Website Tools and Applications with Flash

DESIGN GUIDELINES BASED ON USER TESTING OF 46 FLASH TOOLS

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**REPORT AUTHORS**

Hoa Loranger, Amy Schade, and Jakob Nielsen
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Executive Summary

The Internet is changing. The two main applications used to be reading email and reading Web pages, but we are starting to see much more functionality-oriented applications that aim to provide new types of features and do more things for users. Many of these applications were being developed in Macromedia Flash at the time of our 2002 research study, because traditional Web pages are much more suited to what they were invented for — reading articles — than they are for the new goal of manipulating data objects.

Web-enabled applications can be provided through standard Web pages and the traditional browser interface, but doing so neglects the last twenty years’ advances in graphical user interfaces and sets us back to the asynchronous interaction style last seen on IBM 3270 terminals in the 1970s. It can be done — has been done — but it’s not good for usability.

The alternative is to embed the new functionality within a graphical user interface, along similar lines as those provided for traditional shrink-wrapped software for the Apple Macintosh or Microsoft Windows. Flash offers the hope of graphical user interface (GUI) design for Internet applications, and thus interaction styles that are more suited for supporting functionality beyond reading and browsing.

Although this possibility sounds very good, in the usability field we know that more technical capabilities and a broader set of design options usually translate into more rope for hanging the users. New features are almost always used to excess, and it takes some time to discover the most appropriate way of applying new technology to suit human needs.

We can accelerate this adaptation by running user studies of the early applications, to discover their main usability pitfalls and derive design guidelines to codify the best practices that work with real users. We have done exactly that. In 2002, we tested 46 different Flash applications with users in the United States, Germany, and Japan, and we summarized the resulting lessons for Rich Internet Applications (RIA) in 117 usability guidelines, plus an additional 21 accessibility guidelines.

Our biggest finding may be this: Most current Web-based applications are ephemeral applications that must be immediately understandable or users will fail. The usability requirements for applications on the Web are much stricter than they ever were for traditional software.

Success Rates

We have calculated people’s ability to use the Flash applications we tested in two ways that differ in how they treat partial success. In one calculation, called “feature success,” we looked at people’s ability to use the features of the Flash application and gave partial credit when users were able to complete some parts of a task, even though they failed on other parts (and thus did not truly accomplish the full task). If users needed assistance to proceed through parts of a task, they did not get any score for that part, but they did get credit for anything they figured out on their own. With this feature-based way of scoring, the average success rate across the 46 designs was 64%.

We also computed a “task-success” score, where no credit was given if the user failed to find the application and complete the task, even if the person used some features correctly. If, as happened often, users couldn’t navigate from the homepage to the application, we gave them a task score of zero. We did the same if they failed
on any other step. The theory behind this calculation is that either they did it or they didn’t. With this stricter way of scoring the average success rate across the 46 designs was 45%.

Which success rate is most representative for the usability of Flash applications in 2002? You can argue for either, which is why we computed both.

The task score is the best indicator of whether the total user experience, that integrates traditional HTML web pages and Flash functionality, is working as intended. After all, normally there is no kind usability facilitator sitting next to the users, so if they can’t overcome difficulties in one part of the total user experience, they will usually leave the site. We often helped users overcome initial difficulties in getting into the application in the first place. Without such assistance, they would not have reached the application at all, and thus any success they had using features inside the application in our study would not have occurred in normal usage.

The feature score (that allows credit for using some features even if users didn’t do everything right) may be the best at assessing the quality of the Flash designs seen in isolation from the websites that are hosting them.

For both website and users, feature success may sometimes have some value, even if it is not as good as task success. Users don’t care about Flash applications; they care about the extent to which the Internet solves their problems. If a design answers a question or provides some useful information or insight, the user may still value the site, because he or she would have no way of knowing that there was even more they could have done.

From a business perspective, partial success can also have some small value. The extreme case would be an e-commerce site where the user, for example, succeeds in finding the product but fails to complete the checkout process, and thus is unable to buy anything. This scenario would definitely indicate a failure of design and would score zero for the task of shopping online. The successful features might still have value, however, if the user went on to buy the product in the same vendor’s physical store.

WEB-BASED APPLICATIONS ARE EPHEMERAL APPLICATIONS

In principle, Flash is just an implementation technology, and it could be used to build traditional desktop applications that would be used like any other productivity application. For such applications, the usability issues would likely be the same as for traditional computer software, which definitely has its own problems and weaknesses. But all of the 46 Flash applications we tested were Web-based applications in one form or another, as opposed to traditional shrink-wrapped software.

The low success rates in our study are directly related to the special status of Flash applications as Web-based applications. Web applications are different from traditional applications in several ways, and users view them as low-commitment transient encounters; a concept we refer to as “ephemeral use.”

- A Web-based application is usually a component of a website, meaning that users have to navigate from the traditional, information-oriented, Web pages to the functionality-oriented tool that’s presented in the Flash application. In our study, users failed to make this initial step 36% of the time, which is one of the main reasons for the low task-success rate.
- After users find the application, they need to understand what it does, what it can accomplish for them, and the general task flow and structure of the
application. These problems hold true for all software, but with most traditional software, you have initial training that establishes the basics. Many software products are famous enough that the user knows their basic purpose before even installing them: this is true for both enterprise systems (such as expense reporting or time sheets on an intranet) and desktop software (for example, PowerPoint). In contrast, users are thrown directly into a Flash application from the website, often unexpectedly.

- Users’ motivation to understand advanced features is lower for Web-based applications because of the assumption that the application will not be a core part of their work. In contrast, it’s often people’s job to use traditional software: either as a main defining part of their job (as it is with airline reservation agents, for example) or as the means to generate the deliverables for which their performance is measured (as is often the case with Microsoft Office, for example).

- Users rarely return to the same Flash application multiple times, meaning that they will rarely benefit from a build-up of learning about that specific user interface. In contrast, traditional software is often used repeatedly by the same user.

Because the Web-based application is hosted on a remote server, users may have to register and/or sign in to be able to manipulate their own data. Storing and retrieving user data is an added complication, because it typically cannot be done on the user’s own machine the way people are used to with traditional software.

The fundamental issue behind most of these points is that Web-based applications are ephemeral applications that users encounter in their surfing. Users may be using the application only once, which means that the immediate user experience is all that matters. Even when users access a Web-based application several times, their use is usually intermittent and brief.

We should emphasize that the ephemeral nature of these applications is not a fundamental characteristic of Flash; instead it’s a characteristic of the applications implemented in Flash when we ran our studies. It is true that the Web seems to encourage a much broader range of applications than traditional software does, however. This diversity and breadth of experience is positive, but because people spend less time with each application, there are usability implications.

Ephemeral applications – and thus most Flash applications – must be simple and cannot have too many features. This need for streamlining means developers must understand users’ needs even more than usual, because it will not be possible to just throw a huge feature set at users and have them puzzle out what they need before they can get something useful accomplished.

Ephemeral applications must also be able to give users an overview of their features very quickly and to explain the basic task flow. Applications will be encountered primarily by first-time users, who need to build a conceptual model of how to deal with them; and yet users won’t want to invest a lot of time exploring or learning the application, because they know they may never return.

**NAVIGATING TO FLASH APPLICATIONS**

Many Flash applications are linked in ways that cause most users to avoid them. In our study, users in the United States had to be directed into the Flash area 36% of the time. Normally, then (with no test facilitator to help) more than a third of users would never launch Flash applications linked in this way, even when users were trying to perform the tasks that the applications are intended to support.
The frequent failure to find the application significantly lowered the task-based success score in our study. Basically, companies can get 56% more return on their investment when developing Flash applications if only designers would make it easier for people to find the applications. Of course, we would also like companies to improve the usability of the application itself, but even without any quality improvements, usage would increase by an average of 56% if all users could just get to the application.

The problem is that designers are so happy about their Flash applications that they over-promote them on the Web pages. It is common for a Flash application to be linked by way of a big colorful box of graphics that looks suspiciously like an advertisement. As we have seen in tests for many years now, Web users have developed a strong tendency to ignore anything that looks like an ad. This banner blindness serves users well when navigating traditional websites, because it allows them to focus on the useful links and ignore the ads. Unfortunately, if the colorful promotion links to something useful, like a Flash application, users will never find it, because they simply won’t read the box, much less click it.

Some of the links to Flash applications used animated words in an attempt to be even more attractive and promote the various benefits of the application. This technique backfires even more, because users have a firm belief that anything that contains moving or blinking words is bound to be a useless advertisement — a belief that’s usually true and that saves users much time after they develop the ability to ignore moving words.

Some examples:

- Pergo is a vendor of laminated floor covering. On their site, we had users try to find out what supplies they needed to buy in order to install a new kitchen floor. One user in particular was a sad case: one page asked for the size in square feet of the area that needed to be covered. The user was swearing as he tried to calculate the area of his floor by hand. Completely ignored by the user, but right next to the form asking for the floor size, was a big animated graphic with flying words like “room planner,” “set up room size,” “length,” “width,” and several other terms that should have provided plenty of clues that the box linked to an application for computing floor sizes. Too bad: the user didn’t see it. Neither did our other test users. To get usability data about the actual Flash design, we had to force people to launch the application.

- The Haribon Foundation in the Philippines had lots of good information about the environment and endangered animals. On the foundation website, we asked users to find out which endangered birds live in a certain location. Despite the fact that every single page on Haribon featured a big colorful box promoting an interactive map of key conservation sites in the Philippines, nobody clicked this link. People tried every other alternative to find out about the birds, and again we had to force users to click the link to the application before we could start collecting data for our Flash design guidelines.

Scotts Lawn Care had a useful Flash application that allowed users to sketch their lawns to find out how many bags of various lawn products they needed. Almost no users started this application on their own. There, the problem was not an overly graphical promotion, but rather that the application was found in an area of the site called “Interactive Tools.” Users were much more attracted to areas named “Problem Solving” and “What to Do Now.” Even within the interactive tools, users were more likely to click “Annual Program Builder” than the “Lawn Products Calculator,” even when they were trying to find out how much product to buy.
The problem is clear: users try to avoid anything that's overly hyped or promoted, especially if the promotion looks like an advertisement. They also don't care about interactive tools for their own sake. Anything that sounds complicated or computer-like will be ignored. All users care about is their own problem and a straight task flow that sounds like it will solve that problem.

The solution is also clear: Even if you have an advanced Flash application, don't tell users that. Simply link to the application from your website using a normal hypertext link. The more ordinary it sounds and the more the presentation seems like it will solve users’ problems (as opposed to showing off your technological prowess), the more clicks you will get. Name the link something that clearly indicates what the application does for users, not something that hypes it up. Avoid saying it's interactive or was built in Flash.

**OBJECT-ORIENTED GUI DESIGN**

Conducting user sessions in 2002 with rich Internet applications in many ways was reminiscent of the 1980s when we were testing the first crop of Macintosh applications. Many of the usability problems we identified in this study are related to basic concepts of graphical user interfaces, such as making controls obvious and easy to grab. One of our RIA guidelines is a virtual copy of a finding from the 1980s: you need to provide generous click zones surrounding active areas of the screen or users will think that they clicked something, even if they technically didn't, according to the computer's strict definition of which pixels are clickable.

We also repeated a finding from the earliest generations of presentation packages: when you create new objects on a drawing canvas, they should be staggered relative to other objects so that they don't obscure each other. Other guidelines are new and would never have been found in the traditional software industry: we discovered a substantial number of usability issues relating to sound and to animated objects, both positive (can be used to indicate change and direction) and negative (distracting, annoying, and harmful for users with disabilities). It seems that some of the early Flash applications have inherited bad habits from Web design.

One particular usability problem is worth emphasizing: users often didn't see a large number of the options in several applications because of nonstandard scrollbars. A scrolling control is a standard user interface element in application design and should be designed in accordance with users’ expectations. We did see a few nonstandard scrollbars that worked; notably on Tiffany's site, which is so simplified in appearance that users could not help but notice the scroll controls even though they were fairly small and in violation of GUI recommendations (these deviations did cause other usability problems, but at least people used the scrollbar). In general, users often overlooked nonstandard controls for scrolling, and thus never got to scroll the lists to see the hidden options.

**A NEW GENERATION OF DESIGN GUIDELINES**

The good news is that the tyranny of the browser has come to an end. We no longer have to squeeze functionality and feature-oriented design into a frame that was optimized for hypertext navigation and for reading articles. The bad news is that the move to Internet-based applications requires designers to pay attention to a new set of guidelines, besides those we have identified for Web design.

In summary, much of Web usability can be stated as "answer customers’ questions, get to the point, and take it easy on the bells and whistles." If only we could get websites to stop annoying users, much would be gained.
Applications have to go much further than simply answering questions. We need features: the right ones, not too many, and they must be presented in ways that empower users. This is a much harder design challenge than simply providing information.

This report presents usability guidelines to help you meet this challenge.

In writing this report, we have assumed that you have already decided to develop Web-based functionality with the use of Flash. Certainly, there are preliminary questions as to whether the project is worth doing and what technology you should use for the implementation. We do not provide the answers to these questions but assume that you have already done so, and that this is why you started reading this report.

Some of the guidelines are very specific to current Flash technology, but most of the guidelines are broader, because they relate to the user experience. We derived the guidelines from extensive user testing of a broad set of current Flash applications, and it's certainly possible that new technologies may introduce additional issues in the future and that some of the current issues may be resolved by future releases. We can't know the future for sure, but based on our experience with earlier usability guidelines, we predict that most of the guidelines will prove to be more durable than current technology. Users' behavior doesn't change as rapidly as software releases, and many of the guidelines relate to the core essence of richly-featured Web-based functionality which will also change more slowly than the implementation platform.

It will take effort to raise the design of Flash applications to the new level of usability required for ephemeral applications. A focus on simplicity will be key, as will be a much deeper understanding of users’ needs than has characterized the first decade of Web design.
Changes Since 2002

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The user research described in this report was conducted in 2002, using the predominant technology for Rich Internet Applications (RIA) that year: Flash MX.

Today, most RIA work is done using newer technologies, including newer releases of Flash, as well as AJAX, Silverlight, and probably additional platforms by the time you read this.

The main thrust of the report remains useful, despite these changes in technology: the observations of user behaviors and what they mean for designing better user experiences when embedding functionality on the Web in addition to pure content. The idea behind our research is to consider usage scenarios and find out how to design for users’ real needs; not simply to look at coding tricks. Some of the discussion in this report does reflect specific implementation issues and will probably not apply to your work. But most of the guidelines remain as valid today as they were in 2002, because they don’t concern Flash—they concern the RIA user experience.

Updated Application Usability Advice

For recent usability analysis of contemporary RIA user experience design, please see Nielsen Norman Group report The Best Applications. http://www.nngroup.com/reports/topic/applications/

Several case studies of how to integrate user-centered design (UCD) and Agile development methodologies are presented in a separate report, Agile Development that Incorporates User Experience Practices. http://www.nngroup.com/reports/agile-development-user-experience/

Our most recent usability guidelines for application design are presented each year at our annual usability conference, Usability Week. We can also send a usability expert to your company to present these training events specifically for your team. http://www.nngroup.com/training/
Research Overview

This report offers general guidelines for improving the usability of Flash-based applications and tools. The main purpose of our research was to learn how people use these applications, then develop usability guidelines based on methodical observation and user feedback. The results from this research are summarized in this report, which include explanations and discussion for each recommendation.

This report emphasizes guidelines that can affect a broad range of users. Where appropriate, we’ve included discussions regarding specific user groups such as international users and users with disabilities; however, international guidelines or accessibility guidelines are beyond the scope of this study.

For more detailed information and guidelines on designing for international users, refer to our “International Users” report from the E-commerce User Experience series. [http://www.nngroup.com/reports/ecommerce/international.html](http://www.nngroup.com/reports/ecommerce/international.html)

The guidelines on designing for accessibility with Flash were originally published as a separate report, entitled Accessibility and Usability of Flash for Users with Disabilities. This edition of the report encompasses both the application research and the accessibility research.

PROCEDURE

We conducted our research in three different countries: the United States, Germany, and Japan. Most of the studies were done in the United States, with a subset done in Germany and Japan. Also, additional research was done to discover preliminary issues with regard to accessibility.

We gave all users tasks to do with various Flash-based applications and tools, and observed as they worked. People were encouraged to think out loud as they tried to accomplish the tasks.

A total of 76 users participated in this study: 46 people in the United States, 20 people in Germany, and 10 people in Japan. The sessions were conducted in English, German, and Japanese, respectively. All users were native speakers of the language in the country in which the tests were conducted. Out of the 46 users in the United States, 8 people relied on assistive technology, such as screen readers and screen magnifiers, to interact with the computer.

For full details about the testing procedures, please refer to the Methodology section of this report (page 221).
DESIGNS STUDIED

This section describes the 46 Flash-based designs we tested. Although applications and tools were the focus of this study, we included a few Flash-based websites so that our findings could be as comprehensive as possible. You may notice a slight discrepancy in the number of designs. For designs that have various localized versions, we counted each version separately, because we believe that they are truly different designs. For sites that have multiple tools or applications, we grouped them together and counted them as one design, because they are often used in conjunction with each other. We also included a few applications made with Shockwave, because their functionality closely mimicked other Flash applications.

For a listing of designs by type, please see the Types of Designs Studied section on page 224.

FLASH-BASED DESIGNS STUDIED

<table>
<thead>
<tr>
<th>Name</th>
<th>Description of Application</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aarhus, Denmark</td>
<td>Lets people find important locations, such as restaurants and shopping areas, in the city of Aarhus, Denmark.</td>
<td>Denmark</td>
</tr>
<tr>
<td>Map</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.iaarhus.dk">http://www.iaarhus.dk</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abacho</td>
<td>Lets people create an Easter postcard.</td>
<td>Germany</td>
</tr>
<tr>
<td>Drawing Tool</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://special.abacho.de">http://special.abacho.de</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Better Homes and Garden (BHG)</td>
<td>Allows users to arrange furniture and architectural features (doors, windows, electrical outlets, and so forth) in a room of the user’s choosing. Technically, this was done in Shockwave, but its functionality mimics most Flash applications.</td>
<td>United States</td>
</tr>
<tr>
<td>Arrange-A-Room</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.bhg.com">http://www.bhg.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bose</td>
<td>Lets people draw their room and get advice on where to place the Bose product to get optimal sound.</td>
<td>United States</td>
</tr>
<tr>
<td>Room Planner</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.bose.com">http://www.bose.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Broadmoor</td>
<td>Allows people to enter their information to make hotel reservations all on one screen.</td>
<td>United States</td>
</tr>
<tr>
<td>Hotel Reservations</td>
<td></td>
<td></td>
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<tr>
<td><a href="http://www.broadmoor.com">http://www.broadmoor.com</a></td>
<td></td>
<td></td>
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<tr>
<td>California Pizza Kitchen</td>
<td>Offers an interactive map for finding California Pizza Kitchen restaurants in the United States.</td>
<td>United States</td>
</tr>
<tr>
<td>Store Locator Map</td>
<td></td>
<td></td>
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<tr>
<td><a href="http://www.cpk.com">http://www.cpk.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBC Sports</td>
<td>Gives comprehensive information on the statistics from the 2002 FIFA World Cup.</td>
<td>Canada</td>
</tr>
<tr>
<td>CBC World Cup Game Tracker</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://cbbc.ca/sports/afp/wc-flash/2/gametracker.html">http://cbbc.ca/sports/afp/wc-flash/2/gametracker.html</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CokeMusic</td>
<td>Lets people create their own music by editing sound tracks and samples.</td>
<td>United States</td>
</tr>
<tr>
<td>Create Your Demo</td>
<td></td>
<td></td>
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<tr>
<td><a href="http://www.coca-cola.com">http://www.coca-cola.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Description of Application</td>
<td>Country</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Devil</td>
<td>Lets people send and receive email and create contact lists.</td>
<td>United States</td>
</tr>
<tr>
<td>Email</td>
<td></td>
<td></td>
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<tr>
<td><a href="http://www.devil.com">http://www.devil.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expo02 Exhibition</td>
<td>People can create their own fantasy creature, which they can send for a swim with creatures made up by others in a large virtual pool. The game is a part of the Expo02 Swiss National Exhibition.</td>
<td>Switzerland</td>
</tr>
<tr>
<td>Interactive Game</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.cyberhelvetia.ch">http://www.cyberhelvetia.ch</a> (click Vivarium)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>German Elections</td>
<td>Gives information about the German general elections in 2002, including updated opinion polls.</td>
<td>Germany</td>
</tr>
<tr>
<td>Information to the Public</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.wahlen02.de">http://www.wahlen02.de</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>German Eye Clinic</td>
<td>Provides information about eye surgery offered by the privately held Augen Laser Zentrum clinic in Munich, Germany.</td>
<td>Germany</td>
</tr>
<tr>
<td>Promotional Information</td>
<td></td>
<td></td>
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<tr>
<td><a href="http://www.gutsehen.de">http://www.gutsehen.de</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Giftworld Nestle</td>
<td>Allows people to create their own gift basket by dragging and dropping items into the basket and choosing wrapping options.</td>
<td>Japan</td>
</tr>
<tr>
<td>Gift Basket</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.giftworld.nestle.com">http://www.giftworld.nestle.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haribon Org</td>
<td>Shows the key bird conservation areas in the Philippines.</td>
<td>Philippines</td>
</tr>
<tr>
<td>Saving Species (Locator map)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hewlett Packard</td>
<td>Helps people choose the right paper for their project needs.</td>
<td>United States</td>
</tr>
<tr>
<td>Paper Selector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Prototype version tested)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honda</td>
<td>Lets users choose and customize the motorcycle they want by choosing body style, colors, and options. Technically, this application was done in Shockwave, but its functionality mimics most Flash applications.</td>
<td>Japan</td>
</tr>
<tr>
<td>Bike Customizing</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.honda.co.jp">http://www.honda.co.jp</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hummer.com</td>
<td>Lets people choose the vehicle they want and configure it to their liking.</td>
<td>United States</td>
</tr>
<tr>
<td>Build and Price</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.hummer.com">http://www.hummer.com</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyatt</td>
<td>Provides an interactive floor plan showing the features and setup available for the various meeting rooms.</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>Floor Plans, Birmingham</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://birmingham.meetings.regency.hyatt.com/floorplans.html">http://birmingham.meetings.regency.hyatt.com/floorplans.html</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interactive Diary</td>
<td>Lets people demo and download a photo diary they can customize by changing the font, color, background and image.</td>
<td>United States</td>
</tr>
<tr>
<td>The Crossroads Roadtrip Diary</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.crossroadsmovie.com/diary">http://www.crossroadsmovie.com/diary</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Description of Application</td>
<td>Country</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------------------------------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Kewpie.co.jp</td>
<td>Japanese website specializing in popular salad dressings and mayonnaise.</td>
<td>Japan</td>
</tr>
<tr>
<td>Ladies Home Journal (LHJ)</td>
<td>Lets people choose various lunch items and scores their meals for nutritional value.</td>
<td>United States</td>
</tr>
<tr>
<td>Leaf Racewear</td>
<td>Lets people choose colors for various parts of the suit they want.</td>
<td>Canada</td>
</tr>
<tr>
<td>Lee</td>
<td>Allows people to enter their measurements and personal preferences to get recommendations on a pair of jeans.</td>
<td>United States</td>
</tr>
<tr>
<td>Lipton Japan</td>
<td>Provides interactive information about Lipton brand teas.</td>
<td>Japan</td>
</tr>
<tr>
<td>Men’s Non-No Map of shops</td>
<td>Helps people find stores in different areas.</td>
<td>Japan</td>
</tr>
<tr>
<td>Mini</td>
<td>Lets people configure cars by choosing color, package, and accessory options.</td>
<td>United States</td>
</tr>
<tr>
<td>Mod’s Hair</td>
<td>Lets people import their own picture and experiment with various hair colors and styles.</td>
<td>Japan</td>
</tr>
<tr>
<td>Monopoly</td>
<td>Lets people design their own personal version of the Monopoly board.</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>Nike</td>
<td>Provides entertaining activities for young people.</td>
<td>United States</td>
</tr>
<tr>
<td>Nike Japan</td>
<td>Lets people build and order custom shoes by picking styles, colors, and options.</td>
<td>United States</td>
</tr>
<tr>
<td>Pergo</td>
<td>Lets people choose flooring colors to coordinate with the rest of the colors in their home.</td>
<td>Sweden</td>
</tr>
<tr>
<td>Name</td>
<td>Description of Application</td>
<td>Country</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Pergo</td>
<td>Lets people create their own room, so that they can get a list of flooring supplies needed to install a new floor, based on the user’s drawing.</td>
<td>Sweden (Tested localized United States and German versions)</td>
</tr>
<tr>
<td>Regatta Sport</td>
<td>Lets people choose the colors of the jacket they want.</td>
<td>Canada</td>
</tr>
<tr>
<td>Scotts</td>
<td>Lets people re-create their own yard to get recommendations for the types and amounts of lawn products to purchase.</td>
<td>United States</td>
</tr>
<tr>
<td>Shu Uemura</td>
<td>Allows people to experiment with various makeup colors and combinations and print out the list of products they chose.</td>
<td>Japan</td>
</tr>
<tr>
<td>Sydney Opera House (SOH)</td>
<td>Gives people an interactive 3-D look at the SOH in Australia.</td>
<td>Australia</td>
</tr>
<tr>
<td>Tiffany.com</td>
<td>Lets people shop at this high-end department store.</td>
<td>United States</td>
</tr>
<tr>
<td>TimBuk2</td>
<td>Lets people configure their own bags and pick out various colors and accessories.</td>
<td>United States</td>
</tr>
<tr>
<td>Peugeot</td>
<td>Lets people configure cars by choosing colors and options.</td>
<td>Germany</td>
</tr>
<tr>
<td>Umlandscout Hamburg Map</td>
<td>Provides interactive tourist information in the Hamburg, Germany area.</td>
<td>Germany</td>
</tr>
<tr>
<td>Verizon</td>
<td>Shows people how to review and analyze telephone bills across a company.</td>
<td>United States</td>
</tr>
<tr>
<td>Volkswagen Exhibition Guide</td>
<td>Provides visitor information for the Volkswagen headquarters exhibition center in Wolfsburg, Germany, where people can shop for Volkswagen promotional items.</td>
<td>Germany</td>
</tr>
<tr>
<td>Volkswagen Japan</td>
<td>Lets people choose their car, its color, and get pricing information.</td>
<td>Japan</td>
</tr>
<tr>
<td>Name</td>
<td>Description of Application</td>
<td>Country</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Waitt Media</td>
<td>Shows the locations and the status of advertising billboards.</td>
<td>United States</td>
</tr>
<tr>
<td><em>Billboard (Locator map)</em>&lt;br&gt;<a href="http://www.waittmedia.com/outdoor">http://www.waittmedia.com/outdoor</a>&lt;br&gt;(click &quot;Markets&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>YHA (Youth Hostels of Australia)</td>
<td>Gives people their Australian travel itinerary after they enter dates and destinations on a map.</td>
<td>Australia</td>
</tr>
<tr>
<td><em>Itinerary Planner</em>&lt;br&gt;<a href="http://itinerary.yha.com.au">http://itinerary.yha.com.au</a></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Summary of Findings

This section contains the success rates for the designs studied. Success rates are reported in two ways: feature success rate and task success rate.

For feature success, partial credit was given. Task success was scored as strict pass or fail, with no partial credit. If the facilitator had to guide the user in any way, the application was given a failing score.

Feature success rates are good indicators of the quality of the application if used in isolation, while the task success rates are good indicators of the total user experience, from finding the application to using it.

Note: The detailed findings from the accessibility study are not included in the success rates because it is well known that in general, websites are more difficult for people with disabilities to use, so averaging in the scores from the accessibility part of the study would skew the results. Please refer to our Accessibility and Usability of Flash for Users with Disabilities report for more detailed findings from the accessibility study. http://www.nngroup.com/reports/accessibility/flash

FEATURE SUCCESS RATES

Feature success rates are based on the level of success people had in using the application only. Feature success rates do not include whether or not people were able to find the application.

We scored feature success based on the degree of task completion on a scale ranging from 0–100, with 0 given when tasks were not completed at all, and 100 given when tasks that were fully completed. Designs were given partial credit depending on the amount of information the users found.

When measuring the feature success rates, we took into account whether people were able to:

(1) Understand and use the application to accomplish their task
(2) Get the information they need to accomplish their task.

The graph on the next page shows the feature success rates of the various designs studied. Most designs scored 30%–60%, and two scored 25% or lower. The average feature success rate across the designs was 64%.

Out of 46 designs, only 7 achieved 100% feature success:

- Volkswagen Japan Configuration and Quotation
- Nike Entertainment
- Giftworld Nestle Gift Basket
- Kewpie.co.jp
- Hewlett Packard Paper Selector
- The Crossroads Roadtrip Diary
- California Pizza Kitchen store locator map.
**TASK SUCCESS RATES**

We also measured the task success rates for the designs studied. That is, designs were given strict pass or fail scores without any partial credit. The task success rates in this study measured the entire user process from finding the application on a website all the way through using it to accomplish tasks.

When measuring the task success rates, we took into account whether people were able to:

1. Find the application
2. Understand and use the application to accomplish their task
3. Get the information they need to accomplish their task.

Based on the above scoring system, most designs scored 20%–50%, and 14 designs scored 25% or less. The overall the task success rate was 45%.

**TOP CAUSES OF FAILURE**

The main problems that caused failures in this study were:

- **Lack of guidance and process** – causing people to skip steps and options.
- **Overly complex interactions** – frustrating people until they eventually give up.
- **Options that were listed in unrecognized tabs, buttons and scrolling areas** – causing people to overlook them.
- **Unclear error messages** – confusing people instead of helping them fix the error.
- **Lack of features that support user needs** – causing users to wonder about the usefulness of the application.
- **Lack of obvious links to applications** – causing people not to find the application at all.

One of the biggest problems that users encountered even before using the application was just getting to it. When possible, we started people on the main website and observed as they navigated to the areas where they could accomplish their tasks. In the United States, users had to be directed or helped by the facilitator 36% of the time. The main reasons for people not getting to the application were:

- They couldn’t find the link to the application on the website.
- They noticed the application but didn’t think it could help them.
- They had difficulty with registration.
- They found the information they needed somewhere else on the website.

They didn’t know how to get back to their application after they accidentally clicked outside of its window.
The graph on the next page shows the task success rate across the various designs studied. Only 6 designs achieved 100% task success:

- Volkswagen Japan Configuration and Quotation
- Nike Entertainment
- Giftworld Nestle Gift Basket
- Kewpie.co.jp
- Hewlett Packard Paper Selector
- The Crossroads Roadtrip Diary.

These applications also achieved 100% feature success. California Pizza Kitchen, however, did not make the grade for task success, as most users opted to enter their address instead of using the Flash-based map. Because they had to be directed to use the Flash map, the application failed.

The score for task success assesses the quality of the total user experience, starting from the homepage of the site, and including both traditional Web pages and Flash features. People don’t care about the technologies. They are just trying to get things done on the Internet, and they have to use various user interfaces to accomplish their goals.

