Workshop on
Designing & Conducting User Studies

16 September 2012 @ AutoCarto 2012,
Columbus, Ohio, USA

![ICA Commission on Cognitive Visualization]

Who are we?

Sara Fabrikant,
University of Zürich,
Switzerland

Amy Griffin,
University of New South Wales,
Canberra, Australia

Members from many organizations & countries

To join, see our website!

Please register to receive news and updates!
Click here to become a member.

ICA Commission on Cognitive Visualization

What do we do?

- Organize sessions at the 2013 and 2015 ICC Conferences that focus on cognitive processes associated with using maps and interactive geovisual analytical systems.

- Organize annual meetings of the commission, often in conjunction with other ICC commissions.

- Disseminate the findings of our annual meetings through an up-to-date Commission website, and peer-reviewed scholarly outlets.

- Proactively seek out the involvement of and recruit young researchers interested in the Commission's work by including opportunities for training at our annual events (this event!).

- Maintain a website for electronic dissemination of research on Commission-relevant issues.

ICA Commission on Cognitive Visualization

Upcoming Activities

- GeoViz Hamburg, Germany, March 2013 with the Commission on Geovisualization

- Cognition, Behaviour, Representation session series, AAG, Los Angeles, April 2013

- Eye-tracking workshop, pre-ICC 2013 in Dresden, Germany

  with the Commission on Use and User Issues and Commission on Geovisualization

GeoViz

Hamburg 2013
March 6-8, 2013

Interactive Maps That Help People Think

➤ **Abstract submission**: November 15, 2012

➤ **Special issue:** International Journal of Geographical Information Systems

➤ **More information:** www.geomatik-hamburg.de/geoviz

ICA ACI

Commissions on

GeoVisualization

Cognitive Visualization

ICA Commission on Cognitive Visualization

Upcoming publications

- Special issue of Cartographic Journal, December 2012
  - Based on papers from Cognition, Behaviour, Representation stream at AAG 2012

- Special issue of IJGIS, early 2014
  - Based on papers from Geoviz 2013

ICA Commission
on Use and User issues

www.icaci.org

Corné van Elzakker

David Schobesberger

Alex Pucher

David Forrest

Kristien Ooms

ICA Commission on Use and User Issues

- Small commission 'core' to take care of the website, bibliography and database of experts, facilitation of the organization of workshops / seminars and all relationships with ICA

- Project Groups that may deal with a specific aspect of use and user issues (e.g. on the use of mobile map applications, on methods and techniques of usability research etc.).

- Project Groups may come into being as a consequence of the interactions of corresponding Commission members through the website. Current mailing list of > 110 people (mainly from science and many PhD candidates).

ICA Commission on Use and User Issues

- Goals:
  - Inform
  - Share & exchange
  - Facilitate
- Through:
  - Workshops
  - Congresses
  - Website
  - Publications

ICA Commission on Use and User Issues

- 23 & 24 August 2013 in Dresden, Germany - Joint Commission seminar on **Eye-tracking**
  - ICA Commission on Cognitive Visualization
  - ICA Commission on Geovisualization
  - ICA Commission on Use and User Issues

- 25 – 30 August 2013 in Dresden, Germany – User sessions @ **ICC2013**
  - Deadline for abstracts & papers = 01-11-2012
  - **www.icc2013.org**

ICA Commission
on Use and User Issues

Website

– www.univie.ac.at/icacomuse

– (annotated) online bibliography

– Expert DB

ICA Commission on Use and User Issues

Haklay, M. (ed.) (2010),

Interacting with Geospatial Technologies.

Wiley / ISBN 978-0-470-99824-3
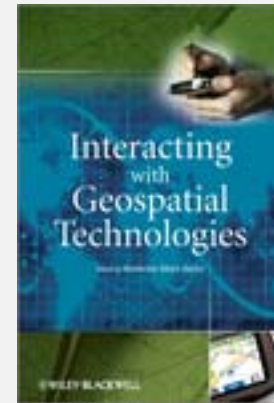
No direct Commission output, but …

- more than half of the authors and co-authors of the chapters are Commission member
- Commission explicitly acknowledged
- book covers Commission's field of interest (unprecedented)
- Complimentary and prelude to planned Handbook …

ICA Commission on Use and User Issues

Book Publication:

***The* Handbook for User Research in Geo-Information**

1. Introductory chapter
2. The use of geo-information
3. The UCD process
4. User research methods and techniques: overview
5. Core part on individual research methods & techniques, illustrated with case studies. Every section following the same structure.
6. Analysis of user research data
7. Conclusions

Overview of the day

Module 1

Kristien Ooms & Corné van Elzakker
University of Ghent
ITC, University of Twente
ICA Commission on Use and User Issues
Methods and techniques of use, user and usability research in geo-information processing and dissemination.

