Aalto University
School of Science
and Technology

USchool Intro

Introduction of USchool at Aalto SCI

http://uschool.aalto.fi/

Prof. Marko Nieminen
Usability and user interfaces
Department of Computer Science

Themes for Today

- Introductions – USchool: staff and students. Multi-disciplinary groups.
- USchool: Themes and topics. What is USchool and what kind of courses does it offer?
- On Human-Computer Interaction and User-Centred Design
- Group Assignment 1: Analysis of interaction with improvement recommendations

USchool Personnel

- Aalto SCI
  - Prof. Marko Nieminen
  - University lecturer Mika P. Nieminen, D.Sc.(Tech.)
  - Study coordinator Anu Kuusela
- Aalto ARTS
  - Prof. Virpi Roto
  - Study coordinator Meri Arnala
- Cognitive Science / University of Helsinki
  - University lecturer Anna-Mari Rusanen, PhD
  - University lecturer, docent Otto Lappi, PhD

Students and Groups 2020

1:

- Roosa Kujanpää SCI
- Jooeun Park ARTS
- Anton Berg UH
- Dongmei Gao

2:

- Yuhui Xu SCI
- Teppo Vesikukka ARTS
- Jasmin Elonen UH

3:

- Sanni Lares SCI
- Ya-Yu Tseng ARTS
- Antti Lampinen UH
- Noora Mela UH

USchool

- The students of USchool get advanced education in user-centred design
- The university units and study programmes that provide the foundation for USchool are
  - **Department of Computer Science and Engineering**, Aalto University, School of Science (SCI)
  - **Department of Design**, Aalto University, School of Art, Design, and Architecture (ARTS)
  - **Cognitive Science Unit,** University of Helsinki
- Five students from each founding study program are selected and enrolled based on special applications
- Students are given a two-year permission to complete their courses in USchool

USchool: A Multi-Disciplinary and Collaborative Study Program

- How do **people** perceive and **experience** the products and **services** that they use?
- Usability research, user-centred development, user experience research, user interface design, service design
- Multi-disciplinary research: methods from different scientific domains:
  - Cognitive science
  - Industrial design, graphical design
  - Computer science, software engineering, interaction technology, information systems
  - Human-Computer Interaction (HCI), user-centred design, user interface design and implementation, product development

- Usability school prepares participants for work in **a multi-disciplinary development environment**: skills for inter-disciplinary discussion

Characteristic to USchool Studies

- Exercises and multi-disciplinary teamwork!
- Qualitative research, methods
- Projects and assignments typically carried out in real-life (industrial / public service) environment.

Concepts and Topics

- Human-computer interaction
- User experience
- User-centred design
- Human-centred design
- Usability
- User interface design
- Usability evaluation
- Interaction design
- User value
- Participatory design
- Co-design
- Service design
- Context-of-use
- Contextual design
- Ethnography
- Action research
- Design science
- …

Skills and Experience: Expectations from Industry

- Technology, ”construction skills”; interest and ability to develop in this
- Basic understanding of cognitive psychology
- Understanding the importance of aesthetics in user interface
- Facilitation of workshops (user/customer/personnel/development/focus)

- Methodological skills in addition to usability evaluation:
  - Focus groups
  - Concept design
  - Gathering of user requirements and translation for engineering
  - ”Thorough ability to use and apply at least one of the methods”
- Ymmärrettävän suomenkielisen tekstin tuottaminen / Ability to produce comprehensible written reports in required natural language (!C# || awk)
- Interaction skills with other developers and designers (engineering / design) as well as with marketing and other – even unexpected stakeholder groups

”So, what am I gonna be?”