Similarly, from a corporate perspective, return on investment is dictated by the success of the total user experience: the task success rate indicates the extent to which customers can start at the homepage and get through all the steps needed to meet the business goals of the project.
INTERPRETING SUCCESS RATES

When interpreting success rates, keep in mind that 100% success doesn’t mean 100% usability. Having a high success score doesn’t necessarily mean that the application is easy to use, has a clear workflow, or supports users’ tasks. It simply implies that people were able to complete a given task, even if the application caused frustration or difficulty.

Conversely, a low success score could mean that the design was difficult to use overall or that it contains a few serious usability obstacles that users couldn’t overcome.

The following examples illustrate how scoring can be interpreted for different designs:

Giftworld Nestle Gift Basket scored 100% because all users were able to complete their task using this application. Most users had difficulty at first because they didn’t know that drag-and-drop functionality was available, but after they figured it out, they had little or no difficulty creating their own gift baskets. The workflow was easy to understand. The pricing information and next-step button was prominent and visually distinct from the site navigation and other page elements.

Several users even commented on how fun and delightful it was to use. People especially enjoyed choosing and seeing what the final gift basket looked like. Overall, this was a good design. Usability could have been improved with simple instructions on how to use drag-and-drop, however.

After people figured out drag-and-drop on Giftworld Nestle, they successfully added items to their gift baskets.
People using Giftworld Nestle enjoyed choosing the wrapping and seeing the final product.

Volkswagen Japan Configuration and Quotation also had a success rate of 100%. Although people figured out the workflow, the application didn’t support the features that users wanted, and they became skeptical of its usefulness. The application gave people the option to change body color only, which seemed insufficient because people expected to have more options, such as interior color, accessories, and so forth. The design wasn’t complete enough to give people an impression of what the car would look like, which turned people off.
Although the application scored 100% success, people didn’t find Volkswagen Japan Configuration and Quotation useful.

TimBuk2 Build Your Own scored only 39% in feature success, even though it was a fairly good design. Most users understood the general workflow and appreciated the visual feedback for each entry. Even Japanese users who didn’t understand English were able to navigate through the application with little or no difficulty based on the visual feedback.

The biggest downfall for TimBuk2 was that it didn’t give people error messages when they accidentally skipped steps. Some users didn’t color enough areas of the bag and were unable to check out. Rather than displaying a constructive error message reminding people to choose colors for all of the panels, the application instead hid the checkout button. Even though this application was mostly usable, some people couldn’t purchase the bag because they couldn’t find a way to check out and didn’t know what the problem was. Several people gave up. TimBuk2 could have been more successful by providing a good error message at the appropriate time.
TimBuk2 Build Your Own had a generally good design, but its major downfall was not giving people constructive error messages when they needed them. In this example, the user had chosen a color for the left panel but had overlooked the need to choose colors for the remaining two panels. The checkout button would not appear unless colors were chosen for all panels, but users didn’t know that and had no options except quitting. One small application design change, then, would likely more than double the number of sales.
Guidelines for Designing with Flash

The following list summarizes our usability guidelines for designing in Flash, based on findings from user research. These guidelines are recommendations for improving the usability of Flash-based applications. Detailed discussions and examples for each guideline are included later in this report. Refer to the page numbers that appear after each guideline below for more information about that guideline.

USER-CENTERED DESIGN

USABLE DESIGN
1. Follow basic rules of good design. (33)

WORKFLOW
2. Provide features and information that support user needs. (33)
3. Avoid overly fancy features that are unrelated to the user’s task. (37)
4. Show features and data that need to be used together on the same screen, but don’t force your entire application onto one screen. (41)
5. Gently guide users through an expected workflow. (44)
6. Integrate your application with the related content on the website. (50)
7. Don’t force users to name a project before they’ve created it. (52)
8. Make sure splash pages serve a user-centered purpose. (53)
9. Don’t offer options that aren’t available. (56)
10. Don’t show features that are incomplete or missing. (58)
11. Don’t require more information than is necessary. (59)
12. When appropriate, make your application similar to those people are already familiar with. (59)

CONTENT
13. Speak the user’s language. (62)
14. Don’t invent words to describe the application. (63)
15. Provide straightforward button and field labels. (63)
16. Don’t overload people with technical information. (64)
17. Don’t make links to content unrelated to your application. (66)
18. Group similar items together in sorted lists and categories. (67)

NAVIGATION
19. Indicate what’s clickable. (68)
20. Don’t hide navigational links behind graphics. (70)
21. When a graphic is associated with a link, make both clickable. (71)
22. Avoid words or labels that automatically disappear or change. (73)
23. Don’t orient words vertically or at odd angles. (76)
FEEDBACK
24. Provide sufficient feedback to show the user’s input. (79)
25. Place interactive and display areas in close proximity to each other. (81)
26. Highlight selected areas. (83)

ATTRACTING VISITORS

MAKE APPLICATIONS COMPELLING
27. Match the tone of your application to your target audience. (85)
28. Make sure people understand the purpose and rationale for the application. (87)
29. Provide useful and complete results. (89)
30. Show the prices. (91)

QUALITY ASSURANCE
31. Make results match people’s input. (91)
32. Fix technical problems. (92)
33. Make sure the instructions are accurate. (93)

OBJECT-ORIENTED CONTROL

DRAG AND DROP
34. Keep drag-and-drop manipulations as simple as possible. (95)
35. Detect where users want to place objects and help them do it. (98)

CREATING OBJECTS
36. Stagger the placement of objects so they don’t stack exactly on top of each other. (99)
37. When objects are placed on top of each other, consider making those objects appear to be transparent or layered in the appropriate order. (99)
38. When there’s a set order in which objects must appear, automatically force the top object to appear to be on top, even if the user didn’t place the objects in that order. (100)
39. Be sure to provide objects and choices that people need. (100)
40. For spatially oriented applications, show the dimensions of the work area. (101)
41. Don’t hide object choices in tabs or menus. (101)

RESIZING OBJECTS
42. Let an object resize only in the direction it is being pulled. (104)
43. Use arrows to represent the value of the dimension, not the direction of the expansion. (105)
ROTATING OBJECTS
44. Make it easy for people to rotate objects. (105)
45. Offer common angles when exact degrees are unnecessary. (107)
46. Don’t automatically rotate objects just to be fancy. (107)

PRESENTATION

MOTION
47. Don’t show gratuitous motion. (108)
48. Avoid using continuous slow motion and fading. (110)

SOUND
49. Sound
50. Don’t play unnecessary music on your site, especially if it’s unrelated to the user’s task. (112)
51. Provide an obvious way to turn off the sound or music. (113)
52. Consider providing audio feedback to signal when a user moves an object into place. (113)

COLORS AND FONTS
53. Don’t use tiny fonts. (113)
54. Ensure adequate contrast between the background and text. (118)
55. Present colors as accurately as possible. (122)
56. Don’t use transparent menu items or field labels. (123)

SCROLLING
57. Make sure users recognize and understand how to use your scrollbar. (124)
58. Provide scrollbars that have an indicator showing the relative length of the page or list and how far users have to scroll. (129)
59. Provide scrollbars that are big enough to be controlled easily. (130)
60. Help users control their scrolling speed. (131)
61. Don’t put content or lists in small scrolling areas. (132)
62. Don’t show a scrollbar when there’s nothing in the pane to scroll. (134)
63. Let users control the scrollbars. (135)

GRAPHICS AND PHOTOGRAPHS
64. Make sure links don’t look like decorations or ads. (136)
65. Use meaningful icons. (138)
66. Label graphics and icons, especially when their meaning isn’t obvious to users. (140)
67. Avoid using pictures that don’t show anything meaningful. (142)
68. When appropriate, complement content with helpful pictures and diagrams. (146)
69. Don’t use faded or blurred pictures. (147)
70. For design-related applications, use realistic looking pictures or sketches. (149)

**IMPLEMENTATION NUTS AND BOLTS**

**BROWSERs**
71. When possible, don’t open a new browser window, but ensure that the Back button works. (151)
72. If you must launch a new window, make it a moderate size. (153)
73. Put the application window in the upper left-hand corner. (153)
74. Force the hidden window to appear on top after users request it. (153)

**INSTALLATION AND LOAD TIME**
75. Auto-detect the Flash player (154)
76. Minimize loading time. (154)
77. Detect the user’s bandwidth. (154)
78. Preload page elements. (154)
79. Provide a simple and accurate loading-status indicator. (154)
80. Don’t make users install any additional plug-ins, unless there’s a great benefit to doing so. (155)

**SAVING AND PRINTING**
81. Set cookies to remember people’s preferences and data. (155)
82. Provide print and save options. (156)
83. Provide an email feature. (156)
84. Send projects directly to the printer. (156)
85. Provide an easy way to bookmark exact locations. (156)

**HOVERING, CLICKING, AND TABBING BEHAVIOR**
86. Consider people’s mouse-hovering behavior. (157)
87. Support double-clicking. (158)
88. Create generous click zones. (158)
89. Ensure that users can tab through fields. (159)

**USER ASSISTANCE**

**HELP**
90. Make help features noticeable. (159)
91. Provide help only when the user asks for it. (159)
92. Address real user problems. (160)
93. Provide help that speaks the users’ language. (163)

INSTRUCTIONS
94. Make features of key importance to novice users highly visible. (165)
95. Keep instructions short and simple. (165)
96. When appropriate, provide good examples. (167)

TUTORIALS
97. Give realistic, scenario-based examples and exercises. (168)
98. Use caution when providing a Next button on every screen. (169)
99. Don’t include unnecessary music in tutorials. (169)
100. Show the length of the tutorial and the user’s current progress toward completion. (169)
101. Give users control. (169)

ERROR RECOVERY
102. Make it easy for users to recover from errors by supporting undo and providing a Back button. (170)
103. Provide appropriate and constructive error messages. (170)
104. When appropriate, show all error messages at once. (171)
105. Make sure error messages are noticeable. (171)

APPLICATION SPECIFICS

MAPS
106. Provide an obvious way to move around on maps. (172)
107. Don’t hide the names of locations. (176)
108. Provide various ways to find locations, especially when there are too many to label. (177)
109. Show users the overview map first and then let them zoom in. (177)
110. Zoom to the place of interest, not to the middle of the map or some arbitrary location. (177)
111. Make simple legends. (178)
112. Provide a scale on every map (180)

REGISTRATION
113. Avoid registration if possible. (180)
114. If registration can’t be avoided, keep it short and simple. (182)
115. If registration is required, provide an obvious way to do so. (183)
116. Give noticeable feedback for successful registration and save operations. (186)
INTERNATIONAL CONSIDERATIONS

117. Make sure sites are localized properly. (186)

ACCESSIBILITY GUIDELINES

See the section on Accessibility, starting on page 188, for further discussion of our accessibility study, and see the listing of accessibility guidelines on page 192.
Discussion and Examples for Flash Design Guidelines

This section discusses the reasoning behind the guidelines and offers examples to support them.

The websites may have changed since we tested them. The screen shots we show were current at the time of testing. It’s important to emphasize, however, that this report is not about specific websites, but rather about design principles that can help in creating usable and successful Flash-based applications and tools.

USER-CENTERED DESIGN

DESIGN USABILITY

1. **Follow basic rules of good design.**

Continue using the good design rules that you already know. Most, if not all, general usability guidelines still apply when designing applications with Flash. User-centered design helps people accomplish their tasks, increases their efficiency, and frustrates them less when they use a site or application.

Some of the guidelines in this report emphasize the importance of continuing to use good design principles when designing an application. In our study, we repeatedly saw basic design guidelines being overlooked, however, causing users to stumble and not accomplish their tasks. Thus, we felt that it was important to include a recommendation in this report to remember to follow traditional human-computer interaction guidelines.

Some of the good design principles to be especially aware of include those that focus on simplicity, such as:

- **Design applications that address user needs and their core tasks**, as opposed to features that are less central to the things users want to accomplish.

- **Prioritize features and options**: make the top few features particularly prominent and easy to access, defer medium-priority features to less prominent placement, and leave out low-priority features completely.

- **Avoid including features, graphics, motion, bells and whistles just for the sake of having them.**

- **Speak the user’s language** with task-based labels and no superfluous marketing or overly technical (system-focused) language.

WORKFLOW

2. **Provide features and information that support user needs.**

Create applications that match the needs and interests of your target audience. Make sure to have useful and realistic options and details. Users become skeptical when the scenarios are unrealistic or the results provide useless or artificial information.

Understand user needs and include features that will help people accomplish key tasks and answer key questions. If users can’t find reasonable functionality on your website, they will go elsewhere. Conduct field research, such as user observations and interviews with your target audience, to find out what they expect and need from your application.
Volkswagen.co.jp: People complained that the application was unhelpful because the functionality was too limited. The site mainly gave people the option to change colors. People expected to be able to configure the entire car by choosing more options. Changing the car color didn't give them an accurate impression of what the car would look like or how much it would cost.

Users said:

“*This is not a realistic site. Normally you can add more accessories to the car.*”

“*There are only a few options here.*”

*Japanese users of Volkswagen’s Configuration and Quotation questioned the usefulness of the application because it gave them only a few options.*

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Mod’s Hair Design: Users liked the idea of creating different hairstyles for themselves, however, they were disappointed by the lack of choices. Most users couldn't find any styles they liked, because the choices were too eccentric and didn’t match their preferences.
Some people didn’t find Mod’s Hair Design to be useful, because the choices were too limited and didn’t match their taste.

Shu-Uemura Make-Up Simulator: After making all of the color choices, people expected to be able to buy the products chosen, save the project, and email the list to friends. People were surprised that these options were unavailable and doubted the usefulness of the site because it didn’t support these needs. The “product” link was too indistinct and most people didn’t know that clicking on it would give them the product list.

Users said:

“How can I buy these cosmetics? I did it, but I can’t buy it.”

“I wish I could email this information.”

Hummer.com: People were disappointed that the site didn’t let them add accessories and get an accurate price for their vehicle.

Users said:

“I’ve dealt with other sites where you select options and get a detailed quote of what you’re going to pay. This is disappointing.”

“This site is not interactive enough. There’s no way to add accessories or get a total of how much it’s going to be.”

Peugeot Car Configurator: This application didn’t have the critical information that people needed, such as pictures of the interior of the car, pictures of the car with the fabric options, and financing information. The differences between the various models weren’t explicit, making the comparison process cumbersome. The navigation hierarchy wasn’t user centered, making it difficult for people to pick the right car. The navigation concept was based on the company’s internal classification.
structure instead. For example, cars were grouped by the name of the car. In contrast, user-centered navigation would start by asking users about their preferences, for example: station wagon, sports car, and so forth, and then help people choose a car model accordingly.

People shrugged off the Peugeot Car Configurator. They said it presented no significant advantages over a traditional paper brochure and that comparisons would actually be simpler with a paper brochure.

German Eye Clinic Promotional Information: The quick tour didn’t adequately address user’s information needs.

Users said:

“What are my chances for recovering completely?”
“How long will I have to stay at the clinic?”
“What are the waiting times – both for getting to talk to a doctor and for the surgery itself?”
“Exactly where is the clinic located?”
“Give me some case stories.”

Some of these information needs were addressed on the main website, but there were no links to this information from the quick tour application.

One user suggested that the application would be more helpful if it provided a test that allowed him to find out what his eye problem was, for example whether he was near-sighted or far-sighted.

Even though the German Eye Clinic left out important information in their presentation, users were quick to point out that this slide (“The LASIK procedure,” slide 6 of 13) had useful and understandable content.

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German Elections Information to the Public: The application was unable to answer reasonable user questions about the published polls such as:
• “How were the polls taken?”
• “How many people were polled?”
• “Who paid for the polls?”

The application also included an inappropriate and unhelpful game, “Put the chancellors in the right chronological order.” The application did offer advanced features that people appreciated, however, such as “Compare polls taken by two different organizations over time.”

All these examples share the common theme that users were disappointed when seemingly advanced Flash applications failed to provide the features that mattered the most to them. Users are ultimately very selfish — particularly on the Web — and care about what you can do for them. They get annoyed when they are seduced into spending time with tools that fail to answer the questions that really matter to them. Not only are such development resources wasted, but providing applications that don’t meet users’ needs may actually hurt customer relationships. Thus, it is extremely important to understand users’ needs before spending time developing less important features.

CokeMusic Create Your Demo: People who were familiar with professional music-handling applications were impressed by the functionality delivered by this application. Users reacted very positively to the sound quality and functionality offered. Although CokeMusic offered less functionality than the professional versions, experienced musicians agreed that the right features had been included. Unfortunately, people who did not have experience in using music applications had great difficulty using it and needed more guidance and instructions. It’s not enough to have the right features. Users must also be able to understand, learn, and use the features.

3. **Avoid overly fancy features that are unrelated to the user’s task.**

Understand the user’s tasks and include only the features that will help people accomplish them. When interactions are too complex, people often can’t find the information they need and can’t benefit from the site. Complex interactions increase learning time and effort and increase the likelihood that people will be overwhelmed by the amount of information or complexity presented. Stay away from adding complex features just for the sake of having a slick and fancy application. It’s better to have a few helpful features rather than a lot of unhelpful ones.

Developing fewer features allows you to conserve development resources and spend more on refining those features that users really need. Fewer features mean fewer things to confuse users, less risk of user errors, less description and documentation, and therefore simpler Help content. Thus, any feature that is removed automatically increases the usability of the remaining features.

SOH Virtual Tour offered users a highly complex and interactive way of viewing the Sydney Opera House. It let users move arrows around to view the building from various vantage points. Balls shot up and revealed the name of the location when users placed the mouse over them. Letting the mouse pointer hover over the photograph revealed more icons. Arrows took users to various parts of the campus, while sound effects, such as chimes and tennis ball sounds, resonated as people clicked on various things.
Users didn’t notice the yellow arrow that changed directions. They didn’t know that the arrow matched the picture being viewed. When we asked people to guess what they thought the arrow meant, we found many different interpretations. Some people thought it marked their current location, one thought it was just a guy on a skateboard, others thought spinning the arrow moved them in various directions, and some had no idea.

This Virtual Tour contained a lot of useful information; however, most people couldn’t figure out how this site worked and didn’t see a lot of it. They were overwhelmed by the complexity of the site and didn’t know where to begin or what the icons meant. For example, to find locations, users had to click a ball and watch it bounce up. They were forced to repeat this process until they clicked on the right ball. People were more successful at finding locations on a well-labeled static map than on a complex interactive one. It would have been more helpful if developers had cut back on the fancy interaction and labeled the locations.

Users said:

“This ball shooting up is annoying. ... I’m trying to figure out if any one of these balls indicates the Playhouse. ... It took me a while to find the Playhouse.”

“Oh, it’s the same thing. ... I’m trying to find out what’s in each label, but there’s nothing here in detail. ... I’m confused. It doesn’t give me any information on a map of the area. I can go on the levels, but it’s not telling me anything.”

“I didn’t notice the Yellow arrow and “i“ icon. I’m very word oriented. I can figure out some of it. I need words. I missed out on a lot of information.”

“I didn’t notice the little arrow. What am I supposed to do with that? I don’t get what that is.”

“I don’t really want to do this grand tour. It takes a lot of time. You get all of this come up: music, intro – something I would rather not go through.”

“It’s rather distracting, this 3-D thing. It’s a little overkill. This is like the USS Enterprise. If you’ve never been on, you wouldn’t know where to begin. It’s pretty and dynamic, but how helpful is it?”

“The SOH map [a static, but zoomable illustration] was helpful; I had what I was looking for written. The other one I had to figure out the balls.”
People had difficulty using the SOH Virtual Tour because of the complex interaction. People were forced to move their mouse pointer to hover over yellow balls in order to get location names. Many people didn’t notice or understand the various icons such as the yellow arrow (shown here in the central corridor on the lower map) and the "i" (here superimposed on the upper photo).

YHA Itinerary Planner: This site offered a feature-intense application that was difficult to use. None of the users succeeded in creating an itinerary. The application was congested with obscure icons and buttons, making it difficult for people to understand how the application worked and the order of operation.

People complained that there were too many things that looked clickable. Links called “after this one” and “before this one,” for example, were too nonspecific and didn’t help users understand the input process. Most users didn’t understand how to add dates to their itinerary. Almost everyone stumbled when moving from one location to another. It wasn’t clear whether they had to draw out the travel path first, then specify dates or instead specify locations and dates one at a time.

The “Travel By” area added to the confusion because people didn’t understand its purpose or how to use it. Some users experimented with it, but there wasn’t a noticeable pattern. A few of the icons changed colors, but they were too obscure, and no one understood the logic behind it. Most people gave up.

Users said:

“It’s not walking me through to show if I’ve booked anything or showing my arrival dates.”
"I wonder what this green thing and briefcase is. ... some have briefcases and others don’t."

"What is ‘add a destination’? ...That's sort of confusing."

"It's very graphic-oriented. I'd rather have it say ‘if you want to do that, click here.’"

"I don’t know what ‘travel by’ means."

"Travel by’ – I wonder what that means. I probably should have chosen those."

"By taking the bus, I can go to purple. But that doesn’t make sense because by car, you can get to all of them."

"Travel by,’ I'm not sure what this is. I clicked on all of the boxes and nothing is happening."

The YHA Itinerary Planner had nonspecific button names and icons, making it difficult for people to understand how to use the application. People didn’t know whether to choose a location or enter the dates first, and when to choose "after this one" and "before this one." The "Travel By" area seemed appealing, but people didn’t know what it did or when in the process to use it.

Lipton.co.jp: The complex interaction and hidden navigation in this application frustrated users. They didn’t understand the bus metaphor used on this site and wondered why there was a flying character that bounced around giving unhelpful information. People were distracted by the blinking billboards and rotating banners and had difficulty finding the information they needed, because all of the links were hidden. Hot spots (mouse pointer hovering points) over the buildings yielded wordy clues like "I know all there is about teas." Users clicked on the “Books” building to find tea recipes because it was the closest thing they could find to recipes. It would have been better to provide visible links on the homepage to save people the hassle of scrubbing the entire screen with the mouse to find the information they needed.

Users said:

"There’s too much stuff going on. ... Do I have to click one-by-one to find a shop? It’s so inconvenient. ... This site emphasized more on design and cuteness, but should focus more on ease of use."
“It should be fun and interesting, but I just get frustrated. ... I have to open up each option, because there is no map to indicate where it is located. I don’t need photo; I need maps. ... These moving objects – it’s too busy.”

“If I can’t go to the place I need in three clicks, I usually give up. It’s the same concept as a cup of Ramen.”

People were baffled by the complexity of the Lipton site. They didn’t understand the bus metaphor and were confused by moving and hidden elements.

German Elections Information to the Public: Several users said that special effects like moving menus and “snow or galaxy travel effects” were inappropriate for a website that deals with a serious topic like elections. German users expected the tone of the election site to match the serious nature of elections.

One user said:

“Requirements: Fast load and no rubbish.”

4. **Show features and data that need to be used together on the same screen, but don’t force your entire application onto one screen.**

Partition functionality so that features and data that need to be seen and used together appear on the same screen. Don’t try to pack everything onto one screen however. It’s better to prioritize the information into discrete and understandable chunks than to show everything at once.

A cluttered-looking screen is very intimidating and difficult to scan visually. The more you fit onto a single screen, the more overwhelming it is to users; and because less space is available for each element, it becomes more awkward to use. For example, having to use a pop-up control and then scroll through a list takes much more effort than viewing the full list of items in a scannable, one-click-access design.
Having too many elements on a page creates extra difficulty for users with low vision (who read the page in many magnified chunks) and those who are blind (who must listen to long lists of items). People were quickly overwhelmed when they had to keep moving around on the same page to figure out how everything worked. It’s better to emphasize a few important areas than to make everything look equally important. When everything is highlighted, nothing is emphasized. It is better to have a few helpful links rather than many unhelpful ones.

CBC World Cup Game Tracker offers comprehensive information about the World Cup. The sheer number of choices and unconventional navigational structure overwhelmed users, however. Almost every element on the screen looked clickable, even when it wasn’t. The clutter of tabs and buttons made it difficult for users to identify where go quickly. The results area also looked like buttons, and almost every user tried clicking there.

Users said:

"When I first looked at this, there's a lot of stuff. I was overwhelmed. I would have stopped sooner and tried another website."

"It looked like there were a lot of things going on at once with a lot of information. ... This site could be simplified to make it more self-explanatory."

"I'm trying to figure out which one of these routes to take."

"I'm not nuts about this site. It's too smart for me. The information is there, but it's not obvious to me how to get it."

"It’s a little intimidating because of all the different options. There are a lot of things. I have to read through these to figure out where I can go. The sites that I like are more straightforward. Like where do you want to go? Where do you want to start? ... It's a beautiful site, but for me, less is more. You can start with something simpler."
CBC World Cup Game Tracker packed too much onto a single screen, overwhelming people with the vast number of buttons and menu options.

CokeMusic Create Your Demo packed many elements onto the screen also. Its interface was not too overwhelming, however, because the features were related and needed to be used with each other. Although there were some usability problems with that application, the packed screen did not seem to contribute to them.

*CokeMusic Create Your Demo appropriately grouped features and data that needed to be used together on the same screen.*

When everything is on one screen, users don’t need to navigate from screen to screen, and they can see everything at once. These benefits can come at the cost of overwhelming the user with options, allowing less space for each option, and not communicating the path of the workflow (as discussed in the following guideline).
Traditional websites often split functionality across too many screens, because they lack the intra-screen continuity of Flash applications, and often only one action can be performed per page. The excessive navigation and response delays caused by these limitations probably caused many of the designers of early Flash applications to overreact against multi-screen designs and pack everything onto a single screen. Usability is optimized when the number of screens follows the structure of the features, as opposed to being dictated by the technology or by a desire to be modern. Some one-screen designs seem to have been made to prove that navigation can be avoided entirely, even when some navigation would be a natural part of the workflow.

5. **Gently guide users through an expected workflow.**

When an application requires multiple steps, it’s helpful to guide users through an expected workflow by laying out a linear process. Forcing users through too many steps at once, or making them bounce around to various places is jarring, especially if they already have a mental model of the workflow. Give users a structured process so they have a sense of progress and completion. Guiding users helps them avoid mistakes, such as skipping steps or wondering where to go next. Keep the interaction model consistent, so users know what to expect and can avoid making mistakes. This guideline relates to the previous one about how to partition functionality across multiple screens. If a workflow has distinct steps, then placing each step on its own screen can help users understand how to deal with the options in each individual step without being confused by the options for other steps.

Lee Fit Finder: The lack of structure on this site frequently caused people to get caught in a loop among the various tools available: Size Finder, Fit Finder, and Style Finder. People didn’t know the best order in which to use the tools, because the site was too flexible. For example, after users found a style, nothing prompted them to go to the next tool. People stalled and wondered whether they should stop there or go on. After they started with one tool, they didn’t know which tool to use next, and sometimes they forgot where they’d been already. Each tool gave a small, specific piece of information that was incomplete. It would have been better to provide an integrated tool that guided people to finding the best pair of jeans, rather than to force people to figure out the path to take and piece the information together themselves.

One user said:

> "I didn't like this website. It didn't have a whole lot. It didn't seem to get me anywhere. I expected progression. I want to pick the style and then get the size."

Broadmoor Hotel Reservation put all of the reservation steps on one screen, so users could enter information in any order they chose. Unfortunately, that lack of structure caused some people to skip entire sections accidentally, thus failing to provide all of the necessary information, such as dates and the number of rooms and people.

Users said:

> "I own time shares. I know how to book rooms and find information. There should be a chronological order. It should give you feedback. I don't know what is expected."

> "At first when I came to this screen, it was so vague. I was learning about giving out my credit card number. ... I thought it would be like other hotels. Most start with the arrival date."


**Broadmoor Hotel Reservation** allowed people to enter their information in any order, causing people to accidentally skip steps or leave out important information.

Nike.co.jp: This site didn’t have a good balance between providing structure and giving users control. The site teased users by displaying too many steps at once, causing people to be curious about them. Users weren’t allowed to click steps out of sequence, however. Most people didn’t understand they had to complete the steps in a certain order and became frustrated when they couldn’t choose a color before completing a previous step.

It would have been better to indicate the number of steps and their progression without overloading users with too many choices at once. For example, present descriptive headings for the main steps first and then show the options for each step in turn. This design approach, an example of *progressive disclosure*, would guide users through the various steps while showing only currently available choices.

Users said:

"This site could be such a fun site. Too bad it’s hard to use, ... It’s such a waste."

"I’ve lost motivation on this page."

"Why can’t I click these colors?"

"I like the image on the site, but I can’t use it."

"I don’t think these steps need to be in this order."
Nike ID revealed too many steps at once, causing people to be curious about them. People tried to skip steps to see what would happen and were disappointed when they weren’t allowed to do so.

CokeMusic Create Your Demo was designed to allow kids to mix their own music. Unfortunately, many users were unable to accomplish this task, because the process wasn’t obvious and the instructions were unhelpful. Whenever an instrument was placed on the track, it disappeared. The users didn’t know they had to click each square of the track to indicate when the instrument should be played. The instructions said to drag the instrument onto the track but didn’t tell users they must choose each square. After a few attempts, many of our users gave up. It would have been better to show step-by-step instructions, perhaps with an example of the process, and so on, rather than let people try to figure it out on their own.

Users said:

"How am I supposed to do it? I don’t know what I’m doing."

"It looks cool, but it’s weird that you really can’t make a beat."

"I don’t get it. When you push play and when you click the things, it doesn’t add."

"It kinda takes a long time. ... I click on this and get a sample of it, but there isn’t a way to make it."

"I think it’s cool, but you don’t actually make up your own beat. ... I don’t know how to make my own."

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WWW.NNGROUP.COM
Kids had difficulty using CokeMusic, because it didn’t explain the steps of the process or provide adequate instructions.

Mini Build Your Own: People often didn’t see some of the car options, because the application bounced them from panel to panel. For example, users had to pick a category from the top panel, then go to the bottom panel to make choices, then go back up and repeat the process for the rest of the categories, then go back to the top panel and click Next when they were done. This process was too confusing and too error-prone, because it put the onus on users to remember where they had been and where they needed to go next.

Users said:

"I'm just pinging around. It's not connecting or flowing very well. There's too much information on this screen. It's too complicated. When you want to look at something, there are way too many selections and way too much stuff."

"I don't know how to pick a package. I don't know why when I clicked on a package up there, I had to go down and pick the package."
People had difficulty keeping track of all the options on Mini Build Your Own because they were forced to bounce back and forth between the top and bottom panels to choose options.

TimBuk2 Build Your Own: Some people accidentally skipped steps because the interaction model changed in the middle of the process. Most of the steps required users to move down the screen; however, to choose color panels on the bag, they had to move horizontally instead. Several people colored the first color panel and thought they were done. They didn’t realize there were two panels left. Some people designed an entire bag without realizing that the other two panels must be colored. It would have been better to break down the color choices into single steps, one for each panel, so that users would be less likely to overlook them.

One user said:

"I didn't notice that it gave different color choices for each panel."
Some users of TimBuk2 didn’t know that they had to choose colors for all three panels on the bag. They chose a color for the first panel but accidentally skipped the last two panels.

Shu-Uemura Make-Up Simulator: People had difficulty applying makeup to the cheek area on the mannequin because the interaction model in this step was inconsistent with the previous ones. For example, in the previous steps, people were able to apply different colors to each numbered area of the face. However, for the cheek step, people could apply color to only one area even though three areas were shown. One user said:

“I’m trying to have some color on all the cheek areas, but I can’t do it. How come I can do it for the eye shadow?”
Users of Shu-Uemura Make-Up Simulator expected to be able to choose three different colors for each area of the cheek shown and were confused when they weren’t able to do so.