Module 2

Amy Griffin
University of New South Wales-Canberra
ICA Commission on Cognitive Visualization
Designing your user study or experiment.

Module 3

Amy Lobben
University of Oregon
ICA Commission on Cognitive Visualization
Research instrument integrity.

Module 4

Robert Roth
University of Wisconsin, Madison
ICA Commission on Use and User Issues
Working with the card sorting method.

AutoCarto

2012

Columbus, Ohio

Workshop on
Designing & Conducting User Studies

Module 1:
Methods and techniques of use, user and usability research in geo-information processing and dissemination.

Overview

- ## Content of the module:

  "The first module will introduce you to use, user & usability research in geo-information processing and dissemination. Reasons for doing such research are to understand and explain how GI tools work for their users and to design more usable tools. In this first module, the focus will be on the latter. The concept of User Centered Design will be presented and an overview will be given of the most commonly applied research techniques, along with tips & tricks on how and when to use them. Experiences will be shared in interactive sessions."

Know your user

- ## Who are you?
  - What is your background?
  - Have you ever done user research?
  - What are your expectations of this workshop?
  - What do you hope to learn from this workshop?
  - Do you have specific questions?

Please Introduce Yourself
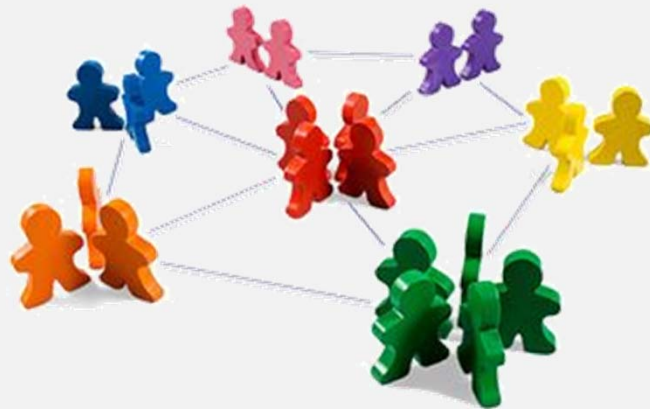
This module…

- *use,*
- *user &*
- *usability research*
- *in **geo-information processing***
- *and **dissemination***
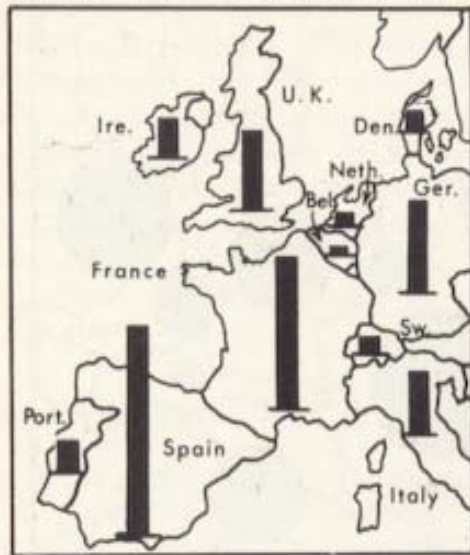- ***???***

Map use research

More holistic, functional map use research

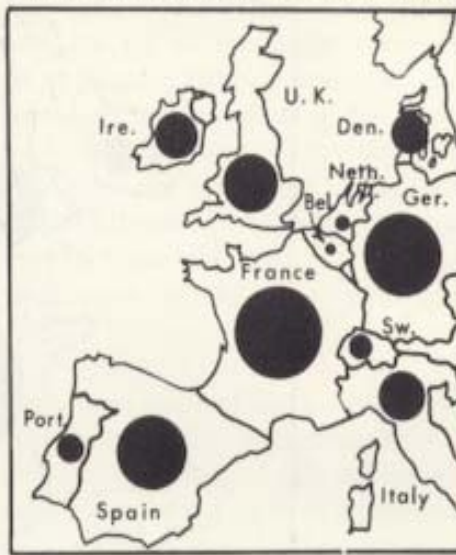

e.g. use of cycling maps, investigated by Dutch project group

Types of map use research

Perceptual and cognitive research

Nowadays …

- Technological developments have led to an integration of the various stages in the geodata collection and geoinformation production processes.

