

A SHAKER APPROACH TO WEB SITE DESIGN

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"That is best which works best"
"Beauty rests on utility"
"Simplicity is the embodiment of purity and unity"
— Shaker Maxims

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THE SHAKERS

Who are the Shakers, and what do they have to do with the World Wide Web?

In brief, the Shakers were a religious denomination who split off from the English Quakers and immigrated to the New World shortly before the American revolution. The Shakers, or United Society of Believers in Christ's Second Appearing, reached a peak of approximately 6000 members in 18 communities by the mid-nineteenth century, and began to decline after the Civil War. Today only a few remain.

The Shakers believed in communal property, pacifism, equality of the sexes, celibacy, open confession of sins, and consecrated labor. They lived in largely self-sufficient communities separate from the "world's people." Unlike some other religious denominations, Shakers were not averse to technology. On the contrary, Shaker communities were early adopters of machinery and techniques that would facilitate their work.

The Shakers are probably best remembered for their furniture, their architecture, and other crafts. All are characterized by an extraordinary level of skill and beauty.

It is the contention of this paper that the three key attributes of Shaker artifacts:

- Simplicity
- Elegance
- Quality

along with the overriding Shaker emphasis on utility, can serve as the guiding principles for designing and developing World Wide Web sites.

A Shaker chair is useful. It is well suited for sitting. Its clean, smooth lines have no excess adornment; the beauty of the wood is adornment enough. So should Web sites be structured for

maximum utility, allowing the value of their content to attract and hold user interest.

MEASURING WEB SUCCESS

It is fairly easy to determine whether a chair is 'successful' or not. From a vendor's point of view, if the chair is purchased and not returned it is a success. If the sale of a chair leads to repeat business, it is even more successful.

From a purchaser's point of view a chair is successful if it is comfortable, does not break when sat upon, has the desired physical dimensions, and fits the aesthetics of the room in which it is located. Depending on the circumstances, other criteria may also be important. Lawn chairs must withstand precipitation and temperature change. Nursery furniture should not poison infants.

Shaker chairs were (and continue to be) successful primarily because they meet the above criteria. Above all else, Shaker chairs are useful. They are designed to seat humans; all other functionality is of secondary consideration.

Determining whether a Web site is successful is less straightforward. The most common metric used is synonymous with popularity: a successful site has a lot of "hits".

This is insufficient. To start with, "hit" is a very poorly defined term. Depending on the site and the tool set used, a reported hit count may or may not include graphic elements such as pictures, icons, and buttons, as well as internal technical details of the Web software such as 'image maps.' So at the very best a hit count can only legitimately be used to measure changes in popularity over time, but not as a comparative cross-site measure.

Another flaw in using hit counts as a basic metric is its leveling effect. A hit count does not distinguish between a content-rich page, a list of internal or external links, or an 'under construction' page. A hit is a hit, regardless of substance.

Worst of all, a hit count often rewards exactly the wrong thing. A site that has been redesigned to streamline user access to the most frequently retrieved material may well show a reduction in hits precisely because its utility has been enhanced.

There are certainly quantitative metrics that can be used: number of sessions, number of users, and number of repeat users are all valuable statistics to gather and analyze. But qualitative measures are equally important. The best measure of success is how well a site facilitates users and sponsors in accomplishing their goals. In short, the value of a site can be assessed by measuring its utility and quality.

In order to determine whether a site's goals have been met, it is useful to begin by introducing a rough taxonomy of site types and Web users.

SITE TYPES

With the explosion of the Web over the past three years, Web sites have sprung up for almost every imaginable purpose. Despite this diversity, when analyzed from the standpoint of interactivity there are only three basic types of Web site:

- Ego, or Vanity sites;
- Resource, or Information sites;
- Transaction or Two-way sites.

A personal home page is the embodiment of an ego site. Its purpose is to say "I'm here. I'm cool. Look at me!" Ego sites may serve as a communications channel for a very small audience (directions to a wedding, for example), or as an advertisement (putting one's resume online) but their primary reason for being is personal gratification for the creator. For an ego site, ongoing interactivity is secondary to the original act of creation.

The success of an ego site can be assessed quite simply: is the creator satisfied or not? No further evaluation is required.

Resource sites attempt to provide information or some other data resource to their readers. This is primarily one-way communication, with the site developer providing information he/she wants to share in some way and site visitors consuming this resource. Most government sites, and most statistical sites, follow this model. Many corporate sites are primarily resource oriented, providing company profiles, product descriptions, and other marketing documents. The resources need not be serious, however. Most entertainment-oriented sites, such as online magazines, lists of jokes, concert schedules, etc. can be categorized as resource sites.

