

Assignment M4

CS6750 Spring 2019

Dan Higgins
daniel.higgins@gatech.edu

Abstract. According to a new report from Juniper Research, smart devices like the Amazon Echo, Google Home and Sonos One will be installed in a majority – that is, 55 percent – of U.S. households by the year 2022.(Perez, 2018) With this accelerated adoption rate of voice-assisted speakers comes the desire by consumers for new and innovative ways to share, and access their digital media content as well as new ways to socialize with friends and family using these speech-enabled services.

Qualitative Evaluation:

Maps to Verbal Prototype

Method: For this evaluation, we will be using *Think-aloud* as it works well for verbal prototypes. The discussion points in the prototype will be used for delivering the prototypes content and will also act as a means for soliciting evaluation data for further analysis.

User's Goal: The user's primary goal is to make it simpler to share media content anywhere not just in their own homes. This includes sharing music, books, and movies that they may own as well as sharing streaming services for which they pay a subscription fee to use.

The Prototype: In the prototype that we will be evaluating, the system recognizes the user (i.e., the user's Identity) through Voice Recognition and authorizes the use of the users streaming services to the Alexa device that they are speaking to. This device does not need to be in there home;

it could be in the home of a family member or friend, yet the user's personal media services and content are still accessible. (See Appendix for details)

Tasks: The tasks include configuring the voice-enabled speaker system for use, voice identification and authorization, requesting and streaming of media content.

Plan: This evaluation will include members of my family who will be recruited based on availability and location. The evaluation will take place, in my home. We will be capturing data during the evaluation with active note taking. I will recruit an additional participant also to take notes so that we have a comparison point and additional data. We will not be recording the session as I feel this would add an extra level of intrusion which could negatively impact the evaluation. Additionally, the post-analysis time for a recorded session was determined too costly and time-consuming for this evaluation.

Evaluation Content: We want to ensure that we focus on the Prototype and we are not doing specific new need-finding although we recognize that we may find new needs during the process it is not our focus.

Directions for the participant:

The participants will be asked to speak aloud any words or thoughts that come to mind while we execute the prototype. The participants will be told that they can think of themselves as quasi-researchers for this effort. Participants will be asked to break the tasks into shorter units so that it can be discussed one step at a time this is also recommended as it should prevent overload of working memory.

What questions, if any, will you ask during their interaction:

Selected questions will be asked based on the specifics of the interactions. The following is a list of selected questions: What aspects of the process did you like? What did you dislike? What was your goal? Was it easy or

hard to achieve? Is it intuitive? What did you like about the interface? What did you dislike about the interface?

Address the requirements:

Our selected participants will meet the criteria of the users as defined in the data inventory (Question 1). The location for the prototype execution will cover (as best as possible) the when and where of the execution as well as the context (Questions 2 and 3). The evaluation will address the user's goals and needs as well as the major tasks and subtasks (Questions 4 thru 7). We will know if the prototype has met these requirements by matching the user's think-aloud results to the defined requirements and data inventory definitions previously defined.

Empirical Evaluation:

Maps to Text Prototype

Control and experimental conditions

What are you testing:

We are trying to show that there is a measurable categorical difference in the amount of time it takes to log-on to the Alexa service HUB between two different HUB interface designs. The test will initially be conducted on the iPhone platform. Although the interfaces are exactly the same on iPhone and Android, we want to eliminate the platform as a potential confounding factor as well as limit the number of variables under test.

Point of comparison:

The point of comparison for our treatments will be three categories which we have defined as Easy, Moderate and Hard. These categories relate to the amount of time required to execute the task of logging on to the HUB. It may be important to note that we are specifically not using Interval /

Ratio testing because we believe our categories will be more relevant for this specific need.

The interfaces will be exactly the same excepts for the changes made to the log-on process.

	Easy	Moderate	Difficult
	0-10 Sec	11-30 Sec	> 30 Sec
Interface 1			
Interface2			

Null and alternative hypotheses:

- $H_{\text{null}}: \mu_{\text{Interface 1}} = \mu_{\text{Interface 2}}$
- $H_{\text{Alternative}}: \mu_{\text{Interface 1}} \neq \mu_{\text{Interface 2}}$

Experimental method:

We will be using *between-subjects* in our experimental testing method. The subjects will be assigned *randomly* from a group of participants. The Participants will be selected from a group of current iPhone users, and they will be adults (Age ≥ 18). Since we are testing only a small difference in our interface, we will want to have as large a group of participants as possible.

