

# Evaluating Mobile User Interfaces

# Evaluation Methods

## I) Expert Evaluation

- Cognitive Walkthrough
- Heuristic Evaluation

## II) User Evaluation in the Lab

- Think Aloud Study
- Performance Evaluation

## III) User Evaluation in the Field

- Diary Study
- Experience Sampling Method (ESM)
- Logging Study

### CRUX OF THE TOPIC

Once you've started building your mobile interface, there are many ways to test it for usability

- Expert evaluation methods should be used early and often to find basic problems
- User evaluations can be conducted in the lab, and are useful for identifying domain-specific problems
- Once you have a deployable application, field evaluations can help you understand how your application is used in context

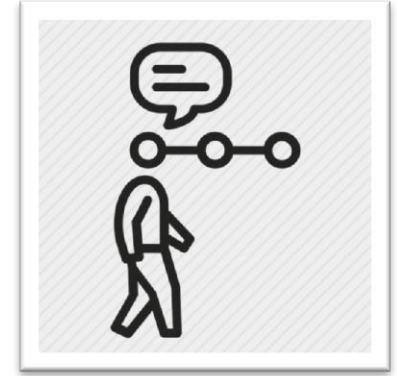
## I) Expert Evaluation

**Web link for detailed study:**

<http://hcibib.org/tcuid/chap-4.html>

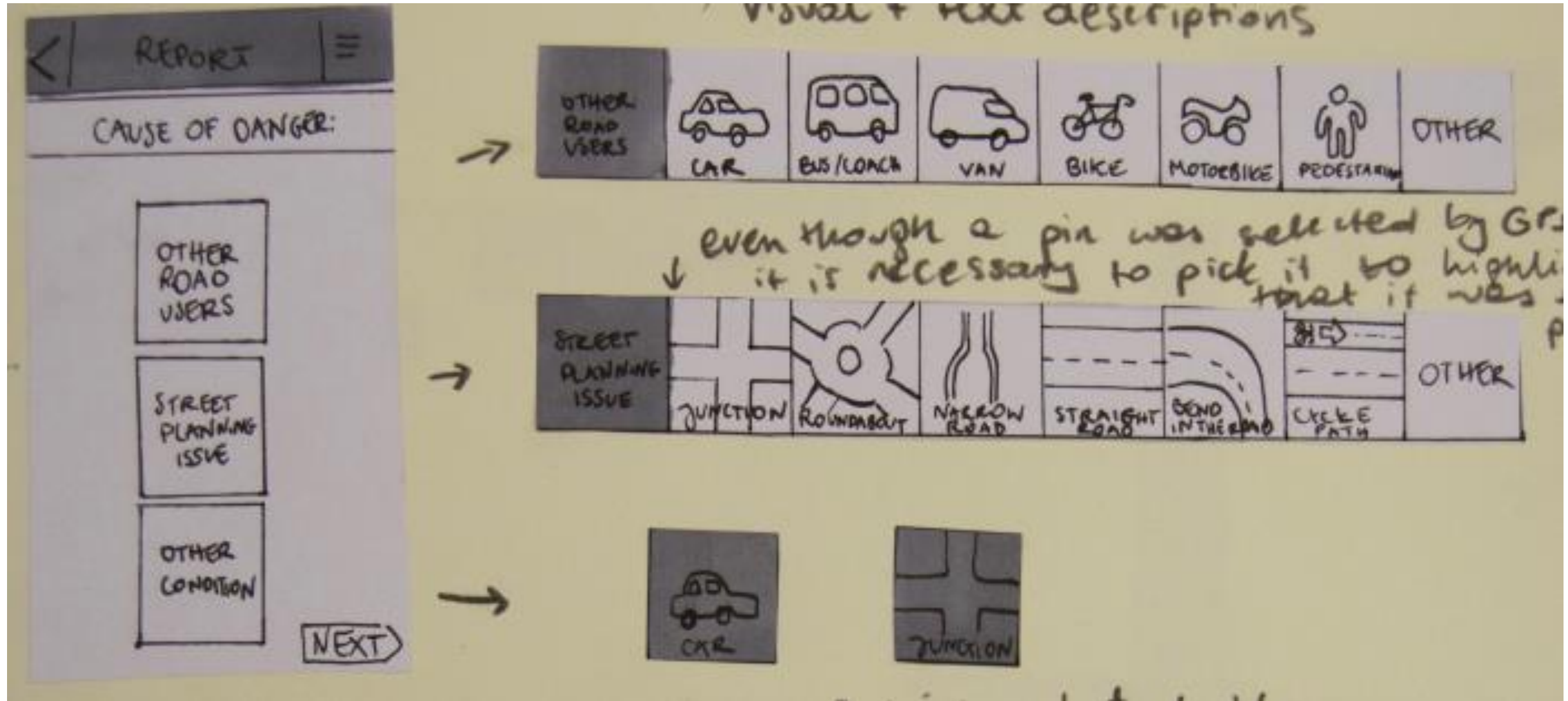
## I) EXPERT EVALUATION METHODS

### a) COGNITIVE WALKTHROUGH METHOD

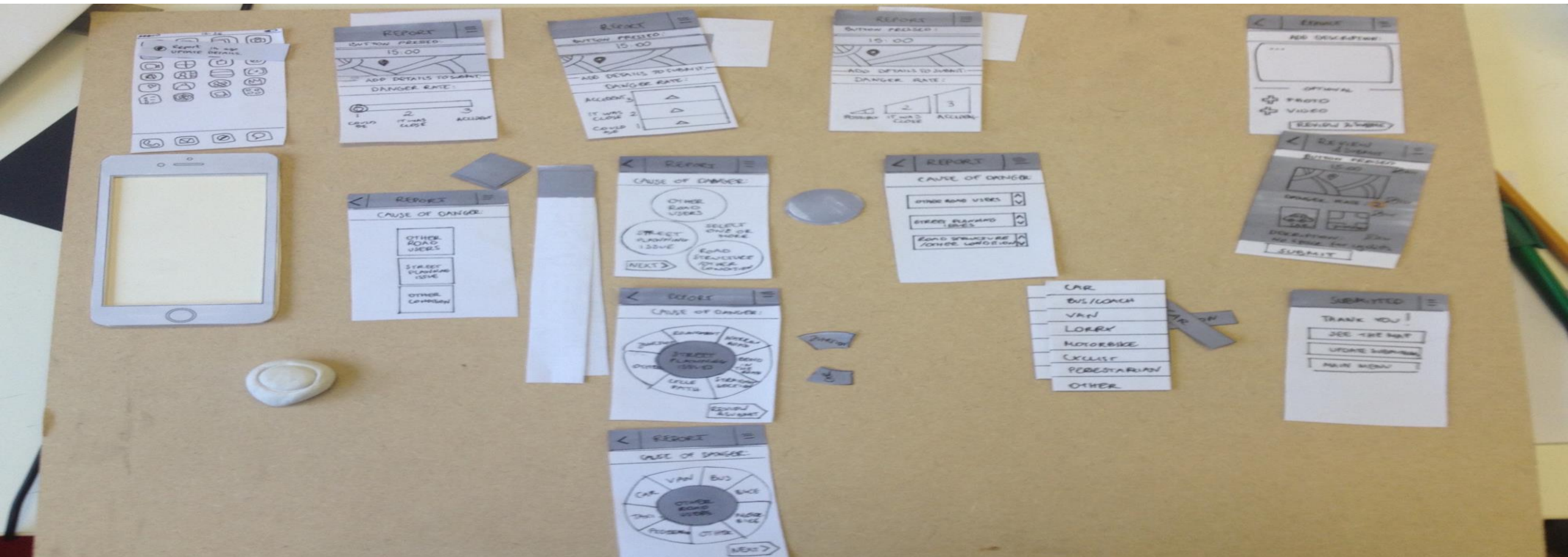


- ✓ The cognitive walkthrough is a **task-specific usability inspection or evaluation method** in which:
  - ... one or more evaluators **work through a series of tasks**
  - ... and **ask a set of questions** from the perspective of the user
  - ... users typically prefer to learn a system by using it to accomplish tasks and not just by studying a user- manual.
- ✓ It is used **to identify usability issues** in interactive systems...
  - ... focusing on how easy it is for new users to accomplish tasks with the system
- ✓ The designers of an interface walk through the interface step-by-step in the context of core tasks an end-user will need to accomplish.
- ✓ It is a formalized technique for **imagining user's thoughts and actions** when user will finally use the user interface.
- ✓ The focus of the cognitive walkthrough is on understanding the system's *learnability* for new or infrequent users.

## Example:



### Example (contd...): Alternate ways to design a User Interface



### Advantages of Cognitive Walkthrough Method :

- This method generate results quickly with low cost.
- Has the ability to apply the method early in the design phases before coding even begins.

### Disadvantages of Cognitive Walkthrough Method :

- Walkthroughs are difficult to do when tasks are not well defined
- The walkthrough does not test real users on the system.

## b) **HEURISTIC EVALUATION METHOD** (also known as **expert review**, **usability audit**, **usability inspection**)

- ❑ Heuristics, also called **guidelines**, are general principles or rules of thumb that can guide design decisions.

- ❑ Developed by **Jacob Nielsen**



Jacob Nielsen

- ❑ Can be performed on Working User Interfaces.

