

Improving Software Usability: A Manager's Guide

Meryl Enerson
Donna Porter
Frederic Rudman

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Introduction

This white paper is geared to the needs of senior marketing and development managers responsible for the success of their organization's software products and Web-based applications.

There are many business benefits to improving the usability of a software application. They include: increasing sales and usage, reducing training and support costs, and improving customer satisfaction and retention.

Friendly, usable software is the result of an ongoing, user-focused design process. This fluid process of *usability design* has at its core the constant monitoring of users' needs and behaviors.

Redesigning a software product to improve its usability involves four steps:

1. Understanding your **users**
2. Evaluating your **product** from the user's point of view
3. Assessing your existing **resources**
4. Updating your **process** to incorporate a user focus.

Every organization has its own unique requirements, constraints, and capabilities; not every group will have either the need or the budget to implement all the methodologies described in this document. It should be possible, however, for most organizations to include variations on these techniques, thus incrementally improving their current processes as well as the end-products.

Understanding Your Users

In order to improve the usability of an application, it is critical to have an understanding both of its users and of the context in which the application is used.

Defining a User Profile

A well-defined user profile is essential for each distinct user group. User profiles enable you to focus your redesign efforts on users' real issues, and avoid wasting time and resources on sideline items. As part of this process, you will need to collect information on users' needs, interests, and demographic information (see Figure 1, below).

Often, development teams build a product from the developers' point of view, without a good working profile of the real users. Software (and Web) history abounds with examples of this – computer programmers who create software that can be used only by other computer programmers, or hip, young Web designers who design sites that befuddle online shoppers in the 40+ age bracket. Too much knowledge of a given technology or industry will unfairly bias such developers in attempting to create a viable and usable design.

Figure 1: Defining the User



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Assemble as much information as you can about your users. The more you understand your users, the more accurate your assessment will be of the User-Product fit.

User profile information can be drawn from such sources as:

- Product registrations (Web-based or paper-based)
- Marketing and sales staff
- Training and customer support staff
- Market research data, including surveys and studies

Understanding the Usage Environment

In addition to understanding who your users are, it is equally important to understand the environments in which they access and use your application.

The goal in examining the usage environments is to understand the range of factors that impact how your application is used. For example, fine-tuning a product for use in call centers is a very different task than fine-tuning a product to be accessed from multiple locations including home, the office and the road. Understanding environmental factors also helps you plan how much field research to conduct. (See User Field Research in the next section.)

Environmental factors to take into consideration include:

- Location (home, office, mobile, etc.)
- Degree of privacy / noise levels
- System configuration
- Connection speed (if there is an online component)
- Type of network and security
- Other applications likely to be in use
- Browser types and settings (if your application is Web-based)

Evaluating Your Product

Usability is relative – a product may be easy and usable for one group of users, but non-intuitive or confusing for another group. An evaluation from the user's perspective means finding out if there is a good fit between your product and its users.

When evaluating your product, some form of *behavioral research* is valuable, and will be an effective guide to the redesign effort. Two forms of behavioral research that provide consistent results are *user field research* and *usability testing*, discussed in more detail below. If your development budget doesn't allow for doing both, aim to include at least a variation of these behavioral research techniques.

Evaluations are best done with as much information on hand as possible.

A thorough approach to product evaluation includes:

- Analysis of **existing user data**
- **User field research** (ethnographic research)
- **Usability testing** (lab research)
- Evaluating the **User-Product "fit"**

Existing User Data

Collect, collate, and analyze the feedback you already have from a variety of sources, such as data from customer service, technical support, sales staff, and marketing staff. Complaints, suggestions, and other customer correspondence received to-date are also important data sources.

Customer surveys and **Webmaster feedback** are both useful for basic information about real problems with the application. Webmaster feedback may not reveal the full breadth of usability issues, however, as it comes from users who are assertive (or upset) enough to take the time to write to the Webmaster. Surveys also rely on self-reporting, which may not yield the same information and understanding as observing users in action (what users say they do does not always reflect what they actually do).