The success of a resource site should be assessed by asking whether most users found the information they were looking for (or discovered that the desired information was – legitimately — not present on the site), how quickly they found it, how many wrong

turns they made along the way, and how satisfied they were with the quality of the interaction.

Transaction sites, by contrast, involve two-way communication. Both the site owner and the user have something to contribute to the interaction. Commercial sites, such as online bookstores or stock brokerages, are typically transactional in nature (the site owner provides a list of products; the user assembles a list of desired goods, then adds a shipping address and a credit card number; finally the site owner physically sends a product). Non-commercial transaction sites would include online surveys.

The success of a transaction site can be measured with the same tools as a resource site, adding a measure of how many successful transactions were completed.

The remainder of this paper will focus primarily on resource sites. All site types, however, can benefit by emulating Shaker craftsmen and women and concentrating on the essentials of the task at hand.

WEB USERS

Like site types, users of the Web can be broken into three categories:

- Non-discretionary;
- Discretionary, directed;
- Discretionary, casual.

Non-discretionary users include those who, for whatever reason, are required to access a particular Web site. This might be an organizational intranet which holds the only copy of a current telephone directory. Non-discretionary users do not have the freedom not to use a particular Web site.

Discretionary, directed users are those who are not required to use a particular Web site, but who are strongly motivated to do so. This may be because they believe other channels for obtaining the necessary information are too cumbersome, expensive, or slow. A discretionary, directed user will try very hard to make sense out of a Web site, and to obtain what he/she is looking for, but will leave if the experience proves too frustrating or the desired information does not appear to be present.

Discretionary, casual users are the stereotype "surfers". Such users may stumble upon a given site, and may be willing to spend a little time investigating, but are not particularly motivated to stay and are likely to leave as soon as they get frustrated or bored.

Different audiences require different approaches to design and implementation. In general, non-

discretionary and discretionary, directed users are likely to focus immediately on how well a site supports their particular task, while casual users may be more 'seducible' by superficial attractions. Ultimately, however, even a surfer requires meaningful and well-organized content to remain at a site or return to it.

Naturally there are many other user and usage characteristics that are relevant to the Web site designer: familiarity with the topic, familiarity with the technology, frequency and duration of sessions, etc.

SITE PERSPECTIVES

The single most important predictor of site utility is the perspective from which the site has been designed. Just as there are two participants in any interaction between a user and a Web site (the user and the site designer), so there are two perspectives around which the site can be designed.

The first is provider-centered. This is a site where the designer cataloged everything his/her organization had to offer, then built a site around the material thus assembled. Provider centered sites often are structured to follow a corporate organization chart. Provider-centered home pages frequently feature a list of links that begins with "Welcome to Our Site", perhaps a picture of the company president or agency head, "About the Organization", perhaps an organization chart, annual report, etc. Most of this information may seem extremely important to employees of the organization, but is seldom of interest to outsiders who are looking for concrete information.

A site that organizes information about product recalls by the date of the press release in which the recall was announced is provider-centered. It is easy to imagine that internal to the company such documents are stored and referenced chronologically. A user of the site, however, is likely to be looking for a particular product, and will probably not know when the recall was announced.

By the same token, any site that has an 'under construction' page is showing signs of provider centricity. The real meaning of 'under construction' is the site developer saying to the user "I know there is something missing here. Its just not ready yet. Don't bug me about it." Meanwhile the user's expectations have been raised, he/she has been tricked into an extra click, and has paid a penalty in unnecessary wait time and possible confusion. 'Under construction' pages are invariably frustrating

for the user; they serve only to bolster the self-esteem of the developer.

Provider-centered sites, regardless of the intent of the creator, end up being ego sites more often than not.

User-centered sites, by contrast, are usually structured to follow specific tasks. Here the designer has attempted to determine what users are likely to wish to accomplish when visiting the site, and has structured the site around those anticipated demands. Whereas corporate information like organization charts, mission statements, or annual reports may still be present on the site – after all, some users are likely to be interested – it will be low on the list, not the first thing a user will see. Instead, items of interest to the user will be displayed most prominently. The site as a whole will be structured so that information of interest to the largest number of users is the easiest to reach, while less popular pages might take a few more clicks.