6. **Integrate your application with the related content on the website.**

Make sure applications integrate well with the content on the rest of the website, so that it’s available when people need it most. We found in our study that most users of e-commerce sites preferred to browse through product or service information first to get general information before investing time in using an interactive tool.

Scotts Product Calculator: Users didn’t notice the links to the interactive tools because they were placed away from the content that people were interested in. Most of our users read through the content first to find solutions for their lawn problems and didn’t think to go directly to the interactive tools. It would have been more helpful to provide links to the calculators in the main body of the product pages to catch people’s attention in the right context.

One user said:

"*I would connect these tools directly to the products for when you're looking at it instead of searching for it.*"
Scotts interactive tools, such as the product calculator, would have been more helpful if they were also available on the product and content pages, where people need them most.

Lee.com: The site designers lost opportunities to showcase their application by not integrating it into the shopping process. Rather than give users a tool at the product-page level, the Lee site forced users to go to a different site, Leefit.com, to use it.

Hyatt Floor Plans: Some people found this tool to be clunky and unhelpful because it wasn’t appropriately tied to the content on the rest of the website. For example, to find information about a banquet facility, people were forced to find parts of the information on the website and the other part by using the tool. The floor plan gave them a sketch of the room but didn’t show the seating capacity. Instead, they had to find seating information in the main website. It would have been better to integrate the tool with the content on the main website. so that users wouldn’t have to bounce back and forth between the two.

One user said:

“It would be nice if you clicked on a map [and then] it would tell you how many people it will sit. Doesn't tie in the room description with the Floor Plan. Symphony Ballroom – I'm wondering why they didn't have a picture here. Can't find the room capacity. You can find the info, but it's scattered.”
Broadmoor Hotel Reservation: The reservation process was too limited and didn’t accommodate all of the available options, such as requests for non-smoking rooms, number of beds, Internet connection, views, and so forth. A user noticed that the tool’s screen didn’t have an area to reserve packages, which was offered on the main website.

The user said:

"There's nothing here to offer packages ... . This is not set up to do packages. There's got to be a way to do that. ... This is very limited. ... What about special requests and non-smoking rooms?"

7. **Don’t force users to name a project before they’ve created it.**

Let people create a project first, then ask them to name it. Pre-categorization is disorienting and clashes with people’s workflow. It’s difficult to think of a name before knowing what the project looks like. People expect to name a project only after they’ve created it.

Bose Room Planner and YHA Itinerary Planner: Both sites asked users to name their project even before giving them a chance to use it. A person in YHA became disoriented and didn’t understand what to enter. He eventually quit before using the application. Most people stalled and came up with generic and unmemorable names.

One user said:

"At this point, I don’t know what my itinerary name is or where I should go."

*YHA Itinerary Planner asked people to name their trip prematurely, causing a user to become disoriented and abandon the application.*
Note that most traditional PC applications don’t ask you for the name of a document or other new object until the end, or after some content exists, when you likely realize you want to save it. This behavior was not always so, and premature naming and categorization was a significant problem in the early days of word processing.

8. **Make sure splash pages serve a user-centered purpose.**

Splash pages can serve several crucial purposes, such as providing a staging area for your application or giving people plug-in information and choices. Providing a staging area before launching a new window for your application is very important, so that people won’t mistake it for a pop-up ad. Avoid intro screens that impede users from getting to the homepage, however. Intro animation can drive people away from your site, especially if it’s unrelated to the user’s task. Intro screens often take too long to download and are unhelpful. If Intro screens can’t be avoided, make sure they are simple and serve a user-centered purpose. Give people an easy way to skip it.

Users of Lipton.co.jp couldn’t easily get past the intro screen because it looked like the homepage of the site. People didn’t know to click “Close” to exit the intro. They said they thought “Close” would close the entire site.

Users said:

“I can’t get rid of this box! I can’t go anywhere!”

“I usually go for keywords, but I can’t figure out how to get out. If I click ‘Close,’ I feel like the entire page will disappear.”
Japanese users thought this splash page was the homepage of the website and were confused when they saw only two links on the page. They were afraid to click "Close," thinking that it would close the whole site.

The Mini site offered two types of splash pages. One type should be avoided and the other served a useful purpose. The first splash page (to be avoided) served no purpose except to be cute. It showed pictures that were unrelated to the site, such as matches and bees, and encouraged users to place the mouse over them to hear repetitive sound effects. Most users complained that they didn’t understand the purpose of it. More seriously, one user didn’t know how to get past the splash page. She didn’t see "Launch MINIUSA.com" in the lower right-hand box.

Users said:

"I don’t know that the matches and drums have anything to do with the cars. I think it’s kind of weird."

"They all have the same sound. What's the point of that? I expected them to do something a little different."
The second splash page served as a staging area for the Flash website. It was simple, unobtrusive, and served its purpose well, because the page was mostly blank with a single link back to the Flash website. If people accidentally clicked outside the application, there was an obvious link on the splash page that took people back to the application.

Users complained that the first Mini splash page was annoying and had nothing to do with the website.

The second Mini splash page was more helpful because it helped take people back to the application in case they accidentally clicked outside of it.
9. **Don’t offer options that aren’t available.**

Don’t allow users to choose unavailable options. Save users the aggravation of having to work hard to get what they want, only to find out later that it isn’t available. It would be better to label items as unavailable or not to show them at all.

TimBuk2 Build Your Own: The site offered bag accessories that were not compatible with certain bags. For example, a laptop sleeve was not compatible with any of the commuter bags, but the option appeared to be available, and people who chose the laptop sleeve option got error messages.

*TimBuk2 Build Your Own confused users by offering options that were not compatible with their bag.*

Mini Build Your Own did a good job of telling users immediately when a color combination wasn’t available – before the user clicked on them. Rather than omitting colors, they explained why a specific color wasn’t available and gave people the option to try different color combinations.
Mini Build Your Own helped people make color choices by telling them immediately when a specific color combination was not compatible.

Nike ID let people design a shoe and then at the end told them that the shoe wasn’t available. There was a warning at the top of the first screen, but users didn’t notice it, because they were intrigued by the colorful shoe-building area. A more obvious warning and a way for people to save the project in case they wanted to try later would have been helpful.

Nike ID had a warning telling users that the shoe wasn’t available. People didn’t notice it, however, because it was placed too far outside the working area, where people weren’t used to looking.
Waitt Billboard locator: The map was misleading because it listed cities that didn’t have any available billboards for rent. People assumed that each city listed had billboard availabilities, because the cities were listed. People were forced to click each city to find out which had available signs. It would have been better to mark the cities that did not have any available billboards.

10. Don’t show features that are incomplete or missing.

It’s fine to let people try out prototypes on your site, but first tell people that the application is not fully functional. People feel betrayed when they think the site is fully functional and spend the time use it, only to get useless results at the end.

Regatta Colour Selector: People were excited about being able to design and order jackets online, but they were extremely disappointed when they got to the end and found out the feature was not functional. They got a message that said, “This feature coming soon … stay tuned.”

Users of Regatta felt cheated when they got to the end and realized that they couldn’t order the jacket because the feature wasn’t fully functional.
11. Don’t require more information than is necessary.

Don’t make users work too hard by requiring specific or detailed information when it’s not necessary. Ask for essential information only. Applications that give general recommendations should ask for only estimations.

The Bose Room Planner site let people configure their current room in order to get recommendations to set up their sound system. It provided a detailed list of furniture, including auxiliary items such as house plants and alarm clocks. It also allowed people to rotate and adjust the size of their furniture to exact degrees. Users didn’t understand the reasoning for having to provide such detailed information, just for a home sound system. Explaining why a certain level of precision was required at the beginning would have been helpful.

Users said:

"It seems like I would spend a lot of item putting together a room here. I would want a quicker way to configure a room. Is there a faster way to get a pretty good estimate? How practical is it to have this? Is this specific enough?"

"It's nice that you can move the speakers, but I don't know why you need to. Why would I want to delete them if it's part of the system? I'm not sure what this is doing for me here."

"To be honest, I don't know if it makes much difference what angle my furniture is in. This seems technical and scientific."

12. When appropriate, make your application similar to those people are already familiar with.

If the features in your application are similar to other commonly used programs, such as Photoshop and Microsoft Word, consider having your application work similarly. This “work-alike” strategy helps reduce errors and training time. After people learn to do things a certain way, they tend to generalize that knowledge. People usually don’t like learning to do something in a new way, unless it gives them some added benefit. If you can’t make interaction similar, then make sure the interaction model is easy to understand.

When in doubt, you will rarely go wrong by emulating commonly used GUI features such as those in Microsoft Windows, Microsoft Office, and Internet Explorer because that’s what most computer users are currently familiar with. (Microsoft is not always the most usable. In general, of course, the advice is to be consistent with users’ expectations, experience, and platform conventions – not necessarily to follow Microsoft – but realistically, Microsoft applications are what most people use on an everyday basis.)

BHG Arrange-A-Room: The resize handles on the corners of objects worked well because they were recognizable and functioned the same way as resize handles in many other graphics applications that users may have encountered in the past. People successfully used the handles by dragging the corners to minimize or maximize objects.
Users of BHG successfully used the corner resize handles, because they functioned in a familiar way.

Lawn Products Calculator: Resizing objects on this site was cumbersome. The handles were placed on the sides, not the corners, where people are use to finding them. Several people tried dragging the corners and were surprised when nothing happened.

In contrast, some people had difficulty using the resize handles on the Lawn Products Calculator, because the handles were placed on the sides, rather than the corners.

Pergo Interactive Room Planner: People resisted using the properties box to enter the dimensions of their object and tried pulling the corners of the objects instead. Resizing objects was difficult, because people expected to be able to drag the
corners and didn’t know the only way they could resize objects was to enter values in the properties box.

*People had the most difficulty resizing in Pergo Interactive Room Planner, because they couldn’t resize the object by dragging the corners as they expected. The only way to resize was to enter the values in the property box.*

**BHG Arrange-A-Room:** People expected the application to have features similar to other drawing programs. For example, users expected to be able to group objects together, like in PowerPoint or to be able to copy and paste objects.

Users said:

*I wish that I could group objects so that I can move them together as one."

*"When you work on other things like Photoshop, you’re used to how it works.”*

**Devil.com Email:** People had difficulty performing some of the most common supported tasks (such as adding new contacts or adding an email address from the contact list to a new email message), because the application was too complex and didn’t work like other email programs they were used to. People were surprised that Contact was in New Messages. Even when they found the right place, it wasn’t apparent they had to click the plus (+) symbol to add new contact information.

Most people didn’t know how to move someone’s email address into a new message. Some people tried double-clicking on a name to bring up a person’s email address. Most people clicked on the triangle next to the name and got to the correct list of options but immediately closed it, because they didn’t expect to find action buttons located in lists. After trial and error, a few people figured out that they could add names to an email message by dragging them over to the email panel. Most people didn’t figure out this interaction, though, because they didn’t generally associate drag-and-drop functionality with email.

Users said:

*I don’t want to read a whole bunch of stuff. You shouldn’t have to go to Help or Tutorial to figure it out. .... It’s silly to have it [link to Tutorial] at the bottom. They should have it where it normally is."

*I’m looking around for ‘email list.’ I don’t see one right away.”

*"This is getting too fancy. When all you want is to get things done. When all you want to do is send email.”*
"I don’t think it’s very user friendly. You should be able to click on the person and have it go there [into the TO: field]."

People had difficulty using Devil email because the menus and interaction model worked differently than those email programs they were use to. For example, people expected Contacts to be in Options, not in New Message. They didn’t know that they could insert people’s email addresses by dragging the names to the message pane or by using the pull-down menus.

**CONTENT**

13. **Speak the user’s language.**

Use terms that that your target audience understands. In our study, some people didn’t know the meaning of system-oriented terms such as:

- Interactive
- plug-in
- online
- tab
- rollover

- thumbnail
- flash
- html
- toggle
- simulator

People who work in the computer industry or at design firms may think that these terms are part of everyday language. They are not. In general, avoid using technical terms in your interface (except when targeting computer professionals), along with design slang (except when targeting professional designers). Also avoid professional
marketing expressions such as “opt-in” or “permission email” or any other terminology that is common on your team but not among the user population.

Users said:

"It's telling me to 'choose Flash or HTML'; I don't know what the difference is."
"'If you don't have Flash...'. I don't know what that means."
"I didn't know what all this stuff is. What’s ‘Flash’ or ‘QuickTime?’ I noticed this and got confused."
"'What is a ‘Shockwave plug-in’?"
"What does 'toggle' mean? I've never heard of that word."
"'Roll over an item for more information;' I don't know what that means."
"'Make-up simulator' — what does that mean?"

14. Don’t invent words to describe the application.

Avoid using fancy or clever, made-up names for your application. People don’t understand them. It’s better to have a descriptive name that concisely explains what something does. If you must have clever names, always explain their meaning. In our study, people tended to skip over applications that had obscure names such as:

<table>
<thead>
<tr>
<th>Arrage-A-Room</th>
<th>Interactive Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interactive Room</td>
<td>Sound Advisor Guide</td>
</tr>
<tr>
<td>Planner</td>
<td>Nike ID</td>
</tr>
<tr>
<td>E-showroom</td>
<td></td>
</tr>
</tbody>
</table>

Users said:

"The question is — what's an 'interactive tool'?"
"'Sound Advisor Guide.' — 'I wonder what that is.'
"'Interactive Tools' — I saw it but didn’t think it pertained to me. ... I’m not sure what it is."

Japanese user: “The term ‘Nike ID’ is very ambiguous. I will never click this in order to design shoes. ... If I move the cursor to ‘Nike ID,’ I want to see the description of what I can do.”

Japanese user: “What is ‘Nike ID?’ I want to see the description of what I can do. For example, 'you can customize your own shoe.’”

15. Provide straightforward button and field labels.

Make sure users can easily understand the button and field labels. Good labels help users predict what will happen. Obscure labels can cause people to enter the wrong information or click the wrong button. If you can’t find a single word to adequately describe the button or field, consider using a short description that gives more detail or provide examples.

Pergo Interactive Room Planner and BHG Arrange-A-Room: This study showed that many people were confused by labels having to do with dimensions such as width and length. They didn’t know what to designate as width and height, especially when objects were rotated and the width became the long vertical side, and the height became the shorter horizontal side.

Users said:
"What's 'length and width'? I want to understand what 'width' means."
"I don't know what 'length' of a door is, there's width and height."
"What do they mean by 'width and length'?"
"It's doing 'length' for 'width.'"
"It says 'width.' I have no clue."

BHG Arrange-A-Room: Most of the buttons at the bottom of the screen were self-explanatory, such as: "Save Room" and "Print Room." People didn't know what "Open Room" meant, however, and wondered what type of room it would open. A clearer label would have been “Open Saved Room.”

Regatta Colour Selector: A user was afraid to click the “Order” button because the term implied a firm commitment. A more familiar and less threatening button label would be “Add to basket,” “Add to shopping cart,” or “Add to wish list.”

One user said:
"I think I’ve gone too far. I don’t see a ‘request a quote’ option. It sounds like they want my money first."

Nike ID: Every user had difficulty understanding what “Select a Symbol or ID” meant. The instructions were vague, so people tried clicking on the Symbol and ID buttons to see if anything would change, but there wasn’t any visual feedback. Some users thought that it meant to enter name and password. They didn’t understand that Symbol and ID allowed them to put names and logos on their shoes.

16. Don’t overload people with technical information.

Don’t overload users with details that are not critical to their task. Don’t talk about the technology behind your application or boast about your technical skills; most people are not interested. Reduce the complexity of your application by removing superfluous information – anything that people don’t care about or need.

BHG Arrange-A-Room gave people a big scary screen that said “Plug-in” right at the beginning. Most people stalled and wondered what “plug-in” meant and whether they could still use the site. One user became suspicious when he saw “plug-in” and thought it would cost him money.

It would have been better to auto-detect the plug-in and address each situation differently. For example, show the download instructions only to people who need the plug-in. Users who already have the plug-in should automatically go to the application.

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1 For additional examples and guidelines about the process of adding to shopping carts, managing shopping carts, and the checkout process, please see our “Shopping Carts, Checkout & Registration” report: http://www.nngroup.com/reports/ecommerce
People were intimidated by the plug-in information on the BHG instructions screen. Most people didn’t know what “Shockwave plug-in” meant and wondered whether they could use the application.

Because the second plug-in on the BHG site is needed only when users attempt to print, it would have been better to defer the check for that plug-in until a user decided to print. Doing so would have several advantages. First, many users would never be faced with the request to download the plug-in, because they would not want to print. Second, when users are trying to print, they are already invested in the use of the application and thus motivated to go through one more step to get their printout. In the early stage of the interaction, users are much less committed and much more likely to go away if you place too many barriers in their way. Helping users experience an early success is a great way to convince them that they should spend time with your application and that it has value for them.

SOH Virtual Tour has prominent Flash player and plug-in warnings and icons on the main entry page to the site. Users were intimidated by technical terms, such as “Get Flash” and “Get QuickTime,” that littered the page. When users do have the required plug-ins, there is no need to intimidate or distract them by mentioning the technology. If users don’t have a required plug-in, it would be better to gently guide them through the download as a separate step after they have decided to use the application.
The Plug-in logos on SOH Virtual Tour overwhelmed users. Some users didn’t know what “Flash” and “QuickTime” meant.

17. **Don’t make links to content unrelated to your application.**

Avoid linking to other sites that are unrelated to your application, especially in the main working area of the page. The experience is very jarring when a link takes people to an unexpected screen, especially if it’s on an unrelated site.

Haribon Saving Species locator: The map contained an obscure icon in the lower right-hand corner of the map that linked to the design company’s website. Out of curiosity, several people clicked on the icon and were startled when a new website launched and started playing loud music.

One user said:

“What on earth is that? I don’t know what this ... I have no clue what this is. This is an advertisement. It plays music. I don’t want music playing. I’m trying to figure something out.”
Users of Haribon were curious about an obscure icon on the map and clicked it, and were startled when a completely different site launched.

18. **Group similar items together in sorted lists and categories.**

When you have a dropdown list or scroll area, it’s good to group like items together. Lists that are not appropriately sorted slow scanning speed because they force people to read each item carefully.

BHG Arrange-A-Room put items in a scroll area, but didn’t sort them into meaningful groups, causing people to scroll through the entire list to find the right objects. For example, some of the tables appeared at the beginning of the list and some at the end.

Tiffany.com showed earrings, but didn’t appropriately sort them according to the type, such as diamond, pearls, gem stones, and so forth. Most users scrolled only for a short time and realized that it would take too long to find all of the pearl earrings in a long list of earrings. Most users opted to use the Search feature instead to narrow down their choices.

Users said:

"*When I do it, it doesn't continue to where I left off does it? There isn't any rhyme or reason to their examples here. There's no order to it. This is just a guessing game that could go on and on."*

"*It’s nice that I can scroll, but if I can just search for black pearl earrings... I want to narrow down my search because I don't want to look through all of them.*"

"*There must be a quicker way to get to that item than to look through here.*"
NAVIGATION

19. Indicate what’s clickable.

Make sure that people can easily tell what is clickable and what is not by testing your design with users. People are required to work harder when there’s no indication. Don’t force users to click everything on the screen to figure out where the links are. People can easily miss what they are looking for, give up prematurely, or think that they have explored all options when they haven’t.

Graphical interface elements can often be given the perceived affordance of clickability by making them appear raised or otherwise different from the background. Standard button shapes are usually perceived as having a clickability affordance, as does anything that can conventionally be clicked in other popular user interfaces.

When designing content oriented navigation, distinguish between visited and unvisited areas so people read the information only once. Stick with the standard paradigm of underlining links and making visited and unvisited links change colors from blue to purple. When nonstandard link colors are used, make sure there’s enough difference in color between the visited and unvisited links that people can easily distinguish between them.

Showing visited areas is unnecessary for command-oriented functionality, such as creating objects, because people might want to repeat the action multiple times. When deciding whether or not to show visited areas, consider whether the action takes people to another screen or merely lets them repeat activities on the same screen. When people go to various areas to get content, they might want to read each bit of information only once, so showing a visited link is helpful. When links represent activities people might reasonably want to repeat, such as updating a total, showing a link as visited is not appropriate.

Highlighting links when the mouse hovers over them is also helpful. Don’t depend solely on the hand-cursor to indicate links. Users don’t always notice when the arrow cursor changes into a hand.

Bose Room Planner: People couldn’t figure out what was clickable without trial and error. The site didn’t have any underlined links, and several identical looking elements functioned differently. For example, the label “ROOM PLANNER,” (which appeared in multiple areas of the website and looked the same in each case), was sometimes clickable and sometimes not. This inconsistency confused users.

Users said:

“I don’t know what this page is doing here. Nothing on this page is clickable.”
“I want to check it out, but I don’t know where to go.”
Screen 1: Users of Bose expected Sound Profile and Room Planner to take them to the applications and were disappointed to discover that the headings weren’t links.

Screen 2: Users clicked on “Sound Profile” and “Room Planner” at the top of the screen because they appeared prominently and first. The actual links appeared later, below, one at a time in slow motion. Also, these blue headings are links on this screen, but not on the previous one.

Conversely, don’t give design elements a perceived affordance of clickability if they are in fact not clickable. Users get very confused when they click something that looks clickable and nothing happens. Users don’t necessarily understand the
distinction between perceived affordance and implemented affordance, so they may believe that they actually issued a command to the system and that they just didn’t understand the outcome, when in fact nothing happened.

CBC World Cup Game Tracker had many elements that looked like clickable buttons, such as colored squares and boxes for the country flags. Some of the elements were clickable and others weren’t. There wasn’t a clear and consistent link metaphor, which caused users to hunt around needlessly.

One user said:

"My problem is telling which one of these things will take me to someplace and which one won’t.

Users of CBC World Cup Game Tracker had difficulty figuring out which elements were clickable and which weren’t.

20. Don’t hide navigational links behind graphics.

Make sure users can easily recognize your navigational links. Don’t disguise them behind obscure pictures and graphics. Make it easy for people to scan your site quickly and figure out where to go to get what they need.

Leaf Racewear Design Your Suit hid its main navigational links behind pictures that looked like decorations. At first, people didn’t think there was any navigation in the application. Many users stumbled across it only by accident after placing their mouse over a picture, which caused a description to appear. It would be better to make the descriptions into links on the screen, instead of hiding the words and requiring people to roll over pictures to get the information.

Users said:

"I have to roll over all these to get a link. I don’t like that. It should come up automatically.

"I didn’t expect pictures to have navigation. That’s why I clicked on the other link because it was labeled for me.’

Some people couldn’t find the main navigation on Leaf Racewear, because it was hidden behind pictures that looked more like illustrations or advertisements than a list of
destination links. Users discovered the navigation by accident when they eventually rolled the mouse over the pictures.

21. When a graphic is associated with a link, make both clickable.

If you have graphics such as bullets or arrows to emphasize links, make both the graphic and the words clickable. People sometimes click the graphic instead of the link, expecting them to be related. People often think something’s wrong with the application when they click the associated image and nothing happens.

Pergo.com: Several people were disappointed when they clicked on the arrow next to the word link and nothing happened. They expected the arrow to take them to the same place as the link.
People tried choosing a country by clicking the triangle next to the word and were surprised when it didn’t take them anywhere.

YHA Itinerary Planner: People clicked the “Save / Exit” link next to the floppy disk icon, thinking that it would save their project. Users were baffled when nothing happened. Several users repeatedly clicked on the words without realizing that they were supposed to click the icon.

People who used YHA Itinerary Planner were baffled when clicking Save / Exit didn’t work. Only the image of the floppy disk was clickable.
22. **Avoid words or labels that automatically disappear or change.**

Don’t let words disappear or change unnecessarily. People read and understand information at different speeds. Making words disappear unexpectedly is like snatching the newspaper out of someone’s hand while they are reading it. It’s better to let users control the length of time the words display, to ensure they have time to notice and read the information, instead of ignoring it or having to wait for the next rotation to see it again.

Also, keep field labels visible, so that people can easily go back and refer to them, especially when they need to fix an error or change an entry. Don’t make people rely on their entries to figure out what the field is for. People sometimes get tripped up if they accidentally enter information in the wrong field and don’t have the label for reference.

Nike ID: Users had difficulty figuring out where to make color changes to their shoes, because the labels for the steps were replaced each time a user chose a color. For example, when users chose blue in step one, the description for step one was replaced with the word “Blue.” Users were forced to click various steps and watch the color change in the picture of the shoe to figure out which step corresponded to which part of the shoe.

Supplement pictures of colors with the names of the colors to help color-blind users. Names allow users to communicate verbally about their choices and provide a record if the user prints on a grayscale printer. The problem on Nike ID was that the color name replaced the step description instead of supplementing it.

*Screen 1: Nike ID had short instructions for each step that helped users figure out which part of the shoe they were designing. For example, Select Upper Material and Select Base Color.*
Screen 2: After a step was completed, however, the description of the step was replaced with a description of the selection made in that step, making it difficult for people to go back and make changes to a specific part of the shoe.

Broadmoor Hotel Reservation: The field labels on this site disappeared when people typed inside the field, making it difficult to accurately reference the field. The labels returned only when the entries in that field were completely erased.

Field labels on Broadmoor Hotel Reservation disappeared after a field was selected, making it extremely difficult to make sure the right information was typed in the appropriate field.

Lee Fit Finder: Disappearing words are especially problematic for people with low vision. For example, on Lee Fit Finder, users with low vision had a hard time reading the labels on the mannequin that changed every few seconds. Labels moved and changed too quickly, and users had to watch the animation go through several loops to fully understand the labels.

One user said:

"Oh boy. That’s the Flash. It doesn’t stay long enough to read it. I have to sit through it many times to read it.”
Screen 1: People with low vision had difficulty following the disappearing labels on Lee Fit Finder and were forced to wait for them to re-appear to read them.

Screen 2: “Waist” disappears as new labels appear.

TimBuk2 Build Your Own: People with low vision had difficulty reading error messages because they disappeared quickly. For example, users got the message “You must select a fabric” when they accidentally skipped a step. Some users didn’t read the message, however because it faded out too quickly and was gone before they could read it. Words that appear temporarily also cause problems for international users if the interface has not been localized. It’s hard enough to read words in a foreign language; users don’t need the additional challenge of doing it very rapidly.
People with low vision had difficulty reading the error message on TimBuk2 Build Your Own, because it disappeared too quickly.

**23. Don’t orient words vertically or at odd angles.**

Avoid having words at angles, especially if they are completely vertical. People have difficulty reading words sideways. In our study, people actually turned their heads sideways to read words that were vertically oriented. If you must have words at an angle, try to minimize the rotation as much as possible.
Users of Regatta had difficulty reading the Garment Colour Selections chart, because some of the labels were vertical, causing users to turn their heads sideways to read it.
Similarly, the vertically oriented words in the Crossroads Roadtrip Diary were difficult to read.

When an area on the California Pizza Kitchen Locator map was chosen, that part of the map zoomed in and rotated, causing words to tilt unnecessarily.
FEEDBACK

24. Provide sufficient feedback to show the user’s input.

When possible, give users immediate feedback. People feel more secure when their input is acknowledged. For applications such as build-your-own configurators, change the picture to be consistent with every user choice. Don’t provide feedback for some steps and not others, because when nothing happens, people become confused and wonder whether their input was accepted.

Mini Build Your Own: People wondered if their choice had been accepted when they clicked on bonnet stripes and didn’t see the picture change. Although the bonnet stripes were added to the price of the car, users didn’t notice that, because in the previous steps, the picture of the car changed with each input.

One user said:

“*It’s got it, but doesn’t show me what it looks like.*”

Insufficient visual feedback on Mini Build Your Own confused users. When they chose Bonnet Stripes, the picture of the car didn’t change to show their input, and users wondered if their selection had been accepted.

Lee Fit Finder: People were especially surprised that clicking on the color swatches didn’t change the color of the mannequin’s jeans, because the application gave sufficient feedback on all of the previous steps.

Users said:

“I thought the image would change colors depending on what I clicked and it didn’t.

“I’m trying to change colors, but it’s not changing the color on the jeans.”
People appreciated having color choices but were disappointed when the color of jeans in the picture didn’t match the color they had chosen.

TimBuk2 Build Your Own: Japanese users were very successful in using this site, even though all the written content on this site was in English, because it provided sufficient visual feedback. Although the Japanese users we tested didn’t understand English very well, the visual cues helped them interpret the interaction. People could understand the options by looking at the pictures and seeing the bag change with every input. For example, the bag started off colorless and changed colors with each selection. In accessories, when an object was selected, animation was used to show the object going into the bag.

Users said:

Japanese user: “I like this site because the selections are very visual. That’s what the Nike site needs.”

Japanese user: “It’s easy to understand because it’s visual.”

Japanese user: “I understood this site although it’s in English. ... Even a monkey would understand this site (old Japanese saying).”
TimBuk2 Build Your Own provided good visual feedback, making it easy for even non-English-speaking Japanese people to use.

25. **Place interactive and display areas in close proximity to each other.**

Make it easy for people to notice changes by putting the interactive and the output area next to each other. People can easily miss the interaction when the views are too far apart or not within the same work area. Users with low vision that use screen magnifiers don’t have the full visual context of the screen and have to move their magnified view around to various areas to get context. Therefore, any changes or feedback that appears outside of the magnified area can easily be overlooked. Putting the active areas close to each other helps all users, but it especially helps people with low vision, who can see only part of the screen at a time.

Hyatt Floor Plans: The floor-plan diagram was situated below the choices, and a user didn’t see the changes on the floor plan because it was too far from his selection area. He clicked on several options to see how it worked, but he didn’t initially notice any changes because the “X” mark was too tiny and barely noticeable. In addition, people who viewed the screen at 800 x 600 pixels didn’t see the map because it was pushed below the viewing area of the screen.
The interactive and display areas were too far away from each other, so users didn’t see the changes. They expected the small map next to the choices to display their input, not the bigger one at the bottom.

**HP Paper Selection Tool:** Users didn’t notice the sample pictures change, because the output area was too far to the side, away from where they were clicking. People tried clicking on the samples but didn’t notice that it had any effect.
The output and input areas were too far away from each other, so people didn’t notice the change.

26. **Highlight selected areas.**

Provide visual indicators to represent selections. Consider using highlighting techniques such as crawling ants, color changes, or outlines. Remember not to make selected regions gray. Gray is usually reserved for non-selectable options.

Leaf Racewear Design Your Suit didn’t highlight the area of the shirt that was selected, making people wonder whether they picked the right region to be colored. Several people accidentally clicked outside of the area they wanted, colored the wrong area of the shirt and were forced to reselect the right area and try again.

One user said:

“I’m not sure which section represents which part of the shirt I chose.”
Leaf Racewear Design Your Suit confused people by not highlighting the selected areas. Some parts of the shirt were very small and narrow, so people wondered whether they clicked in the right place.

The cube markers on YHA Itinerary Planner turned gray when they were selected, causing people to wonder whether the area was selected or unavailable.

*YHA Itinerary Planner confused users because selected locations turned gray.*
27. Match the tone of your application to your target audience.

