User Experience Design Take-home Exam

# Voice Assistant Evaluation & Product Design

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## 1. Introduction

In the words of Mark Weiser, father of ubiquitous computing, we are entering an era of "calm technology" where people can easily use technology without being taxed to learn it. Natural user interfaces like voice and gesture are intuitive, delivering a more seamless smarter user experience and is trending the future.

According to whatis, voice assistant is a digital assistant that uses voice recognition, natural language processing and speech synthesis to provide aid to users through phones and voice recognition applications. Voice assistants are used to assist users with tasks including listening to an audiobook, requesting and querying information, making reservations, adding items to a shopping list, performing mathematical calculations and playing music. Popular voice assistants currently include Apple's Siri, Amazon's Alexa, Google Now, Google Assistant and Microsoft's Cortana.

- **Apple's Siri**: Siri is accessed with your iPhone since the iPhone 4S. It works on all Apple products. Siri provides voice recognition services, notebooks, web services, searches, and weather features. Siri uses Google, Yahoo, and Bing for online searches. It has a wide range of voice options and language choices.
- **Amazon's Alexa**: Alexa is created by Amazon, mostly utilized by the Amazon Echo. It does many of the same things that the other assistants do, including making to-do lists, voice interaction, providing real time traffic and weather information and streaming music and podcasts. One of the biggest advantages about Alexa is that it is connected to Amazon so that you can connect your Prime account to make purchases, listen to music on many platforms. You also have access to Wikipedia, Google calendar, and over 5,000 other functions. As a bonus, certain restaurants offer automated ordering with Alexa.
- **Google Assistant**: Google Assistant works with part of the Google Home system and Android systems and Android Wear, using Google technology which works fairly quickly. The biggest advantage is that unlike other assistants on this list, Google Assistant can participate in two-way conversations, making it more helpful in some situations. It is also quite fast and finally, the customer support is unparalleled.
- **Microsoft's Cortana**: Cortana is Microsoft's take on a voice assistant, and is named after a synthetic intelligence character in Microsoft's Halo series of video games. It's available for Windows 10 Mobile, Windows 10 PCs, the Microsoft Band fitness tracker, Xbox One games console, Windows Mixed Reality headsets

and the Android mobile operating system.

With technology including artificial intelligence, machine learning and voice technology developing, users are becoming increasingly exposed to virtual assistants and attached to them. However, current technology used in voice assistants still cannot go beyond single-threaded conversations and into multi-threaded conversations with even basic context. Besides, voice-controlled interfaces and their information organization have their inherent limitations, which make them not a replacement, but an enhancement. This hands-free interaction method, voice interface, needs to be context-specific and situationally-relevant, which influence voice assistants' user experience greatly. In addition, the non-invasiveness and privacy concerns are also important in voice assistant service development.

Invited by a start-up company to evaluate current voice assistant products and propose product ideas, I am going to present my evaluation plan, evaluation findings and product design proposal.

## 2. Evaluation Goal

Before carrying out our evaluation goals, we should bear these things in mind. It is important for us to identify and engage the stakeholders before carrying out the evaluation. Identifying the purpose of the evaluation can reflect the purposes and values that the stakeholders hold, and can help everyone understand the current field situation, benefiting in later product design and marketing phase. Besides, here no business requirement analysis had been done at the moment, and therefore business insight also has to be considered throughout the design. User experience evaluation is different from usability evaluation. It is about how a person feels about using a system, and is beyond pragmatic utility and usability. It is subjective, holistic, emotional and long-term.

Our evaluation goal is to provide an overview of current voice assistant products' market and get some basic information about their end users, evaluate their user experience and help in later product design.

## 3. Evaluation Methodology

### 3.1 User Profiles

First, we need to gather the characteristics of our end users to help make design evaluation and decisions. Users include those who interact directly with the product, who manage direct users, who make the purchasing decision, who use competitor's products or similar products, and those who are now non-users. Here we focus on the characteristics of voice assistants' direct users.

We are going to use questionnaires directly and in an unambiguous way to get basic information about our users, which can lead to a persona. For sampling part, we should

bear in mind that the sampling should be representative for the target voice assistant user population, and should motivate response. In order to valid the survey, some pilot tests are desired. Considering the sample size and effective sampling method, we are going to analyze some published voice assistants' user survey results and construct persona out of our analysis. Remember we should classify users into newbies, intermediates and experts, for later design phase.

### 3.2 User Requirements

Interviews are effective in gathering user requirements. Giving time and resource constraints, we will not use focus groups here. Considering the trade-off between structured and flexible interviews, since here we want to explore possible user requirements that have not been observed by the current market, we will choose to conduct semi-structured interview. Be careful about not to ask leading questions, ambiguous questions, hypothetical questions and do not ask users to be the designer.