Building a user-centered site requires a very good understanding of the user population. This understanding can come from past interactions with a customer base, from studies of projected user behavior and demands, or from analysis of what users are actually doing on an existing Web site.

Developer intuition concerning user needs and desires is typically not very good. People steeped in either a technology or an organizational culture are frequently not able to leave their knowledge behind and project the experience of either a less knowledgeable individual or an individual with a markedly different perspective. Some sort of objective user study is usually required.

Shakers were both farmers and designers of barns; they understood the task and the technologies very well. Since Web developers can not always be experts in everything required to design appropriate sites (the task domain, the technology, and the techniques of user-centered design) they can draw on outside resources such as guidelines documents and work with usability professionals.

Many designers are thrown by the potential diversity of users. "How can I possibly design a site for a particular user population when literally anyone in the world could stumble across my site?" It is certainly true that the Web user population is huge. But some initial development decisions must be made, without which no trade-offs can ever be approached systematically. This can be as simple as assuming understanding of the English language, or as demanding as requiring facility with college level

statistics and a sophisticated understanding of survey methodology. Different portions of a site can be optimized for distinct user populations (several sites currently suggest different paths depending on whether the user is a high school student, a teacher, a researcher, or a legislative aide), but no site can be built for "everyone."

A user-centered site will usually require several iterations to get right, and can be expected to evolve along with the user population.

COMPONENTS OF WEB SITE DESIGN

There are two main components of Web site design: page design and dialog design.

Page design comprises all the elements that can be seen in one piece through a browser: text and pictures along with headers, footers, icons, banners, buttons, and links arranged in different typefaces and fonts, columns, tables, etc. The objective of good page design is to position elements in such a way that important information is easily recognized, less important information can be located with only a little effort, and unimportant information has been eliminated. Information, in this context, may include text, graphics, menu items and navigation buttons, or site identifiers.

Web page design corresponds to screen or window design in traditional interactive systems, or page layout in paper-based graphic design. A great deal of research has been done in this area, much of which can be transferred to the Web with only slight modification.

Dialog design has to do with the back-and-forth between a user and a Web site. Typically the user enters a site (through a link, a bookmark, or by typing a URL) and is presented with a page. The user spends some time looking at the page, then clicks on a link or a browser button. The system responds by presenting a new page. The user looks at that, then clicks somewhere, and so forth. There is an interaction between the user and the Web site. With any luck, the Web site is responding to the user's actions in a meaningful and predictable way, and the user, in turn, is reacting to the Web site. This can be seen as a conversation between user and Web site, or between user and site designer.

The objective of good dialog design is to facilitate the user finding the page he/she is looking for (i.e. the page or pages on which the desired information resides) in the most effective way possible. The quality and efficacy of a particular

dialog design can only be assessed in the context of its use: specific users performing specific tasks.

Nobody's job description reads "use the computer". Instead, workers are made responsible for specific tasks, and (one hopes) given the necessary tools to accomplish those tasks. The computer is such a tool; the Web site becomes such a tool. Thus effective dialog design is directed towards facilitating task completion in an accurate, comprehensive, and rapid manner.

THE SOFTWARE DEVELOPMENT LIFE CYCLE

Successful Web sites rarely happen by accident. A careful development process will increase the chances of a useful site.

In the past an illusion of ease ("just HTML'ize these documents and put them up on the server") coupled with unrealistic deadlines resulted in a plethora of chaotic sites, sites with little or no advance planning, little or no stylistic coordination, and no process in place for controlled updates, corrections, or expansions to the site once it had been released.

The traditional software development life cycle (SDLC) can serve as a model for a proper development process:

1. Analysis
2. Testing
3. Design
4. Testing
5. Implementation
6. Testing
7. Iterate until correct

Analysis is the phase during which the analyst determines what needs to be accomplished. In a Web context this means identifying the target user population(s); determining what these users want or need from the proposed Web site; and determining what organizational goals are to be met through the Web site. The functionality of a system is specified during analysis.

Design is the life cycle phase during which the designer determines how the required functionality will be provided. In a Web context this includes identifying the content to be placed online, determining the site structure, and developing a uniform style guide.

Implementation is where the site is actually built. Existing documents are converted to HTML. New documents and graphics are created, as are forms, CGI scripts, and applets. Links are inserted. The

Web server is brought up and pointed to a home page.