The participants will be provided a user name and password and will be asked to use the iPhone HUB Application to log into the HUB service. The tests will be recorded to document the process. The test will also automatically start a timer when the phone is picked up and will stop the timer and capture the amount of time it took once the user successfully logs on.

Analysis of the data:

A Kolmogorov-Smirnov test will be used on the data as well as other statistical measures including average time, median time, the standard deviation of times. A chi-squared test will also be completed and compared

with the Kolmogorov-Smirnov test to see how sensitive the trials are to the Ordinal data results.

Confounding data points:

Effort will be made to remove any confounding data points. The phones used in the experiments will all have the exact same application layout; they will be the same size screens and have the same memory and processor. Each phone will be reset to an initial condition at the start of each treatment. We will have the test administered at the same time to remove any potential bias in external factors such as time of day, the load on the network, condition of the room where the experiment is taking place.

Predictive Evaluation:

Maps to Wizard of Oz Prototype

Method: For this evaluation, we will be using *cognitive walkthrough* testing how easy it is for a novice user to carry out the task of configuring and then executing the action of streaming content.

User's Goal: The user's goal is to easily configure Alexa to share media content anywhere not just in their own homes. This includes sharing music, books, and movies that they may own as well as sharing streaming services for which they pay a subscription fee to use.

The Prototype: In the prototype that we will be evaluating the Alexa service recognizes the user's location and their identity based on their cell phones GPS location. Alexa is then able to use this information to stream content to an Amazon enabled device near the user. (See Appendix for details)

Tasks: The tasks include remote configuring of the system. Verification and acceptance into a "family group," identification and authorization of a user for a streaming action, requesting and streaming of media content.

Plan: The *cognitive walkthrough* evaluation does not require additional participants, so recruitment is not necessary. The evaluation will take place, in my home with access to an Alexa device. I will be capturing data during the evaluation with active note taking. We will be looking to understand how *usable* the system is to novice users as well as how *valuable* it is to all users.

Evaluation Content: In this *cognitive walkthrough*, we will be stepping through the process of interacting with the interface, we will be mentally simulating at each step precisely what the user is thinking, doing and seeing.

The Operators we will evaluate:

- Make a request on an unconfigured Alexa Device
- Respond to an Alexa configuration request
- Respond to being added to a family group
- Confirm Acceptance into a Family Group
- Make a request on a configured Alexa Device

Target Evaluation:

I will be evaluating the user experience of interacting with Alexa discovering functionality, the user experience, thinking about the value of the feature/task.

Address the requirements:

The location for the prototype execution will cover (as best as possible) the when and where of the execution as well as the context (Questions 2 and 3). The evaluation will address the user's goals and needs as well as the major tasks and subtasks (Questions 4 thru 7). We will know if the prototype has met these requirements by matching the cognitive walkthrough results to the defined requirements and data inventory definitions previously defined.

Preparing to Execute:

I have chosen to complete Qualitative and Predictive Evaluations for the next assignment. I came to this conclusion through a simple process of elimination as I don't feel my prototype is ready for empirical evaluation nor would I have the resources to execute full the empirical plan as defined.

References

Perez, S. (2018). Voice-enabled smart speakers to reach 55% of U.S. households by 2022, says report. Retrieved from <https://techcrunch.com/2017/11/08/voice-enabled-smart-speakers-to-reach-55-of-u-s-households-by-2022-says-report/>

Appendix

Prototype 1: Verbal Prototype

Maps to Idea 1

I am going to start by simulating a user scenario. The user is at a family member's home, and they would say something like "Alexa play The Beatles Live in the living room from Dan's Account," and the Alexa device in the living room of the family members home would start to stream the music content.

So, you ask: What makes this interesting? What's interesting is that Dan is the one who owns the media content "The Beatles Live" (which is a rare Album and cannot be easily purchased), yet he is effortlessly able to play that content at a friend or family members home by just making a request to Alexa.

So, you say: There must be a catch! Now, yes there is a small catch. The catch is that Dan would have to be a member of a “family group” where the content is being streamed. Let’s define the “family group” as a collection of external Amazon accounts that have been granted permission to use the Alexa devices in this friend or family members home.

OK So, how do you add an Account to the family group? Adding Dan to the “family group” would be accomplished with a setup screen in the Alexa App of the family member. Similar to how other Alexa services are configured. Once the account was added, a voice confirmation would be required from Dan’s Account. This would sync the two accounts and tie Dan’s voice to the Authorization.

