

# SOME DATA COLLECTION TECHNIQUES

## Critical Incident Identification

- During an evaluation session, you cannot always see the interaction design flaws directly. What we can observe directly or indirectly are the effects of those design flaws on the users. We refer to such effects on the users during interaction as critical incidents.
- A critical incident is an event observed within task performance that is a significant indicator of some factor defining the objective of the study.
- Critical incidents are indicators of “something notable” about usability or the user experience.
- The best kind of critical incident data are detailed, observed during usage, and associated closely with specific task performance.
- Critical incidents are observed directly by the facilitator or other observers and are sometimes expressed by the user participant.

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## Critical Incident Identification

Critical incident data about a UX problem should contain as much detail as possible, including contextual information, such as:

- the user's general activity or task
- the specific user intention and action that led immediately to the critical incident
- expectations of the user about what the system was supposed to do when the critical incident occurred
- what happened instead
- as much as possible about the mental and emotional state of the user
- indication of whether the user could recover from the critical incident and, if so, a description of how the user did so
- additional comments or suggested solutions to the problem

# **SOME DATA COLLECTION TECHNIQUES**

## **Critical Incident Identification**

### **Timing of critical incident data capture: The evaluator's awareness zone**

If you capture them as they happen, we call it concurrent data capture. If you capture data immediately after the task, we call it contemporaneous data capture. If you try to capture data after the task is well over, through someone trying to remember the details in an interview or survey after the session, this is retrospective data capture and many of the once-fresh details can be lost.

It is not as easy, however, as just capturing critical incident data immediately upon its occurrence. A critical incident is often not immediately recognized for what it is. The evaluator's recognition of a critical incident will necessarily occur sometime after it begins to occur. And following the point of initial awareness, after confirming that it is a critical incident, the evaluator requires some time and thought in a kind of "awareness zone" to develop an understanding of the problem, possibly through discussion with the participant.

# SOME DATA COLLECTION TECHNIQUES

## The Think-Aloud Technique

Also called “think-aloud protocol” or “verbal protocol,” the think-aloud technique is a qualitative data collection technique in which user participants, as the name implies, express verbally their thoughts about their interaction experience, including their motives, rationale, and perceptions of UX problems. By this method, participants let us in on their thinking, giving us access to a precious understanding of their perspective of the task and the interaction design, their expectations, strategies, biases, likes, and dislikes.

The bulk of real UX problem data is hidden from observation, in the mind of the participant. What is really causing a hesitation and why does this participant perceive it as a problem or barrier? To get the best qualitative data, you have to tap into this hidden data, buried in the participant’s mind, which is the goal of the think-aloud technique.

# **SOME DATA COLLECTION TECHNIQUES**

## **The Think-Aloud Technique**

### **What kind of participant works best?**

The usual participant for think-aloud techniques is someone who matches the work role and user class definitions associated with the tasks you will use to drive the evaluation. This kind of participant will not be trained as a UX practitioner, but that usually will not deter them from offering opinions and theories about UX problems and causes in your design, which is what you want.

That it is your job to accept their comments as inputs to your process and it is still up to you to filter and interpret all think- aloud data in the context of your design.

### **Is thinking aloud natural for participants?**

# **SOME DATA COLLECTION TECHNIQUES**

## **Questionnaires**

A questionnaire is the primary instrument for collecting subjective data from participants in all types of evaluations. It can be used to supplement objective (directly observable) data from lab-based or other data collection methods or as an evaluation method on its own. A questionnaire can contain probing questions about the total user experience. Although post-session questionnaires have been used primarily to assess user satisfaction, they can also contain effective questions oriented specifically toward evaluating broader emotional impact and usefulness of the design.

# SOME DATA COLLECTION TECHNIQUES

## Questionnaires

### The Questionnaire for User Interface Satisfaction (QUIS)

#### User Evaluation of Interactive Computer Systems

For each question, please circle the number that most appropriately reflects your impressions about this topic with respect to using this computer system or product.

