4M21 Software Engineering and Design
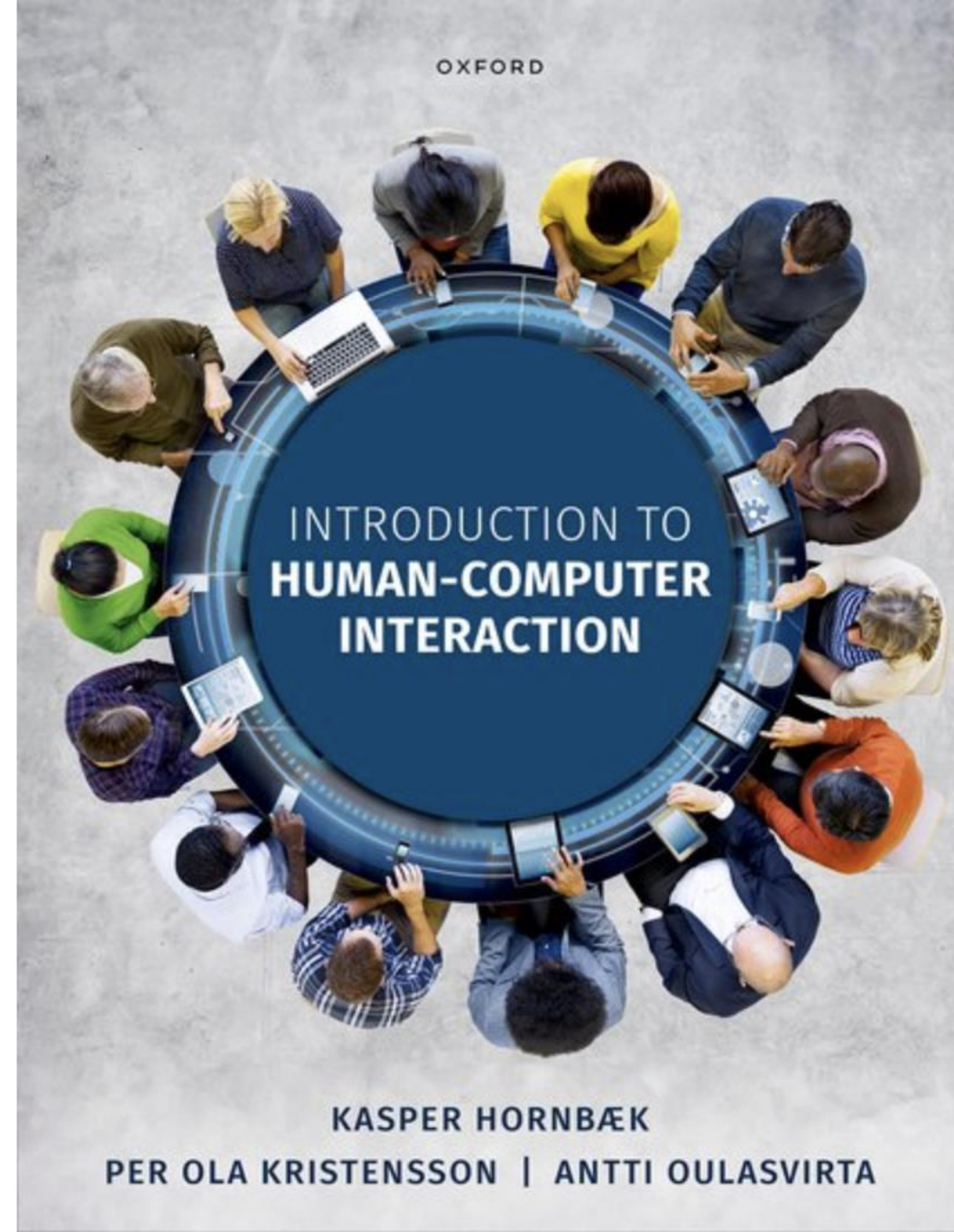# Human-Computer Interaction

Lecture 3/8

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https://global.oup.com/academic/product/introduction-to-human-computer-interaction-9780192864543?cc=gb&lang=en&

User Research

User research

- Many products, systems and services are ultimately unsuccessful as their designs fail to realize an understanding of users' needs, wants and motivations

- User research comprise the principles and methods of empirical research used for obtaining, analyzing, and representing such knowledge

A beginner's guide to finding user needs, https://jdittrich.github.io/userNeedResearchBook.

You are not the user

- Why do user research?
  - Because most of the time **you are not the user**
- Basing critical design decisions on our opinions is risky as developers and designers often represent very different points of view than the users they design for
- Neglecting end-user viewpoints can be in many cases be outright unethical, because it may result in systems, products or services that cause harm or distress
- The data we collect as part of user research should be about actual users engaged in specific activities with specific needs and capabilities
- We should also obtain insights about other (non-using) stakeholders
  - For example, the parents of a child playing a mobile game are non-using stakeholders, who user researchers would aim to produce knowledge about

The aim of user research

- The theories and principles governing our understanding of users are general
  - However, that understanding is necessarily limited
  - Nearly every practical HCI project will face questions that are not covered by existing theories
- Any interactive system also involves particular users doing particular activities in particular contexts
  - We need to know these particulars when we do not have a general understanding that covers them or when it is not clear
- The central aim is thus to **obtain concrete, empirical knowledge about users**
- We should be in direct contact with users, rather than relying on second-hand descriptions or assumptions about them
  - We cannot know the particulars of users indirectly
  - This is a central tenet of being **human-centered**
- A key commitment in user-centered design is to **understand first and design later**
  - User research aims at design-neutral descriptions

Obtaining knowledge about users is complicated (1/2)

- The **say/do problem**: what users say they do might differ from what they actually do
  - For instance, when people are asked how much they use the Internet, their self-reports have only low correlation against log file data
- Many factors that drive our behavior are **latent** in such a way that they are not accessible to conscious inspection and are hard or impossible to describe verbally.
  - **Tacit knowledge** refers to knowledge that we are largely unaware of, but can be effortlessly brought into use in the right situation
  - Highly repeated motor skills, such as riding a bike or typing in a familiar password, are good examples
  - You cannot ask people about how they ride a bike and get the full picture

Obtaining knowledge about users is complicated (2/2)

