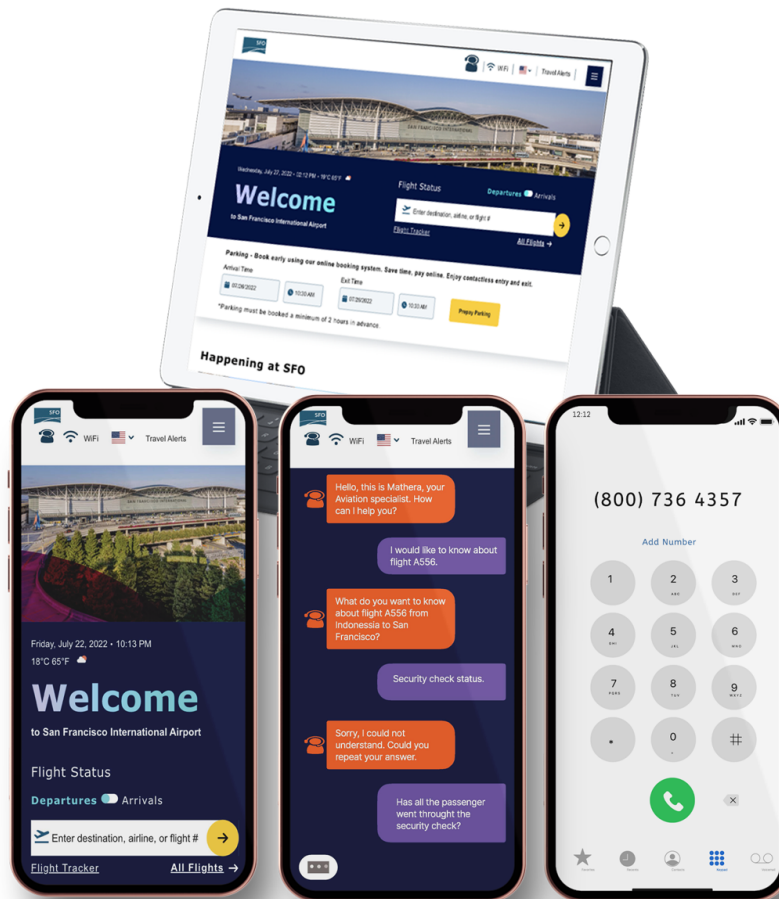# San Francisco International Airport Virtual Assistant

CS160 Summer 2022, UC Berkeley

Group 17

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Description of target users

The target users are travelers with flight plans such as travelers who drive to the airport, senior citizens, people with difficulty in seeing, and Lyft/Uber drivers. When these users want to get information about a flight or the airport, they can call to get the information they need without the need for internet or typing. Senior citizens would prefer this service since they might find an online application harder to use. The Lyft and Uber drivers could also retrieve information when they are driving on how crowded the airport is, so that they can better plan their schedule for picking up a passenger. People with difficulty in seeing would also use this service since it does not require any visual interaction to obtain the information.

Description of target context

Catching a flight is the most stressful task. When people are hurrying to the airport, it could be hard for them to retrieve information about their flights if they are driving or don't have access to the internet. A VUI system of the airport can help resolve the problem by allowing the users to get the information they need hands free.

Interviews

Recruiting Message

Voice User Interaction with SFO Airport Calling System: Call for participation

Hello everyone, we are two UC Berkeley undergraduate students studying user interface design and development.

Currently designing a voice user interface for SFO airport, we want to invite you to participate in a brief interview (approximately 10 minutes) on your experience of interacting with the existing SFO website and services. Learning about your user experience really helps with our understanding of the current pain points and our design process! *Note that participants will **not** be compensated in this study.*

If you are interested in participating, please email sjailani@berkeley.edu or catherinerao@berkeley.edu. Feel free to reply to this message with any questions.

Interview Guide
1. How frequently do you fly from SFO?
2. How do you usually find information about your flight or the airport if you plan to take off from SFO?
3. What platform do you typically use to obtain this information(mobile, desktop, tablet?)
4. **What sort of information do you need to share with the platform/service to get the information you need?**
   a. Do you feel comfortable sharing this information?

