Mobile Air Ticket Booking

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ABSTRACT

Online air ticket booking is a cognitively complex task even on fully-functional internet-access devices such as desktops, representing a repetitive multi-parametric search in the flights database and then browsing long lists of flights found, consisting of different carriers, prices, dates and times, to create an optimal combination of outbound and inbound flights. We present the results of research into prospective users of mobile air ticketing, a set of domain-specific user interface design guidelines, and a wireframe design for mobile air ticket booking application.

Keywords

M-commerce, mobile usability, air ticket booking, guidelines

ACM Classification Keywords

H.5.2 [**Information Interfaces and Presentation**] User Interfaces – *User-centered design*; K.4.4 [**Computing Milieux**] Computers and Society – *Electronic commerce*

1. INTRODUCTION

Travel is by its very nature mobile, and "going mobile" is currently considered by many travel specialists as a central part of travel agents' strategy for growth, even a do-or-die decision for travel industry [1]. Although proliferation of mobile applications in air travel is not so fast as expected by service providers and mass media, a number of airlines currently provide mobile solutions for such activities in the airline travel activity chain as checking flight status, flight schedules, mobile check-in, mobile boarding pass, seat availability and seat selection, and making changes for flights. However, applications for mobile air ticket booking are relatively rare as there are serious barriers to mobile airline ticket purchasing. First of all, the very nature of air ticket booking task makes its mobile implementation highly questionable.

Online air ticket booking is a cognitively complex task even on fully-functional internet-access devices such as desktops and laptops, representing a repetitive multi-parametric search in the flights database and then browsing long lists of flights found, consisting of different carriers, prices, dates and times, to create an optimal combination of outbound and inbound flights. Performing a booking task may well take tens of minutes on a full-fledged PC, it is taxing on attention and mental load, and requires considerable text input (especially when entering passenger data and payment details). These characteristics of the task themselves make their implementation barely suitable for a mobile device because mobile use contexts are not tolerant to long cognitively-loaded interactions and massive text input.

In this practically oriented paper we describe our experience in developing mobile user interface for this highly challenging task, the analysis of target user characteristics, provide a list of domain-specific guidelines for mobile air ticket booking applications, and present a wireframe design for mobile air ticket booking system.

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2. THE PROJECT

The development of m-ticketing system for airline travel became a joint effort between one of the national largest mobile operators and popular online travel agency *Bilet Online*. The system was planned as not a standalone application but to become a component of a bundle of various mobile applications being marketed by the mobile operator to its subscribers.

The parties were aware that usability engineering would be the key to their system's success and hired specialists from the Laboratory of Work Psychology, Moscow State University that had rich experience in online travel usability and conducted long-term research on multitasking and interruptions in human-computer interaction, a field directly relevant to mobile usability. The expected deliverables from our participation in the project were: (I) the user interface guidelines for mobile air ticket booking, (II) a wireframe design of the user interface, and (III) usability testing of a working prototype implemented on a mobile phone. Below we present the results of stages (I) and (II)[1].

2.1 Target Users

From the very beginning the parties realized that a mobile air ticket booking system has no chances to become a mainstream, mass-market product to be used by everyone, so studious efforts had been made to define the target group of prospective users of the air m-ticketing system.

Air travelers are generally classified into two groups – business and leisure travelers – with main difference between them that business travelers being primarily concerned with the exact date and time of travel and are less concerned with its costs while leisure travelers usually seek for the cheapest flights and are

[1] Unfortunately, by the time of writing this article we were not able to test our design with users in real use situations because working prototypes of the software were not yet developed by programmers.

more flexible with dates. Other differences between these two groups include frequency of travel and therefore air travel experience, travelling mainly alone or in a group, and predictability of the moment and destination of the next travel.

