

## **THE ICEBERG MODEL OF WEBSITE USABILITY**

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### **ABSTRACT**

*While usability is recognized as an important component to information systems design, there is an element of information overload that arises with this topic. Literally hundreds of usability guidelines have been proposed by experts yet these guidelines are often not followed in practice. This paper proposes a model to provide greater structure in thinking about website usability. As this model suggests, usability raises a gamut of issues that differ in visibility and severity. The model can be applied by information systems educators, researchers, and practitioners as a tool to generate insight and improve usability practices.*

Keywords: Usability, Human-Computer Interaction, MIS Instructional Issues, Internet

### **INTRODUCTION**

A number of authorities have highlighted the importance of website usability and have proposed guidelines to promote good usability practices [e.g., 3, 5, 7, 10, 15, 16, 17, 25, 26]. Various website usability research studies have also been conducted to evaluate company websites and to make recommendations for improving their practices [e.g., 1, 6, 11, 18, 21, 29]. The Nielsen, Norman Group has built a very successful worldwide business offering usability-related publications, workshops, training sessions, and professional certifications. As these indicators suggest, the importance of website usability is well recognized. A website that follows good usability practices allows users to accomplish their goals quickly and easily, it promotes customer goodwill, and it sends a positive message about the image and professionalism of an organization. Conversely, a site that lacks usability risks creating customer frustration, confusion, or irritation, and even losing business as customers flee to competing websites.

While usability has received growing attention in recent years, many usability issues and problems still seem to persist at organizations' websites. A large-scale study of company websites by Huang and Cappel [6] found that less than half of those websites had a site search function, and less than half also contained a site map, directory or index. An additional study of INC. 500 company websites indicated that these websites often did not follow selected design conventions; for example, the color of hyperlinks did not change after they were clicked at more than 70% of these websites [1]. These are just a few examples of how website practices are often not consistent with the guidelines recommended by usability advocates.

Why are usability guidelines not followed more often at company websites? One reason may be that there are so many guidelines to consider in website design. A leading usability website, [usability.gov](http://usability.gov), identifies well over 200 usability guidelines [25]. This suggests that a plethora of issues are raised by website usability. Or to state it differently, there are many opportunities for website designers to "get it wrong" when it comes to usability – i.e., to ignore, not be aware of, or to violate usability guidelines.

A few related points are also important to consider. First, usability guidelines by definition are guidelines, not rules. This means they are recommended practices that apply to most but not necessarily all websites. Even usability experts concede that there are times that given the unique purpose or focus of a certain website, it may be appropriate for a site to violate one or more usability guidelines. Second, the guidelines themselves differ in their importance and the degree of consensus that exists whether or not they should be followed. Usability.gov assigns a rating from 1 to 5 for the "relative importance" and the "strength of evidence" for each guideline, where 5 is highest. For example, guideline 1.1 that a website should "provide useful content" receives 5s for both "relative importance" and "strength of evidence," while guideline 7.12 for the use of a breadcrumb trail has a rating of 1 for "relative importance" and 3 for "strength of evidence." The "strength of evidence" rating is based on the ratings of an 18-person usability expert panel; as this rating might imply, some guidelines have been researched more than others and usability sources sometimes disagree over whether a particular guideline should be followed [25].

The “bottom line” is that website designers are faced with what can be described as “information overload” when it comes to website usability. Many guidelines have been issued by various sources. Given the plethora of issues raised by website usability, there is a need to bring greater structure and organization to this domain. To that end, this paper presents a model of website usability. Like other models or paradigms, its goal is to bring a greater sense of order to disorder, to generate insight and understanding, and to suggest implications for action to its users, i.e., information systems educators, researchers and practitioners.

### THE IMPETUS FOR THE MODEL

The need for this model was motivated by the experiences of one of the authors of this paper. As part of a usability chapter in a Systems Analysis and Design course, the author gave students an assignment to locate examples of websites that had design problems including commenting on their specific shortcomings and how they should be improved. A systems design assignment of this nature appears to be fairly common. For example, an exercise from a design chapter of a Systems Analysis and Design chapter from Kendall and Kendall [8, p. 364] instructs students to: “Browse the Web to view well-designed and poorly designed Web sites. Choose three examples of each. Comment on what makes the sites excellent or poor.” Various other examples of similar assignments can be found online by conducting net searches on terms such as “bad website design assignment” or “bad website usability assignment.”