Some Job Positions and Titles (N=103)

- UX designer, UX manager, UX specialist (23)
- CX Consultant, CX designer (4)
- Interaction designer (4), Service designer (2)
- Software developer (6), Web developer, Front-end developer, Lead full stack developer, Functional architect (2), Test engineer (2)
- Project manager (7), Project engineer (1), Development manager (2)
- Researcher (7), Research manager (2)
- Product manager
- Game producer, Game designer
- Design lead, Head of design, Lead product designer
- Communication designer
- Business/BI analyst, Business consultant, managing consultant
- CEO, CTO, Director of business development
- Country manager
- Co-founder
- Airline pilot

Job opportunity / thesis topic

User Interface Developer for Python-based Machine Learning Tool

The **Research Group of Energy Conversion** from the Department of Mechanical Engineering (Aalto University, School of Engineering) is hiring a Software Developer for the development of the user interface for a Python-based Machine Learning tool. The expected end product is a web app/tool that will allow the end user (corporate client) to perform operations in a user-friendly infrastructure. There may be a possibility to use this work as the basis of a Master's Thesis.

Expected Skills:

- In-depth knowledge and understanding of User Interface Development
- Ability to create web app from a Python-based mathematical modeling tool (e.g. knowledge of Dash by Plotly)
- Knowledge of web applications best practices and methodologies, including hosting and deployment.
- Good understanding of building fully responsive and efficient web pages.
- Strong analytical approach and problem-solving abilities.
- Good interpersonal skills.
- Excellent written and spoken English.

Desirable Skills:

- Basic understanding of the Energy Industry and Sustainability
- Experience with working with corporate customers

What We Offer:

- Working on a cutting-edge research project with a potential for high societal impact
- International work environment
- Flexible working hours
- Opportunity to turn project into Master's Thesis

Duration of Project: 7 months

Earliest starting date: 15.09.2020

Apply by sending CV/Resume (including links to portfolio/previous work, if any) and Cover Letter to Arpad Toldy at arpad.toldy@aalto.fi

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Diplomityöaihe

"AI Foreman"

Tekoälyn tuottaman resursointisuunnitelman käytettävyys ja hyväksyttävyys teollisessa tuotantotyössä

Diplomityössä on tarkoitus tarkastella **tekoälypohjaisen tuotannonsuunnittelun** tuottamien lopputulosten käytettävyyttä ja hyväksyttävyyttä.

Teollisten tuotantoympäristöjen resursointia tehdään uusilla tekoälyyn pohjautuvilla laskenta- ja suunnittelumenetelmillä. Laskelmien ja suunnitelmien perustana on tuotantoympäristöjen kriittisten resurssien digitaalinen mallintaminen. Myös työntekijöiden piirteitä, osaamista ja työskentelytapoja on alettu liittää osiksi tällaisia laskentamalleja.

Aalto-yliopisto on mukana laajaan teolliseen yhteistyöhön tukeutuvassa tutkimushankkeessa, jonka yhdessä osa-alueessa tarkastellaan myös työntekijöitä kuvaavien piirteiden digitaalista mallintamista (ns. "digital twin") siten, että osaamiseen ja työhyvinvointiin liittyvät tekijät voivat muodostaa osan parametrijoukkoa, jonka tuella tekoälypohjainen tuotannon suunnittelu ja optimointi voi muodostua aiempaa monimuotoisemmaksi.

Työn osana on hyväksyttävyyteen liittyvän arviointikriteeristön määrittely, joihin liittyy ns. **teknisten seikkojen lisäksi myös eettisiä näkökohtia**. Työssä tarkastellaan tekoälyn tuottamaa ratkaisua tuotannollisessa kokonaisuudessa. Kysymyksiä ovat mm. se, tuottaako uusi laskenta- ja analysointitapa työnjohtajien työtä tukevaa tietoa sekä se, onko laskentamallin tuottama tulos työntekijöiden kokemuksen perusteella **hyväksyttävä**. Hankkeessa on kohteena kaksi suomalaista tuotantoyksikköä, joissa ollaan ottamassa käyttöön tekoälypohjaisia resursointijärjestelmiä.