- Users' needs may only be **recognized in the future**
  - For instance, no user of batch computer systems was likely able to articulate the need for a graphical user interface
  - This means that identifying what users need requires them to imagine the impact of new technology on their activities, which is very difficult
- **Social reasons** make it difficult to gain insights into users
  - The ways in which work gets done are often kept secret
  - Making work visible is fraught with difficulties
  - For instance, making work practices visible may challenge the power between those doing the work and other members of an organization
- Technical systems have a large **diversity of users**
  - There are also non-user stakeholders; that is, groups that are affected by the system, or who affect it, but do not necessarily actively use it

Goals of user research

- **People**
  - Insights relating to people include users' skills, personalities, socioeconomic status, abilities, beliefs, habits, motivations, needs, and wants
- **Activities**
  - The tasks that users do and the practices in which they engage
- **Contexts of use**
  - Physical context: the physical environment, such as lighting or the built environment
  - Social context: the social environment of interaction, such as social relationships
  - Organizational context: such as power structures and division of labor
  - Historical context: such as prior exposure to practices and systems
  - Cultural context: cultural beliefs and norms that affect the use of the system.
- **Technologies**
  - Existing interactive systems and tools that users engage with

Who is the *user* in user research?

- If *you* are not the user, then who is?
- **Target Audience**
  - The first step is to specify the target audience, which is a set of profiles that describe the user groups that the product, system or service is intended to reach
- **Sampling**
  - Having settled on a set of profiles that accurately describe the target audience it is now possible to select representative users to reach
- **Stakeholders**
  - In addition to the direct users of interactive systems, in many cases, other people are affected by the systems, indirectly involved in their use, or benefiting from the system
  - For instance, they may be parents of children who use a child's webpage or coworkers of users of an accounting system

User research methods

Research method	Explanation
Open-ended interview	Ask users questions about their attitudes, experiences, and activities.
Contextual inquiry	Observe and speak to users as they do they work.
Observation	Observe users while trying to avoid affecting them.
Ethnography	Explore the viewpoint of the user through observations, interviews, and participation.
Surveys	Collect a large sample of structured self-report data.
Diaries	Have users keep a diary about their use of interactive systems.
Log file analysis	Automatically track what users actually do with interactive systems.
Analysis of archival data	Analyze the documents and posts that users produce in or with interactive systems.

Research strategy

- **Research strategy** concerns how to select one or more research methods for gathering insights about users
  - A balance of anticipated outcomes of user research and resource demands
- Principle 1: research methods bound what we can empirically learn
  - There is no correct method: the selection on methods needs to follow from careful consideration of the goals of the user research
- Principle 2: trading off conflicting criteria
  - **Realism** concerns how similar the situation being studied is to the situations that the researcher wants to gather insights about
  - **Precision** concerns with how much accuracy and detail one obtains about the users' behavior and attitudes, and how much control there is over variables and circumstances of no interest
  - **Generalizability** concerns how well the findings generalize to other people or situations
- Principle 3: triangulation
  - The combination of multiple research methods to study the same phenomenon

Methodological quality (1/2)

- **Validity:** whether the conclusions drawn from a study are warranted
  - Threats to validity are anything that could go wrong and that threatens the validity of the conclusions drawn
  - **Internal validity:** whether a variable under the control of the researcher has an effect on observations
  - **Construct validity:** if a measurement supposed to measure something actually measures it
  - **Statistical conclusion validity:** if the conclusions drawn based on data are statistically reliable
  - **External validity:** do the conclusions hold for other participants and settings?
- **Reliability:** concerns that user research results in consistent results
  - That is, we would like our methods or measures to give the same result, for instance, if they are applied immediately again to the same person

Methodological quality (2/2)

- **Transparency:** refers to the idea that researchers should make the design, data, analysis approach, and derivation of conclusions accessible and inspectable

- **Ethics:** Carrying out user research requires that the person doing the research carefully considers what is right and wrong in collecting, analyzing, and reporting data
  - Concerns about ethics also include allegiances toward the various stakeholders, most importantly the prospective users who participate in the research, the client for which the research is done, the professional standards of the field of HCI, and the responsibility toward the society at large

Does user research work?

- User research as an axiom: *not* doing user research is unethical
  - It may lead to outcomes that harm the end-users in ways not predicted by designers: nausea in virtual reality, algorithmic bias in AI systems, and so on
  - User research can also bring economic benefits
  - Many success stories as a result of user research
- On the other hand:
  - **Incoherent systems** striving to fulfill a plethora of bewildering user requests
  - **Feature creep** due to adhering to even the weakest signal in user research
  - **Users adapt** to systems that offer value, even if such systems are not necessarily adapted well to human abilities
- The core value of user research may lie more in informing good designs rather than driving radical innovations

Interviews

Interviews

- One way to learn about users is to speak with them
  - However, just talking to people is not research
- From a research point of view, the way we talk with people in everyday encounters is fraught with issues
  - Everyday conversations are often not planned and therefore may provide a scattered view of a topic
  - Everyday conversations may not aim to understand the conversational partner's viewpoint; in fact, we often talk in a way that can bias others
  - We rarely record our conversations and it is practically impossible to later form a systematic account of what happened
- **Interviewing** is about learning about the subjective experience of users
  - It aims to learn how users view their tasks

Interview structures

- A **structured interview** has two fundamental variants
  - A *quantitative structured interview* collects statistical survey data and because of this objective the format of the interview and the sequence of the questions is predetermined
  - A *qualitative structured interview* consists of a set schedule and set sequence of questions
- An **unstructured interview** is an interview where there is no fixed schedule or sequence of questions
  - Questions may or may not be prepared in advance
- A **semi-structured interview** is on a continuum between a structured interview and an unstructured interview
  - It does not have a rigorous schedule or a fixed sequence of questions, but it is also not completely loose in its structure

Open-ended interviews

- **Open-ended interviews** are also called semi-structured interviews
- Questions asked during the interview are not fully planned in advance and, at least in part, developed and adapted depending on their answers
- The interviewer pursues unanticipated but interesting answers or adapt the questions so that they help interviewees
- Open-ended interviews try to minimize the influence of the person asking questions