Make sure the functionality and theme of your application match the style and mood of your target audience. If your application is a game, it can be more entertaining and whimsical, because kids generally like more colors and flair. Adults are generally more impatient and don’t like to spend a lot of time looking for what they need. Don’t make applications feel like a game when they are aimed at adults. Eliminate cute music or distracting navigation. Provide useful information that is easy to find.

CokeMusic Create Your Demo: This site successfully matched the mood of its target audience (kids and teenagers) with the appropriate use of bright colors, sound effects, and cool graphics. The activities, such as creating your own character and Music Maker, matched user’s interests and kept them excited.

One user said:

“I like it because it's colorful. The digital character – oh that's cool!”

*CokeMusic appropriately matched the style of their application to their its audience, pre-teens and teens, with elements like interesting characters and bold colors.*

LHJ Pack-A-Lunch: This application targeted adults but tried too hard to be cute and ended up being annoying. Parents were annoyed by the cartoon sandwiches, giggling sounds, and background music. Many decided the application was made for kids and didn’t take it seriously. The interaction wasn’t compelling, and many said it was silly to have to drag lunch items into a lunch box to get a score on the nutritional value of

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2 Please see our report on how children use websites with in-depth research and 70 design guidelines for making websites for kids. [http://www.nngroup.com/reports/kids](http://www.nngroup.com/reports/kids)
the lunch. Several people said they would rather read an article, because it would be easier to get the information and less annoying.

Users said:

“This is way too much work to figure out how to pack a lunch. When you have kids, you wouldn’t have time to use this.”

“This looks like something my four-year-old would do. This would be great for a child. I would rather read an article. It only has this? There's nothing more?”

LHJ Pack-A-Lunch annoyed users because it looked like it was made for kids, and adults didn’t find it compelling to use.

My Monopoly: All users said they appreciated the splash-page introduction because it was both entertaining and informative. Most test participants (including those who didn’t like the Monopoly game) agreed that the graphics, animation, accompanying tune, Mr. Monopoly (who guides users through the site), and even the typeface captured the spirit of Monopoly well.
My Monopoly started by Mr. Monopoly giving a tour of the game board. Here, he is showing the possibility of adding any auto club you like as a stop on the board. The humor, animation, and visual style were in keeping with the nature of the product and were appreciated by users.

28. **Make sure people understand the purpose and rationale for the application.**

An application is compelling only when its purpose and goals are communicated well. Make sure people understand what they can accomplish on your site. People won’t invest the time to use it if they don’t know how they can benefit from using it.

Concisely describe what the application does and what results the user will achieve in a short message shown first. Remember that people don’t read a lot of writing online, but a short initial description can help users interpret the various features of the application as they encounter them. Use simple names and labels that relate to the purpose of the application, and state them in terms of benefits to the user whenever possible.

Pergo Interactive Room Planner: There wasn’t a description on the site that explained what this application does. The link name “Interactive Room Planner” was too vague; it didn’t adequately describe what the application did. People didn’t know that if they entered their information, Pergo would give them a list of supplies and calculate the quantity needed to complete a floor. People didn’t know what the result would be until the end.

Bose Room Planner: There was nothing on the screen that clearly outlined the benefits of using the Planner and the process for getting recommendations. People stalled after configuring their room, because it wasn’t apparent what the results were supposed to be and whether the results would be general or customized to their drawing. People didn’t know whether they would get instant results or if they would have to send in their drawings and wait to get a response. It didn’t make sense to people that they had to place each Bose item in their room before getting a recommendation.

Users said:

"I picked the product that I have, now I expect something to happen. ... Now that I have the product here, what do I do with it?. Where do I get the advice?"

"What is this for? What are the steps that I should take?"
"I don’t think I accomplished anything. I thought you tell the dimension of the room and it gives you placement information. I didn’t tell me where to put the Bose system.”

People using Bose Room Planner were confused because it didn’t clearly explain its purpose and benefits. After people configured their room, they didn’t know what to do with the Bose equipment. People couldn’t understand why they had to position each component, because the application was supposed to give them the recommendation for product placement.

Shu-Uemura Make-Up Simulator: Users were skeptical of the makeup simulator, because the face didn’t look enough like them to be practical. A user expressed that she would never buy makeup online, because she would need to apply it to her face to make sure it matched her skin tone. The model on this site had an unusually white face and didn’t have variable skin tones. Another user complained that the face on the model didn’t look like hers; the model had a European face, but the user was Asian.

Users said:

“Well … the site uses a white-colored face, but this is not my skin tone, so it’s a useless site.”

“I never buy cosmetics online. I need to apply it to my face, then buy it.”

“I guess I can study color options, but I really need to use it in order to see actual colors.”
Shu-Uemura Make-Up Simulator targeted Japanese women, but used an inappropriate, European-looking model. Japanese women were skeptical about the usefulness of this application because the face didn’t resemble them.

29. **Provide useful and complete results.**

Giving advice is not good enough. Recommendations need explanations and reasoning behind them. People appreciate smart tools that give thorough recommendations. Don’t leave users with incomplete explanations; give people the information they need. People are more likely to trust sites that are accurate and thorough, because the information is perceived to be more credible and well thought out.

Scotts Product Calculator recommended products and the amounts to buy but failed to explain why specific products were recommended, exactly which size bags to buy, and how to use the products. The calculator would have been more helpful if it had provided more thorough explanations.

One user said:

"It didn’t say what size bag, how many pounds it is. I never use one bag on that size lawn. That wasn’t really helpful for calculating what I need."
Scotts Product Calculator recommended products but didn’t explain the reasoning behind the recommendation and how to use the products.

LHJ Pack-A-Lunch gave lunches pass / fail scores. The application didn’t show people how to improve those scores, however, or give suggestions about what to include in a healthy meal. A “How to Pass” button pointed to an article on nutrition, but it was not integrated with the application and didn’t explain what was wrong with a lunch or how users could change it to get a passing score. Users were forced to reselect lunch items and test themselves over and over again until they got all passing scores.
30. **Show the prices.**

People expect to see prices along with the first mention of an item. Don’t hide prices or make people click each item to get a price. Show prices, even if they are estimated values. If estimated prices are shown, prominently label them.

Tiffany.com made people click each picture to see the price and didn’t show prices in the wish list, provoking some negative reactions.

Users said:

"Hey! They don't list prices here [in the wish list]. It's hard for me to remember how much it is.”

"I don’t like having to click on every one of these pictures to get a price.”

Pergo Interactive Room Planner: The results page gave lists of supplies but didn’t show any prices.

One user said:

"I would like to see ballpark pricing, if it's a range of what I like to spend."

My Monopoly: The price of the personal version of the Monopoly game appeared throughout the site, letting people know immediately what the cost would be.

### QUALITY ASSURANCE

31. **Make results match people’s input.**

Users lose trust in systems that appear to be unreliable and buggy. Make sure that your application is smart and gives users the most accurate information based on their entries. An application is useless – and sometimes detrimental – when it gives inaccurate recommendations.

A user of Lee Fit Finder complained that it recommended a pair of jeans that didn’t belong to the category that she picked. She chose flared legs and got recommendations for tapered pants instead.

One user said:

"It's not the style that I would wear. … I selected flared, but I got a different picture. Those aren’t flared jeans."

Pergo Interactive Room Planner flashed "Loading ..." on the screen constantly, even when it was finished loading. Some people waited several minutes expecting it to go away and wondered why it didn’t.

One user said:
"I'm not sure what it is doing. I don't know what it's loading."

A user of BHG Arrange-A-Room noticed that the descriptions on the picture and the properties box didn't match. She tried reselecting the doorway several times but couldn’t get the correct size to display. Another user didn’t trust the application because it wouldn’t properly save her drawing. Whenever she opened her project, one of the windows was rotated.

One user said:

"I selected the 4-feet doorway, but the info shows it as 5 feet."

"The window thing is really bugging me. After you’ve done the appropriate steps, it’s frustrating that the window keeps moving. There seems to be a bug in the program. I would discontinue using this program. It's not as easy to use as I thought. It's making me unwilling to use this because I don't trust it. I would use a different program or go to a different site."

YHA Itinerary Planner puzzled users when it displayed the wrong number of destinations. After people clicked Save / Exit, the application automatically added one more destination to the project, even though it had not been chosen.

One user said:

"I don’t know why it shows the fifth destination. I don’t have five destinations, I only have four!"

A user of Tiffany.com became extremely frustrated when the shopping summary inaccurately displayed her entries. She entered "6" for wine glasses and noticed that it showed up as only "1." She went back to check and tried to reenter the correct number, but she couldn’t fix the problem.

32. Fix technical problems.

The main technical problems we found were slow page loads and server errors. Some applications didn’t properly load or locked up, especially over slow connections. Slow sites are frustrating, especially when they lock up and discard user input. If your website is not operational, say so. Tell visitors when the site is expected to be functional again, for example: “We’ll be back online by January 15, 2003.” Don’t use relative times such as “tomorrow” or “in 6 hours” or “at 10 pm,” because people are used to seeing inaccurate and long-expired estimates. They won’t know when you put the notice up or what time zone the site refers to. With known and intermittent problems, it is often enough to say “try again in a few minutes” if that’s the recipe for success.

Broadmoor Hotel Reservation was unreliable, because sometimes it wouldn’t let people select dates or access pricing information, even when those dates were available.

Nike ID: Users were frustrated because the application kept freezing in the middle of configuring their shoe. When the application froze, users lost their data and were forced to re-create the shoe.

One Japanese user said:

"I really like the site, but I can’t imagine buying the shoe if it keeps having these problems ... because this site is not stable. Although I like the design pricing, I would lose motivation quickly."

Mini Build Your Own: When the site was down, the site displayed the reason for the downtime and estimated when it would be functional again.
33. **Make sure the instructions are accurate.**

Inaccurate instructions are confusing and can prevent users from accomplishing their tasks. People depend on instructions, especially when they get stuck. The most common accuracy problem we found had to do with sites using the same instructions on each screen, even when the instructions didn’t apply.

Waitt Billboard locator: People were frustrated because the instructions didn’t match what was shown. The instructions said to “click on a star on the map to see the actual billboard,” but there weren’t any stars to click. In some cities, the stars were outside the viewing area of the map, and people didn’t know they had to select locations from the right-hand panel or change the view to find them. The instructions were especially wrong when no billboard locations were available. A few users agonized over the instructions, didn’t know how to continue, and eventually gave up on the site.

Users said:

"It says to click on the stars, but I don’t see any stars."

"I don’t see any stars on the map. ... So I have to think that they don’t have any locations in Kansas City ... . At this point, I would go to another company."

*Inaccurate instructions on Waitt Billboard locator baffled users. The instructions said to “click on a star on the map,” but people didn’t see any stars and so didn’t know how to proceed.*

Broadmoor Hotel Reservation: Several users noticed the instructions at the bottom of the page stating that “fields shown in white” were required. These instructions baffled users because no fields were white. They didn’t realize that the white field labels disappeared when fields were filled in. It would have been better not to remove field labels and to ask for only required information.
The warning at the bottom of Broadmoor Reservation said white fields were required even when there weren’t any white fields left.

Scotts Product Calculator: The imprecise instructions gave people the wrong impression of what they could do at the site. The instructions said to choose the shape of their “yard,” when it really meant their lot. People mistook “yard” to mean “grass area” and chose the shape of their lawn instead of their lot. As a result of this terminology problem, all users miscalculated the size of their grass area. Most people didn’t know that they were supposed to select a lot and place objects on it, so that the computer could calculate their grass area. People wondered why they had to place architectural elements (for example, garage, driveway, pool, and so forth) on top of their grass. A few users even placed objects around the perimeter of the grass area, which had no effect on the calculations.

One user said:

“I wouldn’t have these things on my lawn – the house, pool, deck, you don’t have any grass under there, so it doesn’t come into play.”
The instructions on Scotts Lawn Calculator said to choose the shape of the yard, but users interpreted “yard” to mean lawn, not lot, which resulted in miscalculations.

OBJECT-ORIENTED CONTROL

DRAG AND DROP

34. Keep drag-and-drop manipulations as simple as possible.

Applications that use drag-and-drop should keep the manipulation as easy to use as possible. To move an object, users expect to click it, drag it to the area they want, and release the mouse. Avoid requiring unnecessary steps to create and move objects. Make a large click zone around objects, so that they can be selected easily. Make sure drag-and-drop functionality is easy to discover. When necessary, include instructions. Enjoyment can be increased with drag and drop, but when movement and precision aren’t critical, consider letting people place objects by simply clicking on them.

BHG Arrange-A-Room and Nestle Gift Basket: Both of these applications created an enjoyable experience for users by having simple drag-and-drop functionality that worked consistently. To move objects, people simply grabbed them and placed them where they wanted. The objects were big enough to produce a large click target, giving people adequate control.

Nestle Gift Basket: Some people didn’t understand at first how to place objects in the gift basket and expected to select objects by clicking on them. Users didn’t know that they could drag and drop the objects. Instructions were present, but users didn’t notice them, because the instructions disappeared whenever users clicked on a product.
Some users of Giftworld Gift Basket didn’t understand how to place items in the basket and tried to add objects by clicking on them.

Bose Room Planner: The drag-and-drop feature didn’t always do what users wanted. A properties box automatically appeared when an object was selected, covering up it up. In addition, when an object was dragged to the canvas, placing it precisely was difficult. When users let go of the mouse or tried to click the object again, it sometimes worked and sometimes didn’t. Some objects were too small and difficult to select. One user ended the session because he couldn’t figure out how to place and move objects.

Another user said:

“I want to leave it somewhere. How do I do it?”
Bose Room Planner made it difficult for people to create, place, and move objects. An object continued to move with the mouse, even after people tried to place it.

Pergo Interactive Room Planner: The application automatically opened a property box whenever an object was selected. To place an object, users were required to close the property box first, but people figured that out only through trial and error. It would have been better to let users have more control over when they wanted to open the property box.

One user said:

"I’m trying to figure out how to put a cabinet in here ... . Oops! ... This is a lot of work."
Pergo Interactive Room Planner confused people, because it automatically opened a properties box whenever an object was dragged onto the canvas.

35. Detect where users want to place objects and help them do it.

Don’t make it difficult to place objects, especially when you can detect where users want to place them. Save users the hassle of having to make fine adjustments, such as aligning objects. When appropriate, help users by automatically snapping objects into place.

BHG Arrange-A-Room and Pergo Interactive Room Planner: Some users in our study took great pains to align objects perfectly along the side walls, so that the configuration accurately represented their actual room. Other users tried several times to get an object, such as a dresser, to line up properly, then became frustrated and simply gave up. They would have been helped by an auto-snap feature.

One user said:

“I want everything to be perfectly level and you have to go and rotate it. I like the info because I can get things lined up and level. That’s important for me. Otherwise, it takes away from the clarity of this website.”
Several people in BHG Arrange-A-Room were frustrated when objects didn’t perfectly align with the side walls.

CREATING OBJECTS

36. **Stagger the placement of objects so they don’t stack exactly on top of each other.**

Don’t let new objects open at the same coordinates as existing objects. It’s better to stagger them, so that each new object is slightly shifted left, right, top, or bottom. Staggered stacking helps prevent objects from hiding behind each other and gives users the visual feedback that an object has been created. When there’s no visible indication of the number of objects, people tend to create duplicate objects without knowing it.

When staggered stacks are not possible, use animation to show new objects floating into place. The faster the user’s system, the more easy it is to miss subtle feedback and animation, so test on a range of systems to make sure your animation is noticeable.

Pergo Interactive Room Planner and Scotts Product Calculator opened objects on the same center coordinate, making objects stack up on top of each other. Several people added the same object over and over again because they didn’t see any new objects being added to the canvas. Users were forced to move each object one by one away from the center coordinate to find out which objects had been created.

37. **When objects are placed on top of each other, consider making those objects appear to be transparent or layered in the appropriate order.**

Opaque objects can completely cover objects that are underneath, especially when the top object is larger than the bottom object. Rather than cover up overlapped objects, consider allowing both objects to be seen, by making the top item appear to be transparent.
38. **When there’s a set order in which objects must appear, automatically force the top object to appear to be on top, even if the user didn’t place the objects in that order.**

BHG Arrange-A-Room helped users by automatically layering objects in the correct order. For example, the rug always appeared underneath the furniture, regardless of the order in which it was placed. Similarly, lamps and plants were always rendered on top of tables.

*In BHG Arrange-A-Room, the rug always appeared underneath the furniture, regardless of the order in which it was placed.*

39. **Be sure to provide objects and choices that people need.**

Support the users’ task by providing them with a list of objects that they need. The list must be comprehensive enough to include the most common items, but not contain overlapping or superfluous items. Users stumble when items they are looking for are not in the list. Sometimes people improvise and substitute an object with something similar. Users become frustrated when nothing on the list closely matches what they need.

BHG Arrange-A-Room and Bose Room Planner: Users complained that these applications didn’t have what they needed. In some cases, the objects were too specific or too similar, so people couldn’t choose one.

Users said:

"*I don’t have the ability to customize furniture. Like a corner piece. ... It didn’t have any lamps or accessories. My choices are limited.*"

"*I have a desk. That’s not one of my options. I have a table, not a vanity table. There’s nothing else that comes close.*"

"*I don’t see a desk in my objects.*"

"*What’s the difference between a club chair and comfy chair?*"

"*In the corner we have a tree and a little piece of furniture by the bed. There are not enough options to add to your room. I have a bookcase too.*"

Users of the Scotts Product Calculator thought that choices for lawn shapes were too limited. People were given only three choices.

Users said:

"*The shapes of lawn provided were too simplistic.*"

"*My lawn doesn’t match any of those. Mine looks like a kidney bean.*"
40.  **For spatially oriented applications, show the dimensions of the work area.**

Label the dimensions of the work area so that users have an understanding of the area they are working with. For example, if the user creates a room that is 10 feet by 10 feet, make sure to label the sides of the room as being 10 feet long. Most of the applications we tested labeled both the dimensions and the unit of measurement. Scotts Product Calculator and BHG Arrange-A-Room were clearly marked with the correct units, for example: 10 feet or 10' 6". Pergo Interactive Room Planner was less helpful because it didn’t include the units. Be sure to allow international users to view dimensions in metric units.

41.  **Don’t hide object choices in tabs or menus.**

The file-folder tab metaphor should be used only to switch views, not to hide choices or steps. People don’t expect to go to tabs to get object choices and often overlook them when they are misplaced in tabs and menus. It is better to guide users with clearly marked steps than to use tabs.

Scotts Product Calculator: None of the users noticed the menus for lawn objects because they were overshadowed by the banner-like area at the top of the screen. People were more attracted to the flashing “Next Step” button at the bottom and overlooked lawn object choices entirely.

*The object choices in Scotts Product Calculator were hidden beneath tabs and overshadowed by the banner-like area at the top of the screen.*
Bose Room Planner: Some users didn’t know where to get furniture to add, because the choices were hidden in the Home Furnishings tab at the bottom of the screen. They expected to see an obvious furniture area, because it was a major step in the process.

Users of Bose Room Planner didn’t find the furniture right away, because “Add Furnishings” was hidden under a tab located in an unusual place.

The Crossroads Roadtrip Diary: Some users had difficulty using the diary at first, because the steps were represented as side tabs. Worse, these tabs were not numbered and appeared to be in previous pages instead of in subsequent sections of the book, so users had to go backwards in the book to go forward in the process. People expected the steps to be presented in the main working area of the page and didn’t notice the tabs right away. After choosing the paper, people looked for an obvious way to get to the next step and stalled because there wasn’t anything that seemed to be guiding them there. People clicked on the Edit Text tab only after trial and error.
With The Crossroads Roadtrip Diary, people overlooked steps that were displayed in tabs.

Honda Bike Customize: A user was annoyed by dropdown selection lists and wanted to see all of the choices at once without having to click items one at a time from a menu:

“Dropdown menus sometimes freeze easily and are very hard to point out.”

Honda Bike Customize forced people to select options from dropdown lists.
One of the reasons this kind of selection list is annoying and difficult to use is that it is often hard to tell which options you’ve tried and which option is currently selected. The advantage of using a list of text links or buttons instead is that they hold still so you can more easily try each item one at a time while you can see all the available options.

Shu-Uemura Make-Up Simulator: Several users didn’t know how to move to the next step, because the steps of the process were at the top of the screen and they didn’t look much like steps. After selecting all of the options in the Face area, people expected to see a Next button or something more obvious on the main body of the screen that would guide them to the next step.

*Users of Shu-Uemura Make-Up Simulator didn’t notice the step buttons at the top of the screen and didn’t know how to go to the next step.*

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**RESIZING OBJECTS**

42. **Let an object resize only in the direction it is being pulled.**

When the user is making an object bigger or smaller, don’t let it resize in all directions. Instead, make the opposite end fixed, and resize the object only in the direction it is being pulled. When the opposite end is fixed, the size of the object in relation to the work area is more predictable, so the amount of guesswork is reduced. Also, this is the way users are used to resizing windows in all currently popular operating systems.

Objects in BHG Arrange-A-Room resized in all directions, forcing users to work harder than necessary to create the right-sized object for a given space. For example, they couldn’t lock the couch along the wall and resize the length of the couch on just one side. Instead, dragging on the resize handles changed the length of the couch on both sides, forcing users to readjust the location of the couch each time.

Similarly, the Scotts Product Calculator resized objects in two directions at once. For example, when the handle was pulled to the right, the object expanded both right and left, instead of just to the right.
43. Use arrows to represent the value of the dimension, not the direction of the expansion.

Make sure that the labels for resizing an object match the dimensions, not the orientation, of the object. Don’t use sideways arrows to control the width of objects, because the meaning of “width” is not preserved when the object is rotated. For example, the width can become the length when the object is rotated 90 degrees. So the object is no longer resizing sideways, but rather up and down. Keep the meaning of the controls consistent by using only up and down arrows for resizing both height and width.

Users of Pergo Interactive Room Planner properties box were confused by the arrow buttons that pointed in different directions. People didn’t understand why some arrows pointed side to side and others pointed up and down.

The arrow buttons on Pergo Interactive Room Planner confused users because they were oriented inconsistently from the objects they controlled.

44. Make it easy for people to rotate objects.

If your application has a rotation tool, make sure it’s easy to use. Offer a recognizable rotation button that works smoothly, without being finicky. For objects and products where detail, texture, and orientation are important, consider offering an easy way of viewing the object in 360 degrees.

In our study, people were most successful in rotating objects in the Arrange-A-Room application, because it had a recognizable button that appeared whenever an object was selected, so people didn’t have to look for it. Several people had difficulty rotating objects, however, because they didn’t know they had to press down on the rotation button and then move their mouse in the direction they wanted the object to be rotated. Some people expected the object to rotate when they clicked on the rotate button several times. The button was also a little large and sometimes obstructed too much of the object or objects around them.
Some people had difficulty rotating objects in BHG Arrange-A-Room, because they didn’t know they had to click the rotate button and drag their mouse in the direction of the rotation.

People using Nike ID were confused by the icons underneath the picture of the shoe. Some people thought they represented steps in the process and didn’t realize they could look at different views of the shoe by clicking on them. A couple of users commented that a more useful feature would allow them to simply rotate the shoe 360 degrees so that they could get a better feel of what the product looked like.

*Nike ID offered users a way to see the shoe from various points of view, but several users complained that it was insufficient and wanted to see the shoe rotate completely around.*

Offer common angles when exact degrees are unnecessary.
Consider allowing users to rotate objects to common angles (for example 45, 90,
180, 270, and 360 degrees), especially when exact degrees (such as 4 or 72) are unnecessary. For example, rather than having people enter the degree of rotation in a properties box, offer a rotation button that has pre-set angles. The degree of rotation should correspond to the number of clicks. People don’t always know the number value of angles and can enter the wrong ones. Providing a rotation button that is recognizable and easy to use saves users the hassle of going through unnecessary steps, such as opening and closing property boxes and entering numbers.

BHG Arrange-A-Room had an easily recognizable rotation button. Most users were able to rotate an object by clicking and dragging it around. Several users clicked on the rotate button several times, however expecting the object to turn automatically. The Pergo Interactive Room Planner made people use up and down arrows to enter their rotation values. Users didn’t always know whether to choose up or down to rotate the object in the direction they wanted. This application offered set degrees, but they seemed too odd. Instead of having commonly used angles, they offered more arbitrary ones such as: 5, 50, 95 and 140.

46. **Don’t automatically rotate objects just to be fancy.**

When an area expands or contracts, it’s better to keep that area in its original orientation, rather than rotating it for no reason. Rotating maps unnecessarily causes more harm than good because the associated labels also rotate, making them difficult to read. Some users have to tilt their head to read a rotated map.

The California Pizza Kitchen locator unnecessarily rotated when it expanded and contracted. People had some difficulty reading the map when the labels were angled and the region was inappropriately represented.

*The CPK Map rotated unnecessarily, causing city labels to be angled and difficult to read.*
PRESENTATION

MOTION

47. Don’t show gratuitous motion.

Avoid having constant movement on your site. Constant motion is distracting and draws people away from the more important areas. Most users complained about the motion after spending only a few minutes at the site, especially when the moving objects were navigational elements. These were particularly annoying, because shifting click targets around forces people to follow and anticipate their movement.

When done well, motion can be used to provide visual feedback. For example, using simple motion transitions to show page load and content changes can be helpful. Because Flash doesn’t have an overpowering page metaphor like HTML, it’s helpful to have simple transitions to show that there is new content on the page. When using a transition, be sure to keep it simple. Fancy transitions are distracting and can take longer to load.

TimBuk2 Build Your Own used motion effectively to show the user’s input. When an object was selected, it moved inside the bag to show that it had been added.

One user said:

“It’s cool that they have a picture that goes inside that bag to show that it’s added.”

People complained that the Corporate Planners website had continuous motion, such as spinning graphics, words that zoomed in and out, and pictures that panned around the page.

Users said:

“This stuff that’s flashing, that’s okay at first, but when you’re looking for information, it needs to stop. It's impressive at first, but it's distracting.”

“This globe keeps moving while you’re trying to read, and it’s distracting.”
Most of the pictures and graphical elements on Corporate Planner.com moved or changed, causing people to be annoyed and frustrated, especially when they were trying to find information.

Shu-Uemura.co.jp: The navigational elements on this site were in constant motion and sometimes disappeared off the screen, requiring users to hunt down the link they needed before it went off the screen. The problem was compounded because the links moved away from the cursor and moved more quickly as people tried to click them.

Users said:

"It’s very hard to point and click because it moves!"

"I can’t read the descriptions because it keeps moving."

"I don’t know how and where to select. There are too many things going on."

The navigation on Sui-Uemura.co.jp kept moving, making it difficult for people to find and get to the application.

LeafRacewear.com had flashing graphics on its homepage and a user complained that it was too “busy.”
One user said:

"This is a really busy website. It makes me want to hurry up and click on something to make all that go away. ... All that moving activity – it distracts my concentration."

Many of the graphical elements on LeafRacewear.com flashed, annoying users.

Users with low vision had difficulty following the objects while using Lee Fit Finder, because the page elements moved too quickly across the screen.

One user said:

"All this jumping around stuff is distracting and hard to use. By the time I focus, the Flash goes away. I have to refocus and then it’s gone."

48. Avoid using continuous slow motion and fading.

Don’t use slow motion, especially to load a page. People interpret visible slowdown as slower loading time. Users with low vision have a harder time focusing on moving images, and users who are blind can’t see them at all. For these users, a fancy splash page becomes a tremendous obstacle. When sites move in slow motion, it’s difficult to sense when the page is finished loading. It would be better to use a simple progress bar that shows the percentage of completion than to make people wait and guess when the site is done.

The Tiffany website had elements that faded in and out slowly while the site was loading. A user complained that it was difficult to tell when the site was finished loading. Even after the movement stopped, she hesitated to use the site right away and wondered if it was ready. People with low vision complained that it was too difficult to focus on the moving elements.

Users said:

"The site keeps changing. I bet this page keeps refreshing itself. It keeps reloading, so I can’t do anything."

"The blind wouldn’t use it. They can’t see that it’s Flash; they just think it’s not working. Things come at you and speech isn’t reading it."

"Flash animations come in and out and they hurt your eyes after a while. It fades in and out and you’re trying to focus and it’s just not happening. I know they are trying to do elegance and classiness, but man, it’s hard on the eyes."
Bose.com had links to applications, such as Room Planner and Product Profiler that faded in one at a time and slowly moved across the screen. The site didn’t have a loading progress bar, and most users wanted to click the first link that appeared, thinking that the site was finished loading. They were surprised when the site continued to move and the second link appeared.

Users said:

“I can’t tell if it’s done loading because there’s constant motion.”

“Graphics move slowly. You don’t know when it’s done.”

This image shows the first Room Planner link that appeared on the Bose screen.

This image shows how the screen changed as the second link, Sound Profiler, appeared.
SOUND

49. **Don’t play unnecessary music on your site, especially if it’s unrelated to the user’s task.**

Besides taking up a lot of bandwidth, unnecessary music can be extremely overwhelming and distracting. Use sound judiciously and only when it’s essential to the user’s task. If you must have sound, make sure it starts out softly so it doesn’t startle users. Experiment with various sound settings to optimize the sound quality and file size. Some people told us that they couldn’t have sound at work because it’s disruptive. They were also concerned that music would overshadow their email and meeting alerts.

Corporateplanners.com had music set too loud; a few users jumped when the site launched. Although some users first thought the music was nice, they later complained that it distracted their concentration and wanted a way to turn it off.

Users said:

"The music goes on and on ... if I can only freakin’ lose the music. It's kind of distracting. ... I'm looking for something in the country and this is abroad music. Why would they choose this type of music? I don't know. If it's supposed to comfort me, it's not. To be constantly on is annoying me."

"When I'm working, I don't know if I want this music playing. There might be reminders (such as email chimes) that I might want to come on."

"The music sounds good. It intrigues you." [Then after 5 minutes] "The music is going the lights are flashing and there's a point where you want to turn it off."

"I think the music is okay, but it's distracting. I want to concentrate on what I'm looking for. ... I would go down here and mute it."

"Oh, music! [Then after 5 minutes] "The music is loud and repetitive."

"When I'm sitting here researching, I don't want music in the background. There's too much music going on. ... I don't see anything on the site that adjusts sound."

Several users of the Shu-Uemura site complained about the unpleasant pulsating sound on the site and wanted to turn it off immediately.

Users said:

"I usually don't care for music."

The Verizon Bills Tutorial had constant background music coupled with a voiceover, causing sensory overload. A user became extremely flustered and complained that the music made it difficult for her to concentrate on the content.

LHJ Pack-A-Lunch had child-like music that didn’t properly match the target users (parents). The adult, test users were not convinced of the site’s usefulness and said they though it was more suitable for children.

Kewpie.co.jp: Users found the jazzy background music and the sound that played every time they pointed to a new navigational item distracting. They said the music was inappropriate for a food company that specialized in mayonnaise.

Lipton.co.jp: The upbeat music looping continuously in the background annoyed and frustrated people, especially when they were trying to find store locations.

Users said:

"The music is annoying."

"The sound is fun and rhythmic, but it may be too noisy."
50. **Provide an obvious way to turn off the sound or music.**

If you can’t avoid music on your site, provide an easy and obvious way to turn it off. Most people don’t want to hear continuous music in the background, especially when it’s unrelated to their task. Reduce the annoyance level by letting people adjust the music. Don’t rely on the volume controls on users’ systems; most users didn’t know how to use them. Instead of using fancy controls, consider having labeled buttons to turn the music on or off and standard slider controls for volume.

