# HCI CS6750 - Assignment M2

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*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 NEEDFINDING EXECUTION 1: SURVEY

The first needfinding exercise employed was a survey.

### 1.1 Survey Execution

The purpose of the survey, as stated in the M1 assignment, was to learn what types of devices households use, how many devices there are, how often devices are upgraded. and how many of those participating in the survey utilized device management. A total of 25 people we asked to participate, ranging from family and friends to a handful of people who I work with. 22 people answered this 8 question survey. The questions can be found in the Appendix section 7.1.

### 1.2 Survey Results and Summary

The majority of smart device users who participated in this survey are between the age of 18 and 39 (77%). The remaining 27% of users were all 40 and older. Of these participants, majority owned a Kindle E-Reader (28%) and/or Amazon Fire Stick (25%). The other notable devices owned were Thermostats (18%) and

Apple TVs (9%). The other devices owned were not significant enough to consider. Interestingly, Amazon branded devices were the most commonly owned by the survey participants. This is an important fact as the Amazon UI for management can get very cluttered very. Another interesting result of this survey is that 91% of these survey participants replace their devices between 2 and 5 years, with 32% saying they replace them as new devices are released. For Amazon Kindles, this is about once per year with the latest Kindle Paperwhite released in October 2021. For the Amazon Fire Stick, a newer version is released has hit the market once every 24 months. Again, the most recent Fire Stick was released in October 2021. With each user replacing devices every 2-5 years, it is important to note that the survey revealed 73% of users have at between 1 and 4 devices in their home. Moreover, 18% of the survey participants have more that 5 devices. Now, what happens to the device once it is replaced? Participants reported that 64% of the time they either give the device to a family/friend or it ends up in a closet or drawer. Finally, when asked what type of device management users do with a new device, the survey revealed that very few do any type of device management. 14% responded they do no type of device management, 23% weren't sure if they did any specific device management, and 41% do only what is required when they power the device on for the first time. Only 2 of the users, or 9%, said they do any type of device management from a UI. A visual representation of each question can be found in the Appendix section 7.2

The results of this needfinding exercise proves that the average user does very little when it comes to device management. The fact that devices are replaced every 2-5 years, coupled with the fact that most of the surveyed households have more than 1 device, tells me it is likely the device management UI looks like the one I shared in the M1 assignment.

### 1.3 Mitigating Survey Bias

Mitigating bias, specifically the observer bias mentioned in the previous assignment, is done in two ways. First, by allowing the user to give an answer if one dose not explicitly answer the question, I am not eliciting answers to questions I want. Secondly, I avoided leading questions by having peers review the survey. I asked two people, both of which have very different technical abilities, to review and suggest improvements. A second type of bias, voluntary response bias, was not mentioned in the first part of this assignment but was an important bias

to avoid as well. This bias, commonly experienced with qualitative questions, says that responders will most commonly answer questions with stronger opinions. Having responders answer with mostly 5's and 1's oversamples the data with extreme views. To avoid this from occurring, I stayed away from quantitative type questions and presented the participants with qualitative questions. Having reviewed the results shared above in section 1.1, I can confidently say this approach was effective at alleviating voluntary response bias from the survey.

## 2 NEEDFINDING EXECUTION 2: THINK-ALOUD

The second needfinding exercise employed was a think-aloud.

### 2.1 Think-Aloud Execution

This think-aloud needfinding exercise took place with three different users spanning the user types as explained in the first M assignment. I had a hard time finding a user who had no Amazon experience, but I was able to identify one user who shops using the Amazon marketplace. However, they have not used any of Amazons electronic devices. The other two user in this needfinding exercise were user who I would categorize as existing Amazon device users; users who own several Amazon specific devices. To execute this part of the needfinding, I asked users to walk me through setup of a new Amazon Fire Stick using their personal Amazon account in their home. While performing each task, I asked for an explanation of what and why it was necessary from their perspective. Fortunately, I was able to be present in person for each of these experiences. For obvious reasons, masks were worn and we socially distanced where possible.

