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# IPM 10/11 – T1.7

## User-Centered Evaluation

Licenciatura em Ciência de Computadores

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**Acknowledgements:** Most of this course is based on the excellent course offered by Prof. Kellogg Booth at the British Columbia University, Vancouver, Canada. Please acknowledge the original source when reusing these slides for academic purposes.

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# Summary

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- Methods for studying users
- Participatory design
- Ethnography
- Contextual design

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# Evaluation in HCI

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- **When to & why** involve users in design process
- **Anytime/anywhere methods:**
  - Observation
  - Interviews
  - Questionnaires
  - Participatory design
- **Specifically pre-design methods**
  - Ethnography
  - Contextual inquiry

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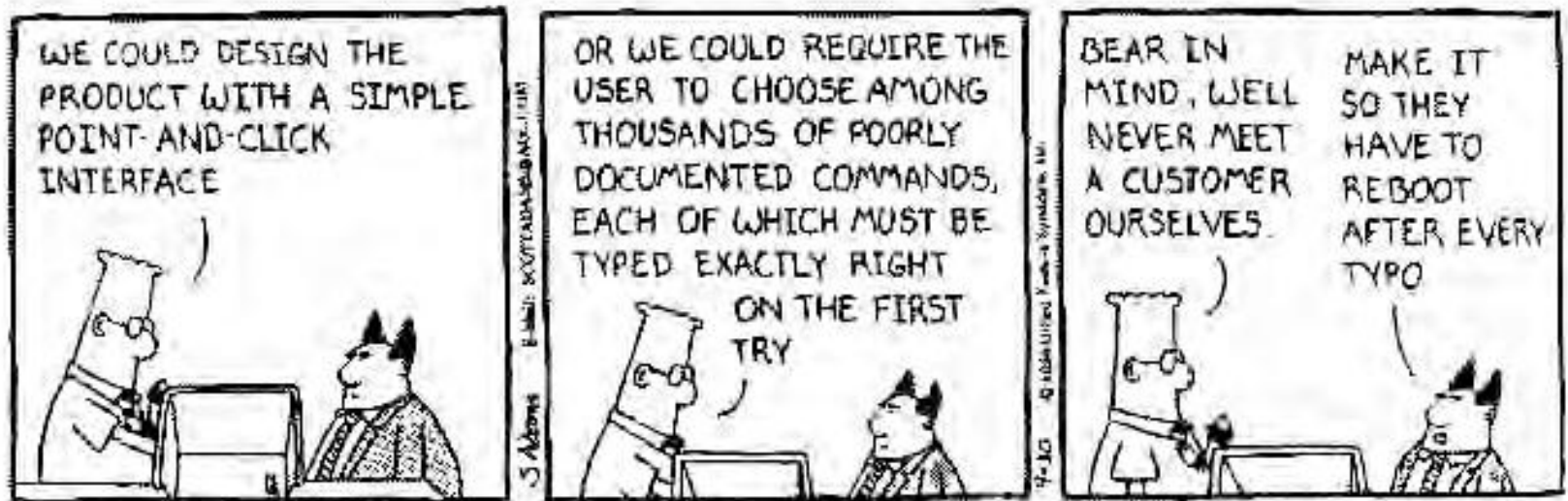
# Recall:

## **System centered design**

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- What can be built easily on this platform?
- What can I create with the available tools?
- What do I as a designer find interesting to work on?

# System centered design



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# Instead → Evaluation

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## Key things

- Evaluation should occur **throughout** the design process
- There are many different evaluation methods
  - Most can be used at **any time during process**
- Evaluation is often equated with **usability testing** at the end of the design process
  - But, that is only **one** use / type of evaluation!
- **Evaluation is good – but it has costs**