51. **Consider providing audio feedback to signal when a user moves an object into place.**

When done well, sound can be used to reinforce an action and appeal to people’s senses. It’s nice to have a simple audible feedback, such as a click or a snap, to reinforce and acknowledge the user’s input. Sound adds an element of fun and comfort. Be careful not to overdo it by using cheap or loud sounds. Use a sound that is appropriate for your application. Something that is simple, short, and subtle is most appropriate.

BHG Arrange-A-Room gave a nice audible feedback when people placed objects in a room. It was soft and subtle and didn’t distract people from their task. Most people don’t even notice it, but subconsciously it could have a reassuring effect.

**COLORS AND FONTS**

52. **Don’t use tiny fonts.**

The use of tiny fonts can be extremely detrimental to your project. Tiny fonts are difficult to read, especially for people with low vision or people over the age of 40. Small fonts may look good at first glance, but when people have to actually use the site and read the words, tiny letters can cause eye strain and are impossible for some people to read.

Just because you can read very small fonts doesn’t mean everyone else can. Remember your target audience when choosing font sizes. Choose sharp, crisp typefaces. We recommend using 11-point fonts, at a minimum, to improve the readability of your site (12 points or bigger if targeting senior citizens\(^3\)). When possible, use typefaces that are optimized for onscreen reading. Sans-serif faces, such as Veranda, are crisp and easiest to read onscreen. Test your application on the most common platforms at the most prevalent screen resolutions to be sure the font size is good enough for everyone to read.

Mini Build Your Own: Users complained that fonts throughout the site were too small, especially in the description and pricing areas.

One user said:

“This area with the specifics is so small. The writing is so small.”

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\(^3\) We have a separate report with many more guidelines on how to design for seniors: http://www.nngroup.com/reports/seniors
Users of Mini Build Your Own complained about the small font size and had difficulty reading the words.

Devil email: The application opened in a small browser window, forcing everything in the application to be small. One user squinted as he used the application to see it better.

People strained their eyes to read the small fonts on Devil email.
Broadmoor Hotel Reservation: All the steps in the reservation process were crammed onto a single screen, causing some of the fonts to be especially small. Many users leaned up in their seats and squinted their eyes to use it.

*People leaned forward to read the small fonts on Broadmoor Hotel Reservation.*
People had difficulty reading the small and fuzzy fonts on Scotts Product Calculator.
California Pizza Kitchen Locator: The map was scaled too small and the labels were not readable. The only way people could read the labels was to choose a state and wait for it to expand. People with low vision had an especially difficult time deciphering each map label. It would have been better to list the names of the cities to the side of the states rather than to squeeze tiny words into a small area.

The labels on the California Pizza Kitchen locator were nearly impossible to read.

Regatta Colour Selector: People complained that the Order and Save buttons at the bottom of the screen were too small. The small font size and low contrast made them difficult to read. People had to squint to read the words, and several people almost overlooked them altogether.

Users said:

"The order button ... that's too tiny. It's too dark down here, because a lot of us can't see anymore."

"Save and Order boxes are too small to see."
The Order and Save buttons on Regatta Colour Selector were too small, and people had to squint to read them.

Shu-Uemura Make-up Simulator: Users complained that the tiny white font in the navigational area was too difficult to read.

One user said:

"The words are too small and the spaces between the words are too narrow. I can’t read it."

The tiny white font in the navigational area of the screen was too difficult to read.

53. Ensure adequate contrast between the background and text.

Reading onscreen is much more difficult than reading printed material. Maximize legibility by using highly contrasting text and background colors. For optimal
Legibility, we recommend using black text on white background. White text on black background provides high contrast and can be almost as good, but this inverted color scheme can cause some blurring around the edges, which slows reading slightly. Light text on black backgrounds must be bold and larger than its black-on-white versions in order to be as legible.

Legibility suffers most for color schemes that have very low contrast, such as light gray text on a gray background. The problem with using low-contrast colors is more severe for people with low vision. Also, be careful not to use color schemes like pink text on a green background, which has too little contrast and can be impossible for red-green colorblind users to read.

Tiffany.com: Many people leaned forward in their seats to read the light gray and blue text on the white background. One user didn’t notice the dropdown menu because it was too light and didn’t have enough contrast. The problem was more severe for users with low vision.

One user said:

"When I clicked on Jewelry, I expected a dropdown menu, but I didn’t see it because it was so light. ... Everything is very light on this site. It’s strenuous on my eyes. It’s pretty, but it’s hard for me to read."

"They need to make this darker. This is terrible. What were they thinking?"

"I wish this were darker and uppercase – bold and darker."

People had difficulty reading the words on Tiffany.com, because of the low contrast between the light gray and blue type and the white background.

Broadmoor Hotel Reservation: The blue type on purple background provided insufficient contrast. Also, users had difficulty seeing the text insertion point because the cursor was black and thus barely visible against the purple background.

Users of Broadmoor Hotel Reservation had difficult reading the blue text on the purple background.
YHA Itinerary Planner: Users complained that they couldn’t read the map because of the low-contrast colors. The map used too-similar colors, like light-green text on a dark-green background, and gray text on a light-green background.

One user said:

"I don’t like the color and background. It’s hard for me to see. I’m having a hard time reading it. I’m going to hold up my bifocals."

Users of YHA Itinerary Planner complained about the lack of contrast between the text and background color.

The More Information area in YHA Itinerary Planner used a blue background with black text, causing one man to lean forward in his seat and push his glasses up to see it better. To make matters worse, the information was displayed in a tiny box (not shown) — and the text was sized to fit the box.
The bright blue background in YHA Itinerary Planner made it difficult for people to read the words.

Nike.co.jp: People had difficulty reading the information on the product pages, because the font was too small and there was little contrast between the gray text and black background.

Users said:

"I can't read this from far away."

"It looks like a catalog, but it's hard to read."
Users of Nike.co.jp complained that the small font with low contrast was too difficult to read.

54. **Present colors as accurately as possible.**

Show the colors of physical objects as precisely as you can, especially on sites that sell things. Users lose confidence in websites that show products differently than they actually appear. Don’t make color swatches appear differently than colors shown on products. If you show various shades of a color, make sure each is discernable. If you have color choices that may appear similar on the screen, provide a brief description to help people differentiate among them.

Regatta Color Selector: A user was confused because her color selection didn’t match the product shown. She noticed that the shade of green on the color palette was different from the shade on the jacket. She wondered if the jacket came in two different shades of green or if it was just a computer glitch. After several attempts to reselect the colors, she decided not to place her order until she could talk to a live customer representative.

One user said:

"The greens look different. The greens aren’t the same. ... I would call to make sure that the greens are the same, because they look different on the Web."

Honda Bike Customize: A user noticed that the color he chose and the color that appeared on the bike were different shades, and he wondered what the problem could be.

He said:
“Its color doesn’t match the one I selected. I chose gold, but the design shows yellow.”

Lee Fit Finder: The site showed color swatches for jeans; however, it was difficult to see the differences among similar colors, such as “dark stone,” “rinse denim,” and “black denim.” People didn’t find the swatches helpful, because they all appeared black on the monitor.

55. **Don’t use transparent menu items or field labels.**

Transparent menus and field labels cause a blur effect that confuses users. Transparent words are very difficult to read, they strain people’s eyes, and many people with low vision often overlook transparent items entirely.

Tiffany.com: People with low vision had difficulty reading the transparent navigational menu at the top of the screen. The picture in the background showed through the navigational list, making it difficult for people to make out the words. **Users of Tiffany.com had difficulty reading the transparent menu items.**

![Tiffany.com Menu](image)

Broadmoor Hotel Reservation: The reservation form’s field labels (which were inside the text-box fields they applied to) faded, leaving only a faint shadow of the label, as people entered data into the fields. Several people leaned in to read the words but couldn’t tell what they said.
The faint field labels on Broadmoor Hotel Reservation bothered people because they couldn’t read them.

Most of the usability issues we saw in this study relating to scrolling can be prevented by using the standard scrollbar component included in Flash MX. Still, it is worth knowing about the following guidelines, especially if you are utilizing the ability to “skin” the component so that it doesn’t retain its standard appearance. (In general, whenever you modify a standard GUI component, you are strongly advised to consider the usability implications of that modification, because users may have difficulties interacting with nonstandard designs unless they are truly easy to use.)

56. **Make sure users recognize and understand how to use your scrollbar.**

People often overlook scrollbars that look too fancy or obscure. Traditional-looking scrollbars are most recognizable because they are familiar. Several scrollbar designs in our study failed because they weren’t easily recognizable or were overshadowed by other elements.

CBC World Cup Game Tracker, Bose Room Planner, Mini Build Your Own, and Hummer Build and Price all had scrollbars that were easily recognizable. They all had a simple design that distinguished them as scrollbars, with arrows at the top and bottom and a slider in the middle. People successfully identified and used these scrollbars, because they stood out among the other elements.
The following are examples of good scrollbars. They were easily recognizable and noticed by users.

Tiffany.com: Most people used the arrows on either side of the product pictures to scroll. Although the arrows were subtle, people noticed them because they were placed in an obvious location and didn’t complete with any other distracting elements. The major downside to this implementation was that it didn’t have visual indicators to show how long the scrolling list was or the user’s current range of view. Users of Tiffany.com used the arrows to scroll through the items, but complained that the scrolling area didn’t show the length of the list.

That users noticed and used the tiny scroll arrows on Tiffany.com is further proof of the value of simplicity in user interfaces. Because Tiffany’s screen doesn’t contain very many elements, there isn’t much to confuse users, so they are more likely to pay attention to those few things that are shown.

Haribon Saving Species locator: Most people didn’t notice the scrollbar on the right side of the dropdown list because of several nonstandard elements in the design: the scrollbar was outside the area it controls, the top and bottom arrows looked like they were part of the map as compass pointers, and there was no slider indicator (sometimes called the “thumb” or “elevator”).
Users of Haribon didn’t notice the scrollbar because it looked like a North / South indicator for the map.

CokeMusic V-Ego: A user couldn’t create her virtual character, because the triangular arrows on the sides of the pictures were too obscure, so she couldn’t figure out how to get more choices. She didn’t know that clicking on the triangles would give her more clothing and hair options.

A user on CokeMusic couldn’t create her character because she didn’t realize that the arrows on the side of each box were scroll arrows.

LHJ Pack-A-Lunch: Most people didn’t notice the little triangles at the top of each category because they blended in with the other graphical elements on the page. The triangles were placed at the top, close to the banner area where people tend to avoid looking. Several people wanted to have more choices and didn’t know they had to click the arrows to get them.

Users said:

“Oh, I really have to pick from this? There isn’t more? I can’t believe that’s all the entrees they have. ... I give her fruit. I can’t believe these are all the snacks they have."

“I didn’t notice the arrows.”
Most users of LHJ Pack-A-Lunch didn’t notice the triangles at the top of the menus and didn’t realize there were more options.

Since our study, LHJ launched a new design of Pack-A-Lunch that has much more noticeable scrolling areas than the design we tested. Unfortunately, the new design is much more modal in that it requires users to view each item one at a time by category or to use the dropdown menu to see a list of alternatives.

The redesign of LHJ Pack-A-Lunch has a much more noticeable scrolling area.

Pergo eShowroom: The scrollbars were camouflaged because they blended in with the square color chips next to them. The color chips and scrollbars were similar in shape, causing people to overlook the control. Also, the color chips overpowered the scrollbars because they were bigger and brighter, and the gray on the scrollbars made them look unavailable.
Some people didn’t notice the scrollbars in Pergo eShowroom because the rectangular shapes used in the scrollbars blended in with the nearby color chips.

Mini Build Your Own: The gray scrollbar at the bottom of the upholstery choices was overlooked by many people because it blended in with the swatches and black background. It also had words in the slider area, which is unusual in a scrollbar. People noticed the scrollbar on the right panel, however, because it wasn’t camouflaged by any distracting elements.

People using Mini Build Your Own didn’t discover that there were more upholstery choices because the horizontal scrollbar blended in with the background and surrounding elements.
57. Provide scrollbars that have an indicator showing the relative length of the page or list and how far users have to scroll.

Don’t leave out the scroll indicator when designing scrollbars. People scroll by using both the up and down arrows as well as the slider indicator. The slider serves three main purposes:

(1) It provides a control with which to scroll.
(2) It shows where the present view is located in the scrolling area.
(3) It can indicate the size of the current view relative to the entire scrollable area.

When the slider is missing, users don’t get the information they expect.

Tiffany.com, Bose Room Planner, and Pergo eShowroom: Users said that the scrollbars on these sites didn’t give them sufficient feedback. These sites had scrolling arrows but no indicator in the slider. The scrolling arrows alone couldn’t indicate where the list started and ended. Users complained that the list could go on and on, and they wouldn’t be able to tell whether it looped back or went on indefinitely.

Users said:

"Does it go in circles? I can’t imagine them having that many shades."

"I can’t tell where the list begins or where it ends."

[For the jewelry menu, a scrolling dropdown list (not shown):] “There’s no bar or graphic to tell me if I’m at the beginning or end, like a typical scroll.

Tiffany.com and Bose Room Planner didn’t have scroll indicators, so people couldn’t tell where the list started or ended.

SOH Virtual Tour: People were attracted to the big scrollbar in the Tour Guide area. The scrolling arrows were clearly labeled with “page up” and “page down.” The scrollbar lacked a scroll indicator, however, and all users kept clicking on the down arrow repeatedly, even when there was nothing left in the pane to scroll.
58. Provide scrollbars that are big enough to be controlled easily.

Tiny scrollbars make it difficult for users to find and target the click zones. Make the scrollbar an adequate size, so that users can easily manipulate it. When scrollbars are too small, people can easily miss the end points or slider. In addition, make the click zones around the scrollbar as large as possible to catch clicks outside of the scrollbar. Several users had great difficulty using small scrollbars and thought that the scrollbars didn’t work, because sometimes they were able to click the correct area and sometimes they weren’t.

CorporatePlanners.com, Mini Build Your Own and LHJ Pack-A-Lunch: The scroll areas were too small and people often clicked outside of them.

Users said:

“These navigational things don't work. ... I think it's silly to have them if they don't work. ... The navigational tools are frustrating. Sometimes they work and sometimes they don't.”

"I have to put my hand exactly over the arrows. I don't like that – your hand has to be right over that."
People had difficulty using the scrollbars on CorporatePlanners.com, Mini Build Your Own, and LHJ Pack-A-Lunch because the click zones were too small.

59. Help users control their scrolling speed.

Set scrolling areas to scroll at a comfortable reading speed. Don’t let them move too quickly or jump to different sections. It’s confusing to have lists and content skip around in the scroll area. Users don’t want to piece together the information and figure out what part they’ve already read and where the new section begins. Don’t let lists move too slowly either; people can become impatient. It’s better to let people control the scrolling speed by allowing them to click the arrows and scroll one line at a time, so that they don’t accidentally miss any important information.

CorporatePlanners.com: When users clicked the down arrow, the content in the scrolling area jumped multiple lines, often passing the area where people had left off reading. It moved so fast that people didn’t see most of the information.
One user said:

"I don't like scrolling with this. I'd rather have a scrollbar." [The user clicked the arrow but sometimes it was non-responsive.] "I think it's going too far. I can't tell if it is or not. ... When I scrolled down, I have to look where I last read. It's inconsistent. Sometimes it jumps all the way, sometimes it doesn't."

CBC World Cup Game Tracker: The drop-down menu in Teams was difficult to use because it scrolled too quickly. When the mouse hovered over the arrows at the top and bottom, the list automatically scrolled at a fast pace. People had to be quick to click the team they wanted.

One user said:

"Oh! This thing moves very fast."

California Pizza Kitchen Locator: The arrows in the results window didn’t let users control the scrolling speed. Placing the mouse pointer over the arrows caused the content to scroll automatically at a slow pace. The scrollbar didn’t have a middle slider, and users didn’t have the option to click the arrow and scroll one line at a time.

Kewpie.co.jp: The scrolling feature on this site was too sensitive and broad, causing users to get frustrated quickly. Whenever people swept their mouse anywhere across the screen, the navigation choices automatically scrolled along with the mouse. Users were annoyed by the constant movement and had to keep their mouse still to keep the row of images from scrolling back and forth.

Users said:

"I thought it was kind of fun, but it’s moving too much. The words and the buttons are both moving. It’s annoying. It’s very design-centric I guess."

"I really feel like it’s playing with me."

People complained about the constant movement on Kewpie.co.jp because the navigation bar scrolled back and forth along with their mouse, even when the mouse wasn’t placed over it.

Don’t put content or lists in small scrolling areas.

Avoid cramming content into a small area. Requiring people to scroll in a tiny area is like forcing people to read through a peep-hole. Maximize the size of the scrollable area to reduce fatigue and make reading more enjoyable, especially when there’s a
Another danger of having small scroll areas is that the scrollbar has the tendency to zip through too quickly, causing users to overlook important information.

CorporatePlanners.com: This site forced users to scroll through a narrow window to read the content. Users were frustrated at having to scroll and read a little at a time. The people we observed had the tendency to scan only the first few lines and skip the rest, because it was too fatiguing to read through a small window that let them see the content only a little bit at a time.

Users said:

“This is really tiny. This is a tiny little space to look at what I want. And the information jumps around too fast.”

“You gotta be quick on the money or it goes beyond what you’re looking for.”

The content on CorporatePlanners.com was difficult to read because it was placed in a small area that required constant scrolling.

California Pizza Kitchen Locator: This website listed restaurant locations in a small box that showed only a small part of the information at a time, forcing users to scroll to get all of it.

California Pizza Kitchen showed location information in a small box that revealed only a little part of it at a time.

Tiffany.com: Users were annoyed that the products were shown in a narrow horizontal scroll area, because it was impossible for them to see more than a few choices at once. People wanted to see more than five products at a time, and they wanted an easier and faster way to scan through their choices.
Tiffany.com let people view only five items at a time.

61. **Don’t show a scrollbar when there’s nothing in the pane to scroll.**

Don’t provide scrollbars where there’s nothing to scroll. It clutters up your interface and adds unnecessary complexity. Users who notice it will undoubtedly try to scroll and wonder why nothing happens.

Waitt Billboard locator: There weren’t enough locations in the cities list to warrant a scrollbar. It persisted anyway, and people kept trying to clicking on it, wondering if something else would appear.
People tried scrolling for more listings in Waitt Billboard even when there was nothing in the pane to scroll.

Lee Fit Finder: A scrollbar was present in the Styles pane, even when there was nothing to scroll.

Users tried to scroll for more styles, even though there weren’t any more items to see.

62. **Let users control the scrollbars.**

Don’t let scrollbars jump up or down on their own. Scrollbars should help people keep track of what they have read and give them an indication of their progress. Scrollbars that move unexpectedly cause disorientation, making people lose their place.

Nike ID automatically scrolled back up to the top after each step, causing people to lose their place. Users scrolled down to reach the final steps, but when ever they made a selection, the screen automatically refreshed and scrolled up without people even noticing. People kept re-selecting the same things over and over again without knowing it. They became confused because they couldn’t tell when the steps ended. People who successfully used Nike ID were forced to keep track diligently of the
numbered step they were on and scroll down after completing each step. Many people complained that the constant scrolling made the process tedious and unpleasant.

**GRAPHICS AND PHOTOGRAPHS**

**63. Make sure links don’t look like decorations or ads.**

Users tend to ignore flashy graphics that look like advertisements, especially when those elements are placed at the top or sides of the screen where most ads appear. Make your links noticeable by using descriptive words instead of fancy graphics or animation. It’s more helpful to use labels that concisely describe what the application does rather than flashy graphics that don’t provide adequate information.

Haribon Saving Species locator: People mistook the graphic link on the site for an advertisement for a book, because it looked like a book or magazine cover. The most noticeable heading in the graphic was “Sites in the Philippines,” which sounded more like an advertisement for vacation spots rather than conservations areas. People didn’t notice “Interactive Map” at the bottom of the graphic, because it was too small and non-descriptive.

Users said:

“Special Features and all that, that’s all advertising. I don’t read any of that.”

“It looks like it’s in a cover format.”

“I thought it was a link to a book.”

*Users of Haribon blew by the link to the application because it looked like an advertisement for a book or magazine.*

Pergo Interactive Room Planner: Most people completely ignored the “Interactive Room Planner” graphic. The logo had movement that faded in and out, making it look like a banner ad. Several people placed the mouse over it but didn’t click, because it didn’t look helpful or appealing.

*Users of Pergo.com didn’t notice the Interactive Room Planner link because it looked like an ad.*
Broadmoor Hotel Reservation: Most people went straight to the word link, "Accommodations," instead of the more graphic link, which featured a fancy script "B" and said "Make a room reservation." The word link was simple and descriptive, whereas the unnoticed, more picture-like link blended in with other promotional graphics on the homepage.
Regatta Colour Selector: The big graphic and marketing language such as, “New! Colour Selector,” and “Try the Colour Selector Now” made people think it was an advertisement, so many people bypassed it.

Most people didn’t click Colour Selector because of the marketing language.

64. Use meaningful icons.

Icons serve dual purposes: They communicate information about the application and the interface, and they make the interface more interesting. The latter purpose must never overshadow the former.

- Use icons that are meaningful to your users.
- Use standardized or de-facto standard symbols for icons whenever possible.
- Test icons carefully in context with typical users. Make sure that the icon symbols are noticed and easily recognized.
- Consider adding captions to icons that explain their meaning or purpose.

Showing an explanation of the icon’s purpose when the mouse hovers over the icon (with hover, tool-tip, or rollover functionality) doesn’t always work for inexperienced users, because they don’t always know to look for that kind of feature.

It is better to use a standard or familiar icon than to invent one. Common sources for de-facto icon standards are the users’ dominant operating system, dominant desktop applications, traffic signs, VCR controls, and signs in airports or other public places.

My Monopoly: The Games Summary window used four icons on the right-hand side of the screen to symbolize possible user actions: continue editing, delete, duplicate, and order.

People didn’t understand these icons. Some users didn’t notice the explanatory legend on the left-hand side at all. Most others did not understand it was explaining the meaning of the icons, partly because it was too far away from them. Using words for the actions would have been much more effective.
Users of My Monopoly didn’t understand the meaning of the icons and didn’t notice the legend in the left-hand panel.

The trash can icon is literally iconic for user interface professionals, as the main symbol for the desktop metaphor and the graphical user interface made popular by the Apple Macintosh. Despite this status among professionals, not all users in our study recognized a trash can icon as a symbol for the command “delete object.” Possible reasons include:

(a) The dominant operating system uses a recycle bin instead of a trash can for copyright reasons.

(b) Users don’t always generalize from specific commands, such as “delete file,” to more general ideas such as throw objects in the trash.

(c) The icon in the Monopoly design is very small, and thus harder to recognize if you don’t already know what it’s supposed to show.

(d) We tested this specific design in Germany where physical trash receptacles usually don’t look like the American trash cans that were the inspiration for the classic icon.

Aarhus Denmark Map: Users liked the icons that represented various kinds of easily recognizable objects of interest for a tourist, for example a teacup, which represented a restaurant.
The Aarhus Denmark Map used recognizable icons that helped users.

65. **Label graphics and icons, especially when their meaning isn’t obvious to users.**

It’s best to have icons that are readily recognizable, but being recognized is not the same as conveying the meaning you intend. To be sure, place labels or descriptions next to the graphics or icons to explain their meaning.

LHJ Pack-A-Lunch: People had difficulty identifying the cartoon sketches of the various sandwiches. People didn’t notice that the name of the sandwich appeared at the bottom of the screen whenever they placed their mouse over a sandwich, because the label appeared too far away from the person’s viewing focus. It would have been better to provide simple labels underneath each picture so that people could identify them right away.

At Pack-A-Lunch, people had trouble differentiating among the various choices, especially the sandwiches, because they all looked too similar to each other.

BHG Arrange-A-Room had good labels under each object, and users identified them easily without having to depend on the graphics.

The explanatory labels at BHG helped users identify objects immediately.
Volkswagen Configuration and Quotation: Japanese users had trouble understanding the navigation on the homepage, because the icons were inappropriately labeled in English. Most users tried placing the mouse pointer over the icons to get a rollover description in Japanese but were disappointed when they didn’t see any. The site actually offered descriptions in Japanese, but users didn’t notice them, because the descriptions were too far away from the icon.

Users said:

"These options are only in English. ... I feel more comfortable reading in Japanese."

"When I move the cursor to the "cars" option, I wish the explanation would display. For example, "You can custom design your car."

Similarly, users overlooked the cars on the product page, because the cars weren’t labeled and the gray icons looked more like decorations than links. People didn’t realize that the icons represented various cars, or that those icons were links to the product pages, where users could configure and price those cars.

Users said:

"It’s hard to see these options, because they are almost transparent gray."

"The color of these options is too light to be visible. It’s very hard to see."

Japanese users had difficulty finding the main navigation on Volkswagen.co.jp because the navigation was buried at the bottom of the screen, behind obscure icons that were inappropriately labeled in English.
People blew by the light gray icons in the middle of the screen, also, because they were barely noticeable and looked like decorative elements.

66. **Avoid using pictures that don’t show anything meaningful.**

Use graphics and pictures judiciously and only when they provide meaningful information. Avoid any superfluous graphics, particularly ones that impact speed. People were impatient and got angry when they had to wait for slow-loading sites. Show images that convey relevant information that people need. The quality should be good enough to show the characteristics that are most important to users. With items for which texture and style are important, show the product from different angles and with close-ups. Show the zoomed out picture first, then offer a way for people to zoom in or get an enlarged picture. Showing first the product’s close-up view doesn’t give users enough context.

**TimBuk2 Build Your Own:** People thought that the sketches of a person carrying various sized bags were helpful, because they showed the size of the bag in relation to a person carrying it. One user said:

"Okay, this is good. So I can see if it's too big. This picture helps me get an idea. That's definitely good."
TimBuk2 Build Your Own had helpful pictures showing the bag size in context – an illustration of a person carrying it.

Mini photo gallery: All of the thumbnail images were cropped too tightly, making it difficult to tell what each picture represented. People were forced to click each one to see a full image. People also had difficulty understanding what each cropped picture represented, because they were grayed out and didn't sharpen until the mouse pointer hovered over them. Most users abandoned this area after viewing only a few pictures, because it was too laborious to use. It would have been better to show a few important full-view shots first and then allow people to zoom in to get more detail.
Mini.com had thumbnail images that were too tightly cropped, forcing people to click them to see the full-view images.

People had difficulty choosing the right fabric on TimBuk2 Build Your Own because the grayscale sketches of the fabrics didn’t adequately show the texture of the material. It would have been better to show a close-up of the actual fabric.

One user said:

“It’s hard to tell the type of fabric in black and white.”

TimBuk2 Build Your Own used sketches that didn’t adequately show the texture of the fabric.

TimBuk2.com: The link “View Inside of Bag” was misleading because the picture didn’t show the inside of the bag – but rather what was underneath the flap. Several people treated the picture as if it were a real bag, sitting up in their seats and looking down on it to try to get a better view of what was inside.
Users of TimBuk2.com tried to look down on the picture to view the inside of the bag.

Broadmoor Hotel Reservation: People complained that the pictures on the site didn’t show the information they needed. The pictures were too close up, and users couldn’t discern the room size, number of beds, or anything else the room included. One user said:

"The picture didn’t tell me if it’s king or full."

People complained that the pictures on Broadmoor Hotel Reservation didn’t show enough detail about what was included in the room.

Hummer.com: The site used photographs for decorative purposes, rather than to provide useful information. The Specs and Features section used the same pictures on every page, and one user wondered why the pictures didn’t match the topic he was reading. Users said:

"I would expect to see different images, rather than seeing the same thing. For performance, I want to see the car climb up the mountain. Tie in the theme. If you have the same images people tend not look at it."
"When I go to a site that costs that much money, I expect to see nice close ups, pictures of what I'm getting. I'm spending a lot of money, give me more detail. For example, the winch – Show me more detail. You can't see it because it's hidden."

67. When appropriate, complement content with helpful pictures and diagrams.

Show a picture next to a description, especially if the information is visual in nature. Seeing an accurate picture of the product gives people information about what the product looks like, lets them know what to expect, and helps them differentiate between the other choices.

TimBuk2.com: The site listed many different bags but didn’t show what they looked like. Many people went to the Products area of the website but were disappointed that it didn’t have the details they wanted. People wanted to see pictures of the bags along with detailed descriptions. It would have been helpful to show a picture of the various bags next to the links, so that users wouldn’t have to click each link to find out what the bags looked like.

One user said:

“There aren’t styles to see what you want. Usually, on a site, if you want a sweater, you go to Sweaters, and it’ll tell you what’s there, what your options are."

Users of TimBuk2 were forced to choose a bag before knowing what it looked like.

Leaf Racewear Design Your Suit: People wanted to customize their own shirt, but didn’t know which category to look in for the shirt they wanted. None of the product pages had pictures, and the descriptions weren’t enough to describe the shirt adequately. It would have been better to show a picture next to the description, so that people could easily and quickly determine whether they were in the right place and which product to pick.
One user said:

“It's kind of a crew shirt, but I don't know. Right now, I want to see a picture. I want to know what they mean by crew shirt.”

Users of Leaf Racewear Design Your Suit had difficulty choosing the correct shirt, because there wasn’t a picture next to the description.

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68. **Don’t use faded or blurred pictures.**

Showing faded or blurry pictures diminishes their usefulness by making people work too hard to get the information they need. When people see blurry pictures, they think there’s something wrong with the site or their eyes. It would have been better to show crisp, informative pictures, rather than faded or fuzzy ones that made people guess what the images depicted.

Hummer.com: This site used blurry pictures and forced users to place their mouse over each one to see the focused version. Several users leaned closer to the screen to see them better and remarked that their eyes were going bad.

One user said:

“Those [pictures] are kind of blurry. Oh! I see, when you go over it, it sharpens. That seems kind of pointless.”
Users of Hummer.com had difficulty seeing the blurry pictures and some thought the problem was their eyes.

Nestle Gift Basket: People complained about the tiny, faded pictures on the site. It was difficult for people to differentiate among the products without having to place their mouse over each one to get a clearer and larger image. One user thought that the products were unavailable, because they appeared grayed out:

"The products are all transparent. ... I feel like I can’t select any products."
69. For design-related applications, use realistic looking pictures or sketches.

For applications in which visual detail is important, give users an accurate impression of what their end-product will look like by showing realistic drawings or pictures. Simple line drawings or cartoons aren’t as helpful and make the program much less compelling to use.

Users of Pergo eShowroom appreciated that the picture looked true-to-life and saw value in using this tool to conceptualize their design choices:

"I like that – it’s a color picture rather than a drawing."

"It’s interesting to get a visual. It’s hard to get a realistic impression of cartoon drawings. I like that it gives a visual of what and how it’s going to look together."
Users of Pergo eShowroom found it helpful to get realistic pictures of a living room instead of a cartoon sketch.

Several users of TimBuk2 Build Your Own complained that the cartoon picture of the bag wasn’t sufficient to give them a realistic impression of what the bag would look like. They wanted something more true-to-life.

Users said:

"It’s a picture, not a high quality one, especially considering it’s Flash."

