

Usability Design

– Integrating user-centered systems design in the software development process



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Tutorial at INTERACT 2003, Zürich, Switzerland

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Usability design – Integrating user-centered systems design in the software development process

Proposed Agenda

9.00 – The Start

- ❖ Welcome and presentation of participants
- ❖ Introduction and objectives for the tutorial
- ❖ Definition and key principles for UCSD

10.30 – Coffee

- ❖ Discussion of the principles
- ❖ A case study
- ❖ Championing usability

12.30–14.00 – Lunch

- ❖ Group exercise: rough project outline of a UCSD project / how can I apply the principles in my organization?
- ❖ Usability Design and Rational Unified Process (RUP)...

15.30 – Coffee

- ❖ Usability Design and Rational Unified Process (RUP), continued
- ❖ Wrapping up: Strategic UCSD
- ❖ Discussion, questions and hopefully some answers

17.30 – The End

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Usability design – Integrating user-centered systems design in the software development process

Jan and Bengt

Jan is an associate professor in HCI at Uppsala University. Participates in ISO's work on software ergonomics. Has done UCSD research since 1990.



Bengt is a licentiate in HCI at Uppsala University. Researcher (Ph.D.) and consultant at Enea Redina. Has practiced UCSD since 1984.

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Presentation of the participants

- ❖ Name, country
- ❖ Affiliation, company, university
- ❖ Education and experience
- ❖ Current position
- ❖ Current work situation
- ❖ Development process
- ❖ Technical platform (if applicable)
- ❖ Expectations



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People, not technology

“Innovation starts with people not enabling technologies or manufacturing plans or distributor preferences. If you forget this you risk delivering **feature-rich rubbish into already over-crowded lives.**”

(Richard Seymour, Design in Business Week 2001)

**Developing usable
interactive systems is
all about practicing
user-centered systems
design**

Is it really all that difficult?

- » The high-tech industry is in denial of a simple fact that every person with a cell phone or a word processor can clearly see: Our computerized tools are too hard to use. The software engineers who create them have tried as hard as they can to make them easy to use and they have made some minor progress. They believe that their products are as easy to use as it is technically possible to make them. As engineers, their belief is in technology, and they have faith that only some new technology, like voice recognition or artificial intelligence, will improve the user's experience.

Alan Cooper in "The inmates are running the asylum: Why high-tech products drive us crazy and how to restore the sanity", 1999, p. 15.

Do we need numbers?

- ❖ Eighty percent of software life cycle costs occur after the product is released, in the maintenance phase. Of that work, 80% is due to unmet or unseen user requirements only 20% of this is due to bugs or reliability problems.
Karat, C. (1993), Usability Engineering in Dollars and Cents, IEEE Software, May 1993, pp 89.
- ❖ After the New York Stock Exchange upgraded its core trading systems using user-centered design techniques, productivity rose dramatically and users' error rates fell by a factor of 10 even though workloads more than doubled.
Cited in Gibbs, W W (1997). Taking Computers to Task. Scientific America, July 1997.
- ❖ Norwich Union, an insurance company in Australia, found that calls to its help desk reduced dramatically by two thirds after one of its core applications was improved using user-centered design techniques.
Norwich Rethinks Customer Service, Computer World, 24 November 1995.

User involvement is central

In US 250 billion dollars is every year spent on 175 000 different IT-projects. 365 IT-companies with 8380 different IT-projects were analyzed in 1995.

- 31,1 % of the companies' projects were cancelled.
- 52,7 % were performed with changed plans.
- 16,2 % were performed according to plan.

On average the costs for the changing plans increased with 189 %. 81 billion dollars is every year spent on projects that never leads to any results.

CHAOS report, Standish Group, 1995 (www.standishgroup.com)

Swedish Work Environment Law (Ch.2, §1)

Arbetsmiljön skall vara tillfredsställande med hänsyn till arbetets natur och den sociala och tekniska utvecklingen i samhället

Arbetsförhållandena skall anpassas till människors olika förutsättningar i fysiskt och psykiskt avseende.

Arbetsstagaren skall ges möjlighet att påverka sin arbetsituation samt i förändring av eget arbete.

Teknik, arbetsorganisation och arbetsmetoder skall inte utsättas för fysiska eller psykiska olycksfall. Därvid skall även löneförhållanden, starkt styrt eller bundet arbete sk

Det skall eftersträvas att arbetet ger tillfälle till samarbete samt sammanhang mellan olika arbetsuppgifter

Det skall vidare eftersträvas att arbetsförhållandena ger möjlighet till personlig och yrkesmässig utveckling liksom till självbestämmande och yrkesmässigt ansvar.

The worker should be given the possibility to participate in the design of his/her own work situation and in changes and development that concerns the work.

User-Centered Systems Design

Donald Norman wrote back in 1986:

- ❖ “But user-centered design emphasizes that the purpose of the system is to **serve the user**, not to use a specific technology, not to be an elegant piece of programming. The **needs of the users** should dominate the design of the interface, and the needs of the interface should **dominate the design** of the rest of the system.”

Donald Norman, “Cognitive Engineering”, in D. A. Norman & S. W. Draper (eds.), *User Centered System Design*, 1986

E.g. John Karat’s view on UCD

- ❖ “For me, UCD is an **iterative process** whose goal is the development of **usable** systems, achieved through involvement of potential users of a system in system design.”

Karat, J. (1996) *User Centered Design: Quality or Quackery?*, in the ACM/SIGCHI magazine, *Interactions* July+August 1996.

- ❖ “I suggest we consider UCD an adequate label under which to continue to gather our knowledge of how to develop usable systems. It captures a commitment the usability community supports—that you **must involve users** in system design—while leaving fairly open how this is accomplished.”

Karat, J. (1997), *Evolving the Scope of User-Centered Design*, in *Communications of the ACM*, Vol. 40, No 7, pp. 33-38.

Lack of common definition of UCSD

- ❖ Usability engineering (Nielsen, Mayhew)
- ❖ Human-centered design (ISO 13407)
- ❖ Goal-directed design (Cooper)
- ❖ Usage-centered design (Constantine & Lockwood)
- ❖ Contextual design (Wixon & Holtzblatt)
- ❖ Customer-centered design (Beyer & Holtzblatt)
- ❖ Cooperative design (Scandinavian School) (Greenbaum & Kyng)
- ❖ Participatory design (Muller, Haslwanter & Dayton)



Objectives for the tutorial

- ❖ Be very specific on what is meant by UCSD.
- ❖ It is not about the design but rather about how to get there...
- ❖ Practice UCSD in your organization.
- ❖ Give you "tools" to work in a user-centered way.
- ❖ Give possibilities for the participants to share their experiences in working user-centered.

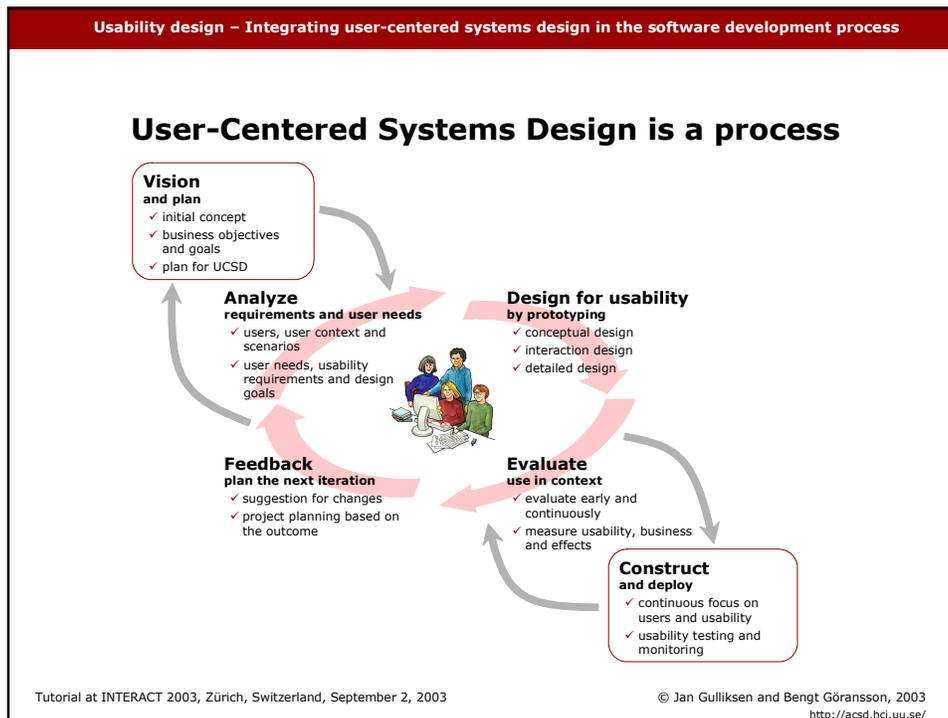
User-centered systems design Defined



User-centered systems design – UCSD

- ❖ Is not just a question of methods...
- ❖ Is not only “thinking” about users...
- ❖ Is not the search for the “ultimate truth” or reaching exact goals...
- ❖ Is not just a usability test...
- ❖ Is not just using Flash or some other fancy technique...
- ❖ Is not about a “design guru”, knowing everything...

**User-centered systems design
is about attitude and process!**



Usability design – Integrating user-centered systems design in the software development process

Usability

- ❖ People tend to believe that usability is something that can be added on. *That is not true!*
- ❖ The usability of a system is defined as:

"The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use."

