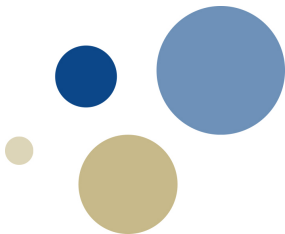




Norwegian University of  
Science and Technology



# Human Computer Interaction

Trends in HCI

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## Learning Outcomes



- Get a sense of the differences between 1st, 2nd, and 3rd wave in HCI.
- Explore a range of key topics in the HCI discipline.
- Identify the format of CHI paper writing.
- Discover the elements in a successful CHI paper submission.

## Preparation: Reading

- Watch this video, which explains how the course will work:  
<http://folk.ntnu.no/annax/MCT-videos/VL-2018-10-15-09-01-MCT.mp4>, slides here.
  - Send a summary (1 page max.) of the following article:
    - Being Human Human-Computer Interaction in the Year 2020 [1]  
<https://hxd.research.microsoft.com/manage/resources/beinghumana3-1.pdf>
- You should pick one subsection (e.g. 1.1 changing computers, 2.2. the end of interface stability, 3.2 extending the research and design cycle) and briefly summarize it reflecting on the present day: (1) give the context of the text, (2) summarize the subsection, and (3) reflect on the present day.

## Final Assignment (1/2)



- The final assignment of this course will consist in writing a short paper (4 pages long) about the prototype that you built in team and presented during the mini-hackathon of the Physical Computing Workshop.
- The paper will have both individual parts (written individually) and group parts (written in team).
- This final assignment will count 40% of the total grading of the course, where 50% will count from your individual contributions and 50% will count from group contributions.
- Page about the final assignment on Canvas:  
<https://uio.instructure.com/courses/22318/assignments/28321>

## Final Assignment (2/2)

The paper structure should have the following sections:

- Title
- Abstract (300 words)
- Introduction (*group*)
- Background (*group*)
- The System (*group*)
- The Performance (*group*)
- Reflective Notes (*individual*)
- Conclusion (*individual*)



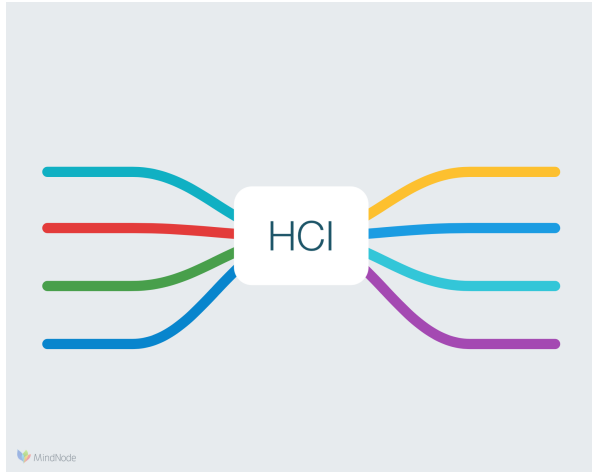
## Class Structure

- 10.15-10.45 Presentation course/day. Presentation/lecture of the 1st, 2nd, and 3rd wave in HCI.
- 10.30-11.00 Discussion about the prep. reading framed in the context of the three waves in HCI.
- 11.00-11.30 Teamwork: Selection of a paper from the CHI 2019 Best Papers (<https://chi2019.acm.org/2019/03/15/chi-2019-best-papers-honourable-mentions/>) and discussion about what is the research question, the approach used to address the research question, the main findings and the main contribution.
- 11.30-12.00 The teams summarize to the group their selected paper (10 min per group).

# What is HCl?



# What is HCI?





## What is HCI?

*Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them. [2]*

- HCI is described as a constantly changing field.
- *Interaction Design* is concerned with the theory, research, and practice of designing user experiences for all manner of technologies, systems, and products. [3]
- *Ergonomics and Human Factors* have closely overlapping goals with HCI, being concerned with understanding the interactions among humans and other aspects of a system in order to optimize human well-being and overall system performance. [3]

## What is an HCI course?

The basic elements of an HCI course can be consulted on the Association for Computing Machinery's Special Interest Group on Computer-Human Interaction (ACM SIGCHI) online statement:

*SIGCHI members are involved in the design, implementation, and use of interactive computer-based systems in the broadest sense.<sup>1</sup>*

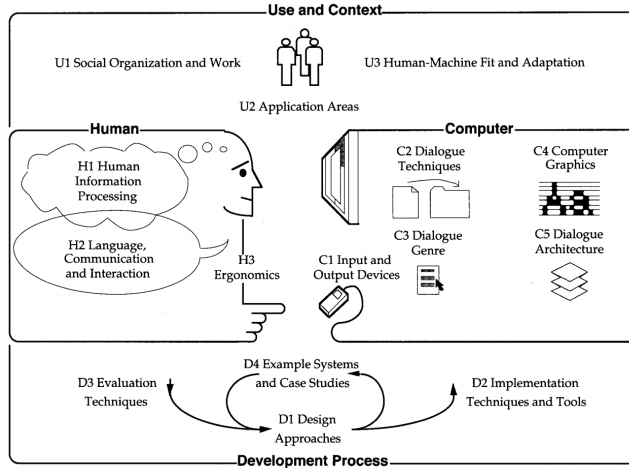
A course that includes any of these aspects of interactive systems can be categorized as an HCI course.

