

Establishing the Credibility of Social Web Applications

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INTRODUCTION

In recent years, there has been a steady shift in the *nature* of Web applications. The vehicle of this transition of Web applications is *us*, the people. The ability to post photographs or videos, exchange music snippets with peers, and annotate a piece of information, are but a few exemplars of this phenomenon. Indeed, the pseudonym Web 2.0 (O'Reilly, 2005) has been used to describe the apparent "socialization" of the Web.

In spite of the significant prospects offered by human-centric Web applications, the mere fact that virtually *anyone* can set up such applications claiming to sell products and services or upload/post unscrutinized information on a topic as being "definitive," raises the issues of credibility from a consumers' viewpoint. Therefore, establishing credibility is essential for an organization's reputation and for building consumers' trust.

The rest of the article is organized as follows. We first provide the background necessary for later discussion. This is followed by the introduction of a framework within which different types of credibility in the context of human-centric Web applications can be systematically addressed and thereby improved. Next, challenges and directions for future research are outlined. Finally, concluding remarks are given.

BACKGROUND

In this section, we present the fundamental concepts underlying credibility and present the motivation and related work for addressing credibility within the context of Web applications.

Basic Concepts of Credibility of Web Applications

For the purposes of this article, we will consider credibility to be synonymous to (and therefore interchangeable with) believability (Fogg & Tseng, 1999).

The concept of credibility can be classified based upon the types of user interactions with a Web application. A user could consider a Web application to be credible based upon direct interaction with the application (*active credibility*), or

consider it to be credible in absence of any direct interaction but based on certain pre-determined notions (*passive credibility*). There can be two types of *active credibility*, namely *surface credibility*, which describes how much the user believes the Web application based on simple inspection, and *experienced credibility*, which describes how much the user believes the Web application based on first-hand experience in the past. There can be two types of *passive credibility*, namely *presumed credibility*, which describes how much the user believes the Web application because of general assumptions that the user holds, and *reputed credibility*, which describes how much the user believes the Web application because of a reference from a third party.

Related Work on Credibility of Web Applications

The issue of the credibility of Web applications has garnered attention in recent years from diverse viewpoints and this has led to theoretical (Fogg, 2003; Metzger, 2005) and empirical (Consumer Reports Web Watch, 2005) studies pertaining to the credibility of both commercial and non-commercial Web applications.

There have been some partial efforts in addressing the credibility of Web applications. A set of guidelines for improving the credibility of Web applications have been presented (Fogg, 2003). However, these guidelines are stated in such a fashion that they can be open to broad interpretation, do not always present the relationships among them, and are stated at such a high-level that they may not always be practical or may be difficult to realize by a novice user.

A general framework for addressing the credibility of Web applications has been proposed previously (Kamthan, 2007; Kamthan, 2008). This article presents an adaptation as well as a modest extension of these works.

A SYSTEMATIC APPROACH TOWARDS THE CREDIBILITY OF WEB APPLICATIONS

In this section, we consider approaches for understanding and improving active and passive credibility.

Stakeholders and Credibility of Web Applications

We identify two broad classes of stakeholders with respect to their *roles* in relationship to a Web application: a *producer* (such as the provider or an engineer) is the one who owns, finances, develops, deploys, or maintains the Web application, and a *consumer* (such as a novice or expert user) is the one who uses the Web application for some purpose.

We then assert that credibility is a *perceived* quality attribute with respect to the stakeholders of a Web application. Indeed, we view credibility as a *contract* between a producer and a consumer. This contract can have ethical, legal, and/or moral implications.

Addressing Active Credibility of Web Applications

We consider a Web application to be an interactive information system and adopt semiotics (Shanks, 1999; Stamper, 1992) as the theoretical basis for communication of information. The active credibility of Web applications is viewed as a qualitative aspect and is addressed indirectly from the perspective of semiotics (Table 1).

We now discuss each of the components of Table 1 in detail.

Identification of Semiotic Levels

The first column of Table 1 addresses semiotic levels. We are particularly interested in the communicative properties of the representations of a Web application, which in semiotics we can view on six interrelated levels: physical, empirical, syntactic, semantic, pragmatic, and social.

We focus only on the quality concerns at the last two levels: at the *pragmatic level* the interest is in the utility of the representations to its stakeholders, while at the *social level* the interest is in the manifestations of social interaction among stakeholders with respect to the representations.

Decomposition of Semiotic Levels and Assignment of Quality Attributes

The second column of Table 1 draws the relationship between semiotic levels and corresponding quality attributes.

Since each semiotic level is rather high to be tackled directly, we decompose it further into quality attributes that are widely-known and relevant. Not all attributes corresponding to a semiotic level are on the same echelon, and therefore they are placed at different tiers. We contend that the quality attributes included are necessary but make no claim of their sufficiency. Also, the quality attributes are not necessarily mutually exclusive, and this dependency can be either favorable or unfavorable (Wieggers, 2003). We note that some of the quality attributes are classical and relevant in a desktop environment but they get amplified, and in certain cases exacerbated, in a networked environment.

Specifically, credibility belongs to the social level and depends on the layers beneath it. The quality attributes aesthetics (presentation), legality, privacy, security, and transparency (of the producer) also at the social level depend upon the quality attributes accessibility and usability at the pragmatic level, which in turn depend upon the quality attributes comprehensibility, interoperability, performance, readability, reliability, and robustness also at the pragmatic level.

We discuss only the entries in the social level in some detail. The sensitivity part of visual perception is strongly related to aesthetics as it is close to human senses. The artistic expression plays an important role in making a Web application “attractive” to its customers beyond simply the functionality it provides. It is critical that the Web application be legal (for example, is legal in the jurisdiction it operates and all components it makes use of are legal); takes steps to respect user’s privacy (for example, does not abuse or share user-supplied information without permission); takes steps to secure itself (for example, in situations where financial transactions are made). The provider must take all steps to be transparent with respect to the user (for example, not include misleading information such as the features of products or services offered, clearly label promotional

Table 1. A semiotic framework for active credibility of Web applications

Semiotic Level	Quality Attributes	Means for Assurance and Evaluation		Decision Support
Social	Credibility	Process-Oriented: Inspections, Testing	Tools	Feasibility
	Aesthetics, Legality, Privacy, Security, Transparency			
Pragmatic	Accessibility, Usability	Product-Oriented: Training, Guidance		
	Comprehensibility, Interoperability, Performance, Readability, Reliability, Robustness			

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