

Improving the Usability of Web 2.0 Applications

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ABSTRACT

Web 2.0 is revolutionizing the way that users access content and interact with each other on the Web. Unfortunately, many developers are inspired by what is technologically possible possibly disregarding good design practice and fundamental theory. Very little research on Web 2.0 usability is reported in the literature. This paper reports progress on an investigation into the usability of Web 2.0 applications through an empirical study of the level of disorientation and cognitive overhead that users might experience. The outcomes of this project aim to provide an empirical basis for the development of design guidelines to improve Web 2.0 usability.

Categories and Subject Descriptors

H.5.4 [Information Interfaces and Presentation]:
Hypertext/Hypermedia - *navigation, user issues*

General Terms

Design, Human Factors

Keywords

Web 2.0, Usability, Disorientation

1. INTRODUCTION

All As the World Wide Web continues to grow the provision of appropriate user interfaces is critical to its future success. One significant challenge is that the Web that has some entrenched, seemingly irresolvable tensions. On one hand we have a system that needs to be simple to access and contribute to, and on the other it must also contain a vast amount of diverse and rich information which can be accessed in a variety of ways. The tension is realized as new technological advances provide opportunities for rich interfaces that allow users to interact with information and each other in ways not envisaged by the creators of the Web.

The most recent generation of technologies which are now permeating the Web are collectively titled Web 2.0. Whilst the underlying technologies in Web 2.0 applications are not new, the creative combination of these technologies has led to a revolution

in the types of application which are now becoming available. The term “Web 2.0” was coined by O’Reilly Media in 2004 and refers to new generation Web applications which provide for on-line participation, collaboration and interaction. Examples of Web 2.0 applications include blogs, wikis and popular systems such as Google Maps, FaceBook and MySpace. Such applications are built using new techniques such as mashups and may include technology such as AJAX.

Web 2.0 has undoubtedly enabled a revolution in the way in which users access and interact with content and each other, however the rush to embrace Web 2.0 has resulted in many developers overlooking principles of good design and usability established over the last decade [1].

One significant challenge is the shift in the paradigm of how users now interact with Web 2.0 applications. The shift requires users to change their view of the Web from that as a vehicle for viewing content, to that where the Web becomes a platform by which applications and services are delivered [2]. The paradigm shift relates to the fundamental principle of the architecture of the World Wide Web as having the unit of the ‘page’ [3].

The introduction of Web 2.0 technologies such as AJAX break this entrenched page-based model in several ways. First, traditional web sites rely on a page update model whereby each interaction results in a complete page refresh. Web 2.0 applications permit part page updates. For instance, GoogleMaps do not require an entire page to be refreshed when the user selects an adjacent view. Instead the Google system pre-fetches the data that lies outside of the border of the map in frame allowing the user to grab the map and drag it without any significant interruption [4]. Similarly, Gmail uses AJAX to update a portion of the display when a new email arrives without having to refresh the entire screen. Here, Gmail acts more like a desktop application than a web site.

Another paradigm breaker is that Web 2.0 technologies can result in unpredictable behavior of the Back button on the browser. A well cited empirical study of Web use found that the Back button accounts for 41% of all page requests [5]. Since an AJAX application resides in a single page, there is sometimes no page to return to, or no page history to navigate [6] resulting in unexpected outcomes for users.

2. HCI CONSIDERATIONS

We know that as we interact with the world our mind constructs mental models of how things work. Mental models may be used to anticipate events, to reason, and to explain the world. The strong page-based model of the Web is something that is now part

of how users understand the Web and how they should interact with it. A change in the basic model may cause difficulties for users.

A basic principle of Human Computer Interaction (HCI) is that user interfaces should be easy to use and predictable [7]. This is particularly important for commercial web-sites as we know that in general, Web users are impatient, require instant gratification and will leave a site if they cannot immediately figure out how to use it [8]. Therefore, it is important that users can quickly appreciate the nature of a site's content, its organization and the methods by which to find particular information as soon as they arrive at a web site. Norman's theory of affordance [9] tells us that an interface should provide inherent clues to what actions are possible at any moment, the results of actions and the current state of the system so that users will know what to do instinctively. Alignment with a user's mental model will support their predictive and explanatory abilities for understanding an interaction. Conflicts between the user's mental model of a system and the reality of how a system behaves can result in disorientation and/or cognitive overhead.

Conklin described disorientation as "the tendency to lose one's sense of location and direction in a non-linear document" and cognitive overhead as "the additional effort and concentration necessary to maintain several tasks or trails at one time" [10]. Disorientation and cognitive overhead have been issues which have been thoroughly investigated in traditional hypertext systems.

3. METHODOLOGY

The aim of this project is to investigate empirically how the introduction of Web 2.0 technologies such as AJAX into commercial websites has affected the level of disorientation and cognitive overhead that users might experience. The outcomes of this project will provide the empirical basis for further research into the development of tools and techniques to alleviate any additional disorientation and cognitive overhead resulting from Web 2.0 interfaces.

The project involves various HCI techniques in order to investigate several usability issues relating to Web 2.0 applications, the alignment of Web 2.0 application to the user's mental model of the Web, and the impact on level of disorientation and cognitive overhead that users might experience. Test sites include several popular commercial Web 2.0 applications such as Gmail.

The experimental methodology employed in the project relies on several empirical measures which are used to quantify and measure disorientation and cognitive overhead. The approach employed for disorientation is based on that proposed by Smith [11] who developed an optimal path deviation measure that produced a lostness rating based on various navigational path measures through hypertext systems. Additional subjective measures based on a survey of feelings of disorientation are also utilized.

The methodology for measuring cognitive effort and mental workload is based on that commonly used for pilot performance [12]. This technique uses ratings based on the user's own estimate of their mental workload and is similar to the NASA Task Load Index (TLX) [13] which measures operator workload based on a weighted average of ratings on six sub-scales: mental demands, physical demands, temporal demands, own performance, effort and frustration.

4. PROGRESS

The poster reports on the development and selection of the experimental methods to investigate disorientation and cognitive overhead for Web 2.0 applications. The results and preliminary analysis of a pilot study are reported.

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