User Field Research

The goal of user field research is to gather first-hand information on how your application works with its intended users. One or more researchers spends time observing and talking with users about their experience with the application.

This research process is essential to understanding current issues business applications, and also provides insights for consumer software and services. Even a few days of talking with and observing users yields useful information for your redesign. Many usability issues that may not have been obvious during development will emerge during field research.

User field research is best conducted at the beginning of your redesign, to collect information on current usage as well as on unresolved user needs. Potential partners for this step include your own staff (e.g. market research department) and outside consultants (e.g. usability specialists; market researchers).

Usability Testing

The purpose of usability testing is to discover exactly where users are having problems using the application. Testing should be based on tasks considered central to the success of your application (e.g., setting up the application, or completing an online transaction).

Usability testing can be conducted in many different settings, including an outside market research facility, a designated area within your own organization (such as a converted conference room), or on customer premises. It can be effective for data gathering—whether the setup is simple (researcher and a notepad) or more sophisticated (taped interviews at a research facility).

Elaborate testing setups are generally used by large organizations, where there are many (sometimes senior) stakeholders in the product design and development process. Although a written report can define the issues, the process of observing (videotaped) usability research sessions as user after user fails to complete the same task(s) will help ensure that usability issues are taken seriously and that their resolution is given a high priority.

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If you're unclear about the scope of your product's usability issues, conduct preliminary testing to establish a baseline. To ascertain the degree of improvement of successive (or various) redesigns, conduct usability tests on each design or release. Usability testing also can be used to fine-tune alpha and beta code. Again, potential partners for such an effort include your own staff (such as your market research department), consultants specializing in user research, and usability lab facilities.

Evaluating the User-Product "Fit"

After you have collected and analyzed data from your users, you can assess and prioritize usability issues. A usability expert can help you evaluate the fit between the product and the user, and identify what modifications need to be made.

An evaluation of the user interface should consider the various factors that can affect usability in the areas of functionality, content, creative elements, and application performance.

Some of the most critical interface components that impact the success of a software product are:

- Personalization of **content**
- Underlying behavioral **metaphor**
- Quality of the **graphics**
- Clarity of screen **language**
- Intuitive **navigation**
- **Error handling**
- Presentation **performance**

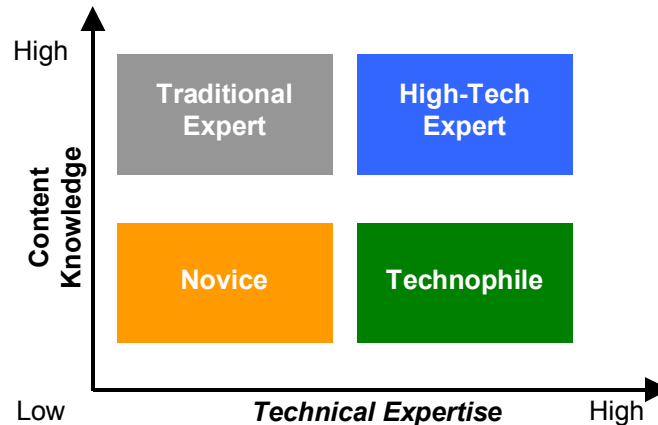
A product may get high marks in some areas, but have problems in others. An application with a well-produced look may still need better screen prompts, for example, or more intuitive transaction flows. Or, while search may be easy to use, it may be difficult for users to find information by direct browsing.

The cumulative effect of all these interface components is the overall **user experience**. Does the user feel the program is "worth the effort"? Is there a positive impression to the experience, or does the application provoke negative feelings and frustration?

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For business applications, one approach to determining the fit between product and user is shown in Figure 2, which categorizes users in terms of four basic “quadrants” based on their content knowledge and technical comfort levels.