- Map users became also map producers (and collectors of map data > crowd sourcing / VGI).

- Not only maps, but also other ways of geospatial data dissemination.

therefore ….

Not only <u>map</u> use issues …

But also use and user issues related to, e.g.:

- Data and databases
- Other output formats
- Software and information systems
- Hardware
- Interfaces

From map use research to use, user & usability research in geo-information processing and dissemination…..

Aspects of usability (ISO 9241-11)

Guidance on Usability:

*"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"*

Effectiveness:

the accuracy and completeness with which specified users can achieve specified goals in particular environments

Efficiency:

the resources expended in relation to the accuracy and completeness of goals achieved

Satisfaction:

the comfort and acceptability of the work system to its users and other people affected by its use

Not only usability …

In our workshop we are dealing with:

- **uses** (tasks, questions, purposes, applications, etc.)
- **users** (human beings)
- **usability**

…and particularly with:

methods and techniques of doing use, user and usability **research**

Not only usability …

Morville, 2004
http://semanticstudios.com/publications/semantics/000029.php

25

Not only usability ...

- **Useful** > able to be used for a practical purpose > are our geoinformation products and systems useful? (~ effective)

- **Usable** > relative ease of use

- **Desirable** > emotional desirability (tempers efficiency)

- **Findable** > users should be able to find what they need

- **Accessible** > geoinformation, tools and systems should also be accessible to people with disabilities (more than 10% of the population)

- **Credible** > do users trust and believe the geoinformation products and tools they see or have to work with?