Open-ended interviews: the interview

- The interview is flexible in content and structure, just like a conversation may freely develop
  - Thus, the interviewer adapts their questions based on what is being said
  - They follow up on answers and may pursue new information with additional questions
- The interview has a certain continuity
  - The conversational partners understand where the conversation is going
- The interview is about understanding what the conversational partner says
  - If you do not understand what the interviewee says, you follow up and probe with additional questions
- The interview needs the full attention of the interviewer and, ideally, of the interviewee
  - Minimize the attention given to notes and note taking, other people, and the environment
- The interview requires conversational partners to treat each other with respect and to protect opinions, if shared in confidence

Contextual inquiry

- The key idea in **contextual inquiries** is to watch users do activities that are important to them and talk to them about those activities
- Activities should be actual ongoing work or leisure, whenever that is possible, or concrete summaries thereof
- The interviewing of users should be focused on understanding the activities and the reasons why users engage in them
- This approach to interviewing emphasizes *realism*, in that it attempt to come close to users' activities and their perception thereof
  - It emphasizes concrete data about a few users over generalizability and a full understanding of activity over precise details about a single task

Principles of contextual inquiry

- **Context:** by being close to the activity and the interviewee's perception of it, we gain insights into all those aspects of context that shapes what people do
  - We prefer to be with the interviewee during the activities: watch them cook, listen in on them making a phone call, or whatever is the focus of our inquiry
- **Partnership:** there is a collaboration between the interviewer and the interviewee to understand the activity and the users' perception of it
  - The ideal partnership in contextual inquiry is described as one between a master and an apprentice
- **Interpretation:** the user and the interviewer together attempt to create meaning of the activity
  - The interviewer should be listening for "no", "but", "maybe"
  - The interviewer should also strive to confirm views and be sensitive to cues about the interviewee being hesitant about the interpretation
- **Focus:** the interviewer should go for depth

Analysis of interviews

- **Transcription:** the audio or video of the interview are typed up so that later analysis may be done with the text
- **Analysis:** the interviewer carries out rich readings of transcripts while trying also to organize and condensate the interviews
  - In particular, the focus is on the meanings that interviewees assign to their behavior and the world around them
- **Verification:** the interviewer may return to participants for clarification and to check if interpretations are correct
  - While this is not always possible, it may give valuable input
  - As such, it is a tactic to increase the validity of the findings from the interview
- **Reporting:** the outcomes of the interviewing are documented
  - This may be as a paper or it may be in the form of representations of users, such as models of work sequences, personas, or something else

The say/do problem

- The main limitation of the interview method boils down to a single question:
  - *Is it possible to obtain accurate information about users' practices by asking them?*
- The **say/do problem** refers to the discrepancy between what an interviewee says versus does
  - For example, the vast majority of people would say that they wash their hands after using a toilet
  - However, according to one study that directly observed hand washing behavior, 15% of men and 7% of women do not wash their hands after using a toilet
- Why?
  - Inability to imagine the future
  - Not all knowledge can be articulated: *tacit* knowledge
  - Social reasons, such as deliberately exaggerating or omitting information to provide a positive impression

Field Research

Field research

- **Field research** is the collection of data on users in their real contexts
- Unlike in experimental research, where researchers set up the tasks in laboratory conditions, in field research users can be observed doing things that would occur also without the researcher being present
- Field research attempts to minimize the bias of the researcher being present

Field research is uniquely positioned to understand how technology use is contingent on the following aspects:
- *Context: such as the setup of the room*
- *Social: such as relations between the workers*
- *Technical: such as digital and other artefacts*

M. Wahlström, A. Salovaara, L. Salo, and A. Oulasvirta. Resolving safety-critical incidents in a rally control center. *Human-Computer Interaction* **26**(1-2):9–37, 2011.

Observation

- **Observation** is a method of data collection where a researcher is positioned to perceive and make note of activity related to the use of interactive systems.

- The goal in collecting such notes is to account for relevant types of events, their frequencies, and patterns occurring over time

- One ideal in observation is to interfere as little as possible in what is being observed
  - The researcher should be positioned in such a way that there is little interference or bias due to the presence
  - This type of observation is sometimes called an outsider's or *etic* view

Considerations for observations

- **Site of observation:** *where* to observe users
  - *Reactivity* refers to the impact that the observer has on the observed individuals
  - Consider for example having a field researcher hired by your employer observing you, how might that affect your behavior?
- **Shadowing:** follow particular people
  - Covert observations are observations where users do not know that they are observed (for instance, using video cameras)
- **Data capture and note-taking:** records of observations for later analysis and verification
  - Field notes: recordings of remarks in the field
  - Field diaries: logs of observations
  - Structured notes: following some form of structure that allows analysis of patterns

What to focus on

- *What to focus on* is largely prescribed by the goals of the user research
- Several frameworks exist in the literature to give researchers inspiration on what to focus on
- The table shows dimensions that helps researchers focus on aspects of the field directly relevant for the research questions

Dimension	Description
Space	Physical layout and organization of the observation site
Actors	Names, roles, and other characteristics of the people at the site
Activities	The doings of the actors
Objects	The physical elements of the site
Acts	Individual things that people do and say
Events	Particular important things that happens
Time	The sequence of events and activities
Goals	The things actors are trying to accomplish
Feelings	Actors' emotions and moods

J. P. Spradley. *Participant Observation*. Waveland Press, 2016.

Principles for analyzing field notes

- **Immediate recall:** field research relies on the observer's memory
  - It is therefore critical that observations are analyzed quickly after being recorded
  - Knowing when to observe, when to take notes, and what to remember from an event, are some of the skills that one develops as a field researcher
- **Thick description:** important events should get more attention in analysis
  - A field researcher should try to recall as much as an event as soon as possible and write a rich account of an event called a *thick description*
- **Coding data:** any post hoc coding of data should strive to develop to be reliable and reproducible
  - Categorizations of observations should be based on as unambiguous definitions as possible
  - Coding definitions, with examples and counter-examples, should be written down into a coding manual
- **Validation with participants:** conclusions that are drawn based on field research are statements made about users
  - Users are therefore *stakeholders* in field research
  - For them, these statements can be wrong: irrelevant, biased, partial, or incorrect
  - Validation can seek to verify conclusions drawn from data
  - Validation can also provide some agency to users on what is being said about them

Can field research inform design?