ISO 9241-11 Guidance on usability

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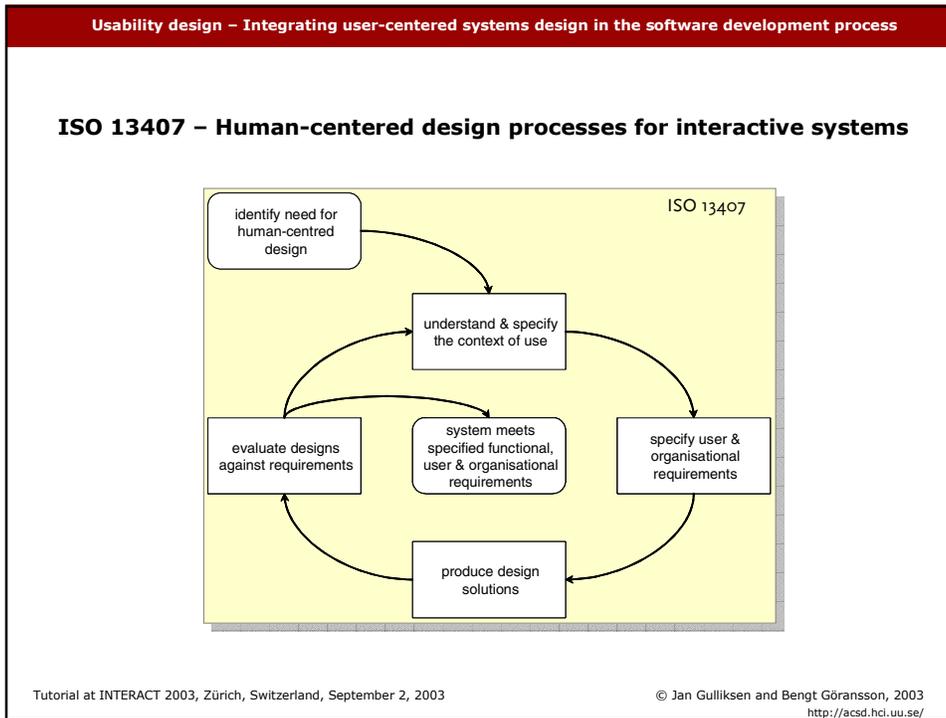
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Principles / Best practices / Success factors

- ❖ A **principle** is a commonly accepted fundamental rule or law from which other principles can be derived.
- ❖ We have identified a set of key principles or best practices for UCSD.

Background to the principles for UCSD

- ❖ IBM research: Gould, Boies & Ukelson (Lewis) 1983, 1985, 1988, 1997
 - Early – and continual – focus on users.
 - Empirical measurement.
 - Iterative design.
 - Integrated design – wherein all aspects of usability evolve together.
- ❖ ISO 13407, Human-centered design processes for interactive systems.
 - Active involvement of users and a clear understanding of user and task requirements.
 - Appropriate allocation of function between users and technology.
 - Iteration of design solutions.
 - Multi-disciplinary design.



Usability design – Integrating user-centered systems design in the software development process

Definition of User-Centered Systems Design

“User-centered systems design is a process focusing on usability throughout the entire development process and further throughout the system life cycle. It is based on the following key principles.”

Gulliksen, Göransson, Boivie, Blomkvist, Persson & Cajander (2003)

Key Principles for User-Centered Systems Design

User-centered systems design is a process focusing on usability throughout the entire development process and further throughout the system life cycle. It is based on the following key principles:

<p>User focus – the goals of the activity, the work domain or context of use, the user’s goals, tasks and needs should guide the development.</p> <p>Active user involvement – representative users should actively participate, early and continuously throughout the entire development process and throughout the system life cycle.</p> <p>Evolutionary systems development – the systems development should be both iterative and incremental.</p> <p>Simple design representations – the design must be represented in such ways that they can be easily understood by users and all other stakeholders.</p> <p>Prototyping – early and continuous prototyping should be used to visualize and evaluate ideas and design solutions in cooperation with the end users.</p> <p>Evaluate user in context – hierarchical usability goals and design criteria should control the development.</p>	<p>Tight and consistent design activities – the development process should contain dedicated design activities.</p> <p>A professional attitude – the development process should be performed by effective multidisciplinary teams.</p> <p>Usability champion – usability experts should be involved early and continuously throughout the development lifecycle.</p> <p>Holistic design – all aspects that influence the future use situation should be developed in parallel.</p> <p>Processes customization – the user-centered systems design process must be specified, adapted and/or implemented locally in each organization.</p> <p>A user centered attitude should always be visualized.</p>
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Key principles for user-centered systems design, by Jan Gulliksen, Bengt Göransson & Bengt Göransson 2003

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User focus

- ❖ The goals of the activity, the work domain or context of use, the users' goals, tasks and needs should early guide the development.
 - All members of a project must understand the goals of the activity, the context of use, who the users are, their situation, goals and tasks, why and how they perform their tasks, how they communicate, cooperate and interact, etc. This helps in creating and maintaining a focus on the users' needs instead of a technical focus.
 - Activities, such as identifying user profiles, contextual inquiries and task analysis, must be a natural part of the development process.
 - Make sure that all project members have met real or potential users, for instance, by visiting the workplace. Descriptions of typical users, tasks and scenarios could, for instance, be put up on the walls of the project room/area to maintain the user focus.



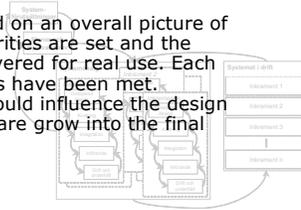
Active user involvement

- ❖ Representative users should actively participate, early and continuously throughout the entire development process and throughout the system lifecycle.
 - The users should be directly involved, both in the development project and in related activities, such as, organizational development and the development of new work practices.
 - The users must be representative of the intended user groups.
 - Specify where, when and how users should participate in the development. Identify appropriate phases for user participation and specify their characteristics. Emphasize the importance of meeting the users in context, for instance, at their workplace.
 - Note the important difference between domain experts (very familiar with the activity, but not necessarily potential users) and real users. Domain experts can be members of the development team but real users should be involved on a temporary basis, in single activities during the analysis, design and evaluations of design solutions.



Evolutionary systems development

- ❖ The systems development should be both iterative and incremental.
 - It is impossible to know exactly what to build from the outset. Hence, UCSD requires an approach which allows continuous iterations with users and incremental deliveries so that design suggestions and solutions can be evaluated by the users before they are made permanent.
 - An iteration should contain a proper analysis of the users' needs and the context of use, a design phase, a documented evaluation with concrete suggestions for modifications and a redesign in accordance with the results of the evaluation. These activities do not have to be formal. An iteration could be as short as half an hour, as long as it contains all three steps.
 - Incremental development means that, based on an overall picture of the System Under Development (SUD), priorities are set and the system is divided into parts that can be delivered for real use. Each increment is iterated until the specified goals have been met. Evaluations of the increments in real use should influence the design of the subsequent increments. Let the software grow into the final product.



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Simple design representations

- ❖ The design must be represented in such ways that it can be easily understood by users and all other stakeholders.
 - Use design representations and terminology that are easily understood by all users and stakeholders so that they can fully appreciate the consequences of the design on their future use situation. Use, for instance, prototypes (sketches and mock-ups) and simulations.
 - Abstract notations, such as use cases, UML diagrams or requirements specifications are not sufficient to give the users and stakeholders a concrete understanding of the future use situation.
 - The representations must also be usable and effective. The goal is that all parties involved share the same understanding of what is being built.



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Prototyping

- ❖ Early and continuously, prototypes should be used to visualize and evaluate ideas and design solutions in cooperation with the end users.
 - Use multiple paper sketches, mock-ups and prototypes to support the creative process, elicit requirements and visualize ideas and solutions. The prototypes should be evaluated with real users in context.
 - It is essential to start with low-fidelity materials, for instance, quick sketches, before implementing anything in code.
 - Work with prototypes in cooperation with the users in context (contextual prototyping).
 - Start with the conceptual design on a high level and do not move on to detail too quickly. If possible produce several prototypes in parallel.



Evaluate use in context

- ❖ Baselined usability goals and design criteria should control the development.
 - Critical usability goals should be specified and the design should be based on specific design criteria. Evaluate the design against the goals and criteria in cooperation with the users.
 - Early in the development project, one should observe and analyze the users' reactions to paper sketches and mock-ups. Later in the project, users should perform real tasks with simulations or prototype tasks and their behavior and reactions should be observed, recorded and analyzed.
 - Be sure to specify goals for aspects that are crucial for the usability and that cover critical activities as well as the overall use situation.



Explicit and conscious design activities

- ❖ The development process should contain dedicated design activities.
 - The user interface design and the interaction design are of undisputed importance for the success of the system. Far too often, the UI and interaction design “happens” as a result of somebody doing a bit of coding or modeling rather than being the result of professional interaction design as a structured and prioritized activity.
 - Remember that to users the user interface is the system. The design of the SUD as regards the user interaction and usability should be the result of dedicated and conscious design activities. The construction of the SUD should adhere to that design.



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A professional attitude

- ❖ The development process should be performed by effective multidisciplinary teams.
 - Different aspects and parts of the system design and development process require different sets of skills and expertise.
 - The analysis, design and development work should be performed by empowered multi-disciplinary teams of, for instance, system architects, programmers, usability designers and interaction designers.
 - A professional attitude is required and so are tools that facilitate the cooperation and efficiency of the team.



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Usability champion

- ❖ Usability experts should be involved early and continuously throughout the development lifecycle.
 - An experienced usability expert (usability designer) or possibly a usability group, should be on the development team.
 - The usability designer should be devoted to the project as an “engine” for the UCSD process from the beginning of the project and throughout the lifecycle.
 - The usability designer must be given the authority to decide on matters affecting the usability of the system and the future use situation.

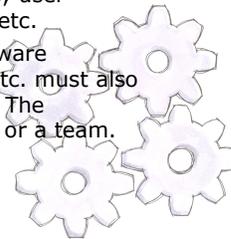


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Holistic design

- ❖ All aspects that influence the future use situation should be developed in parallel.
 - Software does not exist in isolation from other parts of, for instance, a work situation. When developing software for the support of work activities, the work organization, work practices, roles, etc, must be modified.
 - All aspects should be developed in parallel. This includes work/task practices and work/task organization, user interface and interaction; on-line help; manuals; user training, work environment, health and safety, etc.
 - Other parts of the context of use such as: hardware equipment, social and physical environments, etc, must also be considered in the integrated design process. The responsibility should be placed with one person or a team.

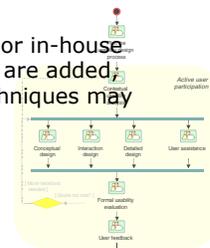


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Processes customization

- ❖ The UCSD process must be specified, adapted and/or implemented locally in each organization.
 - UCSD and usability cannot be achieved without a user-centered process. There is, however, no one-size-fits-all process.
 - Thus the actual contents of the UCSD process, the methods used, the order of activities, etc, must be customized and adapted to the particular organization and project based on their particular needs.
 - A UCSD process can be based on a commercial or in-house software development process, where activities are added, removed or modified. Existing methods and techniques may well be re-used, if they comply with the above factors/practices.