"It’s really nice to see visually, but I wish I could see actual product photos."

Users of TimBuk2 Build Your Own wanted a more realistic picture of their bags.
IMPLEMENTATION NUTS AND BOLTS

BROWSERS

70. When possible, don’t open a new browser window, but ensure that the Back button works.

Keeping the application in the same browser window as the main website creates an integrated feel between the application and the website. Users don’t differentiate between the two, so creating a smooth transition enhances the user experience. We found in our study that people often didn’t use the tools and applications in isolation. Rather, they gathered information from both the website and the Flash areas and frequently jumped between the two to get the information they needed. They expected the information from the website and the Flash area to flow back and forth, as it would on a traditional HTML site.

This flowing back and forth between media types didn’t work as well when the site and application were in two windows, because in current versions of the Windows operating system (the system we used in our test), browser windows tend to cover the whole screen, and each other. Embedding the application in HTML-based pages turned out to be a better strategy than opening a new window of any size on top of the launching web page’s window. Embedded applications prevented people from accidentally clicking outside the application’s active browser window and thus burying the application underneath the parent window. Almost every user in our study made this error—then couldn’t find their way back to the application window and concluded they had lost their data. Most of these people didn’t notice the application window’s icon at the bottom of the screen.

The embedded approach works best when the Back button behaves as expected. All embedded Flash applications we studied discarded people’s work when they clicked the browser’s Back button. This problem exists with other web-application technologies, such as Java, that appear to change pages as they go. These changes are really new screens internal to the application, and technically the user is still viewing the same HTML page in the same browser window as when the application started.

When someone wants to go back to a previous step in the application, it is natural to press the browser’s Back button, which terminates the application prematurely. From a technical standpoint, it is also only natural for this sequence of events to occur, because of the characteristics of the technologies used. For users, however, this problem is severe, because the system has thrown their work away. The problem is worst when it occurs during a linear procedure that requires several steps in succession.

One of the main reasons developers open applications in windows with no Back button is to try to work around this Back button problem. A more integrated approach is called for, however, in order to meet the user’s need for nondestructive navigation. Make sure the Back button works by capturing each user input as an individual step. Use named anchors to set points in your application so that users can navigate back. In this case, take care not to discard the user’s data and to provide a way to view the activity screen again after the result screen is shown.

When streamlining the application is not possible or there’s just too much to put on one screen, another solution might be to use very attractive internal application navigation that allows the user to go to the various screens of the application.
Shopping carts and checkout processes have been doing this for some time, so users might be familiar with it.4

Because application navigation and data loss is such a common and severe problem, each application should be tested with users who are not Web experts. Always test your applications in the context of the surrounding website with credible user tasks to make sure your solution works.

TimBuk2 Build Your Own: This application was embedded in the same browser window as the main website. Two users clicked the Back button and lost all of their input. The Back button took them to the HTML page that started the Flash application, rather than back to the previous step in the application. Clicking the forward button restarted the application from the beginning, with none of their previously entered data.

One user said:

"Now I'm going to have to start once again."

CBC World Cup Game Tracker launched a new browser window with back and forward browser controls grayed out. A user complained that there was no way for him to go back.

It would have been better to have fully functioning back and forward buttons on the active window so that people could go back to the previous step. At a minimum, provide an obvious Back button in the application.

One user said:

"I don't even know how to get back to the homepage. I can't go back."

Users of Waitt Billboard locator, Mini Build Your Own, Scotts Product Calculator, and Pergo eShowroom clicked outside of the active window and caused it to disappear behind the main website browser window. Several people clicked on the scrollbar on the main window, thinking that the scrollbar was part of the application. They tried clicking on the link to the application on the main website, but couldn't get the application to re-appear and thought that the site was broken.

One user said:

"Oh my! I lost my design. I'm not sure what I did. When did I get here? Now I can't design a floor anymore. I was doing so well. I don't now what I did."

Users of YHA Itinerary Planner lost their input after clicking the browser Back button. One user wanted to go back to change a date, but the application wouldn't let him re-enter the Planner without having to start over again.

One user said:

"Oh! I entered the wrong day. I have to undo my last step and now I have to start over again."

A user of Leaf Racewear (where the Flash application was embedded in the main website) clicked the Back button on the main browser window to check pricing information and was taken back to the beginning of the application, losing all of her entries. There was a Back button in the application, but she didn't notice it, because the browser's Back button was more prominent. She didn’t make the distinction between the website and the Flash application and expected the Back function to work like other, HTML websites.

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4 For more information about the usability of shopping carts and checkout processes, please see http://www.nngroup.com/reports/ecommerce/checkout.html
One user said:

"I thought I was doing so well. ... I’m confused and frustrated. I found the one I wanted, but it won’t give me the price."

Users of Tiffany.com were frustrated by the Back functionality on the site. The Back button in the application didn’t take users back to the previous step. Rather, it took people back to the first page of the main navigational area. For example, pressing Back took people to the first page of Shopping, but not to the exact shopping page that they were on. The embedded “Back to Shopping” link simply restarted the shopping movie, rather than returning to where the users left off.

Also, several people used the browser’s Back button on the parent (Tiffany homepage) window, causing both the application window to disappear behind the parent window and the parent window to change – taking the user off the Tiffany site altogether. Most people didn’t know that that the application was simply hidden behind the main browser window.

Users said:

"When I go back to Shopping, I want to go back to exactly where I left off."

"’Back to shopping’ takes me back to the beginning, not immediately back. Oh hell, let’s see if I can get it again."

"I’m like a dead fish out of water now. I keep getting dead ends. I’m afraid to go back now. It doesn’t take me to the previous page."

"I can’t go back."

Broadmoor Hotel Reservations: The Back button didn’t work the way people expected. After people launched the Reservations application from the main website, they were not able to go back to the main website by clicking Back. Back took people to the beginning of the Flash movie and erased all of their entries.

71. **If you must launch a new window, make it a moderate size.**

If you have to launch a new browser window for your application, we recommend keeping it to a reasonable size. When it’s too small, everything inside becomes too tiny and difficult to read. When it’s maximized, too much of the desktop is covered, and people don’t like new windows taking over their screen. Some people like to work with several browser windows open at once. Having a moderate size window lets them work with applications such as e-mail at the same time.

72. **Put the application window in the upper left-hand corner.**

Place the application window in the upper left-hand corner of the screen so that the Back button on the parent window is mostly covered. Covering the Back button helps prevent users from accidentally clicking on it and losing their data. This position also helps keep users farthest away from the scrollbar of the parent window and deters them from clicking on it and accidentally bringing the parent window into the foreground and hiding the pop-up window behind.

One way to keep the launching page from hiding the application window would be to change the size and location of the launching page’s window when the user launches the application.

73. **Force the hidden window to appear on top after users request it.**

Many people in our study thought they lost all of their data when they accidentally clicked outside the pop-up application window. Most people tried clicking on the link
to the application in the parent window, but nothing happened. Most people didn’t
know they could bring the application back by clicking on the application’s icon in the
taskbar at the bottom of the screen. The application started over in the hidden
window after people accidentally restarted the application from the main website.
Clicking the application link on the parent page should bring the application to the
foreground again, not restart it.

INSTALLATION AND LOADING

74.  Auto-detect the Flash player.

Detect the Flash player using the Flash technology. If there are features within your
application that require a minimum version of the Flash player to run, make sure to
add this detection to your project to give people the opportunity to install the new
version, but be flexible. If you require at least version 4 and a user has version 5, for
example, allow them into the site. Don’t show the install warning screen at all, if
people already have the correct version of the Flash player. If possible, give people
the option of viewing the content in an alternative format if they don’t want to
update or install the Flash player.

Users said:

"If you don’t have Flash …’. I don’t know what that means."

"When they say ‘plug-in,’ it makes me nervous. I’m always kind of suspicious …
like it’s going to charge me."

75.  Minimize loading time.

When developing your project, consider users who have slow connections and
processors. Keep your file size small by removing unnecessary frills such as graphics,
sound, and motion. Optimize file sizes to reduce download time by experimenting
with various fonts and image files. Make sure to analyze how well your project
performs at various connection speeds.

76.  Detect the user’s bandwidth.

Measure the user’s connection speed and set a cookie value accordingly. Give people
who have slow connections functionality geared toward low-bandwidth users. People
who have faster load times can better handle the more robust version.
Unfortunately, bandwidth detection is difficult with current technology, so we
recommend doing so only in cases where the download delays would be a major
problem for narrowband users or where there are substantial additional benefits to
be gained from a “fat” version of the application for broadband users.

77.  Preload page elements.

Don’t make users wait for the entire project to load all at once. Instead, allow
elements to load at different times by using the streaming feature in Macromedia
Flash. Make sure that the important elements of content load first, so that people
have quick access to them.

78.  Provide a simple and accurate loading-status indicator.

Show a progress indicator to provide visual feedback about the loading duration. A
well-designed indicator reduces the perceived loading time, because people see the
progress and know what to expect. Keep the design of the indicator simple. It’s most
helpful to show the actual percentage of data transferred (for example, “50% loaded”) so that people can assess how much more time the download will take.

79. **Don’t show placeholder screens while the application is loading.**

It’s better to have a simple status bar that indicates the progress toward completion. Avoid using gratuitous motion and graphics. The exception to this rule is when designing for children. Then it’s appropriate to fill download times with distracting animation – or even a small placeholder game – during very long load times.

80. **Don’t make users install any additional plug-ins, unless there’s a great benefit to doing so.**

Try to use the features available in the existing Flash player without requiring people to install other types of plug-ins. BHG Arrange-A-Room required people to install the Print-O-Matic plug-in to print their projects. It would have been better to rely on the print features in the existing plug-in or browser so that people would not be inconvenienced with an extra download.

**SAVING AND PRINTING**

81. **Set cookies to remember people’s preferences and data.**

People don’t want to enter the same information more than once, especially in the same session. If possible, automatically save people’s entries as they work on the project, even if they accidentally go outside of it. Use cookies to save users the frustration of having to reenter the same information.

At a minimum, remind users to save their projects before leaving. Several of the applications that we tested didn’t preserve the user’s data. People lost their projects by clicking on areas outside the application, such as logos or links to other applications. In all of these cases, users could have been helped if their application information was automatically saved, or if they had adequate warning.

Lee Fit Finder: People were frustrated when their data didn’t flow from one project to another on the same site. After people chose a style, they expected their previous input to flow into the next project without having to re-enter then same information.

Nike ID: People lost their entries each time they went back to the previous steps to change their color options. For example, a user on step 4 wanted to go back up to step 2 to change the body color of the shoe. As a result, he also had to redo steps 3 and 4.

Bose Room Planner: While using Room Planner, some users noticed a link to Sound Profile and clicked it. When they went back to the Room Planner, they had lost the drawing they were working on.

YHA Itinerary Planner: Users lost their itinerary simply by clicking on the YHA logo at the top of the page. Clicking “Back” just took them to the beginning of the Flash application.

BHG Arrange-A-Room: A user noticed that she was designing her bedroom in the living room area and needed to change room type to get bedroom options. When she switched rooms, she was forced to save her project and start all over again with the bedroom. There was no way for her to flow the information from one room to another.
One user said:

"Once you select a room, you can’t change the room without losing your information. That’s sad."

82. **Provide print and save options.**

People expressed repeatedly that they would print and save their work. Several people tried saving their projects by using the File menu’s Save command in their browsers and were disappointed when it wasn’t possible. At a minimum, provide an obvious way to save and print easily. Make sure the areas of interest will print on a regular sheet of printer paper (both 8.5 x 11 and A4, unless you know that you have users only in a single country).

A user of Pergo eShowroom said that he loved being able to create and instantly see what he created. He found the program unhelpful, however, because it didn’t let him print the project when he was finished. He wanted to be able to take it to the store or show his friends and family.

One user said:

"It had difficulty concluding what I wanted. It doesn’t bring things together at the end, like printing. It would be fine up until printing it out at the end."

A user on BHG Arrange-A-Room said he would try a different website because it didn’t allow him to print his design. He wanted a way to show it to his designer.

83. **Provide an email feature.**

Give people the option to email their finished projects. Users said they wanted to forward their projects to vendors, friends, and family. Make sure the email contains the actual finished project, not just a link to the application. Provide a comment area so people can include a message or ask a question.

84. **Send projects directly to the printer.**

If possible, send printable versions of the projects directly to the printer and avoid any intermediate steps. If an additional printer-friendly preview step is required, make sure that it looks different from the actual project. Provide a prominent print button, such as ”Send to Printer” on the printer-friendly screen so that users know to click it.

A person using YHA Itinerary Planner clicked Print and expected the itinerary to go directly to the printer. He didn’t realize that Print took him only to a printer friendly screen, which looked very similar to the previous screen. He waited a few minutes and thought that the system was down when nothing came out of the printer.

85. **Provide an easy way to bookmark exact locations.**

People in our study repeatedly said they would like to save their results or send their friends and family links to applications. Make sure that your application provides an easy way to bookmark the exact page so that users can come back to it or email the link.

Mini Build Your Own offered a bookmark feature that took people back to the main parts of the site, but sometimes not to the exact location chosen. Although it was a good attempt to provide a useful feature, the functionality fell short of being truly useful.
It’s misleading to have a feature that is partly functional, because users will surely be disappointed and feel deceived when they try to find their way back using the bookmark and discover that it doesn’t work the way they expected.

**Hovering, Clicking, and Tabbing Behavior**

**86. Consider people’s mouse-hovering behavior.**

Consider people’s mousing behavior when designing rollover and navigation. People have the tendency to move their mouse around the screen, especially when they are not sure where to go or when they are looking for something to click. Rollovers work when the interaction is intentional. Sometimes rollovers can be confusing, however, and even detrimental – if they appear unexpectedly and are poorly designed.

Users of Broadmoor Hotel Reservation were startled and confused when an error message appeared out of nowhere. Simply passing the mouse over the Finished Reservation area caused the error message box to appear unexpectedly. Every user stopped what they were doing upon getting this message and tried to figure out what they might have done wrong. The error messages appeared out of context and prematurely, before people were finished entering the required information.

*On Broadmoor Hotel Reservation, when people accidentally let the mouse pointer hover over the Finished Reservation area, they were startled by error messages.*
Hummer.com allowed people to switch among navigational tabs for various cars by simply moving the mouse over the car type. This feature was problematic because people didn’t expect that allowing the mouse to rest over an area would make an unintended choice. Some people configured the wrong car because they lingered over the H2 link and accidentally switched their car model from H1 to H2. It would have been safer to remove this hover functionality and let people select a car by clicking a model instead. Some people at Hummer.com configured the wrong car by accidentally allowing the mouse to hover over a different model number. Surprisingly, even though "H1" and "H2" were large page elements, they were not sufficient to cue the users to the unintentional model change.

Pop-ups should not appear simply because the user passes the mouse pointer across an area. Wait until the user has not moved the mouse for a short time. We do not have sufficient evidence to determine the optimal time-out period, but even 0.1 second would be sufficient to avoid invoking distracting pop-ups while the user is moving the mouse. The timeout period should not be much more than 0.1 second, because users need to perceive that the reaction is instantaneous when they intentionally point to an active area to view the pop-up.

87. **Support double-clicking.**

Some people are in the habit of double-clicking. It’s important to trap double-clicks and interpret them as a single click so that double clickers can still effectively use the application. A few of the applications we tested didn’t respond to double clicks, and users wondered what was wrong when their input wasn’t recognized.

88. **Create generous click zones.**

Make generously sized buttons and hot areas so that people can quickly click in the general vicinity and get the response they need. Be sure to make the spaces between each word in a link clickable as well.

The click zones on TimBuk2 Build Your Own Bag were too small. Some people clicked outside the clickable area and were disappointed when nothing happened. TimBuk2 could have been easier to use if it had been built with bigger clicking areas, particularly because there was a lot of space around each link.

The control buttons in the Pergo Interactive Room Planner were too small, so people had difficulty clicking them. Bigger buttons with larger click zones would have been helpful.
89. **Ensure that users can tab through fields.**

People are used to clicking the Tab key to move through form fields. If your application requires people to enter information in fields, make sure that it supports this tabbing behavior. Devil email didn’t allow people to tab to the next field, and users complained that it was inconvenient and difficult to use. Users had an easier time on Tiffany.com because it allowed them to tab through the fields.

One user said:

"The Tab doesn't work. Normally you can click Tab and go to the next field."

**USER ASSISTANCE**

90. **Make help features noticeable.**

If help is available, make sure that users notice it by providing prominent Help button on the screen. If you have instructions to your application, make it brief.

91. **Provide help only when the user asks for it.**

Never provide unsolicited assistance. Offer advice only when people ask for it. Offer a link to Help in error messages.

My Monopoly: All users ran into considerable problems when they first started editing their Monopoly board. In an attempt to be helpful, the application automatically started its help application. Users were supposed to click Close to several pieces of help content before they could enter information about their personal Monopoly board. Because all users were very focused on their task, no one noticed the Hints & Tips text or the Help button. Users complained bitterly that the application suddenly wasn’t working properly. Most users gave up. Only two very computer-savvy users eventually managed to figure out what the problem was.
My Monopoly automatically launched tips that were unnoticed by users but prevented them from continuing.

Instructions were displayed on the left side, while 10 stacked tips appeared embedded in the right side. Users didn’t realize they had to close each message in turn in order to proceed. Normally in a situation when one thing absolutely must be done before the next, a separate window pops up that the user must deal with first, for example an error or alert.

Also note that there is no reason to mention the total number of tips or messages: there is no way users are going to keep track of how many instructions they read. It would have been better to keep each message as short as possible to maximize the probability that users would read them.

92. **Address real user problems.**

Address real user problems in your help content, not the problems that you or your colleagues imagine users could have. Chances are that you and your colleagues are not typical users of your application. Real user problems are discovered only through user testing and careful attention to user feedback. If you have a support department, ask for the top-20 user questions. Make sure they are addressed in help content. Make resources available to add and modify contents of the help system after your application has been launched. Remember that a help system is less than 50% finished when an application is launched.

Umlandscout Hamburg Map: Help (“Hilfe”) was easy to find, but it did not explain the tourist map symbols that our users did not understand. It contained a reasonable description of the pictograms, however, which our users had no problem understanding.
Umlandscout provided easy access to help. ("Hilfe" is the top-left button.) We usually recommend placing help in the upper-right corner, which is the most common location, however.
Umlandscout's help system made it easy to get an explanation of the symbols, which is a common user request. Unfortunately, only some of the symbols were explained.

Scotts Product Calculator: Several users noticed the Help button and clicked it, but their questions were not answered there. They asked:

"How do I adjust the lawn size?"
"How do I move objects around?"
"How can I buy the products in my product list?"

Some users of SOH Virtual Tour clicked on the "i" icon on the panoramic pictures, expecting to get information about how to use the site. Instead, it gave them the architectural history of the building.

Although there were Help and Info buttons on each screen, most people chose Info because it was listed first and they couldn't figure out the difference between the two choices.

Info explained how the panoramic pictures were created. After people realized that Info showed the same unhelpful content on every screen, they abandoned the Help and Info areas altogether.

Users said:

"That's more information than I need. I don't need architectural drawings for this place.
"If you're on a map, it should show you the easiest way to find a map."
I understood that I can ask for info. Instead it gave info on making the website. If I’m going there looking for info I personally wanted, that’s two different things.”

“So that’s the info on how they did it.”

“It’s telling you about construction. I don’t care.”

People went to Info hoping to find out how to use the application. Instead it gave them information on how the Virtual Tour was created.

93. Provide help that speaks the users’ language.

Help must be comprehensible. Help content that requires a dictionary or another help system for explanation will not be successful. Help content isn’t helpful if it uses terms that are understood only by users who master the interface without problems anyway. Use simple words that are free of technical jargon.

Distinguish sharply between user-oriented help that explains how to solve user task issues and system-oriented help that explains, for example, how to use the controls on a certain page. During this study we saw several examples of reasonably successful system-oriented help but no examples of successful user-oriented help.

Expo02 Exhibition Interactive Game: People who used Help in this application demonstrated that it was comprehensible and useful. In particular, the system-oriented Help clearly explained how to use the CyBee virtual creature editor (“modulator”), and people were successful in using it.
Expo02 Exhibition Interactive Game had good explanations in Help. Note the good paragraph chunking, which made the information easy to approach.

CokeMusic Create Your Demo: Several users went to Help to get information on how to use the application, but none of the users were helped. The explanations were too vague and incomplete, and didn’t give people enough information on how to use the application or what steps they needed to take. Some people didn’t understand terms such as “change out” and “drag and drop”; other users didn’t know that they had to click the arrow button to play the tracks, because the button icon was obscure and this critical step was left out of the instructions.
The explanations in Help on CokeMusic were too vague and incomplete to be helpful.

**INSTRUCTIONS**

**94. Make features of key importance to novice users highly visible.**

Application features are useful only if users know they exist. Our tests showed that very computer-savvy users sometimes were able to guess that drag and drop was available in an application, but less-experienced users didn't expect it. Simply tell users that drag and drop is available. Even better: Use an animation to show users what drag and drop is.

Nestle Gift Basket: People didn’t know right away how to move objects into their gift baskets. Many clicked on the items thinking that they would automatically pop into the basket. Although there were instructions about dragging and dropping, users didn’t notice them, because they were placed too far way from the user’s working area and disappeared after people selected an item.

Men’s Non-No map: Japanese users didn’t realize that they could change the map view, because there weren’t any visual cues indicating that it was possible. People discovered that they could drag the map view around only by accident. Simple instructions or other visual cues would have helped.

CokeMusic Create Your Demo: Some people struggled to use the application because they didn’t know that it required drag-and-drop manipulations. Drag and drop was explained in Help, but most users didn’t notice Help or considered it unimportant. In addition, most people didn’t recognize the arrow icon as the Play button, which was critical to exploring the music sampler. A more visible and obvious play button that was labeled “Play” would have been better.

**95. Keep instructions short and simple.**

Provide simple and concise instructions that tell people what to do. Make sure that the steps are plainly labeled and presented at the appropriate time. Short, simple
instructions at the right time help people focus on one step at a time and reduce the amount of information they have to remember. Long and complex instructions are an indication that the application is too difficult to use.

Leaf Racewear Design Your Suit: This site did a good job of breaking down the instructions into simple steps and presenting just the part people needed one step at a time. For example, the first step said simply, “Choose a shirt,” and the instructions for color choices appeared only in the color selection step.

*The simple and concise instructions on Leaf Racewear explained the steps for designing a shirt quite well.*

Haribon Saving Species Locator and YHA Itinerary Planner: The instructions on these sites were too complex, long, and improperly chunked to optimize visual scanning. Most people re-read the instructions several times to understand them. A few people gave up reading the instructions and tried to figure the sites out on their own.

People had difficulty understanding the instructions on Haribon, because they were long, complex, and placed in a narrow area, which made them difficult to read.

Mod’s Hair Simulator: The instructions and process for downloading pictures were too complex, making it very difficult for people even to get to the application. It required users to create and name various types of folders, while forcing them to open and control multiple screens at once. In our study, we saw one user try uploading her picture, but it was too difficult. We suspected that the upload process was too
cumbersome to test, so we uploaded pictures for the rest of the users in order to test the rest of the application.

The instructions and process for uploading pictures to Mod’s Hair Simulator was too complex, forcing people to create various folders and open multiple screens at once.

96. When appropriate, provide good examples.

Users like examples. Whenever users have a choice between examples and explanations, they always start with the examples and try to find one that answers their question. Examples are similar to pictures in that they can be quickly understood, but instructions must be read and interpreted. Carefully chosen examples can communicate important information on how an application works. Examples do not have to be exhaustive – showing one way of doing things is sufficient; exhaustive examples are often unusable. Make sure to mark sample projects as such, and give people an easy way to start a real one.

CokeMusic Create Your Demo: The application automatically showed users a preloaded sample mix. Many of our users experimented extensively with the example to find out how the application worked. Some people were helped by working on the sample project because it showed them what the final project could look like. The downside was that many users didn’t know that they were working on a sample demo and didn’t understand why some of the tracks were already filled in. Some people expected to start off with a new project instead. Although this demo was helpful for some people, it could have had better labels identifying it as such.

Expo02 Exhibition Interactive Game: The application unobtrusively presented a sample virtual creature, which users could then explore, modify, or replace with another one. This invitation to experiment with the user interface worked perfectly for all our users. Some users were initially intimidated by the apparent complexity of the interface, but when they discovered that the interface reacted sensibly to their actions, they continued to experiment.
Users of Expo02 Exhibition Interactive Game appreciated having a sample virtual creature to try out.

**TUTORIALS**

97. **Give realistic, scenario-based examples and exercises.**

Tutorials are most helpful when the explanations and exercises are based on realistic scenarios. Examples should relate to real-life situations so that users understand the relevance of what they are learning. Learning is easier and more interesting when people can contextualize the concepts and understand how to use them to accomplish their goals. Emphasize conceptual learning rather than procedural memorization. Complex concepts are easier to grasp when they are presented in context.

The Verizon Billing tutorial flustered users because it presented complex topics without adequate context. For example, it showed step-by-step instructions on how to use key features such as how to filter reports but didn’t adequately explain the importance of this feature or when to use it. Users were concerned that they couldn’t remember all the steps involved in using each feature and wanted to have a manual for later reference.
Users said:

"I can't keep all this stuff in my mind. This is very specific. If I was to learn this, I’d need a workbook and hands on training. ... Five or eight times going through this would be enough. ... A lot of stuff was packed into that because it goes quickly."

"I don't remember him [the narrator] talking about PIC report. Honestly, I don't remember this. Where's the cheat sheet so I can look this up. There's so much they want me to learn at once. I’m failing the quiz. ... Gosh! I'm in high school again."

98. **Use caution when providing a Next button on every screen.**

When the Next button is used as the main mode of input and it's placed in the exact same location on every screen, people tend to get accustomed to clicking it. In our study, some users accidentally skipped over important sections and exercises simply because they were in the habit of keeping their mouse in the same place and clicking the Next button.

The general usability rule is to design for consistency. For example, place navigational elements in the same place so that people know where it is and don’t have to look for it. This rule is true for designs that require a high level of motivation and vigilance, such as entering tax information or going through the checkout process. For applications that have a more passive walkthrough, however, such as tutorials, users’ level of attention can be lower, causing people to passively click the Next button out of habit.

It's also particularly important to trap double-clicks as single clicks for navigation items, so people don’t accidentally skip parts of the application by clicking Next or Previous too many times.

99. **Don’t include unnecessary music in tutorials.**

Remove any unnecessary music from your tutorial, especially when there is other sound, such as narration. Listening to music and a voiceover at the same time is distracting and causes sensory overload. Keep people focused on the content by removing anything that may compete for their attention. If you must have music, provide an obvious way to turn it off.

100. **Show the length of the tutorial and the user’s current progress toward completion.**

People want to know how far they’ve progressed and how far they have to go. For example, show the total number of pages and the current page number. Number each exercise and show the total number of questions.

101. **Give users control.**

When possible, give users control over the tutorial. Everyone learns at a different pace. Let people control the speed and amount of information being presented by letting them skip, pause, rewind, toggle, and jump between topics.

Verizon gave users all the necessary controls. In addition, it presented a bulleted list of the main points to help users review any part they might have missed in the audio explanation.
A user said:
"I thought each segment went a little quickly. Quicker than I would have chosen if I did it myself. Glad I was able to read along with the man."

**ERROR RECOVERY**

102. **Make it easy for users to recover from errors by supporting undo and providing a Back button.**

Users should be able to undo their actions. This feature encourages experimentation and reduces the adverse effects of mistakes. Sometimes, undo can be provided by having an opposing feature: for example, if you create an object by mistake, you can get rid of it by deleting it. Also, if the user deletes an object by mistake, it should be possible to bring it back with an undo feature.

When it was not obvious how to delete objects, we sometimes saw users drag objects to the edge of the application screen in an attempt to remove them — although this didn’t work in the sites we tested.

As discussed previously, you should avoid breaking the browser’s Back button. People rely on the Back button to undo or view information from the previous step. Back should take users to the previous application screen, not to the beginning of the project or the previous HTML page. Let people go back by coding named anchors for each individual step.

If your project launches in a window without a browser controls, provide an obvious Back button in the new window. Most people expect to see a back link in the upper left-hand corner, or next to the Continue, Next, or Forward button. Make sure that it’s easily recognized and more attractive than the Back button in the parent browser window, so that people don’t accidentally click it and hide their project underneath the parent browser window.

103. **Provide appropriate and constructive error messages.**

Don’t show unhelpful error messages, because they can prevent users from accomplishing their tasks. Error messages should explain the nature of the problem and how to resolve it in plain language.

Devil email: People had difficulty signing up for email, because the error message didn’t tell them how to fix the problem. For example, a user stalled when he got the message, “Username contains invalid characters.” He was frustrated because he didn’t know that he couldn’t include spaces in his user name. A better error message would have explicitly stated which characters were not allowed in usernames.

Broadmoor Hotel Reservation: As mentioned previously, when people let their mouse hover over the Finished Reservation area, an error message appeared unexpectedly and out of context. This application allowed people to enter their reservation information in any order, thus error messages appeared before people were finished making their reservations. The message said that certain steps were incomplete, when in fact people already knew that and hadn’t tried to submit their information yet. Also, the message was too generic and didn’t provide enough information. For example, it said, “Some required fields are blank or invalid,” but didn’t tell which fields were blank or why they were invalid. It forced people to figure out how to fix errors on their own.

YHA Itinerary Planner stumped American users because it accepted dates entered in the European order only. They didn’t realize that they were supposed to enter the
dates in a different format, with day-month-year order, because the United States uses the month-day-year order. People who used the calendar to select dates didn’t have this problem. Although there was a format example at the top of the field, users didn’t notice it. When American users got the error message, “Invalid arrival date (1)!/Invalid departure date (1)” they had no idea what was wrong with the dates they had entered.

Users said:

"I'm stuck. If I was at home, I would stop here."

"Do I have to arrive and depart on the same day? I don't know where I messed up."

"Highlight what my error is so I don't get frustrated."

TimBuk2 Build Your Own didn’t give error messages when people needed them. Several users got to the end of the process and couldn’t find a way to purchase the bag. They didn’t realize they had skipped a step during the color selection process, causing the “Add to Shopping Cart” button not to appear. Several people couldn’t figure out what the problem was and gave up. Rather than hiding the “Add to Shopping Cart” button, it would have been more helpful to show a constructive error message explaining what the problem was and how to fix it.

Users said:

"I would stop this purchase because it's not working."

"I'm not sure where to proceed. I don't want to quit because I don't want to cancel everything."

"I can't purchase this bag and don't know why."

104. **When appropriate, show all error messages at once.**

For forms that are on a single page (for example, registration forms), show all error messages at once so people don’t have to jump from page to page. Error messages that pop up one at a time are annoying, especially when there are many of them. It’s better to present messages all at once so that people can deal with them together.

For complex interactions that have multiple steps, show the error message at the point where the error occurs in order to save people the hassle of having to locate the right place to correct the error.

105. **Make sure error messages are noticeable.**

Show error messages in an obvious location so they can be identified easily. When error messages are subtle, people get confused and wonder why they can’t move forward.

