Supporting the Aviation Industry: a Traveler-Centered Approach

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ABSTRACT

The aviation industry is fundamental to today's connected global economies, rapidly and effectively linking people, places and cultures. However, aviation struggles to provide a high quality of service; air travelers typically report dissatisfaction and frustration with their experiences. This paper describes fieldwork in the form of 63 interviews that aims to understand the needs of air travelers in order to improve user experiences during and around air travel. Three themes from this traveler-centered user research process are presented and the design of FlyTalk, a mobile phone application inspired by this data and tailored to the needs of air travelers is described. FlyTalk collates existing information about airports and their procedures, presents this to users in a location and context aware interface and seamlessly integrates social media features connecting travelers with both their service providers and each other. This paper argues air travel is an important but overlooked domain for HCI practitioners and that mobile applications that meet user needs in this scenario have the potential to reduce travel costs while improving traveler satisfaction.

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Air travel, airport, user-centered design, mobile application

ACM Classification Keywords
H.5.2: User Interfaces—user-centered design

General Terms
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INTRODUCTION
Aviation is a critical and unique industry. It provides the world's only rapid global transportation network with over 2,000 airlines flying to 3,750 airports and transporting more than 2.2 billion passengers annually. 40% of international tourists travel by air while increased ease of business travel has contributed to the growth of global business services (estimated to be worth USD 1.3 billion in 2006). Aviation is estimated to account for 7.5% of the global GDP and supports over 33 million jobs worldwide [1].

Despite the clear contribution the aviation industry makes to the global economy, travel remains a frustrating and often unpleasant experience for actual air travelers. These low satisfaction levels directly affect the aviation industry. A study by the U.S. Travel Association in June 2008 reported that frustration with air travel caused avoidance (cancelation or opting not to travel) of an estimated 41 million trips per year. The cost to the US economy was reported to be more than $26 billion, including $9 billion lost revenue from airlines, $6 billion from hotels and $3 billion from restaurants. Federal, state and local governments reportedly lost more than $4 billion in tax revenue because of reduced spending by travelers [2].

The aviation industry is also notoriously sensitive to the prevailing economic climate. In recent years, airlines and airports have responded to decreasing profit margins by increasing the number of flights and routes, airline mergers, code sharing and offering 'no frills' flights [3]. This paper argues that the aviation industry's efforts to sustain itself in these conditions are one sided. Although it has adapted to deal with external factors such as increased fuel costs, poor weather conditions, a weak global economy and concerns regarding international security, it also needs focus on vital internal factors that can support the industry, namely improving the quality of the air travel experience. Airports, in particular, are sensitive to such issues. They sustain their infrastructure through charges to airlines and air navigation service providers, fees that in 2006 amounted to USD 42 billion and are typically passed on directly to air travelers as compulsory ticket charges [1].

The ultimate goal of this research is to improve the air travel experience by making air travelers more satisfied, which this paper argues can have knock on effects of

driving up revenue for the industry whilst simultaneously lowering prices for the traveler.

RELATED WORK

The air travel experience has attracted significant attention from HCI researchers. With the increase in mobile phone usage and navigational complexity at airports, way finding and calculation of wait times at the airport has proven to be a fruitful research area [4, 5, 13]. The prevalence of smartphone use while traveling has also spurred interest in applications that customize the travel experience [6, 7]. Researchers have also studied travelers in situ, leading to insights and guidelines relating to user needs [8, 12]. Several commercial applications also provide services that support the air travel experience: TripIt (www.tripit.com/) manages and maintains itineraries and travel documentation; GateGuru (www.gateguruapp.com/) and goHow Airport (www.ionosplatform.com/mobile/) provide navigational support and crowd-sourced wait times, reviews, ratings, travel tips and photos of airports and their services; NS Reisplanner by Schiphol airport (m.ns.nl/) lists all airport services and aids in navigation. Many airlines now also offer their own smartphone applications to help coordinate and manage travel activities. However, despite current commercial and academic solutions to the everyday woes afflicting air travel experiences (poor customer service, flight delays, baggage mishandling), there is still little research exploring genuine user needs during travel and applying findings from these process to the design of mobile technology.

DESIGN PROCESS

To maintain a focus on the air traveler, a user centered design process was conducted. User research was performed between February and May 2011 in three European airports: Funchal (Madeira, Portugal), Lisbon Portela (Portugal) and Amsterdam Schiphol (the Netherlands). Diary studies were also performed with travelers from around the world. The three airports were specifically chosen to capture travel experiences at small, medium and large airports. All three are international airports and, according to 2010 figures, Funchal handles approximately 60 flights each day, Lisbon roughly 400 and Amsterdam 1100 [9]. Schiphol airport also represents best practices; it is rated as a top European airport [10].

A total of 63 travelers participated using seven different methods; guided storytelling (seven users), retrospective interviews (21 users), fly on the wall (three 20 minute observations sessions), make tools (13 users), diary studies (11 users), bodystorming (three users) and personal inventory (seven users). Most participants completed a session involving more than one research method and, as the series of studies proceeded, methods were included and excluded according to researcher's subjective assessments of what was effective and in order to focus on different aspects of the travel experience. Research participants were not compensated.

Analysis and consolidation of these research findings generated a set three themes relating to unmet traveler needs. This was used to drive an ideation stage where three design candidates were conceptualized. A final concept was chosen from the three and an iterative process of prototyping and testing with users was conducted. Three iterations of concept development were performed beginning with low-fidelity paper prototypes, to high-fidelity paper prototypes and finally to a functioning digital prototype implemented using the Sencha Touch API on an Apple iPhone. These processes are unpacked in the following sections of this paper.