A user-centered attitude

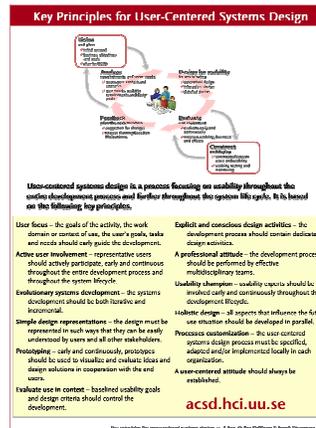
- ❖ A user-centered attitude should always be established.
 - UCSD requires a user-centered attitude throughout the project team, the development organization and the client organization.
 - All people involved in the project must be aware of and committed to the importance of usability, but the degree of knowledge on usability may differ depending on role and project phase. The key principles, defined here, can serve as a common ground.



Definition of User-Centered Systems Design

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Activity lists

- ❖ The purpose of the activity list that accompanies each principle is to elaborate on what it takes to apply a principle. The activity list suggests activities of a general nature alongside appropriate methods or tools for the achievement of the principle. The principles are general but the activity list should be developed specifically to fit each organization.
- ❖ The activity list serves as both a To-do list and a checklist, where each item can be “ticked off”. There are three options for each activity:
 - **No** = we decided to not perform this activity. We gave rationales for this decision and had a general agreement on the motives.
 - **Yes** = we performed this activity, in full or to the extent that the project team and management, found appropriate.
 - **N/A** = we found that this activity was not applicable. The rationales for this were clearly stated and agreed on. We have conducted other activities to compensate for this.

Example of activity list for – User focus...

- ☑ Vision, purpose goal and constraints of the target activity analyzed and understood by all project members.
 - Tools and methods: Goals analysis, Focus groups
- ☑ Identification, description and prioritization of all user groups.
 - Tools and methods: User analysis
- ☐ Visualization and characteristics of target user groups made available to everyone in the project.
 - Tools and methods: Decorate a project room with artifacts, etc. that illustrates the users work situation, environment and characteristics.
- ☐ Potential limitations and restrictions in the users' capabilities (for instance vision impairments or language problems) are clear to everyone in the project.
- ☐ Target user groups have guided the development.

▪ *continues*

...example of activity list for – User focus

▪ *continued*

- ☐ The users have expressed their impressions of current system and expectations on future system.
 - Tools and methods: Users asked about good things and bad things in their current work situation, Think-out loud.
- ☐ Users observed as they were performing their tasks in context.
 - Tools and methods: Analysis of information utilization, Context-of-use analysis, Field studies, Contextual inquiry.
- ☐ Use situation documented
 - Tools and methods: Video and still camera, scenarios, personas
- ☐ Tasks analyzed.
 - Tools and methods: Task analysis
- ☐ Copies of artifacts (forms, documents archives, notebooks, etc.) used by the users collected.

Application of the principles

- ❖ **Explanation model** – to analyze and communicate why organizations, projects or processes did not meet their goals as regards usability
- ❖ **Process development** – for defining a UCSD process
- ❖ **Process / organization customization** – to customize or adapt an organization, project or development process to UCSD
- ❖ **Process / organization assessment** – to assess the user-centeredness of an organization, project or process
- ❖ **Knowledge transfer** – to teach and transfer knowledge about UCSD,
- ❖ **Procurement support** – support for procurers as a basis for specifying requirements on the design process as such

Using the principles in practice

- ❖ These 12 principles ensure a truly user-centered approach and generate several benefits. They facilitate communicating, assessing and developing processes for the analysis, design, evaluation, construction and implementation of an interactive system. They help in maintaining the focus on the users and the usability throughout the entire development process.
- ❖ We fully appreciate that it will be more or less impossible to start applying the principles in one strategic shift. Adopting them gradually is probably more feasible and practicable. It is, however, important to comply with the principles to as large an extent as possible, at any point in time.

What you can do

- ❖ Decide on how important usability is.
- ❖ You specifically have to address usability aspects to achieve a usable system.
- ❖ A specific and explicit approach and philosophy is needed – user-centered.
- ❖ Include user-centered activities and foster a common understanding among all stakeholders about the importance of usability.
- ❖ Ensure active user participation.

Reflections from the audience...

A case study



A case study of the rise and fall of a UCSD project

- ❖ The pilot project was an in-house development project within the Swedish National Tax Board. The purpose of the project was to develop a new computerized case-handling tool for administrators working with national registration.
- ❖ The project had an explicit **goal to apply a UCSD** approach.
- ❖ Based on previous experiences simply adding usability engineering methods to existing processes did not make any difference
- ❖ We established a set of **UCSD principles** for the project to follow.

Initial set of principles for UCSD

- ❖ *Work practices* of the users control the development.
- ❖ *Active user participation* throughout the project.
 - *work domain experts* (continuously through the development project)
 - and *actual end-users* (for evaluation of various design results)
- ❖ *Early prototyping* to evaluate and develop design solutions.
- ❖ *Continuous iteration* of design solutions.
- ❖ *Multidisciplinary design teams*.
- ❖ *Integrated design*.

Activities

- ❖ Usability designer.
- ❖ User and task analysis.
- ❖ Personas →
- ❖ Collaborative prototyping with users.
- ❖ ...
- ❖ Quality assurance plan.
- ❖ Implementation support.



Problems

- ❖ Little or no lifecycle perspective.
- ❖ Usability designers were ignored.
- ❖ Use case mania.
- ❖ Little understanding of the documentation.
- ❖ Changing technical platform.
- ❖ Problems establishing a user-centered attitude.

Lessons learnt

- ❖ UCSD is not commonly understood, and there is no clear definition.
- ❖ One needs to be very specific about what it takes from the process to comply with UCSD.
- ❖ Commercial products don't give us much help.
- ❖ We had to modify our principles for UCSD.
- ❖ All participant's and stakeholders' support is crucial.
- ❖ UCSD is as strong as its weakest link.
- ❖ It's all about attitude...

Championing usability – Usability designer



A job title?

- ❖ UI expert / UI designer / GUI programmer
- ❖ Human factors expert / Ergonomics expert
- ❖ Information architect / Information designer
- ❖ Art director
- ❖ Usability expert
- ❖ Behavioral scientist
- ❖ User experience designer

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- ❖ Behavioral scientist
- ❖ User researcher

Titles in your organization?

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A Usability designer at work

- ❖ A usability champion working together with users and acting as an advocate for the users.



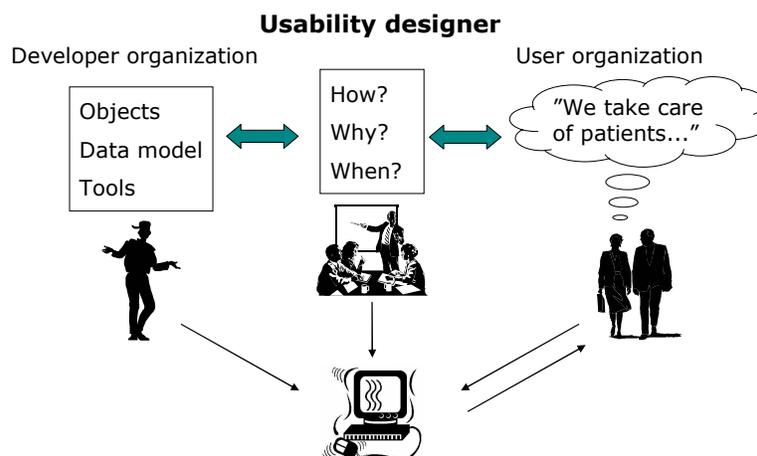
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Usability designer – Manifesto

- ❖ The usability designer is responsible for keeping the development process user-centered, focusing on usability aspects.
- ❖ It is crucial that the usability designer takes an active part in the design and development process, and does not only become another project manager.
- ❖ We emphasize the importance of a person participating in all the user-centered activities, to prevent valuable information from being lost in the transitions between the activities.
- ❖ The usability designer can to some extent be seen as a “discount” usability role.

Göransson, B. & Sandbäck, T., (1999), Usability Designers Improve the User-Centred Design Process, in Proceedings for INTERACT'99, Edinburgh, UK.

The usability designer as a facilitator and a mentor



Rationales

- ❖ Gould: “In order for this to happen successfully, all aspects of usability should be under one focus or one person”.

Gould, Boies & Ukelson, 1997, p. 239, in Helander, 1997.

- ❖ Promoted in ISO/TR 18529:2000(E) (p. 8): “Act as advocate for end users and other stakeholders in the system development enterprise and the development team. NOTE 1 The stakeholder’ advocate reminds the staff in the system development enterprise that the system is intended for use by real people and has to achieve quality in use. This role includes championing human-centered approaches, arranging for end-user involvement in conceptual studies, investigation and dissemination of context of use issues”

Usability designer in the organization

- ❖ A tool for promoting user-centered systems design.
- ❖ A tool to increase the usability maturity within the organization.
- ❖ Must act on his / her own!
- ❖ Must get to know the right people – building relations.
- ❖ Must be tactical.
- ❖ Must of course in the long run be given the authority to act.
- ❖ According to “guru” Nielsen: it takes ten years to be a good usability professional!
- ❖ Just a piece in the puzzle...

Usability designer in a project

- ❖ Must be planned and allocated for.
- ❖ Must be a role in the development process.
- ❖ Must have “visible” activities, deliverables, etc.
- ❖ Must be in the project on a regular basis.
- ❖ Must be given rights and resources to act.

Usability champion – conclusion

- ❖ But, don't forget that user-centered systems design is an attitude that all stakeholders must share.
- ❖ The usability champion / designer can act as a mentor and specialist, but most of the UCSD development is performed by others.
- ❖ Truly multi-disciplinary teams or projects might be the optimal solution, but they are seldom possible.
- ❖ A certain level of skills in UCSD must be shared among all project members.

Lunch break



Group exercise



Group exercises

- ❖ Group exercise 1 – Applying the principles
 - **Objectives:** Discuss how you can take this back, the principles, to your organization and what obstacles you anticipate to run into.
- ❖ Group exercise 2 – The UCSD project
 - **Objectives:** Produce a rough project outline of a UCSD project. Identify activities, deliverables, roles, user participation, etc.
- ❖ Trivia: 30 minutes of discussion, one person to document and present.