Testing is an ongoing activity, particularly important towards the end of each life cycle phase. The earlier an error or misunderstanding can be identified, the cheaper it will be to correct. It must be recognized, however, that later phases tend to uncover insufficiencies in earlier phases. Thus design may well highlight missing functionality, and implementation will surely point out gaps in the design. So developers should be willing to revisit each life cycle stage more than once. Development can be viewed less as a waterfall, where each phase leads clearly to the next, and more as a spiral, with each phase revisited as often as necessary.

All of the above phases have a traditional functionality component and a usability component. The two are not fully independent, but neither are they the same thing. Insofar as careful methodologies have been applied to Web development in the past, most of it has been directed towards functionality: is the HTML correct, do the links point to the correct pages, is the appropriate content present, are the scripts and applets fully debugged. This is critical to a fully functioning, successful site. Equally important are other questions: Does this make sense to our expected user population? Can new users figure out where to go? Can experienced users take advantage of shortcuts? Does the site assist the users in accomplishing their underlying goals? Usability analysis, usability design, and usability testing run parallel to their functional counterparts.

The SDLC is not unique; some general equivalent exists in most professional fields. Publishing, for example: common advice to authors would include “identify the audience before beginning to write”, “clarify in your own mind what you wanted to say”, “begin with an outline, then flesh out the outline, then have others read and critique the work.”

SHAKER PRINCIPLES TAILORED TO WEB SYSTEMS

The preceding sections have focused primarily on utility and quality – how these can be determined and how they can be produced. It is time to return to the other two Shaker principles, simplicity and elegance.

Webster's gives one definition of simplicity as “absence of affectation or pretense”, and elegance as “grace and restraint of style.” In the Web context,

these characteristics define a design philosophy which concentrates on supporting, enhancing, and emphasizing the underlying content by careful arrangement and use of graphical elements, but never allows the design itself to become prominent. If the user becomes aware of the design beyond an almost subliminal sense of aesthetic satisfaction, the effort has failed.

In an earlier paper¹ Levi and Conrad took a set of general-purpose usability principles originally proposed by Jakob Nielsen and modified them to apply specifically to Web sites. Of the nine principles thus derived, five are relevant to this paper because they deal with simplicity and elegance:

Design aesthetic and minimalist systems. Create visually pleasing displays. Eliminate information which is irrelevant or distracting.

Simple does not mean ugly or boring. Shaker crafts are quite beautiful. Web sites can be engaging and visually pleasing without succumbing to excess. The key point is that no amount of graphic or other technical virtuosity can make up for insufficient, inaccurate, or poorly organized content. On the contrary, baroque or otherwise unnecessary stylistic embellishment (see below for examples) frequently hides or draws attention away from the substance of a site.

Be Consistent. Indicate similar concepts through identical terminology and graphics. Adhere to uniform conventions for layout, formatting, typefaces, labeling, etc.

The importance of consistency can not be overemphasized. Not only will use of uniform vocabulary and graphic layout add to site aesthetics, but it will enhance utility as well. In a 1996 study² Mahajan and Shneiderman report up to 30 percent degradation in speed of task completion when synonyms such as question/inquiry, search/browse, or counselor/advisor were used on different screens of an application. According to this study, such inconsistencies in wording decrease user's

¹ *A Heuristic Evaluation of a World Wide Web Prototype*, Michael D. Levi and Frederick G. Conrad, *interactions Magazine*, July/August 1996

² *Visual and Textual Consistency Checking Tools for Graphical User Interfaces*, Rohit Mahajan and Ben Shneiderman, *IEEE Transactions on Software Engineering* 23, 11 (November 1997), pp. 722-735

performance regardless of the user's level of expertise.

Speak the users' language. Use words, phrases, and concepts familiar to the user. Present information in a natural and logical order. Avoid jargon wherever possible. Use acronyms cautiously, usually spelling out the complete phrase upon first use (note that in a hypertext system the designer can not assume that the reader has already traversed any given page, so such clarification might be required every time an acronym is used).

A site designed explicitly for users highly familiar with a given task domain will probably employ a specialized vocabulary; a site designed for a general audience must use a more accessible vocabulary.

Build flexible and efficient systems. Accommodate a range of user sophistication and diverse user goals. Lay out screens so that frequently accessed information is easily found. Provide instructions where useful.

The goal is to build a Web site that is clear enough for a novice or intermittent user to navigate with relative ease, yet is powerful enough or contains sufficient shortcuts so that an experienced user is not slowed down unnecessarily.

