

Mobile Internet User Experience in the Western World: Cost-Benefit Estimation

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ABSTRACT

The user experience of the mobile internet is most of the time inferior to the desktop internet. This is often explained by the mobile internet's cumbersome user interface. This paper argues that the real reason behind the mobile internet's perceived inferiority is the business community's incomplete understanding of the mobile context, preventing the creation of killer applications. While mobile browser access to any web page is fundamental, we argue that it is even more important to offer mobile context specific web-based services. These services would generate user benefit by initially aiming for the mobile context before catering the desktop context.

Author Keywords

User Experience, Mobile Internet, Perceived Cost, Perceived Benefit, Context, Write Once Run Anywhere, One Web.

ACM Classification Keywords

H.5.4 [Hypertext/Hypermedia]: Theory, User issues, H.5.2 [User Interfaces]: Theory and methods, H.5.1 [Multimedia Information Systems]: Hypertext navigation and maps

INTRODUCTION

User experience (UX) in mobile web browsing is a complex issue as it combines the dynamic and intangible phenomenon of user experience with a system involving a multitude of stakeholders with conflicting interests [4, p.16ff] [8, p.35]. The system is multi-layered making appealing user experience hard to achieve, which we see as one explanation for the low mobile internet usage numbers. MediaScreens [5] reports that only 5% of US broadband subscribers with internet-enabled phones use the mobile internet. Similar numbers can be expected for Europe. While low speed, difficult navigation and inconsistency with the desktop internet may be catalysing factors, we believe that the real problem is the low use value perceived by potential users. This was highlighted in a small qualitative survey [4, p.45] we conducted with non-technical students as participants (N=5). As these subjects represent typical early majority users [7], the survey helped us in understanding common users' attitude towards the internet. While the participants reported a clear benefit of the internet as such, but could not see any ad-

ded benefit in mobile internet access as they reported spending too much time online already.

This paper offers a few observations and insights from our investigation into the user experience of the mobile internet [4]. The thoughts presented do not reflect the prevalent business attitude of "simple access to the exactly same resources from your mobile and your desktop". Rather, our aim is to trigger a discussion amongst researchers and practitioners regarding the mobile internet user experience. While we believe in the importance of easy access to the same sites on mobile phones and desktops, we also see a clear motivation for special internet services specifically targeted to mobile users.

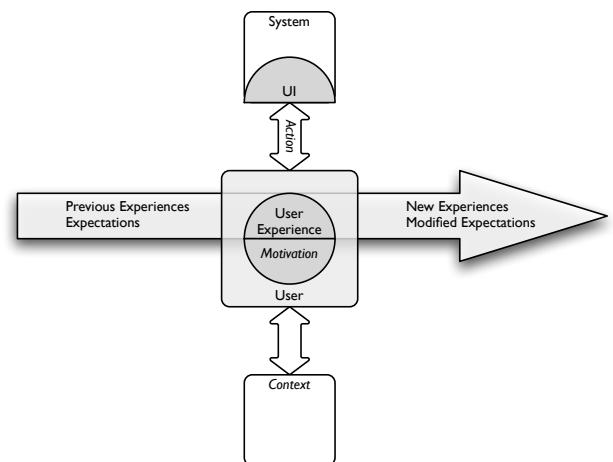


Figure 1. Personal UX Model.

Based on Kankainen's model [3], current user experience depends on previous expectations, the user's motivation and the context of use while it influences the user's actions and the new experiences.

THEORETICAL BACKGROUND

Three established models — each aiming to help understand and predict internet user behaviour — are presented. In the

body of this paper the third model of cost benefit analysis and estimation is further elaborated.

Personal User Experience Model

Kankainen's [3] enhanced model (Figure 1) states that the current experience is based on previous experiences and expectations starting on an affective level already beginning when the person considers whether to use a system. If a potential user finds the system worthy of use, actual interaction will take place [6]. Context, user motivation and system interactions shape the user experience from this moment on. The outcome then influences expectations and decisions in regards to on later use.