### 2.2 Think-Aloud Summary and Results

The three participants in this experiment simply do no device management. All three users, with varying levels of experience, plugged the Amazon Fire Stick into their TV, attached the power cable, put batteries in the provided remote, and followed the onscreen prompts to set the device up. At no time did any of the users finish the setup by logging into their Amazon account and checking that the device they removed was no longer present or that the device they added was appropriately named. One of the items I provided to users with was the "Setup Your Fire TV Instructions" from the Amazon Digital Services and Device

Support page. Whether the instructions were used or not was up to the participant. Interestingly, the instructions, as provided by Amazon support, do not mention device management or the ability to manage devices from the Amazon UI. The instructions from the Amazon website can be found here. I have also included the full instructions in the Appendix section 7.3

The results of this exercise, as I observed them are as follows:

- All three users were able to complete the task
  - The user who has never used an Amazon Fire Stick took the longest to get the task done. 22 minutes
  - Users who currently own Amazon devices took an average of 13.5 minutes. User 1 took 17 minutes and User 2 took 10 minutes.
- The walk through instructions provided by Amazon (Appendix 7.3) are sufficient for the user to get it installed.

At no time during the setup does the walkthrough enable the user to change the name of the device. As a result, a default name is given such as "Michael $X^{th}$ Fire Stick". Another fact I observed throughout this think-aloud exercise is that none of the three participants noted the name of the Amazon Fire Stick that was just setup. The task was considered complete once the user was able to view the Amazon Fire Stick UI and navigate to an installed app, TV show, or movie.

## 2.3 Mitigating Think-Aloud Bias

As mentioned in the M1 assignment, I had to be aware of confirmation bias and social desirability bias. Confirmation bias, more simply known as seeing what I want to see, was avoided by giving very detailed instructions. The instructions in Appendix section 7.3 were provided along with the hardware. It was up to the participant whether they wanted/needed the instructions. Also, by keeping the goal of this exercise to myself while performing the experiment, I was able to minimize social desirability bias. That is, I did not make known my intentions other than asking the user to walk me though the steps they would take from end-to-end setup. The last type of bias that I was aware of during this exercise was recall bias. By being present and observing the users interact with the Amazon Fire Stick in real time, it was easy for them to think out load and express what they were thinking and feeling during the task.

## 3 NEEDFINDING EXECUTION 3: EXISTING UI EVALUATION

The third and final needfinding exercise employed was to evaluate existing UI's.

### 3.1 Existing UI Evaluation Execution

To determine the best existing interfaces to evaluate, I looked at the data provided from the conducted survey. While Amazon devices makeup most smart devices reported by the survey participants (53%), Google devices were second (25%). As a result, this was the UI selected to evaluate.

### 3.2 Existing UI Evaluation Summary and Results

Specific to streaming devices, Google Chromecast offers very similar functionality and has a similar set of requirements to install the device. Required is a wireless network, a Google Account, and the device itself. Setup of the Google Chromecast is done using an iOS/Android device via the Google Home app. To begin, like the Amazon Fire Stick, the Chromecast must be plugged into a HDMI port on the TV and supplied power, and the remote needs to be powered with the supplied batteries. Once this is done, the user will navigate to the Google Home app and complete the remainder of the device setup from there. The step-by-step instructions can be referenced in the Appendix section 7.4 and a walkthrough of the setup in on YouTube here. For brevity, once the user has opened the Google Home App and selects "Add a device", a QR code is scanned that initiates the setup procedure. From the app, the user selects the Chromecast from a list of devices. During the setup process, the user is prompted to select the room in which the Chromecast is being installed. After selected, the rest of the setup process includes selecting apps to be installed, what Wi-Fi network to use, etc. Once the setup is complete, the user will now see the Chromecast from their Google Home app UI. A visual representation of this can be found in the Appendix section 7.5

From the images in section 7.5, it is my opinion that device management is a priority Google has set. Even in a case where the user does not change the device name, Google requires the user to identify where they want the device set up. If upgrading or adding a device, the user would clearly see more than 1 device listed in their Living Room and make the changes necessary to avoid a cluttered UI. While not impossible, it seems highly unlikely that a user would have 8 of

the same devices installed; 7 old ones that have been replaced over several years with one being the currently used device.