Feedback from group exercise

Proposed Agenda

9.00 – *The Start*

- ❖ Welcome and presentation of participants
- ❖ Introduction and objectives for the tutorial
- ❖ Definition and key principles for UCSD

10.30 – *Coffee*

- ❖ Discussion of the principles
- ❖ A case study
- ❖ Championing usability

12.30–14.00 – *Lunch*

- ❖ Group exercise: rough project outline of a UCSD project / how can I apply the principles in my organization?
- ❖ Usability Design and Rational Unified Process (RUP)...

15.30 – *Coffee*

- ❖ Usability Design and Rational Unified Process (RUP), continued
- ❖ Wrapping up: Strategic UCSD
- ❖ Discussion, questions and hopefully some answers

17.30 – *The End*

**To practice UCSD
– Usability Design and
Rational Unified Process**



Usability design – Integrating user-centered systems design in the software development process

If we just add some usability, everything will turn out just fine?

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No, what we need is a user-centered systems design process...

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Usability design – Integrating user-centered systems design in the software development process

To practice user-centered systems design

- ❖ You have to decide on making usable systems.
 - Demands the “users” of the process (the developers) to have a user-centered *attitude* and act accordingly.
- ❖ All stakeholders have to agree on this and act accordingly: clients, managers, users, developers, etc.
 - Further on, there must be an understanding between the development organization and the organization buying the system to work according to a user-centered design philosophy.
- ❖ There must be requirements on usability as well as demands on what kind of process to use.
- ❖ A dedicated plan and process to incorporate user-centered activities in systems development.
 - User-centered systems design must become the standard operating procedure for a developing organization.
- ❖ A project role to assure the user-centered focus: usability champion or usability designer.

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User-centered systems design in practice



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Usability design – Integrating user-centered systems design in the software development process

Usability design – Our objectives

- ❖ To introduce UCSD in practice.
- ❖ There are problems in understanding and recognizing UCSD. State of the art development processes do not honor usability and user-centered design.
- ❖ Lack of competence in usability and UCSD.
- ❖ Usability is often taken for granted and does not get any attention.
- ❖ If a client in the tender process does not specifically order a usable system, e.g. have usability requirements built into the requirements specification, the developer organization is reluctant to spend any additional resources on making the system usable.

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Usability design – Integrating user-centered systems design in the software development process

Usability design – A “simplified” UCSD process

- ❖ Adds essential UCSD activities to any process.
- ❖ Easy to communicate.
- ❖ Easy to integrate: in organizations and projects.
- ❖ Not a complete process or fully UCSD.
- ❖ Kind of discount UCSD.

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Usability design – Integrating user-centered systems design in the software development process

Usability design process

© Bengt Göransson, Enea Redina AB, version 1.7en

Requirements analysis

Elicit business objectives, Contextual inquiries, User profiles

System goals, design criteria and usability goals

Usability Design Guide, Functional description use-cases

Active user involvement

Growing software with iterative design

Usage Scenarios, Conceptual Design, Mock-ups, Evaluation

Analysis Refine models, Interaction Design, Prototypes, Evaluation

Analysis Refine models, Detailed Design, Evaluation

Goals met? (Yes/No)

Usability Design Guide

Usability Design in system development

- Early and continual focus on users
- Evaluate with users
- Iterative design
- Integrated design

Driven by a usability champion a.k.a. the **Usability Designer**

Deployment

Introduce and operate

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Usability design – Integrating user-centered systems design in the software development process

Technology-driven design vs. user-centered systems design

Technology-driven design philosophy	User-centered systems design philosophy
Technology/developer-driven	→ User-driven
Component focus	→ Solution focus
Individual contribution	→ Multidisciplinary teamwork including users, developers, customers, usability experts
Focus on internal architecture	→ Focus on usability attributes: effectiveness, efficiency and satisfaction
Quality measured by product defects and performance (system quality)	→ Quality defined by usability (quality in use)
Implementation prior to usability validation	→ Implementation of user-validated solutions only
Solutions are directed by functional requirements	→ Understanding the context of use: user, work task, work environment

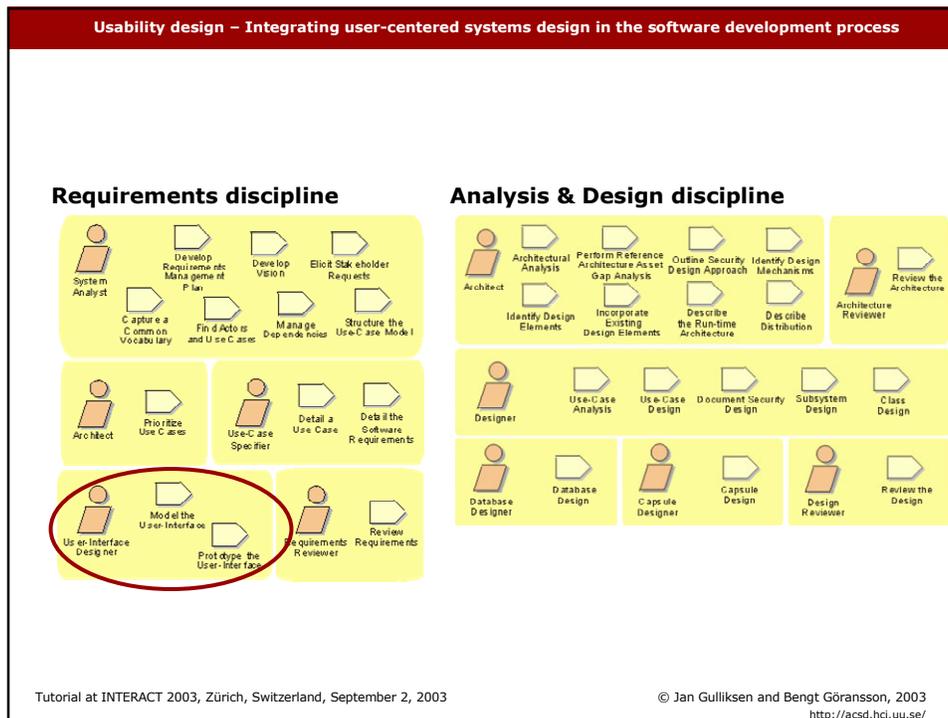
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Usability design – Integrating user-centered systems design in the software development process

RUP vs UCSD

- ❖ The fundamentals in RUP actually prohibits a true user-centered systems design process.
- ❖ RUP is an “architecture-centric” and a “use case driven”.
- ❖ Usability related activities do only occur within the Requirements discipline (workflow) and primarily in the Elaboration phase. To consider usability only when gathering requirements is fundamentally wrong.
- ❖ RUP focuses too much on artifacts. There is a risk that the “big picture” gets lost and that each role puts too much effort in writing documents (fill out forms).
- ❖ No, or little, support for interaction design.
- ❖ The use of use cases...

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Usability design – Integrating user-centered systems design in the software development process

Use cases—promising but not enough

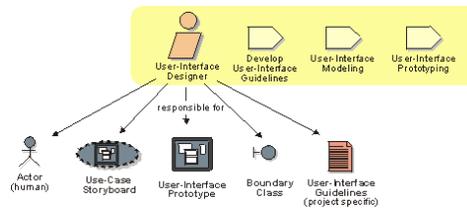
- ❖ The notation of use cases is difficult for users to understand.
- ❖ Different requirements on the size of the use cases.
 - Software developers prefer small use cases when specifying the functionality.
 - For usability designers use cases instead have to be large to correspond to users' work tasks.
- ❖ The way use cases are described can have implications on the design space.
- ❖ Use cases are modeled with the software system as the focus of attention.

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How is usability treated in RUP today?

- ❖ Capturing requirements on the user interface, including usability requirements.
- ❖ Building user-interface prototypes.
- ❖ Involving other stakeholders of the user interface, such as end-users, in usability reviews and use testing sessions.
- ❖ Reviewing and providing the appropriate feedback on the final implementation of the user interface (as created by other developers, i.e. designers and implementers).

*Rational Unified Process Version 2000 – 0011
Workers and Activities → User-Interface Designer*



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Usability design discipline

- ❖ A plug-in to RUP: textual and graphical guidelines, examples and templates.
- ❖ Adds the key principles for user-centered systems design to Best Practices segment in RUP.
- ❖ Contains accepted design and usability methods.
- ❖ The “news” is that they are put into a software engineering framework (RUP) and that they go beyond usability testing and usability goal setting / requirements.
- ❖ User-centered systems design throughout the systems life cycle.
- ❖ RUP will never be fully user-centered, but it can be improved.
- ❖ Developed by us, Enea and Rational. Will be available for use by us (Enea) and our clients.

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Usability design – Integrating user-centered systems design in the software development process

Benefits of the discipline

- ❖ The discipline is visible and easy to adopt.
- ❖ UCSD integrated, or at least visible, in the software engineering process.
- ❖ Contributes support for focusing on users and active user participation.
- ❖ Adds roles with explicit usability, UCSD and HCI competence.
- ❖ Quality assurance for usability.
- ❖ Early, active and continues involvement of users and business will make the introduction and deployment of the system easier and more successful.

