

HCI CS675 Assignment M4

Michael Lukacsko
mlukacsko3@gatech.edu

Abstract— As a company, Amazon is much more than an online marketplace. The company manufactures and distributes a huge variety of electronic devices, from smart speakers and E-readers to tablets, streaming devices and many more, that are used in every aspect of daily activities. Each device is registered to an Amazon account and managed from the Amazon interface under “Account & Lists”. As with most technology, users upgrade their hardware by purchasing new products as improvements are released. Old devices are powered off/unplugged and live the rest of their life in the back of a drawer or on a closet shelf never to see the light of day again. The task of managing these devices is an important task and will be the subject of discussion throughout this M assignment.

1 QUALITATIVE EVALUATION

Qualitative evaluation is an effective tool for gathering qualitative feedback from users. For this assignment, I will ask participants to complete a survey to qualitatively evaluate the textual prototype presented in the previous assignment. For brevity, the textual prototype from the previous assignment is a set of instructions for installing a new Amazon Fire Stick that includes steps specific to naming and assigning the device to a specific location. The full set of instructions can be found in the Appendix, section 5.1.

1.1 Evaluation Plan

Like the surveys done during needfinding, it will be vitally important to have a few people peer review my survey questions. Because the survey will be executed asynchronously, I want to make sure I am asking the right questions so that the data I receive is useful during the qualitative evaluation. Furthermore, I want to make sure that I am gathering useful data once I begin interacting with real users. To do this, I will run a few pilot studies with my wife and some

friends/family to iron out any kinks that may hinder delivery. Once I am confident the survey will provide valuable data about the textual prototype, I will ask classmates, family, friends, and coworkers who own at least one Amazon Fire Stick to complete it using PeerReview from anywhere they see fit. Once the survey has been complete, the results will be recoded in PeerSurvey and/or via a hardcopy and transferred to Google Sheets to analysis. There will be no note taking or recording because of the nature of the survey.

1.2 Evaluation Content

The survey will be structured in a way such that it minimizes potential biases while maximizing the quality of data that is returned. To do this, I will stick with the “less is more” theory deployed in the previous needfinding survey. The questions will be broad asking the participant about the instructions provided in the textual prototype it references. The following questions will be given to obtain qualitative data:

- a) What did you like about the installation process?
- b) What did you dislike about the installation process?
- c) What were you thinking while using the installation interface?
- d) How useful do you think this will be managing the devices from the Amazon device management user interface?

Also, I will ask the user what their goal was when performing some of the new tasks that are included in the textual prototype such as:

- a) When giving the device a location, what was your goal?
- b) When naming the device, what was your goal?

The answers to these questions will help me better understand if the actions of the users match the end goal of managing the device, or if the user is just feeding the interface information because it is required.

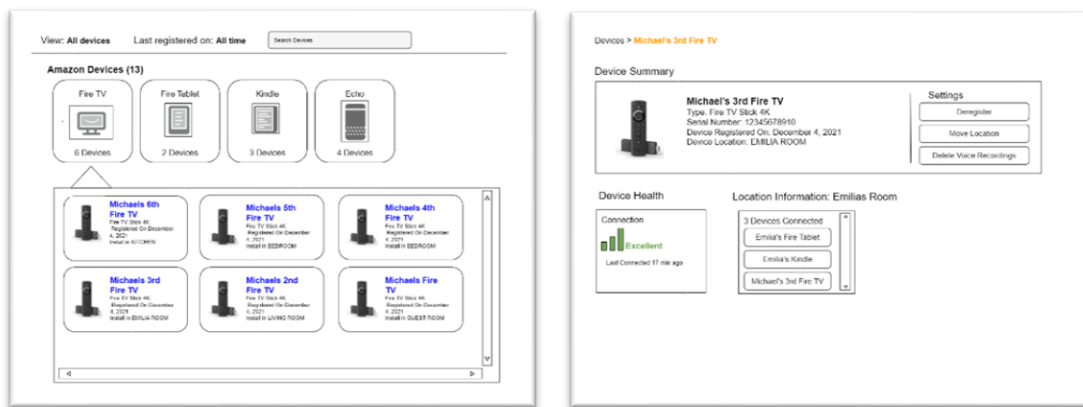
Evaluating the survey results will be done using hypothesis testing. The null hypothesis, or stating that users did not find this prototype to be beneficial, is my starting point. The alternate hypothesis, which I hope to prove true through analyzing the survey results, is that users do find the improvements in this prototype beneficial. Once complete with hypothesis testing, assuming the alternative hypothesis has been proved true, I can address the requirements and data

inventory items from the previous assignments. I have included a copy of the M2 data inventory and defining requirements in the appendix, sections 5.2 and 5.3.

2 EMPIRICAL EVALUATION

For question 2, I will use the improved device description card prototype in figure one below and evaluate it using empirical observation.