Some sample questions are provided here:

- Some basic demographical information.
- Have you tried voice assistants before? Which product do you like most?
- What is the best thing and the worst thing of your voice assistant?
- When was your last time to use your voice assistant? Can you recall the feeling during and after you used it?
- When do you usually want to use your voice assistant?

Both online and offline interviews are carried out, and the sample size is 5 people. Standard procedures including introduction, getting consent, warm-up, main body and closure are followed.

### 3.3 User Tasks

We need to figure out what the users want to achieve. Here we will collect detailed task scenarios from our end users to help drive the design of task workflows, with knowing their required knowledge and skills.

From the interview described in Section 3.2 and the observation described in Section 3.4, we will be able to analyze how users perform their tasks by paying attention to their actions while using voice assistants. We will be able to get their goals, end results, their tasks and their actions. Brainstorming is also used in this part of analysis. Use cases, which is a sequence of transactions in a system whose task is to yield a measurable value to an individual actor of the system, are used in later iterative product design and debugging phase.

### 3.4 Using Scenarios

We also need to conduct work environment analysis to assist in evaluation and later design. Direct observation is the most straightforward approach of user study. Below is a structured framework to guide observation (Robson, 2014).

| | |
|---|---|
| **SPACE** | What is the physical space like and how is it laid out? |
| **ACTORS** | What are the names and relevant details of the people involved? |
| **ACTIVITIES** | What are the actors doing and why? |
| **OBJECTS** | What physical objects are present, such as furniture? |
| **EVENTS** | What is you observe part of a special event? |
| **TIME** | What is the sequence of events? |
| **GOALS** | What are the actors trying to accomplish? |
| **FEELLINGS** | What is the mood of the group and of individuals? |

Table 1. A framework to guide observation.

Pay attention to the similarities and differences across people, their workarounds and hacks, and their errors. In our evaluation we should be passive observers, and correctly handle acceptance and sensitive topics. After observation and according to Crabtree 2007, we are expected to collect activity descriptions, rules and procedures that govern particular activities, recordings and informal interviews. The sample size is 3 people.

Note that intended observation can make some using scenarios not spontaneous, and some true scenarios may be hard to observe. We also integrate diary studies, in which we encourage users to record their related tasks while using voice assistants, the environment and their thoughts and feelings.

## 4. Evaluation Rules

According to Quesenbery's five Es (2003), we will evaluate the user experience from the following scales:

- **Effective**: The completeness and accuracy with which users achieve their goals.
- **Efficient**: The speed (with accuracy) in which users complete their tasks.
- **Engaging**: How pleasant or satisfying the interface is to use.
- **Error tolerant**: The ability of the interface to prevent errors or help users recover from those that occur.
- **Easy to learn**: How well the product supports both initial orientation and deeper learning.

## 5. Recruitment Plan

Research participants can sometimes be controversial, so we will keep stakeholders informed periodically by sharing the details of the recruits as they are scheduled. But we should not include participants' names and identifying information in plans, and use numbers (P1, P2, etc.) instead to preserve their privacy.

To design recruitment announcement, we should state who we are and our purpose, why their response is important, how the answers and recordings will be treated with

confidentiality and anonymity, and provide clear instructions and time details. Participants can be recruited via WeChat or Facebook. Remember employees should not be recruited for analysis, but they can be suitable for pilot studies.

## 6. Results

### 6.1 The Targeted User Population

In order to cover a non-biased and large enough sample size, and due to time limits, we use survey results conducted by three survey websites to get information about our target user population and construct a persona.

A. User habit and characteristics:

In Ask Your Target Market's survey in 2015, 37% of the 400 respondents said they've used voice assistants at some point. Siri was the most popular among those respondents; 62% said they've used Apple's Siri feature. 40% have used Google Now, a popular Android assistant. And 24% have used Microsoft's Cortana assistant.

In MindMeld's January 2016 survey, over half of voice assistant users (55%) said they used smartphone voice assistants daily or weekly, an increase from the previous quarter. Smartphone users make use of voice assistants most commonly in the home, with 43% according to MindMeld. Use while driving ranked second at 36%. Roll out of voice controls for a broader range of devices in smart homes will therefore pull in more users, and cause existing users to make greater use of intelligent voice assistants.

In general, according to a survey conducted by Eric Enge in 2017, people were more comfortable using voice commands when by themselves first, then with friends next, and then not so much with people they don't know very well. As an exception to this, people feel a bit more self-conscious about doing so when in a restaurant by themselves, and the presence of friends made them more likely to use voice commands with their smartphones. Nearly 10% more men are willing to use voice commands than women. When in public areas, such as at a restaurant with friends, at the gym, in a public restroom, or in a theater, there is a definite tendency for those under 24 to use voice commands quite a bit more than the other age groups

B. User opinions:

Overall, in Ask Your Target Market's survey, 73% of those who regularly use voice assistants said that they are at least somewhat satisfied with their functionality. Siri users were 2% less likely to be satisfied with their primary voice feature than the overall panel. Google Now users were 5% more likely to be satisfied with their voice feature. And Cortana users 3% more likely to be satisfied than the panel as a whole. This is probably because Google and Microsoft's powerful search engine can provide a better assistant experience.

