SIGCHI Premier Session

SIGCHI EC Member(4명) + 국내연사(3명)으로 구성

Fred Sampson (10:00 ~ 10:20)  
- 주제: "When 'Help' Doesn't: User Assistance in the User Interface"
- 소개: Vice President for Operations of ACM SIGCHI EC

Philippe Palanque (10:20 ~ 10:40)  
- 주제: Task-Centred Design, Construction and Operation of Safe, Usable and Reliable Interactive
- 소개: Adjunct Chair for Specialized Conferences of ACM SIGCHI EC

Gerrit van der Veer (10:40 ~ 11:00)  
- 주제: Education for Interaction Design Teaching considered harmful
- 소개: President of ACM SIGCHI EC

Tuomo Kujala (11:00 ~ 11:20)  
- 주제: VisGuard Proactive Distraction Prevention System
- 소개: Vice President for Chapters of ACM SIGCHI EC

11:20-11:40 Coffee Break

MD. Cheolbae Lee (11:40 ~ 12:00)  
- 주제: "Art of compromise in ux design" (UX 디자인과 절묘한 타협)
- 소개: Mobile Communication Design 연구소장, 디자인경영센터, LG 전자 상무

Prof. Dongwhee Shin (12:00 ~ 12:20)  
- 주제: "What Do Users Want from Social TV?: The Mediating Role of Sociality and Interactivity on the Effect of Performance on Attitude"
- 소개: 성균관대학교 교수

Prof. Junghyun Kim (12:20 ~ 12:40)  
- 주제: Multimodal Fusion and Illusion: An Alternative to Physical Immersion?
- 소개: 고려대학교 교수
When Help Doesn’t:  
Embedded Assistance in the UI

HCI Korea 2014
안녕하세요

- My job:
  - Technical writer, information developer, technical communicator, information architect
  - Interaction designer, usability engineer, taxonomist, terminologist . . .

- My goal:
  - Put all the information that your users need to complete their tasks into the user interface
   . . . and never write another help topic again!

- But, I need your help. . .
Agenda

Problem: No one wants to push the “Help” button!
Process: User-centered design
Solution: Embedded assistance following progressive disclosure
Implementation: Details
Challenges: Mobile
“Help” doesn’t.

-Jakob Nielsen

Source: Personal communication, BayCHI meeting, circa 2008
What’s the problem?

Problem: No one wants to push the “Help” button

Process: User-centered design
Solution: Embedded assistance
Implementation: Details
Challenges: Mobile
Users don’t want to use help

- Universally regarded as unhelpful
  - Years of poor user experiences
  - No one wants to click the “Help” button, but they miss it if it isn’t there!

- "We'll just have to document that“
  - Fix the UI instead of the documentation

- "Type your user name in the user name field“
  - Obvious instructions are a distraction
  - Reduce confidence in user assistance

- Too often, help interrupts the task at hand
  - We should facilitate task completion, not hinder or distract

- Users will ask their neighbor or search Google before clicking “Help”
More help is not the answer

How do we fix it?

Problem: No one wants to push the “Help” button

Process: User-centered design

Solution: Embedded assistance

Implementation: Details

Challenges: Mobile
Some hypotheses

- "Don't make me think!" (Steve Krug on usability)
  - Make the UI obvious
  - Prevent or recover from known errors

- Information developers should think more, write less
  - Know your user
  - Personas and scenarios

- Focus on user tasks, goals
  - Not a list of features!
  - Design to support successful completion of a task

- Put the information needed right in front of the user
  - When and where it’s needed
  - Help them complete their work with minimal distraction
  - Then get out of the way
Proposed solution

Problem: No one wants to push the “Help” button

Process: User-centered design

Solution: Embedded assistance with progressive disclosure

Implementation: Details

Challenges: Mobile, Video
“Just-in-time” information

- Let’s put information just where users need it and just when they need it; ideally, the interface with its associated text is so clear that users don’t need additional assistance
- Make it obvious: design for success
- Progressive disclosure
  - Provide just enough initially
  - Provide more information as needed
- Document the UI in the UI; make it self-documenting
- Document the domain, cross-UI-pane tasks, cross-product tasks and processes, and so on, in the online information center
- PDF is where information goes to die
How we do it

Problem: No one wants to push the “Help” button

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Solution: Embedded assistance following progressive disclosure

Implementation: Details

Challenges: Mobile
## A simplified progressive disclosure model

<table>
<thead>
<tr>
<th>Informational element</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. UI labels and strings</td>
<td>Consistent, clear terminology</td>
</tr>
<tr>
<td>2. Instructional text in the UI</td>
<td>Additional instructions to provide context, orientation, warnings, examples</td>
</tr>
<tr>
<td>3. Hover help, tool tips, pop-ups</td>
<td>Rules for what to enter in a field, confusing items, relationships among UI objects, examples...</td>
</tr>
<tr>
<td>4. Help linked from the UI (usually a help push button or link)</td>
<td>Broader scenarios that show how tasks link together at a high level; expertise, recommendations</td>
</tr>
<tr>
<td>5. Online help, book-type topics</td>
<td>Conceptual material; programming; messages; troubleshooting; installing; configuring; etc.</td>
</tr>
</tbody>
</table>
How progressive disclosure works

- Reveal information in an ordered manner
  - Each embedded assistance layer builds on the previous one in a flow that provides progressively more information.
  - Provide only the details that are necessary at a given time
  - Provide assistance when necessary.
    - Do not write unhelpful information just to fill in an empty widget.
  - Do not repeat information,
    - For example, do not repeat field labels in hover text!

- Provide a clear trail for the user.
  - Transitions between assistance (both embedded and non-embedded).
  - “A guided journey, not a scavenger hunt.” (Jennifer Fell, IBM)

- Connect the information into a bigger picture.
  - Context for smaller choices and tasks becomes clear.
The tools

- Information architecture of the UI
- Field labels, buttons, headings
- Inline text
- Hover help, tool tips
- Popups, local information center
- Links out to context-sensitive help
- eUA DITA specialization

During product development, 2/3 of my time is on embedded assistance
  - Working closely with interaction designers to get the flow right
  - Get the terminology right
  - Don't fix bad UI in the docs, fix the UI!
Progressive Disclosure: Level 1
Field labels, pre-filled default values

- Default values
- Sensible labels
- No jargon!
Examples, restrictions, instructions – As much as space allows
Progressive Disclosure: Level 3
Hover help, tool tips

Hover help for examples, restrictions
Tool tips describe icons
Progressive Disclosure: Level 4
Open local help

Search tips
Each field on the Search pane has some additional options that can help refine your search.

Search basics
In general, eDiscovery Manager can search any content that is stored in a content server and indexed with an archive server.

Review the following basic search tips to improve the speed and accuracy of your searches, and to most effectively use other specialized search capabilities:

- Choosing the right search terms is the key to finding the information you need. The more precise results that you need, the more specific keywords you should use. For example, search for tax avoidance strategies rather than taxes. Or search for California energy usage rather than energy.
- To find an exact match and ensure that terms appear in documents in the same sequence in which you entered them, put double quotation marks around your search term, for example, "Alaskas pipeline" or "endangered species". In contrast, entering Alaska's pipeline without quotation marks returns any documents that contain both of those words anywhere in the content because a space in search terms without double quotation marks is interpreted as the Boolean operator AND.
- You cannot use wildcard characters inside search terms that you enclose in double quotation marks.

Using double quotation marks prevents documents with term variants from being returned. For example, searching for "mouse" does not return documents with mice and searching for "stock option" does not return documents with stock options.

- Case-sensitivity
  - Searching e-mail properties and content is not case sensitive. For example, searches for legal, Legal, and Legal2 will all return the same results.
  - Searching file properties is case sensitive. For example, searches for energy, Energy, and Energy will all return different results.
- To combine search terms within a search field, use the logical operators AND, OR, and NOT. Use AND to find documents that contain multiple terms, OR to find documents that contain at least one of the terms, and NOT to find documents that do not contain the specified term. For example:
Progressive Disclosure: Level 5
Link out to online information
What users tell us

Users say that they …

- Love, and expect, all the information in the UI, and they ask for it when it is not there.
- Never attempt to click Help or access the Help menu; they stay within the dialog and look for information there.
- Want hover text to be concise and not redundant with labels or with each other (other hover text in same dialog).
- Ask for the ability to turn off hover text after they know what they're doing.
- Like the information inside an embedded help pane, but do not want the pane open by default or otherwise taking up room.
But what about . . . ?

Problem: No one wants to push the “Help” button!

Process: User-centered design

Solution: Embedded assistance following progressive disclosure

Implementation: Details

Challenges: Mobile

Source: If applicable, describe source origin

22  14 February 2014
What do you do in these situations?

- **Mobile devices**
  - No hover help?!
  - Don't take user away from the task!
    * Stay in context
    * No linking out
  - Simplified UI
  - Overlays for introduction
  - Short video introduction
  - Rely on common interactions, gestures
    * Long press, short press
    * Swipe
    * Pinch, expand
A few references


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Thank you!

감사합니다
Task-Centred Design, Construction and Operation of Safe, Usable and Reliable Interactive and (partly-) Autonomous Systems

Philippe Palanque

Interactive Critical Systems Research Group
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Feb 14th 2014
Task-Centred Design, Construction and Operation of Safe, Usable and Reliable Interactive and (partly-) Autonomous Systems

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Feb 14th 2014
Past-Current Research Projects

• **Air Trafic Management** (enroute ATC workstations) 1995-2001 & 2010-2014 HALA! Network of excellence & SPAD
  - Dynamic instantiation of widgets, Post WIMP interfaces
  - Time constraint about 3mn (speed vector)
  - Automation

  - Multimodal interfaces for ground segments
  - Specification of satellite ground segments with multimodal interfaces
  - Target application: AGENDA & spacecraft-debris collision avoidance system

• **Civil aviation** Thales (2001-2004) 2009-2016 (Airbus – dependable interactive cockpits)
  - Interactive Cockpits (ARINC 661 standards)
  - Specification of system architectures for dependable interactive systems
A bit of history (revisited): What is HCI?

- Human Computer Interaction: Usability of computing systems (effectiveness, efficiency, satisfaction)

  Basic principle: user centered design
  Process: iterative design/development

- Initial approach in computer science
  We design/develop the system and THEN usability is evaluated

- HCI domain contribution
  We design/develop the system and FOR usability
A bit of history (revisited): What is HCI?

- Human Computer Interaction: **Usability** of computing systems (effectiveness, efficiency, satisfaction)

  Basic principle: **user centered design**

  Process: **iterative design/development**

- Initial approach in computer science
  - We design/develop the system and THEN usability is evaluated

- HCI domain contribution
  - We design/develop the system **FOR usability**
• In one sentence: Designing Interactive Systems neither Interaction, nor Interfaces

• Principle: Usability and User eXperience are NOT more important than Reliability, Dependability, Security, Resilience, Safety, others Privacy, Trust, Accessibility, ...

• Proposal: Design methods, processes and tool to design/develop interactive systems FOR these properties
They are not Orthogonal!?

• Usable & reliable then safer?

▫ Planes
▫ Command and control systems

• Usable & reliable then less safe!!

▫ The less usable the safer
▫ The less reliable the safer

• Safer for some, less for others

▫ More Secure and more Reliable then less Usable
▫ More Privacy then less Security
▫ More Security less reliability (cockpits & satellites)
They are not Orthogonal !?