It has been highlighted that HCI education is an ongoing field that is rapidly and continually changing in order to keep in alignment with sociotechnical changes [4]. A revision of the past, present and future HCI situates diversity as an important and inevitable factor in HCI [5].

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<sup>1</sup><https://interactions.acm.org/about-sigchi>

# The Content of HCI



## ACM Classification Keywords

*ACM's first classification system for the computing field was published in 1964. Then, in 1982, the ACM published an entirely new system. New versions based on the 1982 system followed, in 1983, 1987, 1991, and 1998. The 2012 scheme utilizes a new poly-hierarchical structure and a more in-depth approach than the 1998 version. It no longer uses the letter-and-number coding of the previous versions. The old scheme has been mapped to the new, and both the 1998 and 2012 terms are available on Citation Pages of all indexed articles in the ACM Digital Library.*

*Source: <https://www.acm.org/about-acm/class>*

# The 2012 ACM Computing Classification System

- Hardware
- Computer Systems Organization
- Networks
- Software
- Theory of Computation
- Mathematics of Computing
- Information Systems
- Security and Privacy
- Human-Centered Computing
- Computing Methodologies
- Applied Computing
- Social and Professional Topics

Source: <https://www.acm.org/publications/class-2012-intro>

Tool with a visual display: <https://dl.acm.org/ccs/ccs.cfm>



## What is SIGCHI

ACM SIGCHI is the Special Interest Group on Human-Computer Interaction.

*SIGCHI is the premier international society for professionals, academics and students who are interested in human-technology and human-computer interaction (HCI). We provide a forum for the discussion of all aspects of HCI through over 20 sponsored and over 40 in-cooperation conferences, publications (eg. OpenTOC: Table of Contents page), communities, web sites, and other services. We advance education in HCI through workshops and outreach, and we promote informal access to a wide range of individuals and organizations involved in HCI.*

*Source: <https://sigchi.org/about/about-sigchi/>*

## How does HCI relate to music tech?

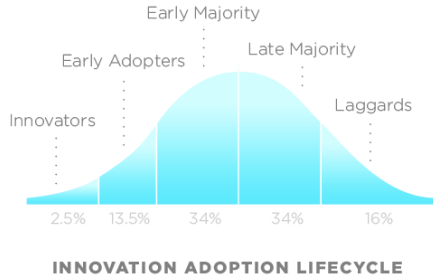


*I also discovered that in the grand scheme of things, there are three levels of design: standard spec, military spec and artist spec. Most significantly, I learned that the third, artist spec, was the hardest (and most important). If you could nail it, then everything else was easy. Buxton, 1997 [6]*

Lectures 3 and 4 focus on this topic.

# How does HCI relate to industry?

## Technology Innovation Adoption Lifecycle



The technology adoption lifecycle is a sociological model that describes the adoption or acceptance of a new product or innovation, according to the demographic and psychological characteristics of defined adopter groups.

The process of adoption over time is typically illustrated as a classical normal distribution or “bell curve”. [7]

Image source: [https://en.wikipedia.org/wiki/Technology\\_adoption\\_life\\_cycle](https://en.wikipedia.org/wiki/Technology_adoption_life_cycle)



# What is CHI?

- CHI stands for the ACM Conference on Human Factors in Computing Systems.
- The CHI series of academic conferences is generally considered the most prestigious in the field of human-computer interaction and is one of the top ranked conferences in computer science.
- CHI has been held annually since 1982 and attracts thousands of international attendees. CHI continues to grow, reaching over 3,300 attendees in 2013 and 3,800 in 2016.
- Since 1993 the acceptance rate for full papers was consistently below 30 percent. After 1992 the average acceptance rate was around 20 percent. The number of accepted full papers is slowly increasing and reached 157 accepted papers with an acceptance rate of 22 percent in 2008.
- The Proceedings of CHI can be found on the ACM Digital Library: <https://dl.acm.org/>

Source: [https://en.wikipedia.org/wiki/Conference\\_on\\_Human\\_Factors\\_in\\_Computing\\_Systems](https://en.wikipedia.org/wiki/Conference_on_Human_Factors_in_Computing_Systems)