People using Pergo Interactive Room Planner didn’t notice the error message because it was small, red, and located someplace other than the registration area they were working in. They didn’t know what the problem was, but tried entering their information over and over again and became frustrated when they couldn’t get past the registration screen.

One user said:

"I'm getting frustrated because registration is not intuitive. I'm not getting any errors, and all fields have been filled in."
APPLICATION SPECIFICS

MAPS

106. Provide an obvious way to move around on maps.

Make it easy for people to shift the map around so they can view more of it. In our study, the maps that worked best had noticeable icons that represented north, south, east and west movement. Another way people liked to control maps was by grabbing and moving them. This method allows greater control over the speed and direction in which the map moves. Because this method doesn't have icons that cue users about the functionality, provide visible instructions on how to move the map or redundant arrow controls.

Waitt Billboard locator: The map had large and obvious button controls, and users noticed immediately that they could move the map around.

Waitt Billboard locator offered people obvious controls for panning the map view.

Some users thought that the Men’s Non-No map was static because there weren’t any indicators showing that that map was movable. Some people discovered the panning feature only by accident, when they clicked on a location and accidentally dragged the mouse. After people realized that they could move the map, however, they had little or no difficulty grabbing and moving it.
Some people using Men’s Non-No map didn’t realize right away that they could move the map view because it lacked visual cues to show that it was possible.

Haribon Saving Species locator: People had difficulty moving the map view because the controls were too complex and awkward. In order to move the main map, people had to point to a location in a small map view finder, wait for the view finder to catch up, and then wait for the main map view to shift. Some people didn’t know how to shift the view because they expected the main map view to shift at the same time the view finder did. It would have been better to let the user control the view finder directly and synchronize the main map to move along with it.
The complex interaction model on the Haribon Saving Species locator made it difficult for people to control the map.

Umlandscout used a nonstandard way of panning the map view that could be hard to get used to: pressing the mouse button inside the map area caused a joystick-like control to appear, which could be used to change the map view. In this screenshot, the user is moving down and to the right. The benefit of the joystick control is that the map view could be shifted in any direction instead of just the cardinal directions. Also, by placing the joystick bullet closer to the center, movement could be slowed. Unfortunately, it was hard to operate this control without practice, though, making it less suitable for a casual application that people would use infrequently.
Umlandscout's joystick control took too long to get used to, even though it had some good features.

Some people who used the YHA Itinerary Planner Map didn’t know how to change the map view because there weren’t any instructions. Some users tried to find a scroll area or move to the sides of the map with their mouse and were disappointed when nothing happened. They didn’t know they could shift the map view by moving the little backpacker icon.

Users said:

"How can I move the map side to side?"

"I would expect a slide bar to move this [the map] around."
There was nothing on the YHA Itinerary Planner map to indicate that the map view could be changed.

107. Don’t hide the names of locations.

Prioritize and label as many locations as possible. Don’t make users roll over dots or go through tabs and dropdown menus to find names of places, because that extra effort frustrates people.

The SOH Virtual Tour forced people to click yellow balls to find out the name of each location. People complained:

"Nothing is labeled. I don’t know where anything is. Oh I see — I have to go through every bouncing ball to see what's at the Opera House. It would be nice if they could label these instead. I'm wishing there was a search here that I could type in rather than bouncing around the Opera House."

"Am I going to have to click on every ball? That's a lot of clicking."

"I didn't figure out the balls right way. ... This is fine if you have a lot of time and want to bonk around."

"This popping around with the ball didn’t appeal to me."

"Bouncing balls were not helpful when you have to go through different levels and click on every one."

Haribon Saving Species locator didn’t label most of the locations and hid them in tabs, requiring users to scan through the long lists. People tried to click the unlabeled dots on the map, but abandoned this technique quickly because it was too time consuming. People were more successful in finding locations on an alphabetical list than by using the map.

Users said:

"I don't see an easy way to figure out where Mt. Sinaka is."

"There are too many islands in the Philippines. We'll never find it that way" [referring to the map].
"I'm not finding anything in Mt. Sinaka. ... [After several minutes of searching through the tabs] Success! It was buried in a pile in the website."

"I didn't know I was supposed to click on the dots. ... This is interesting if you were bouncing around rather than looking at something specific. I would have done it by the alphabetical list."

"To be looking for a specific place, the alphabetized list takes me there, not the map."

"You shouldn't have to go to a picture on one side and an index on another. That's overkill. The info is there, but you don’t want to spend 10–15 minutes finding it.”

Men’s Non-No Map: The site required users to click the dots to get the names and descriptions of stores. After a few minutes, a user complained that it was too difficult and time consuming to look for shops this way. She said she would rather have a search option to narrow down the choices or have a listing of shops sorted by type and area.

One user said:

"It’s very hard to find a shop name. ... If I can’t find a place, I usually give up within three minutes. ... I don’t think I will visit this site again. I won’t use it. ... I don’t see any value in this site.”

108. Provide various ways to find locations, especially when there are too many to label.

When there are too many locations, it becomes impractical to label each one. The font gets too small and the labels become too crowded to be readable. It’s helpful to have multiple ways of searching for locations. Consider providing a search box where people can type in locations, or an alphabetical location list. When people have difficulty finding locations on a map, they often resort to searches and lists. It’s also helpful to have the dots on the map light up when the mouse hovers over the description to show where the area is located.

109. Show users the overview map first and then let them zoom in.

Show the overview map first, then let users click to zoom in and get more-specific information. The main map should give users context. Zooming in too quickly causes disorientation and doesn’t give people enough contextual information to differentiate among locations or to understand how they are connected.

The maps on Waitt Billboard locator and Men’s Non-No were too magnified, making it difficult for users to see where they were in relation to the broader view of the city.

110. Zoom to the place of interest, not to the middle of the map or some arbitrary location.

When users zoomed in, they expected to see a larger and more detailed view of the area of interest, not some arbitrary location. Maps that zoomed to unexpected locations were unhelpful and disorienting.

YHA Itinerary Planner: The map zoomed into the center of the map, making people find their location again. People often gave up using the zoom because re-finding the location was too difficult. It would have been better to zoom in toward the last location visited by the user.
One user said:

"It zoomed in way too far. I thought there were more in Sydney, instead it zoomed in a general location."

111. **Make simple legends.**

Don’t provide complex legends that disappear and fade. Make sure they are noticeable and that people can easily understand the meaning for each icon. People rely on legends to tell them how to interpret map information. Complex legends make users work too hard to figure out the meaning behind each symbol. They can misunderstand information, overlook information they need, or abandon the site entirely. A complex legend can indicate that the application is too complicated to use.

Most users of Broadmoor Hotel Reservation ignored the legend because it was too difficult to understand. There were too many conditions to memorize. For example, purple meant there was space available that day, white represented the selected date, light purple meant no space was available, a half-shaded box meant that the date was available only for checkout, and a box with a red frame meant that a minimum stay was required. The descriptions for each of these conditions were so complex and wordy that all users skipped them.

Users said:

"Calendar legend – this website is confusing. It should say this room is not available for this date instead of all the shading. Every time I try to click on the shaded squares, it won’t let me click on it. ... I don’t understand the legend. It’s confusing what it wants to say.

"I saw this, but didn’t really understand what it was."

"I’m not sure what that’s for. ... It says 12, so is that 12 months?"

"I don’t understand the shading thing. I’ve looked at other websites and it’s never been like this."
Users of Broadmoor Hotel Reservation had difficulty understanding the complex legend.

None of the users of California Pizza Kitchen locator noticed the legend at the bottom of the map, because it faded after a location was chosen. It would have been better to make the legend persist so that it would be more noticeable and easier to read.

After an area was selected, the legend on California Pizza Kitchen locator faded into the background and became barely visible.
Some users of the Men’s Non-No map couldn’t figure out what the colored dots meant, because the legend at the bottom was too subtle to notice. The font was too small and the legend was placed in a bar at the bottom of the screen that matched the bar at the top. The top and bottom bars formed a frame around the map, and users ignored the legend because it was too separated from the map area where their attention was focused.

Many people using the Men’s Non-No map didn’t see the legend because it was a line of small words buried at the bottom.

112. Provide a scale on every map.

It’s helpful for people to have an idea of the distance and size of the area they are working with. All maps should have a scale that indicates a consistent relationship between the distances on the map and distance in reality. Unfortunately, none of the map applications we tested had scales.

Users said:

“It would be nice to have distances. Having some kind of reference. How big is this whole area?”

“There really isn’t a scale or anything.”

REGISTRATION

113. Avoid registration if possible.

We saw so many people have problems with registration that we must recommend against requiring it, especially in ephemeral applications, where people’s motivation to struggle with the interface can be lost easily. People experienced difficulty on all of the sites that we tested that required registration. Don’t put unnecessary obstacles
in people’s way of using your product. When possible, avoid registration, and don’t require it before users have a chance to try the site or application and find out what they can accomplish there.

CokeMusic Create Your Demo: Some users didn’t understand some of the registration fields. For example, they didn’t know what “Screen Name” meant or its relevance. The password field didn’t have format examples, so people made errors when they used the wrong format. In addition, some users thought it was unreasonable to have to complete the required registration just so they could create a music demo. The experience would have been more enjoyable if users could have bypassed the registration process entirely.

YHA Itinerary Planner: The registration and login areas were so prominent in many places that people assumed registration was required to use the application. It had several warnings that said, “You must log in to access your saved itineraries,” and several people interpreted that to mean registration was required, but it was actually necessary only if the user wanted to save something at a much later stage in the process. It would have been better for new users to see registration information at the end of the process, when they were more likely to want to save their projects. Returning users, however, need early login availability if they have saved itineraries. Amazon handles this well, by recognizing the user and prompting about saved items via prominent links.

Amazon.com helps returning users by recognizing them and prompting them about saved items.

Pergo eShowroom required users to register in order to save their projects. Some users couldn’t save their projects because they couldn’t get past the cumbersome registration process. This site had separate fields for new and returning customers, and many users invented a user name and password by typing into the fields for returning customers. Even when fields for new and returning users were labeled, the users picked the wrong set. They didn’t always read instructions, but simply entered data into the first field they saw on the page. Others entered invalid user names and passwords and didn’t know how to correct them.

To alleviate similar confusion, we suggest the following solutions:
If you have two forms, allow new users to register even if they use the returning customer login form.

Eliminate the two-form problem by provide two buttons for new and returning users instead of type-in fields.

In any case, show error messages that clearly explain what might be the problem and steer new users toward a means of creating a new account when errors occur.

Nike ID and Nestle Gift Basket: The site forced users to register in order to purchase shoes. People were reluctant to register, because the form was too long and required personal information that they were unwilling to give. People wanted an option to bypass the registration process altogether.

Users said:

"I don’t want to register. I just want to buy this.”

"Why do I need to register? I don’t want to give my personal information when I go to the shops.”

"I feel like I must be a Nike member in order to register here.”

"Why do I have to register to order a gift?”

Tiffany.com: A user was surprised that she had to register in order to place items in a wish list and said that she might register only because she was familiar with the company. Otherwise she would be very leery.

One user said:

"It makes me suspicious when I have to give them personal information. With Tiffany, I might give this information, but for someone I don’t know, I don’t trust that I want to do business with them.”

114. If registration can’t be avoided, keep it short and simple.

Keep the registration as short as possible by having only required fields. Ask for personal information only if it is absolutely necessary to complete the process. Many people are reluctant to enter personal information that they perceive is unnecessary, mainly for security reasons and because they detest spam and telemarketers. If personal information is required, make sure to explain carefully your privacy policy and why you need the information.

Use straightforward labels and show examples of valid entries. Prevent users from making errors by accepting special characters and spaces for user names and passwords. Consider having registration at the end so that it doesn’t become a barrier to using your site.

Leaf Racewear Design Your Suit: People thought it was ridiculous to be required to fill out personal information, such as name, phone number, and fax number to get a price quote. People expected to be able to get the information right away, or via email, without having to provide any additional information or talk with a live person.

Mini Build Your Own: Users who tried to email a dealer the configured image were forced to register using a long form that asked for too much irrelevant information, such as home address. Users were reluctant to provide personal information for a price quote. The same site, however, did a good job of making it easy to save projects. They kept it simple by not requiring full registration. Instead users were asked only to create a user name and password.
Bose Room Planner required people to enter too much information to save a project. The site made people go through a registration process that asked for personal information such as name, phone number, and address.

CokeMusic Create Your Demo: A German user entered “Karl-Marx-Stadt” to the challenge question, “In which city were you born,” but his response was rejected because it contained hyphens. The user was confused because the accurate spelling of the city includes hyphens.

115. If registration is required, provide an obvious way to do so.

Make it easy for people to find the correct place to register. Don’t let people confuse the registration area with the login area. Users of several of the applications we tested had difficulty registering because they noticed the login area first or mistook login for registration and completed the wrong area. In all of these cases, people were drawn to the open text boxes in the login area and tried to enter user names and passwords. Many people didn’t realize that they were in the wrong area, even when they got error messages for invalid user names and passwords. It’s important to keep in mind that people have the tendency to go directly to familiar widgets, such as text boxes, enter information, and ignore the instructions and labels around them. When designing the registration area, make sure there’s an obvious registration area and that it’s not overshadowed by other elements on the screen. It’s important not to let registration be an obstacle to using your application.

Devil Email: The Registration button was hidden below the fold, and people immediately went to the login area, which was more prominently displayed above the fold as open text fields. Several people tried entering user names and passwords in the login area and were frustrated when they kept getting error messages. Many people tried registering using the login area. They were naturally drawn to the open text boxes and didn’t notice the Register button at the bottom of the page, below the fold (also not visible in our screenshot).

Tiffany.com: People were drawn to the open text boxes in the returning customer sign-in area and didn’t notice “Your First Tiffany Purchase?” above it.
Users of Tiffany.com tried to register using the prominent text boxes in the returning customer area.
Pergo eShowroom: The login area and registration area were on the same screen, and users accidentally went to the login area, which was first. People filled in a user name and password, hoping that would be enough to save their project. There are several likely problems here: The two areas were not really separated, the first set of fields was attractive and easier looking, and users don’t like to give their personal information to websites, so they may have tried to beat the registration system. Many users of Pergo.com tried to register by using the Login area instead of the Registration area.

There may not be a perfect solution to this problem. Our current recommendation is to use an approach similar to Amazon.com’s sign-in design, where users are presented with two choices: new user or registered user. The exact wording of the two alternatives would depend on the application.

The Amazon form does come at the cost of an additional step for the new users who cannot register on the spot, but they are less likely to misunderstand the alternatives. Amazon’s solution eliminates many distracting form elements and puts the two choices close together.

In addition, Amazon does not require people to make up and remember a unique user name. Instead it uses a person’s email address. Unfortunately people change email addresses frequently. Also, family members may share an email address or a credit card, which makes it hard to divide account identities easily. So take these factors into account when designing similar solutions.
Amazon.com’s sign-in screen. If the user is in fact a return visitor, the site will most likely have pre-populated the email field with the user’s address, which has been stored in a cookie.

116. Give noticeable feedback for successful registration and save operations.

Let people know when they’ve successfully registered or saved a project. Most websites give feedback by showing users a confirmation screen.

The Crossroads Roadtrip Diary and BHG Arrange-A-Room didn’t give users any confirmation message when they saved their projects. The page that they were on persisted without showing any additional information or feedback, and users wondered if the project was properly saved.

Devil email had a confirmation screen, but it didn’t persist long enough, so people didn’t notice it. Once on the homepage again, people weren’t sure whether they should try logging in or register again.

INTERNATIONAL CONSIDERATIONS

117. Make sure sites are localized properly.

The main finding from our research with regard to international use is that many of the applications were not properly localized for their intended audience. A localized website appears as though it were developed in that country for the target language. Make sure the language, culture, and ambience of the application is adapted to the local market. Simple translation may not be enough and can cause difficulty when the language, images, and intentions are misinterpreted or misunderstood. Below are a few examples of localization issues we found in our study.

For more detailed information and guidelines on designing for international users, refer to the International Users report from our E-commerce User Experience series. 
http://www.nngroup.com/reports/ecommerce
Japanese Users

We found in our study that Japanese users had great difficulty using sites that were improperly localized. The main problem with many of these sites is that they still used a lot of English. Japanese users had difficulty with the English content, terms, and labels, and they appreciated sites that were all in Japanese.

Users of Honda.co.jp said they liked the site because it was entirely in Japanese.

One user said:
"I like the Japanese site because everything in here is explained in Japanese. ... This is easy to understand. All of the options are clearly explained in Japanese."

Users of Nike ID were disgruntled by the vast amount of English on the site and thought that having Japanese pop-up descriptions would have been helpful.

Users said:
"Oh, English again!"
"I wish there was a Japanese description under the English title."

Even though Kewpie is a Japanese company that targets the Japanese market, the navigation on the site was in English, and Japanese users had difficulty understanding the terms.

Users said:
"It’s too technical. It’s all in English!"

German Users

German users of CokeMusic Create Your Demo didn’t know what “Zip” meant. It would have been better to use the prompt “ZIP / postal code” rather than “ZIP” or “ZIP Code.”

German users of Leaf Racewear Design Your suit had difficulty understanding what “quote” meant.

American Users

In Hyatt Floor Plans, users didn’t know what a “socket” was and wondered if it meant “electrical outlet.”

Users of Hummer.com didn’t know what “Canadian Homologation” was and why it was on the site.

Users of Mini Build Your Own didn’t understand the option for “Bonnet.” It would have been better to use a more common term in American English like “hood.”
**Accessibility**

**EXECUTIVE SUMMARY**

Flash used to be inaccessible for users with disabilities, but the 2002 release of Flash MX changed this by including support for accessibility. What was once a barrier has turned into an opportunity for making advanced Internet features available to users with disabilities.

In our earlier usability studies of users with disabilities, we found that the Internet can be a great, empowering tool that gives these users access to experiences and information that were previously difficult to access, if they were available at all. For example, blind users’ ability to have a daily newspaper read aloud from a website has greatly enhanced their ability to follow current events without having to wait for special editions to be prepared.

Unfortunately, our earlier studies of how users with disabilities use websites also found that simply making a website technically accessible is not sufficient. It must also be easy to use, even for people using assistive technology, which produces a different user experience than mainstream browsers. Usability and accessibility go hand in hand, and one without the other is not much use in the real world. If something is too difficult to use or if users get lost all the time, they won’t benefit much.

Our earlier studies of non-Flash websites generated a long list of usability guidelines to supplement the traditional rules for technical accessibility. There are many design considerations — beyond technical questions such as ALT text — that make websites easier and more pleasant to use for users with disabilities. Having an ALT text is one thing, but ensuring that it helps users navigate a user interface is another, and it requires attention to both usability and accessibility.

**Preliminary Study, Early Findings**

Given our earlier experience, we knew that the launch of Flash MX with accessibility support would require the development of special usability guidelines to make these designs easier to use.

Because the accessible Flash technology had only been on the market for a few months at the time of our study, we had very few good Flash applications available for user testing. Sure, we could have tested old Flash designs that were not accessible, but all we would have found was that without accessibility, there is not going to be any usability worth mentioning. Obviously, if you can’t access an application, you can’t use it — not really a finding that would be particularly helpful in guiding designers who want to make Flash applications easier to use for people with disabilities.

Given this, we restricted our research study’s testing to four Flash applications that we’d identified as candidates. We are releasing the early findings in this report to help establish, good practices for usable Rich Internet Application design for users with disabilities. More research will clearly be needed to discover the full set of guidelines for this field.

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5 The full report can be downloaded (for free): [http://www.nngroup.com/reports/accessibility/](http://www.nngroup.com/reports/accessibility/)
Flash’s Main Usability Problems for Users with Disabilities

Even our limited early research identified several usability issues with Flash designs when used by users with disabilities. We identified several key issues that designers must address when creating Flash for users with disabilities:

**Flash is unknown.** Because Flash has been inaccessible until recently, users with disabilities have no experience with Flash designs. As more Flash designs become accessible, many of these users will be encountering Flash for the first time, and will have to make sense of an unfamiliar environment that behaves differently than a static Web page. This is a temporary problem, but will be a real one for several years.

To overcome this problem, designers might have to include short instructional texts on websites to help users with disabilities understand how to interact with Flash designs. Obviously, this is a short-term solution to a short-term problem. In the long run, individual websites cannot take on the job of teaching users how to use the Web; websites should instead produce designs that follow familiar standards and interface conventions and rely on the fact that users will have already learned how to interact with such designs.

**Lack of alternative textual descriptions.** Flash designs tend to be highly visual, but users who cannot see or who have low vision need a textual alternative that describes what the visuals mean for the application. For example, a product photo should be supplemented with a description of the salient product features that are being visually communicated.

We usually recommend against Flash intros, because they are often annoying to users and do not add value to the user interface. But, when animations or other intros are used appropriately -- such as to set the stage or give users a conceptual model of the system -- they should be supplemented with equivalent explanatory text for users who cannot see the animation and would otherwise be dropped into the main interface without the required knowledge.

**Moving interface elements.** Anything that users need to read or interact with should stay still; moving text and navigation control were big offenders in several designs we studied.

**Related items spaced too far apart.** Things that are used together should be placed close together. Otherwise, such items might get separated when the screen is magnified for low-vision users or read aloud for users who are accessing the design with a screen reader. Somebody who can see a big area of the screen might see both items simultaneously and thus experience an integrated user interface, but users with disabilities will experience a disjointed user interface. Examples of when such spacing is particularly important are:

- **Choosing between alternatives.** All alternatives should be visible at the same time, or users might think that only the one, visible alternative is available.
- **An operator and the operand.** When one interface element acts on another, both must be visible together.
- **An action and its result.** If feedback or instructions are displayed too far from the actionable area of the screen, users might think nothing is happening.

**Overly complex functionality.** Flash applications introduce the ability to offer advanced functionality, making the Web into a full-featured environment. Great, but users with disabilities sometimes appreciate simply being able to get through a process with less hassle and fewer options.
In particular, many Flash applications let users construct their own objects, layouts, or customized products. Such interactions can be made smoother for users with disabilities if they include appropriate default constructions that can be modified, rather than requiring that all users build everything from scratch every time. Of course, users with disabilities should still have the choice of utilizing the full scope of features and options. They just shouldn't be required to do all the work all the time. It's much easier to modify something than to start with a blank screen.

Further research will probably identify additional issues that make Flash easy to use for users with disabilities. Still, having designers pay attention to the guidelines identified so far will go a long way toward making Flash more accessible — and ensuring the broadest audience for the new functionality it makes possible on the Web.

OVERVIEW OF THE RIA ACCESSIBILITY STUDY

Reason for this study
Internet users with low vision and users who are blind rely on assistive technology to interact with the computer. In the past, Flash has been criticized for its deficiency in accommodating these users. While accessibility testing was beyond the scope of the main Flash usability research project Nielsen Norman Group conducted, we felt it was very important to begin doing research for this particular area. Thus, we did a small study, at the same time of but separate from the main Flash study.

This report contains preliminary research data from this first set of sessions we conducted. These tests were conducted to collect initial information from a small set of users working with assistive technology and a few select Flash applications.

Assistive and Flash Technology is Improving
Improvements have been made both by Flash and by makers of accessibility software. The latest version of Flash incorporated accessibility features based on Microsoft Active Accessibility (MSAA), which has allowed screen readers to read Flash content for the first time.

Some screen reader software has subsequently released new versions which are more accommodating to Flash based sites and applications. Some readers, including Window Eyes 4.2 and JAWS 4.5, can now read Flash content.

Even with these improvements to the accessibility technology and Flash, Flash sites still present accessibility issues for users of screen magnifiers and screen readers, making it difficult if not impossible for many users of assistive technology to access Flash-based content.

A significant point to remember is that website designers have not had adequate time to respond to these software improvements. Once Flash sites and applications had more time to catch up with technology accessibility improvements, we plan

6 Screen reader software converts text to speech, and reads the computer screen aloud. Some popular programs are JAWS, IBM Homepage Reader, and Window Eyes.

7 Screen magnification software increases the size of what appears on a computer monitor and enables users to invert and adjust colors, allowing them to see the screen more clearly.
to conduct a more thorough and larger-scale study about what is usable and unusable for people using Flash and assistive technology.

**Things Appear to Still Be Less Usable for Screen Reader Users**

In our previous Web accessibility study, we found that sighted users were about three times as successful completing tasks as screen magnifier users, and six times as successful completing tasks as screen reader users. With the small sample in this Flash study, we can draw no such firm conclusions. But, it is apparent that while people who use screen magnifiers also have usability problems, greater problems still exist for users of screen readers. In some cases, the content was completely inaccessible, and at times, the screen readers read nothing on a page.

One reason for the difficulties is that screen reader users rely on the descriptions of the items on the pages that developers must provide. Flash is frequently used for highly visual or interactive online experiences. Many sites develop in Flash only, or develop key site functionality in Flash only, with no alternate way to access content. And even if the developers care about accessibility, it can seem daunting for them to adequately describe these applications to people without sight. But, unnamed page elements and ceaseless screen refreshes prevented users from being able to complete tasks.

As one test participant said, "Anything visually appealing for a sighted person is a nightmare for the visually challenged. There’s got to be a happy compromise."

Developers can now incorporate accessibility into their development time and incorporate the new Flash accessibility tools to help make their sites more accessible. However, using a Flash site with a screen reader requires a different set of commands than accessing HTML-based websites, and users of screen readers do not necessarily recognize 1) when a site contains Flash and 2) how to use their screen reader software to access Flash sites.

One difference users in our study observed was that normally, users with some sight can point to text with their mouse and Window Eyes will read it, but that does not happen with Flash content.

One user said, "Mouse movements aren’t read. I need to Tab though the content."

Another user said, "Speech is not reading where the mouse is located, it’s reading the whole screen. So, when you click Enter, it’s not following the link that it’s reading; it’s following some other link."

Finally, some users rely on the browser’s Find feature to be able to navigate websites. If they cannot find a certain area of the site, they will do a Find for a specific word that they heard on the page or that they think will be there, such as search or cart. Text searches don’t work in Flash, so users cannot search for the content they want on the screen.

Participants who used screen magnification software to access Flash have some of the same problems that screen reader users encounter. But, most of their issues are the same ones that they encounter when accessing standard HTML content. The biggest offenders are moving images, and text that changes or fades in and out.
GENERAL FINDINGS FROM THE STUDY

It’s important to recall that any numbers in this report are just preliminary and are based on a low number of participants—eight total users in this study. These numbers are presented for comparison, but not as representative of user groups as a whole. Still, they are telling to start forming some hypotheses for further research purposes.

- Users quit the tasks before they were complete 16 out of 29 times, or 55% of the time.
- Users were either totally frustrated, or believed it was impossible for them to complete the task. (In two instances, tasks could not be completed because of technical issues with the site, and in one case, a task was not completed because of a connection problem.)
- The average task time across the four sites studied was 11 minutes and 14 seconds.

Following each task, users were asked to rate their satisfaction, the site’s reliability, their confidence and the site’s usefulness on a one to seven scale, with seven being the most positive response.

- Screen reader users’ ratings in each category were lower than magnifier users’ ratings.

We evaluated user success based on a four-point scale, giving users from 100% success for fully completing a task to 0% for not completing a task at all. Though full success would have been difficult or impossible for users reliant only on speech, we evaluated their success comparative to magnifier users in this study.

- Most users were unable to complete the tasks and missed much of the Flash functionality of the sites. The overall success rate for screen reader users was 26%, and for screen magnifier users was 45%.

Users tested four sites that either included a Flash application or were developed in Flash. They looked at tools on the California Pizza Kitchen and Timbuk2 sites and looked at the sites [www.leefit.com](http://www.leefit.com) and [www.tiffany.com](http://www.tiffany.com) in their entirety. Assistive technology users were most successful when using [www.cpk.com](http://www.cpk.com), because users found a non-Flash way to access the same content as was available through Flash. Users were easily lost in the Tiffany site. On both the Lee Fit and Timbuk2 sites, users played with some functionality and then lost interest in completing the task.

ACCESSIBILITY GUIDELINES

Testing

Discussion appears on page 194.

118. Conduct usability testing and quality testing for accessibility. Test all pages with screen reader and screen magnification software.

User Control
119. Provide features in a non-flash format. Give users an option upon selecting the site or feature, or include a link to the alternate format in the upper left hand corner of the site.

120. Avoid opening animations and splash pages.

121. If you do open animations or splash pages, consider what those images are meant to convey, and also represent this in text.

122. Provide static navigation. Don’t make navigational elements disappear and reappear.

123. Let users control the length of time text appears on the screen. Don’t make text automatically change or disappear.

124. Provide instructions for users.

125. Always include a way to navigate back.

126. Include a button to “Close Window” in all additional windows that open.

127. Make sure the text is read in a logical order. Set the tab order on pages.

128. Apply general good design conventions. Reuse well-known, good designs when possible.

129. Include a site search.

Graphics and Visuals

Discussion begins on page 205.

130. Include detailed descriptions of all products and essential images on your site.

131. Accurately name all elements on the page.

132. Don’t rely on images to convey information.

133. Use colors with strong contrast and fonts with clean lines.

134. Do not gray out information or overlap menus.

135. Visually respond to user actions in close proximity to the user’s location.

136. Keep the interface and site design internally consistent.

137. Don’t put too much on one page. Isolate activity to one area of the screen.
138. Use clear, large product images and include the option to enlarge the image.

TESTING

118. Conduct usability testing and quality testing for accessibility. Test all pages with screen reader and screen magnification software.

The only way to fully understand what someone using a screen reader or screen magnifier will see or hear on your site is to test the site with assistive software. The best thing would be to watch real users working with their own technology. Alternatively, you can begin to learn about issues by using the assistive technology yourself. For assistive technology associated with vision, free trial downloads are available from some of the most popular manufacturers of these products, including:

- Zoomtext screen magnifier at www.aisquared.com
- Window Eyes screen reader at www.gwmicro.com
- JAWS screen reader at www.freedomscientific.com

Users who are blind or who have low vision are only one segment of the online audience with disabilities. They are an important segment when considering Flash, since applications developed with Flash tend to be so visual. However, developers should also consider users with disabilities associated with cognition, motor skills, and hearing.

USER CONTROL

119. Provide features in a non-flash format. Give users an option upon selecting the site or feature, or include a link to the alternate format in the upper left hand corner of the site.

While users’ software knowledge may be overcome with time, it is important that developers recognize that some Flash content, even with increased attention to accessibility, will not be fully accessible to some Internet users. This frustrated users who wanted to read content on sites, but could not access them.

One user on www.timbuk2.com said, “This could be a fun thing. Things like this are not accessible—things where you have to make choices about things that are graphic. If they wanted to, it would be possible for them to make this accessible. They could describe all the pictures.”

Another user said, “I hate not being able to get into the same stuff everybody else does. The inequity of the situation annoys me.”

Users looked for and used alternate versions of content, whether it was the Tiffany HTML website, or the California Pizza Kitchen’s form-based location tool. They wanted the non-Flash option to be up front and clear. Though Flash is more accessible than it has been in the past, it is still easier in many cases, at least for users of screen readers, to use an HTML version of a site.

On the Tiffany website, the choice of HTML or Flash site appears in a browser window that remains open, but hidden, while the Flash based site opens in a window in front
of it. Users found the page when they were trying to use the browser controls they saw behind the Flash window and accidentally found the HTML option. It would have been better if users were either given the option of HTML or Flash upon entering the site, or if there were a link to the HTML version of the site in the upper left hand corner of the Flash based site.