- Usable & reliable then safer?
  - Planes
  - Command and control systems
- Usable & reliable then less safe!!
  - The less usable the safer
  - The less reliable the safer
- Safer for some less for others
- Less Reliability less User eXperience
- More Secure and more Reliable then less Usable
- More Privacy then less Security
- More Security less reliability (cockpits & satellites)

There is a need for a holistic view on these properties and not for a reductionist one (even though this supports progress)
Adapted from: Avizienis, A., Laprie, J.-C., Randell, B., Landwehr, C. Basic concepts and taxonomy of dependable and secure computing. In IEEE Trans. on Dependable and Secure Computing, vol.1, no.1, pp. 11-33, Jan.-March 2004
Faults and Errors

Adapted from: Avizienis, A., Laprie, J.-C., Randell, B., Landwehr, C. Basic concepts and taxonomy of dependable and secure computing. In IEEE Trans. on Dependable and Secure Computing, vol.1, no.1, pp. 11-33, Jan.-March 2004
Outline of the talk

• Introduction (HCI in Critical Contexts)
• Introduction to the Interactive Cockpits domain
• A Research Contribution based on Models
• Dependability for Interactive Systems/Cockpits
• Dealing with automation
• Conclusions and perspectives
A380 Interactive cockpit (flight deck)

CDS: Control and Display System

KCCU: Keyboard and Cursor Control Unit

DU: Display Unit
A380 Interactive cockpit (flight deck)

CDS: Control and Display System

KCCU: Keyboard and Cursor Control Unit

Interactivity is limited to non-critical functions
Subject: Meeting Report

Cockpit Display System (CDS) Subcommittee
January 24-26, 2006, Phoenix, Arizona

Summary

ARINC Specification 661: Cockpit Display System Interface to User Systems, is being updated to support new airplane development activities.

Supplement 3 will add six new Graphical User Interface (GUI) objects. The new widgets are:

- 3.6.1 EditBoxNumericBCD
- 3.6.2 CursorRef
- 3.6.3 CursorOver
- 3.6.4 FocusLink
- 3.6.5 SizeToFitContainer
- 3.6.6 ShuffleToFitContainer

Supplement 3 will also include new material:

- Section 7 - Bit maps within User Application Definition Files (UADF)
- Appendix F - Reliable Communication Between UA and CDS
- Appendix G - Introduction of New Widgets into ARINC Specification 661

The CDS Subcommittee expressed support for an update to Section 6 that will allow XML extensions to be used to attach new properties to a widget. This will be included in Supplement 3.

The next CDS Subcommittee meeting is scheduled tentatively for June 13-15, 2006, in Seattle, Washington. Boeing volunteered to host the meeting.
ARINC 661 specification architecture

Software/OS/Hardware integration
Human error, usability
Function allocation
Outline of the talk

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- Introduction to the Interactive Cockpits domain
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  - System models
  - Task models
  - Integrated models
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- Conclusions and perspectives
Current Situation

- Low hanging fruits already been collected
- Foundations identified many years ago
  - Annett & Duncan HTA in 1967 (task modeling)
  - Carl Adam Petri work in 1962 (concurrent systems modeling)
- Interactive systems raise a whole set of new issues
  - Refinement and deeper understanding over the years
  - Need for long term detailed smaller refinements
  - Need for support to the design, development of safe, usable and dependable interactive systems
Research Proposal

• “Formal” description techniques for interactive systems: the ICO formalism

• Set of cooperating classes

• For each class
  ▫ Behavior (Petri nets)
  ▫ Services (availability)
  ▫ State (distribution and value of tokens)
  ▫ Presentation
    • Activation (how users' actions on the input devices trigger systems methods)
    • Rendering (how state changes are presented to the users)

• Extensions
  ▫ Asynchronous multicast communication mechanism
  ▫ Quantitative temporal information (temporal window) reuse of previous work in Petri nets theory
  ▫ Dynamic event handling
Goal of ICOs and PetShop

• The user interface requires the same dependability as the rest of the software

• Completeness (model the entire UI)
  ▫ the complex parts must be dealt with too
  ▫ the more complex the UI the more likely the notation is to be not able to deal with it

• Concurrency, “infinite” number of states, temporal aspects, objects and behavior integrated, ...

• Verification, validation, certification, ... of the interactive software

• Bridge the edition-execution gap (Navarre D. et al. A Model-Based Tool for Interactive Prototyping of Highly Interactive Applications. 12th IEEE, International Workshop on Rapid System Prototyping ; Monterey (USA), IEEE, 2001.)
An example: the MPIA application
MPIA Application

- Available in several cockpits
  - Switch between modes
  - The tilt angle: a numeric edit box permits to select its value into range \([-15^\circ; 15^\circ]\)
  - Modifications are forbidden when in AUTO tilt selection mode
- Simple behavior but realistic
- Tasks are simple enough too
- Used in our group for dependability and scalability studies of interactive applications
Behavioral description of the application: system model
PetShop and the system model
Modelling the Entire Interactive System

- User Application
- Widgets
- User interface server
  - Objects, widgets
  - Applications
  - Input and output devices
Formal Description of a "simple" widget: ARINC 661 PushButton p.98-101

- Informal presentation
- Formal Description of the PushButton
  - Services and Events
  - Behaviour
  - Activation and Rendering functions
- Thales CDS Look & Feel (21 other ones modelled)
PushButton : The Behavior
Interaction Technique
Modelling the Entire Interactive System

- User Application
- Widgets
- User interface server
  - Objects, widgets
  - Applications
  - Input and output devices
- Towards zero-default interactive systems (reliability)
More about ICOs


• Navarre et al. ICOs: a Model-Based User Interface Description Technique dedicated to Interactive Systems Addressing Usability, Reliability and Scalability. ToCHI, ACM SIGCHI, Vol. 16 N. 4, p. 1-56, 2009


• Bastide R. & P. Palanque Modelling a groupware editing tool with cooperative objects Advance in Petri nets on Object Orientation, 2001, G. Agha & F. De Cindio (Eds.), Springer Verlag, Lecture Notes in Computer Science n° 2001

• R.Bastide, Ph. Palanque A Petri Net Based Environment for the Design of Event-Driven Interfaces. 16th International Conference on Application and theory of Petri Nets (ATPN'95) Torino, Italy, 20-22 June 1995, LNCS.
There is a need for adequate tools
Outline of the talk

- Introduction (ICS group and HCI in Critical Contexts)
- Introduction to the Interactive Cockpits domain
- A Research Contribution based on Models
  - System models
  - Task models
  - Integrated models
- Dependability for Interactive Systems/Cockpits
- Dealing with automation
- Conclusions and perspectives
Certification Specifications for Large Aeroplanes CS-25

Amendment 4
27 December 2007
CS 25.1301 Function and installation
(See AMC 25.1301)

Each item of installed equipment must –
(a) Be of a kind and design appropriate to its intended function;
(b) Be labelled as to its identification, function, or operating limitations, or any applicable combination of these factors. (See AMC 25.1301(b));
(c) Be installed according to limitations specified for that equipment.
[Amendment No.:25/2]

CS 25.1302 Installed systems and equipment for use by the flight crew
(See AMC 25.1302)

This paragraph applies to installed equipment intended for flight crew members’ use in the operation of the aeroplane from their normally seated positions on the flight deck. This installed equipment must be shown, individually and in combination with other such equipment, to be designed so that qualified flight crew members trained in its use can safely perform their tasks associated with its intended function by meeting the following requirements:

(a) Flight deck controls must be installed to allow accomplishment of these tasks and information necessary to accomplish these tasks must be provided.
(b) Flight deck controls and information intended for flight crew use must be:
   (1) Present in a clear and unambiguous form, at resolution and precision appropriate to the task.
   (2) Be accessible and usable by the flight crew in a manner consistent with the urgency, frequency, and duration of their tasks, and
   (3) Enable flight crew awareness, if awareness is required for safe operation, of the effects on the aeroplane or systems resulting from flight crew actions.
(c) Operationally-relevant behaviour of the installed equipment must be:
   (1) Predictable and unambiguous, and
   (2) Designed to enable the flight crew to intervene in a manner appropriate to the task.
   (d) To the extent practicable, installed equipment must enable the flight crew to manage errors resulting from the kinds of flight crew interactions with the equipment that can be reasonably expected in service, assuming the flight crew is acting in good faith. This sub-paragraph (d) does not apply to skill-related errors associated with manual control of the aeroplane.
[Amendment No.:25/2]

CS 25.1303 Flight and navigation instruments
(a) The following flight and navigation instruments must be installed so that the instrument is visible from each pilot station:
   (1) A free-air temperature indicator or an air-temperature indicator which provides indications that are convertible to free-air temperature.
   (2) A clock displaying hours, minutes, and seconds with a sweep-second pointer or digital presentation.
   (3) A magnetic compass.
(b) The following flight and navigation instruments must be installed at each pilot station:
   (1) An airspeed indicator. If airspeed limitations vary with altitude, the indicator must have a maximum allowable airspeed indicator showing the variation of V_{ASA} with altitude.
   (2) An altimeter (sensitive).
   (3) A rate-of-climb indicator (vertical speed).
   (4) A gyroscopic rate-of-turn indicator combined with an integral slip-slip indicator (turn-and-bank indicator) except that only a slip-slip indicator is required on aeroplanes with a third attitude instrument system usable through flight attitudes of 360° of pitch and roll, which is powered from a source independent of the electrical generating system and continues reliable operation for a minimum of 30 minutes after total failure of the electrical generating system, and is installed in accordance with CS 25.1321(a).
(a) Flight deck controls must be installed to allow accomplishment of these tasks and information necessary to accomplish these tasks must be provided.

(b) Flight deck controls and information intended for flight crew use must:

1. Be presented in a clear and unambiguous form, at resolution and precision appropriate to the task.

2. Be accessible and usable by the flight crew in a manner consistent with the urgency, frequency, and duration of their tasks, and

3. Enable flight crew awareness, if awareness is required for safe operation, of the effects on the aeroplane or systems resulting from flight crew actions.

(d) To the extent practicable, installed equipment must enable the flight crew to manage errors resulting from the kinds of flight crew interactions with the equipment that can be reasonably expected in service, assuming the flight crew is acting in good faith. This sub-paragraph (d) does not apply to skill-related errors associated with manual control of the aeroplane.
Problem

- Engineering Interactive Systems
  - Processes, methods, techniques, and tools for the design, construction, validation and verification of interactive systems

- Usability
  - Efficiency
  - Satisfaction
  - Effectiveness

Interactive System model

Users’ Tasks and Goals model

- Fun
- Pleasurable
- Desirable
- Stimulating

task/artefact vicious cycle
Caroll/Rosson 1991
Goals of HAMSTERS

- Remain similar to the main task modeling:
  - Factorization of operators
  - Handle low-level tasks (related to interaction techniques)
  - Handle object information (preconditions, processing, ...)