1. Terminology relates to task domain	[distantly]	0 1 2 3 4 5 6 7 8 9 10	[closely]	NA
2. Instructions describing tasks	[confusing]	0 1 2 3 4 5 6 7 8 9 10	[clear]	NA
3. Instructions are consistent	[never]	0 1 2 3 4 5 6 7 8 9 10	[always]	NA
4. Operations relate to tasks	[distantly]	0 1 2 3 4 5 6 7 8 9 10	[closely]	NA
5. Informative feedback	[never]	0 1 2 3 4 5 6 7 8 9 10	[always]	NA
6. Display layouts simplify tasks	[never]	0 1 2 3 4 5 6 7 8 9 10	[always]	NA
7. Sequence of displays	[confusing]	0 1 2 3 4 5 6 7 8 9 10	[clear]	NA
8. Error messages are helpful	[never]	0 1 2 3 4 5 6 7 8 9 10	[always]	NA
9. Error correction	[confusing]	0 1 2 3 4 5 6 7 8 9 10	[clear]	NA
10. Learning the operation	[difficult]	0 1 2 3 4 5 6 7 8 9 10	[easy]	NA
11. Human memory limitations	[overwhelmed]	0 1 2 3 4 5 6 7 8 9 10	[are respected]	NA
12. Exploration of features	[discouraged]	0 1 2 3 4 5 6 7 8 9 10	[encouraged]	NA
13. Overall reactions	[terrible]	0 1 2 3 4 5 6 7 8 9 10	[wonderful]	NA
	[frustrating]	0 1 2 3 4 5 6 7 8 9 10	[satisfying]	NA
	[uninteresting]	0 1 2 3 4 5 6 7 8 9 10	[interesting]	NA
	[dull]	0 1 2 3 4 5 6 7 8 9 10	[stimulating]	NA
	[difficult]	0 1 2 3 4 5 6 7 8 9 10	[easy]	NA

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## Questionnaires

### The System Usability Scale (SUS)

The questions are presented as simple declarative statements, each with a five- point Likert scale anchored with “strongly disagree” and “strongly agree” and with values of 1 through 5. These 10 statements are (used with permission):

I think that I would like to use this system frequently

I found the system unnecessarily complex

I thought the system was easy to use

I think that I would need the support of a technical person to be able to use this system

I found the various functions in this system were well integrated

I thought there was too much inconsistency in this system

I would imagine that most people would learn to use this system very quickly

I found the system very cumbersome to use

I felt very confident using the system

I needed to learn a lot of things before I could get going with this system



# SOME DATA COLLECTION TECHNIQUES

## Questionnaires

### The Usefulness, Satisfaction, and Ease of Use (USE)

Usefulness	<ul style="list-style-type: none"><li>It helps me be more effective.</li><li>It helps me be more productive.</li><li>It is useful.</li><li>It gives me more control over the activities in my life.</li><li>It makes the things I want to accomplish easier to get done.</li><li>It saves me time when I use it.</li><li>It meets my needs.</li><li>It does everything I would expect it to do.</li></ul>	Satisfaction	<ul style="list-style-type: none"><li>I quickly became skillful with it.</li><li>I am satisfied with it.</li><li>I would recommend it to a friend.</li><li>It is fun to use.</li><li>It works the way I want it to work.</li><li>It is wonderful.</li><li>I feel I need to have it.</li><li>It is pleasant to use.</li></ul>
Ease of use	<ul style="list-style-type: none"><li>It is easy to use.</li><li>It is simple to use.</li><li>It is user-friendly.</li><li>It requires the fewest steps possible to accomplish what I want to do with it.</li><li>It is flexible.</li><li>Using it is effortless.</li><li>I can use it without written instructions.</li><li>I do not notice any inconsistencies as I use it.</li><li>Both occasional and regular users would like it.</li><li>I can recover from mistakes quickly and easily.</li><li>I can use it successfully every time.</li></ul>		
Ease of learning	<ul style="list-style-type: none"><li>I learned to use it quickly.</li><li>I easily remember how to use it.</li><li>It is easy to learn to use it.</li><li>I quickly became skillful with it.</li></ul>		

# Rapid Evaluation Methods

Here are some of the general characteristics of rapid evaluation methods:

- Rapid evaluation techniques are aimed almost exclusively at finding qualitative data—finding UX problems that are cost-effective to fix.
- Seldom, if ever, is attention given to quantitative measurements.
- There is a heavy dependency on practical techniques, such as the “think-aloud” technique.
- Everything is less formal, with less protocol and fewer rules.
- There is much more variability in the process, with almost every evaluation “session” being different, tailored to the prevailing conditions.
- This freedom to adapt to conditions creates more room for spontaneous ingenuity, something experienced practitioners do best.

## DESIGN WALKTHROUGHS AND REVIEWS

The goal of a design walkthrough is to explore a design on behalf of users to simulate the user's view of moving through the design, but to see it with an expert's eye. The team is trying to anticipate problems that users might have if they were the ones using the design.