Simple does not mean simplistic. Web sites can and should contain a wealth and richness of material. A well-structured page, for example, can support scores of links without being confusing or overwhelming.

Don't lie to the user. Eliminate erroneous or misleading links. Do not refer to missing information.

SOME THINGS TO AVOID

As a general rule, anything that detracts from ease of use, including legibility, comprehension, ability to focus, etc., should be eliminated. New techniques, such as extensions to HTML or programming languages such as Java or ActiveX, can usually be used either to facilitate users' tasks or to complicate them. Web developers should be aware that technology for technology's sake (cool for cool's sake) is unlikely to help the users.

Backgrounds. Since at this time most computer screens are rather grainy, the pixels in background graphics tend to interfere with foreground text, making it difficult to read. Virtually all patterned or textured backgrounds fall into this category. Since there is already a performance penalty in reading off a screen rather than reading from reasonable-quality

paper, such further degradation just adds insult to injury.

Equally problematic are poor choices of background and foreground color. Pastel on pastel, or bright contrasting colors, may provide a striking and memorable display, but will not make reading any easier.

Scrolling text, blinking text, animated graphics. These can all be lumped together as "gratuitous moving stuff". Movement anywhere in one's field of vision is very seductive and distracting; this draws the user's attention away from content and degrades performance and possibly comprehension.

Some concepts can be very effectively illustrated through animation; one of the great strengths of a computer screen as opposed to a printed sheet of paper lies in the ability to dynamically change what is displayed on a CRT. Designer should use such capabilities wherever they enhance or explicate the subject matter. But waving flags, grinning monsters, or slithering marquees are unlikely to add much value.

Frames. Frames are an attempt to solve a real problem: how to present multiple views of an information space or task domain. Unfortunately they are a failed attempt. Frames break the common metaphors of the Web (one page at a time), and don't work well with many browsers (the back button behaves erratically, bookmarks and printing may not work as expected). What's more, they don't even do a very good job at the problem they were intended to solve. Coordinating multiple frames so that an action in one frame updates multiple other frames is difficult if not impossible; certainly few if any sites have implemented such functionality correctly.

PDF files. Adobe's Portable Document Format (PDF) is perhaps the best way to support perfect facsimile printing, but what works well on paper does not necessarily work well on a computer monitor. PDF files typically do not render well on screen (the typeface is often fuzzy). Layout options such as multiple columns depend on having an entire page visible at once; this is typically not the case on a screen, so the user ends up paging down one column, then returning to the top and paging down again, and then perhaps yet a third time. Such scrolling is time consuming, error-prone, distracting, and a waste of precious screen real estate. Finally, having a PDF reader as a browser add-in makes the user's work environment that much more complicated by adding another set of buttons and commands that may work

subtly different from the buttons and commands which are part of the standard browser.

If the designer's intent is to provide material to be printed, PDF is a very good choice of formats. If the intent is for users to view documents on screen, provide HTML. If users can be expected to do both, provide both formats.

CONCLUSION

The World Wide Web is an interactive information dissemination mechanism unprecedented in scale and accessibility. Never before has it been so easy to provide computer-supported data, news, knowledge, analysis, opinions, and advertising to so many people around the globe. And never before has it been possible for a computer to confuse, frustrate, and annoy so many people in such a short time.

Given the vastness of the information space represented by the Web, only the best sites can be expected to thrive. Slick technology tricks are fascinating the first time, but become boring after the second or third iteration. Fancy design curlicues become stale equally quickly.

If a site is to endure, it is the value of its content that will make the difference. For the value of content to be apparent, the site must be designed to sustain and enhance that content. Shaker handicraft, and the philosophy that gave rise to it, provides the model to do just that.

In a paper on Shaker architecture, Robert P. Emlen wrote:

“Nineteenth-century visitors wrote of the unity of design in Shaker villages. Developed according to the community's standards and requirements, the buildings in a Shaker village are more consistent in appearance than those of the neighboring farms. Their clustering on the land, the way they relate to one another in function and scale, the consistency of aesthetic choices employed by Shaker craftsmen, all attest to that communal society of spiritual brethren and sisters devoted to creating an ideal life on earth.”³

If a few words in the above quote were changed, it could describe a well-crafted Web site. Anyone should be very proud to have created such a Web site

³ Robert P. Emlen, *The Distinctiveness of Shaker Architecture*. Originally published as the foreword in: Julie Nicoletta, *The Architecture of the Shakers*. Photography by Bret Morgan. Countryman Press, 1995