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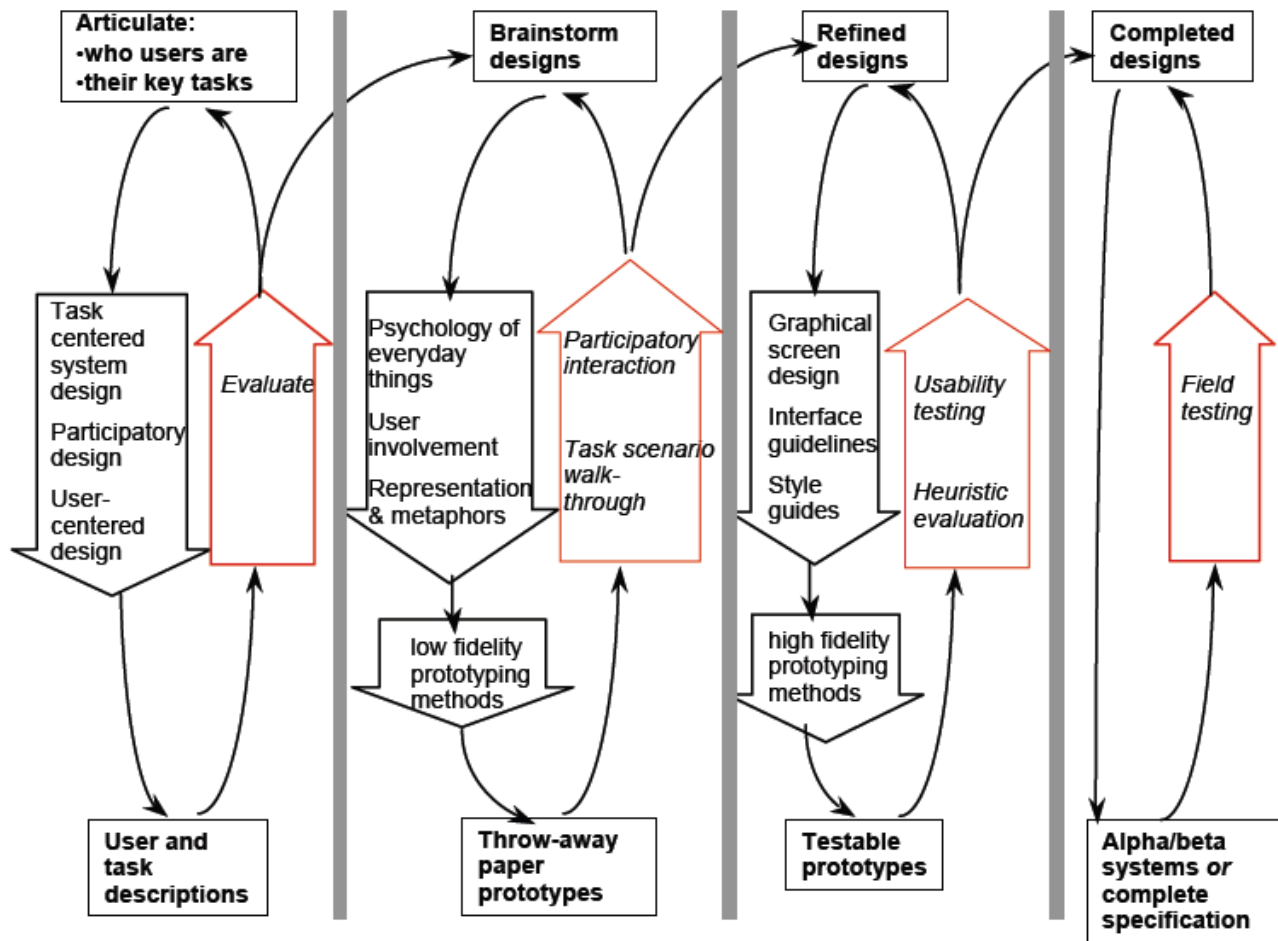
# Why study users *before* you design?

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- Because you need to know things like:
  - **How users do it now**
    - Fix what's broken, keep what's good
  - **Current problems**
    - Inefficiencies, frustrations, confusions, lack of *critical* functionality
  - **Current dependencies:**
    - What parts of the current system are valid, and need to be retained?
  - If you have an **approach** for a new design, is it generally likely to solve existing problems?

To answer this, you must understand *existing problems*.

# Evaluation in the HCI design process





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# Evaluation at various stages

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- **Pre-design – needs assessment**
  - Viability proof ...for investment in new expensive system  
*is there a real need, and what should the approach be?*
- **Initial design stages – user input**
  - Develop and evaluate initial design ideas with the user
- **Iterating throughout design – user feedback**
  - Does system behavior match the user's task requirements?
  - Are there specific problems with the design?
  - Verify that interface meets expected performance criteria  
*ease of learning, usability, user's attitude, performance criteria:*  
"A first-time user will take 1-3 minutes to learn how to withdraw \$50 from the automatic teller"
- **Post-design - acceptance testing**
  - After all that, does user *use it?*

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# Empirical methods of directly studying users: **what are they?**

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- **Sample surveys / questionnaires / interviews**
  - Ask people to report on themselves
- **Field studies / observation methods**
  - Observe normal use (before or after design)
- **Interpretive methods (usually pre-design)**
  - Understand larger context
  - Case studies, ethnography, action research, etc.
- **Experiments and quasi-experiments**
  - Observe/measure under controlled conditions
- **Analysis, modeling, and theory**

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# What can you expect to learn?