Figure 1 – Device description detail prototype from M3



2.1 Control and Experiment Conditions

This empirical evaluation will be done using a within-subjects experiment such that each participant, in a randomized order, will use the current device description interface and the improved prototype to compare Amazon Fire Stick device management within the Amazon device management interface. The goal here is to identify if the improved features of the device description page aid in device management or impede it. For metrics, I will look at the amount of time it takes to identify a device they are managing in the current interface versus the improved interface. During this experiment, there will also exist a need to keep all conditions the same. For this reason, I will have to implement some controls. To do this, I will make sure that the same Amazon account and same number of Amazon Devices are in each experiment. Moreover, I will use my Amazon account to perform this test. The advantage of using my account is that there will be a static number of devices to manage and, as described in the abstract above

and previous assignment, the problem with device management is glaringly evident in my Amazon accounts device management interface.

2.2 Hypothesis Testing

Like the qualitative evaluation in question 1, I will initially have to assume that the amount of time it takes to manage a device is equal between the two interfaces. That is, that the null hypothesis is true. If I can prove the null hypothesis to be wrong via testing and analysis, then I can accept the alternative hypothesis which would be that the prototyped interface improves the device management.

To gather the needed data and evaluate my hypothesis, I will use the within-subject design experiment. The reason for this approach is that I do not believe I will be able to recruit enough subjects such that the alternative, a between-subject designed experiment, would yield enough data to unquestionably prove my alternative hypothesis true. Hence, using the within-subject design, I will be able to gather twice as much data using only 10 or 12 subjects. Once the subjects are identified, they will be assigned randomly to each treatment. Using a random assignment to each treatment will mitigate one lurking variable that may introduce biases into the data. Finally, once all the subjects have completed their treatment, and their time is recorded, I will average the times and calculate the standard deviation. This will create ratio data and, as such, I will use a student's t-test to perform my statistical test. My expectation is to have a set of data like the below table to analyze:

Table 1 — Sample data to use in empirical evaluation

Treatment	N	Post-Test Avg. (seconds)	Standard Deviation
Current	30	650	2.2
Prototype	30	550	1.7

2.3 Variables

The entire empirical evaluation process outlined above exposes the possibility of lurking variables which can confound the data. First is the order of what treatment each subject sees first. If not addressed, this could tilt the data one way especially if the order in which the subject receives the treatments matters. As

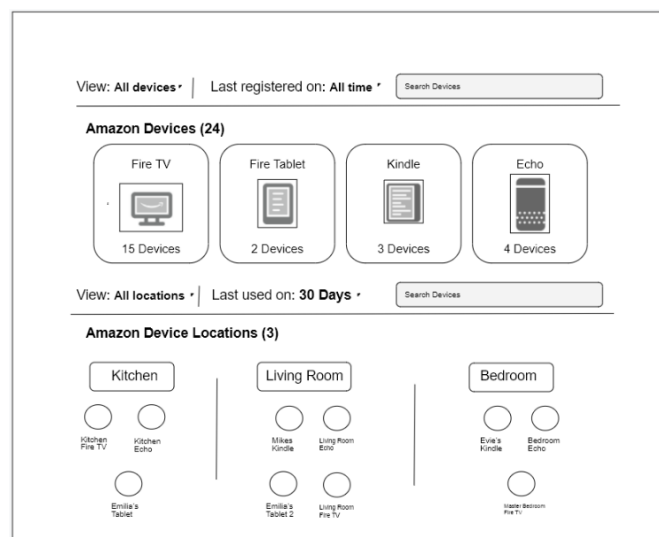
described above, this is address by randomly assigning the order of treatment for each subject. A second lurking variable that may distort the data is each subject's experience with device management. While some subject may be very familiar with device management, others simply may not. Because all levels of experience are important to this effort, as outlined in the M2 data inventory, my plan to mitigate this variable is to give a demonstration of the device management interface prior to the subjects beginning their corresponding treatment. In theory, this should equalize each subject's knowledge and effectively remove the variable from the equation.

If any of these variables are not correctly controlled, or if any variable I did not foresee occurs, I will document them accordingly. If I am unable to prove that the different in comparison is big enough to accept the alternative hypothesis, and there are unaccounted for variables confounding the data, I will most likely need to reassess the empirical evaluation in totality.

3 PREDICTIVE EVALUATION

Assignment M3 introduced device location specificity to the Amazon device management user interface. This wire frame prototype can be seen in the figure below and will be used in this predictive evaluation.

Figure 2 — Amazon device management interface M3 prototype with device location.



3.1 Evaluation Plan

The scenario to be evaluated in this exercise is that of a user managing a device through the improved device management interface. To predictively evaluate this task, I will create a cognitive walkthrough simulating the process of interaction with the prototyped interface. More specifically, I will evaluate the task of removing an Amazon Fire Stick from the Amazon device management user interface. The goal of the user will be to identify and remove a specific Amazon Fire Stick successfully.

3.2 Tasks and Operators

As indicated above, the user's goal will be to find and remove a device from the Amazon device management interface. To begin this evaluation, the user will be logged into their Amazon account and in the device management interface. From here, the user will have a set of tasks and/or subtasks to view their current devices by clicking on "Devices" tab, selecting the "Fire TV" devices to view their devices, and identify and deregister the device by clicking on the specific device and clicking the "Deregister" button.