- Make it possible to:
  - Connect to a system model (TAMODIA 2007 AMBOSS)
  - Support performance evaluation (EICS 2009)
  - Formally check the compatibility of tasks and system models (EHCI 1995, IwC 1997)
  - Support training (EICS 2011)
- Decomposition of a user’s goal
- Hierarchical
- Temporally ordered
More about Task Modeling (HAMSTERS)


Outline of the talk

- Introduction (ICS group and HCI in Critical Contexts)
- Introduction to the Interactive Cockpits domain
- A Research Contribution based on Models
  - System models
  - Task models
  - Integrated models
- Dependability for Interactive Systems/Cockpits
- Dealing with automation
- Conclusions and perspectives
Integration Principles

• Strong integration (co-execution of models)
• One single platform (PetShop with HAMSTERS inside)
• Two modes
  ▫ Task driven (performing a task makes the system evolve)
  ▫ System driven (acting on the system changes the current task in the task model)
Objectives of the work

• **Increase reliability**
  ▫ Complete and unambiguous description of the entire interactive system (cockpit)
  ▫ Verification techniques
  ▫ Including interaction (including multimodal)
  ▫ Support context-tolerance (interruptions, failures, errors, …)

• **Reduction of costs**
  ▫ Faster iterations to support task/artefact *virtuous* circle
  ▫ Support for testing (software and usability)

• **Improved operations**
  ▫ Faster and safer interactions in the cockpit
  ▫ Faster recovery from system failure (MTTR)
  ▫ Assess impact of human error
Conclusions on the example

• 4 views of the same real world
  ▫ System (including interaction and interface)
  ▫ Tasks (of each operator and of the cooperating operators)
  ▫ Training material
  ▫ User Manual (e.g. Elect. Flight Bag)

• Support for task-based construction and testing

• Not presented
  ▫ Construction of training program, assessment of trainee and online contextual help (EICS 2011)
  ▫ Dealing with errors and failures (human and systems)
  ▫ Dealing with “user over the loop” issues (automation)
  ▫ Configurations switching following system failures
There is a need for adequate tools.
Outline of the talk

- Introduction (HCI in Critical Contexts)
- Introduction to the Interactive Cockpits domain
- A Research Contribution based on Models
- Dependability for Interactive Systems/Cockpits
  - Zero default
  - N-version programming
  - Self-checking widgets
  - Impact of hardware/software architecture on usability
- Dealing with automation
- Conclusions and perspectives
Dependability

• “The dependability of a system is the ability to avoid service failures that are more frequent and more severe than is acceptable” Avizienis A., Laprie J-C., Randell B., Landwehr C: Basic Concepts and Taxonomy of Dependable and Secure Computing. IEEE (2004)

• Failure Condition Severity DO 178C and Probability Objectives

<table>
<thead>
<tr>
<th>Failure Condition Severity</th>
<th>Probability Objective</th>
<th>Probability descriptive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophic</td>
<td>&lt;10^-9</td>
<td>Extremely Improbable</td>
</tr>
<tr>
<td>Hazardous</td>
<td>&lt;10^-7</td>
<td>(very) Improbable</td>
</tr>
<tr>
<td>Major</td>
<td>&lt;10^-5</td>
<td>Improbable</td>
</tr>
<tr>
<td>Minor</td>
<td>&lt;10^-3</td>
<td>Reasonably probable</td>
</tr>
</tbody>
</table>

Redundancy is required to provide design protection from catastrophic failure conditions (ARP 4761) safety civil airborne systems
Security

Faults and Errors

Mal = Malicious – Del = Deliberate – Nat = Natural
Hdw = Hardware

Development software faults (Issue 1)
Malicious faults (Issue 2)
Development hardware faults (Issue 3)
Operational natural faults (Issue 4)
Operational human errors (Issue 5)

Phase of occurrence
System boundaries
Genotype
Dimension
Objective
Intent

Security

Fault Tolerance

Usability

Reliability
A Research Agenda for the Resilience of Interactive Critical Systems

- **Software side of it**
  - If the systems exhibit zero default then the interactive cockpit is dependable
  - Formal description techniques (complete and unambiguous specification)
  - No gap between code and implementation
  - Models can be used to support exhaustive testing

- **Hardware side of it**
  - Hardware failures still possible *(KCCU is a single point of failure)*
  - Network failure/bugs

- **Environment side of it**
  - Bit flips (altitude), memory errors, memory leaking (flight time 18 hours certification) ...

- **Human side of it**
  - ~80% of accidents are attributed to human error
  - Increase dependability level should not have a negative impact on usability of interactive system
  - New mechanisms and methods to make cockpits dependable without increasing task difficulty for crew
More about Dependability & Safety

Outline of the talk

- Introduction (HCI in Critical Contexts)
- Introduction to the Interactive Cockpits domain
- A Research Contribution based on Models
- Dependability for Interactive Systems/Cockpits
- Dealing with automation
- Conclusions and perspectives
Iterative Process Including Automation
Outline of the talk

- Introduction (HCI in Critical Contexts)
- Examples from the Interactive Cockpits domain
- A Research Contribution based on Models
- Dependability for Interactive Systems/Cockpits
- Similarities with other domains (Space, ATM & Entertainment)
- Conclusions and perspectives
Dependability and usability are intrinsically related, but often studied independently in the literature.

Increase dependability level can have a huge (possibly negative) impact on usability of interactive system.

Necessity to design new mechanisms or methods which can make critical interactive system reliable assessing:

- Impact on usability
- Impact on training
- Impact on performance
- Potential for automation (impact of degradation)
Thoughts for the future

• Construction
  ▫ Adequate tools
  ▫ Adequate machines
  ▫ Adequate factories

• Product characteristics
  ▫ Properties / qualities
  ▫ Handling and managing conflicts/trade-offs rationally and systematically
  ▫ Supporting certification activities of interactive systems

• Understanding and handling the borders
  ▫ Formal and informal
  ▫ Hardware / software / OS
  ▫ Critical systems / mass market
  ▫ Work environment / entertainment-social
Thank you very much ...

for the invitation

for your attention
Acknowledgements

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education for interaction design

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education for interaction design

teaching considered harmful?

Gerrit C. van der Veer
gerrit@acm.org
www.cs.vu.nl/~gerrit
thanks to

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Els Rogier (Belgium)
Maria Menendez Blanco (Spain)
Niek de Moel (Netherlands)
Teresa Consiglio (Italy)

and many more ......
Interaction Design

our job is “to teach”

our students want to design

we develop interactive learning environments

Korean HCI 2014 GvdVeer
Interaction Design

our job is “to teach”

our students want to design

we develop interactive learning environments

Korean HCI 2014 GvdVeer
our job is “to teach”

In various academic curriculums
• Architecture and Design
• Artificial Intelligence
• Ergonomics
• Cognitive Psychology
• Computer Science
• Industrial Design
• Information Sciences ...
our job is “to teach”

various courses
• cognitive ergonomics
• design for precious memories / cultural heritage
• dialogue design
• human information processing
• research methods and techniques
• service design
• task analysis and task modeling
• user interface design
• visual design
• web culture
• web design ....
our job is “to teach”

in different educational cultures
• native languages
our job is “to teach”
our job is “to teach”

a problem of goals for learning

- our students have primary learning goals
- most colleagues have secondary learning goals
- schools have tertiary learning goals
- we want to support our students in the first place

- schools mostly favor traditional business goals
Interaction Design

our job is “to teach”

our students want to design

we develop interactive learning environments

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Ethnography

academic studios and design students’ projects
multimodal interaction
exploration
creative ecology
shared environments
developing shared understanding
shared awareness
personal workspace, personal awareness
exploration through “performances”
collaborative sketching
use of physical space
shared annotations
Interaction Design

our job is “to teach”

our students want to design

we develop interactive learning environments

Korean HCI 2014 GvdVeer
while we learned from our students

different learning resources provide different opportunities

1. stable resources
2. living course worlds
3. communication through artifacts
while we learned from our students
different learning resources provide different opportunities

1. stable resources
2. living course worlds
3. communication through artifacts
human information processing
Welcome to the interactive course ‘Human Information Processing’

This course is about you! Currently, you are using a computer, probably with a mouse and keyboard, and you have an interface in front of you. A lot of things are going on continuously as you read this text. Your eyes sense light, your brain forms words, and you can understand the meaning of this text. This course will take you step by step through all the phases between sense and understanding. This course - and that is the best part - allows you to experience these phases interactively as well!

Minimum system requirements are:

- A decent recent browser (Firefox, Safari, Opera or Internet Explorer)
- The Adobe Flash Player plugin installed

Please sign up to do the course. No personal information is required, only your email address for the purpose of password retrieval. The site will then remember at which point you leave the course, so that you can continue where you left off.

Email address: 
Password: 
Retype password: 

Login
If you already signed up for this course, please login here:

Email address: 
Password: 

OK
Introduction

Computers and ICT (information and communication technology) are designed for human users. So designers need to understand the human factor of ICT. The course Human Information Processing (HIP) is about the capabilities, limitations and individual differences in humans when it comes to processing information. Knowledge on this topic is important when it comes to user-centred design of user interfaces. The course starts at the point where ‘input’ is sensed (receptors) and will go all the way up to the point of ‘understanding the input’ (cognition). The next step in this process of HIP is action selection or decision making (intention), and actually performing the actions. Both will be discussed very briefly, but the focus will be on the next five domains:

- Senses
- Perception
- Attention (brief)
- Memory
- Mental models

If you rather study from paper, you can download the text of this course as pdf-file.
Introduction

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- Senses
- Perception
- Attention
- Memory
- Mental models

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Cognitive Psychology

Cognitive psychology is the study of how people think and learn. The goal in cognitive psychology is to get better insight in which psychological processes take place in the acquisition and use of knowledge by people. Several domains of cognitive psychology can have application in Human-Computer Interaction, such as perception, attention, memory, learning, thinking and the effect of social and environmental influences on these domains.

In the field of cognitive psychology, different models have been developed to describe and even predict human performance in certain situations. When designing a user interface, some models can help to determine the performance of it before a user ever saw the interface! We have pragmatically chosen small parts of psychology knowledge, parts and models that are relevant for the design of ICT.

- I completed this slide
- I did not complete this slide
Cognitive Psychology

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Here you find several interactive tests that are related to the subject. They are fun to do and bring theory in practice.

You are about to experience the 'Stroop effect'. We will show you sixteen words. You must say the number of characters in the words. For example: if the word is 'flower', you should say 'six', because it consists of six characters. After doing so for all sixteen words, press 'done'.

Ready?

start
Cognitive Psychology

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- This slide has a 'try it' item
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In the field of cognitive psychology, different models have been developed to try to describe and even predict human performance in certain situations. When designing a user interface, some models can help to determine the expected performance of it before a user ever saw the interface! We have chosen small parts of psychology knowledge; parts and models that are relevant for the design of ICT.
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seven  three  eleven  six
four  eight  one  seven
twelve  ten  two  three
six  five  nine  eight

I completed this slide
I did not complete this slide
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- This slide has a 'try it' item

- I completed this slide
- I did not complete this slide

You read the amount of characters in 14623 milliseconds. You completed the first assignment in 8640 milliseconds.

As you can see, the first test was completed sooner than the second test. That is because of the interference between the meaning of the word, and the task of counting (both involve numbers, but on different conceptual levels).

This was an example from the field of cognitive psychology.
**The necessity of HIP**

Why learn anything about Human Information Processing? It might not yet be clear why knowledge about HIP is necessary. For decades (or even centuries) users have been adjusting themselves to badly designed tools. At the same time, users have been adjusting the tools to better fit these to themselves. For some reason, user interfaces are barely being adjusted to the users' needs. How many elderly can handle a computer interface? How many people know how to set the timer on their video / DVD player without using the manual? The problem is that developers mainly focus on technology, and not on the user. This is your chance to do that differently: learn about the user and design for that user.

**Problem:** During the gold rush, the poor needed a way of transportation to their destination.

**Ideal ergonomist:**
Create a solution that is adapted to the user.
The necessity of HIP

Why learn anything about Human Information Processing? It might not yet be clear why knowledge about HIP is necessary. For decades (or even centuries) users have been adjusting themselves to badly designed tools. At the same time, users have been adjusting the tools to better fit these to themselves. For some reason, user interfaces are barely being adjusted to the users’ needs. How many elderly can handle a computer interface? How many people know how to set the timer on their video / DVD player without using the manual? The problem is that developers mainly focus on technology, and not on the user. This is your chance to do that differently: learn about the user and design for that user.