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- **Qualitative:**
  - **Users tell you** of problems & situations of which they are aware
  - **You observe** situations that users may not be fully aware of, due to their immersion
- **Quantitative:**
  - Measure **task performance** with existing tools / methods: speed, errors, dead-ends, learning curves for novice users, ...
  - **Numerical data** from questionnaires:  
# of computers owned, # of email messages received per day, ...

*For both, what you get is influenced by **how** you ask the question!*

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# Characteristics of methods

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- **Properties**
  - Disruptive to nondisruptive
  - Formal to informal
  - Abstract to concrete
- **Criteria**
  - Generalizability
  - Precision / detail
  - Realism
- **multiple methods often required**  
“triangulation”

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# Disruptive methods (?)

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## Also called “intrusive”

(What does this mean?)

- Participant observation
- Interviews
- Questionnaires (beliefs/attitudes)
- Diaries (times and events)
- Observation
- “think aloud” protocols
- Audio/video recording
- Physiological traces
- Head-mounted eye-tracking
- ...

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# Non-disruptive methods (?)

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- Gaze or eye movement traces (non-head-mounted)
- System logs (including Web logs)
- (Hidden) observation
- (Hidden) audio/video recording
- Archives

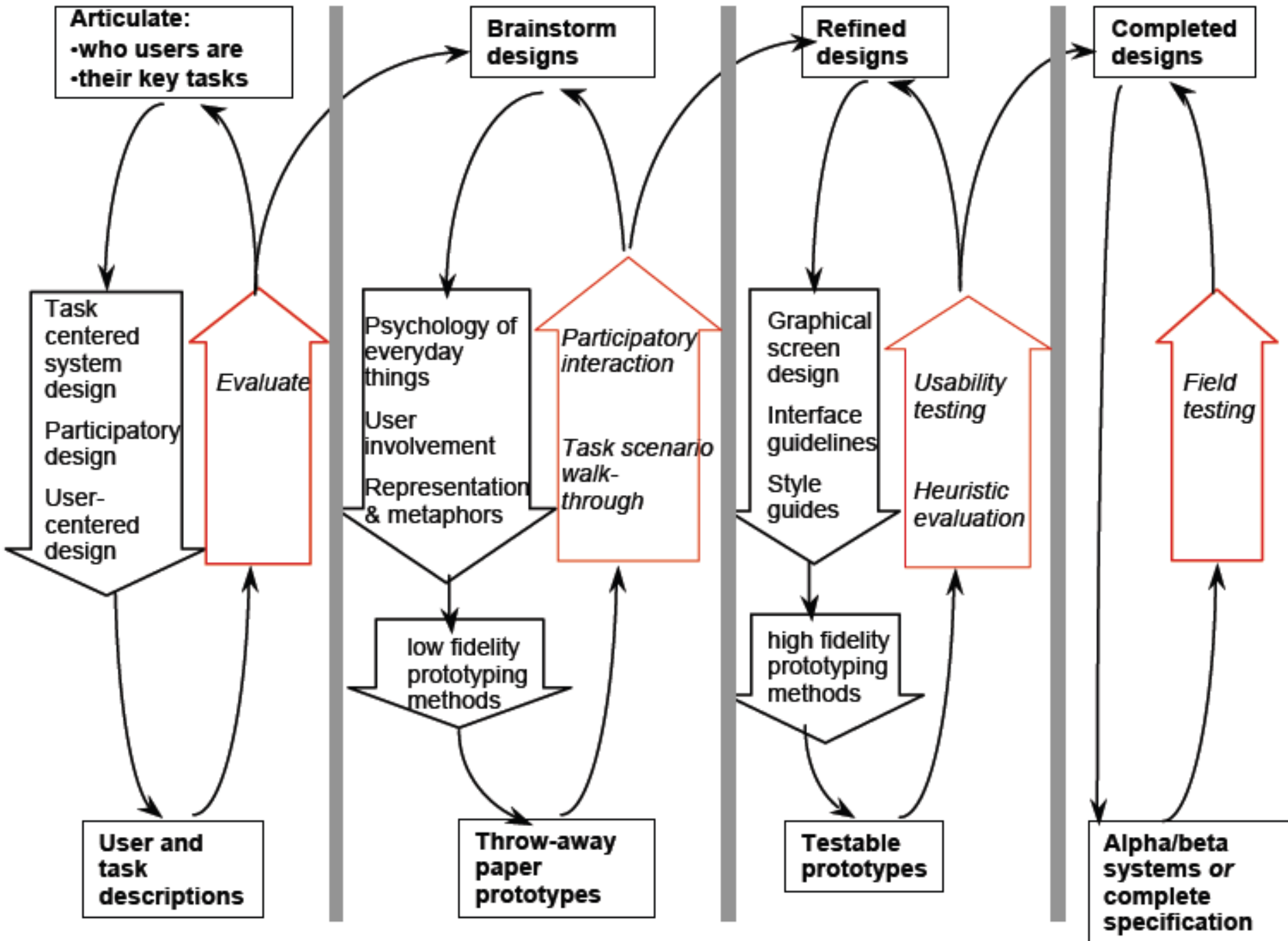
note: 'nondisruptive'  $\neq$  privacy-respecting!