OK So to set this up in the first place Dan would need to be at his home, correct? Yes, so maybe that the small catch we said above may not be that small. As Dan would have to be at his home in order to pre-configure the system. That is to accept, and voice authenticate membership into the “family group”.

OK, but once the Alexa “family group” is set up it would be as easy to play your music, movies, and books in your friends’ home as it would be to play them in your own home. Yup!

Are you worried about Account spoofing? Yes, current Voice recognition is pretty easy to trick but we could add an additional voice passcode.

Feedback / Evaluation

Requirements meet: This Prototype meets most of the requirements but has a complex configuration process.

Requirements missed: Although not specifically mentioned in the requirements Voice Authentication may not be optimal. A passcode could be added, but this also adds additional complexity.

Audience: The solution aligns well with the defined audience.

Prototype 2: Text Prototype

Maps to Idea 2

Imagine an Amazon Alexa interface that uses your cell phone as a media service hub. It recognizes nearby WiFi Networks and automatically joins networks if it has prior authentication. With the "sharing hub" attached to a family member or friends home network the subscription services and digital media the user owns are instantly available for sharing. Of course, multiple factors of authentication and authorization are seamlessly applied to ensure your content is secure. Let's quickly review the security.

1. You are in physical possession of your phone (the sharing hub).
2. You have logged on to your Alexa service on the sharing hub.
3. You have granted your Alexa service access to your media subscriptions.
4. Your sharing hub has been granted access to the WiFi network of a family member or friend.
5. The WiFi network you are on also has access to other Alexa devices.

Additionally, note that all this handshaking is done only once and remains in place until revoked.

With the hub configured the user can stream content that they own or pay for at a remote location by saying "Alexa play the Iron Man Movie from Dan's hub." Alex identifies the hub and the other Alexa devices on the network, finding the Fire TV as a compatible destination for the movie, the TV is turned on, and the movie content starts streaming.

Feedback / Evaluation

Requirements met: Most requirements are met but there is the additional configuration of both software and hardware which could impact the usability of the services. This prototype seems to align well with security and configuration options of other Alexa devices.

Requirements missed: This solution requires the user to introduce new hardware **need** into the solution ecosystem (the sharing hub). It also adds additional networking **needs**.

Audience: The solution aligns well with the defined primary audience of skilled Alexa Users and early adopters of new technologies. It also benefits the secondary users the kids in this example.

Prototype 3: Wizard of Oz Prototype

Maps to Idea 3

The system recognizes the user's location and identity based on their cell phones GPS and allows for streaming content to nearby Amazon Alexa devices. It is important to note that the cell phone connects to the Amazon cloud and does NOT need to have access to any local Wi-Fi networks. To use the service, start with the wake word “Alex” followed by an “invocation request” (this could be any Amazon service request that you use at home) and then end the request with “From XYZ Account” Where XYZ is the name you have given your Alexa Account. So, for example, “Alex play Iron Man 2 from Dan’s Account”.

Prerequisites

The user has an Alexa Account and Amazon Services that they currently use: Unlimited Music, Prime Movies, Audible. Additionally, the user has the Amazon Alexa App running on their cell phone allowing Amazon Alexa to know their location.

Scenario Setup

The user Anne is at her sister Kathleen’s home who also has Alexa. Kathleen does not own the Iron Man 2 Movie, but Anne does, and the two want to play the movie for their kids.

User Interaction

Anne: “Alexa play Iron Man from Anne’s Account in the living room.”

Alexa: “I don’t know Anne’s Account. Would you like to add an account to the Family group?”

Anne: “Yes”

Alexa: “OK I see the account Anne@yahoo.com nearby is this the Account you would like to have added?”

Anne: “Yes”

Alexa: ”OK I have added this account and sent a confirmations request to Anne@Yahoo.com’s phone”

Anne:<Confirms Acceptance to the Family Group from her phone>

Kathleen’s:<Alexa Device is configured to allows nearby accounts to join without additional confirmation> (This is a configurable option.)

Anne: “Alexa play Iron Man 2 from Anne’s Account in the living room.”

Alexa: ”OK” <The movie starts playing on the Fire TV in Kathleen’s Livingroom>

Feedback / Evaluation

Requirements met: The prototype meets the requirements as defined and additionally it meets the majority of the data inventory questions.

Requirements missed: Although not specifically stated in data inventory. This Prototype adds an additional **need** which is that the user is required to have a cell phone to enable the solution.

Audience: The solution aligns well with the defined primary audience of skilled Alexa Users and early adopters of new technologies.