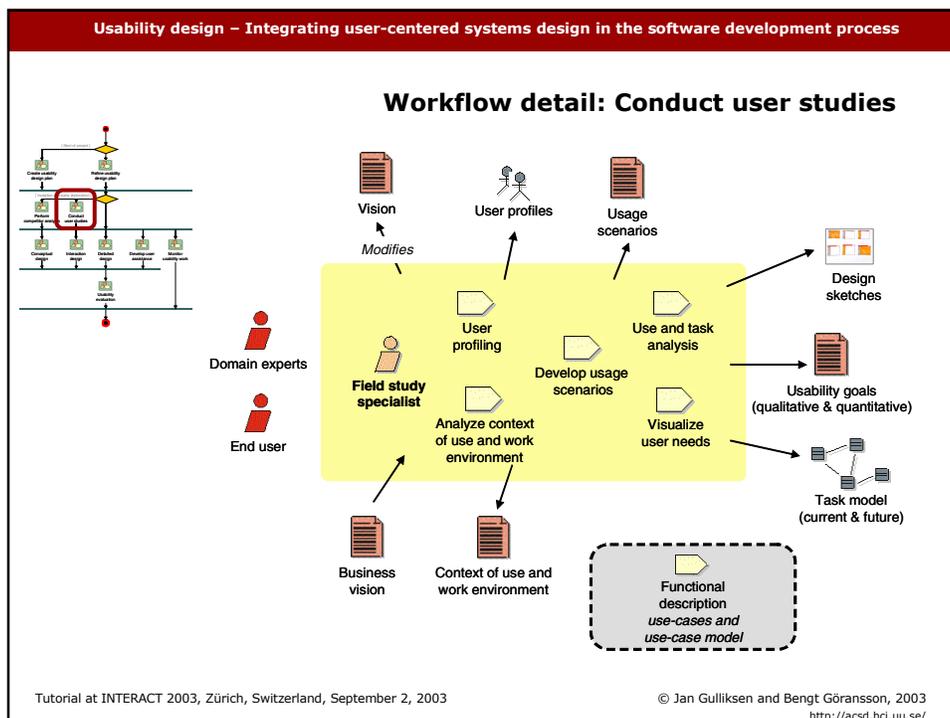
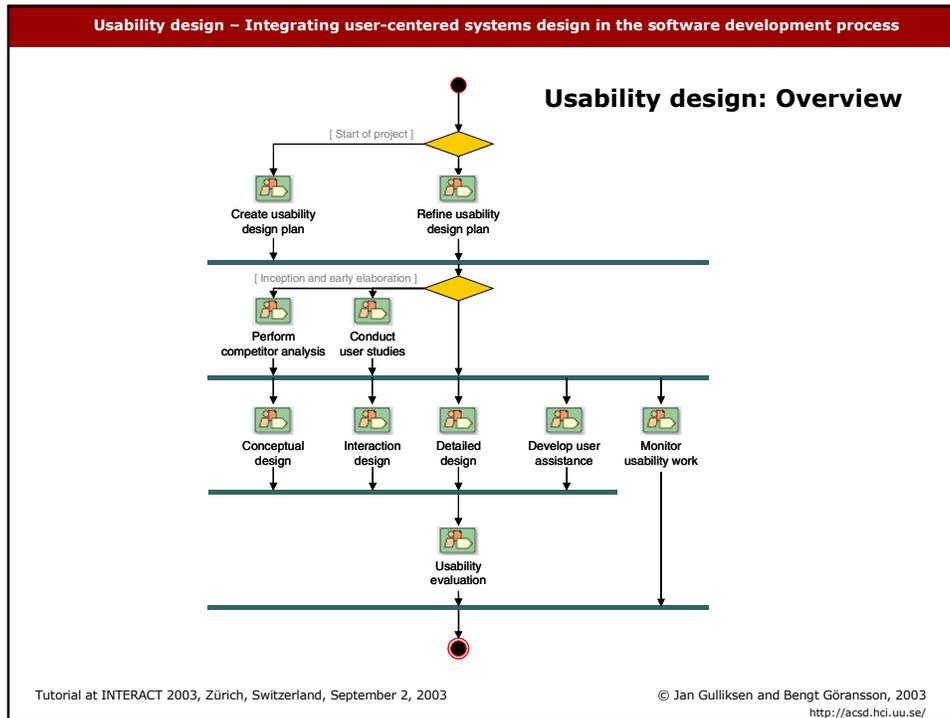
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Usability design in RUP

Disciplines	Phases			
	Inception	Elaboration	Construction	Transition
Business Modeling	High	Low	Low	Low
Requirements	High	Medium	Low	Low
Usability Design	High	Medium	Medium	Medium
Analysis & Design	Low	High	Medium	Low
Implementation Test	Low	Low	High	Medium
Deployment	Low	Low	Low	High
Configuration & Change Mgmt	Low	Low	Low	High
Project Management Environment	Low	Low	Low	High

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Activity: User profiling

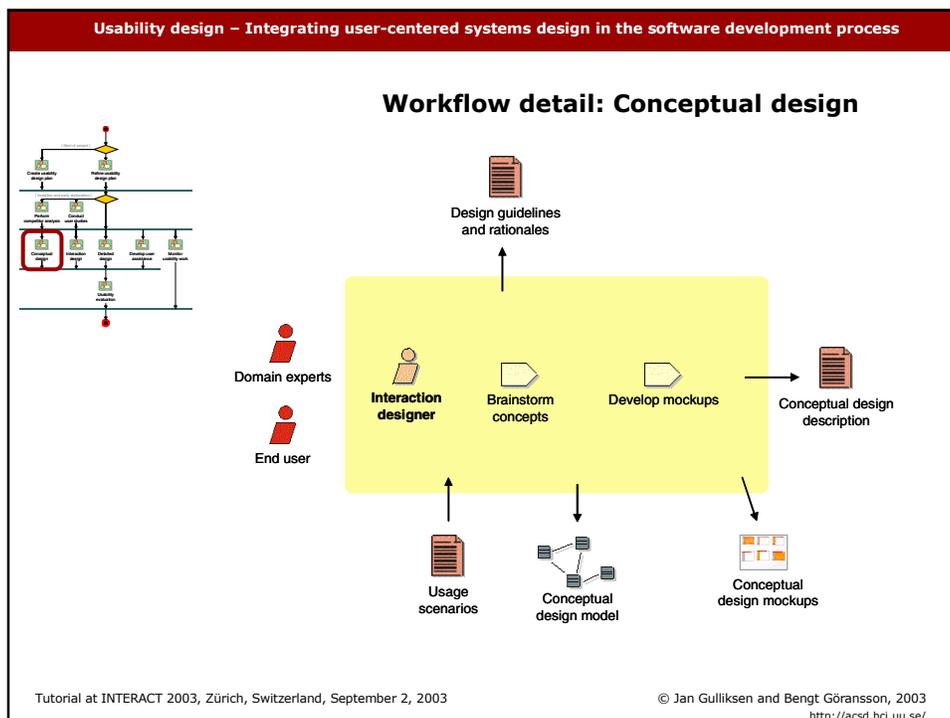
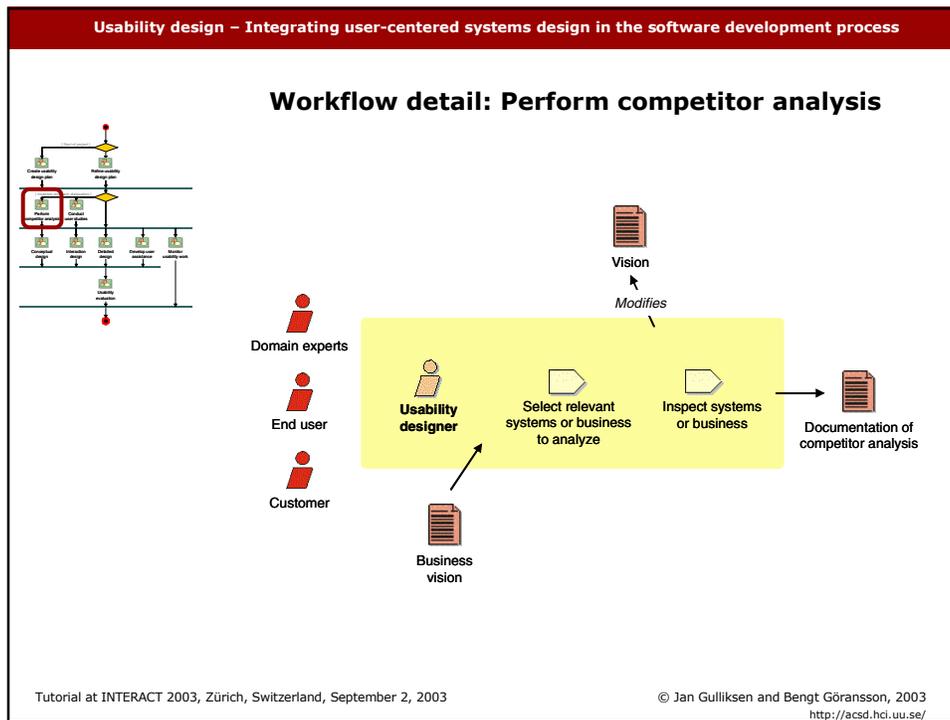
Purpose • Define users, their characteristics and prioritize them	
Steps • To understand who to use the system • Collect characteristics of different user categories • Prioritize user categories	
Input artifacts • ...	Resulting artifacts • User profiles • User model
Role: Usability designer	
Tool mentors • ...	
Workflow details • ...	