- **Realism** is the strength of field research
  - Its results offer a level of fidelity and open-endedness that is out of reach of other approaches in user research
  - Field research conveys in detail how actions and experiences take place in context
- However:
  - Realism also makes it hard to draw implications to design: when every observation is tied to a unique circumstance, how can one draw general conclusions?
  - Field research is costly
- On the other hand:
  - Field research can identify non-obvious problems affecting computer use
  - Field research is important when changing or designing new socio-technical practices: many systems need to be domesticated and appropriated
  - Sometimes field observations are instrumental to radical new concepts in design
  - Field research has narrative power by recounting accounts of users' lived experiences
  - A deep understanding of situated use of computers is valuable on its own

Survey Research

Survey research

- **Survey research** means a researcher designs a questionnaire and distributes it to respondents who fill it in, typically without the researcher's presence
- A questionnaire consists of a series of questions presented and answered in a structured way
- Surveys are used in user research to understand users':
  - **Behaviors:** for example, based on their reports on their activities, routines, or uses of interactive systems
  - **Experiences:** such as their reports of positive and negative experiences during computer use
  - **Needs:** desires, and wants
  - **Attitudes:** preferences, and beliefs
- The key advantage of survey research is **generalizability**

Design of survey research

- **Research focus:** identifying the goals of research
  - Using surveys as a measuring tool: a well-designed questionnaires can measure behavior or attitudes precisely and at scale
  - Using surveys to collect qualitative data at scale to study people's attitudes in depth
- **Survey types:** descriptive or analytic
  - *Descriptive surveys* are known from census, election surveys, and surveys on how people spend their time: they describe and characterize attitudes or behavior
  - *Analytic surveys* provide a deeper understanding *why* a certain situation exist by comparing variables, the stories told by respondents, or responses from different groups of people
- **Sampling:** how people are approached to respond to a survey

Selecting a questionnaire

- It is best to use existing questionnaires as it is difficult to create reliable and valid questionnaires

- Research has shown that custom questionnaires have lower reliability than established questionnaires

Questionnaire	Purpose
Nasa Task Load Index (TLX)	Measure the experienced workload when using an interactive system using six items, including mental demands, physical demand, and effort [43].
Godspeed question-naire	Measures five distinct components of users' perception of social robots, including their anthropomorphy, animacy, and perceived intelligence [9].
User Engagement	O'Brien and Toms [88] presented a questionnaire that assess six factors in being engaged with interactive systems, including focused attention, felt involvement, and novelty.
Player Experience	The Player Experience inventory helps measure payer expereince as functional consequences (e.g., audiovisual control) and psychosocial consequences (e.g., mastery) [2].
Single-item post-task usability questionnaire	Sauro and Dumas [110] showed that questionnaires can be short by offering a single-item questionnaire for usability after a task: "Overal this task was", answered on a seven-item scale going from "very easy" to "very difficult".

Examples of established questionnaires

Analysis of survey data: processing answers

- Answers need to be checked, cleaned, and prepared before further analysis
- Cleaning implies removing those answers that are invalid, for example because of failed attention check, answering the same to all questions, or copy-pasting irrelevant data
- Participants who are inconsistent with their answers may also be removed
- When some answers are removed, analysts face a decision
  - Should they remove a participant entirely: *list-wise deletion*?
  - Or should they just the problematic answers: *pair-wise deletion*?
  - If a large proportion of the data needs to be removed, the questionnaire is probably poorly designed

Analysis of survey data: reliability

- The **reliability** of questionnaires is particularly relevant for scales that are made up of multiple items
- For such scales, we would like the answers to vary in the same way
  - For example, if a user answers low in response to an item on "is the software useful", they should also answer low in response to an item on "does the software help you do things that are important to you"
- A way to measure reliability is Cronbach's alpha:

$$\alpha = \left(\frac{k}{k-1}\right)\left(1 - \frac{\sum_{i=1}^{k} \sigma_{y_i}^2}{\sigma_x^2}\right)$$

  - where k is the number of items, $\sigma_{y_i}^2$ is the variance for item i, and σ_x^2 is the variance of the total scores
- Cronbach's alpha quantifies the internal consistency of a test between zero (no reliability) and one (maximum reliability)
- A high value of Cronbach's alpha is expected for reliable scales: the cutoff is typically 0.7
- Note that reliability is only relevant for questions that purport to measure the same thing

Example: how do people use Facebook?

- The study focused on three research questions:
  1. How has the respondents' communication with people on Facebook changed over time?
  2. How has the respondents' perception of the audience on Facebook changed over time?
  3. How has the respondents' attitudes towards Facebook changed over time?

- Over the years the site has become increasingly part of users' daily life, as suggested by answers to the first two questions

- This is perceived by the respondents as useful, question six, although the site also appears to increasingly cause problems for respondents

Year of survey		2006		2007		2008	
	F	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Facebook is part of my everyday activity	36.12	3.12	1.26	3.75^1	1.11	3.85^2	1.12
Facebook has become part of my daily routine	35.82	2.96	1.32	3.70^1	1.16	3.66^2	1.19
I am proud to tell people I am on Facebook	2.90	3.24	0.89	3.40^1	0.87	3.34	0.85
Facebook is just a fad	12.15	3.14	1.03	2.96	1.09	$2.75^{1,2}$	1.00
I would be sorry if Facebook shut down	5.21	3.45	1.14	3.69^1	1.19	3.72^2	1.34
I use Facebook to get useful information	78.51	2.55	1.10	3.39^1	1.02	3.54^2	1.00
I use Facebook to find out about things going on at MSU	56.59	2.59	1.08	3.34^1	1.18	3.51^2	1.10
My Facebook use has caused me problems	22.51	1.67	0.89	2.14^1	1.10	2.20^2	1.12
I spend time on Facebook when I should be doing other things	9.44	3.16	1.15	3.52^1	1.23	3.54^2	1.18

C. Lampe, N. B. Ellison, and C. Steinfield. Changes in use and perception of Facebook. In Proceedings of the Conference on Computer Supported Cooperative Work, page 721–730, 2008.