3.3 Evaluation

Whether this exercise is determined to be successful or not will be contingent on the evaluation performed. Because the user will have to figure out how to accomplish the goal, I want to investigate this from the perspective of the gulf of execution and gulf of evaluation at each stage of the cognitive walkthrough. I want to know if the right actions needed to reach the goal are sufficiently obvious. Moreover, I want to know that the response of these actions is what would be expected by the user.

4 PREPARING TO EXECUTE

Because I don't feel like the empirical evaluation is an option currently, the two evaluations I will use in the next assignment will be the qualitative evaluation of the textual prototype and the predictive evaluation of the wire frame prototype. To use the card prototype in the empirical evaluation would require it to be developed further and in a working state. Furthermore, gathering reliable data

would require some type of software logging to be implemented, and this is not feasible. Hence, the limitations of time and resources cause this one to be removed from consideration.

As far as those that I will execute, the survey associated with qualitative evaluation is a low-cost (no-cost) option that is easy to administer and will provide sufficient data to analyze. Also, because of the success in my previous survey, I am confident and familiar with the type of information I expect will be returned. The predictive evaluation, or cognitive walkthrough, is also feasible using the wire frame prototype. Executing this evaluation can be done without needing to locate any participants but will still yield useful information by exploring the users thought process.

In summary, both of the selected evaluations above will immediately help me identify any ongoing design decisions for my prototypes if applicable. Also, despite the need for only a single person to perform them, both evaluations will investigate the users thought process which increases their feasibility.

5 APPENDICES

5.1 Qualitative Evaluation for Textual Prototype from M3

Instructions to install a new device:

- a) The Fire Stick will need the power supply connected and plugged into the wall. It will be connected to any open HDMI port on the TV.
- b) The remote will also need power using the provided batteries.
- c) On the TV, the user will navigate to the HDMI input where the Fire Stick is connected and follow on the onscreen prompts. The user will be prompted to sync the remote, select a preferred language, and select a Wi-Fi network before being asked to provide their Amazon credentials.
- d) Once the Amazon credentials are provided, this is where I would require the user to give the device a descriptive name AND provide the location it is being installed. The location would be selected from a dropdown with preselected options such as bedroom, living room, kitchen, guest room, etc. An "Other" selection would be available to the user if needed.
- e) Once the user selects the location and gives a name, the device would display in the Amazon device management interface with the information provided by the user.
- f) The user would complete the setup consistent with what is currently in place.

5.2 Data Inventory from M2

Inventory Item	Observations
Who are the users?	The users for this assignment are not limited. They are anyone, anywhere, and of all experience levels. The user is anyone who might interact with an Amazon smart device and users that are currently using them today. The survey for this assignment focused on those who are familiar with Amazon, at the very least having used Amazon marketplace but no necessarily having used an Amazon smart device like the Fire Stick

Inventory Item	Observations
Where are the users?	From the survey, users are at home mostly. When using a steaming device, smart speakers, etc, users are in their home. Regarding E-readers, users are not limited to a location. This is reinforced by the think-aloud as this tool place in the user's home.
What is the context of the task?	The context of this task is that users are adding or replacing an electronic smart device offered by Amazon. Because of the wide array of devices offered and how they are managed from the same UI, this is not limited to one type of device. As seen in the survey results, most households utilize more than one type.
What are their goals?	While not captured in any of the needfinding exercises, the goal is to improve the user's quality of life. Whether entertaining themselves by streaming a TV show, reading on their E-reader, or saving money using a smart thermostat, all these devices are used for personal gratification.
What do they need?	All three exercises demonstrate that a need exists to prioritize device management when adding/modifying new and existing devices. The initial setup of a device needs to make this clear, and there needs to be a more efficient way of managing devices via the current user interface
What are their tasks?	The task is to setup a new device, identify this device from a management UI, and manage their current devices.
What are their sub-tasks	User subtasks include setting up new devices, identifying devices that are already installed and searching for identifiable information from the device itself. Some of these tasks were not performed as part of this exercise and will be address in the next iteration of needfinding. To gather the required data to identify all possible subtasks, I believe I would utilize think-aloud such that I would see where the user struggles and where they are easily able to accomplish the subtasks in real time.

5.3 Defining Requirements from M2

Requirement	Description
Functionality	Enable to user to manage their devices more efficiently by making this a priority during setup.
Usability	The user should be informed of device management during setup and encouraged to use it.
Learnability	The device management interface would be a part of the initial setup. Also, it would be mentioned in the Amazon setup instructions (Appendix section 7.3)
Accessibility	Device management is already accessible, however, improving the UI to be like Googles Home app UI would make the user more likely to manage their devices in a proactive manner.
Compatibility	This is a non-issue and should remain unchanged. Device management is currently accessible via smart devices and PCs.
Compliance	This is a non-issue and should continue to be managed the way it is now.