Assignment M1
CS6750 Summer 2021

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Abstract—In the "M" assignments, we examine the free video streaming service Pluto TV, with the goal of determining how "drop-in" users (who do not have accounts) can easily search for "On Demand" content to watch; this functionality currently does not exist on Pluto TV. We approach this problem through an HCI (human-computer interface) design lifecycle.

1 PROBLEM SPACE

Pluto TV (https://pluto.tv) is a subscription-free video streaming service with advertisements. Our problem concerns searching for content within Pluto TV's "On Demand" library.

1.1 Locations and delivery methods

Like other streaming services, Pluto TV can be used in locations where Internet connectivity is present:

- Residences (bedroom, living room, backyard)
- Hotels (guest rooms, lounges)
- Passenger vehicles (automobile, train, bus, ferry, airplane)
- Anywhere else a wireless device can be used, in public or private (airports, parks, plazas, libraries)

Pluto TV content can be viewed on various displays:

- Mobile devices (phone, tablet)
- Computer monitors (desktop, laptop)
- Televisions (using Roku or Chromecast)

1.2 Target segment of Pluto TV

There is currently no interface for searching Pluto TV's On Demand library, so we will investigate the possibilities for accomplishing this task.

2 USER TYPES

2.1 Low-income households

Pluto TV could be suited for users in low-income households, because the service requires neither a subscription nor an account. If multiple generations reside in the same household, and an Internet-enabled device is available for the use of all household members, then the user base could potentially span entire families, from young to old. The person who owns the device can be expected to interact with the Pluto TV service, so we can expect one group of users to be adults (of any gender). Since this user base can be broad, their levels of expertise may vary from novice to expert. However, we wish to target novice users (see section 2.3).

University students, either on- or off-campus, may have less disposable income, so a subscription-free video streaming service could be appealing to these users. Expertise level of students could range from novice to expert, but again we are more inclined to design for novice users.

2.2 Desktop and laptop users

As Pluto TV can be accessed not only via its own app, but also in a web browser, we would like to consider the needs of desktop or laptop users. While mobile devices are increasingly ubiquitous, there remain many users of technologies with larger footprints and form factors. These users can be of all ages; we are interested in older audiences, including retirees (who may also have less disposable income); displays used by desktops or laptops are generally larger and easier to see. Laptop users also include business and leisure travelers, quite possibly entailing a different demographic than in **2.1 Low-income households.** Ideally, the Pluto TV search interface should be universally accessible, and not need to account for whether a given user enjoys fewer privileges than another.

2.3 Novice users and "drop-in" users

Because the service can be used on a "drop-in" basis — "as is", without an account — we wish to design for novices: if anyone happens across the Pluto TV website, and can start watching without any barrier to entry, it would be advantageous to search the Pluto TV library just as easily. As there is no means of searching at present, this functionality would be just as useful for expert users.

3 NEEDFINDING PLANS

3.1 Analysis of product reviews, hacks, and workarounds

3.1.1 *Data inventory*

In analyzing reviews of Pluto TV, we wish to better understand the following about users of the service:

- Who are the current users of the service
- Users' surrounding environment and situation (location & context)
- What users want to accomplish (what kinds of content they are looking for, why they want to use Pluto TV for this purpose)
- What items or information users need in order to find content
- What tasks and subtasks users perform while looking for content

In particular, we are interested in learning how users *currently* locate what they want to watch, and identifying existing methods for working around the nonexistent search functionality. This list of workarounds may also inform the needfinding in **3.2 Evaluation of existing user interfaces** and **3.3 Think-aloud protocol (with participant observation)**.

3.1.2 *Review sources*

User discussions containing reviews, hacks, and workarounds for using Pluto TV will be gathered from YouTube, Reddit, Cord Cutters News, Cordcutting.com, Amazon.com, and other sources located through Internet searches.

3.1.3 *Data to be collected*

For each review, we will note the following from the perspective of the reviewer:

- User background
- Whether the review is positive or negative, and how much so
- User expectations
- How the service is being used, to what end, and where
- Pros and cons
- Common issues/complaints
- Workarounds
- Preferred or desired video content
- Preferred or desired functionality

- Other notable experiences

3.1.4 *Potential biases*

User-submitted reviews are performed on a voluntary basis, thus are prone to *voluntary response bias*. People who feel strongly one way or another are more inclined to comment: the "vocal minority" on a forum or subreddit comes immediately to mind. Such reviews are retrospective, therefore *recall bias* is another risk: in writing reviews, users are generally commenting on past experiences. There may even be *social desirability bias*, as individual reviewers may wish to be perceived in a more positive light by their audiences. Since we are drawing upon pre-existing data, our ability to offset these biases is limited. We avoid the use of quantitative analysis with extant product reviews.

3.2 Evaluation of existing user interfaces

3.2.1 *Data inventory*

We will consider existing search interfaces of video streaming services. This will provide us with additional insight on:

- What items or information users need in order to find content
- What tasks and subtasks users perform while looking for content
- What is the context of these tasks and subtasks (what aspects of the service itself can distract from, or otherwise impact, the task at hand)

3.2.2 *Interfaces to evaluate*

We will evaluate Crackle, Kanopy, and JustWatch. The services will be accessed in a Firefox or Chrome desktop browser with Privacy Badger enabled to block user tracking which might otherwise influence website behavior.

3.2.3 *Data to be collected*

The following qualitative observations will be collected:

- What requirements must be met before using the search interface, if any?
- Where is the search interface positioned on the display?
- How large is the search interface relative to the overall "real estate" on the display?
- What are the components of the search interface?
- If the search interface is labeled, what labeling is used?