Jos olet kiinnostunut diplomityöstä, lähetä hakemuksesi prof. Marko Niemiselle (marko.nieminen@aalto.fi). Liitä hakemukseesi opintosuoritusotteesi ja CV:si sekä kirjoita varsinaiseen viestiin lyhyt motivaatiokirje, jossa kerrot omasta osaamisestasi ja kiinnostuksestasi aiheeseen liittyen. Laita viestisi otsikkoon "Diplomityö / AI Foreman". Diplomityö on osa Reboot IoT Factory -tutkimushanketta.

UCD Courses at Aalto SCI 1/3

- **User-Centered Methods for Product and Service Design** 5 cr (M.Sc.) (~100 students)
  - The course **introduces the commonly used user-centred user research methods** for early stage product and service design and provides tools to analyze and visualize the gathered data to fuel product and service design.
  - After the course, **you know the basic methods for user research**. You understand and can describe different methods for use in the beginning of the user-centered design process and select appropriate methods for a given user research problem. You know how to apply a number of methods in a simple user research case. You will be able to find and analyze relevant new information in the field and concisely present research results to an audience.
  - You are comfortable with reading academic articles and will be able to write and reference an academically paper properly.

UCD Courses at Aalto SCI 2/3

- **User Interface Construction** (5 cr) (M.Sc. ~80 students)
  - The **design and construction of user interfaces,** emphasis on technical aspects and prototyping. Use of basic user interface elements for construction with style guides. As a result, students are able to develop an interactive user interface that can be used for usability testing. Students know how to apply user-centred design principles, guidelines, and patterns in the design and implementation of interactive user interfaces.
- **Collaborative Evaluation of Interactive Systems** (5 cr) (M.Sc.) (~25 students)
  - The course introduces several **methods for collaborative evaluation of interactive systems**. The methods for evaluation of usability and user experience are applied in project works conducted in cooperation with customers. Findings further the development of the evaluated interactive system or service.
  - After the course, you can select methods for collaborative evaluation of usability and user experience. You are able to **design and carry out an evaluation of interactive systems** in different contexts. You know **how to communicate your results** to various stakeholders in order to **impact the further development of the system or service**.

UCD Courses at Aalto SCI 3/3

- **Data-Driven Concept Design** (M.Sc. ~60 students)
  - How to create product and service concepts? How to prepare and analyse common user research data to produce relevant user knowledge for data-driven design? How to develop select parts into visualised prototypes of various fidelity?
  - As part of a team, students apply creative problem-solving methods in a rigorous manner to find innovative solutions based on demonstrable potential and limitations. Students present the designs and argue the design decisions in a clear and concise manner to various stakeholders.
- Seminar in Software and Service Engineering (M.Sc.+)
- Research Seminar on Software Engineering (M.Sc.+)

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HCI – Human-Computer Interaction

