or learning
- Jobs must be designed from the tasks based on factors such as responsibility, task variety, interference between and within tasks, user communication, and individual capability
- Evaluation
  - The provisional allocations and jobs should be evaluated based on factors such as: safety, system performance, usability, cost, job satisfaction and human well-being, acceptance by users, management and society and social impact. The evaluation findings should be used to review and revise the provisional allocations which should then be re-evaluated.

4 out of 6: Planning and feasibility – Requirements – Design – Implementation - Testing and measurement - Post release

- Style guides and design guidelines
- Ensure that rapid prototyping activities incorporate usability

Style guides

- Style guides are used to provide a consistent look & feel
- Should be defined as part of usability requirements
- Conformance should be monitored during development
- How
  - Handbooks (e.g., by A. Cooper)
  - Style Guides (e.g., from Microsoft)
  - Design Principles (e.g., from J. Nielsen)

- Benefits
  - Style guides embody good practice in interface design
  - Following a style guide will increase the consistency between screens
  - Using a style guide can reduce the development time
  - Following general usability guidelines will improve the quality of the interface

Prototyping

- Paper prototyping
- Creation of an artefact that will eventually be discarded rather than becoming part of the final delivered software

- Benefits
  - Quick
  - Possible to evaluate many designs

5 out of 6: Planning and feasibility – Requirements – Design – Implementation - Testing and measurement - Post release

- **Diagnose usability problems**
  - user-based methods such as participatory evaluation, diagnostic evaluation, and critical incident analysis should be used when possible, supported by questionnaires to assess attitudes
  - these can be supplemented by expert or heuristic evaluation.
  - These methods should be used to improve early machine prototypes.
- **Evaluate if usability objectives have been achieved**
  - requirements for user performance and satisfaction can be evaluated by use of performance testing, cognitive workload and attitude questionnaires.
  - other usability objectives can be assessed by expert evaluation.

Participatory evaluation

- **Evaluation** of a paper or machine prototype to identify usability problems
- User is probed to explain their expectations and problems
- Users (*participants*, old: *subjects*) are an essential part

Diagnostic evaluation

- User based evaluation of a *working system*
  - primary objective is to identify usability problems
  - 3-5 users, 8: better results, more: complex systems
  - most frequent/important tasks
- **Benefits**
  - Major usability problems are identified
  - An understanding is gained of why the user has difficulties with the system
  - Approximate measures can be obtained for the users' effectiveness, efficiency and satisfaction

Critical Incident Technique Analysis

- CIT: end users asked to identify specific incidents they experienced personally and which had an important effect on the final outcome
  - Emphasis is on incidents rather than vague opinions
  - The context of the incident may also be elicited
- Data from many users is collected and analysed
- **Benefits**
  - Open-ended retrospective method of finding out what users feel are the critical features are
  - More flexible than a questionnaire or survey
  - Recommended in situations where the only alternative is to develop a questionnaire or survey from the start
  - Focuses on user behaviour, can be used in situations where video rec. is not practicable
- **Method**
  - Get a subjective report
    - minimize interference from stereotypical reactions or received opinions
  - User is asked to focus on one or more critical incidents which they experienced personally
    - A critical incident is defined as one which had an important effect on the final outcome
    - Critical incidents can only be recognised *retrospectively*
  - Then Content Analysis technique to summarise the experiences of many users or many experiences of the same user

Subjective Assessment (testing & post-release)

- Tells the evaluator how the users *feel* about the software being tested
  - Distinct from how efficiently or effectively they perform with the software
  - The usual method of assessment: standardised opinion questionnaire
    - to avoid criticisms of subjectivity

- Benefits
  - In a *discretionary* use scenario, user satisfaction is most probably the largest single key factor which will influence the users' decision whether or not to continue with the software
    - other factors: price, technology, brand loyalty
  - In a *mandatory* use scenario, poor satisfaction leads to absenteeism, fast staff turnover, and unrelated complaints from the workforce
  - Subjective Assessment *complements* data from efficiency and effectiveness measures
  - Usually produces a list of satisfying and unsatisfying software features which is especially useful if testing is taking place during development

Heuristic evaluation

- Use heuristic rules
- Quick and cheap
- **Expert evaluation** is similar, but does not use specific heuristics

Performance testing

- Rigorous usability evaluation of a working system under realistic conditions
  - Identifies usability problems; compares measures such as success rate, task time and user satisfaction with requirements
- Benefits
  - Major usability problems are identified that may not be revealed by less formal testing
  - Measures can be obtained for the users' effectiveness, efficiency and satisfaction
- Method
  - Select the most important tasks and user groups to be tested
    - (e.g. the most frequent or the most critical)
  - Select users who are representative of each user group
    - 3-5 users, 8: better results / more reliable measures.
  - Produce a task scenario and input data and write instructions for users

6 out of 6: Planning and feasibility – Requirements – Design – Implementation - Testing and measurement - Post release

- Monitor the usability of the system after release to ensure that it meets user needs in the field
- Can be used as an input to requirements for a new version or release
- Techniques for collecting user feedback
  - post release tesing
  - questionnaires to survey user satisfaction
  - remote testing
  - analysis of help desk calls
  - observing users

Post release testing and measurement

- Measurement involves sampling
  - Small subset of a large and usually indefinable population
- During development, user sample sizes are extremely small
  - order of 3 to 10 users
  - Testing procedures will usually focus on a small number of user tasks
    - BUT Product will often support large number of tasks
  - Task sample sizes will also be extremely small
    - Lack of confidence in measured values
- Can fix this later, with more users!

Remote evaluation

- Method where the evaluator and user participant are not in the same location
  - **Moderated,** with the evaluator observing the participant in real time
  - **Automated** or **unmoderated** with the participant working without direct observation or
- Wide number of detailed methods that collect a range of data
  - One extreme, there is little difference from in-person *task*-based lab testing, except that the *moderator* and participant are not in the same place
  - Other extreme, there are no user tasks at all, and the data collected is aggregated analytics
- **Qualitative (moderated)** methods using remote screen-sharing and audio: a participant and moderator work together in real time
  - Adobe Connect, GoTomeeting, NetMeeting, LiveLook, UserVue, Skupe, WebEx, Glance
- **Quantitative (unmoderated)**
  - Testing on live sites/apps. Tools include UserZoom, RelevantView, WebEffective
  - Testing wireframes. Tools include Chalkmark, Usabila
  - Testing conceptual artifacts. Tools include online *card sorting*, OptimalSort, WebSort
- **Quantitative**
  - User analytics on live sites. Tools include ClickTale, ClickHeat
  - A/B/C testing on live sites
  - Surveys

User observation/field studies

- Involve an investigator viewing users as they work in a field study, and taking notes on the activity that takes place
  - Direct
    - investigator is actually present during the task
  - Indirect