## 3.3 Mitigating Existing UI Evaluation Bias

Like the think-aloud, I was aware that confirmation bias might affect this exercise. To minimize this, I empirically tested my beliefs. While I ended up being the one to compare the Amazon interface with the Google interface, I was able to keep my observation factual and note what factually occurred, rather than what I wanted to occur. Moreover, by comparing the full process of setting up a Google and Amazon device and avoiding the subtasks, I was able to reduce any observer bias. I know that registering an Amazon device and the subsequent device management is a subtask that needs to be improved. Because of this, while evaluating the Google UI, it was vital that I do not bias myself to focus only on the subtasks. By avoiding these two biases, I was able to objectively gather data and make a reasonable comparison of the two user interfaces.

## 4 DATA INVENTORY

*Table 1* — Data Inventory Items for Amazon Device Management

| 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 |
| 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 |

| Inventory Item | Observations |
|---|---|
| | 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 subtasks | 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 DEFINING REQUIRMENTS

*Table 2* — Defining requirements for Amazon device mgment.

| Requirement | Description |
|---|---|
| Functionality | Enable to user to manage their devices more efficiently by making this a priority during setup. |

| Requirement | Description |
| --- | --- |
| 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. |

## 6 CONTINUED NEEDFINDING

While the survey participants were asked what type of device management they do, it did not explicitly ask users to evaluate the device management UI. Similarly, the think-aloud exercise asked users to setup a new device to see whether device management would be taken into consideration, however, the participants were not tasked with anything concerning device management. To strengthen my findings, I would (1) create a survey focused more on the task of device management and (2) use another think-aloud exercise to see how users manage devices in real time. Being conscious of the same biases outlined above, these would be useful exercises producing useful data to further my summary and results.

## 7 APPENDICES

### 7.1 Survey Questions

<u>Question 1: What is your current age?</u>

    a. 18-29
    b. 30-39
    c. 40-49
    d. 50-59
    e. Over 60

<u>Question 2: What type of Smart Electronic Devices are in your home? Select all that apply.</u>

    a. Smart Speaker (Amazon Echo/Alexa, Google Nest, Apple HomePod, etc)
    b. Streaming Device (Amazon Fire Stick, Roku Stick, Google Chromecast, Apple TV)
    c. E-Readers (Amazon Kindle, Kobo Clara, Barner & Noble Nook, Apple iPad)
    d. Smart Thermostat (Ecobee, Google Nest, Amazon Smart Thermostat)
    e. Other.

<u>Question 4: If answered "Other" in Q2, what devices are in your home</u>

    a. _____

<u>Question 5: How many devices total do you own</u>

    a. 0-1
    b. 2-3
    c. 4-5
    d. 6-7
    e. 8+

Question 6: How often do you replace devices with a newer version?