Figure 2: User Types by Content Knowledge and Technical Expertise



Problems arise when a product doesn't have the correct user focus—the product is geared to a specific user quadrant, in the above figure, but its users fall into a different quadrant.

The biggest mistake designers and developers usually make is in *overestimating* the level of content knowledge or technical expertise of their users. Designing for the lowest common denominator (i.e., the Novice) is often the safest route.

Targeting an application to a specialized group of users (e.g., in a specific trade or profession) requires thoughtful design decisions, particularly in the area of screen language. Unfamiliar jargon slows down and confuses users; familiar terminology encourages use. Developing a *lexicon* of appropriate terminology for consistent use throughout the application is highly recommended.

It's important as part of the redesign process to plot where your users are, relative to their content and technical expertise. That then becomes your product focus.

Assessing Your Resources

Once you have a full understanding of your users and have identified issues with the current product, assess your existing resources and the ability of your team to execute a redesign. Additional resources may be required in order to accomplish the redesign. These can be temporarily brought in (as contractors, consultants, or through an outside group), or added as staff. Generally, using outside resources allows you to accomplish a redesign more quickly; adding resources on staff requires a larger budget and commitment to growing your development group.

Creative Resources

Quality software design teams have diverse talents and capabilities. You should strive for a balanced mix of design skills on a team, in order to produce quality **screen writing**, **interaction design**, and **graphic (page) design**.

Although some team members can contribute more than one capability, it's hard to find all these capabilities in the same person. Even if your single UI staff member is a multi-talented maestro, a one-person redesign effort will never be as professional or effective as a redesign by a small, balanced team, since it will still reflect only one individual's perspective.

The range of skills for product development team members is shown in Table 1. The example of a large creative team lists members for a large-scale application, where there are major brand and marketing copy requirements (e.g., for a large consumer application). The small team example is based on a business software application with minimal brand development or marketing copy requirements. These examples illustrate how required skill sets will vary based on the size and scope of the effort.

Table 1: Sample Large and Small Design Teams

Large Design Team	Small Design Team
Producer	
Creative Director	
Art Director	
Graphic Designer(s)	Interaction designer
Interaction designer	Graphic designer
Information architect	Developer
Copy writer (marketing copy)	
Developer(s)	
Technical writer	

User Advocacy

Championing the point of view of the user is key to successful user-centered design. User advocacy can take place on several different levels. First and foremost, at least one person within the design team should be a user advocate. Among his/her roles, this person should constantly question, for each design decision, “Does this work for the user?” and “Is this the better or easier way for the user?” That helps keep the design work focused.

Even with a user advocate on the design team, after a while it’s hard to see the forest for the trees, so it’s a good idea to get some additional help with user advocacy. “Friendly users” can then be recruited to try out the software product at various stages.

These friendly users should be at a competency level similar to your target user group. For consumer applications, your user advocates or friendly users may be non-technical assistants or clerical personnel who have not been involved in the actual design. For business applications, friendly users may be drawn from staff in other departments, or from outside the organization.

It’s not difficult to find recruits if you give users an incentive to work with your team– find a financial reward, giveaway, or barter services to get people involved. It’s worth the effort.

Updating Your Development Process

To maintain a successful usability process for future releases, you may need to rethink aspects of your overall development cycle. Three core elements of a user-centered design process are:

1. Adequate levels of **design documentation**
2. Allowing for **cycles of user feedback**
3. Establishing methods of **tracking results**

Design documentation

It's a good idea to have a change document in place prior to embarking on a redesign. There are many different methods of documenting the design of a software application, reflected by different kinds of design documents. They range from defining the goals of an application before it is created (Requirements Documents), to a complete description of what the program actually does after the redesign is complete (Application Specifications).