5. What are your present frustrations / pain points with the current system?
6. How do you often go to SFO if you need to catch a flight?
7. **What information do you usually gather before you head off to the airport?**
8. **How would you check your flight status or airport-related information on your way to SFO?**

Table of Interview Participants

#	Brief Description of Participant	Interview Length
1	A product manager working in the Bay Area who travels 5-10 times a year departing from SFO	10 min
2	A bachelor student in business administration who works as a part time Uber driver living in Sacramento.	10 min
3	A master student from NYU who currently resides in Berkeley.	10min

Synthesized Findings

1. Users are very used to and relying heavily on internet service these days when they try to access information. Although the way for users to obtain information about flights varies from person to person, we did find that all three users try to obtain information they need by accessing certain online services such as mobile apps or search engines. This means that the VUI system won't be the default choice for general users under a majority of circumstances, so we need to focus our VUI design on only handling specific scenarios such as when the users don't have internet connection.

2. Users want speed and efficiency when they want to get the information about their flights and the airport. One user mentioned that he would call to check for flight status when he lost internet connection on his way to the airport. However, he would prefer not to call for information because they think that customer service hotlines are always busy and it's slow to get the information they need. It would be helpful if our VUI system allows users to get their needed information as quickly as possible.

User Persona

Hi, meet Sam. He is an Uber driver and frequent traveler. He always stresses out when he has a flight from SFO. He needs to travel 3 - 4 times a year, and every time he thinks about not missing the flight. He wonders why the flight schedules are fluctuating so much, and if he can find a way to get real-time information about the arrival board, departure board, and expected waiting time. Moreover, when he is working for Uber, he finds the airport pickups very challenging. Because there is always a big line and the Uber application does not tell him about the expected waiting time. In addition, whenever his parents or one of his friends asks him to pick them up after an international flight, he knows that his day is gone. There is no way for him

to know if all passengers are checked off and waiting in the pickup area or not, therefore he has to drive and see if they are present in the pickup area or not. While driving from and to the pickup area he can not gain information regarding his friend or relatives hands-free. He is very frustrated with the current system that SFO offers and wishes for an improvement. He would love to use an automated system if available to get all the information.

System Persona

Hi, meet Matheera. She is a 21 years old gender neutral person. from the San Francisco area. She is very friendly and speaks professionally. She is an aviation enthusiast and knows everything about airlines, airliners, and airports. She is very polite and does not speak when others are talking. Moreover, she can speak English, Spanish, Cantonese, and German fluently. She speaks elegantly in a low pitch without any vocal fry. She is a speech-language pathologist and knows exactly what pitch to combine with the information for a better understanding. Although she can not see, she has exceptional audio observation skills. She can figure out the mood of the speaker from their speech. She sympathizes with the speakers if they feel low, and makes them feel comfortable.

Narrative Scenarios

1. Sam finds out about Mathera from his friend Jack. Jack tells him that he used Mathera by calling (1 800 air help), and the experience was smooth. One day Sam had to pick up his mom from the airport. He did not know if the plane had landed and all the passengers had checked off or not. There were a lot of police patrol cars around the airport and he could not use his phone to get the information. He was very worried and suddenly remembered that Jack had told him about Mathera. He called Matheera using Siri and asked him if all passengers from flight A556 had been checked off or not. Mathera responded that all passengers will be checked off in 10 minutes. 27 passengers are waiting in the check-off queue. Sam was very happy and timed his arrival exactly at the time his mom was in the pickup area.

2. Sam travels to Singapore for the first time. He did not check the things that are legal in the USA but illegal in Singapore at home. Moreover, he is driving his car and does not know where to park his car at the airport. He is already late and can not pull up to the shoulder to check the information he needs. He remembers Matheera and calls the hotline. He asks Mathera about the things that are legal in the USA and illegal in Singapore. Mathera without any delay tells him a list of everything he can not do in Singapore. Moreover, Sam asks Matheera where to park his car and the pricing. Matheera walks Sam through the whole process, finds the best parking package for his car, and navigates him to the spot as if someone was sitting with him in the car. Sam is so happy and thanks Matheera for the service.