In MindMeld's survey, 48% said they were satisfied with their voice assistants, despite seeing room for improvement. Recognition of basic speech was one of the primary areas respondents said could be improved. However, more users said natural language understanding and search accuracy could be improved in the latest quarterly survey. 72%

said they would use intelligent voice assistants more if these improvements were made. Use of voice activated controls varies among app types, and voice users make use of approximately twice as many apps as non-voice users. They're also looking forward to using voice assistants to interact with more types of apps. Half of those that said they use music apps said they want voice controls for them. More than 40% said the same for shopping, travel, video and local service apps.

C. Persona:

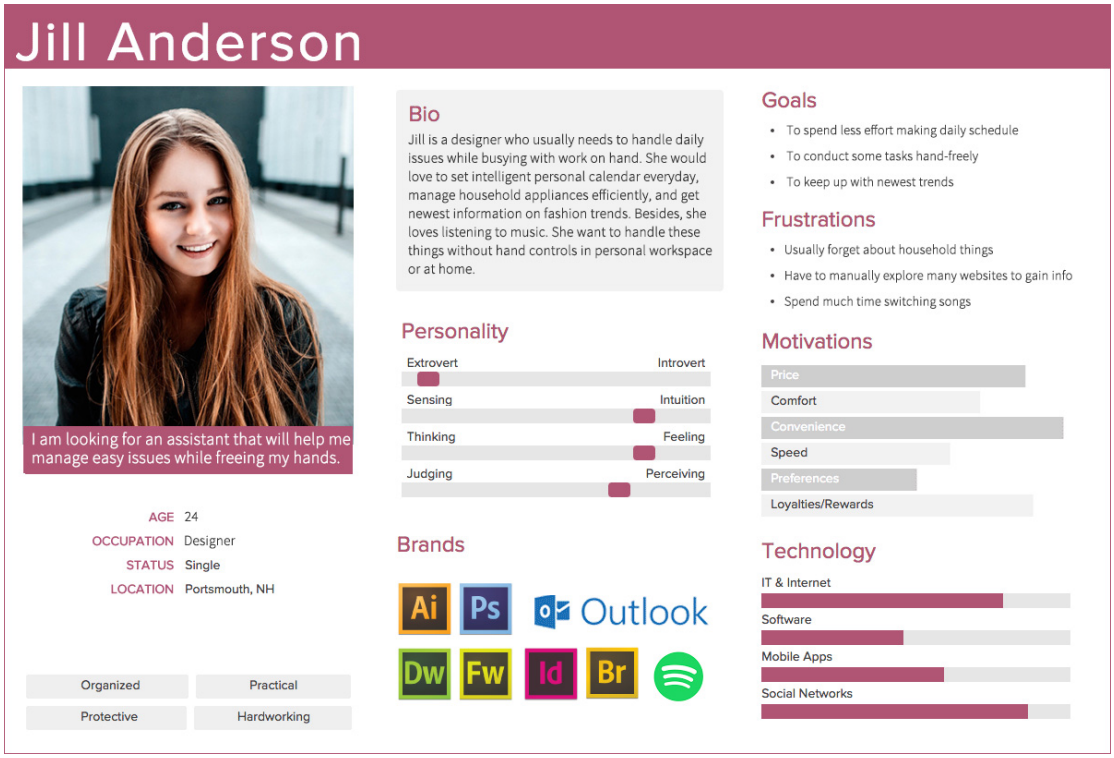


Figure 1. A persona for voice assistant users.

### 6.2 Satisfied User Requirements

We summarize our satisfied user requirements here:

- Efficient natural language understanding.
- Immediate response.
- Easy to use and can be controlled with common instructions.
- Good context interpretation and accurate user content forecasting.
- Be interesting enough to encourage users to keep using.
- Conversational and entertainment functions are not so important, usually given up after several tries out of interest.
- Multilanguage can be an advantage.
- Should provide low-error-rate and accurate experience as for those useful functions which people tend to multitask, such as setting reminders, navigation, information query, making phone calls and making orders.
- Allow personalization, therefore having special communication styles, and

making it easy to repeat routine functions such as setting alarms and call frequent contacts.
- Special design should be considered for visually impaired people.

Some most common features include:
- Language option.
- Read the news.
- Control the music using voice.
- Find information via search engine by giving instructions.
- Get weather forecasts.
- Translate into words and voices.
- Connection with social media.
- Take notes.
- Set reminders. Manage personal calendar.
- Get local information conveniently.
- Easily get navigation and can be easy to follow.
- Remotely control devices.