Problem: During the gold rush, the poor needed a way to transportation to their destination

Business man:
Find a cheap solution
and let the user adapt
Sensory receptors

Receptors are specialized nerves that respond to their adequate stimuli. Sensory receptors can be classified in many ways, and one often used is classification by its adequate stimulus. Thermoreceptors for example respond to temperature. Photoreceptors respond to light. Mechanoreceptors respond to mechanical pressure or distortion.

Example: Hearing

Hearing is the perception of the sound stimulus. But on the way to the receptors, the soundwaves trigger mechanoreceptors. Sound is converted into pressure or movement somewhere. That is where the sound happens in your ear. Tiny hairs in your hearing channel will move when sound enters the ear. These hairs have mechanoreceptors. The mechanoreceptors detect the movement of these hairs. So indirectly, they are the stimuli for mechanoreceptors.

There are many more receptors than the few named above. But it is the last two receptors would go beyond the extend of this course. If you would like to learn more, just take a look at the media and references tab.

I completed this slide
I did not complete this slide

The hairs that are in your ear for the purpose of hearing will respond to sounds between the 20Hz and 20,000kHz. Elderly hear frequencies in a more limited range.

The following experience needs a working sound system. Test if your sound system is working by pressing the 'test sound system' button. It should make a 'ding' sound. Make sure you can clearly hear the 'ding' sound. Then press start.

progress

landscape
Sensory receptors

Receptors are specialized nerves that respond to their adequate stimuli. Sensory receptors can be classified in many ways, and one often used is classification by its adequate stimulus. Thermoreceptors for example respond to temperature. Photoreceptors respond to light. Mechanoreceptors respond to mechanical pressure or distortion.

Example: Hearing

Hearing is the perception of the sound stimulus. But on this page (the Try it receptors), the soundwaves trigger mechanoreceptors. Sounds are converted into pressure or movement somewhere. That is what happens in your ear. Tiny hairs in your hearing channel with sound enters the ear. These hairs have mechanoreceptors. These receptors detect the movement of these hairs. So indirectly the stimuli for mechanoreceptors.

There are many more receptors than the few named above. You could read more, just take a look at the media and references tab.

---

With the buttons below, you can test your hearing. Do you hear the 18.000 Hz sound?

- 50Hz: 12.000Hz
- 100Hz: 14.000Hz
- 250Hz: 16.000Hz
- 500Hz: 18.000Hz

Warning: not all sound systems can correctly produce a 18.000Hz sound

---

I completed this slide
I did not complete this slide
OpenER Course: Human Information Processing

- This slide has a *try it* item

Gestalt

Perception is assigning meaning to sensory information, and organizing this.
You could say it is interpreting what you see, hear, taste, and so on.
Apparently we are very good in constructing meaning out of incomplete or
distorted stimuli. When it comes to visuals, there are some interesting findings
which are part of the Gestalt psychology.

Closure

We tend to see complete figures, even if some
parts are missing. Like the square on the right; it is
merely four circles with a gap in them, but we
perceive it as square

Similarity

When we see similar objects (colour, texture,
shape, size, orientation) we tend to group these
objects together. So in the image on the right we
tend to see diagonal stripes.

Proximity

Depending on the proximity of objects that are
ordered in rows and columns, we will either
perceive them as a whole, as a bunch of rows, or
as a bunch of columns. The top left image is
perceived as a whole, the image on the right as
'rows', and the image on the bottom as 'columns'
visual design patterns
This website is about visual design patterns used for webdesign. With the use of an interactive wizard we allow you to configure a advised set of patterns for your situation.

Select only categories of your interest

start the wizard
Examples

Funda, a Dutch real-estate site, uses a carousel as part of an Image Browser.

At Yahoo Movies a non-circular carousel is used. Also note the 3 dots next to the arrow keys that act as a 'you are here' indicator.

Summer Movie Guide

At World's End
Ratatouille
Rise of the Silver Surfer
Spider-Man 3

Watch trailers and clips, see production and celeb photos, and get the inside scoop on all the big summer blockbusters.
<table>
<thead>
<tr>
<th>Home</th>
<th>About patterns</th>
<th>Pattern design</th>
<th>Demonstration pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Page description</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Categorizing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Users</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Page elements</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Selection and choice**
- Action Panel
- Dropdown Chooser
- Icon Menu

**Data representation**
- Alternating Row
- Carrousel
- Table Sorter
- Tree-Table

**Navigating around**
- Breadcrumbs
- Clear Entry Points
- Color Coded
- Home Link
- Horizontal Menu
- Inverted L Menu
- Main Navigation
- Vertical Menu Left

**Page types**
- Calendar
- Homepage
- Printer-friendly

**Page layout**
- Center Stage
- Deep Background
- Diagonal Balance
- Extras On Demand
- Grid-based Layout
- Liquid Layout
- Responsive
- Titled Sections

**Page elements**
- Footer Bar
- Holist
Page description

Is the purpose of the website information or entertainment?
- information
- entertainment

Will the user have to read long texts on the website?
- yes
- no

Is it useful for the user to be able to print the short texts on the website?
- yes
- no

Will there be more than 30 pages with content on this website?
- yes
- no

Will there be more than 15 pages with content?
- yes
- no

Apart from navigation, are there other tasks or actions to be performed by the users of the website? Such as file-uploads, filling forms, etc...?
- yes
- no

Are these tasks so complex, that it should be split into separate smaller steps (subtasks)?
- yes
- no

Selection and choice
- Action Panel
- Dropdown Chooser
- Form Menu

Data representation
- Alternating Row
- Carousel
- Table Sorter
- Tree-Table

Navigating around
- Breadcrumbs
- Clear Entry Points
- Color Coded
- Home Link
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- Inverted L Menu
- Main Navigation
- Vertical Menu

Page types
- Calendar
- Homepage
- Printer-friendly

Page layout
- Center Stage
- Deep Background
- Diagonal Balance
- Extras On Demand
- Grid-based Layout
- Liquid Layout
- Responsive
- Tiled Sections

Page elements
- Footer Bar
- Hotlist
### Page description

Is the purpose of the website information or entertainment?
- [ ] Information
- [x] Entertainment

Will the user have to read long texts on the website?
- [ ] Yes
- [x] No

Is it useful for the user to be able to print the short texts on the website?
- [ ] Yes
- [x] No

Will there be more than 30 pages with content on this website?
- [ ] Yes
- [x] No

Will there be more than 15 pages with content?
- [ ] Yes
- [x] No

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- [ ] Yes
- [x] No

Are these tasks so complex, that it should be split into separate smaller steps (subtasks)?
- [ ] Yes
- [x] No
**Page description**

Is the purpose of the website information or entertainment?
- information  ○  entertainment

Will the user have to read long texts on the website?
- yes  ○  no

Is it useful for the user to be able to print the short texts on the website?
- yes  ○  no

Will there be more than 30 pages with content on this website?
- yes  ○  no

Will there be more than 15 pages with content?
- yes  ○  no

Apart from navigation, are there other tasks or actions to be performed by the users of the website? Such as file-uploads, filling forms, etc...?
- yes  ○  no

Are these tasks so complex, that it should be split into separate smaller steps (subtasks)?
- yes  ○  no
OpenUniversiteit Nederland
Visual Design Course: Patterns

Pattern description

- Categorizing
  - Can the pages be categorized in meaningful sections?
    - [ ] yes
    - [x] no
  - Will the hierarchy of this categorization be more than 2 levels deep?
    - [ ] yes
    - [x] no
  - Will there be icons to support this categorization?
    - [ ] yes
    - [x] no
  - Based upon your content, do you want to use categorization in a hierarchy?
    - [x] continue with categorization
    - [ ] continue without categorization

Users

Page elements

Selection and choice
- Action Panel
- Dropdown Chooser
- Icon Menu

Data representation
- Alternating Row
- Carousel
- Table Sorter
- Tree Table

Navigating around
- Bread crumbs
- Clear Entry Points
- Color Coded
- Home Link
- Horizontal Menu
- Inverted L Menu
- Main Navigation
- Vertical Menu, List

Page types
- Calendar
- Homepage
- Printer-friendly

Page layout
- Center Stage
- Deep Background
- Diagonal Balance
- Extras On Demand
- Grid-based Layout
- Liquid Layout
- Responsive
- Tilted Sections

Page elements
Categorizing

Users

Are the majority of the intended website visitors experienced internet-users?
- yes  - no

Are there more than ten events per year?
- yes  - no

Will the website be developed for mobile users, or only for desktop?
- mobile  - desktop

Will there be any sort of poll or reviewing by users on the website?
- yes  - no
Page description

Categorizing

Users

Page elements

Will there be icons for the menu's of these pages?
- yes  - no

Will there be (large) tables on the website?
- yes  - no

Will there be photojournals on the website?
- yes  - no
Breadcrumbs

Basics | Examples | Forces | How | When_why

Problem

The users need to know where they are in a hierarchical structure and navigate back to higher levels in the hierarchy.

Solution

Show the hierarchical path from the top level to the current page and make each step clickable.

Macromedia Flash MX
Product Overview

From www.macromedia.com
This example from World66 combines a Fly-out Menu with a breadcrumb.

The shopping area of Akihabara is best discovered by walking Chuo Dori, which is the main street in the area. The shopping is excellent, and there are many electronic goods for sale, placed on the sidewalks. In this district it’s also possible to discuss prices a bit.
**ForcesOK**

best for large site (50+ pages) best for deep hierarchy (3+ levels)

**ForcesNOT**

less use for a small site unfit for mobile use

**UserOK**

better overview anchorpoint to rely on confidence in localization can browse quickly

**UserNOT**

may mistake breadcrumbs for main navigation
How

The path shows the location of the current page in the total information structure. Each level of the hierarchy is labeled and functions as a link to that level. The current page is marked in order to give the users feedback about where they are now and should not be a link. Don't use the current page name in the breadcrumb as the only way to show section title, add a title anyway. The path shows that a top-down path is traversed by using appropriate separators such as > or \ that suggest a downward motion. If the path becomes too long to fit in the designated place, some of the steps can be replaced by an ellipsis e.g. "...". The path is placed in a separate "bar" that preferably spans the entire width of the content area. It is placed close to the content area, preferably above the content area but below the page header.
Breadcrumbs

When

Sites with a large hierarchical information structure, typically more than 3 levels deep. Such sites are medium to large sized and include E-commerce Site, catalogs, Portal Site, Corporate Site etc. The site has got some type of Main Navigation that allows users to traverse the hierarchy. Users may want to jump several steps back instead of following the hierarchy. Users may be unfamiliar with the hierarchical structure of the information.

Why

The bread crumbs show the users where they are and how the information is structured. Because users see the way the hierarchy is structured they can learn it more easily. By making each label a link, the users can quickly browse up the hierarchy. They take up minimal space on the page and leave most of the space for the real content. Breadcrumbs are not for primary navigation and should always be used together with a form of Main Navigation. Usability testing has shown that breadcrumbs are never cause trouble and that at least some people use them. So it is nearly always good to use them. The name breadcrumb refers to the fairy-tale of Hansel and Gretel where a breadcrumb trail is thrown.
Task Analysis
Task Analysis and Design

Find out about task analysis concepts; design; and techniques

Since we use information and communication technology (ICT) people are revising the way they work. Task domains change due to the availability of ICT. Collaboration between people (and other agents) changes due to the same cause. The general picture is that roles get exchanged more easily between actors, and that activities get more easily delegated to systems. In addition, it seems that mandating of roles, and delegation of activities, occurs at a more detailed level than before. Our analysis techniques need to be reconsidered in order to set more precise design goals for supporting technology.