- ❑ **Small set (ie 3 to 5) evaluators or experts examine the User Interface.**

- ✓ Evaluators check compliance with usability heuristics /guidelines
- ✓ Different evaluators will find different problems
- ✓ Evaluators only communicate with each other after evaluation so as to aggregate the findings

### **NOTE**

Heuristic evaluation is **never a substitute for user testing**, since it does not provide any insights on how actual users use the system, it is hard even for experts to predict it.





# **Nielsen and Molich used their own experience to identify NINE GENERAL HEURISTICS as listed below :**

(These 9 Heuristics are implicit or explicit in almost all the lists of guidelines that have been suggested for User Interfaces)



1	<b>Simple and Natural dialog</b>	<b>Simple</b> means no irrelevant or rarely used information. <b>Natural</b> means an order that matches the task.
2	<b>Speak the user's language</b>	Use words and concepts from the user's world. Don't use system-specific engineering terms.
3	<b>Minimize user memory load</b>	Don't make the user remember things from one action to the next. Leave information on the screen until it's not needed.
4	<b>Be consistent</b>	Users should be able to learn an action sequence in one part of the system and apply it again to get similar results in other places.
5	<b>Provide feedback</b>	Let users know what effect their actions have on the system.
6	<b>Provide clearly marked EXITS</b>	If users get into part of the system that doesn't interest them, they should always be able to get out quickly-+.
7	<b>Provide shortcuts</b>	Shortcuts can help experienced users avoid lengthy dialogs and informational messages that they don't need.
8	<b>Good error messages</b>	Good error messages let the user know what the problem is and how to correct it.
9	<b>Prevent errors</b>	Whenever you write an error message you should also ask, can this error be avoided?



**EXAMPLE:** HEURISTIC EVALUATION – Checklist prepared by Xerox Corporation

Usability Techniques

Heuristic Evaluation - A System Checklist

By Denise Pierotti, Xerox Corporation

**Heuristic Evaluation - A System Checklist**

**1. Visibility of System Status**

The system should always keep user informed about what is going on, through appropriate feedback within reasonable time.

#	Review Checklist	Yes No N/A	Comments
1.1	Does every display begin with a title or header that describes screen contents?	<input type="radio"/> <input type="radio"/> <input type="radio"/>	
1.2	Is there a consistent icon design scheme and stylistic treatment across the system?	<input type="radio"/> <input type="radio"/> <input type="radio"/>	
1.3	Is a single, selected icon clearly visible when surrounded by unselected icons?	<input type="radio"/> <input type="radio"/> <input type="radio"/>	
1.4	Do menu instructions, prompts, and error messages appear in the same place(s) on each menu?	<input type="radio"/> <input type="radio"/> <input type="radio"/>	

More Examples

Can't copy info from one window to another

- Violates "Minimize the users' memory load"
- Fix: allow copying

Typography uses mix of upper/lower case formats and fonts

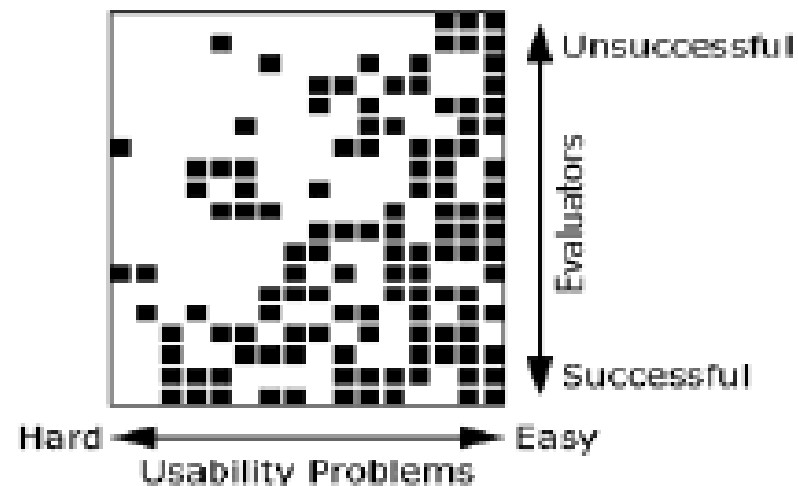
- Violates "Consistency and standards"
- Slows users down
- Fix: pick a single format for entire interface

Benefits of Heuristic Evaluation:

- They provide quick feedback to designers, relatively easy to do compared to other methods;
- Cheaper than many other methods, such as user testing.
- Could be carried out before user testing
- Reviews are also excellent in competitive benchmarking, since they allow comparing the usability of your product to your competitor's product.