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# Specific kinds of user study: When to use them?

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- Participatory design
- Interviews
- Ethnography
- Observation methods
- Questionnaires & surveys
- ‘Discount’ (expert evaluator) methods
- Contextual inquiry





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# How do you choose a method(s)?

## Depends on goals, questions, & constraints

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- **Your need for control over:**
  - **Experiment design** (internal validity - will variation in results be attributable to the experimental manipulations?)
  - **Realism** (ecological validity - will results apply in real world?)
  - **Generalizability** (external validity - will results apply to other situations?)
- **Natural vs. artificial setting**
- **Objective vs. interpretive approaches**
- **General principles vs. understanding a specific event**
- **Time, cost, expertise, or resources available**
- **Stage of development when evaluation is performed**

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# Challenges to involving users

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- **Expensive and time consuming**
  - Many software projects have very short lead times
  - Users have other things they need to be doing
- **Can disrupt the design process**
  - Users who are part of a design team may ask for changes that are hard, or at an inopportune time
  - Users aren't always able to articulate what they want

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# Participatory design: “extreme” user-centering!

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- Users become 1st class members in the design process
  - Active collaborators vs passive participants (e.g., interviewees)
- Users considered are subject matter experts
- Iterative process: all design stages subject to revision

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# Participatory design

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- **Problem: when user has a limited role in the design,**
  - Designer's intuitions can be wrong
  - Interviews and other techniques not sufficiently precise
  - Designer cannot get to know the user sufficiently well to answer all issues that come up during the design
- **Solution**
  - Designers obtain access to pool of representative users
  - END users, not their managers or union reps!

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# Participatory design

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- **Up side**
  - Users are excellent at reacting to suggested system designs
    - Designs must be concrete and visible
  - Users bring in important “folk” knowledge of work context
    - Knowledge may be otherwise inaccessible to design team
  - Greater buy-in for the system often results
- **Down side**
  - Hard to get a pool of articulate end users
    - Expensive, reluctant ...
  - Users are not expert designers
    - Don’t expect them to come up with design ideas from scratch
  - The user does not always know what they really want
  - Conservative bias to perpetuate current practices
    - Don’t expect them to fully exploit the potential of new technologies

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# Exclusively pre-design methods

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- **Ethnography:**
  - Study users “in the wild”
  - (usually) don’t have a specific product / idea in mind

*[example: baby boomers, soccer moms]*
- **Contextual inquiry:**
  - Targeted observation of a specific work context
- **Both: how do you make sense of the data?**

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# Ethnography

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- Origin: anthropology
  - Basic idea: studying people “in the wild”
  - Research ethnographers attempt to  
Understand a workplace through *immersion, extended contact, and analysis*
  - Most useful very early in development  
build an understanding of existing (work) practices thorough enough to illuminate the possibilities for and implications of introducing technology
  - Ethnographic studies might provide warnings and Opportunities
    - Detailed descriptions of work practices that change may disrupt
    - Broken practices where change could help
- Valuable where complex practices, relationships, social factors exist.