One user said, "It's positive that they have a choice of HTML, but I had to get frustrated to find it. If I saw another choice in the beginning, I might have picked it before I got really frustrated."

The image below shows the browser window that remains open behind the Flash Tiffany.com site. The page offers users a choice of HTML or Flash, but it is hidden from the users by the Flash site, which opens in a window in front of this one.

There is an added advantage to including an introductory HTML page or link to an alternate site. Some users could not get their screen readers to read anything on Flash-based sites when they loaded. If HTML content appeared on the page, the reader would read something that would allow users to select a more accessible version of the site.

One user could not hear the Lee Fit site at all.

She said, "I know these sites. I can't find anything, though I suspect the screen is up. I would get out of this site. It's a challenge to figure out."

When alternate versions of an application do exist, the options should be offered next to one another. On the Timbuk2 site, users can select an HTML or Flash based bag-building tool. These options appear on opposite sides of the screen, though, so many users did not realize there was an HTML option.
The images below shows the bag building options on www.timbuk2.com. Users can select a Flash builder on the left or an HTML builder on the right. The second image below shows what the same screen looks like magnified. It would be easier for users with low vision and users who are blind if there were a single list of bag names, with links to HTML Bag Builder and Flash Bag Builder under each name.

On the CPK site, users tried to use the Locations area of the site to find a restaurant location. Participants started to use the Flash map interface, and then noticed the form option. Every user switched to use the form-based option and abandoned the map as soon as they saw or heard that they could fill in a form. It would have been
better if the form-based content appeared before the Flash content on the site, so that users with low vision and users who are blind could find it more easily.

One user said, "You would think there would be a combo box on this screen, but I don’t see one until I actually click on a state."

The image below shows the CPK.com locator tool. Though the form-based locator is available on the full map, users only noticed it after they were on the state detail page. All users used the form fields rather than pursue the map interface.

120. **Avoid opening animations and splash pages.**

Users with low vision have a hard time focusing on images that are moving. To these users, and users who are blind, a site with a Flash introduction or animation is just a site that is slow to load.

One user on [www.tiffany.com](http://www.tiffany.com) said, "The site keeps changing. I bet this page keeps refreshing itself. It keeps reloading, so I can’t do anything."

Another user testing the Tiffany site said, "The blind wouldn’t use it. They can’t see that it’s Flash; they just think it’s not working. Things come at you and speech isn’t reading it."

Animations can be a bigger problem to users with low vision who try to focus on the changing images.

One user said on Tiffany’s site, "Flash animations come in and out and they hurt your eyes after a while. It fades in and out and you’re trying
to focus and it’s just not happening. I know they’re trying to do
elegance and classiness, but man, it’s hard on the eyes.”

On LeeFit.com, one user said, “All this jumping around stuff is
distracting and hard to use. By the time I focus, the Flash goes away.
I have to refocus and then it’s gone.”

The problem is accentuated once a user is within a site and a subsequent page on
the site, which is not the homepage, unexpectedly contains an opening animation.
One user was looking at How to Buy Pearls on the Tiffany site and didn’t understand
what was happening when the introduction started.

She said, “It’s still loading? What happened?”

121. **If you do open animations or splash pages, consider what those
images are meant to convey, and also represent this in text.**

Whatever information you put in an animation or splash screen is totally lost on
users of assistive technology. Site designers are missing the opportunity to convey
the message at all if they don’t also provide it in text. What’s worse is that the users
are left wondering what information they are missing.

122. **Provide static navigation. Don’t make navigational elements
disappear and reappear.**

Users of [www.leefit.com](http://www.leefit.com) consistently had trouble using the homepage. They tried to
click the Womens or Mens headings, and it took some time for them to notice the
navigation options that appeared below the headings when they put their mouse
over them. Some users noticed movement on the screen, but did not shift their
focus to read the new links that appeared.

One user said, "I can’t tell what to click on. I think they’re not letting
me in this. I don’t know why it’s moving like that."

Another said, "If you don’t know the other links are there, you don’t
see them."

One user was confused when she was looking around the page, and rolling over the
Mens area made the Womens area disappear.

She said, “I don’t see anything about women’s. Oh, it’s changing. Did it change?”

One user explained why it was difficult to notice the additional navigation.

She said, "I know if I move my mouse over the clock in the bottom
right hand corner of my desktop and wait, the date will pop up down
here. But on this site, I don’t know anything is going to pop up.
When you have trouble focusing and you don’t know it’s going to pop
up, you don’t know to focus.”
The two images below show the homepage of www.leefit.com. The top image shows the homepage with options for men and women. The second image shows the page as it appears when a user rolls his mouse over **Womens**. Three additional links, **Size**, **Fit**, and **Style**, appear and the **Mens** option disappears altogether. This confused users, who expected to be able to click **Womens** or **Mens** to enter the site.

123. **Let users control the length of time text appears on the screen. Don’t make text automatically change or disappear.**

On the Lee Fit site, information about taking measurements to find the right size changes every few seconds as a tape measure appears around various parts of a figure. Users with low vision had a hard time seeing this text and had to watch the screen through multiple rotations to even understand what the text might be saying.
It would be better to give users control over how quickly they want to page through content, letting them act when they want the content to change.

One user said, "Oh, boy. That’s the Flash. It doesn’t stay long enough to read it. I have to sit through it many times to read it."

The images below show two of the three rotations of text that appear on the Lee Fit size page. The tape measure moves on the image to demonstrate where users need to take their measurements, and the text rotates among three different areas: waist, seat, and inseam. The first image shows the waist instructions, and the second shows the inseam instructions. Users with low vision were unable to focus quickly enough to read this changing text. Screen readers did not read this text.

On the Timbuk2 site, users are required to select a fabric before they can select a color for the bag they are building. If users try to select a color first, an error
message appears on the screen for a few seconds, which reads, “You must select a fabric.” This message then fades away, and it disappeared too quickly for users with low vision to see it, and was gone before screen readers even read it.

The image below shows the fading error message which users on Timbuk2 receive when they do not select a fabric before selecting a color. The message reads "You must select a fabric," and it appears on the screen for only a few seconds and then fades away, which makes it easy for a user of a screen magnifier or screen reader to miss.

124. **Provide instructions for users.**

When people use screen magnification software, they see only one small part of the screen at a time. Two users went to the *Size* page of [www.leefit.com](http://www.leefit.com) and did not see that they could select their size from dropdown menus on the right hand side of the screen. They saw the content in the middle of the screen, which didn’t indicate that there was anything to do on that screen, and they thought it was purely an informational page.

One user clicked the *Fit Me* button at the bottom of the page without realizing she was supposed to enter her measurements. On the *Fit* screen, she realized she had to answer some questions because there were instructions in the middle of the screen. The center of the page referred to *six easy questions* to answer.

Once she saw her options she said, "*This is interesting. This is good. This is really fun!*"
The two images below show the *Fit* page on www.leefit.com. Users did not notice the options on the right hand side of the screen until they read the text about six easy questions in the middle of the screen that made them look for and find the questions. The second image shows the same screen as it appears with screen magnification.

125. **Always include a way to navigate back.**

Needing to locate and click the browser’s *Back* button often sidetracked users when trying to complete tasks. Even on www.tiffany.com, where the Flash site opens in a new window without browser controls, users looked behind the active window at the browser controls on the page behind the active screen, and clicked the *Back* button...
they found on that page. In most cases, we recommend that site designers rely on known browser controls. In this case however, because getting out of the Flash application can be very disruptive for users of assistive technology, we recommend including a back button within the Flash.

The image below shows the Tiffany site. The browser loads a page giving users an option of HTML or Flash while a Flash window without browser controls opens in front of it. Users tried to click Back in the rear window to navigate through the front window.

Within sites or applications, Back buttons are important. If the browser control will not work, then there should be a button that allows users to return to the previous page. One participant using leefit.com tried to click Back to return to her previous jean selection, and instead was returned to the homepage.

She said, "Back to start? That was a surprise. Usually, if you go back, you go back a screen."

126. Include a button to “Close Window” in all additional windows that open.

It is hard for users with low vision and users who are blind to know when an additional window has opened. Users were confused by the dual windows on the Tiffany.com site, with the Flash window in the front, and the choice of HTML or Flash window in the back.

Even windows that opened internally in a Flash movie caused confusion. One user did not want to click the Close button on the Timbuk2 Bag Builder Color window
because she thought it would close the entire tool. In this case, a button labeled Close Window or Close Color Choices would have been better.

Including a Close button also is a good way to indicate to users that they are in an additional window.

127. Make sure the text is read in a logical order. Set the tab order on pages.

On www.leefit.com, button names were read in the middle of explanatory text, which made the text difficult to understand. If a user opened the menu for women’s dressing room, the screen reader read:

"Button fall twenty oh one fit finder button womens at lee we make many different SIZE BUTTON FIT BUTTON styles of jeans for you click on the button STYLE BUTTON fit button to find the styles that MENS most closely match your preferences DRESSING ROOM and lifestyle."

The image below shows the homepage for the Lee Fit Finder. Though users see the links for women and men in the center of the page and the descriptive text on the right, a screen reader reads a jumble of links and descriptive text on the page.

On www.cpk.com, in the locator tool, city names are read across the map, and not every city is read. This was very hard for users of assistive technology to understand. It would have been better if the reader read the state names, even if it was in geographical and not alphabetical order, since that would approximate what a sighted user sees on the screen. Alternately, the states’ tab order could have been set in alphabetical order, giving screen reader users a better idea of where states would fall in the list.
128. Apply general good design conventions. Reuse well-known, good designs when possible.

Flash allows designers and developers a lot of freedom, which means that there are not standards that users can rely on. Even scroll bars and text boxes can differ from site to site. It is best to mimic standard controls in Flash as much as possible, to help users have a more immediate understanding of a site or application.

129. Include a site search.

Search features allow users with low vision and users who are blind to find information they are looking for without having to navigate through sites. Searching becomes particularly important because the browser’s Find feature, which many users depend on, does not work in Flash. Some users immediately looked for a search feature on each site they went to.

On Timbuk2, one user said, "I'll go to search, if there is a search."

On Lee Fit, a user said, "This is bad. It doesn’t tell you search or anything."

When using Tiffany.com, a user immediately looked for a search feature.

She said, "Where can I punch in the type of earrings I want?"

GRAPHICS AND VISUALS

130. Include detailed descriptions of all products and Essential images on your site.

Flash sites are often very visual, which makes them difficult for users with low vision and users who are blind. Text descriptions of products are essential to these users, who either cannot see items clearly or cannot see them at all. Users need descriptions of what products look like in order to make the decision to buy.

Users wanted to know more about the bags on Timbuk2.com before they entered the bag-building tool. They had difficulty locating information about the bags. Though many users went to the Products area of the site, they did not find the details that they wanted to see about the bags. They wanted to see pictures with text descriptions, and they wanted to be able to buy a pre-designed bag without having to design a bag themselves.

One user said, "How do you just add one to your cart? I don’t want to do this custom bag stuff. I just want to buy one. I don’t want to build one. They just lost a sale. I don’t want to spend all this time."

One user said, "There aren’t styles to see what you want. Usually, on a site if you want a sweater, you go to sweaters and it'll tell you what your options are."
One user followed the More Info link from the bag builder and liked the descriptive content she found there. She wished it had been available outside of the building tool.

The image below shows the More Info window available through a link in the Bag Builder tool on Timbuk2. The window includes information about the inside and outside of the bag, as well as additional features. Users wanted to see this information before they went to the Bag Builder.

Users had a hard time finding product descriptions on Tiffany.com. They were looking for black pearl earrings, and most could not determine from the images if the pearls were black or not. Users had to click on items to be able to see descriptions of the products.

One user said, “I can’t tell if they’re black or not. There’s no way to know if they’re black without looking at them. It doesn’t say black pearl.”

Another said, “It’s frustrating. There’s no description of what the earring is. If I had a hard time seeing it, it would be impossible. It’s all grayed out until you put your mouse over it. Forget this—I’d go to the store.”

Another said, “They make you work so hard to find a description. A site like Tiffany’s, you’d think they’d have the money to have a better designed site.”

In addition, the black pearls were labeled Tahitian pearls on the site, so users did not know from the name in the description if they were black or not. The more descriptive the text descriptions of products can be, the better they are for users.
The image below shows the Earrings page on the Tiffany site. Earrings are displayed as small images across the bottom of the screen. When a user moves his mouse to the area of the screen with the images, the earrings the mouse is over remain full color, and all the other earrings are grayed out. Users have to click on one of these pairs of earrings in order to get a text description of the earrings.

131. **Accurately Name all elements on the page.**

Screen reader technology can only read items on the page that are labeled by the developer. Developers must name elements accurately rather than relying on default settings.

On Tiffany.com, the *Shopping* link is read as *button*, as is the link to the homepage. It would be better if they were named *Shopping* and *Home*. On [www.leefit.com](http://www.leefit.com), the arrows next to the color selection on the style page are simply read as *button*. On [Timbuk2.com](http://www.timbuk2.com), the colors of the bag are read as *button*.

On Tiffany.com, a user said, "It doesn’t say Shopping. It doesn’t want to let me in. It knows that I’ll have problems, so it won’t let me try. I really do want to buy—I love shopping online."

Some sites used triangular arrows to indicate scrolling through choices. Users with low vision had a hard time seeing these arrows. In addition, on two sites, these arrows were not named and were read by screen readers as *button*. On [www.leefit.com](http://www.leefit.com), users had to use arrows to select a color of jeans, and on [www.tiffany.com](http://www.tiffany.com), users had to use the arrows to see additional jewelry.

One user on [www.leefit.com](http://www.leefit.com) said, "Some of these buttons don’t have names, so I’m clicking on them to see what they are. Last time I clicked Where to Buy by accident. It would be nice if they would show..."
me some colors. There are two buttons for color that say absolutely nothing. One appears to be the Lee Locator, the other does nothing that I can detect.”

On Tiffany.com, one user said, "I found earrings, but there was only one kind of earrings.”

The image below shows the Style page of the Lee Fit Finder. Users must scroll through the color choices by clicking an arrow icon below the Select a Color heading. These arrows were read as button by the screen reader, and were not easy to find for screen magnifier users.

Items should be named accurately and appropriately. On the California Pizza Kitchen locator tool, when the map page loads, a sighted person would make their selection based on a state name. When the page is read by a reader, however, the reader lists cities, not states. Users had no idea that the links being read to them appeared on a map, did not realize that they represented an entire state and not just that city, and did not know that there were more cities with CPK locations than were being read.

Window Eyes read a city from each state, like this: “Button Bellevue, button Minneapolis S T Paul Intl Airport button San Jose button Mirage Hotel Las Vegas button Salt Lake City International Airport button Troy button Westbury button Littleton button Boston button Schaumburg...”.

One user said, "I found Paramus, and I’m assuming that’s the right Paramus.”

Another user, who could see that she was looking at a map, said, "It’s not reading the abbreviations. Without vision, I can’t use this.”
One user knew there was a CPK in Manhattan because she had been there. Listening to the site, however, the closest location she heard was Westbury, NY.

She said, “Bellevue: I suppose they don’t mean the hospital [in New York City]. I’ll try Westbury. That’s the closest. Though, I seem to recall I’ve eaten in one in Manhattan.”

The image below shows the map to find locations of California Pizza Kitchen. Sighted users would select a state from this map, but when it is read by a screen reader, the reader reads only one city from each state, and no state name. Users couldn’t understand the list because it was not the equivalent of what was on the screen.

Because Flash is built on layers, sometimes information from layers that aren’t visible or are grayed out is still read as content by the screen reader. In the California Pizza Kitchen locator tool, when users click on a state, they should hear listings of only those locations available in that state. Instead, they hear another list of cities.

On www.cpk.com, one user who is blind was able to get to New York State by clicking on Westbury. The New York State screen loaded, but the reader still read options other than those in New York State: “button Westbury, button Huntington Station, button Scarsdale, button, button Baltimore, button Plano, button Kuala Lumpur.”

She said, “Is this the same list? It seems like I’m in the same place.”
The image below shows New York State detail on CPK.com’s locator tool. Though users see Westbury, Huntington Station, Scarsdale and Manhattan, users hear Westbury, Huntington Station, Scarsdale, Baltimore, Plano and Kuala Lumpur. Users do not hear Manhattan.

132. Don’t rely on images to convey information.

Users who are blind cannot see images on the screen. Proper image names and descriptions can help them. However, some users completely turn off graphics altogether. Users with low vision often have difficulty seeing pictures, thus, information that is key to using the site should not be shown only in an image.

Users with low vision had difficulty with the locations map on www.cpk.com. Some were not familiar with maps and had to look for their state for some time before they found it. Participants who were blind did not know that the locations they were hearing were locations from a map, so thought that the list was a confused combo box and not a map.

One user who is blind tried to understand the order of the information read to her off a map. "Am I in a combo box here? I was thinking maybe this was alphabetical, so I tried an M. This is so funny. It’s a funny way to do it. A combo box or list would be better: you could type a letter. If it’s a combo box, there’s something wrong.”

133. Use colors with strong contrast and fonts with clean lines.

Users with low vision generally had an easier time seeing sites that used colors with strong contrast.

One user had a hard time seeing the writing on the California Pizza Kitchen map.
She said, "It’s little black writing and I couldn’t see it. It’s dark on
dark. It’s no good. Put the words in light, with the background
darker."

Users had difficulty reading text on the Tiffany site because of the low contrast
between text and the background- a lot of the text was light gray on a white
background.

One user said, "They need to make this darker. This is terrible. What
were they thinking?"

Another said, "I wish this were darker and uppercase—bold and
darker."

On www.leefit.com, one user complained that the words were just a darker shade of
the background color. However, she also appreciated that the site used a simple font
with clean lines.

She said, "The print was good. Like Arial, straight and thick and bold,
as opposed to fancy letters that are close together. The less busy, the
better."

134. **Don’t gray out information or overlap menus.**

Users need strong contrast in all elements of a page. Graying items out makes it
impossible for users with low vision to determine what is grayed out. Also,
overlapping text is extremely difficult to read.

On www.tiffany.com, users need to pick an image of an item in order to get
information about that item. When users roll the mouse over one image, the other
images gray out, making it even more difficult to see the items.

Also on www.tiffany.com, a transparent navigational menu appears on top of existing
content. This was impossible for users with low vision to see and understand.
135. Visually respond to user actions in close proximity to the user’s location.

Users with low vision or who are blind don’t have visual context on a site. Any feedback that appears on the screen must appear or be read by a screen reader in close in proximity to where the user action took place.

Some users never realized that the selections they made in the Timbuk2.com bag-building tool were reflected in an image on the other side of the screen. Users also had a hard time finding the informational windows that opened when they clicked on Size or Color. After they found those windows, they then did not realize further informational windows opened elsewhere on the screen when they clicked, for instance, a fabric type.

One user said of her fabric choices, "I wish they would describe what they are."

When one user found the descriptive windows, she said, "The information helped, but it took a while to notice it was there."
The image below shows the Timbuk2 Bag Builder which the Fabric choices open on the screen. Clicking *Choose a Fabric* opens the top middle window, with two fabric names and images of the fabrics. Clicking on a fabric opens the additional detail window at the bottom center of the screen which describes the fabric. Users with low vision had a hard time finding the additional windows that opened, and screen reader users had no easy way to quickly locate the new content available on the page.

Users were also confused by the process for selecting a color for the bag on the Timbuk2 site. Users could not see the side of the screen with the picture of the bag, which changes color as users select colors. They did not understand the left, center and right color options, and they didn’t even know what color it was they were selecting, because the color labels appear below the color choices, and they did not see this feedback.

One user said, "How about a label? I have no idea what color this is. I’m disappointed and upset.”
The images below show color selection for the Timbuk2 Bag Builder. Users have to click on icons labeled Left, Center and Right, and then select a color for each of those sections of the bag. Only one user with low vision understood that she had to select three colors. The name of the color appears below swatches of all the colors and was easily overlooked. The second image below shows what the same screen looks like when magnified and reversed. Color names become even more important when a user reverses the screen colors to make the image easier to read.
136. Keep the interface and site design internally consistent.

Users have to learn a different interface for many Flash sites. It is best to use or mimic standard interface items, such as text fields and combo boxes, as much as possible, to make them identifiable to users with low vision. At the very least, sites should maintain internal consistency with the interface within the site.

Participants using the bag-building tool on the Timbuk2 site were confused by the *Custom Features* and *Accessories* areas. While the size and fabric options were selected by clicking directly on the open checkbox, options in *Custom Features* and *Accessories* required an additional click in another small window that opened.

Many users tried to select accessories or features on Timbuk2. They expected that once they clicked on an item, a checkmark would appear, since that’s what happened in other areas. They did not see the informational box to the side. Further, when they did find the informational windows that opened, each one opened in a different area of the screen.

After some users found the size and fabric detail windows, they assumed all the windows would open in a similar area. Users had a hard time locating the details about accessories and custom features because they appeared in a different area of the screen, and thought that they could not add them to their bags.

One user said, "I couldn’t do custom features or accessories. I don’t know why I can’t choose this. I would like the laptop sleeve, but it’s not letting me select it.”
The image below shows the Custom Features menu for the Timbuk2 Bag Builder, when magnified. Users with low vision did not understand why clicking on a box did not add a checkmark to the screen and add that feature to their order. They did not realize another window opened to the right which contained a button reading Add to Bag.

Users were also confused when the look of the site was not consistent. On www.leefit.com, each time the homepage is opened, a different image appears in the background of the homepage. One user was confused by this. She had problems with the site, and returned to the homepage twice to start over. Each time, she was confused by the changing image, which made her think she might be on a different site.

She said, "It opened differently. Now I got this guy. What is this shit?"
The two images below show two different images on the LeeFit.com homepage. The first image shows a woman in the background and the second shows a man.

137. **Don’t put too much on one page. Isolate activity to one area of the screen.**

Too many elements on a page are too hard for users with low vision to be able to understand and too hard for users who are blind to listen to. Users were easily overwhelmed when they had to keep moving around the same page.

Users were also confused when they found open windows after they’d forgotten what they just clicked. Since they did not see the window open, they didn’t know what it related to. One user had already selected a fabric and color for her bag on the Timbuk2 site, and then clicked the laptop sleeve accessory for her bag. Clicking **Options** on that accessory opens a window asking for fabric, size and color. When she saw it, she thought the site was asking for fabric, size and color of the bag, which she had already selected.


One user was frustrated with all the windows and options and said, "It’s disorganized and confusing. It’s taking me too much time to ensure that I’m buying the right thing.”
The image below shows the Timbuk2 Bag Builder with options open for the Laptop Sleeve. When a user clicks Laptop Sleeve in the lower left hand corner of the screen, an informational window opens to the right. If a user finds that window and clicks Options, another window asking for size, fabric and color selections appears in the upper left hand corner. This was too much on one screen.

138. Use clear, large product images and include the option to enlarge the image.

For users with low vision, text descriptions are essential to understanding what a product looks like. A good quality picture that can be enlarged also helps.

One user did not like the small images of products on Tiffany.com and did not see the link to Enlarge Item, since it was not near the item itself.

One participant using LeeFit.com liked that the jeans images were large. She said, “They don’t even have to be clicked to be larger. They’re just a good size.”

One user did not understand why the CPK locator page would squeeze all the cities into a small image of the state, when they had plenty of empty space to the sides of the state image to clearly list the city names.

A few users commented that they disliked the drawings on the Timbuk2 site and would have preferred more accurate images.

One user said, "It’s a picture, but not a high quality one, especially considering it’s Flash.”
PARTICIPANTS
To assess Flash accessibility and usability, we conducted eight usability tests with Internet users with low vision or no vision. Four participants relied predominantly on screen magnification software and four participants relied predominantly on Window Eyes, a screen reader that can read Flash content. Though JAWS is known as the most popular screen reader, we did not invite JAWS users to participate in this study because at the time of the sessions the newest version of JAWS had just recently been released, while the newest version of Window Eyes had been available for some time.

All participants had been using the Internet between two and ten years. Four participants used the Internet daily, two used it several times a week, and two used it weekly.

Sessions were conducted at the user’s site, and all participants used their home or work computers for the study. If users did not have the latest Flash Player installed, the facilitator installed it on the computer. The facilitator also removed the Flash Player at the conclusion of the session as requested by some participants, who were concerned about compatibility issues between Flash and their assistive software.

TASKS AND WEBSITES
We selected a subset of the tasks and sites given to sighted users in Nielsen Norman Group’s general Flash usability study. We selected the particular sites because they allowed some accessibility via a screen reader and enabled us to watch people using Flash with assistive technology. Some of the sites we did not include in this part of the study were completely inaccessible and impossible to use with assistive technology. Other sites, such as car manufacturers’ sites, were eliminated because they were inappropriate for users who were blind or had low vision.

It was possible for screen magnifier users to complete all tasks in this study. It was possible (albeit in some cases extremely difficult) for screen reader users to complete most tasks. Though screen reader users could not access all content on each site, their success was still rated comparative to the success of the screen magnification users.

Users were asked to use the following four websites:

- Lee FitFinder (finding clothes that match your body shape and preferences): www.leefit.com
- Tiffany’s (jewelry store; e-commerce): www.tiffany.com
- Timbuk2 (customized messenger bags): www.timbuk2.com

All users were given the same four tasks (though one user only completed three tasks because of connectivity problems.) The tasks users were given included:

- You’re meeting your friend at California Pizza Kitchen for lunch. Go to www.cpk.com and see if you can get directions to the closest one to your home.
- You need to get a new pair of jeans. Your friend suggested that you try the Lee brand. Go to www.leefit.com and see if it can recommend a pair of jeans that might interest you.
• You won a $3,500 gift certificate to Tiffany’s at the company dinner last week. Now you want to spend it. Go to www.tiffany.com and see if you can get: Black pearl earrings for your aunt, wine glasses for your friend, a nice gift for your 6 month old niece.

• Your friend’s birthday is coming up and you need to get her a present. She mentioned that she needs a bag that could hold her files, laptop and books. A co-worker suggested that you check out www.timbuk2.com. Go there and see if you can get something for your friend.
Methodology

OVERVIEW

Our study was conducted in three countries: United States, Germany, and Japan. Similar procedures were followed in all user sessions. The facilitator sat next to the user and observed, listened, and took notes as the participant attempted tasks using the applications and websites. Users were asked to think aloud as they worked on the tasks. Each session was scheduled for 90 minutes.

The accessibility study employed a separate research methodology, see page 219.

PARTICIPANTS

A total of 76 people participated in this study: 46 participants were tested in the United States, 20 participants were tested in Germany, and 10 participants were tested in Japan. The sessions were conducted in English, German, and Japanese, respectively. All users spoke and wrote the language in the country in which the tests were conducted. Out of the 46 users in the United States, 8 people relied on assistive technology (screen readers and screen magnifiers) to interact with the computer.

There were 31 male and 45 female participants.

NUMBER OF PARTICIPANTS IN EACH AGE GROUP

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<tr>
<th>Age Group</th>
<th>Under 26</th>
<th>26-35</th>
<th>36-45</th>
<th>46-55</th>
<th>56-65</th>
<th>Over 65</th>
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<td>16</td>
<td>22</td>
<td>15</td>
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</tbody>
</table>

All of the users had previous online experience, ranging from novice to experienced. We screened out any participants who were “technical experts,” such as IT personnel, programmers, or Web or software designers, because they have expert knowledge in using the Web and are generally not the target users for the applications we tested.

The following is a partial list of participants’ occupations:

- Bookkeeper
- Human Resources Director
- Plant Manager
- Student
- Mortgage Broker
- Homemaker
- Registered Nurse
- Construction Worker
- Administrative Assistant
- Graphic Designer
- Audio Technician
- Product Manager
- Investor
- Teacher
- Hardware Engineer
- Personnel
- Claims Examiner
**TASKS**

The facilitator gave users tasks one at a time and asked them to carry out each task as far as they would if they were at home or on their own. Each user was given approximately 3–5 different tasks, depending on the time remaining in the session. On average, each design was tested 5 times by different participants.

Examples of some of the tasks are listed below:

- Your friend’s birthday is coming up and you need to get her a present. She mentioned that she needs a bag that could hold her files, laptop, and books. A co-worker suggested that you check out [www.timbuk2.com](http://www.timbuk2.com). Go there and see if you can get something for your friend.

- You just bought the Bose Lifestyle 25 Home Theatre System for your bedroom and don’t know where to place the components. Go to [www.bose.com](http://www.bose.com) and see if they offer anything that will help you properly place the equipment in your room.

- You want to remodel your kitchen by painting the walls and replacing the cabinets and flooring. Your friend suggested [www.pergo.com](http://www.pergo.com). Go there and see if they have anything that can help you make a decision on flooring that might go well with your furniture and color choices.

- You just saw an advertisement for the Mini Cooper car and want to find out more about it. Go to [www.miniusa.com](http://www.miniusa.com) and see if you can find the price for the exact model that you might want.

- You need to get a new pair of jeans. Your friend suggested that you try the Lee brand. Go to [www.lee.com](http://www.lee.com) and see if it can recommend a pair of jeans that might interest you.

- You’re meeting your friend at California Pizza Kitchen for lunch. Go to [www.cpk.com](http://www.cpk.com) and see if you can get directions to the closest one to your home.

- You’ve been unhappy with the way your grass looks. Your friend told you about [www.scotts.com](http://www.scotts.com). Go there and see if they have anything that can help you figure out which supplies you need and the quantity of each.

- You want to install the new kitchen flooring yourself. Go to [www.pergo.com](http://www.pergo.com) and see if it has anything that can help you figure out which supplies you need and the quantity.

- You are planning a trip with your friend to Colorado Springs and need a hotel room that will accommodate both of you. Your travel agent recommended [www.broadmoor.com](http://www.broadmoor.com). Go there and see if you can reserve a room for 3 nights. Your schedule is flexible. You can go anytime in September 2002 or January 2003.

- You want to redesign your bedroom and have just hired an interior designer to help you. Your interior designer needs a detailed drawing of your current living room, so that she can better design the new one. She suggested you go to [www.bhg.com](http://www.bhg.com). Go there create a detailed picture of your current bedroom.
• Your friend is in a car racing team. He asked if you could help him get matching tops for an upcoming event. He gave you a picture of the top that he wanted. Go to www.leafracewear.com and see if you can get pricing information for this shirt.

![Car racing top](image.jpg)

• Your friend is a big soccer fan. Her computer is down and she just called and asked if you could look up some soccer information for her.
  She wants to know:
  - Who Spain played with last and the final score.
  - How many games Spain played in total.

  She suggested that you try http://cbc.ca/sports/afp/wc-flash/2/gamtracker.html. Go there and see if they have the information that your friend needs.

• You’re planning a trip to Australia and need to find affordable accommodations. You want to visit 4 different territories in 4 nights. Your plane arrives in Sydney on August 12, 2002. You’re on a budget and can spend up to $30 Australian dollars per night. A friend told you about www.yha.com.au. Go there and plan your trip.

• Your company is attending a conference in Australia and is having dinner and seeing a show at the Sydney Opera House.
  Dinner will be at the Guillaume at Bennelong Restaurant and the show is at the Playhouse. You want to know where they are so you can plan enough time to get between them.
  Your friend recommended www.soh.nsw.gov.au. Go there and see if you can find this information.