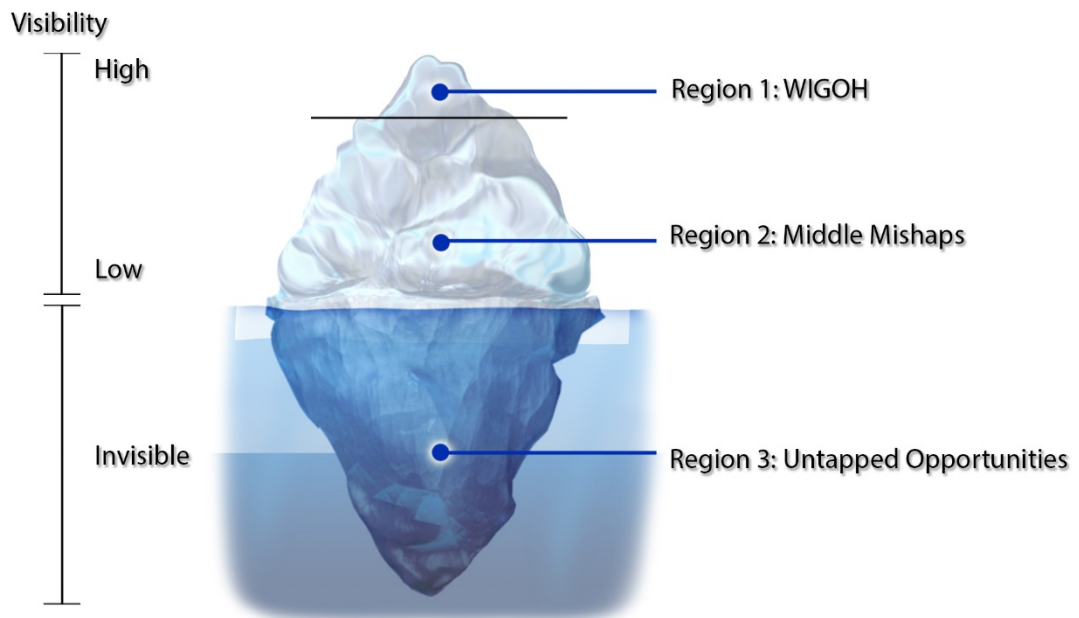
While assignments of this kind are fun and entertaining and have some value, they also tend to misrepresent what website usability is about. When students complete these assignments, they typically conduct Web searches using terms such as “worst websites” or “bad websites.” What emerges is the most outrageous examples of website design gone awry from lists of “worst websites” published by various sources such as Flanders’ Websites that Suck [2, 4, 12, 19, 20, 22, 23]. Most of the examples on these sites are so absurd that many students tend to be left with the impression that usability problems are confined to a rather small number of sites that are “off-the-charts” bad. An important point that is often missed is that the usability of many websites, perhaps most of them, can be improved through making incremental improvements to a number of “little things.” It should be remembered that “little things” can quickly add up to “big things” and this can make all the difference about whether or not a user stays on a site. As Krug describes it, a user typically brings a “reservoir of goodwill” to a website; for each problem or issue encountered, this reservoir goes down [9]. If it goes down too much, the user will ultimately abandon a site, be less likely to return to it in the future, and he/she may even think less of the organization itself [9]. Thus, improving website usability is far more often about taking an average or good website up to a level of excellence through the developer’s attention to detail than it is about performing a radical overhaul of a poor site.

### THE MODEL

The Iceberg Model of Website Usability is presented in Figure 1. As suggested by this image, website usability issues can be differentiated by the degree to which they are visible or noticeable to the user. The model identifies three regions that are summarized below. The size of the each region suggests how frequently it occurs; i.e. the larger the area, the more frequent it tends to be. Key features of the three regions of the model are summarized in Appendix 1. Due to space limitations, the rationale for each of the specific usability problems that are presented in this section cannot be addressed in this paper. However, the rationale of leading usability authorities about many of these usability issues are summarized in Huang and Cappel [6].