A Very Short Introduction

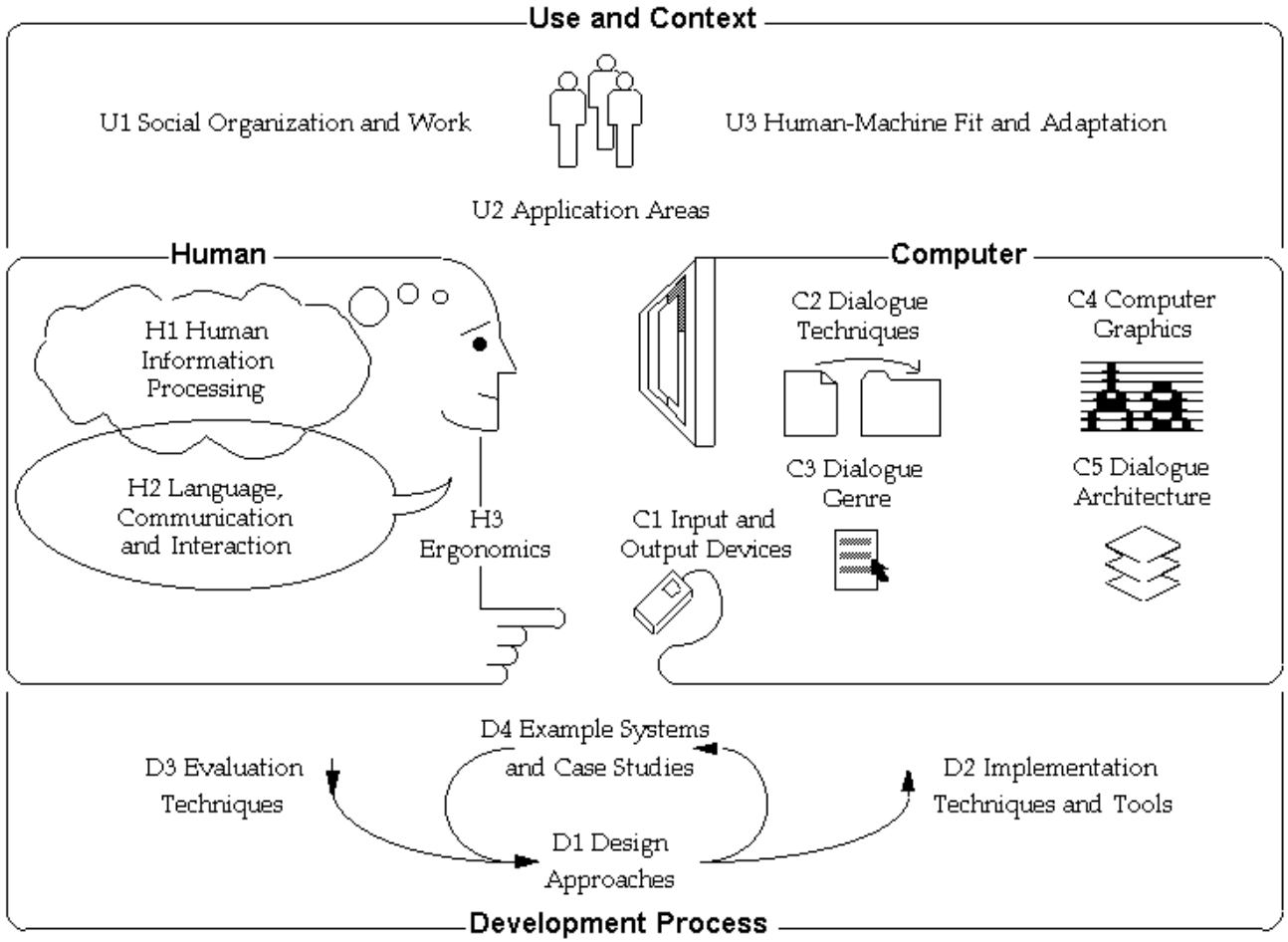
ACM SIGCHI / HCI Curricula

(ACM 1992, 1996)

- HCI – Human-Computer Interaction
- ACM – Association for Computing Machinery
- SIGCHI – Special Interest Group on Computer-Human Interaction

- http://www.acm.org
- http://www.acm.org/sigchi/cdg/index.html

ACM SIGCHI – Human Computer Interaction, trad.



http://www.acm.org/sigchi/cdg/figure_1.gif
ACM SIGCHI Curricula for Human-Computer Interaction