Market research conducted by the travel agent's marketing department on their existing client base showed that in normal situations leisure travelers more than likely will use non-mobile channels of purchasing tickets (either online at an e-commerce website, via a phone call or alternatively at a physical travel outlet) and would almost never use a mobile phone (especially in the case of family vacation planning). This finding is in concordance with opinion expressed by travel market specialists that "while the capability obviously exists, there is not yet a universal demand for using a mobile to book the next family holiday" [1]. Alternatively, active business travelers seemed to be potentially more grateful users of the m-ticketing technology, for example, in situations of rush travel. However, business travelers noted as well that mobile alternative will only be used when PC internet is unavailable. A survey of passengers of two airlines in South Africa [11] showed that (1) respondents perceive more value in *receiving information* via their mobile devices than they do in *making bookings*, and (2) business travelers exhibited significantly more "mobile readiness" than leisure travelers.

The resulting prospective customer profile that guided further development of the guidelines and interface design looked as follows: (a) frequent business traveler, the moment of next travel sometimes unpredictable, (b) experienced in air travel and familiar with its peculiarities, (c) mainly travelling between limited number of familiar airports, (d) travelling mainly alone than in group, (e) high degree of technology self-efficacy individuals.

2.2 Mobile Usability

The most recent study of mobile usability published by Jakob Nielsen in July 2009 *Alertbox* [13] showed that mobile web user experience is still miserable, main usability problems remaining the same as ten years ago: small screens making almost all interactions hard; awkward and error-prone input, especially for typing; download delays, even with 3G service; and mis-designed sites not optimized for mobile access. Website use on mobile devices, even on touch phones that offer full-featured browsers does not offer PC-level usability [13]. In contrast to web-based mobile applications, device-based mobile applications utilizing client side processing and location context are able to achieve objective performance and subjective usability measures comparable to those of the PC-based versions, despite the limited input and display capabilities of the mobile device [15].

The decision not to use WAP and instead build on a device-based rich media platform such as Java was not ours, but we appreciated it a lot due to a number of reasons. In particular, device-based mobile applications provide sophisticated interaction styles beyond the simple navigation model of web based applications. They also offer a more immediate experience since they are not so heavily bound by request/response cycles inherent in web based design [15]. Furthermore, device-based applications also give more opportunities for visual design aesthetics having significant impact on perceived usefulness, ease of use, and enjoyment, which ultimately influences users' loyalty intentions towards a mobile service [5].

2.3 Existing Applications

Our search for existing air ticket booking solutions revealed that a number of airlines offer WAP-based booking services, but it yielded only a few rich media solutions. All but one of these solutions were solutions for a single air company and not included search requests to global distribution systems (GDS) accumulating hundreds of air carriers, the case we dealt with. The only GDS-powered solution was in fact 1:1 replica of a corresponding PC website transported into mobile device and obviously represented an inappropriate design decision to a mobile task. Among existing systems, only one has been designed by the usability specialists [8], so our work combining rich media, GDS access and usability engineering looked as a pioneering one.

3. GUIDELINES

The guidelines below adapt general recommendations for mobile applications [6,7,9,10] and recommendations for air travel websites [4,17,18]. These guidelines are oriented to regular mobile phones that account for the vast majority of the market: devices with a tiny low-resolution screen, a numeric keypad, a joystick or four-directional buttons, two soft-buttons below the screen, and the ability to run Java applications. Due to space limitations we mention only a subset of most general guidelines we developed.

3.1 Define the Target User

Mobile applications strongly require a clear understanding of the motivations and circumstances surrounding mobile device use and adoption from the perspective of the consumers [16]. In particular, culture is an important determinant of mobile device use and adoption since different cultures developed different traditions for mobile services use. For example, in Japan on *All Nippon Airways*, 5% of all domestic flights are booked on mobile phones [2], and this high percentage is unbeaten anywhere in the world. The explanation of this fact is because of the length of their commute to work, people in Japan use a mobile to surf the web, making more surfing on mobiles than on PCs. Another interesting motivation for mobile device use, in the case of a major city in Thailand, was the fact that people are often stuck in their car due to frequent traffic jams [16].