3. Sam is out to make some extra money by working for Uber. He thinks that the airport passengers are very gracious and give very good tips, however, he does not like the long wait in the Uber parking log in SFO. He calls his friend Max and asks him if the queue is so long and what he thinks about the expected wait time until assigned a trip in the app. Max doesn't know anything and is as confused as Sam. Sam remembers that SFO has launched a new VUI system that tells the users about everything regarding

airport-associated stuff. He calls Matheera and asks for information about expected arrivals, departure, the security check, immigration queues, and what time the airport will get busier. Based on the information he decides not to go to the airport, and drives in the city. This makes him make more income in a short amount of time.
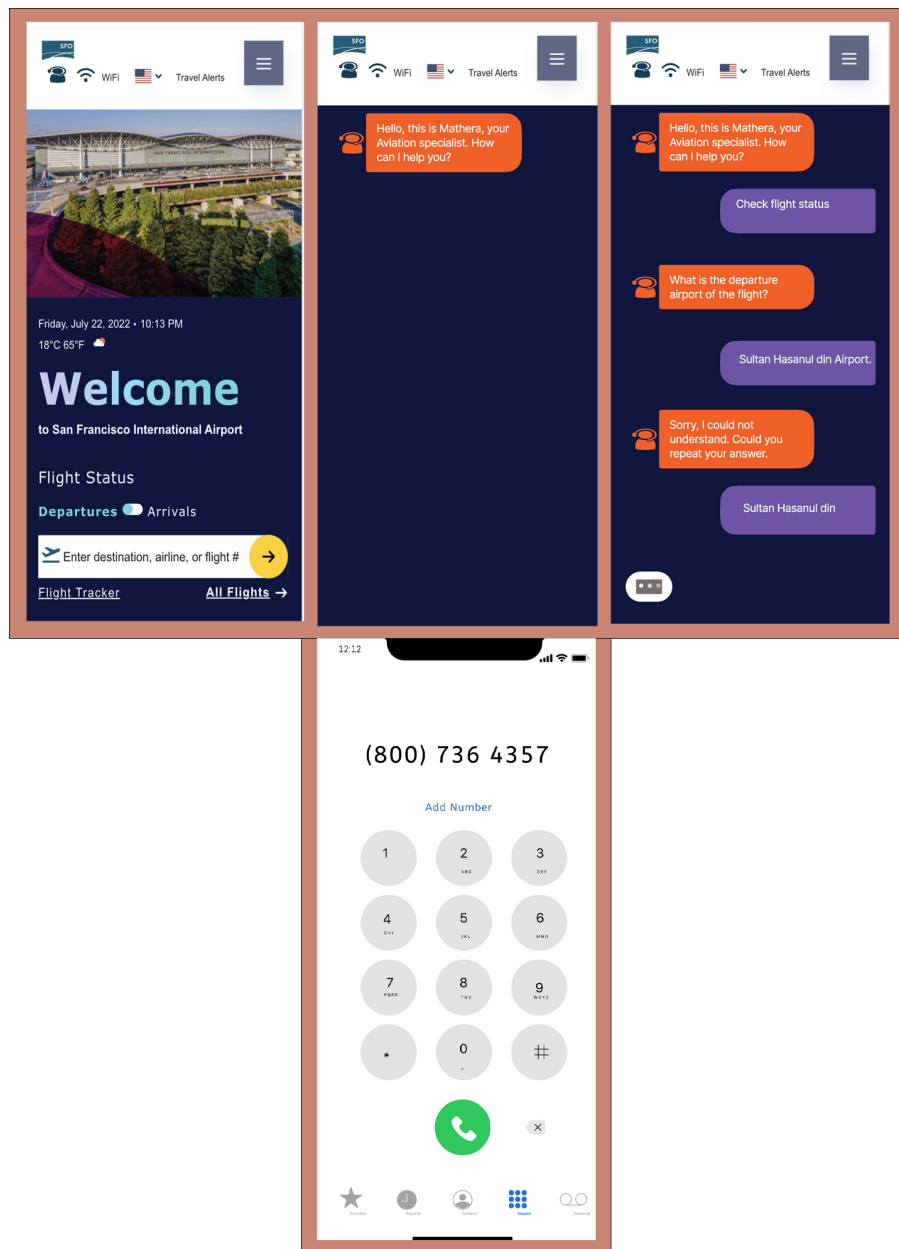
Figma Prototype