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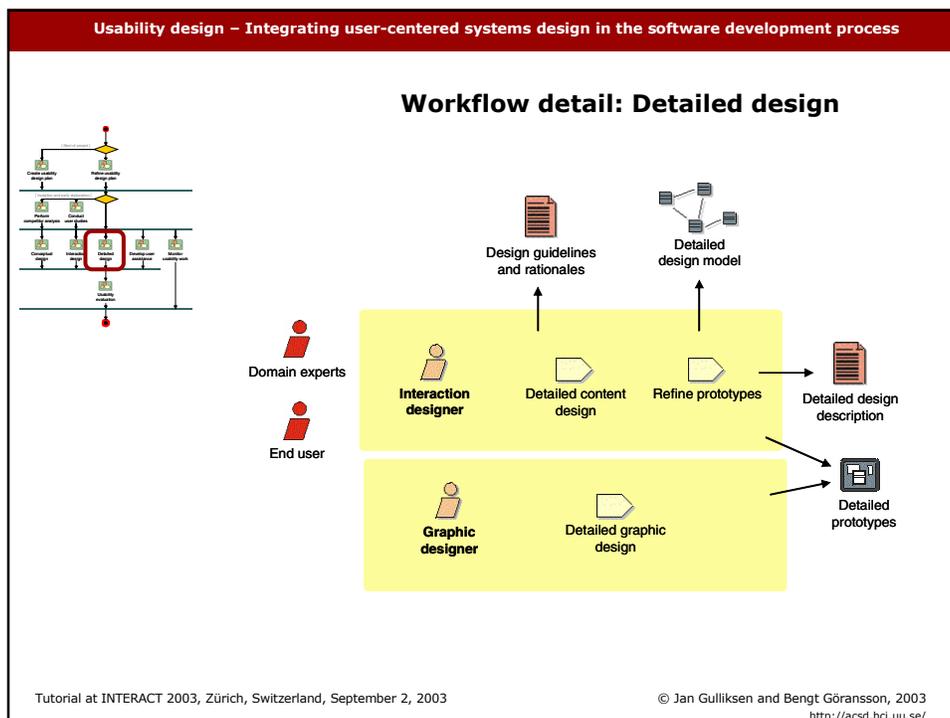
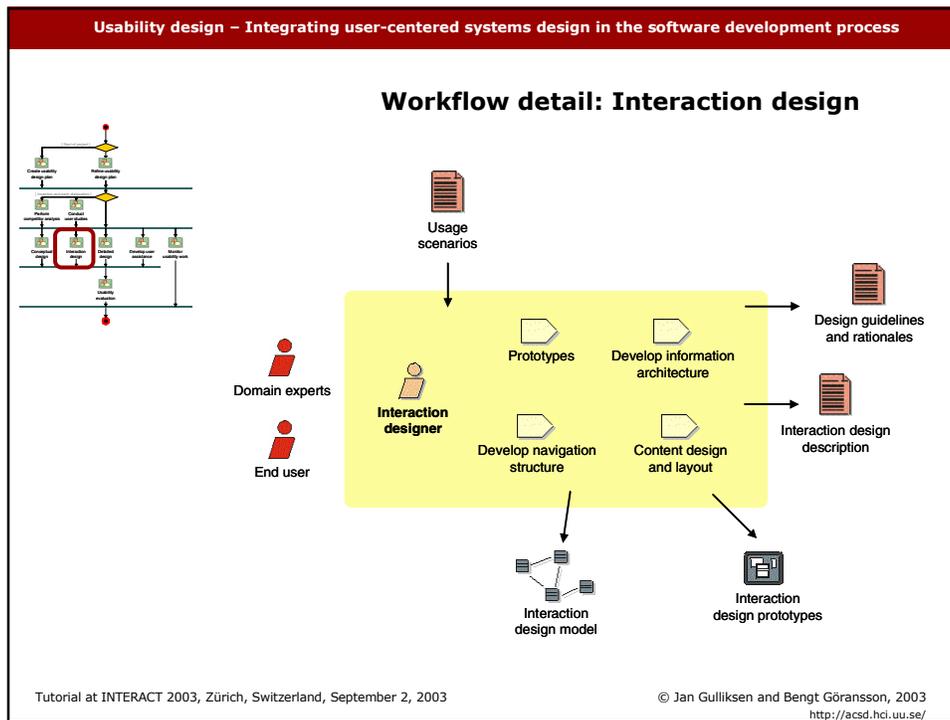
Usability design – Integrating user-centered systems design in the software development process