This means that investigation into characteristics of prospective users, contexts of use and technology adoption factors must be a starting point in developing mobile applications for such a complex and specific task as airline m-ticketing.

3.2 Make Mobile Application a Supplement to a Website

There are serious reasons to implement and market mobile version as not a standalone application but a satellite to the "main" travel agent's website. Firstly, this will avoid heavy text input aspects of the air ticket booking task because the mobile application can use data from the user's profile (passenger and payment information) entered via website and stored on the central server. Secondly, this will temper the user fears about safety of mobile transactions since no sensitive information will be transferred through mobile channels. Thirdly, close integration with the website will allow users to make urgent changes and cancel flights booked via the website thus seriously increasing the usefulness of mobile application to the user. Fourthly, the history of previous travel and user preferences can be borrowed from the central server to mobile in order to pre-

fill the fields in the mobile interface with smart defaults thus minimizing text entry.

3.3 Reduce Functionality to an Absolute Necessary Minimum

The standard set of flight search parameters on a travel agent websites includes: (a) roundtrip/one-way flights, (b) from/to destinations, (c) departure/return dates, (d) preferred departure/return time of day, (e) number of adults, children and infants, (f) economy/business class, (g) flexible dates, (h) direct flights only, and (i) preferred airlines. For a mobile application, we recommend to reduce the search options to (a), (b) and (c) only.

When displaying the flight search results page, it is recommended to avoid cluttering the screen with redundant information except (1) date and time, (2) price, (3) number of stops for transfer flights, (4) next day arrival, and (5) operating carrier (the airline that uses its aircraft for the flight). (More detailed information on the selected flight may be presented on the flight summary screen.)

3.4 Provide Support for Multitasking and Interruptions

The nature of mobile computing requires user interaction design to pay special attention to multitasking and interruptions [12]. Mobile contexts are typically public and dynamic rather than private and stable, and mobile users must permanently switch back and forth between the mobile tasks and external sources, temporarily leaving the switched-from tasks on hold or slowing them down [14]. Tasks with interruptions take longer to complete on a mobile device compared to a desktop computer, due to a smaller screen, limited input interaction and high demands on attention [12].

A semi-naturalistic field study of users performing mobile web tasks while moving through typical urban situations [14] demonstrated the impulsive, fragmented, and drastically short-term nature of attention in mobility. Continuous attention to the mobile device fragmented and broke down to bursts of just 4 to 8 seconds, and attention to the mobile device had to be interrupted by glancing the environment up to 8 times during waiting a web page to be loaded.

Our earlier research [3] revealed that re-orientation in the main task after attention switch-away is mainly responsible for performance degradation in interrupted tasks, and this case requires the development of less attention-demanding user interfaces and support for quick resumption when switching back to the mobile task.

Recommendations for the support of task switching include: (1) breaking the interaction into small pieces – typically one operation per screen, and (2) providing an attention cues enhancing recognition to direct the user to a place in the suspended task (for example, a highlight may be presented around a text box as an attention indicator for a specific point in a task) [12].

3.5 Make Application Location Aware

Location awareness is a clear advantage of mobiles over desktops. Even without using GPS sensors, there are technical possibilities to detect the user's current location at least with geographical region precision and provide the user with relevant information and smart defaults to reduce text input.

4. DESIGN

Figures 1–3 present a wireframe design for the mobile user interface following the canonic scheme of online air ticket booking process: flight search (a–g in Figure 1), search results (h, j), flight summary and flight confirmation (i, k), booking and payment (l–n), purchase confirmation (o)[2].