- **Valuable** > value should be delivered to the sponsors, the mission must be advanced (~ satisfaction & effectiveness)
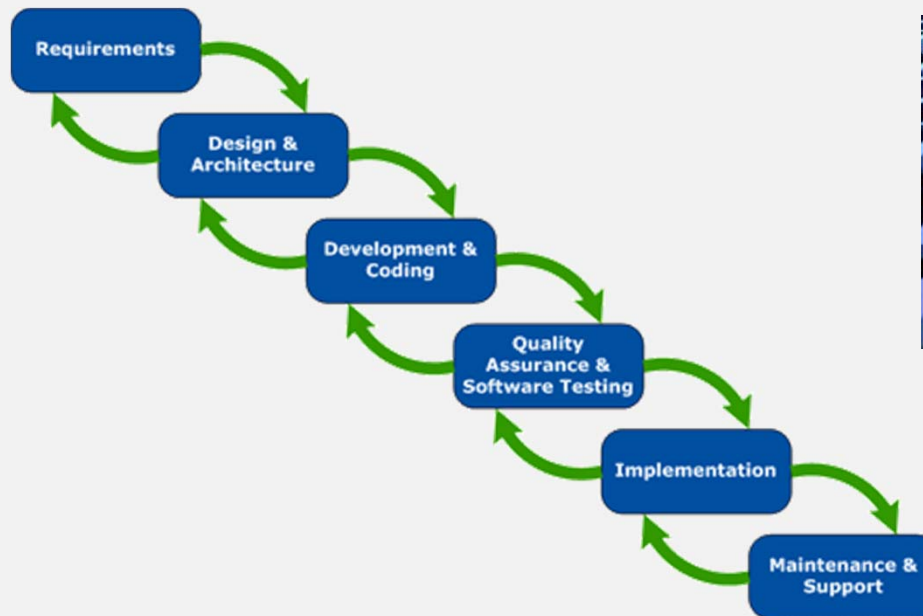
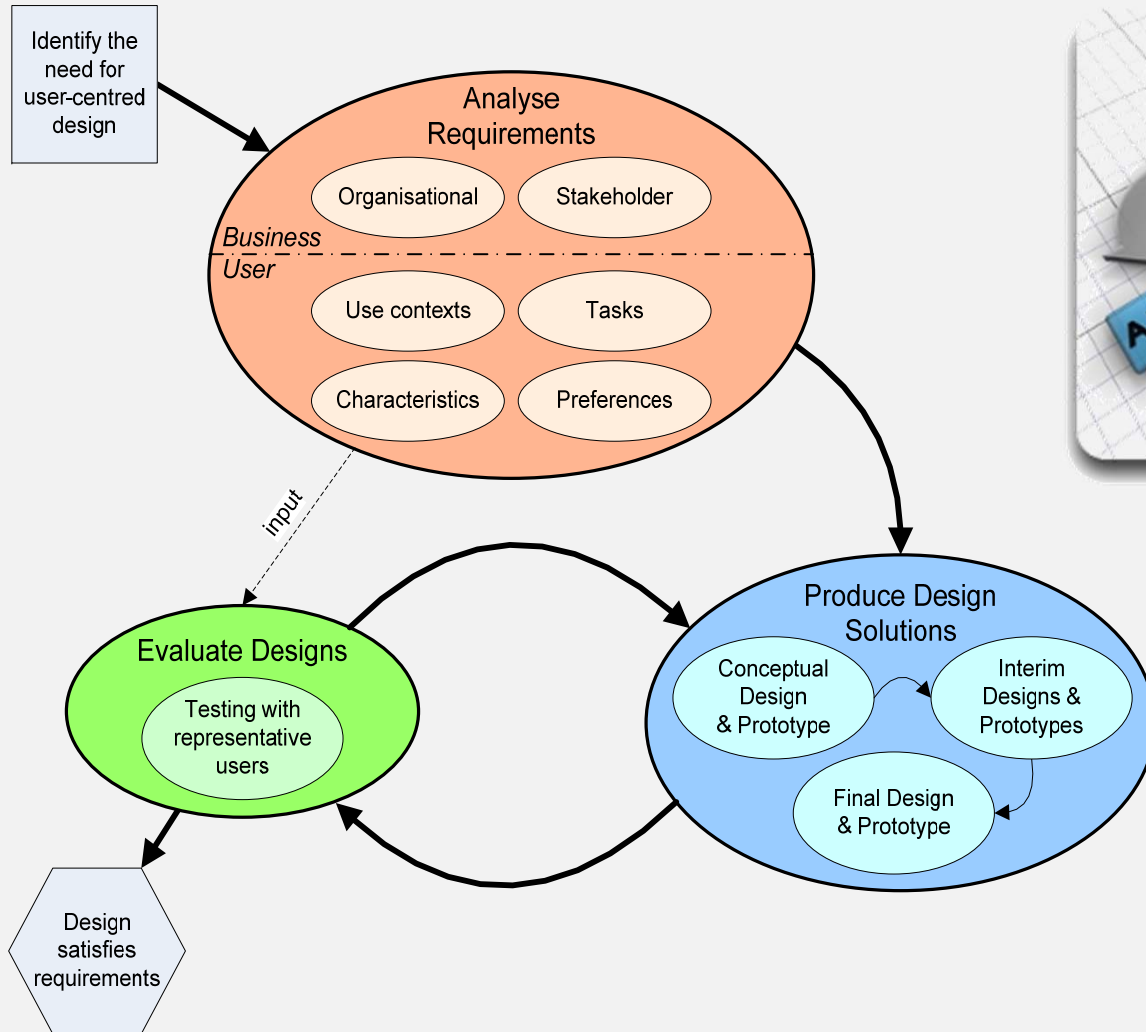*Morville, 2004*
http://semanticstudios.com/publications/semantics/000029.php

26

User Centered Design

- ## What is UCD?
  - Origin: software engineering
    - Product development: waterfall model
    - Involve user in all stages of design process

The UCD life cycle

Identify the need for user-centred design

Analyse Requirements
- Organisational
- Stakeholder

Business
User

- Use contexts
- Tasks
- Characteristics
- Preferences

input

Evaluate Designs
- Testing with representative users

Produce Design Solutions
- Conceptual Design & Prototype
- Interim Designs & Prototypes
- Final Design & Prototype