Description of Interface and Interactions:

The interface is very easy to use. We are proposing to add an assistance icon in SFO airport's website. This icon will launch the VUI system which will be operated by voice only. A user asks their questions after the system finishes talking. Moreover, the user can directly call Mathera by calling +1 (800) SFO HELP.

Screenshots

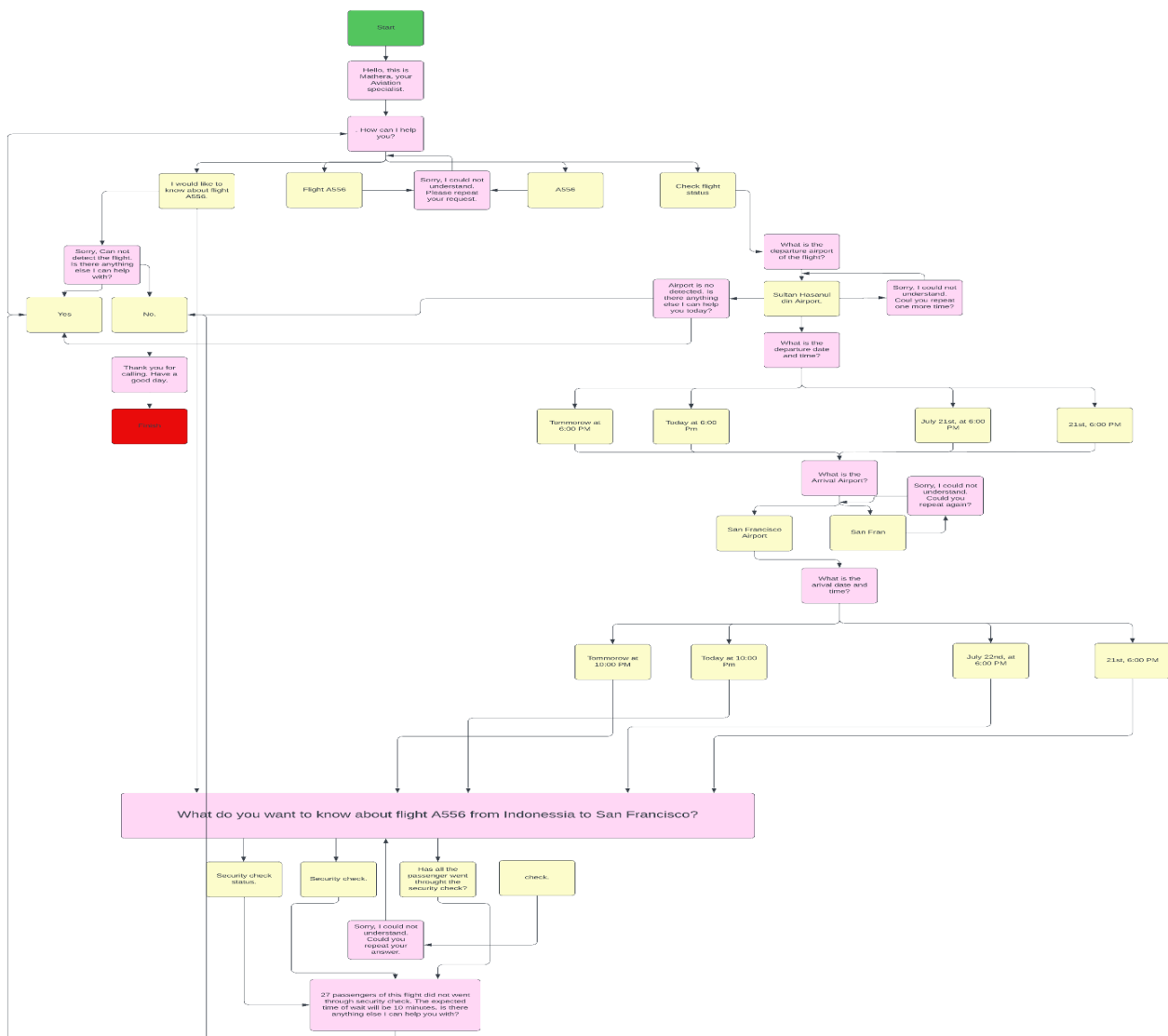The top three screen shots are showcasing the add-on interface on SFO's website.
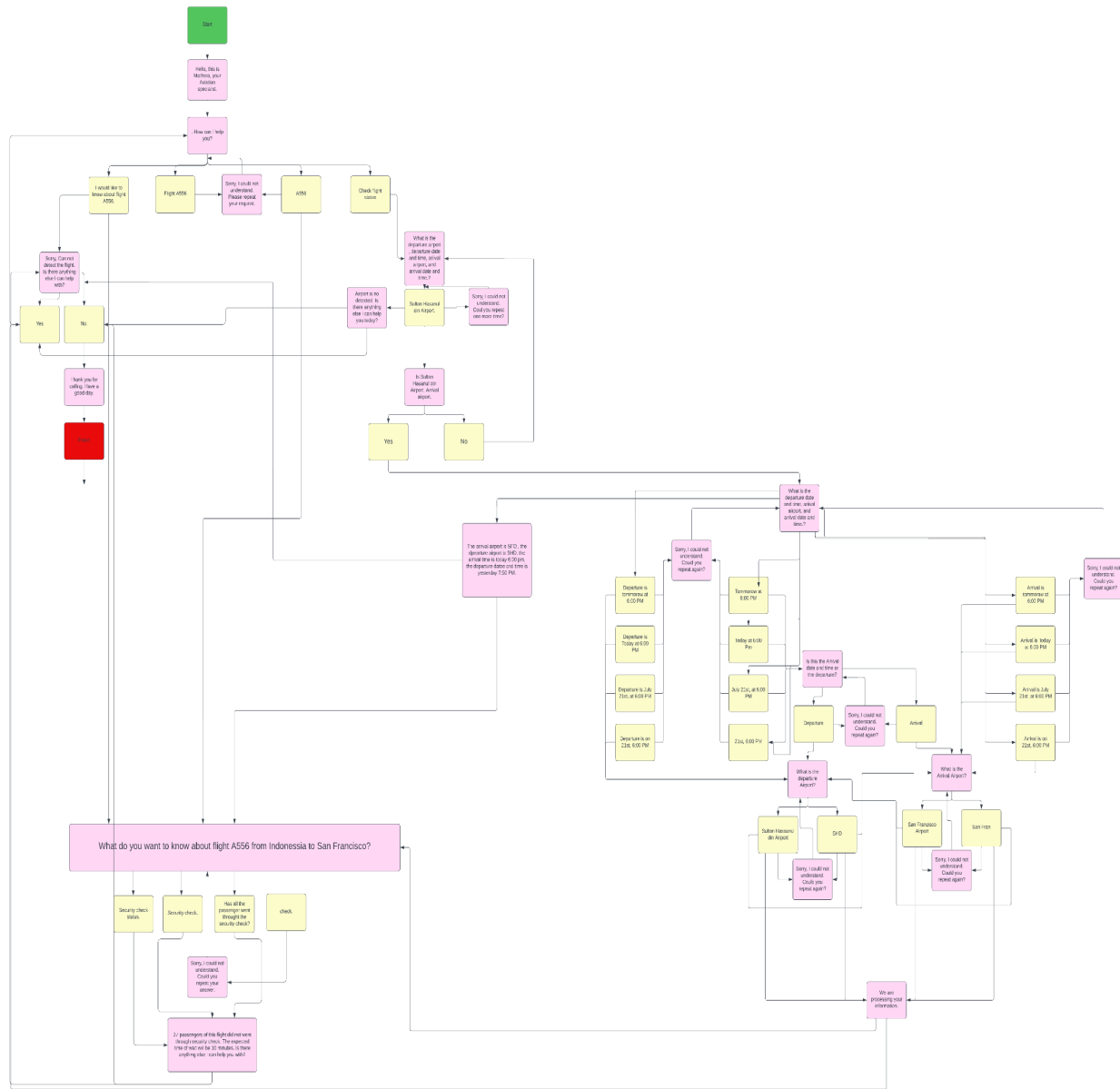
Dialogue Flow Charts