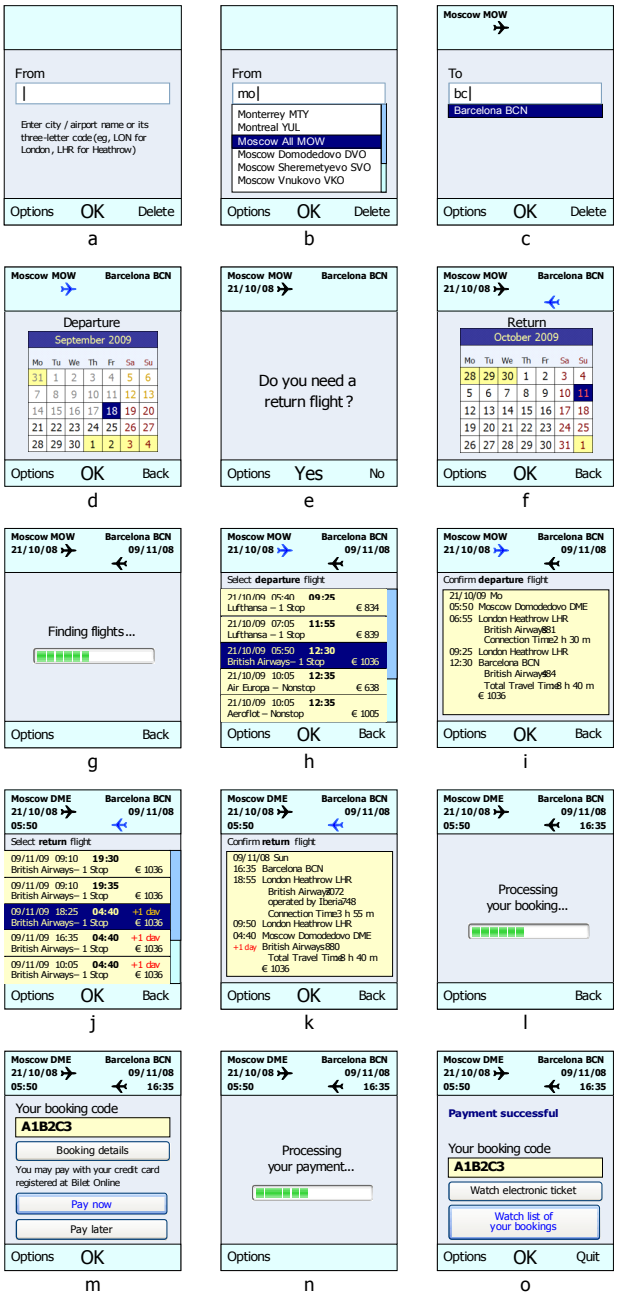

Figure 1. Booking process

Figure 2 presents the screen area organization and Figure 3 shows the "slide-push" transition between consecutive screens.

[2] One may notice that our design in many aspects resembles the design described in [8]. However, we came to a similar design independently, borrowing only one idea from [8] – a push-left/right screen transitions between pages. Similar problems, similar solutions.

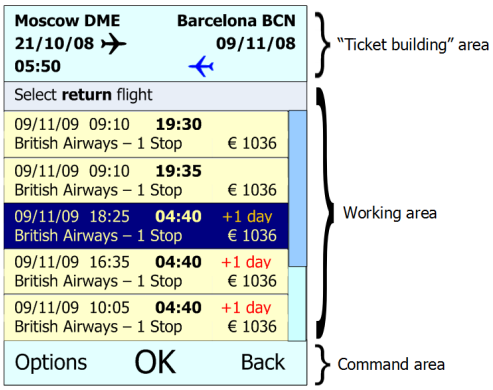

Figure 2. Screen organization

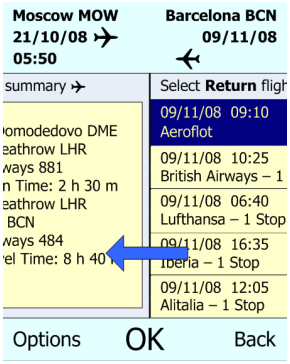

Figure 3. Push transition

5. ACKNOWLEDGMENTS

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