Design satisfies requirements

IMPLEMENT DEVELOPMENT ANALYZE DESIGN

28

The UCD life cycle

Requirement analysis!!!
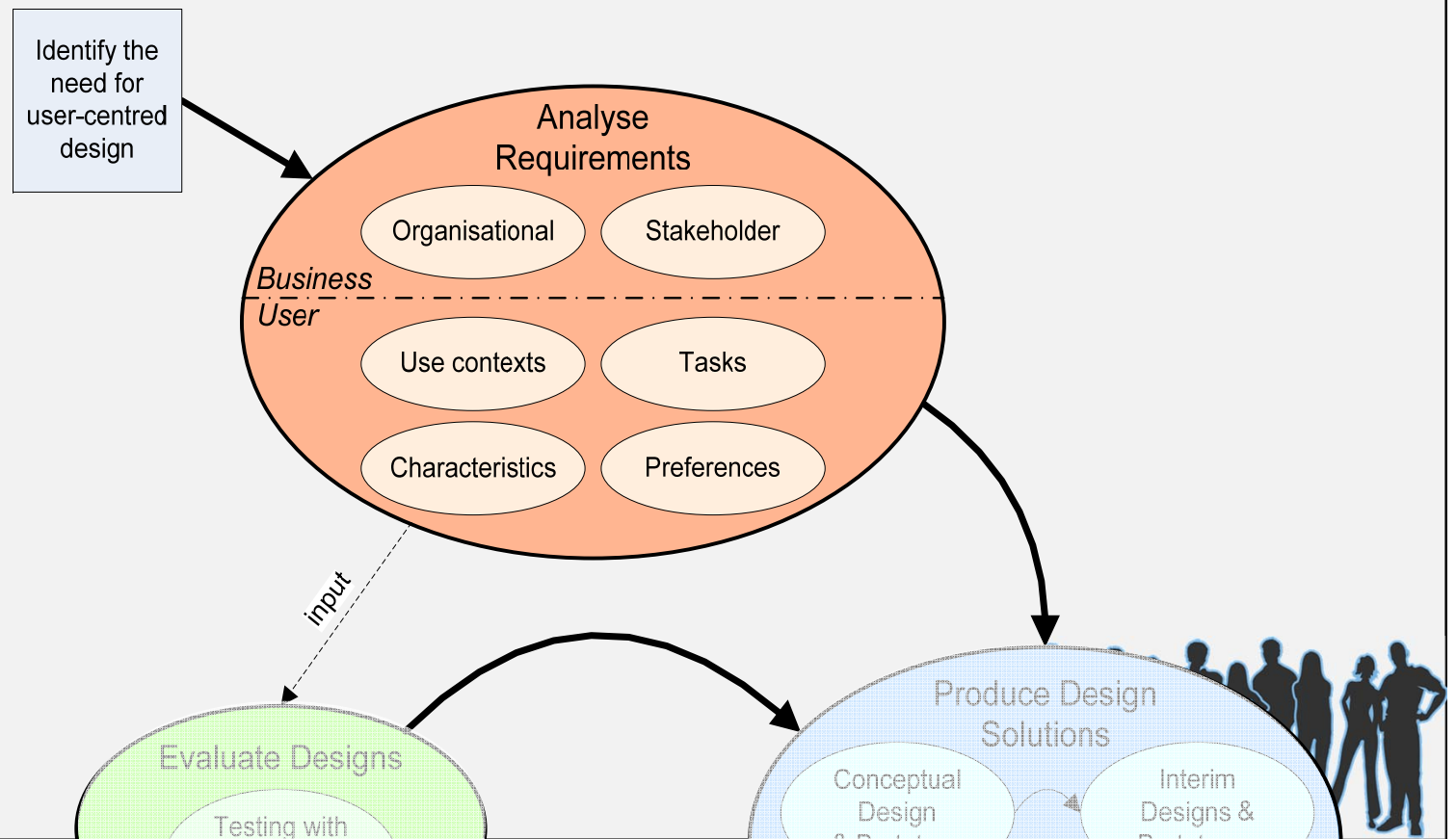
The UCD life cycle