Unobtrusive Research
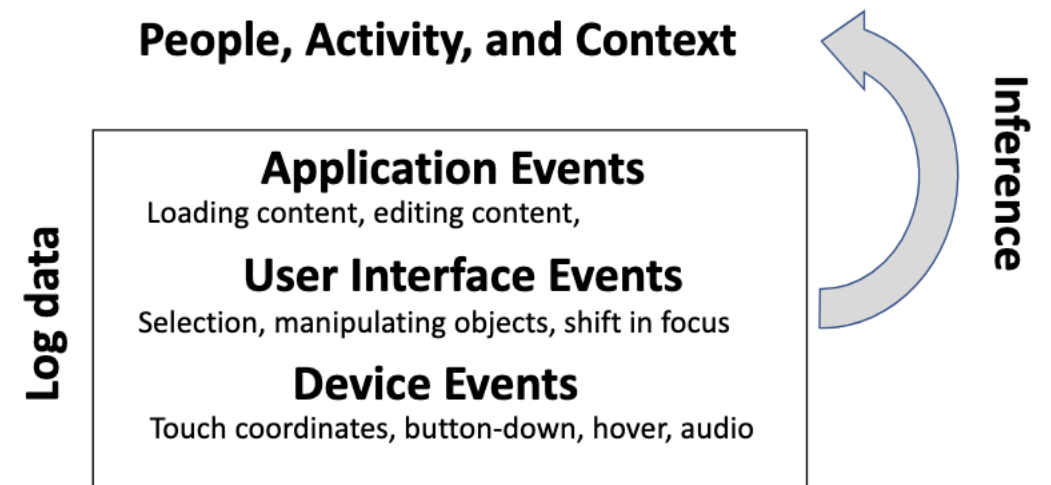
Unobtrusive research

- User research tends to affect or change activities users are engage with
  - *Reactivity*—or the impact of research on what is being studied—may fundamentally change what is discovered and therefore potentially undermining the validity of the research
- **Unobtrusive research** is a form of non-interventional user research
- Unobtrusive research uses traces of users' behavior or archival records to make inferences about users and their activities
- Examples:
  - Analyzing application logs of activities in a system, such as what users click on a web site (click data)
  - Examining records of posts and comments written in a social media application to, for example, analyze the norms in such posts
  - Using publicly available YouTube videos showing incidents, or near-by-incidents, involving self-driving cars to analyze how drivers interpret the intentions of other drivers and the car

Four sources of nonreactive data

- **Traces** are either obtained by logfile analysis, for instance from web logs, or from instrumenting people, things or places

- **Direct traces** are recordings that are caused by users' actions
  - For example, mouse movements and clicks can be logged by an operating system and stored to a file

- **Indirect traces** are caused only indirectly by users via some intermediary mechanism
  - There is no need to elicit user needs about routes in a park through interviews if a path has been trodden that reveals how users want to cross

- **Archive data** may be of many kinds, including social media content
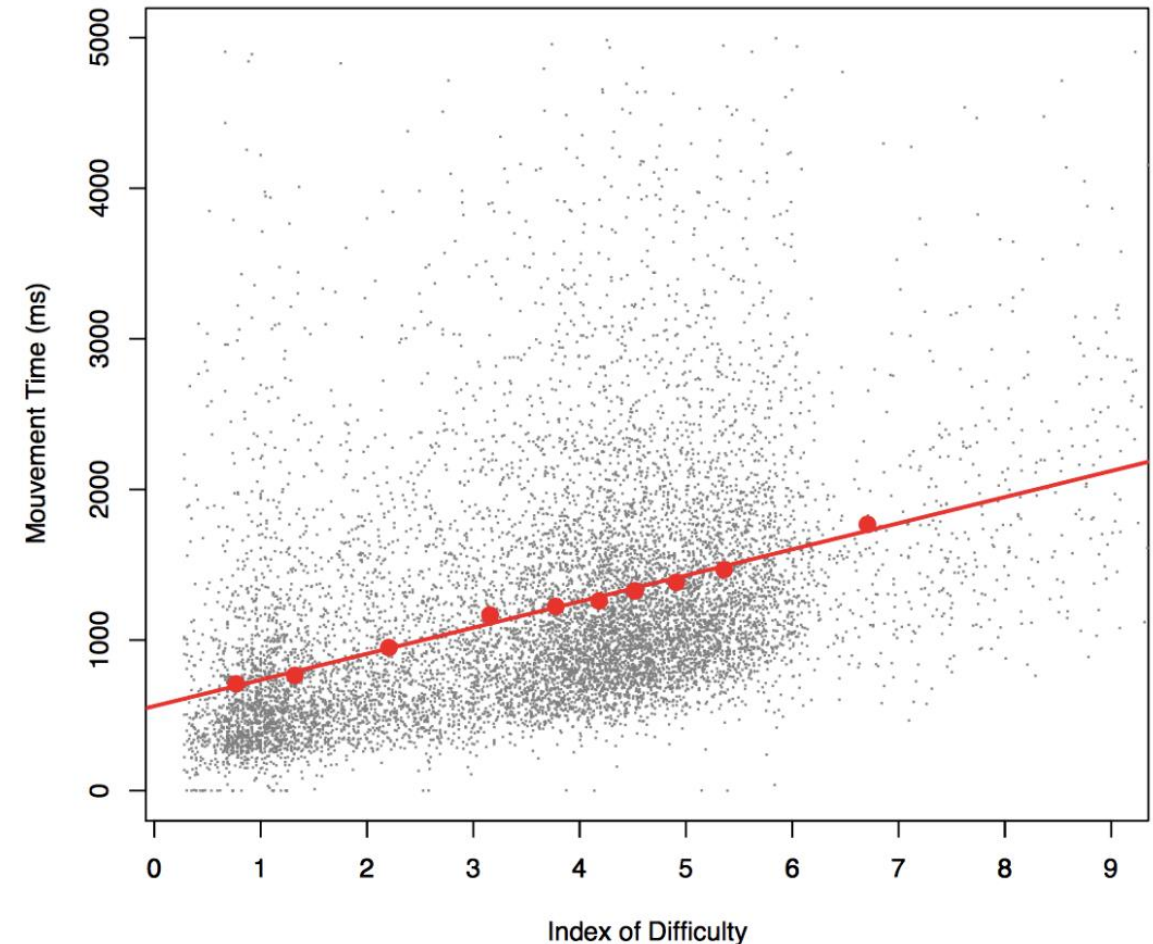
Log files

- **Device events** are low-level events triggered as soon as the input device senses them
- **User interface events** are about objects and actions in the user interface
- **Application events** which are related to the functions available in the interactive system
- Log data needs to be cleaned and transformed into a format that can be processed
  - Such data wrangling is complicated and the topic of much work
  - Among the topics are dealing with missing data, obviously wrong data, and noisy data, and so on

People, Activity, and Context

Inference

Log data

Application Events
Loading content, editing content,

User Interface Events
Selection, manipulating objects, shift in focus

Device Events
Touch coordinates, button-down, hover, audio

Example: log study of real-world pointing

- How well does Fitts' law apply to real-world pointing movements with a mouse?