Topics of Interest

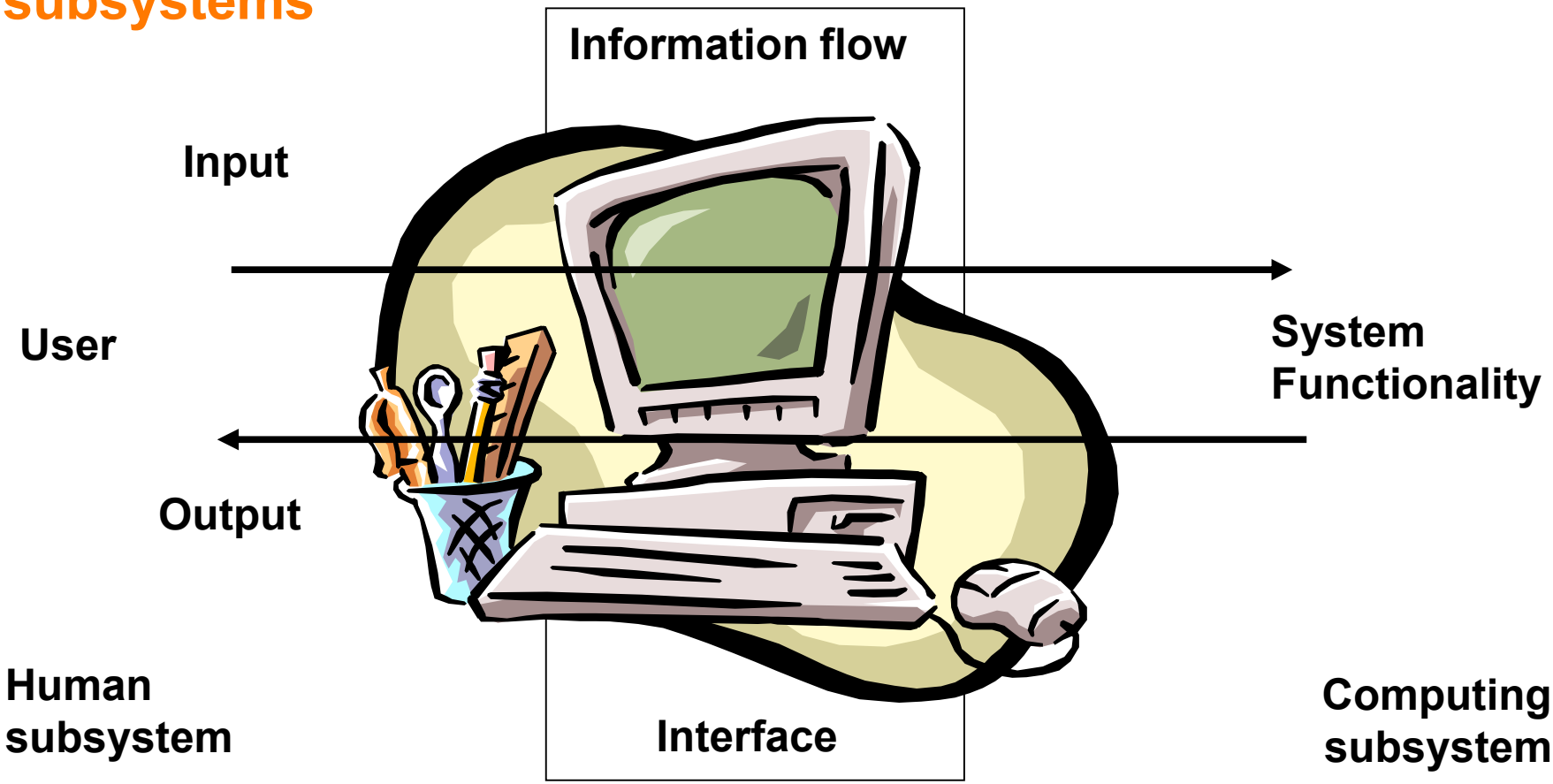
(Churchill & al. 2016)

- Interaction design
  Cognitive science, computer science (general), design (general), digital media, information science, psychology (general), sociology, statistics

- Experience design
- Desktop, mobile, tablet
- Gesture, keyboard, sensor, touch
- Agile/iterative design
- Participatory design
- Value-centred design