But: “each design has a unique context”
(Jennifer Tidwell, 2006)

There is reason for Computer Scientists to systematically look at the relation between ICT and society. ICT has been changing the world, and the way people do their work. Therefore: we need to consider systematically human tasks: both analyzing and (re)designing these, where tasks should be considered both in professional domains, in civil and community activities, and in leisure situations.
Task Analysis and Design

Introduction

Since we use information and communication technologies (ICT), people are revising the way they work. Task domains change due to the same cause. The general picture is that roles get exchanged more easily between actors, and that activities get more easily delegated to systems. In addition, it seems that mandating of roles, and delegation of activities, occurs at a more detailed level than before. Our analysis techniques need to be reconsidered in order to set more precise design goals for supporting technology.

There is reason for Computer Scientists to systematically look at the relation between ICT and society.

ICT has been changing the world, and the way people do their work: People delegate work to ICT. E.g., An e-mail system maintains my communication: it keeps a record of when I received a message, when I answered, and to whom I forwarded a message.

ICT helps people to improve their work, to be more precise, quicker, and more reliable. E.g., Text processors provide spell and grammar checks, allow me to create template text for re-use, and support storage in folder systems.

People easily collaborate through ICT. E.g., collaborative authoring through the internet enables a flexible process flow, support of version control, and group awareness of the state of individual subtasks. Communication tools and shared workspaces support such process even if the individual co-workers are no longer together in time or space.
Task Analysis and Design

Design for tasks

Our design process is task based, i.e. continually analyzing and specifying the tasks of users as a driving force in the design process. The goals are to design both usable and effective systems. We think it is important to base the design upon the tasks to be done by the users. Therefore, the users play an important role in acquiring knowledge about their work as well as for usability testing.

Our process consists of four main activities:

a. analysing a "current" task situation,

b. envisioning a future task situation for which information technology is to be designed,

c. specifying the information technology to be designed. In parallel to these activities,

d. evaluation activities make the process cyclic.
Subtasks are often delegated or mandated.

Definition

A coherent package of subtasks (an activity) that may be delegated or mandated to an agent is referred to as a role. In order to assign a role to some agent, the characteristics of the agent should match the required expertise and specializations. Roles are normally taken by agents that feel themselves entitled to so do, or transferred by delegation or mandate.

Example from the domain of collaborative authoring

Common roles in this task domain are Author and Content Editor. This last one related to current practice where academic publishing is mostly group work:
"I never write a paper alone. I can almost not remember my last paper that I was single author."

Remarkably, we found multiple evidence for specialized roles that could, if needed, be delegated or mandated to agents of the type support staff like

Literature Searcher:
"I prefer journal articles, because they are strictly referenced, and contain a lot of information and because they are a bit more stable work";

or Spelling Editor.
These roles are in some cases given to real specialists:
With the use of an interactive wizard we allow you to find the right techniques for Task Analysis and Design.
# Task Analysis and Design

## Task knowledge

**Where is knowledge?**
- ☑️ person  
  - ❌ context/group

**How is knowledge?**  
- ☑️ explicit  
  - ❌ implicit

## Focus

## Design phases

### Knowledge sources
- Distributed
- Ethnography
- Hermeneutics
- Interview

### Analysis orientation
- OOR
- POR
- SOR
- TOR

### Sketching
- Mood board
- Persona
- Role playing
- Storyboard

### Phenomena of use
- Customer
- Design for action
- Flow diagrams
- Storytelling

### Negotiation
- Design games
- Group sketching
- Role script

### Envisioning
- Context
- Euterpe
- Head lines
- Service image

### Assessment
- Cognitive walkthrough
- Heuristic evaluation
- Scenario evaluation
- SUS
Task knowledge

Focus

Focus on:
- actors/roles
- process
- action
- experience
- objects
- context/group

Design phases
<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task knowledge</td>
<td></td>
</tr>
<tr>
<td>Focus</td>
<td></td>
</tr>
<tr>
<td>Design phases</td>
<td>task analysis, task design, dialog design, assessment</td>
</tr>
</tbody>
</table>

Korean HCI 2014 GvdVeer
**Group sketching**

**Goals**

Co-develop design ideas with future users and stakeholders, aiming at multiple viewpoints and distributed insights in the task domain.
### Group sketching

<table>
<thead>
<tr>
<th>Goals</th>
<th>Problem</th>
<th>How</th>
<th>Examples</th>
<th>Try_It</th>
<th>More_Info</th>
</tr>
</thead>
</table>

**Goals**

Co-develop design ideas with future users and stakeholders, aiming at multiple viewpoints and distributed insights in the task domain.
### Problem
In some cases different users and stakeholders may stem from different professional cultures, and have different goals, knowledge, and viewpoints on the processes related to the task world.
Group sketching

How

Collect the different stakeholders around a table with many pens and a large sheet of paper, brainstorm ideas and stimulate each participant to simultaneously sketch and visualize ideas and to relate these to the visualizations of the others. Language should not be considered important, neither should be culture of communication or turn taking.
<table>
<thead>
<tr>
<th>Goals</th>
<th>Problem</th>
<th>How</th>
<th>Examples</th>
<th>Try_It</th>
<th>More_Info</th>
</tr>
</thead>
</table>

**Examples**

![Sketch Examples](image)
<table>
<thead>
<tr>
<th>Goals</th>
<th>Problem</th>
<th>How</th>
<th>Examples</th>
<th>Try it</th>
<th>More_Info</th>
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</tbody>
</table>

**More Information**

www.designcouncil.org
Goals

The client of your design intends to provide some experience to his customers. His website, his stationary and brochures, and his building or shop window should give a good impression of the culture, atmosphere and mood he wants to deliver.

How can you "dress" your design (the product, the service environment, the website)?
<table>
<thead>
<tr>
<th>Goals</th>
<th>Problem</th>
<th>How</th>
<th>Examples</th>
<th>Try_It</th>
<th>More_Info</th>
</tr>
</thead>
</table>

**Problem**

The designer should understand the client's intended image, and should develop a palette of representations and visualizations that the client recognizes as fit for his business and that at the same time fit the type of artifact or service to be designed (screen or paper size, location to advertise).
How

Developing a mood board and working on it with the client is a way to develop representation ideas that aim at the intended experience.

A Mood Board is, traditionally, a collage, or assemblage, of colors, shapes, pictures, textures, symbols, etc., that aim at triggering an intended (by the client) experience in the audience (users) of the design.

In the current state of available technology (multimedia, web, 3D printing) we need to broaden the scope of what might be relevant to collect: video, sound tracks, 3D objects or representations, tactile impressions.

Moodboards aim at the users' experience as intended by the client

- Developing a moodboard starts with the designer collecting items that seem to express the culture, attitude, feelings that characterize the enterprise.

- Based on this, in collaboration with the client, a perception is created to trigger the users' understanding, feelings, and intention to act.
Examples

Designers want to develop a website for a service providing company that has, as its motto: 'reducing complexity'. The company mainly communicates with the world by website and slide show.

The first step is to analyze the company's current website

eMMA seems to be the main administrative service. The company's slide show provides content, though not in a way that aims at any experience
Based on visiting the company's office and asking the client as well as customers (e.g. from the car industry) impressions were collected.

The impressions were used to develop a series of collages that provide suggestions for several aspects of the intended experiences:
Based on the moodboard(s) and the client's comments on this, sketches for a new website were developed.

These are the base for co-designing with the client, focusing explicitly on the experience, where the previous website, as well as promotional slide show, only considered content.
Try It Yourself

Take a small community you know well, e.g.

- a music group
- a sports club

Collect images:
- logo, picture of a performance on stage, or of sports game
- picture of the audience
- picture of entrance of club home or ports field
- picture of solo player or team leader
- pictures of instruments, or of sports articles / t-shirt

Consider including a short video (of a match or a performance)
Consider including a sound track (music, public shouting when a team wins.
Develop a mood board and make it interactive if video or sound are part of it (to be played when clicked)

Show your mood board to some members of the group.
- Find out if they like their club to be represented this way

Show your mood board to some friends who are not members of the group.
- Find out if your presentation makes them experience the culture of
More Information

Mood boards in different design domains:

http://en.wikipedia.org/wiki/Mood_board

Why mood boards matter:

www.webdesignerdepot.com

To buy images for mood boards:

http://www.moodboard.com
our approach is not unique

<table>
<thead>
<tr>
<th>DESIGN ACTIVITIES</th>
<th>REPRESENTATIONS</th>
<th>RECIPIENTS</th>
<th>CONTENTS</th>
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<tbody>
<tr>
<td>CO-DESIGNING</td>
<td>TEXTS</td>
<td>STAKEHOLDERS</td>
<td>CONTEXT</td>
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<tr>
<td>ENVISIONING</td>
<td>GRAPHS</td>
<td>PROFESSIONALS</td>
<td>SYSTEM</td>
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<tr>
<td>TESTING &amp; PROTOTYPING</td>
<td>NARRATIVES</td>
<td>SERVICE STAFF</td>
<td>OFFERING</td>
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<tr>
<td>IMPLEMENTING</td>
<td>GAMES</td>
<td>USERS</td>
<td>INTERACTION</td>
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<td></td>
<td>MODELS</td>
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<tr>
<td>Tool</td>
<td>Icon</td>
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<tr>
<td>Task Analysis Grid</td>
<td><img src="image1.png" alt="Task Analysis Grid Icon" /></td>
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<tr>
<td>Service Image</td>
<td><img src="image2.png" alt="Service Image Icon" /></td>
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<tr>
<td>Touchpoints Matrix</td>
<td><img src="image3.png" alt="Touchpoints Matrix Icon" /></td>
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<tr>
<td>Lego Serious Play™</td>
<td><img src="image4.png" alt="Lego Serious Play™ Icon" /></td>
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<tr>
<td>Design Games</td>
<td><img src="image5.png" alt="Design Games Icon" /></td>
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<tr>
<td>Evidencing</td>
<td><img src="image6.png" alt="Evidencing Icon" /></td>
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<td>Personas</td>
<td><img src="image7.png" alt="Personas Icon" /></td>
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<td>Offering Map</td>
<td><img src="image8.png" alt="Offering Map Icon" /></td>
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<tr>
<td>Interaction Table</td>
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<tr>
<td>Actors Map</td>
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<td>Blueprint</td>
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<td>Informance</td>
<td><img src="image12.png" alt="Informance Icon" /></td>
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<tr>
<td>Poster</td>
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<tr>
<td>System Map</td>
<td><img src="image14.png" alt="System Map Icon" /></td>
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<td>Specification</td>
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<td>Affinity Diagram</td>
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<td>Experience Prototype</td>
<td><img src="image17.png" alt="Experience Prototype Icon" /></td>
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<tr>
<td>Motivation Matrix</td>
<td><img src="image18.png" alt="Motivation Matrix Icon" /></td>
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<td>Mock Up</td>
<td><img src="image19.png" alt="Mock Up Icon" /></td>
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<td>Moodboard</td>
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<td>Mind Map</td>
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<td>Tomorrow Headlines</td>
<td><img src="image22.png" alt="Tomorrow Headlines Icon" /></td>
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<tr>
<td>Storyboard</td>
<td><img src="image23.png" alt="Storyboard Icon" /></td>
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<tr>
<td>Customer Journey Map</td>
<td><img src="image24.png" alt="Customer Journey Map Icon" /></td>
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</table>
The experience prototype is a simulation of the service experience that foresees some of its performances through the use of the specific physical touchpoints involved.