What materials do you need upfront? You should prepare for a design walkthrough by gathering at least these items:

- Design representation(s), including storyboards, screen sketches, illustrated scenarios (scenario text interspersed with storyboard frames and/or screen sketches), paper prototypes, and/or higher fidelity prototypes
- Descriptions of relevant users, work roles, and user classes
- Usage or design scenarios to drive the walkthrough

# UX INSPECTION

When we use the term “UX inspection,” we are aware that you cannot inspect UX but must inspect a design for user experience issues.

A UX inspection is an “analytical” evaluation method in that it involves evaluating by looking at and trying out the design yourself as a UX expert instead of having participants exercise it while you observe. Here we generalize the original concept of usability inspection to include inspection of both usability characteristics and emotional impact factors and we call it UX inspection.

Because the process depends on the evaluator’s judgment, it requires an expert, a UX practitioner or consultant, which is why this kind of evaluation method is also sometimes called “expert evaluation” or “expert inspection.”

# UX INSPECTION

## Inspection Is a Valuable Tool in the UX Toolbox

- Where they are applied in early stages and early design iterations.
- Where you should save the more expensive and more powerful tools, such as lab-based testing, for later to dig out the more subtle and difficult problems.
- Where you have not yet done any other kind of evaluation.
- Where you cannot afford or cannot do lab-based testing for some reason but still want to do some evaluation.

## How Many Inspectors Are Needed?

In UX inspection, to improve effectiveness you can add more inspectors. But does it help? Yes, for inspections, a team approach is beneficial, maybe even necessary, because low individual detection rates preclude finding enough problems by one person. The number depends on conditions and a great deal on the system you are inspecting.

# UX INSPECTION

## **What Kind of Inspectors Are Needed?**

Sometimes it is best to get a fresh view by using an expert evaluator who is not on the project team. If those UX experts also have knowledge in the subject-matter domain of the interface being evaluated, all the better. Those people are called dual experts and can evaluate through both a design guidelines perspective and a work activity, workflow, and task perspective.

# HEURISTIC EVALUATION, A UX INSPECTION METHOD

The heuristic evaluation (HE) method has the advantages of being inexpensive, intuitive, and easy to motivate practitioners to do, and it is effective for use early in the UX process. Therefore, it is no surprise that of all the inspection methods, the HE method is the best known and the most popular. Another important point about the heuristics is that they teach the designers about criteria to keep in mind while doing their own designs so they will not violate these guidelines.

# How-to-Do-It: Heuristic Evaluation

## Heuristics

### **Visibility of System Status**

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

### **Match Between System and The Real World**

The system should speak the users' language, with words, phrases, and concepts familiar to the user rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

### **User Control and Freedom**

Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

### **Consistency and Standards**

Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

*Continued*



# How-to-Do-It: Heuristic Evaluation

## Heuristics

### Error Prevention

Even better than good error messages is a careful design that prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

### Recognition Rather Than Recall

Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

### Flexibility and Efficiency of Use

Accelerators—unseen by the novice user—may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

### Aesthetic and Minimalist Design

Dialogues should not contain information that is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

### Help Users Recognize, Diagnose, and Recover from Errors

Error messages should be expressed in plain language (no codes), indicate the problem precisely, and suggest a solution constructively.

### Help and Documentation

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

# The procedure

These inspection sessions can take from a couple of hours for small systems to several days for larger systems. Here is how to do it:

- The project team or manager selects a set of evaluators, typically three to five.
- The team selects a small, tractable set, about 10, of “heuristics,” generalized and simplified design guidelines in the form of inspection questions, for example, “Does the interaction design use the natural language that is familiar to the target user?” The set of heuristics given in the previous section are a good start.

Each inspector individually browses through each part of the interaction design, asking the heuristic questions about that part:

- assesses the compliance of each part of the design
- notes places where a heuristic is violated as candidate usability problems
- notes places where heuristics are supported (things done well)
- identifies the context of each instance noted previously, usually by capturing an
- image of the screen or part of the screen where the problem or good design feature occurs

# The procedure

All the inspectors get together and, as a team, they:

- merge their problem lists
- select the most important ones to fix
- brainstorm suggested solutions
- decide on recommendations for the designers based on the most frequently visited screens, screens with the most usability problems, guidelines violated most often, and resources available to make changes
- issue a group report

A heuristic evaluation report should:

- start with an overview of the system being evaluated
- give an overview explanation of inspection process
- list the inspection questions based on heuristics used
- report on potential usability problems revealed by the inspection, either:
  - by heuristic—for each heuristic, give examples of design violations and of ways the design supports the heuristic
  - by part of the design—for each part, give specific examples of heuristics violated and/ or supported
- include as many illustrative screen images or other visual examples as possible.