    a. 0-1 years
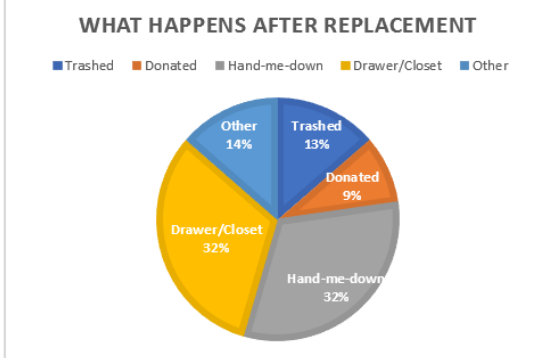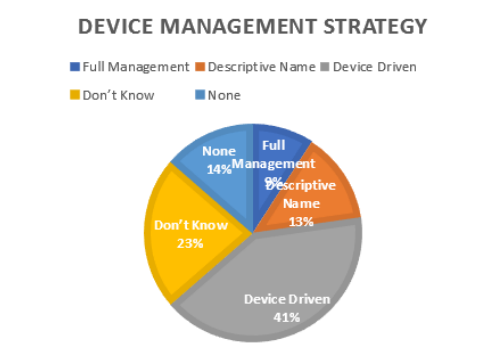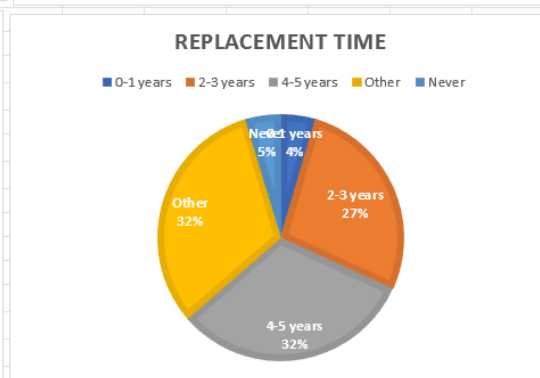    b. 2-3 years
    c. 4-5 years
    d. Other
    e. Never
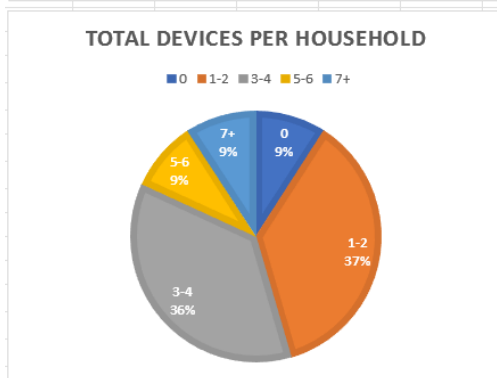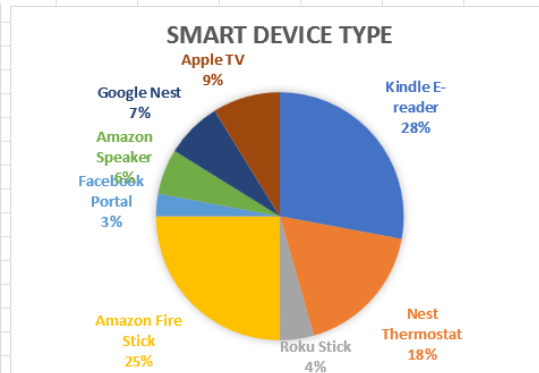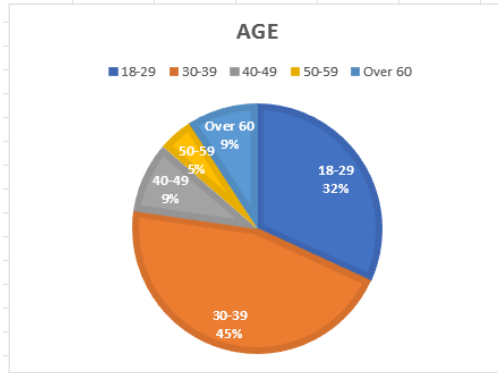
Question 7:  What happens to the devices being replaced?

    a. They go in the trash/recycled
    b. They are donated
    c. They are passed onto other family members
    d. They go into a drawer/closet
    e. Other

Question 8: You are replacing an old device. What type of device management do you do when registering your new devices? Select all that apply.

    a. The old device is removed from the users account via some user interface and the new device is added/registered in its place
    b. The new device is given a descriptive name during the setup
    c. The new device is powered on and I do whatever the device asks me to do while setting it up
    d. I did not know I could manage the devices
    e. I don't do any device management