- Researchers logged the movement kinematics of 24 users in 36 computer configurations over several months

- The researchers needed to decide what constitutes the beginning and what is the ending of a pointing movement
  - Analyzing their data, they learned that real-world pointing trajectories contain numerous pauses, or time segments where velocity drops to zero
  - Based on a closer inspection, they decided that pauses that are longer than 300 ms are stops
  - Any pause that occurs after a stop and before a click would be ignored
  - This way they divided the data into 2 million pointing movements

O. Chapuis, R. Blanch, and M. Beaudouin-Lafon. Fitts' Law in the Wild: A Field Study of Aimed Movements. Technical report, Dec. 2007. URL https://hal.archives-ouvertes.fr/hal-00612026. LRI Technical Repport Number 1480, Univ. Paris-Sud, 11 pages.

Instrumenting people, things, and places

- We can turn people, things, or places into measuring instruments by **instrumenting** them

- **People.** On-person measurements can be done, such as everyday emotion sensing by embedding skin galvanisation sensors to a driving wheel

- **Things.** Instrumentation has a long history in mobile computing, where sensors in mobile phones – such as accelerometers, gyroscopes, and geopositioning – have been used to understand, for example, whether people are walking or standing still throughout the day

- **Places.** Studies on ubiquitous computing have instrumented everyday environments using everything from pressure sensors to video cameras and microphones
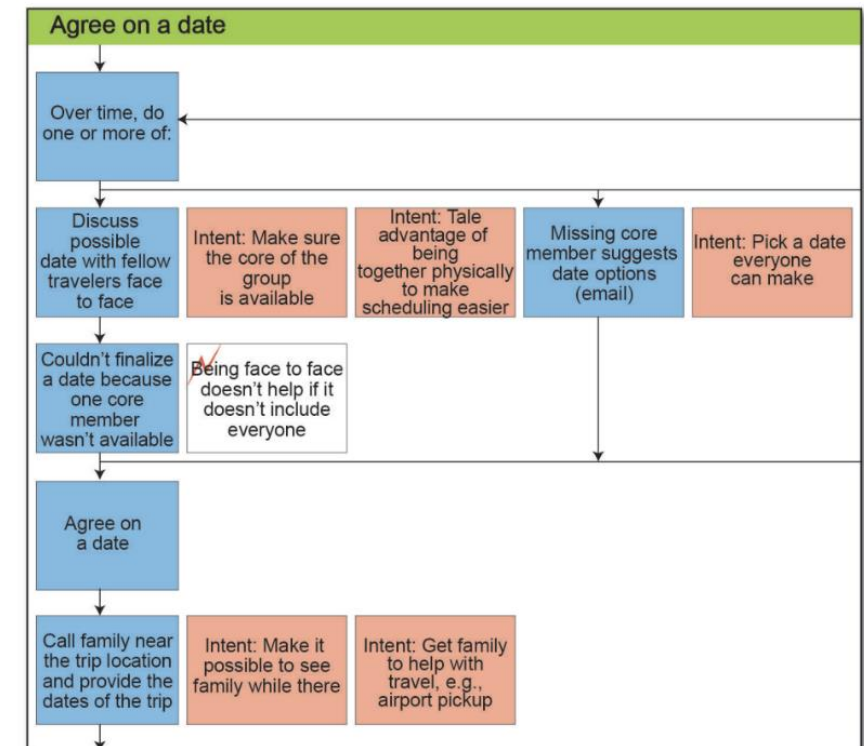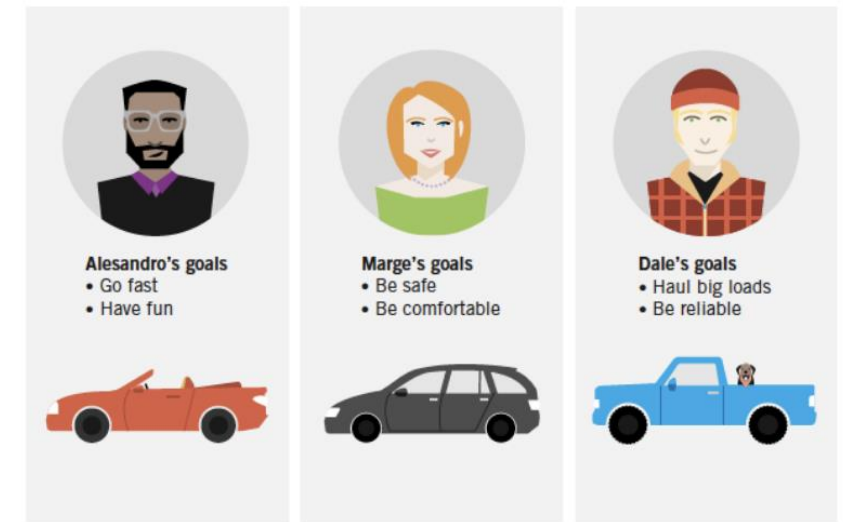
Archival data

- **Archival data** is found in archives, be they online, in public repositories, or in individual's records
- Archival data may be analyzed to teach us about users, their activities, their context, and the use of existing interactive systems
- Examples of archival data include online reviews, bug reports, and user-generated content
- Archival data is frequently analyzed using **content analysis**
  - Content analysis is a technique that helps making a subjective interpretation of the data using a systematic processes of coding, aggregating, and describing archival data
  - Content analysis results in a classification of content, descriptions of types of content, and frequencies of content
  - For instance, a content analysis of complaints to a call center about an interactive system may attempt to describe the main types of written complaints and their causes
  - It may also enter into a deeper analysis of the dynamics of the conversations, breakdowns in talk, and expressions of frustration

Representations of User Research

Representations of user research

- User research aims to *inform* design decisions
- Its aim is to gather knowledge about the prospective users of a system, their activities, the contexts in which they work, and existing technologies they use
- We now consider how we represent research data using diagrams, models, and text
- How we represent user research matters, just as how we represent a logical puzzle or lay out a math problem impacts how easy it is to solve

A. Cooper, R. Reimann, D. Cronin, and C. Noessel. About Face: The Essentials of Interaction Design. John Wiley & Sons, 2014.
K. Holtzblatt and H. Beyer. Contextual design. Morgan Kaufmann, 2nd edition, 2017.