The Long Tail Model

The Long Tail by Anderson [1] is a popular theory about how the internet works and how revenue can be generated (see Figure 2). It is a model suggesting that a few big sites may have a large number of users while the cumulative number of users from all small sites is exponentially larger. The big sites (i.e. Google, Yahoo, Amazon) are called killer applications as they appeal to and attract a proliferating number of users across all user types [7]. In contrast, the smaller sites' appeal may be extraordinary high to specific users but the general awareness about their existence is low. User internet awareness has been created by the killer applications that everybody is talking about. Over time users then explore other services and find the sites on the long tail. This increases internet value with increasing usage.

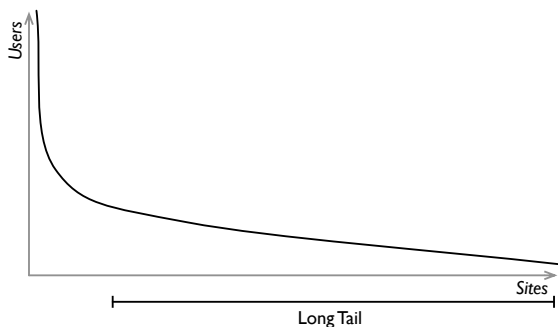


Figure 2. The Long Tail.

Anderson's [1] model shows that many less popular items (sites) can outweigh the few highly popular items (sites).

Cost-Benefit Model

Along Davis' [2] notions of cost and benefit, we regard the terms in an abstract way involving non-monetary factors such as attention load or affective benefit. We believe that users weight perceived costs against perceived benefits, much like they estimate the duration of processes [8, p.45]. From this behaviour we can assume that services in actual use have a healthy cost-benefit ratio. This means, that the perceived benefit is greater or equal to the cost. Modifications in the service conditions change this ratio affecting the user's motivation to use or continue using a service. If this ratio tilts to the negative side, users may stop using a service.

COST-BENEFIT ANALYSIS

The high market penetration of desktop internet in the Western World lets us assume a healthy balance between costs and benefits of use. Mobile access to the internet changes this equation by adding both costs and benefits. For our subjects, saving time and money using the (desktop) internet was a key benefit. 24 hour low-cost access and services (i.e. shopping, gifts, mail, information and entertainment) were further reported benefits of internet use [4, p.45]. Reported cost and benefit for both desktop and mobile internet are:

Monetary Cost From a user's point of view the desktop internet is almost free. With exception to public hotspots, users are only confronted with a monthly bill for flat-rate access. Mobile phones companies still mostly charge per megabyte, even if this is progressively changing.

Cost of Effort The desktop internet sets the standard for the effort it takes to navigate the web. While mouse and keyboard input are well established, their use requires cognitive and physical effort still too excessive for some people. Performing the same actions on a smaller device with limited input will always result in extra cognitive effort. In the worst case scenario, this interaction is so difficult that users give up in order to maintain their self-respect.

Cost of Time The desktop internet is the point of reference here too. Compared to the desktop internet, the mobile internet will always be slower; even if the same internet connection (i.e. WiFi) can be used. The same activity will be perceived as slower by users due to inferior processing power and limited interaction possibilities.

Cost of Attention The visual media internet mainly draws on our primary communication channel. This demand of attention is feasible in safe environments such as offices and homes. Laptop users sit down for usage; mobile phones are used in transit and in public places where the user's attentional capacity may be challenged [8, p.55f].

Benefit of Use The three services provided by the internet are entertainment, information and communication/community. Currently, these services are provided by other media such as media players (for entertainment), billboards (for information) and phone calls (for communication). This was once the case in the home environment as well until suitable internet services (i.e. media downloads, email) became available.

Benefit of Mobility The mobile internet uniquely affords its users with access from anywhere with network coverage and independence from any fixed location.

COST-BENEFIT ESTIMATION

As a result of shrinking monetary costs and growing potentials, mobile internet usage has grown continuously. People discover the benefit of mobility when solving everyday problems. While we believe in a steady growth of user numbers on the long tail, the mobile killer applications capturing people's awareness and attracting large user numbers still fail to appear. Such novel and unprecedented solutions will have to fulfil a genuine need in specific contexts which, in turn, will

lead to widespread appeal, growing awareness and demand for mobile internet.