## 7.2  Visual Results

### AGE

**Legend:** 18-29 · 30-39 · 40-49 · 50-59 · Over 60

- 18-29: 32%
- 30-39: 45%
- 40-49: 9%
- 50-59: 5%
- Over 60: 9%

### SMART DEVICE TYPE

- Kindle E-reader: 28%
- Nest Thermostat: 18%
- Roku Stick: 4%
- Amazon Fire Stick: 25%
- Facebook Portal: 3%
- Amazon Speaker: 5%
- Google Nest: 7%
- Apple TV: 9%

### TOTAL DEVICES PER HOUSEHOLD

**Legend:** 0 · 1-2 · 3-4 · 5-6 · 7+

- 0: 9%
- 1-2: 37%
- 3-4: 36%
- 5-6: 9%
- 7+: 9%

### REPLACEMENT TIME

**Legend:** 0-1 years · 2-3 years · 4-5 years · Other · Never

- 0-1 years: 4%
- 2-3 years: 27%
- 4-5 years: 32%
- Other: 32%
- Never: 5%

### DEVICE MANAGEMENT STRATEGY

**Legend:** Full Management · Descriptive Name · Device Driven · Don't Know · None

- Full Management: 9%
- Descriptive Name: 13%
- Device Driven: 41%
- Don't Know: 23%
- None: 14%

### WHAT HAPPENS AFTER REPLACEMENT

**Legend:** Trashed · Donated · Hand-me-down · Drawer/Closet · Other

- Trashed: 13%
- Donated: 9%
- Hand-me-down: 32%
- Drawer/Closet: 32%
- Other: 14%

### 7.3 Amazon Fire TV Stick Setup Instructions

1) Plug your Fire TV into your TV's HDMI port and then plug the power adapter into an outlet.
2) Use the USB cable to connect the power adapter and your Fire TV.
3) Put batteries in your Fire TV remote.
4) Turn on your TV and switch to the correct HDMI input.
5) If your remote doesn't pair automatically, press the Home ⊚ button until "Press ⊕ to start" appears on-screen (about 10 seconds).
6) Follow the on-screen instructions to connect to Wi-Fi and download the latest software update.
7) Note: If you're having issues with your Wi-Fi password, contact your internet service provider.
8) Sign in with your Amazon account. Use your mobile phone or computer to visit the on-screen web address (amazon.com/code) and enter the verification code.
9) Follow the on-screen questions to set up equipment control for devices like soundbars.

### 7.4 Google Chromecast Setup Instructions

#### 7.4.1 What you need to get started

1) A Chromecast device (3rd gen or older).
2) Latest version of the Google Home app ⌂.
3) Latest version of Google app G (Android only. Download it here).
4) A Google Account.
5) A display device with an HDMI input, for example, a high-definition television (HDTV).
6) A mobile device or tablet.
7) A compatible mobile device or tablet that must support a 5 GHz connection to set up Chromecast on a 5 GHz connection. Note: A WPA2-Enterprise network is not supported.
8) Meet the minimum Operating System (OS) requirements to run the Google Home app ⌂.
9) An internet connection.
10) Access to a secure wireless network. Make sure you have the wireless network password handy.

11) Availability and performance of certain features, services, and applications are device and network dependent and may not be available in all areas. Subscription(s) may be required, and additional terms, conditions, and/or charges may apply.

### 7.4.2 *Set up Chromecast or Chromecast Ultra*

1) Plug in your Chromecast.
2) Download the Google Home app on your Chromecast-supported device.
3) Open the Google Home app 🏠.
4) Follow the steps.
5) If you don't find the steps to set up your Chromecast:
6) At the top left of the Google Home app home screen, tap Add + › Set up device › New device.
7) Follow the remaining steps.
8) Setup is successful. You're all done!

### 7.5 Google Home App User Interface