## Why Multiple Evaluators?

- Every evaluator doesn't find every problem
- Good evaluators find both easy & hard ones



## Expert vs. User Evaluation

Expert evaluation is much faster

- 1-2 hours each evaluator vs. days-weeks

Doesn't require interpreting user's actions

User testing is far more accurate (by def.)

- Takes into account actual users and tasks
- HE may miss problems & find "false positives"

Good to alternate between expert & user-based testing

- Find different problems
- Don't waste participants

## II) User Evaluation in the Lab

### Lab Testing

- Bring real people into the lab
- Participants perform tasks with user interface
- Often pre- and post-questionnaires to elicit extra feedback



# Two Kinds of Lab Studies

## a) “Think Aloud” Study

- Focus is on qualitative data
- Find confusing and difficult elements of UI
- Typically used early in the design process

## b) Performance Study

- Focus is on quantitative data
- Measure completion time, errors
- Typically used later in the design process
- Requires a point of comparison (earlier or competitor’s designs)

### “Think Aloud” Study

Key: Ask users to say everything they are thinking aloud

- Remind them when they forget

As with any other user study, be careful not to introduce bias

- Let users work through any confusion, don’t help them
- Avoid laughing, making facial expressions, etc.

## Benefits

### Note: Can Run Study At Any Time

Don't need a complete implementation  
(or any implementation at all!)



# The Problem with Lab Studies

Lab studies cannot perfectly simulate the real world

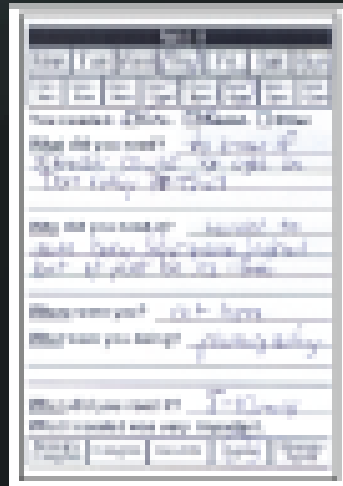
Inherently artificial

- Artificial setting
- Artificial motivation
- (in the case of mobile) Artificial events
- Etc.

### III) User Evaluation in the Field



# Three Field Study Methods



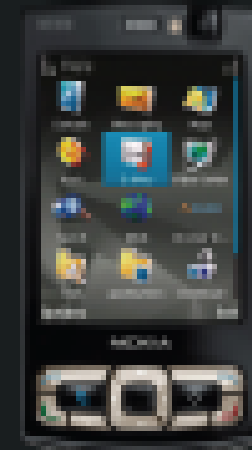
A handwritten diary page with multiple sections for notes and observations. The text is written in cursive and includes various entries, some of which are underlined or highlighted. The page is divided into several horizontal sections by lines.

(a)  
Diary Study



A screenshot of a mobile application interface for the Experience Sampling Method (ESM). The interface is titled "ETP" and asks the user "What are you doing? (Check all that apply)". Below the question, there is a list of activities with checkboxes: "working" (checked), "eating", "exercising", "meeting demands", "drinking alcohol", and "other". A "Done" button is at the bottom.

(b)  
Experience Sampling  
Method (ESM)



(c) Logging Study

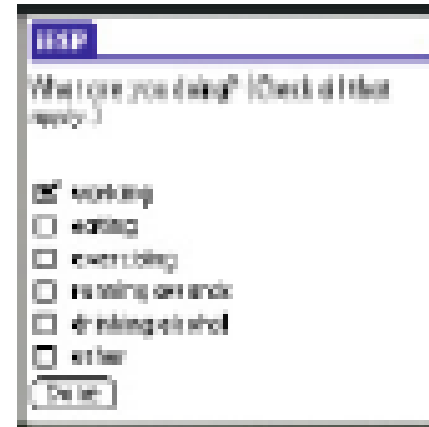
## a) Diary Study

- Capture activities from users' real mobile environments
- Users jot down responses to questions given before hand in a journal
- Relies on self-reporting, so may miss some data points



## b) Experience Sampling Method (ESM)

- Developed in the mid 70's by Csikszentmihalyi, Larson, and Prescott
- Useful for studying mobile users because it gathers data in their environment
- Beep users several times a day to answer questions
  - At random
  - After a relevant event



The image shows a screenshot of a mobile application interface for the Experience Sampling Method (ESM). At the top, there is a purple header with the text "ESM". Below the header, the question "What are you doing? (Check all that apply)" is displayed. A list of activities follows, each with a checkbox: "working" (checked), "eating", "exercising", "reading or writing", "drinking alcohol", and "other". At the bottom of the list is a "Delete" button.

## c) Logging Study

- Install program on users' devices to capture data
- Infer user activity or intent from log data
- Capture data that may be missed through self-reporting methods
- Obviously, many privacy concerns!