- Brainstorming
- Field study / etnography
- Prototyping: Interactive hi-fi & paper-based lo-fi
- Interviews
- Observation
- Scenarios, storytelling
- Surveys
- Usability testing, thinking aloud
- Qualitative and quantitative research methods
- Data analysis
- Experimental metods

Interacting with [put the object here]
User Interface: Mediator for the Input / Output between subsystems

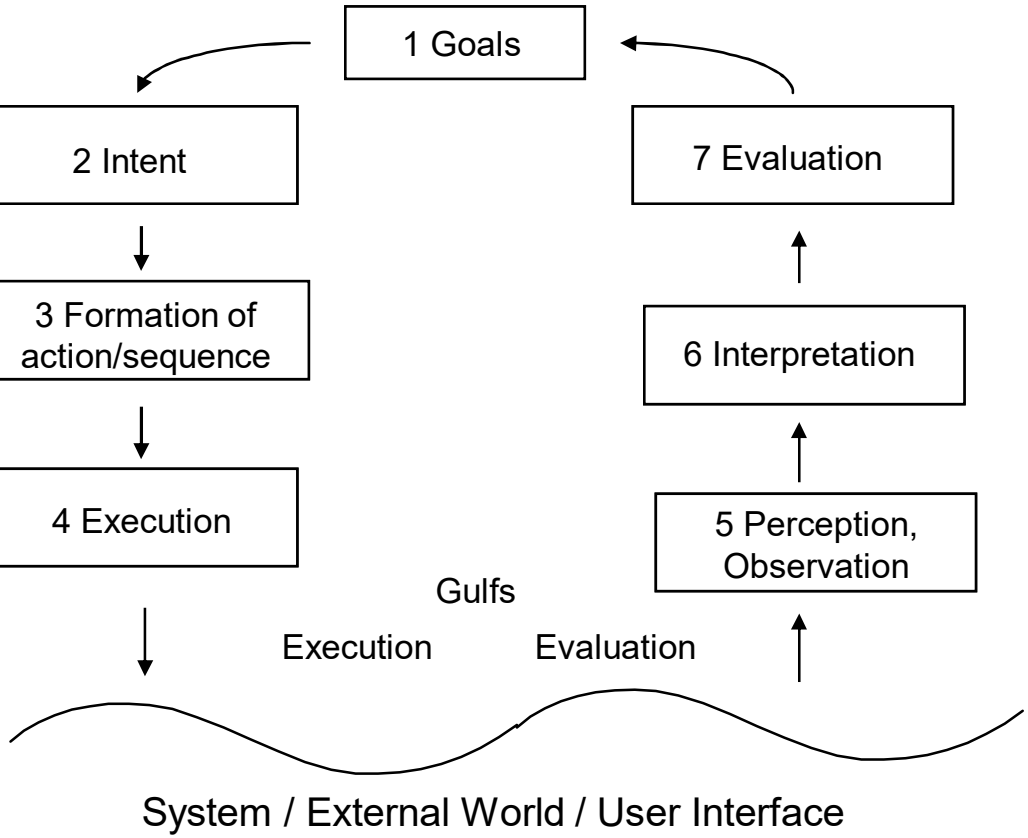


Assignment: Analysis of Interaction

in Multi-Disciplinary Groups

- Form the multi-disciplinary groups!
- Assignment: analyse interaction
  - Observe your surroundings for sub-optimal functionality
  - Select an interesting case to study in detail
    - First: Based on your existing background
    - Then: Familiarize yourself with the Norman's model (next slide)
  - Analyze user interaction with the object/device/app/service:
    - What are the challenges?
    - How does the user perform? How to do a breakdown of activities for analysis? Based on your existing background? How does Norman's model inform you?
    - Any ideas on improvements?
  - Create a synthesized analysis & conclusion in your group
    - **To be presented next time at the SCI meeting**

Interaction with UI: Seven Stages



Norman 1986