The experience prototype allows designers to show and test the solution through an active participation of the users.

references:

CASE STUDIES
FOLLOW-UP STUDY FOR T-MOBILE
Stby
while we learned from our students
different learning resources provide different opportunities

1. stable resources
2. living course worlds
3. communication through artifacts
Goal of the course

Websites are for people: the website owner, the visitors (users) and other stakeholders;
In this course we aim at:
- understanding the problems;
- finding an appropriate approach and relevant design knowledge;
- experiencing "user centered" design.
In order to reach this we will actively experience how to:
- analyze stakeholders, task, and context
- develop conceptual design solution
- specify detailed solution
- define details of text and visuals
- assess the solution
- present the design to the client

Course outline

[Diagram]

Click on the image for a larger view

Video version of course outline

[Video]

Professor

Gerit C. van der Veer has been working in University since 1961. He started in Cognitive Psychology and received his Ph.D. Computer Science, where he specialized in Human Computer Interaction (HCI) and usability. In 2007 he joined the HCI Department of the Faculty of Arts and Social Sciences of the University of Amsterdam. He is a professor of HCI and Rector of the Faculty of Arts and Social Sciences.
Homework: design sketches and scenarios

Mood board Atoens
Click on the image for a larger view

Wireframe Atoens
Click on the image for a larger view

Cicada buttons preferred and long list
Click on the image for a larger view
I'm deadhead student!

department (open class)

details

You're not welcome (the course is locked by teacher) on (mouse over) display!

Add to my course

Download resources of the course

Korean HCI 2014 GvdVeer
Cicada picture set. Click on the images
<table>
<thead>
<tr>
<th>时间</th>
<th>内容</th>
</tr>
</thead>
<tbody>
<tr>
<td>5月12日 7:00AM</td>
<td>望周知：由于学校安排公务出差，下周一课调整到周日，教室具体由学习委员安排，安排完后请告知所有学生。张光塔</td>
</tr>
<tr>
<td>5月13日 8:00AM</td>
<td>望周知：正所谓天有不测风云，人有福祸旦夕，老湿我不幸感染H1N9，正在医院接受治疗，同学们保重。接下来的课由学习委......张光塔</td>
</tr>
<tr>
<td>5月12日 7:00AM</td>
<td>望周知：由于学校安排公务出差，下周一课调整到周日，教室具体由学习委员安排，安排完后请告知所有学生。张光塔</td>
</tr>
</tbody>
</table>
Presentations

Group name: A-Teens

Members: Li Han, Neil Yu, Katherine Bao, Thomas Zhou, Annie Wang

Presentation title: A Website for providing Web Services

We will design a website providing web services for DMU Software Engineering Laboratory. They are looking for someone to design a website that can achieve the function to arrange, search, browse and make use of

...read more

Group name: Cicada

Author: Buwei Liao

Presentation title: Cicada for information spreading & resource sharing

The system focus on build connection between teacher and student by providing network platform that supports them to communicate with each other. Based on analysis of existing circumstance of contact between teacher and student, it is found that if there is a course relation between teacher and student, interaction joint will be built...read more
Report and presentation to the client

13:00 Yu-Fang The, Nedap, Groenlo

Our agenda is an online application for specific type of medical professionals, for example physiotherapists. It is used to schedule appointments with patients and register working hours in the end of week.

When medical professionals provide their services, Ons Agenda helps to facilitate the communication between medical professionals, their clients and their colleagues.

The challenge will be sorting the main and sub-tasks of our potential users. We would also like to know: What information do users need during their daily task? What is the importance (priority) of each information? What information do they like to see on the first sight when they open the website? The screen size will be based on the devices our users use. They may use tablet, mobile, or PC.

15:00 David van der Loo, Tilburg Ondernemer & Adviseur Mobiele Applicaties

AppSpecialisten is based on the experience that David van der Loo accrued as a mobile app consultant. He advises organizations and companies on how to make successful mobile applications. During projects he speaks with organizations that have a desire to build an app, but also to the companies who actually design and program the app as well. These companies struggle with different problems: “I don’t have enough capacity to meet the demand for apps” and “I can not find the right customers.”

David resolves these issues by linking customers with app-developers based on their experience with building apps. If projects are awarded to app-developers based on the previous apps they created, they can re-use their knowledge, experience and programming code. This in turn allows them to work faster and therefore make better use of their limited programming capacity. The reuse of their experience in building comparable also helps them to build apps faster, better and more affordable, which also benefits client organizations.
Envision and model possible changes/improvements

- design space analysis
- modeling
- scenarios and system representations

Playlist: Envision (4 videos)
TA chapt 3 1 knowledge analysis

3. knowledge analysis

requirements for redesign (Task Model 2) can be inspired by:

3.1. TM 1 - issues from the model
3.2. requirements from Client of design
3.3. needs / ideas from any stakeholder or current agents
3.4. competitor analysis

Korean HCI 2014 GvdVeer
Design for living memories
Goal of the course

People create or collect, maintain, and share memories of valuable experiences. Students will understand and practice how new technologies can be used to design support to enrich memories and to share these, at the same time considering privacy, intellectual property, and temporality of social relations.

Link to the video lecture

Goal of Course

Professor

Gerrit C. van der Veer has been working in University since 1961. He started in Cognitive Psychology, moved to Ergonomics, and into Computer Science, where he specialized in design of interactive systems. He has been teaching in many European countries including Belgium, Germany, Spain, Italy, Romania, and the Netherlands. His research concerns user-centered design methods, task modeling, individual differences, cultural differences, mental models, and visualization. He is currently employed by the Dutch Open University Faculty of Computer Science, and the University of Sässari (Italia) Faculty of Architecture. Gerrit is President of ACM SIGCHI, the world leading international society for human-computer interaction.

gerrit@acm.org

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Re: offering map
by Gerrit van der Veer - Thursday, 1 November 2012, 04:12 AM

Hi Neil,

the elaboration for the Express service is perfect.

Please add 2 or 3 slides on how to use this technique in general (a very short lecture)

Thanks

Gerrit
What if the "owner" dies

Goal
Being aware what happens to living memories after the originator (original owner) dies. Being aware how a living originator might want to, and is able to, withdraw the souvenir or withdraw the souvenir.

Example
The suicide machine http://suicidemachine.org/

Cherishing memories
the designed souvenir could be made to handle dead or a user's wish to disconnect.
At a course “design for living memories” students developed a website for a society on maintaining cultural heritage of costumes.

Client was the sister of one of them, who owned a historic dress.
Margherita Scanu

The dress concerned dates back to the 800 and belonged to Margherita Scanu (17/09/1892 - 19/08/1932). It was her working dress and it had been sewn by her mother.

After Margherita's death, just two years after the birth of her only son Filippo Casu (19/01/1930 - 06/11/1999), her husband preserved all his wife's belongings in order to allow his son to keep alive his mother's memory. So the dress and all the other jewels were given as a gift to his son on the occasion of his marriage (27/10/1957) with Mariangela Deroma (17/06/1934).
Margherita Casu

Later, the inheritance was supposed to go to the third daughter of Philip and Mariangela because she was the only female born from that marriage, who had inherited the name of the deceased grandmother. Unfortunately, Margherita (18/06/1965 - 28/09/1965) passed away prematurely so the dress and the jewels were kept by Mariangela.
Margherita Casu

Angelo, (26/04/1960) Filippo's son, named his eldest daughter Margherita (13/04/1988) in honor of his sister and grandmother. Philip then decided to give the inheritance to Margherita, contrary to his wife who wanted to divide it among several grandchildren, however, Mariangela, after her husband's death, decided to fulfill his will, giving the inheritance to his niece Margherita.

At that time the dress was so worn-out so that, before being given, she decided to fix it making also some changes.
**Tibbone (jacket):**
Black goat’s hair, with a cape around his neck stitched in velvet blacks and pink floral on a blue background, edged with braid and fringes. It is enriched by a ruffle of the same velvet skirting even the cuffs. The sleeves have a thick pleating from the shoulder to the elbow.
Encyclopedia (costumes and jewelry of Sardinia)

My team leader has chosen me to pose with the dress to produce an encyclopedia of Sardinian costume and jewelry. I was very happy and very excited for this opportunity because I could show with pride the dress which had passed from generation to generation in the years up to me.

Preparations for the photo shoot was really fun, there were make up artists and hairdressers professional, in the end I was too happy with the result. It was also very funny posing with the photographer, and all was so well organized that I felt a real model. I am very glad of this opportunity because with that dress I represented my whole country and it is something that will go down in history.
while we learned from our students
different learning resources provide different opportunities

1. stable resources
2. living course worlds
3. communication through artifacts
part of ongoing research

tool design: CAM (cooperative artifact memory) presented at UbiComp’10

(a) CAM running on iPhone;

Korean HCI 2014 GvdVeer
part of ongoing research

tool design: CAM (cooperative artifact memory) presented at UbiComp’10

(a) CAM running on iPhone;
(b) Reading design sketch (Microsoft TagReader)
short explanation of CAM

designers develop many artifacts
short explanation of CAM

designers develop many artifacts
short explanation of CAM

designers develop many artifacts

artifacts can be tagged with 2D barcode
short explanation of CAM

designers develop many artifacts

artifacts can be tagged with 2D barcode

JAVA web server uses Twitter API
short explanation of CAM

designers develop many artifacts

artifacts can be tagged with 2D barcode

JAVA web server uses Twitter API

each tagged object has its own digital profile on the internet, associated to a twitter account
short explanation of CAM

designers develop many artifacts

artifacts can be tagged with 2D barcode

JAVA web server uses Twitter API

each tagged object has its own digital profile on the internet, associated to a twitter account

information can be added, and Tweet logs can be read

Korean HCI 2014 GvdVeer
information can be added
information can be added, and Tweet logs can be read
Intelligente Lampe
mit Bewegungsmelder
Betrifft jemand den Raum, schaltet sich die Lampe automatisch ein.

Befindet sich niemand mehr im Raum, schaltet sich die Lampe automatisch wieder ab.

Information kann hinzugefügt werden, Tweetlogs können gelesen werden.

Korean HCI 2014 GvdVeer
design teams
design teams
what we discovered: CAM objects

1. physical objects tagged
CAM objects

2. sketches on paper
CAM objects

3. textual descriptions

- Küchen de cken lampe (Tese lampe?)
- Reaqiest auf Pessonen ➔ Geht a vem Pesson
del Raum stiit
  ➔ word ad 5 Pessonen
  farbig / bewegt sich
- Reaqiest auf Raum, Verschiedene Grössen
di Trage auf Musik

Braucht Sensoren

- Unt tremendous LED’s etc.
2/3 combination
CAM objects

4. abstract references

Vote this one...

Planning
Tweet log of “Planning” object

- Thursday: Grigoris – presentation Sketch
- Thursday: Eric – technical drawing
- Thursday: Tarek & Julia – finishing the design model
- Make technical drawing
- Wednesday: planning, task distribution. Grigoris
- Wednesday: Braille design with Eric
- Proposals on the buttons:
  - Payment
  - Volume
  - Channels
  - Program Selection
- Joey's?
- What else should we add for supporting touch-based facilities?
- I would very much like to order pizza for tomorrow. Better designs with full stomach
- Touch screen OUT. Agreed on the use of Braille writing system. Any proposals on the form?
- How many keys does a blind remote control require?
- I propose that we combine both the concepts, your form and our concept of designing for “blind people”
surprising ways of using CAM

expression and aesthetics
Previous Tweets

und wenn der papa der mama was vorliest?
erkennt erbdas auch und projiziert er dann
auch die passenden sachen?GP 2 days ago
zum schlafen zum lesen für alle wesen! 2
days ago

strahlmann, der strahlt uns an. ob tag und
ob nacht, wär hätt's gedacht. 2 days ago

erkennt über eingebaute chips welche
bücher man gerade liest und erstellt
dekenprojektionen 2 days ago

name: strahlmann intelligente
schlafzimmerleuchte die auf tages- und
jahreszeiten sowie personen innerhalb des
raums reagiert 2 days ago
the Shiny-man, who shines on us. whether day or night, no matter what.
the sun in the morning,
the stars at night,
slowly accompany us into sleeping tight.

the Shiny-man, who shines on us.
whether day or night, no matter what.
very early prototype, CAM is just a hack

new facility induces new ways of:
• collaboration – communication and coordination
• creativity – aesthetics and expression
• creative exploration

discovering functionality just “happened”;

the tools seemed to systematically trigger some types of unexpected functionality
Interaction Design

our job is “to teach”

our students want to design

we develop interactive learning environments
Our students choose their techniques to collaborate in design teams, collaborating with a real client and stakeholders.