Representations of people: personas

- A **persona** is the description of an idealized, non-existing, person that represents a group or type of users
- The idea is to construct archetypes of users in the form of fictional but representative individuals with specific characteristics
- Personas are based on user research—thus, they are more a synthesis or aggregate than fiction

"Camilla and Jesper live on the outskirts of Copenhagen. They are 35 and 39 respectively, and they have enough on their plate with children and careers. They have lived together for the past five years. Two years ago, they had their son Storm. Jesper has two children from his previous marriage, Christian and Caroline, 11 and 8 years old. The children live with Jesper and Camilla every second week. Camilla and Jesper prefer to use self-service solutions, and they are curious about what information the public sector stores on them, and how it is stored."

L. Nielsen. *Personas-user focused design*, volume 1373. Springer, 2013.

Advantages and drawbacks of personas

- Advantages
  - Creating specific individuals: a degree of inflexibility can keep design in check as it ensures that when we take design decisions, we do not distort user data to the benefit of the design
  - Personas help avoid self-centeredness
  - Personas prioritize data: personas require selecting which user segments are most important in design
  - Personas synthesize data: raw data is often too complex to deal with in design
  - Personas can drive empathy: it is easier to relate to another person's viewpoint than to quantitative summaries
- Drawbacks
  - Personas are often haphazardly created, dismissing issues on how to cluster users, and how to select persons to represent whole groups
  - Thus, personas can be almost anything and the connection to original data can be broken
  - Personas can be perceived by design teams as not believable, 'designed by committee', or lacking links to original data
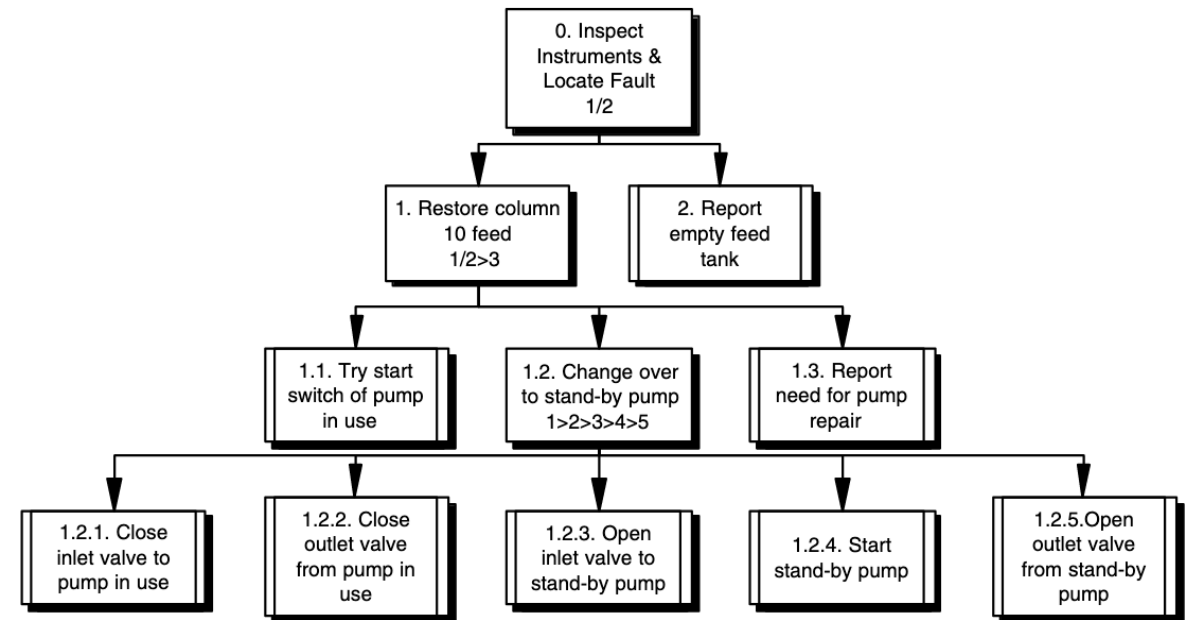
Representations of activities

- **Scenarios:** narrative accounts of an activity or task
  - Scenarios use storytelling to communicate relationships between users and events
  - A well-written narrative helps us imagine the experience of a person from their perspective
- **Customer journeys:** accounts of events where a user encounters a service or product
  - A map is presented in the form of a journey, or a path that goes via *touchpoints*: events through which customers interact with a service
  - Customer journey mapping cover events that precede actual use, for example advertisements, creation of accounts, onboarding, and so on
  - Touchpoints are depicted from the perspective of evolving relationship between a customer and a business, where a might-be-customer transforms into a loyal customer via touchpoints

Task analysis

- **Task analysis** is a method for decomposing tasks and presenting them as hierarchically organized sequences of subtasks
- Task analysis is a *functional* description of behavior
- It begins by outlining goals before considering actions by which the task is accomplished
- The output of task analysis is a **task model**
- A *sequential task model* describes a task as consisting of a linear progression of subtasks, such as:
    1. Enter login name
    2. Enter password
    3. Click 'Login'
- Steps can be expanded into subgoals, resulting in a higher-fidelity model

Hierarchical task analysis

- **Hierarchical Task Analysis** (HTA) is an established task analysis method that assumes two kinds of relationships between subtasks:
    1. Order: Task A precedes Task B
    2. Part-whole relationship: Task B is a subtask of task A
- Every subtask requires operations for completion
- Tasks are recursively split into subtasks
- A task, or sub-task, consist of a well-defined beginning state, goal state, and operations that transform the beginning state to the goal state
- Operations can be conditional