Usability evaluation

Evaluate Designs

Testing with representative users

Produce Design Solutions

Conceptual Design & Prototype

Interim Designs & Prototypes

Final Design & Prototype

Design satisfies requirements

Iterative process
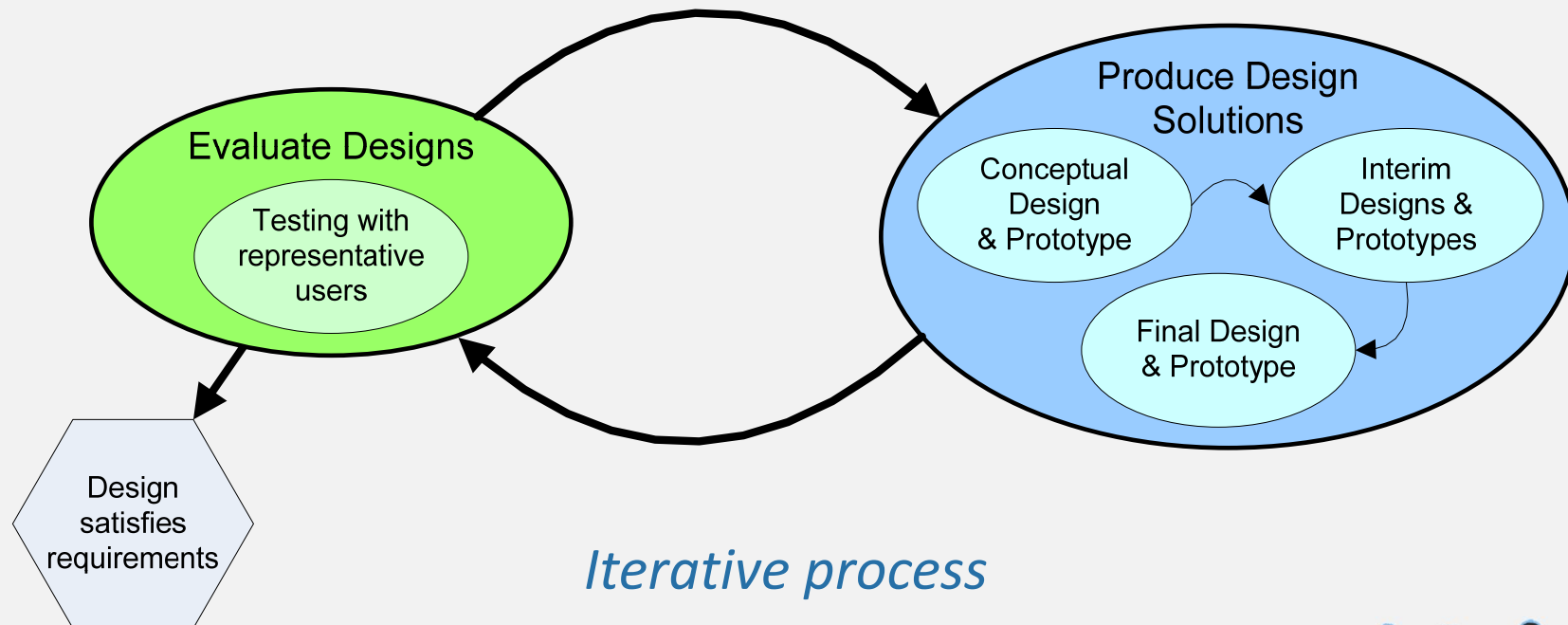
Many user research methods & techniques

Interviews Product analysis Literature / document studies Observation Bra___ming Surveys / questionnaires Thinking ___ud Eye-tracking Heuristic evaluation Personas Scenari_ ___elopment Screen logging Snapshot studies Focus gr___s Stakeholder meeting Participat___ ___ Task analysis ___ ___ gh Diary / notekeep___ ___ Usability inspectio___ ___ction measurement Expert evaluation

31

Important aspects of usability research

- Distinction between methods & techniques of data collection and data analysis

- Keep in mind that not all methods can be applied in all stages of the UCD

- Distinction between qualitative and quantitative research

- Working with experts or with (representatives of) "real" end-users

- Is it a within- or between user study?

- Doing research in the proper context (field-based vs. laboratory based research)

33

Important aspects of usability research

Method = User Centered Design

(of geospatial data processing and dissemination systems)

