The Role of Cognitive Ergonomics in Interaction Design, Addressing Advances in HCI

Workshop at ECCE 2016

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Workshop Objectives

Exchange ideas, thoughts, visions, experiences on the changing role of Cognitive Ergonomics in Interaction Design and Human-Computer Interaction.

- Conceptual, social and exploratory design approaches
- Co-design and co-creation
- Supporting User-Centered Design
- Creativity in Cognitive Ergonomics
- Unintended and implicit interaction
- Raise context-awareness in design
- Understanding artefact use in context
- End user development
- Training and experimentation facilities, teaching approaches...

Workshop Contributions

- M. Patterson et al.
  A Web-Based Human Computer Interaction Audit Tool To Encourage Collaborative Cognitive Ergonomics Within Interaction Design
- Josep M. Junoy Domènech
  Cognitive Ergonomics topics observed at CaixaBank, Barcelona
- E. Kantorowitz
  Two Step User Interface Design
- A. Dittmar
  Support for Nested Design Spaces and End-User Designers
- C. Le Bail et al.
  A methodological approach to the conceptualization of a socio-technical system: a smart and collaborative neighbourhood
- M.-L. Bourguet
  Designing More Robust Ubiquitous Systems
- G. de Haan
  Conclusions about Cognitive Ergonomics in Interaction Design & Advances in HCI

Organization

12:00 Informal introduction round (tea & coffee)
12:30 Introduction (Geert and Anke)
13:15 Presentation and discussion of the workshop contributions
14:30 Coffee & tea break
15:00 Shared discussion: contributions of cognitive ergonomics to future interaction design
16:30 Conclusions

HCI research

- Software ergonomics
- Formal specification
- Design methods
- Usability evaluation
- Intelligent wearables
- Cultural heritage/metadata
- Intelligent interfaces

Education & Research Background - GdH

Geert de Haan
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HCI Work
- Design methods
- Usability & User Centred Design
- Intelligent Sensor Networks
- Ubiquitous computing
- Internet of Things
  - Design methods
  - HCI developments
  - Curriculum renewal
    - Research methods
    - Social learning
    - Education thru research ...

HCI / ICT developments
- Tangible
- Mobile
- Smart
- Sensitive
- Social
- Connected

Design methods
- User centredness
- Design exploration
- Patterns & frameworks

Research Theme's
- Intelligence in Ubicomp, IoT and Sensornetworks?
- Design methods for Intelligent, Social, Context-sensitive applications (mashup, iteration, concepting, prototyping):
  - Scrum, XP, RAD, DSDM ...
  - Scenario’s, role playing, concepting, narratives
  - UCD, Co-design, co-creation
  - Living labs, tinkering, mash-ups, creative design
- Relevance of the developments?
  - Sensors, location-based, service protocols, pattern matching, social computing, data mining, open data

Anke
- Background in computer science, HCI
- Research:
  - Human-centered design practices, interaction design
    - Use of design representations: personas, scenarios, prototypes, formal models... (role of CE, e.g. explorative prototyping)
    - Support by software engineering methods
  - Understanding interaction with digital artifacts in a broader context
    - How to study artifact use? (role of CE)
    - How can theoretical frameworks help understanding interaction and guide design?

Participants introduce themselves

Introduction
(Geert and Anke)
“Evolution” of HCI

- From late 1970s (graphical user interfaces)
  - Usability concerns
  - Cognitive modelling
  - User-Centered Design ("know the user!")
- From 1990ies (communication between people enabled by computers)
  - Understanding workplace practices and human activity
  - Theoretical frameworks
  - Emergence of CSCW
- At the same time: design as a set of related practices
  - Emergence of interaction design

What is Interaction Design?

Consideration of aspects such as:
- culture, emotion, experience in HCI,
- critical design approaches (how we live with and through technology),
- unintended and implicit interaction...

Emergence of Interaction Design

T. Winograd: The Design of Interaction. 1987

- Computers have created a new medium that is both active and virtual.
- Need for principles and practices that are unique to this new scope and fluidity of interactivity
  - interaction spaces.

Compared with
- architecture
- graphic design
- Product design

Developments

- Tangible
- Mobile
- Smart
- Sensitive
- Social
- Connected

Design methods

- User centredness
- Design exploration
- Patterns & frameworks

Civil engineering

build a house, an office building, hospital...

- Focus on structural soundness, construction methods, cost, durability etc.
- Educated to apply the formal knowledge to predict and calculate the technical possibilities and resource tradeoffs that go into deciding what can be constructed.

Architecture

build an interactive system...

- Focus on people and their interactions with and within the space being created.
- Educated in a studio environment that emphasizes the creation and critique of suitable designs.

Computer Science/SE

build an interactive system...

- Focus on the computing aspects that can be best approached through its formal theories and engineering methods.

Interaction Design

- Focus on understanding, analyzing, and creating interaction spaces within which people can communicate.
- Challenge: to combine the practical aspects learned different disciplines -- Role of Cognitive Ergonomics?

IOT design - structure

- Technical know-how declines
- Creativity increases
- Cooperative problem-solving

- Friendly nearby? (sensor)
- Traffic situation (ota)
- Event (co-created cloud data)
- Agenda (cloud data)
- Location (service)
- Stress (sensor)
- Busy / Engaged? (sensor)
- Next Appointment location (compute)
IOT design - process

- IOT design as media or web design
- Phases are NOT linear

Own work / insights

- screen-based vs. memory interaction (etag)
- information push vs. pull (comris)
- usability of adaptive interfaces
- predictability of intelligent/agent systems (imass)
- interacting with intelligent agents (superassist)
- ubiquitous computing – unintended interaction
- intelligent sensor networks - unwanted reactions
- web interfaces — interaction delays and feedback
- integration of different apps to do one task
- co-design, scenario-design, design exploration – tool-based vs engineering design (little theories)

Solutions !?

- agile and exploratory design - learn as you go design, fablabs, design studios
- emergent design practices – incremental design
- scenario-based design
- co-design practices, role playing - users as designers
- reliance on tools - interface builders, personas
- use of flexible technology - apps, web-based applications, soa’s
- integrating design and use - continuous design (design while use), living labs, innovation experiment systems, report back

Role of Cognitive Ergonomics?

"...we need to have a new conception of the ‘computer’ in HCI. We need a better way of understanding how the embedding of digital technologies in everyday artefacts, in the built structures around us and in the natural landscape is transforming our surrounding environment into a physical-digital ecosystem. We now need to address not just the design of the artefacts themselves but also the spaces within which these artefacts reside. More than this, design has to deal with deeper, systemic issues."

"Being Human – Human-Computer Interaction in the Year 2020"

CE: profound knowledge and systematic methods in analyzing situation awareness, tasks, collaborative activities (co-located or not)… than interaction designers.
(Norman, 2006)