**6.3 User Experience**

According to the 2017 voice report by VoiceLabs, most users will not buy a competing voice assistant device once they own one. Therefore, customers are viewing the devices as about the same, while indeed the devices are quickly specializing. Daily life management and specialized functions like smart home controller are among the most important functions for most users. According to VoiceLabs, below are the specialization trends for several giant companies currently:
- Google is going to excel at mining the web and providing intelligent responses to general knowledge questions.
- Amazon is going to excel at commerce.
- Google and Microsoft should excel at email, contacts and calendar.
- Microsoft has a huge opportunity to excel at gaming.
- Google and Amazon are going to battle for hands-free TV and home automation.
- Apple is betting on AirPods for on-the-go use cases, and should have an Apple TV voice strategy.
- All players will battle to become the go to controller of the kitchen, living room and bedroom.

We evaluate the user experience for Apple Siri, Microsoft Cortana, and Amazon Echo, by experiencing and search for experience report articles on internet. This can provide some ideas for our product proposal, trying to find potential business opportunities.

A. Apple Siri

Siri has the advantage that it has already got the Apple ecosystem. Siri does a good job in calling a uber, providing routes plan, and searching information online. However, when comes to functions such as composing an email, Siri only allows for Apple Mail.

As for music platform, it also only supports Apple Music. For natural experience, it should improve its compatibility with other platforms. Besides, for functions such as reading tweets, Siri has to be triggered using certain specific phrases, which degrades its easy to learn. Besides, if ask about the weather forecasts, Siri won't provide detailed forecasting results, which is not hands-free.

B. Microsoft Cortana

Cortana has got the Microsoft ecosystem for supports, and can make the best use of Bing search and Windows Maps etc. However, it does not provide a good context understanding. For example, if Cortana asks the user for selections and the user says "the first one", it will search for "the first one" but not the first choice that the user meant. This corresponds to the engaging part of user experience. When asked about current traffic, Cortana merely brought up a widget full of info, and users have to click to get the information they truly want. This degrades its efficiency. As for music, it only supports the music platform Groove Music service, and its compatibility should also be improved.

C. Amazon Echo

Amazon makes it easy for users to build Alexa voice applications, most of which are in News, Trivia and Educational categories. Music Streaming and Books, Home Automation, Games and Entertainment and News dominate. As reported by VoiceLabs, Home Automation stands out as a category with relatively few applications, but remains top-of-mind as a core use case. Games and Trivia stood out as a category with a high number of applications, but relatively few big winners. Besides, many independent developers cannot guarantee the quality of those applications. In this case, its experience is effective but with much room to promote application utility efficiency. However, it currently misses platform capabilities like social awareness, which impair its engaging experience.

## 7. Product Idea Proposal

A. Prior thoughts:

From the analysis above, we can get some design implications. And we should bear in mind some design principles before constructing the proposal. We should always make the design process iterative, and remember to involve users throughout the product life cycle. User centered design does not mean presenting users with all the information they need, which is especially inefficient and unrealizable in voice interface condition. Voice assistant cannot make decisions for the users, and does not necessarily mean automation.

B. Product core characteristics:

Since we are a start-up company, it will be hard for us to develop products that can compete with current giants in this market regarding rich information and high-technology. We will focus on a segmented customer group, and design products that are

considerate and can provide better user experience. Considering the following issues that current voice assistants seem to have:

- Mobile applications using voice control have large quantities but low quality, leading to low customer usage. This can reflect that users tend to use voice control out of intention but not just for fun. Besides, too much frequent app switches may provide interrupted feelings for users.
- Voice control are not private enough when at public places, and can be annoying to other people sometimes.

Therefore, we will focus on developing voice assistant products in less public occasions such as home, and our assistant's functions should be necessary to control using voices. And we will try to minimize third party applications.

C. Product functions:

- Schedule personalized housework plans and household target management, and be able to remind users regularly.
- Allow remote control for smart furniture and electricity.
- Play music, TV series or news report under users' voice control, to let the users easily multitask.
- Provide household tips such as recipes.
- Send messages and phone calls using voice control accurately.
- Allow personalized settings, including setting of name, gender, language and personality of the assistant.
- Be able to distinguish family members, and allocate different authority levels for them.
- Let user monitor the current condition of the house easily. For example, the temperature, power level of devices, the timing of washing machine, etc.

D. User experience design:

a. Socially-aware, which is, allow family members to interact and supervise the house together.
b. Natural guidance and smooth experience to conduct basic functions.
c. Light and easy to control, but allow personalization and function extension according to user preference.
d. Show the minimum amount of information to users and minimize the chance for them to operate using hands.
e. Try not to be too smart, and instead let users feel in control all the time.
f. Be compatible with current giant platform builders such as Amazon, Google and Apple for the time being.

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