Techniques *e.g.:*

Qualitative

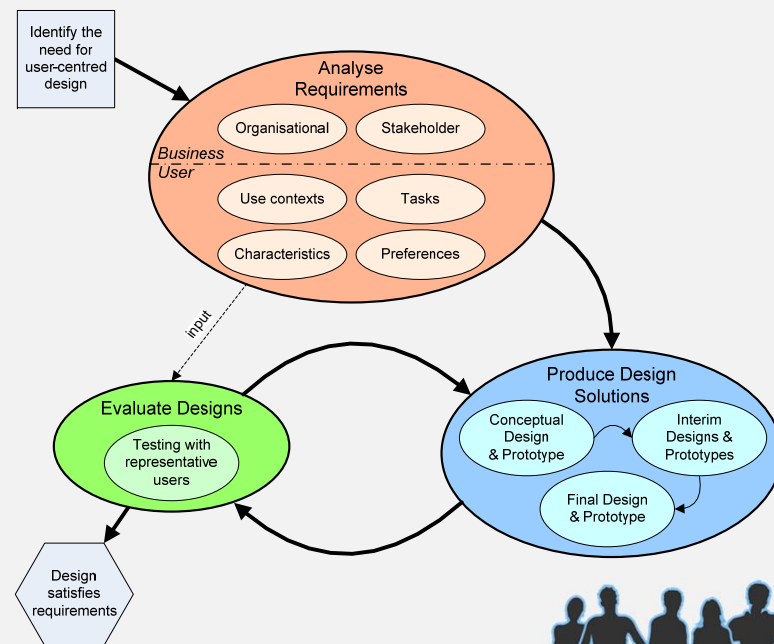*Focus groups*

Interviews

Observation

Thinking aloud

Questionnaires

Screen logging

Eye tracking

Performance analysis

Quantitative

34

Important aspects of usability research

Requirements Analysis
- ✓ *Focus groups*
- ✓ *Brainstorm sessions*
- ✓ *Interviews*
- ✓ *Surveys & questionnaires*
- ✓ *Stakeholder meetings*
- ✓ *Literature review*
- ✓ *Card sorting*
- ✓ *...*

User feedback
- ✓ *Questionnaires*
- ✓ *User satisfaction*
- ✓ *Logging user interactions*
- ✓ *Observations*
- ✓ *Diary keeping*
- ✓ *...*

Evaluate early design
- ✓ *Paper prototype*
- ✓ *Storyboarding*
- ✓ *Heuristic evaluation*
- ✓ *Automated evaluation*
- ✓ *Wizard of Oz*
- ✓ *Thinking aloud*
- ✓ *Eye tracking*
- ✓ *Card sorting*
- ✓ *Cognitive walkthrough*
- ✓ *....*

Evaluate elaborate design
- ✓ *Performance testing*
- ✓ *User satisfaction*
- ✓ *Heuristic evaluation*
- ✓ *Cognitive walkthrough*
- ✓ *Functional prototyping*
- ✓ *Critical incidents*
- ✓ *Logging user interactions*
- ✓ *....*

Important aspects of usability research

- Involving (representatives of) **"real" users**:
  - *Surveys & questionnaires*
  - *Interviews*
  - *Focus groups / stakeholder meetings*
  - *Observation: logging user activities (including tracking, video, screen logging)*
  - *Eye-movement tracking*
  - *Thinking aloud*
  - *Participatory design*

- Involving **experts** (not the users themselves):
  - *Heuristic evaluation / usability inspection*
  - *Cognitive walkthrough*

- **Theory** based
  - *Automated evaluation*
  - *Scenario-based design*
  - *Secondary sources*

KO1   Checken methods book
                 card sorting
                        link to module rob
                 Kristien Ooms, 26/06/2012

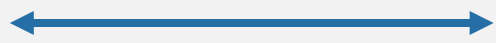# Important aspects of usability research

How many users?!

- Depending on technique
  - Data = Qualitative or Quantitative?

Qualitative analyses on... ←——————→ **Statistical analyses on....**

Focus Groups　　*Observations*　　　　　　　　*Performance measurements*

Thinking aloud　　　　　　　　*Questionnaires*　　*Eye tracking*

$n \geq 5$ participants...　　　　　　$n \longleftrightarrow \alpha, SD, z, \dot{x},...$

- How many user groups?
  - Evaluate user characteristics (between user)
    - Multiple groups, different characteristics
  - Evaluate different products (within user)
    - Multiple groups, same characteristics

Learning from each other...

- Input from audience
  - Who did user research?
  - Describe background
  - Decisions you had to make (select technique, find participants,...)
  - Issues you encountered
  - ....

Thank you for your attention!

Contact:
kristien.ooms@ugent.be
elzakker@itc.nl
www.univie.ac.at/icacomuse/