Too little documentation is often the lead cause of “feature creep.” Feature creep occurs when different members of an organization add or request features and functionality with little group discussion or consensus. Folks from the sales and marketing department request features they can promote to customers, and developers decide to try out new technical tools or techniques. Undocumented features begin to appear in the application, and nobody can remember how or why they are there. Over time, the product focus degrades, and the application collapses under its own weight, becoming increasingly difficult to use.

The following documents are useful both for original design work as well as to aid in a redesign effort.

Marketing (Business) Requirements Document describes the goals and functionality of each release, and explains why each new requested feature is being added.

Why it's useful: Creates a vision for each product

Who creates it: Marketing or Product manager

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Functional Specifications Document describes the program from an engineering perspective, including data processing requirements.

Why it's useful: Enables development to dimension technical resources

Who creates it: Lead development manager

Flowcharts are visual diagrams depicting transactional flows within the application. They may contain specifics of screens, prompts, or user actions.

Why they're useful: Provide an overview of the entire information architecture of an application, and a “bird’s eye view” of transactional flows.

Who creates them: Interaction designer

User Interface Specifications depict the elements of the front end, through “wireframes” of screens or pages, and/or by including graphical look-and-feel elements in a document. Frequently, a written form of UI Specifications is combined with a rough prototype (see below).

Why they're useful: Define the user experience and key screens for the team

Who creates them: Design team leader

Prototypes are simplified, interactive versions of the flows and navigation for an application, usually without regard to back-end programming or art direction. They are electronic documents, serving a similar purpose as User Interface Specifications. Prototypes are often created in designer-friendly, high-level authoring tools, such as Macromedia’s Dreamweaver.

Why they're useful: Act as an interactive reference for development. Can also be used for testing the design with friendly users

Who creates them: Interaction designer (with support from a developer for large applications)

Application Specifications Document is a highly detailed, large document, including all the elements found in the Functional Specifications Document as well the User Interface Specifications.

Why it's useful: Acts as a complete reference for development and ongoing maintenance. Very useful for large or complex applications, or for those involving large development teams.

Who creates it: Documentation specialist / Multiple team members contribute.

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Your existing approach to documentation will determine what documents to use as part of your redesign effort, and which ones to add to your ongoing process. If redesign requirements are minor, you may need only a single change document—either User Interface Specifications or a Flowchart indicating changes to the interface or flows. If your product design documentation is currently on the light side, now may be a good time to enhance your approach to documentation.

Cycles of User Feedback

Another critical component to designing for usability is establishing cycles of user feedback. Expect some resistance when introducing this concept to your development team. Developers frequently find it difficult to accept that user feedback needs to be part of their ongoing process. The process of having design judged by “outsiders” (even if the outsiders are actual users) can feel uncomfortable and even threatening.

Nevertheless, cycles of user feedback and reviews are so valuable to improving and maintain usability of any software product, it's worth figuring out how to incorporate it into your process.

Eventually, design teams come to appreciate and rely on user feedback from research and reviews. After the first few usability testing observations, it should become obvious that *uncovering usability issues must be the norm – not the exception* –and that it's part of the process of creating good software.

Tracking Results

Redesigns are a lot of work. What should you measure, and how do you measure it, to cost-justify the time and resources involved? User-centered design is a results-oriented process. Working with users to improve navigation, comprehension, or successful completion of tasks can be conducted in a qualitative or quantitative manner. For quantitative analysis, a skilled market researcher or business analyst is required.

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To gauge the results of a redesign effort, first define your goals. What do you want the redesign to achieve? Is it something specific that can be tested in a usability lab (e.g., increasing the percentage of users who successfully can install client software from 25% to 45%)? Or should you conduct a customer survey to gather results on an annual basis (e.g., increasing the total percentage of customers who find your software “usable” or “very usable” by 15%).

If you currently track usage of a Web-based application, you'll need to compile and analyze statistics prior to a redesign. Web analytical tools are useful, but you should not rely on them exclusively since they provide metrics only for the current design; they don't point the way to how to optimize the design. To fully understand an application's usability quotient, put field research and lab testing in the forefront of your research and analysis methodology. Plan ongoing usability lab sessions and field research to establish the degree of improvement in the application over time.