We always ask then to explain why and how.

To analyze more the service offered by SMUOVI we have used the tool Group sketching.
In this box we analyze the first step that makes a possible customer when he decides to comes to Alghero in fact he search on internet informations about the city, and then he find the Smuovi’s website.
In the second panel we represent when the tourist arrives at Alghero airport and takes the bus to go to the city where he can find informations regarding the SMUOVI service.
In the third panel we have drawn when the tourists arriving at the Smuovi site, there is the service staff that provides all the information.
We’ve choose the **issue card Tool**, because in this way is possible to explain our point of view on problems and the relative solutions.

Korean HCI 2014 GvdVeer
To analyze the problems that there are in this service we have decided to use the tool Mind Map in fact with the Professional of SMUOVI we have created a document where everyone can insert the problems that they have discovered in the service.
For describe the offer we decided to use the tool **ROUGH PROTOTYPING** that allows us to visualize quickly and through the use of materials available (brochure, flyer, newspaper clippings, etc..) the development of our idea of project. In the following image it’s possible to see the realization, through the tool, of our idea. We create an approximate map (we did not attempt to observe real distance) that identifies the collaboration of services in the space.
In this step we have collaborated with Marketing responsible that has told to us how they would the website and their needs and the demands of the clients.
After this interaction in which we’ve shown to him our first simple draft of the website, we’ve brought the opportune changes following his suggestions.
Our students choose their own support and resources to learn. e.g. to get a definition.
Our students choose their own support and resources to learn. e.g. to get a definition.
Our students choose their own support and resources to learn e.g. to get a definition
Our students choose their own support and resources to learn e.g. to get a definition

Roles
A coherent package of subtasks (an activity) that may be delegated or mandated is referred to as a role

In order to assign a role to some agent, the characteristics of the agent should match the required expertise and specializations.

Roles are normally taken by agents that feel themselves entitled to so do, or transferred by delegation or mandate.
Our students often suggest alternative support and resources e.g. a prototype note sharing tool, or a tool for “finding a study buddy”
we admit we have some tricks

10. June 6, example presentations

in order to prepare your team presentation to the client,

study some examples from your own class, on a smartphone,

and describe what you learned from these.
we admit we have some tricks

10. June 6, example presentations

in order to prepare the client, study some examples on a smartphone and describe

presentations to study

Federico Cossu – see how he addresses the people in the room

Antonella Sechi – see how she keeps the room listening, even when reading from notes

Francesco Frulio – see how he feels free to speak and uses gestures

Alessandro Fadda – sheets are well readable
10. June 6, example presentations

In order to present to the client, you need to study some examples on a smartphone.

Federico Cossu – see how he addresses the people in the presentations to study.

Antonella Seccia

Francesco Fratini – speak and

Alessandro Famili

Write what you learned

Each team should deliver a 2-page report: for each of these examples:

- what is the most useful aspect,
- why is this good for the final presentation,
- how can your team use this,

Deliver the report by email to Selene and Gerrit at June 7, 13:00,

seluras@gmail.com
gvv@ou.nl
students happily teach each other

and teach their teachers

and adapt if they have to miss a meeting

Korean HCI 2014 GvdVeer
Some data:

a course on cognitive psychology for design
from discussions with students, we identified different learning results:

a. new knowledge and models on H.I.P.
b. new experiences of phenomena
c. expanding understanding of the models of H.I.P
d. expanding understanding of experiments / demos
e. expanding understanding of how humans work with systems
f. acquiring a base to make decisions for HCI
the course seemed to include different learning activities:

1. Planning by using the “living” HIP website
2. (re)reading slides from “living” HIP website
3. Communications at “living” HIP website
4. themselves preparing and presenting
5. Other students presenting
6. The teacher presenting
7. Reading and pointers at the “stable” HIP website
8. Doing experiments at the “stable” HIP website
after the course students were asked to attribute a maximum total of 10 coins (each valued symbolically 1 “Yuan”)

for each learning result (a-f);

to the different activities (1-8)

where “mostly used” should be valued: 2 Yuan,
“somewhat used: 1 Yuan,
and “not much”: 0 Yuan.
a. new knowledge and models on H.I.P. mainly learned through:

1. Planning by using the “living” HIP website  5
2. (re)reading slides from “living” HIP website  11
3. Communications at “living” HIP website  3
4. themselves preparing and presenting  13
5. Other students presenting  10
6. The teacher presenting  12
7. Reading and pointers at the “stable” HIP website  14
8. Doing try it experiments at the “stable” HIP website  12
b. new experiences of phenomena mainly learned through:

1. Planning by using the “living” HIP website 1
2. (re)reading slides from “living” HIP website 8
3. Communications at “living” HIP website 2
4. themselves preparing and presenting 16
5. Other students presenting 14
6. The teacher presenting 12
7. Reading and pointers at the “stable” HIP website 14
8. Doing try it experiments at the “stable” HIP website 13
c. expanding understanding of the models of H.I.P mainly learned through:

1. Planning by using the “living” HIP website  5
2. (re)reading slides from “living” HIP website  11
3. Communications at “living” HIP website  3
4. themselves preparing and presenting  12
5. Other students presenting  11
6. The teacher presenting  10
7. Reading and pointers at the “stable” HIP website  15
8. Doing try it experiments at the “stable” HIP website  10
d. expanding understanding of experiments / demos
mainly learned through:

1. Planning by using the “living” HIP website 4
2. (re)reading slides from “living” HIP website 6
3. Communications at “living” HIP website 4
4. themselves preparing and presenting 14
5. Other students presenting 15
6. The teacher presenting 13
7. Reading and pointers at the “stable” HIP website 11
8. Doing try it experiments at the “stable” HIP website 13
e. expanding understanding of how humans work with systems - mainly learned through:

1. Planning by using the “living” HIP website  3
2. (re)reading slides from “living” HIP website  9
3. Communications at “living” HIP website  2
4. themselves preparing and presenting  16
5. Other students presenting  13
6. The teacher presenting  15
7. Reading and pointers at the “stable” HIP website  13
8. Doing try it experiments at the “stable” HIP website  9
f. acquiring a base to make decisions for HCI mainly learned through:

1. Planning by using the “living” HIP website 3
2. (re)reading slides from “living” HIP website 6
3. Communications at “living” HIP website 2
4. themselves preparing and presenting 16
5. Other students presenting 12
6. The teacher presenting 13
7. Reading and pointers at the “stable” HIP website 14
8. Doing try it experiments at the “stable” HIP website 13
so who is teaching after all?
VisGuard –
Proactive Distraction Prevention System

Tuomo Kujala

HCI Korea 2014 - February 14th 2014
Dept. of Computer Science and IT / University of Jyväskylä / Finland

tuomo.kujala@jyu.fi
Safety-Critical Event Risk Associated With Cell Phone Use (NHTSA 2013)
The Challenge and The Need

- Drivers use and want to use ICT while driving
- Eyes are off the road when they should not be
- Means to support safer visual sampling?
Are the visual demands of driving the same for all the traffic environments and situations?
Are the visual demands of driving in a certain situation the same for all the drivers?
VisGuard is a PROACTIVE visual distraction prevention system that uses a visual demand algorithm for telling the driver in which kind of traffic situations and for how long the driver SHOULD NOT have eyes off road.

www.visguard.com
Grey circle:
- gaze at the device not recognized
- warning threshold in grey: empty circle 2 seconds, half circle 1 second

Orange circle (filling up):
- gaze at the device recognized, be careful!
- look back at the road before the orange circle is full

Warning sign:
- please pay attention to the road immediately!!!
- displayed in highly demanding situations and when the warning threshold for a glance duration is exceeded
Ahead of its time?

• Supported devices at the moment:
  – Samsung Galaxy S3, Note2, Nexus
Proof-of-Concept

1. Driving simulator, summer 2013
   - N=130 (97)
   - Visual occlusion
   ➔ Visual Demand Algorithm (VDA)

2. Pilot studies, winter/spring 2013
   - Finland, Austria
   - Within-subject controlled trials (N>10, 3+3 weeks)
   - Track tests (N=40)
Driving Simulator Study

- Simulation of a real Finnish traffic environment: Martinlaakso, Vantaa
Visual Demand Algorithm (VDA)

• Visual occlusion (Senders et al., 1967):
  – Driving scene visible 500 ms by pressing a lever
    but with speed control available
• Occlusion Distance (OD) = Occlusion Time x Speed

Senders, et al. (1967).
The Attentional Demand of Automobile Driving,
Highway Research Record
# 195, 15-33
Senders et al. (1967)

![Graph showing the relationship between occlusion time (s) and velocity (mph). The graph indicates a decrease in velocity as occlusion time increases.]
OD for the same road and driver

Calculated velocity points (mph) after Senders et al. (1967)
The Model

• OD = 1.5 + 1.6*Speed – 13*Winding, $R^2 = 0.74$
• OD seems to be driver-specific: e.g. high-OD drivers have high ODs over most scenarios
OD and VDA - Potential

• Distraction prevention systems
  – Mobile devices
  – Dashboard driver monitoring systems

• Baseline for appropriate visual glancing behaviors while driving
  – In-car user interface testing and verification
  – Distraction research
Thank you for your attention!

감사합니다

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University of Jyväskylä
ACM SIGCHI Vice President for Chapters

www.visguard.com
Social TV: UX and UV Perspective

Dong-Hee Shin
Professor & Chair
Dept. of Interaction Science
Sungkyunkwan University
Seoul, Korea

HCI Korea 2014
Research Goal

- User attitude and UX related to STVs with a focus on the role of perceived interactivity/sociability and its relation to other factors of STV adoption and usage.

- Can user experience be measured?
- Interactivity vs. Sociability
Interaction

- Sign
  ![Traffic Lights](image)

- Symbol
  ![Coca-Cola Bottle](image)

- Metaphor
  ![Black Shape](image)
Theoretical Framework

- Adaptation of TRA/TPB that consists of perceived interactivity, hedonic and utilitarian performance along with the traditional components of TRA.