Our qualitative interviews [4, p.45] showed that for potential users the perceived cost of the mobile internet seems to outweigh the benefits. For one, the mobile internet has to compete with traditional means to get entertainment, information and communication on the move. Mobile entertainment has been delivered by music players since the Sony Walkman. Mobile information and communication has traditionally been covered well by other means such as calling or texting friends and public displays. Being established, these options have a better estimated cost-benefit ratio and are being used.

When looking at the analysis presented above, we can see that the cost-benefit for the mobile internet is worse than for the desktop. Thus, giving mobile access to exactly the same information as on the desktop cannot produce a better cost-benefit ratio. We believe that the key lever to mitigate the additional costs of mobile internet is to harvest the advantages of mobility by genuinely designing for the mobile context which will bring scalable benefits. Next, we present aspects of this leverage to provide an improved cost-benefit ratio for the mobile internet users.

TOWARDS A SOLUTION

While the technology for future killer applications can vary from widgets to web sites, the applications must be initially designed with the mobile user in mind. Later, suitable features for desktop activities may be added, but the fundamental differences between desktop and mobile users must be acknowledged. This marks a crucial change of attitude away from simply tweaking the desktop web services into mobile web services. This lack of primary focus on the mobile user is also why almost no successful mobile web services exist in the Western World.

Having access to GPS or triangulation would pave the way for location aware services naturally interesting for users on the move. Navigational help and location-based solutions are only examples regarding possible services with location data as the unique selling point. Geo-tagged pictures, location-based communication or location-aware communities are a few more examples of interesting mobile internet services.

Additional benefit can be created by taking advantage of device specific properties such as device input and output (e.g. camera, vibration, loudspeaker or microphone). These provide new ways to interact with online services specific to mobile phones. Posting pictures directly via Opera Mini is one successful example for closing the gap between the device I/O and the internet for a smoother interaction. Similar multimedia services may tie the handset even closer to the internet. Being carried all the time and quick to switch on, it can provide different information than a desktop (e.g. GPS, accelerometers, body functions, etc.). In this sense the mobile phone can become a personal representation on the web that enables users to access work-flows across devices to use the most suitable device for each task.

CONCLUSION

For the highly valuable long tail the ability to access the internet by a desktop-like mobile browser will always remain. However, with the steep growth in mobile user numbers, more mobile-specific killer applications will be needed. These must be tailored to the mobile context first and will necessarily feature applications non-existent on the web of today. From a technical perspective these solutions may use widgets or web sites and be accessible from the desktop, although their core design will be all-new and revolutionary.

The day a normal user at home will reach for the mobile phone instead of the desktop to solve a given task using the internet is the day when the flourishing times of the mobile internet will begin. And at that day, interaction design and user experience will become distinguishing factors for mobile web applications. Until then, more and more people will use the mobile internet only as a smaller and slower copy of the (real) desktop internet.

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The opinions presented in this paper are not necessarily those of our employers.

REFERENCES

1. Anderson, C. *The Long Tail*. Wired, Oct. 2004. URL (last checked 2007-06-30): www.wired.com/wired/archive/12.10/tail.html
2. Davis, F.D. *Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology*. MIS Quarterly, 13, 319-339, 1989.
3. Kankainen, A. *Thinking Model and Tools for Understanding User Experience Related to Information Appliance Product Concepts*. PhD thesis, Helsinki University of Technology, Helsinki, 2002. p.32.
4. Maehr, W. (supervised by Bolstad, L.E. and Fjeld, M.) *User Experience of the Mobile internet*. Master Thesis (to be published at www.t2i.se), Chalmers TH (2007), Gothenburg, Sweden.
5. Media-Post Communications *Only Five Percent of Innovative Web Users Access internet on Mobile Device*.

- 2007 URL (last checked 2007-06-30):
www.centerformediaresearch.com/cfmr_brief.cfm?fnl=070329
6. Revang, M. *The User Experience Wheel* 2007 URL (last checked 2007-06-30):
userexperienceproject.blogspot.com/2007/04/user-experience-wheel.html
7. Rogers, E. M. *Diffusion of Innovations*. The Free Press. New York, 1962.
8. Roto, V. *Web Browsing on Mobile Phones - Characteristics of User Experience*. PhD thesis, Helsinki University of Technology, Espoo, Finland, 2006.