**Region 1: The “Tip” of the Iceberg.** This extreme exposed area at the top of the iceberg is named by the acronym “WIGOH” which stands for “What is going on here?” Websites in this category have one or more serious design issues or problems that tend to attract a lot of attention. For example, the website may contain shocking colors, grossly oversized graphics, extremely long text and/or screen length, extreme animation, or auto-loading audio or video that is distracting, annoying or even disorienting. Users’ typical reactions to sites with these elements tend to range from amusement at one extreme to repulsion or the need to abandon the site as quickly as possible at the opposite extreme. For these reasons, sites in this category may make one or more lists of “worst websites” on the Internet or they could qualify for them [2, 4, 12, 19, 20, 22, 23]. Because the design elements they contain are highly visible and annoying to many users, these websites tend to get in the way of the user experience, i.e., not allowing users to accomplish their goals quickly and easily. Depending on the quantity and severity of the design problems

present, these websites typically require moderate to radical redesign. Since this is by far the smallest area of the model it suggests that the least number of websites fall into this category.



**Figure 1.** Iceberg Model of Website Usability

**Region 2: “Middle Mishaps.”** The majority of the visible region of the model consists of “middle mishaps.” Like the first category, this classification focuses on problems or issues that a website does incorrectly, i.e., “sins of commission” that are observable to users. However, the nature of these problems are less severe than those observed in the first category. This classification is characterized by the presence of errors, not following Web design practices (or conventions), or using Web design practices that are generally not in conformance with the guidelines of many Web usability experts and what many users have come to expect. Some specific problems of these sites include: the presence of grammar, spelling or punctuation errors, non-functioning links, links whose color does not change after being clicked, the use of a splash page, the need for users to scroll horizontally to view the website, a poorly performing search function, and a limited use of social media links. Due to the less dramatic nature of these issues, many users would probably be forgiving of a website that contains a few of these design elements. However, as the quantity and severity of these issues grow, user reactions likely intensify as they begin to get irritated, they may question the reputation or professionalism of the company, and they may ultimately leave the website. Sites that contain “middle mishaps” suggest remedial action that calls for slight to moderate redesign, depending on the quantity and severity of the issues raised.

**Region 3: “Untapped Opportunities.”** The region below the surface of the water represents “untapped opportunities” of a website. It is quite possible for a particular website to contain some combination of “middle mishaps” and “untapped opportunities,” meaning that the categories of the model are not mutually exclusive. A website that fits this third “invisible” portion of the model fails to present certain Web design elements that users have come to expect or it does not take full advantage of the power of the Web. In other words, the website contains one or more “sins of omission.” For example, a website may not include a site search function that many users like or expect; it may not contain a site map, directory or index; or it may lack a breadcrumb trail to give users context as to their current location within the website. As social media has grown rapidly in recent years, many times users also expect to see links to Facebook, Twitter, LinkedIn, or YouTube or even social media element such as video images embedded into a site’s own pages. Yet on some websites, social media elements that might be used are still missing, so they represent “untapped opportunities.” Like the second category of the model, many missing elements are not

of a dramatic nature and many users will probably not notice them. Their overall impact is dependent on the quantity and severity of these missing elements. In the interest of continuous improvement, almost any company can benefit from reevaluating its website periodically to determine whether it suggests any “untapped opportunities.”

## CONCLUSIONS

In this paper, we have proposed a model of website usability. It is a “model” in the sense that it seems to fit the dictionary definitions of this concept as “a preliminary pattern” [24, p. 545] or “a standard or example for imitation or comparison” [27]. The proposed model can also be viewed as a “paradigm” in that it is “a theory or group of ideas about how something should be done, made, or thought about” [28] or “an example that serves as a pattern or model” [24, p. 612]. Finally, through its use of an iceberg image, the proposed model can be considered a “metaphor” since it is “an object, activity, or idea that is used as a symbol of something else” [28]. Thus, how the iceberg model is viewed is subject to different interpretations.

Gareth Morgan [13, 14] wrote two exceptional books to describe the use of metaphors to provide different perspectives on organizations. For example, organizations are compared to organisms, machines, brains, political systems, and even psychic prisons. As Morgan suggests, there is value in each metaphor. As it highlights certain aspects of organizations, the metaphor provides unique insight toward understanding organizations better and it may raise implications for action. However, no single metaphor is totally adequate at capturing the complexities of modern organizations.

So may it be with the concept of website usability. The model presented in this paper distinguishes website usability issues according to their “visibility,” and the size of the respective regions of the model suggest how frequently these issues tend to occur. The image of an iceberg works effectively at conveying these messages. However, the authors recognize that the model seems somewhat incomplete at capturing the full range of complexities raised by website usability. As noted earlier, usability.gov has identified dimensions of usability guidelines such as their “relative importance” and “strength of evidence.” There is an opportunity for future research to extend the proposed model or to propose alternative models to identify and capture more fully the features or dimensions of website usability.