## When Second Wave HCI meets Third Wave Challenges

*Abstract: This paper surveys the current status of second generation HCI theory, faced with the challenges brought to HCI by the so-called third wave. In the third wave, the use context and application types are broadened, and intermixed, relative to the focus of the second wave on work. Technology spreads from the workplace to our homes and everyday lives and culture. Using these challenges the paper specifically addresses the topics of multiplicity, context, boundaries, experience and participation in order to discuss where second wave theory and conceptions can still be positioned to make a contribution as part of the maturing of our handling of the challenges brought on by the third wave.*

*Bødker, 2006 [8]*

## The 'third wave'



The 'third wave' provides a different lens for understanding alternative computing systems to window-icon-mouse-pointer systems, such as ubiquitous, mobile, collaborative or social computing systems. This paradigm is referred to by [9] as 'situated perspectives', a sum of perspectives that studies HCI interaction as situated in a particular context and which connects to qualitative disciplines such as ethnography or practice-based research.

# The three paradigms compared

	Paradigm 1	Paradigm 2	Paradigm 3
<b>Metaphor of interaction</b>	Interaction as man-machine coupling	Interaction as information communication	Interaction as phenomenologically situated
<b>Central goal for interaction</b>	Optimizing fit between man and machine	Optimizing accuracy and efficiency of information transfer	Support for situated action in the world
<b>Typical questions of interest</b>	How can we fix specific problems that arise in interaction?	<ul style="list-style-type: none"><li>▪ What mismatches come up in communication between computers and people?</li><li>▪ How can we accurately model what people do?</li><li>▪ How can we improve the efficiency of computer use?</li></ul>	<ul style="list-style-type: none"><li>▪ What existing situated activities in the world should we support?</li><li>▪ How do users appropriate technologies, and how can we support those appropriations?</li><li>▪ How can we support interaction without constraining it too strongly by what a computer can do or understand?</li><li>▪ What are the politics and values at the site of interaction, and how can we support those in design?</li></ul>

Harrison et al. (2007) [9]

## Third-Wave HCI, Ten Years Later (Bødker, 2015)



- The first wave was cognitive science and human factors. It was model-driven and focused on the human being as a subject to be studied through rigid guidelines, formal methods, and systematic testing. [10]
- The second wave is the move “from human factors to human actors.” In the second wave, the focus was on groups working with a collection of applications. Focus on situated action, distributed cognition, context, and proactive methods (e.g. participatory design, prototyping). [10]
- In the third wave, technology spread from the workplace to our homes and everyday lives and culture. Focus on understanding experience and meaning-making. [10]

# Examples



- *Example first wave*

Fitts's Law: <https://www.interaction-design.org/literature/book/the-glossary-of-human-computer-interaction/fitts-s-law>

- *Example second wave*

Distributed Cognition in an Airline Cockpit:

[http://hci.ucsd.edu/media/uploads/hci\\_papers/EH1996-1.pdf](http://hci.ucsd.edu/media/uploads/hci_papers/EH1996-1.pdf) [11]

- *Example third wave*

Where The Action Is: The Foundations of Embodied Interaction by Paul Dourish:

<https://www.dourish.com/embodied/> [12]

## What is NordCHI?

*NordiCHI is a biennial conference functioning as the main Nordic forum for human-computer interaction research. NordiCHI is the meeting place for researchers from academia and industry, designers, practitioners, educators and others from a broad range of traditions and communities. The NordiCHI conference takes HCI in the non-limited sense of research and practice addressing the design and use of interactive technology. The NordiCHI conference is a joint effort initiated by Nordic HCI organisations (some of which do not exist anymore).*

*<https://www.nordichi.eu/>*



# Roadmap: Being Human



## Being human: HCI in the year 2020

*Computer technologies are not neutral – they are laden with human, cultural and social values. We need to define a new agenda for human-computer interaction in the 21st century — one that anticipates and shapes the impact of technology rather than simply reacts to it.*

Source: <https://hxd.research.microsoft.com/work/>

*being-human-human-computer-interaction-in-the-year-2020.php*

- What is a roadmap or agenda?
- After 10 years of the publication of this agenda, to what extent their predictions have been successful or not. Any surprises?

## Being human: HCI in the year 2020: Discussion



- 10.30-11.00 Discussion about the prep. reading framed in the context of the three waves in HCI.

## CHI 2019 Best Papers



- 11.00-11.30 Teamwork: Selection of a paper from the CHI 2019 Best Papers (<https://chi2019.acm.org/2019/03/15/chi-2019-best-papers-honourable-mentions/>) and discussion about what is the research question, the approach used to address the research question, the main findings and the main contribution.
- 11.30-12.00 The teams summarize to the group their selected paper (10 min per group).