# QUASI-EMPIRICAL UX EVALUATION

## Introduction

- Quasi-empirical UX evaluation methods are empirical because they involve taking some kind of data using volunteer participants.
- Most empirical methods are characterized by formal protocols and procedures. Thus, the qualifier “quasi.” Most empirical methods have at least some focus on quantitative data; quasi-empirical approaches have none.
- Quasi-empirical testing can occur almost anywhere, including UX lab space, a conference room, an office, a cafeteria, or in the field. Quasi-empirical methods are defined by the freedom given to the practitioner to innovate, to make it up as they go. Quasi-empirical evaluation sessions mean being flexible about goals and approaches.

Unlike other empirical methods, there are no formal predefined “benchmark tasks,” but a session can be task driven.

Quasi-empirical sessions can also be driven by exploration of features, screens, widgets, or whatever suits

# How-to-Do-It:

## Prepare

- Begin by ensuring that you have a set of representative, frequently used, and mission-critical tasks for your participants to explore.
- Assign your UX evaluation team roles effectively, including evaluator, facilitator, and data collectors.
- Preparation includes selection and recruiting of participants, preparation of materials such as the informed consent form, and establishment of protocols and procedures for the sessions.

# Conduct session and collect data

As you, the facilitator, sit with each participant:

- Cultivate a partnership; you get the best results from working closely in collaboration.
- Make extensive use of the think-aloud data collection technique. Encourage the participant by prompting occasionally: “Remember to tell us what you are thinking as you go.”
- Make sure that the participant understands the role as that of helping you evaluate the UX
- Although recording audio or video is sometimes helpful in rigorous evaluation methods, to retain a rapidness in this method, it is best not to record audio or video; just take notes. Keep it simple and lightweight.
- Encourage the participant to explore the system for a few minutes and get familiarized with it. This type of free-play is important because it is representative of what happens when users first interact with a system (except in cases where walk up and use is an issue).
- Use some of the tasks that you have at hand, from the preparation step given earlier, more or less as props to support the action and the conversation. You are not interested in user performance times or other quantitative data.



- Work together with the participant to find UX problems and ways the design should be improved. Take thorough notes; they are sole raw data from the process.
- Let the user choose some tasks to do.
- Be ready to follow threads that arise rather than just following prescribed activities.
- Listen as much as you can to the participant; most of the time it is your job to listen, not talk.
- It is also your job to lead the session, which means saying the right thing at the right time to keep it on track and to switch tracks when useful.

At any time during the session, you can interact with the participant with questions such as:

- Ask participants to describe initial reactions as they interact with this system.
- Ask questions such as “How would you describe this system to someone who has never seen it before? What is the underlying “model” for this system? Is that model appropriate? Where does it deviate? Does it meet your expectations? Why and how? These questions get to the root of determining the user’s mental model for the system.
- Ask what parts of the design are not clear and why.
- Inquire about how the system compares with others they have used in the past.
- Ask if they have any suggestions for changing the designs.
- To place them in the context of their own work, ask them how they would use this system in their daily work. In other words, ask them to walk you through some tasks they would perform using this system in a typical workday.

# Analyze and report results

Problem	Imp.	Solution	Cost	Prio. Ratio	Prio. Rank	Cuml. Cost	Resolution
User confused by the button label "Submit" to proceed to payment part of the purchasing transaction							

**Importance** : M(Must Fix), 5 (The most important problems to fix after the “Must fix” category,3 (Moderate) ,1 (Low Impact).

**Costs** for our analysis are stated in terms of resources (e.g., time, money) needed, which almost always translates to person-hours required.

If the importance rating is “M” (for “must fix regardless”), the **priority ratio** is also “M.” For all numerical values of importance. the priority ratio becomes:

$$\text{Priority ratio} = (\text{importance/cost}) * 1000$$

Each problem enter an amount that is the cost of fixing that problem plus the cost of fixing all the problems above it in the table.

Problem	Imp.	Solutions	Cost	Prio. Ratio	Prio. Rank	Cuml. Cost	Resolution
Did not recognize the “counter” as being for the number of tickets. As a result, user failed to even think about how many tickets he needed.	M	Move quantity information and label it	2	M	1	2	Fix in this version