- Interactivity/sociability as process, features, & perception.
Hypotheses

• H1: Attitude toward STVs is positively related to the intention to use STVs.
• H2: PI positively influences intention to use STVs.
• H3: PI positively influences attitude toward STVs.
• H4: PI positively influences perceived hedonic performance of STVs.
• H5: PI positively influences perceived utilitarian performance of STVs.
• H6: The higher utilitarian performance a user perceives of an STV, the more positive an attitude the user has about STVs.
• H7: The higher hedonic performance a user perceives of an STV, the more positive an attitude the user has about STVs.
Why Model-Driven Approach in HCI?
Research Design

• Multiple & iterative process:
  1) Individual in-depth interviews were conducted.
  2) Six focus groups (current and prospective users) were organized and group interviews were conducted.
  3) A draft survey questionnaire was developed through several comment rounds.
  4) Experiment + survey
User Experiment
Gaze Plot
Heat Map
Cluster
## Hypothesis Test Results

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Path coefficient ($\beta$)</th>
<th>t-value</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Attitude $\rightarrow$ Intention</td>
<td>0.23*</td>
<td>3.120</td>
<td>Yes</td>
</tr>
<tr>
<td>H2: PI $\rightarrow$ Intention</td>
<td>0.65***</td>
<td>4.981</td>
<td>Yes</td>
</tr>
<tr>
<td>H3: PI $\rightarrow$ Attitude</td>
<td>0.41**</td>
<td>3.420</td>
<td>Yes</td>
</tr>
<tr>
<td>H4: PI $\rightarrow$ PHP</td>
<td>0.40**</td>
<td>3.001</td>
<td>Yes</td>
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<tr>
<td>H5: PI $\rightarrow$ PUP</td>
<td>0.34*</td>
<td>3.459</td>
<td>Yes</td>
</tr>
<tr>
<td>H6: PUP $\rightarrow$ Attitude</td>
<td>0.49**</td>
<td>2.921</td>
<td>Yes</td>
</tr>
<tr>
<td>H7: PHP $\rightarrow$ Attitude</td>
<td>0.43**</td>
<td>3.001</td>
<td>Yes</td>
</tr>
</tbody>
</table>
The Result of the Model

Perceived interactivity

Perceived personalization

Perceived responsiveness

Perceived control

Perceived utilitarian performance

R² = 0.202

Perceived hedonic performance

R² = 0.291

R² = 0.491

Attitude

R² = 0.581

Intention

0.65***

0.41**

0.49**

0.43**

0.23*

0.34**

0.40**

0.40**
Testing of Mediating Roles Played by PI

- Process (1): Show the correlations of the initial variables;
- Process (2): Show the correlations of the initial variables with the mediator;
- Process (3): Show how the mediator influences the outcome variable; and
- Process (4): Establish that the mediator mediates the relationship of the initial variables.

-Baron and Kenny (1986)’s procedure
Multi-Dimensional Interactivity

- Possible varied roles by interactivity
  - Moderating effect
  - Interaction effect
  And more?

![Diagram showing perceived interactivity affecting utilitarian and hedonic performance, which in turn affect intention.]

- Perceived utilitarian performance
- Perceived hedonic performance
- Perceived interactivity
- Intention
New Definition of Interactivity

• Semantic Interactivity in Smart Era
  - Contextual participation with a text.
  - Syntax vs. Semantic

• New dimension
  Low vs. high → Textual vs. contextual interactivity
Meta-Interactivity

• \( Y = f(X) \)
• \( Y = \text{Interactivity}, \ X = \text{Sociability} \)
• \( \text{Interactivity} = \text{Sociability} + \text{Social presence} + \text{flow} + \text{immersion} \ldots ? \)
• Users participate within the context of a system.
  - Outside the experience of a single text.
  - Smart Interaction
Implications

• Employing interactivity and performance would be a worthwhile extension of TRA/TPB or TAM in STVs.
• The recognition of a directional relationship of PI.
• Importance of user experience
• User experience as a value
From UX to User Values

• UX: factor → requirement analysis
• UV: human values
  – Privacy; Trust; Accountability; Aesthetic; Sociability; Connectivity; Ownership & property; Freedom from bias; Human welfare; Universal usability

• Interactivity as a value
• Human values are increasingly incorporated in the design of ubiquitous technologies.
• Value-Sensitive Design
Quality of Experience

• QoX or simply QX
• Quality experience, and a more holistic evaluation than narrowly focused UX.
• Meaningful interaction
Why?

- 3D TV, Smart TV, Second Screen, Social TV, Bendable TV
Positive Feedback Loop of Value

- Social TV as a Platform within Ecosystem

1. Ecosystem
2. Interaction
3. Experience
4. Value
Value Sensitive Design

- Usability
- Learnability
- Sociability

• Experience-infused software
  • Value-infused system
Thank You

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  Sungkyunkwan University
  Seoul, Korea 110-745
  02-740-1864
Multimodal Fusion and Illusion: An Alternative to Physical Immersion?

Gerard J. Kim
Korea University
Motivation

- Immersion / Presence
  - One aspect of UX
  - Physical immersion
    - Feeling like “being there” (spatial)
    - “Big VR”: Wide FOV, Whole body interaction, Surround sound, …
  - Psychological immersion – Books, Story, Interaction, …

**Question:** Spatial immersion (presence) possible with small VR?

**Possible answer:** Multimodal interaction

Cross modal integration / Substitution and Illusion
Multimodal Systems

- Systems that process two or more combined user input/output modes such as speech, pen, touch, gesture, body movement, etc. in a coordinated manner

  - Five senses: Visual, Aural, Haptic, Tactile, Olfactory, …
  - Just different modes: Mouse, Touch, Voice, Gaze, Gesture, Pen, Brain wave, Foot, …

Why Multimodality?

Usual reasons
- Usability – Natural / Easy to Learn / Preference
- Flexible – Broader Target Users / Complementary
- Efficient – Fast / Lower error / Robust and Disambiguating / Modality match
- Experiential – Realistic / Affective

Get something with something else (and maybe less)
- Cross modal integration, Modality Substitution, Illusion
  - Force feedback with vibro-tactile
  - McGurk effect
  - Ventriloquist effect
  - Phantom limb
  - Synesthesia
Increasing the effective FOV with proprioceptive and tactile feedback (with Ungyeon Yang)
Head Mounted Display

- General *egocentric* visual interface
  - Immersive and high presence

- Narrow *physical* field of view (FOV).
  - Popular edition: 20°~30° (diagonal)
    - *Oculus Rift*: Inexpensive and wide FOV (2013)

- Negative Effects
  - Unnatural
  - Task performance in virtual environment.
  - Decrease *Presence*

- Geometric FOV
  - S/W controllable parameter

Virtual Research
V8 Diagonal 60°
GFOV (Software FOV)

GFOV = PFOV

(a) Enlarged GFOV

(b) But possibly with distorted distance perception

Scaled down scene
FOV and Distance Perception

- Egocentric distance perception
  - Under-estimation in real environment
  - Significant under-estimation in VE
  - Important to sensory feedback match between visual and proprioceptive cue

- Conventional Calibration with HMD
  - 100% mapping to physical FOV
  - Under-estimation condition

- How about increasing GFOV to MAX?
  - To see more (wider effective FOV)
  - Constraint: Without loss of distance perception
Suggested Solution: Multimodal Feedback

- Increase GFOV for HMD and
- Compensate degraded depth perception with multimodal interaction
  (*Proprioceptive* – Reach out to the object, not just looking at it …)

**Hypothesis!**

- Overestimated
- Matched
- Underestimated

Mapping ratio of Geometric FOV

- (only visual) feedback
- (visual + proprioceptive) feedback
- (visual + proprioceptive + tactile) feedback
Experiment

- Compare distance perception (Matching task)
  - Real vs. virtual under different conditions
  - Test condition
    - GFOV: 11 levels
      - 100% ~ 200%
    - Matching feedback types
      - Visual only
      - Tactile only
      - Visual and tactile (multimodal)
Results

- Maximum over-mapping GFOV to 170%
  - diagonal FOV 31.2° → diagonal GFOV 53.04°
ACM VRST 2006

Hand-held virtual reality: A feasibility study
(with Jane Hwang)
Objective

- Q: Is “minimum” level of immersion or presence possible with hand-held devices? (is hand-held VR a possibility?)
  - Can we overcome the small “display” problem with multimodality and interaction design?
  - Plus: what about usability and task performance?
What we did

- Vary Interaction style
  - Button based
  - Motion based multimodal interface (proprioceptive / body based)

- Against different displays by size of FOV
  - Mobile
  - Monitor
  - Large monitor

- Measure
  - Presence/immersion and Perceived FOV
  - Usability
  - Performance
Motion based interface: (optical flow)
5 Treatments

Motion-based hand-held VR

Button-based hand-held VR

Mouse/Keyboard interaction in small screen/desktop/large screen
Tasks

Navigating in virtual environment ➔ Usability, presence/immersion, enjoyment, and perceived FOV

Locating and selecting objects ➔ Task performance
Presence/Immersion

Presence score

Motion based hh Button based hh Small screen 17' screen 42' screen

Presence score

Immersion

Motion based hh Button based hh Small screen 17' screen 42' screen

5.41
4.34
4.06
4.33
4.71

0
1
2
3
4
5
6

5.7
4.5
4.3
4.7
4.9

0
1
2
3
4
5
6
7
Perceived FOV

Perceived FOV and Actual FOV (deg. marked by subjects)

- Perceived FOV
- Actual FOV

Motion based hh
Button based hh
Small screen
17' screen
42' screen

- Perceived FOV
- Actual FOV
Measuring perceived FOV
Task Performance

Task completion time (sec)

Motion based hh
Button based hh
Small screen
17'
42'

160 243 221 223 262
### Usability

#### Easy to use

<table>
<thead>
<tr>
<th></th>
<th>Motion based hh</th>
<th>Button based hh</th>
<th>Small screen</th>
<th>17’ screen</th>
<th>42’ screen</th>
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<tbody>
<tr>
<td>Naturalness</td>
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<td>4.7</td>
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#### Easy to learn

<table>
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<td>6.04</td>
<td>5.48</td>
<td>5.52</td>
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#### Naturalness

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<th>17’ screen</th>
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<td>Easy to learn</td>
<td>6.4</td>
<td>6.0</td>
<td>5.5</td>
<td>5.8</td>
<td>5.6</td>
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#### Intuitiveness

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<td>6.4</td>
<td>3.9</td>
<td>3.4</td>
<td>3.5</td>
<td>3.4</td>
</tr>
</tbody>
</table>
Summary

- Assessed the feasibility of VR on hand-held devices
  - High presence/Immersion possible
  - Widened perceived FOV
  - Usability, enjoyment and task performance

- Interaction style is important
  - Involve the body
  - Multimodal synergy
Funneling and saltation effects for tactile interaction with virtual objects

(with Jaedong Lee and Youngsun Kim)
Motivation

- Vibro-tactile feedback
  - Inexpensive and effective way to enhance interaction experience

- Limitations of tactile interaction
  - High mechanical complexity
  - Costly hardware
  - Unnatural interaction
  - Indirect stimulation / Single vibrator: Difficult to associate detailed content
Use “Out of the body” Tactile Illusion

- Minimize the number of vibrators
- Provide indirect but richer tactile feedback
Applications

Stereoscopically rendered object
Funneling and Saltation

Funneling (simultaneously)


Saltation (Time intervals)

Out of the Body Illusion

- Physical medium: About 3cm
- Virtual medium: About 1.3cm
Out of the Body on the Virtual
Out of the Body: without Body Extension

Funneling

![Diagram showing funneling with tactile and visual inputs at points A and B, and voltage levels at P1, P2, P3, P4, P5.]
Out of the Body: without Body Extension

Saltation

Visual Feedback (Intended P3)

Time interval
S1(Left) 800ms S2(Left) S3(Right) 50ms
Extending to 2D

- **Single**
  - Used
  - Stimulation at the middle
  - Location of sensation not controllable

- **Funneling**
  - Not used
  - Simultaneous stimulation at 3 corners
  - Location of sensation controlled with relative amplitudes

- **Saltation**
  - Not used
  - Timed stimulation at 4 corners
  - Location of sensation controlled with ISI’s
Arkanoid
Today’s media devices are relatively equipped well (however may not be as good as “Big VR”)

Lots of possibilities to still produce rich experience by:
- Synergistic effects of multimodal integration/illusion
- Combined with proper interaction design
- Look out for negative interaction (interference)!
- Importance of the story (and empathy)
Empatheater

(5) Time to the next: [00 : 00]
Interaction point

(6) InteractionType
[ StraightPunch ]

(7) Straight Punch!! Straight Punch!!

movie
Thank you

gjkim@korea.ac.kr