Getting Outside Help

In today's competitive technology environment, software usability is an imperative for product managers and senior managers alike. A usable product will be embraced more quickly by end-users and customer organizations, and will help your organization meet its bottom-line objectives. Yet many managers are frustrated when they know usability problems exist, but don't know where to find the resources and expertise to address them.

Some suggestions for outsourcing options are shown in Table 2.

Table 2: Outside Resources for Improving Usability

If you need help with...	Consider hiring...
Product and usability evaluation	Customer experience consultant Market researcher Usability specialist
User field research	Market researcher Usability specialist
Usability testing	User research firm Usability lab facility
Navigation and user interaction design	Interaction /Application designer Information architect Usability specialist
Screen language, prompts & labels	Interaction /Application designer Writer with interactive experience
Online help	Documentation specialist Technical writer
Graphics and look	Art director / Graphic designer Advertising agency
Content areas of an application	Content expert Specialty copy writer Information architect

About Enervision Media

Enervision Media, Inc., provides user-centered research, analysis, and design to developers and stakeholders in digital media. Our goal is to assist you in gaining rapid customer adoption of your new technology products. Our iterative research and design techniques have been honed over years of product development for industry leaders such as AT&T, United Airlines, Citibank, Morgan Stanley, and United Parcel Service. We have also helped numerous startups and e-businesses develop effective, usable software and online services.

We work with clients tailor the design of applications to many different kinds of markets and users. These have included: consumers in various age and income brackets, employees in Fortune 500 and global organizations, engineers, business travelers, researchers and scholars, customer service representatives, traders, brokers, analysts, investment bankers, client relationship managers, and small business owners.

Our core service offerings include:

Research and Analysis

Product reviews * Usability evaluations * Requirements analysis * Best practices *
User field research * Usability testing * Market research and analysis

Application Design and Redesign

Information architecture * Screen writing * Graphic Design and production *
Prototyping * Design documentation

For more information

Meryl Enerson, President

Enervision Media, Inc.

Phone: 518.392.8740

Email: info@enervisionmedia.com

Web: www.enervisionmedia.com

About the Authors

Meryl Enerson

Meryl Enerson, founder of Enervision Media, has been an interactive designer and consultant since the early 80's. She has directed the design of user-friendly applications for different technology platforms, including Windows, Web, wireless, and small screen devices. Her clients have included Citibank, AT&T, UPS, Morgan Stanley, and United Airlines, as well as startups, e-businesses, advertising agencies, non-profit organizations, and digital media companies.

Meryl is a graduate of the University of Michigan (Ann Arbor), and of New York University, where she received a master's degree in Interactive Telecommunications.

Donna Porter

Donna Porter has over 22 years experience developing complex interactive systems and online services for educational, consumer and business markets. Her clients have included the U.S. Postal Service, Pitney Bowes, American Express, Sealed Air Corporation, Schein Pharmaceutical, and Verizon.

Donna is skilled in the iterative design cycle where customer-acceptance testing informs and guides product development. Donna was a Creative Director for Citibank's interface development group, where she managed product design and development of several major staff and customer systems. She is a former educator with a B.S. in Education from Northern Arizona University.

Frederic Rudman

Frederic Rudman, Enervision's Chief Technology Officer, has over a decade of experience in the design, development and management of software and information systems. One of Frederic's specialties is the development of software for embedded systems, and in the design of interfaces for small screen devices, including wireless, PDAs and Internet appliances.

Frederic was formerly a co-founder and principal of Interaxis Corporation, a New York-based software company responsible for deploying UPS's successful customer automation product, TeleShip. Frederic has also consulted to IBM, Citibank, Alliance Insurance, and Credit Foncier. He holds a B.Sc. in Mathematics from McGill University (Montreal).