Workflow detail: Create usability design plan

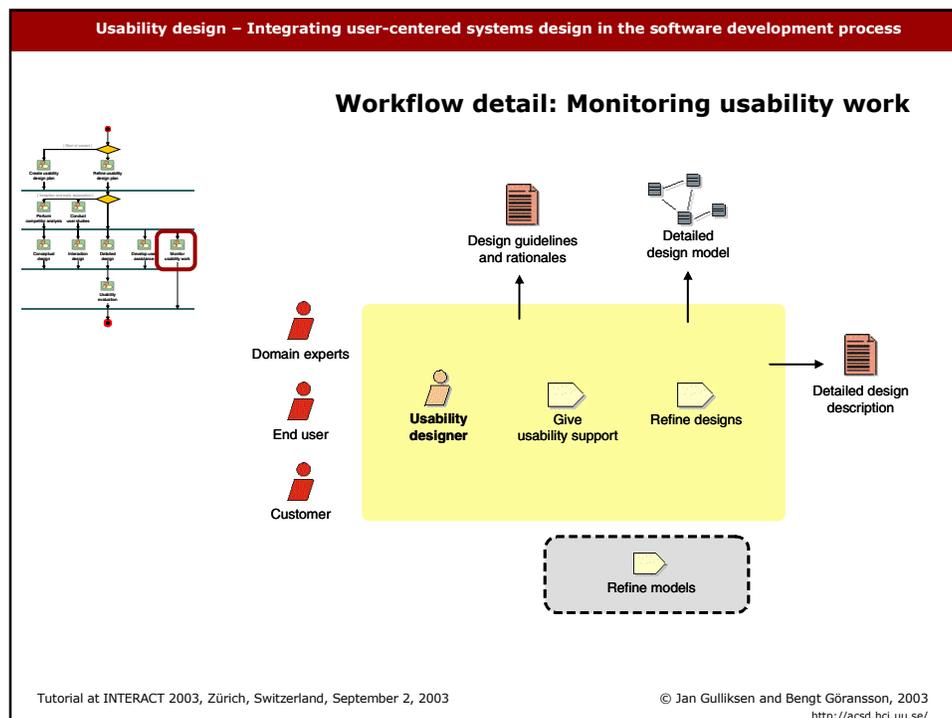
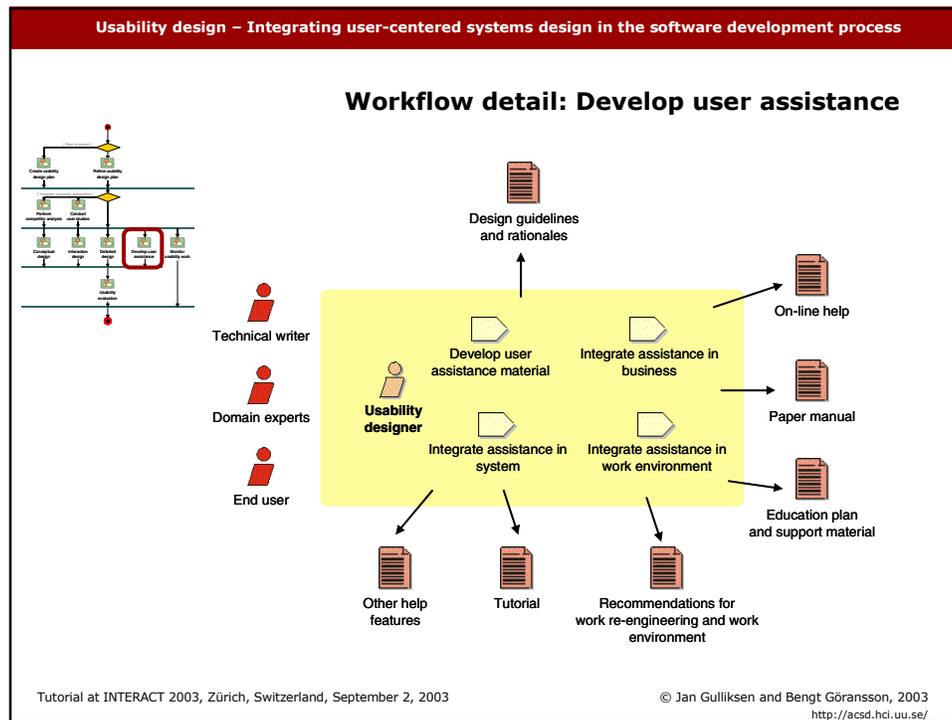
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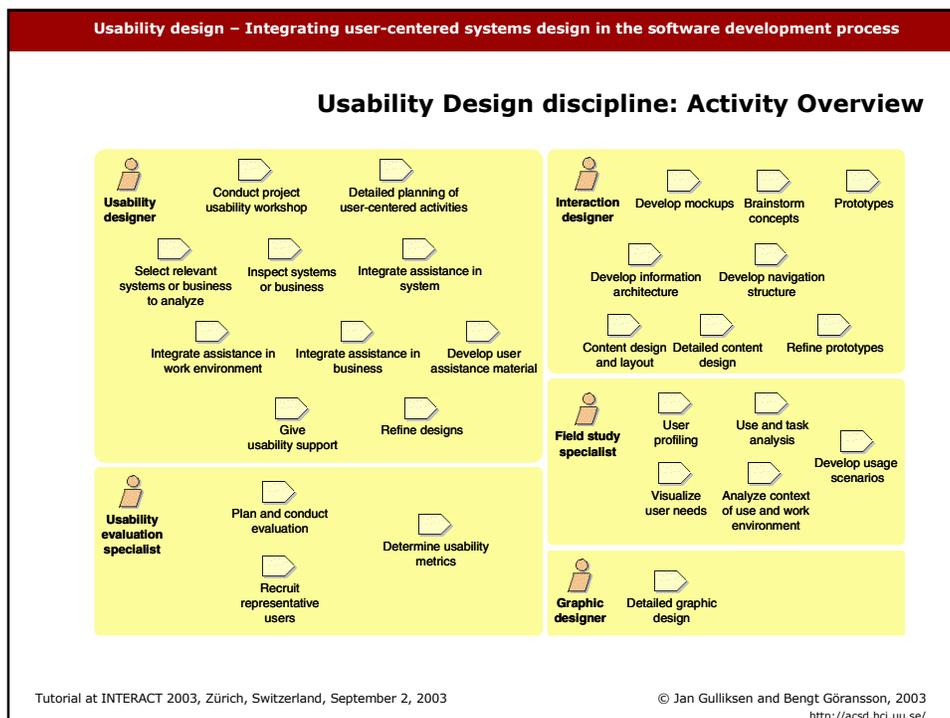
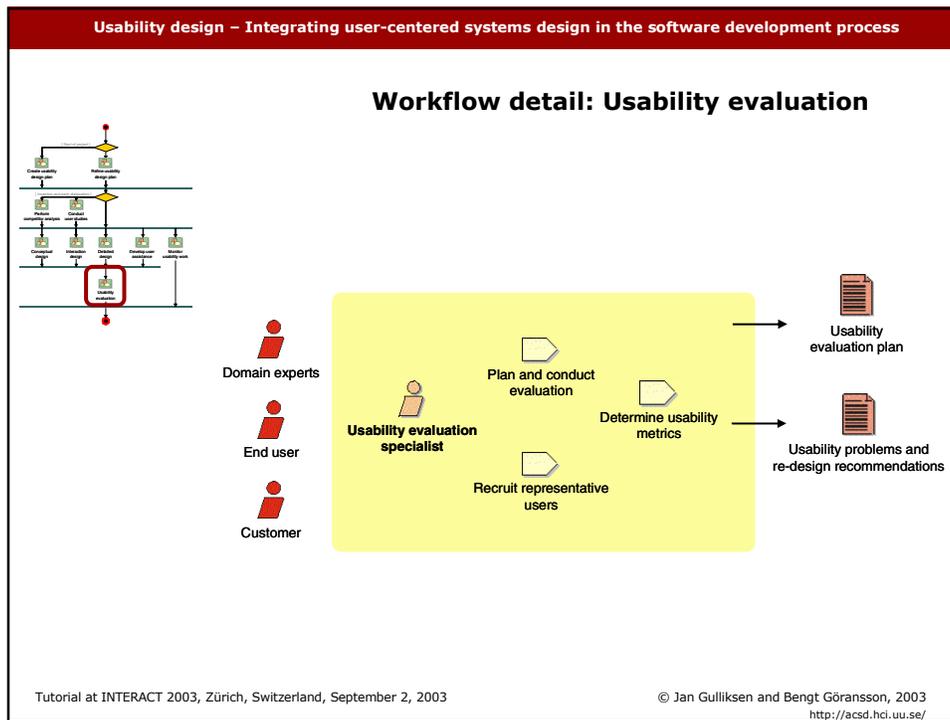
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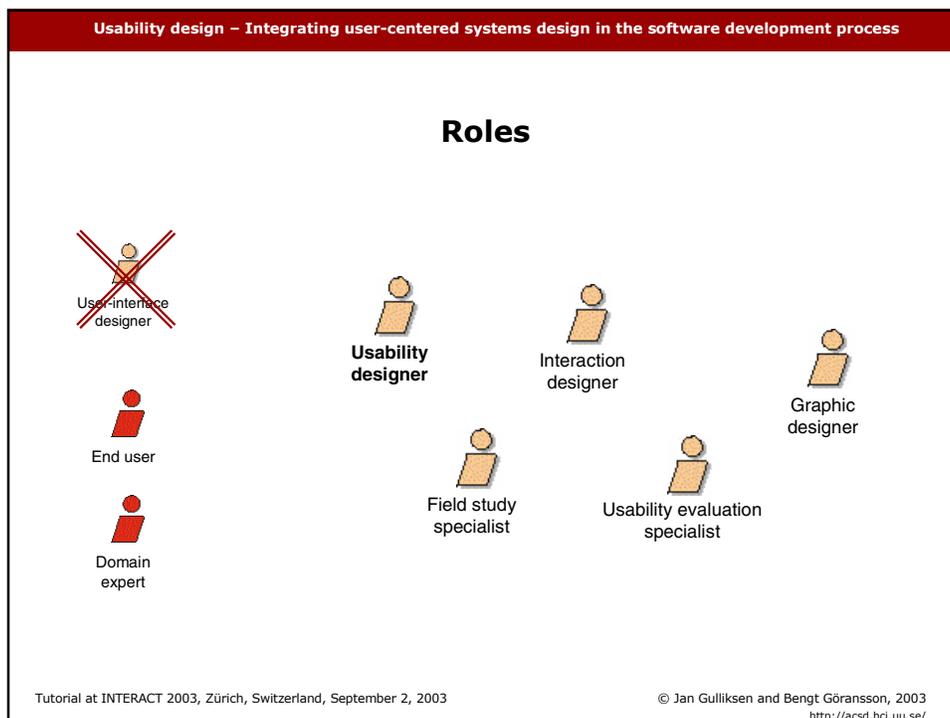
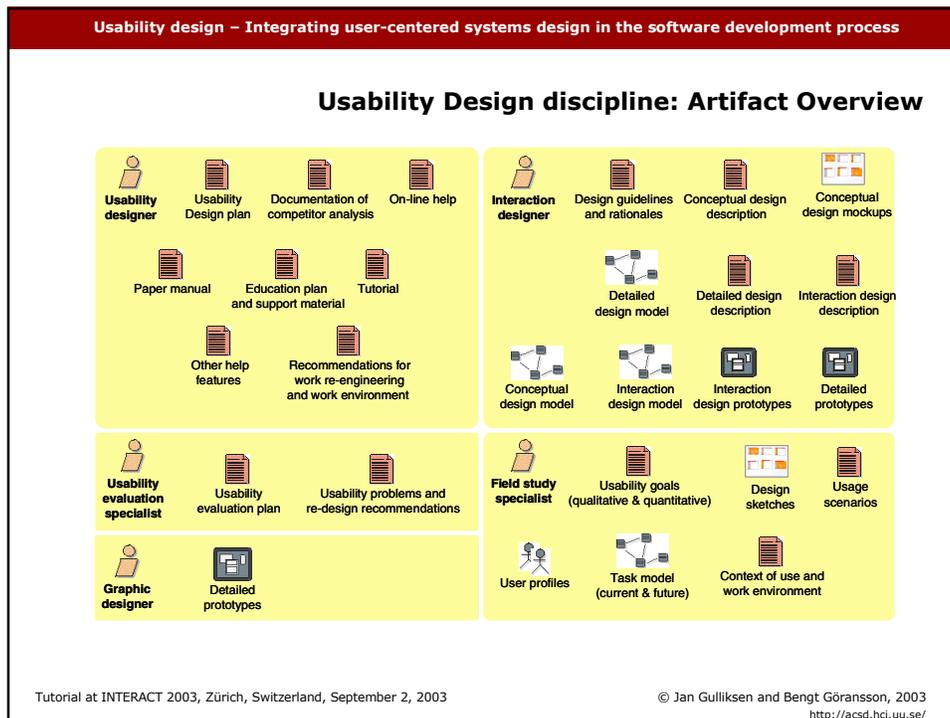
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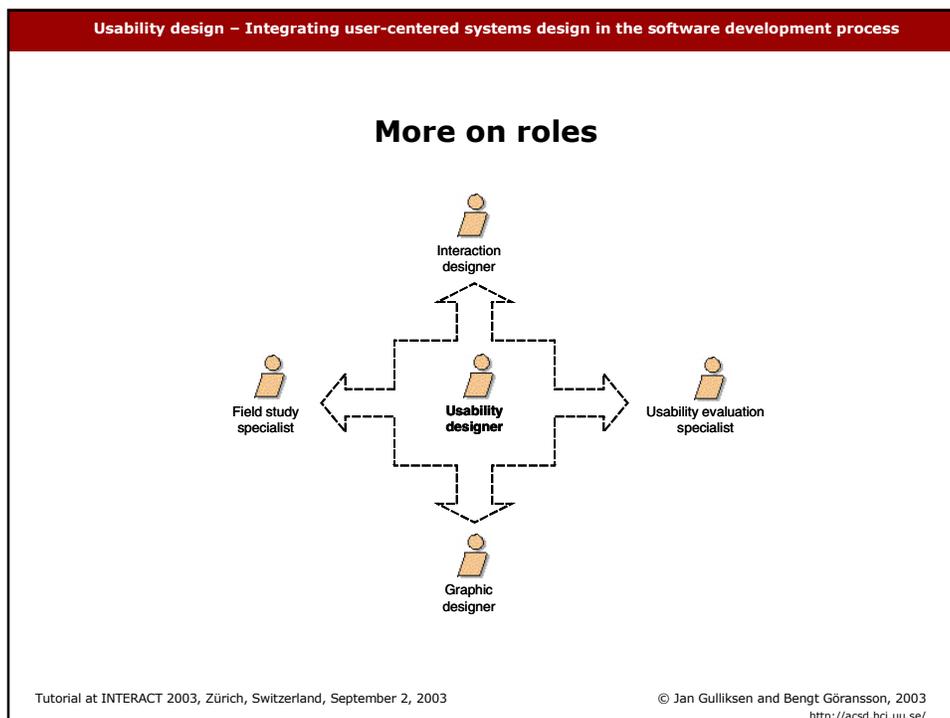
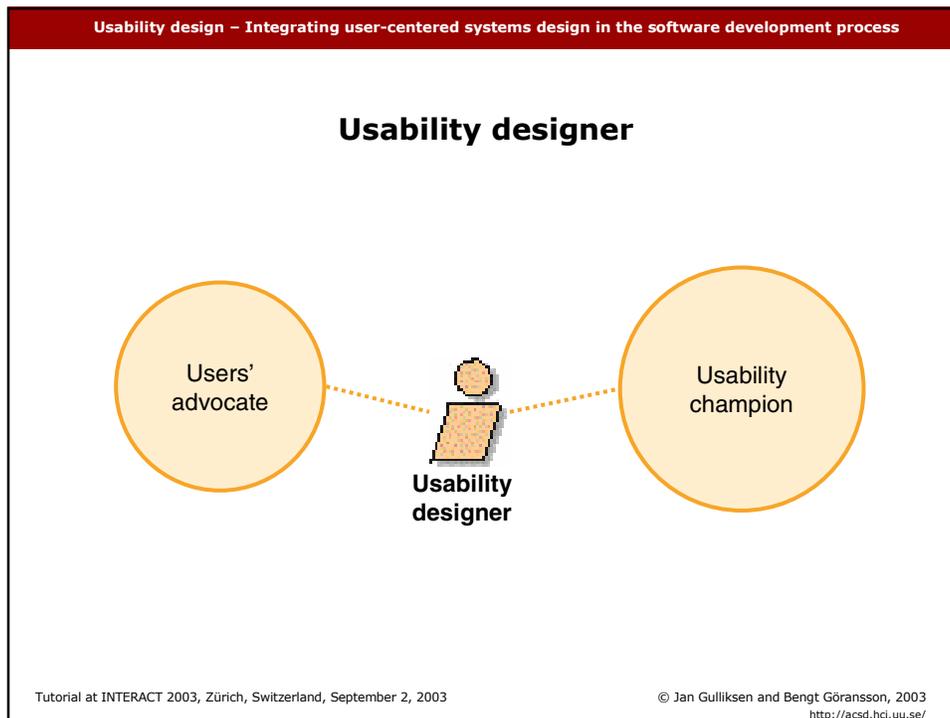


Usability design – Integrating user-centered systems design in the software development process



Usability design – Integrating user-centered systems design in the software development process





Experiences using the discipline

- ❖ Helps out to keep user focus – usability on the agenda.
- ❖ Makes user-centered activities explicit and easy to communicate.
- ❖ Straight forward, easy to apply.
- ❖ Practiced within our consultant company, but we have to adapt to our customers “wishes” – situated UCSD.
- ❖ The discipline has partly been tested within our projects.
- ❖ Yet, to be fully explored in a larger project.

Conclusion on usability design in RUP

- ❖ RUP gives no or little support in addressing usability aspects.
- ❖ Activities in RUP have to be more user-centered than architecture-centered.
- ❖ Customize your instance of RUP for this, with additional activities and roles (and even workflows).
- ❖ Additional roles for usability as well as additional roles for active user participation.