FINDINGS FROM RESEARCH

Three major themes relating to the needs of the air traveler were ultimately identified during user research. These guided the design of a traveler-centric solution. These were:

1. Control and Information Manageability

Travelers desire control over their trip but are often put in situations in which they feel powerless. Our research showed that this loss of control often results from information overloads or lacks. Some participants complained that they had too much information to manage: managing their itinerary; handling their travel documents and baggage; navigating the airport; arranging ground transportation; dealing with specifics of currencies, dietary requirements, accommodation and shopping. Others reported strains and stresses from having too little information, particularly inadequate documentation of ground transportation options and security processes.

2. Infrastructure and Procedural Complexity

Variations in airport procedures were reported as a major cause of traveler frustration. This factor relates closely to information lacks. Likewise, poor technical infrastructure contributed to user dissatisfaction. Participants cited poor support for charging electronic devices and confusing Internet connectivity options as major annoyances.

3. Customized experiences

Travelers come from highly diverse backgrounds, with varied preferences and characteristics. Participants reported feelings of vulnerability whilst in foreign airports with cultures or languages different from their own. These participants desired that the airport be an extension of the comforts they were used to at home. Also, although participants understood that waits are an inevitable part of air travel, whether due to mandatory procedures (e.g. security and baggage pickup) or unscheduled problems (e.g. flight delays) they reported they were a continual source of frustration and frequently led to stress or boredom.

DESIGN OF FLYTALK

Analysis of research findings guided the ideation and concept development phases and led to the design of FlyTalk. FlyTalk is a context aware application that meets

the needs of the air traveler by providing them with relevant information at the right time to ensure a seamless travel experience. The design of FlyTalk was based on the research findings and inspired by the growing importance of social media technologies in the travel industry [11]. FlyTalk addresses the needs of the air traveler by providing three levels of information: a base level of existing information, a middle level of context-aware information, and a top level of social information.

Base level: Existing information

User research revealed that the most common cause of traveler frustration at the airport relates to information lacks especially those concerning airport procedures. FlyTalk addresses this using a context aware itinerary feature that organizes existing information on all airport checkpoints relevant to the traveler, in particular focusing on the procedures to be followed at each. This is shown in Figure 1. It achieves this by creating a list of the stages and steps a traveler is required to go through for a particular flight and at a particular airport, providing optional links to detailed documentation.

Middle level: Context- aware information

The middle level provides context-aware information that updates dynamically based on the traveler's flight details, time, current location and airport spending habits. This contextual information is used at several points in the FlyTalk application: it powers a dynamic map showing the traveler's route through the airport; it highlights wait and walk times on the itinerary and map; it is used to calculate total free time remaining prior to boarding; to display airport services based on the traveler's current location and previous spending habits; to provide wait times for food at airport restaurants. Figure 2 shows an example of this contextual data at work through the service list. The design of these contextual services was intended to ease decision making by providing customized and pertinent data while ensuring travelers are up-to-date with dynamic changes to their itineraries, for example updates to boarding time or boarding gate.

Figure 2. FlyTalk Service List, showing location awareness guidance to facilities in an airport.

Top level: Social information

FlyTalk integrates social media based on *feeds*, or streams of short textual messages as popularized by Twitter. These are illustrated in Figure 3. FlyTalk feeds encompass messages from official sources, such as announcements regarding flight delays or security procedures.

It also presents information from businesses, such as restaurants within the airport advertising discounts. Finally, travelers can also post messages, updates and opinions. These feed streams are highly targeted. Through combining smart itinerary features with automatic management of tags (e.g. by using automatically generated unique tags in the form of airport and flight codes), all users are able to rapidly and effectively communicate or search through the contributed content relating to their current needs: airport news updates; the status of their next flight; where to get the best food; and under a *Bored* feature (see Figure 3), share suggestions on how to pass time at the airport.

In summary, the design of FlyTalk mixes location and context awareness with social media and crowd-sourced content to deliver salient, up-to-date information to

Figure 1. FlyTalk itinerary feature showing an overview of a passenger's required path through the airport with detailed information available on request.

Figure 3. FlyTalk social media and messages. Overall list of feeds show on the left, and messages under the category of "Bored" shown on right.

travelers as they spend time at and move through airports. By providing an archive of such material, FlyTalk allows travelers to search a continually growing knowledge base of information, allowing them to optimize and customize their travel experience. The use of automatically appended and contextually sorted message tags allows users to easily access the information relevant to their current situation. FlyTalk was ultimately instantiated as a broad but shallow interactive prototype on a mobile phone.

DISCUSSION AND CONCLUSION

This paper described a traveler-centered approach to sustaining the aviation industry. Extensive user research was conducted on 63 travelers across 3 European airports to develop an understanding of their needs, problems and frustrations. These needs guided the design of a smartphone phone application that uses static, context-aware and social information to support travelers during their trips by meeting their needs and improving their experience. The application was mocked up as an interactive prototype on a smartphone.

Future work will involve developing the application and support infrastructure (e.g. indoor location tracking technologies, airport maps, links to online data sources) such that situated user testing can be performed. Another interesting avenue for development of this work is in its role as a service. Airports and airlines regard traveler problems as financial problems: for example, they may need pay fines or compensation for missed flights and support salaries for helpdesk staff. By reducing the number of problems experienced by travelers, applications such as FlyTalk may lighten this load and be viable investments for existing stakeholders in air travel. Studies assessing the real impact of contextual and social services such as FlyTalk would be a valuable topic for future work.

In summary, we believe that continued research on traveler needs and the development of traveler-centered mobile applications will improve levels of traveler satisfaction with the flying experience. Ultimately, this will lead not only to happier holidays, but also provide economic benefits for airlines, airports and the wider economy.

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