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# Ethnography

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- **Up side**
  - Comprehensive understanding of current (work) practices
  - Greater ability to predict the impact of a new or re-designed technology
  - Possibly greater buy-in for the system
- **Down side**
  - Principal cost is time, both the ethnographer's and the users'
  - Could perpetuate negative aspects of current practices
  - Can produce vast (unmanageable) amount of data
  - Output is description of practices, rather than specific designs
    - Ethnographers are not trained as designers;  
Taught to “interfere” as little as possible with the community



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# Contextual design

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- Structured method for gathering and representing information from fieldwork (such as ethnography)
  - ... to bring it into the design process
- Some call it an *ethnographic-based approach*
- Stages relating to *understanding user's work*:
  - **1. contextual inquiry**
  - **2. work modeling**
  - **3. work consolidation**

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# Contextual design

## 1. Contextual inquiry

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- Between observation and interview
- *gist*: intensely interview people while they work
- **Principles:**
  - a) Carry out in work context:**
    - The best way to understand work practice is to **talk to people in their actual work environment.**
    - People speak about their work in **abstractions** –  
Often presenting an idealized model. Being there lets you tie to reality.
    - Differentiate between **summary info and ongoing experience**  
Most people do not conceptualize their work, they just do it!
    - **Access ongoing experience:**  
Being present in the work context leads to more information

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# Contextual inquiry principles, cont.

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## b) Partnership:

- Users are the experts – they are the ones doing the work!
- Share control during the inquiry –  
Users have the information we want to know
- Creating shared meaning –  
To prevent self-listening, share design ideas *as they occur*
- Reflection and engagement –  
**Engagement** occurs through active listening;  
**Reflection** occurs when we stop to integrate new information into our evolving understanding

## c) Focus:

- Don't try to understand the full organizational culture
- Maintain focus - complete inquiry in reasonable time

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# Conducting a contextual interview

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1. Identify users
2. Arrange visit (typically one day)
3. Select initial users (consider roles you want to cover)
4. Use multiple interviewers if possible  
(to cover as many users as possible, and/or to bring different perspective)
5. Set the focus before the interview (revisit this at time of analysis)
6. Structure the interview:
  - *Introduction*: establishing a relationship
  - *Ongoing work inquiry*: users works, interviewer observes and occasionally asks questions
  - *Wrap up*: summarize what was learned, ask if possible to call with further questions, invite user to forward further comments

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# Analyzing contextual inquiry information

**Goal:** Create many independent observations

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1. Transcribe the interview
2. Fix the focus of **analysis**
3. Record understandings: coded transcripts or post-It notes
  - Description of users' work
  - Flow or structure of the work
  - Description of problems in their work
  - Description of problems with the computer tools
  - Design ideas that emerge from understanding of their work
  - Questions for subsequent interviews

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# Contextual design

## 2. Work modeling

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- **Encapsulate** and **document** understanding from study
- Several different aspects of work can be modeled
- Some or all might be relevant:
  - **Work flow**: diagram of players, responsibilities, and the path that individual tasks take among them
  - **Sequence**: like a paper prototype / task model:  
Have to understand the goals clearly or result will be pointless
  - **Artifacts**: objects. *examples?*
  - **Culture**: reflects the organization's attitudes, practices, taboos, unwritten laws
  - **Physical / space**: local and remote layout; physical workflow

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# Contextual design

## 3. Work consolidation

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### *Abstracting insights*

- One tool: the affinity diagram
- Can use to “consolidate” specific insights from
  - Any one of the work models
  - All of them together
  - Or on data collected in other ways. for example:
    - Brainstorming about design problems
      - > **Categories of problems**
    - Brainstorming about design ideas
      - > **Categories of ideas**
    - Comments from users
      - > **Categories of desirable / successful features**

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# How do you make an affinity diagram?

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1. Team writes down all data & insights on post-it notes;  
Be sure you can link the post-it back to its source!
2. Stick one post-it on the wall  
A whiteboard or big sheet of butcher paper is best
3. Arrange the other post-its around it, **grouping by affinity** to each other.  
**Iteration** will be required.
4. Look at each group and see what it has in common;  
**Name and describe** each group.
5. **“snapshot” the result for documentation**
  - Digital photo -> Your design website or notebook
  - Transfer post-its onto paper, 1 sheet / group  
-> Scan -> Website



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# Evaluation in HCI design: summary

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- Evaluation should occur **throughout** the design process
- Lots of methods which have different strengths/weaknesses
  - > Use as appropriate
- Participatory design is: ?
- Ethnography and contextual inquiry / work Modeling are two mechanisms for gaining a **generalized understanding** of user's current situation

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# Resources

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1. Kellogg S. Booth, Introduction to HCI Methods, University of British Columbia, Canada  
<http://www.ugrad.cs.ubc.ca/~cs344/current-term/>