- Is the search interface easy to locate/identify?
- How can a user interact with the search interface?
- Does the search interface make suggestions, and if so, what types of suggestions are made?
- How is the output of a search ordered? How can this ordering be changed?
- Does the output display all on one page, or is it divided between pages?
- Does the output require horizontal scrolling, vertical scrolling, or both?
- What makes the interface easy or difficult to use?
- What would you change about the interface?

A few quantitative observations will be collected (with accompanying qualitative feedback):

- If the search interface is labeled, how helpful is the labeling?
    - 1: N/A (no label)
    - 2: Did not help / confusing
    - 3: Not very helpful
    - 4: The right amount of helpful
    - 5: Very helpful
    - 6: Unexpectedly / surprisingly helpful

      If 2 or 6 were selected, what was unhelpful or unexpected?
- If the search interface makes suggestions, how helpful are the suggestions?
    - 1: N/A (no suggestions)
    - 2: Did not help / confusing
    - 3: Not very helpful
    - 4: The right amount of helpful
    - 5: Very helpful
    - 6: Extremely / surprisingly helpful

      If 2 or 6 were selected, what was unhelpful or unexpected?
- How much effort is it to search for movie or TV show, on a scale of 1-6, where:
    - 1: Could not find what I was looking for
    - 2: Too much effort / it's too much trouble
    - 3: A lot of effort
    - 4: A comfortable amount of effort
    - 5: Very little effort

- 6: Effortless / no effort at all
  If 2 or 6 were selected, what was the worst or best part of the experience?

3.2.4 *Potential biases*

Confirmation bias is an issue because the author is both planning and executing this needfinding method; recruiting and surveying additional subjects would help to limit the impact of this bias. *Recall bias* will be mitigated by collecting the data in real time, while the interface is being used.

3.3 Think-aloud protocol (with participant observation)

3.3.1 *Data inventory*

We wish to gain insight into the thought process of novice Pluto TV users who are looking for content to watch, and compare this with the users' experience with another streaming service that already has an existing search interface.

Using a think-aloud protocol, we can learn about the following:

- Who is the user
- The user's surrounding environment and situation (location & context)
- What items or information the user needs in order to find content
- What tasks/subtasks a user is performing while looking for content
- How the user thinks and feels while performing these tasks

One such novice user is the author, so this also presents an opportunity to perform participant observation using a structured think-aloud protocol.

3.3.2 *Participant activities*

Subjects will be asked to perform the tasks outlined below.

We will ask if the subject prefers to make observations aloud or in written form. If the subject consents to voice recording:

1. The subject will start a voice recorder, then open the Pluto TV website. The subject will not log into a Pluto TV account, in order to act as a "drop-in" user. The subject will be asked to perform a running commentary, speaking to the points listed in **3.3.3 *Questions to ask***, while looking for a science fiction movie.

2. The subject will be asked to record additional observations while browsing the library (performing a search without any specific target).
3. The subject will be asked to repeat items 1 and 2, this time using Crackle.
4. If the subject has a Netflix account, the subject can repeat items 1 and 2, this time using Netflix, but will have to log in. The subject can skip this if they do not wish to use their Netflix account (or if they do not have one).

If the subject does not wish to use voice recording, the subject will instead be asked to make written observations. Audio and written records should be destroyed after data is gathered.

One subject will be the author of this document; think-aloud will occur during participant observation. The author's husband is not a current Pluto TV user, and prior to this assignment, had expressed the desire for better search capability in the Netflix streaming service, so we would like to recruit him as well. Ideally, additional subjects should be recruited from the Georgia Tech student pool.

3.3.3 *Questions to ask*

The following questions will be provided during the think-aloud sessions:

- Where are you using the service?
- What do you see on the current webpage?
- Which part(s) of the page draw your attention?
- What do you like about this page?
- What do you dislike about this page?
- If you want to watch a sci-fi movie, how would you look for one?
- What changes would you like to see to make searching easier?
- What changes would make this page more pleasing to use?

(Other questions could arise organically during an interactive session, so the above is not an exhaustive list.)

3.3.4 *Potential biases*

Confirmation bias is an issue here because participant observation is involved: the author is both planner and subject of this needfinding method. We can minimize emphasis on the author's opinions and expectations, and focus instead on empirical observations. *Egocentric bias*, the tendency to rely too heavily on one's

own perspective ("Egocentric bias", 2020), is also a risk; after all, one is not one's user! To mitigate both of these biases, additional subjects ought to be recruited.

The plan is also prone to *observer bias* and *social desirability bias*. An individual with a close personal relationship to the researcher conducting the session may be predisposed to cast observations in a positive light, even more so if the researcher is interacting directly. Care must be taken in the phrasing of the questions asked, so that they: a) are as neutral as possible, b) do not "lead the witness", and c) focus on the respondent's observations and perspective as much as possible. This bias can also be mitigated by using a scripted "self-administered questionnaire" ("Response bias", 2021), in which the questions would be supplied on a paper, text file, or webpage form provided to the subject, removing the need for the researcher to be present.

4 REFERENCES

1. Egocentric bias. (2020, December 9). In *Wikipedia*. https://en.wikipedia.org/w/index.php?title=Egocentric_bias&oldid=993309867
2. Response bias. (2021, May 6). In *Wikipedia*. https://en.wikipedia.org/w/index.php?title=Response_bias&oldid=1021669955