Wrapping up: Strategic UCSD



Obstacles to strategic UCSD...

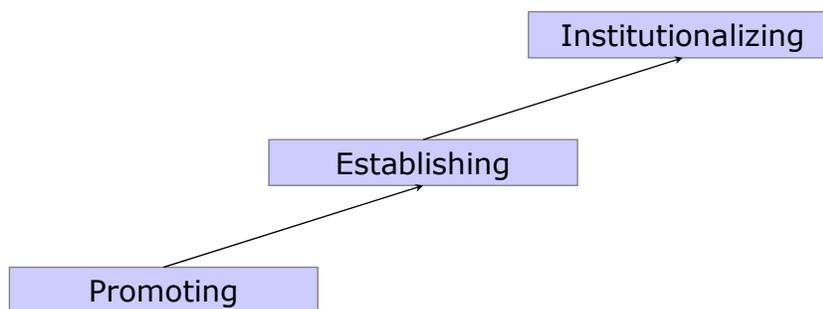
- ❖ Resource constraints (28.6 %)
- ❖ Resistance to UCD/usability (26.0 %)
- ❖ Lack of understanding/knowledge about what usability is (17.3 %)
- ❖ Better ways to communicate impact of work and results (13.3 %)
- ❖ Lack of trained usability/HCI engineers (6.1 %)
- ❖ Lack of early involvement (5.1 %)
- ❖ No economic need – customers not asking for usability (3.6 %)

Rosenbaum, S., Rohn, J.A., & Humburg, J., (2000), A toolkit for strategic usability: results from Workshops, Panels and Surveys. In T. Turner, G. Szwillius, M. Czerwinski, & F. Paternó (eds.) CHI 2000 Conference on Human Factors in Computing Systems Proceedings. 1-6 April, 2000, ACM Press.

Obstacles to strategic UCSD

- ❖ We believe that all of these factors are related to a lack of knowledge on how to apply UCSD methods and their potential benefits.
- ❖ System development projects, in general, don't have the explicit goal to develop usable systems.
- ❖ They have the goal to deliver a "running and working" system.
- ❖ Existing tools does not give any support for performing UCSD.
- ❖ Not everybody has the goal of developing usable systems.

Strategic UCSD in organizations – three steps



Based on a tutorial given by Deborah Mayhew, CHI 2002

Promoting UCSD

- ❖ Focus on influencing **people**.
- ❖ Gaining initial support for usability.
- ❖ Single usability designer / champion.
- ❖ Introduce usability methods and techniques.
- ❖ Cost justification – “number crunching”.
- ❖ Demonstrate what usability is all about – demonstrate value.
- ❖ Make usability visible.
- ❖ Introduce UCSD, nice and easy. Be careful not to overwhelm the receiver.
- ❖ Get into project plans is a key success factor.

- ❖ *Possible pitfall*: creating a single usability position, but never getting any further.

Promoting UCSD – the Usability champion...

- ❖ Understand how to effect changes in the organization
 - Cast yourself as an ally, not enemy or competitor – no usability police...
 - Talk to the right people, those with influence.
 - Realize what’s important for different stakeholders and act accordingly.
- ❖ Produce well-defined work products.
- ❖ Pick your projects carefully, always think strategically.
- ❖ Use usability testing strategically.
- ❖ The usability champion is an organizational change agent.
- ❖ Learn to deal with usability myths and even ignorance.

Promoting UCSD – the Usability champion

- ❖ Learn to speak the language of engineers.
 - You are doing engineering now, not science – focus on what's practical.
 - Learn to estimate and prepare project plans.
 - Set goals and measure results.
 - Lead team to a design vs. impose a design.
- ❖ Learn to speak the language of business.
 - Link business goals to usability goals.
 - Cost justification – cost benefit analysis
 - Write executive summaries.
 - "Educate" executives, project managers, marketing and sales...
 - Invite managers to usability testing!

Establishing UCSD

- ❖ Focus is on influencing **projects / products**.
- ❖ Define UCSD roles and define the UCSD organizational structure – staffing up.
 - Centralized vs. decentralized organization
- ❖ Impact projects.
- ❖ Usability as requirements.
- ❖ Style Guide and some user-centered activities (user analysis, usability testing) are accepted and treated as "standards". Demands management support.
- ❖ Planning and operating strategically for long term success.
- ❖ Get access to users.

- ❖ *Possible pitfall:* Too focused on projects, and never get any strategic and corporate-wide influence.

Institutionalizing UCSD

- ❖ Focus is on influencing **process**.
- ❖ Change from projects to process.
- ❖ Requirements with usability focus.
- ❖ Develop UCSD into the “standard operation procedure” (SOP).
- ❖ UCSD well integrated into development process.
- ❖ UCSD is spread among all developers / stakeholders.
- ❖ Get all stakeholders involved – usability and UCSD everywhere. A change in paradigm.
- ❖ Full acceptance and conformance of the principles for UCSD.

- ❖ *Possible pitfall:* Getting cut during downsizing and layoffs.

Strategic UCSD in organizations – conclusion

- ❖ Promoting
 - Focus is on influencing **people**.
- ❖ Establishing
 - Focus is on influencing **projects / products**.
- ❖ Institutionalizing
 - Focus is on influencing **process**.

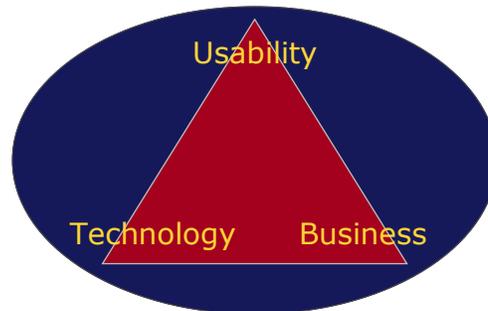
The real challenge is to move from a work practice where new technology is the main objective, to a work practice where the benefits and the usability of the IT-system are in focus—a shift in paradigm towards User-Centered Systems Design.

A user-centered development organization

- ❖ “Educate” developers in UCSD and facilitate from their knowledge and previous experiences.
- ❖ Establish a user-centered “climate”:
 - Make sure that everybody understands why they develop IT-systems – justification and responsibility.
- ❖ Get support from upper management – UCSD must be an objective for the organization / company.
- ❖ Good relations with customers / organizations.
- ❖ A UCSD process, or at least a framework
- ❖ “Human” knowledge and experience networks.

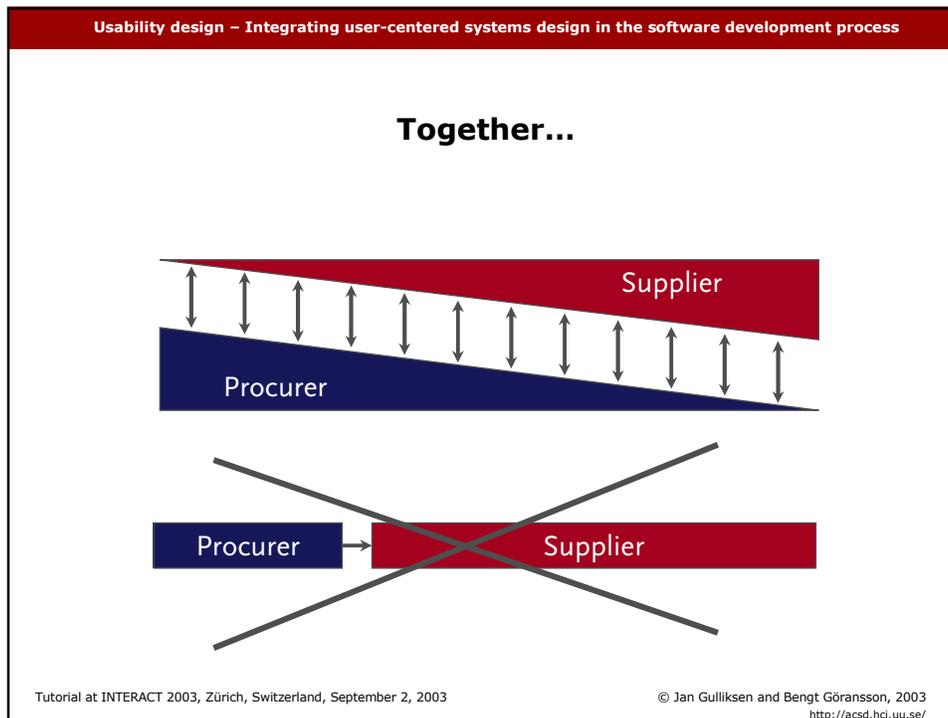
User-centered companies

- ❖ So far, developing IT-systems has been all about *technology* and *business*. With *usability*, we add a new dimension to this platform—User-Centered Systems Design.



Procurer and supplier

- ❖ Different ways of organizing development: in-house, product and consultants.
- ❖ *Supplier* :: take responsibility and be given the opportunity to have an impact on the development process, content, etc.
- ❖ *Procurer* :: make UCSD possible by e.g. creating opportunities for active user involvement.



Usability design – Integrating user-centered systems design in the software development process

Conclusions

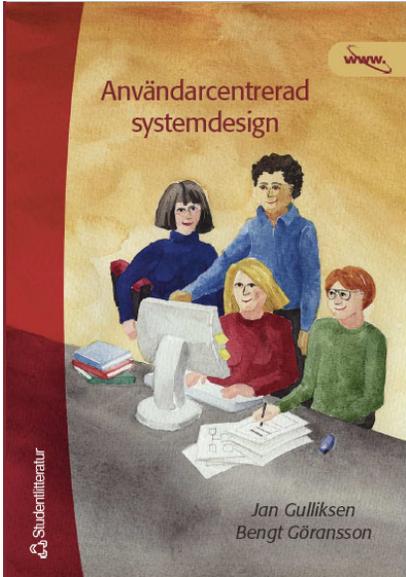
- ❖ Working consciously towards a development process focusing on users and usability is central.
- ❖ Usability is everybody's concern.
- ❖ Usability designers are important but that does not mean that all others can ignore usability.
- ❖ Management must acknowledge UCSD.
- ❖ All principles for UCSD must be applied.
- ❖ A new paradigm.

We're not there yet. We're not even close – but we have taken the first step.

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More info on usability and User-Centered Systems Design

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...sorry, only in Swedish...

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Bengt Göransson

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Selected readings on UCSD

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**Discussion, questions and
answers**