J. Annett. Hierarchical task analysis. Handbook of *Cognitive Task Design*, 2:17–35, 2003.
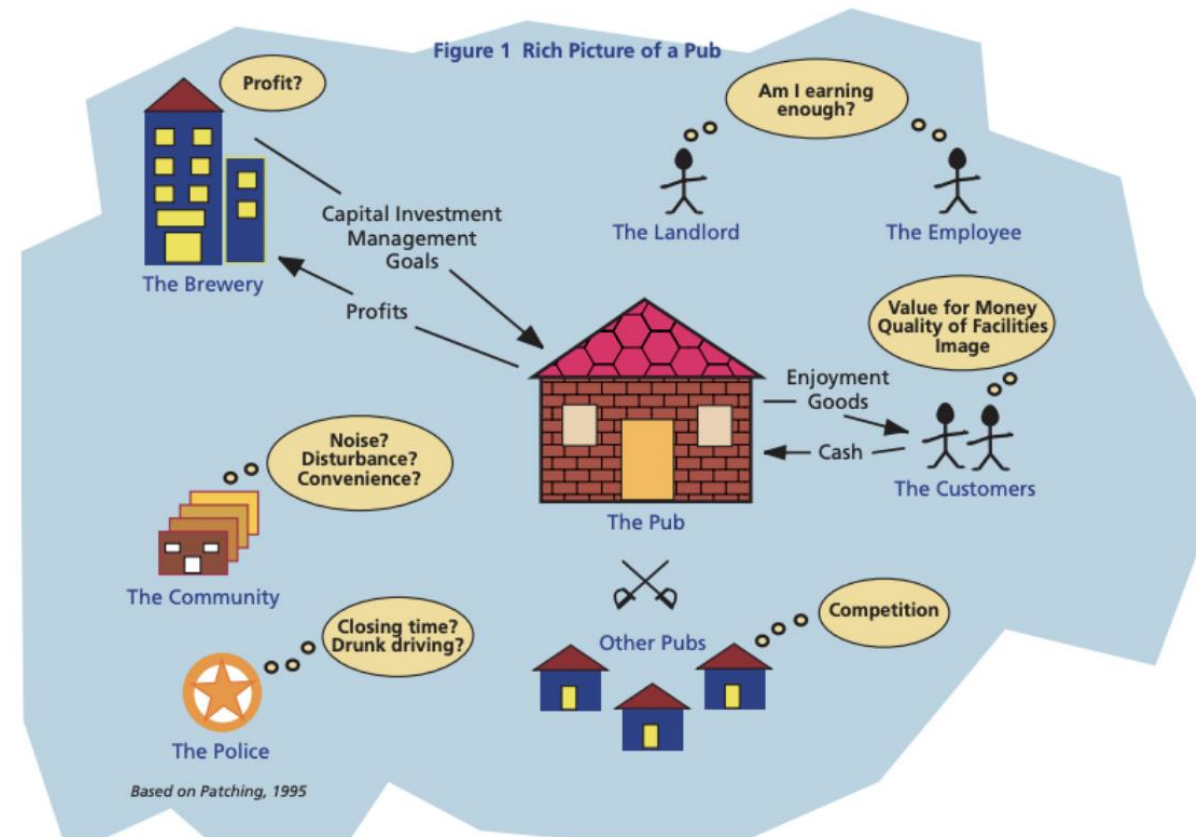
Representations of context

- An **actor** is here anything – human or non-human, digital or physical – that participates in some active sense in an activity
- **Context models** describe flows, sequences, artefacts, as well as cultural and physical circumstances related to those actors
  - **Flow model:** an enumeration of the main actors in context and their relationships to the use (graphs with actors as nodes and actions as directional arrows)
  - **Sequence model:** an ordered list of actions needed to carry out to complete a task
  - **Artefact model:** a description of interactions among artefacts in a workflow
  - **Cultural model:** an expression of different beliefs, values, and practices that the involved actors may have (typically Venn diagrams where each circle is a 'culture')
  - **Physical model:** a rendition of the physical space and the actors' movement in the space

Rich picture

- A **rich picture** is a way of representing the insights from user research in a diagram
  - It focuses on the relations among people and technologies, as well as the richness of the current use situation
- An effective rich picture shows some of the structure of the situation, some of the key processes, and some of the concerns of the stakeholders
- A rich picture can use the words and phrases of actors, but can otherwise use any means of communication
  - There is no set syntax or set of notations
- A rich picture is about capturing some of the complexity of the situation
  - It is not about a system or a solution to a problem

A rich picture about a pub

A. Monk and S. Howard. Methods & tools: the rich picture: a tool for reasoning about work context. *Interactions* **5**(2):21–30, 1998.

Requirements

- User requirements are used in software engineering to specify user's expectations on what the software is able to do
- User requirements are *user-centered*
- User requirements should be verifiable and traceable
- A *use case* is a technique for eliciting and specifying requirements
- A use case enumerates actions that a user must take to achieve a goal
- At a minimum, a use case should state the initial state or preconditions for the case to occur, the user's goal, the flow of events, and post-conditions, and anything that must be done after achieving the goal
- A *user story* is an informally expressed use case: narrative-like descriptions of system use written from the perspective of an end user

What representations can and cannot do

- User research is disappointingly often carried out without a critical view on validity
  - A representation of user data is essentially a proposition, a claim about users
- **Verifiability** refers to how well the claim can be cross-checked with observations that are independent of the original dataset
  - For example, in task analysis, it is generally recommended to have task analysis diagrams checked by those stakeholders whose work it describe
- **Traceability** refers to the documentation of the reasonings that led from original data to the final claim
- Does all user research aim at empirically valid statements about users?
  - In design research, some researchers hold that whatever inspires or informs design can be useful
  - Taken to extreme, exaggerations and embellishments are fine a long as the data is somehow inspirational
- Two stances thus complement each other
  - The **instrumentalist** view: if user research is useful for design, it is sufficient
  - The **realist** view: user research must be validated

Summary

- **You are not the user:** empirical research is required to obtain knowledge on the practices and experiences of other people
- User research uses empirical methods to understand users, their activities, the contexts in which they act, and the interactive systems they presently use, if any
- The goal of user research is to produce actionable knowledge about users; insights that may subsequently help design an interactive system or make a decision about its use
- All methods for user research are limited, for instance, with respect to their realism, generalizability, and precision
- The key qualities of research methods concern validity, reliability, transparency, and ethics

- Open access (PDF at link)
- Further reading:
  - Part III: User Research
  - Chapters 10–15