To IS educators and practitioners, the proposed model can serve as a useful tool for thinking about the full realm of issues raised by website usability. As noted earlier, when website usability problems are examined in an educational setting, there tends to be an overemphasis on the most extreme examples without providing a more balanced view of what usability really means in practice. This suggests, for example, that instead of giving students an assignment to find “bad websites,” an instructor can challenge students to find real-life websites that contain examples of each region of the model presented here. This crystallizes the message to students that improving usability is far less often about radical redesign than it is about making incremental design improvements to otherwise reasonably good websites to bring out their full potential.

For IS practitioners, the model provides a framework for considering website usability issues. It reminds designers that usability is not just about correcting what is wrong in a website, it is also about identifying what is missing, i.e. its “untapped opportunities.” Particularly with the rise of social media, companies should reconsider whether their website is taking full advantage of this emerging business reality. The table presented earlier provides various examples of usability issues for the different regions of the model. Practitioners can use these issues as a starting point in prioritizing the usability issues they want to emphasize. This could mean expanding this table by mapping the guidelines of usability.gov, or some portion of them, into the model’s different regions so as to provide a checklist of issues for designers to consider in performing website development or redesign. These actions suggest that following good usability practices requires a careful attention to detail and an attitude of striving for excellence. As the model suggests, there are important benefits to executing website usability effectively and equally important consequences for failing to execute it.

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**Appendix 1. Summary of the Iceberg Model of Website Usability**

<b>Region Name</b>	<b>Location</b>	<b>Involves Sins of:</b>	<b>Description of a website that fits this category:</b>	<b>Examples of problems/issues the website may contain:</b>	<b>User reactions may include:</b>	<b>Degree of rework implied:</b>
WIGOH  (What is going on here?)	Tip of the iceberg	Commission	<ul style="list-style-type: none"> <li>- Is “off-the-charts” bad</li> <li>- Tends to contain multiple, major, highly visible problems</li> <li>- Has an interface that calls a lot of attention to itself</li> <li>- Tends to make list(s) of “worst websites” or is a good candidate for them</li> </ul>	<ul style="list-style-type: none"> <li>- Extreme, distracting animation</li> <li>- Shocking colors</li> <li>- Extremely long screen length</li> <li>- Extremely long, dense text</li> <li>- Very slow loading pages</li> <li>- Grossly oversized graphics</li> <li>- Poor color contrast</li> <li>- Unreadable text</li> <li>- Scrolling text</li> <li>- Auto loading audio and/or video</li> </ul>	<ul style="list-style-type: none"> <li>- Amusement</li> <li>- Disbelief</li> <li>- Repulsion</li> <li>- Abandonment</li> <li>- Questioning company credibility</li> </ul>	Moderate to radical redesign
Middle Mishaps	The rest of the visible area	Commission	<ul style="list-style-type: none"> <li>- Contains one or more slight to moderate problems/issues that should be corrected</li> <li>- Impact rises as the quantity and severity of issues grow</li> <li>- Includes errors, not following Web conventions, and using questionable design practices</li> </ul>	<ul style="list-style-type: none"> <li>- Use of a splash page</li> <li>- Requires horizontal scrolling</li> <li>- Hyperlink colors do not change after being clicked</li> <li>- Co. logo on an internal pages does not return to the homepage</li> <li>- Site search function is present but does not work effectively</li> <li>- Links do not work</li> <li>- Contains grammar, spelling, or punctuation errors</li> <li>- Limited use of social media links or elements</li> </ul>	<ul style="list-style-type: none"> <li>- Irritation</li> <li>- Annoyance</li> <li>- Frustration</li> <li>- Questioning company credibility</li> </ul>	Slight to moderate redesign

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Untapped Opportunities	Under-water	Omission	<ul style="list-style-type: none"> <li>- Lacks selected design features or elements that users expect</li> <li>- Fails to take full advantage of the power of the Web</li> </ul>	<ul style="list-style-type: none"> <li>- No site search capability</li> <li>- No site map, directory or index</li> <li>- No breadcrumb trail</li> <li>- No tagline or explanation of what the website offers</li> <li>- No use of social media links or elements</li> </ul>	<ul style="list-style-type: none"> <li>- None</li> <li>- Irritation</li> <li>- Annoyance</li> <li>- Frustration</li> <li>- Questioning company credibility</li> </ul>	Slight to moderate redesign
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