## Final Remarks (1/3)



- In the 21st century, sophisticated information and communication technologies are emerging different from the 20th century, and bringing different opportunities and challenges.
- At the same time, engineering, humanities and artistic subjects are all relevant in order to tackle the increasingly complex modern technical society.

## Final Remarks (2/3)



“Renaissance thinking” in modern HCI [5, p.196] as so well represented by Leonardo da Vinci and as pointed out by Shneiderman [14, p.2–3]:

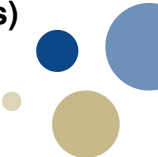
*This modern Renaissance would unify thinking about technology by promoting multidisciplinary education and a sympathy for diversity. [ . . . ] However, linking the high-tech world more closely to the needs of people still requires some new forms of thinking. The Renaissance integration of disciplines that Leonardo da Vinci exemplified could guide us in repairing the split in our modern world.*

## Final Remarks (3/3)



- HCI is an important subject to be taught in courses related to prototyping interactive computer-based systems and can provide a theoretical framework and critical thinking tool to support building new technology.
- TBL is a suitable pedagogical method to teach HCI in future educational scenarios due to the promotion of teamworking within diverse complementary teams and for problem-solving societal challenges.
- Being technological humanists means being responsible thinkers and makers.

## Human-Computer Interaction Day 1 - Group Assignment (post-class)



- Send a summary (1 page max.) of the selected article discussed in group during class from the CHI 2019 Best Papers after the class on Tuesday 22 October 2019 and before Thursday 24 October 2019 9:00. You should explain the research question, the approach used to address the research question, the main findings and the main contribution and include the feedback from the class.

## Human-Computer Interaction Day 2 - Individual Assignment



- Send a summary (1 page max.) of the following article before Thursday 24 October 2019 9:00 and be ready to discuss it in class:

From Mice to Men - 24 years of Evaluation in CHI [13]

The summary should include: the main topic of the paper, the research question, the approach used to address the research question, the main findings, and the main contribution.



## Resources



- SIGCHI: <https://sigchi.org/>
- HCI Bibliography: <http://www.hcibib.org/>
- HCI Glossary - Alan Dix:  
<https://alandix.com/academic/papers/theory-formal-2003/glossary.html>
- The Glossary of Human Computer Interaction: <https://www.interaction-design.org/literature/book/the-glossary-of-human-computer-interaction>

# References

- [1] Richard Harper et al. *Being Human: Human-Computer Interaction in the Year 2020*. Microsoft Research Ltd, 2008.
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- [3] Jenny Preece, Yvonne Rogers, and Helen Sharp. *Interaction Design: Beyond Human-Computer Interaction*. John Wiley & Sons, 2015.
- [4] Sukeshini A. Grandhi. “Educating Ourselves on HCI Education”. In: *interactions* 22.6 (2015), pp. 69–71.
- [5] Tom Gross. “Human-Computer Interaction Education and Diversity”. In: *16th International Conference on Human-Computer Interaction. Theories, Methods, and Tools - Volume 8510*. Ed. by Masaaki Kurosu. Berlin, Heidelberg: Springer-Verlag, 2014, pp. 187–198. ISBN: 978-3-319-07232-6.
- [6] Bill Buxton. “Artists and the Art of the Luthier”. In: *SIGGRAPH Comput. Graph.* 31.1 (Feb. 1997), pp. 10–11.
- [7] Everett M Rogers. *Diffusion of Innovations*. The Free Press, 1983.
- [8] Susanne Bødker. “When Second Wave HCI Meets Third Wave Challenges”. In: *Proceedings of the 4th Nordic Conference on Human-Computer Interaction: Changing Roles*. ACM. 2006, pp. 1–8.
- [9] Steve Harrison, Deborah Tatar, and Phoebe Sengers. “The three Paradigms of HCI”. In: *Alt. Chi. Session at the SIGCHI Conference on Human Factors in Computing Systems San Jose, California, USA*. 2007, pp. 1–18.
- [10] Susanne Bødker. “Third-wave HCI, 10 Years Later—participation and Sharing”. In: *interactions* 22.5 (Aug. 2015), pp. 24–31.
- [11] Edwin Hutchins and Tove Klausen. “Distributed Cognition in an Airline Cockpit”. In: *Cognition and Communication at Work* (1996), pp. 15–34.
- [12] Paul Dourish. *Where The Action Is: The Foundations of Embodied Interaction*. MIT press, 2004.
- [13] Louise Barkhuus and Jennifer A Rode. “From Mice to Men – 24 Years of Evaluation in CHI”. In: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 2007, pp. 1–16.
- [14] Ben Shneiderman. *Leonardo’s Laptop: Human Needs and the New Computing Technologies*. Cambridge, MA, USA: MIT Press, 2003. ISBN: 0262692996.