The controlled flow asks for one piece of information in each question, whereas, the treated flow asks for multiple pieces of information at the same time and follows up with questions asking the missing pieces.

Controlled:

Treated:

Experiment Design & Results

Key Question	Is it better to ask the users to provide one piece of information at a time or multiple all at once?
Hypothesis	Asking the users to provide multiple pieces of information at once (and ask for any missing information as needed) is a more time-efficient system design compared to asking the users to provide one piece of information at a time.

Independent Variables	Independent variables: <u>the number of pieces of information a user is asked to provide within a single question</u> by the VUI system. We can conduct the experiments by asking the questions designed in our original Dialogue Flow altogether at once, and see if more iterations of Q&A are needed because of incomplete information in the users' response.
Dependent Variables	The dependent variable is <u>the expected time a user needs to obtain the information he/she needs</u>. It is a measure of efficiency of the system.
Instrumentation	The quantitative data to measure the dependent variable (i.e. the expected time a user needs to obtain the info he/she needs) is the <u>number of nodes in the flow graph a user walks to before reaching a goal answer</u>. We assume the cost of walking each edge is one unit.
Survey Questions	1. We will be collecting the cost of reaching a goal state as explained in the instrumentation part. 2. We will be asking users the following questions at the end of both tasks. a. On a scale of 1 - 5, how do you like answering multiple questions at once? b. How many words should a question consist of for the best comprehension?
Within subjects or between subjects	We will perform a <u>within subjects experiment</u> since we want to compare two ways of asking questions by the VUI system for the same user to obtain the same information. We need to control the subject to compare which way of asking questions is more efficient.
Tasks	The participants are expected to take part in two short interactive sessions with our system and answer a short survey at the end. Each of the two interactive sessions will take 3-4 minutes and the survey will take 1 minute. In both of the interactive sessions, the user needs to complete the same task of acquiring the needed information about a flight as described in the given prompt. In the first session, the user will be asked to provide multiple pieces of information at once to retrieve the needed information. In the second interactive session, the users will be asked to provide one piece of information each time so as to reach the needed answer.
Participants	Johannes Fung, Luis Navarrete Rios, Oliver Pan
Conditions	Each user was tasked to retrieve information about the security checkoff status of a flight by calling our VUI system given the arrival

	airport, date and time, as well as the departure airport, date and time of the flight we provide. The study has been conducted remotely over the zoom.
Results	The number of Q&A between the user and the system(i.e. the number of nodes in the diagram flow) is significantly lower in the multiple-questions-in-one system design than in the one-question-at-a-time design, as is expected. However, 3 out of 4 participants favor answering the question once at a time over answering all the questions bundled together.
Reflection on Hypothesis	Although the results of the usability test confirm our hypothesis that "Asking the users to provide multiple pieces of information at once (and ask for any missing information as needed) is a more time-efficient system design compared to asking the users to provide one piece of information at a time", the debrief interviews with the participants on their user experience tell us that a time-efficient system might not provide the best user experience. Although asking and answering all the questions at once is more time-efficient, the users generally find it easier to parse information and tell information in the one-question-at-a-time interactive mode. They believe it's easy to miss or forget some part of the needed information if the questions are asked and answered all at once. The participants also all agree on the fact that the question should be as short as possible for better user comprehension. The interview results remind us that designers should consider not only the system efficiency during the design process, but also the balance between the efficiency and the user experience.