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Usability and Usability Testing of Websites: An Example Redesign for Sargent Manufacturing

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An Example Redesign for Sargent Manufacturing

A Major Qualifying Project Submitted to the faculty of Worcester Polytechnic Institute in partial fulfillment of the requirements for the Degree of Bachelor of Science, Professional Writing

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Abstract

This project explores website usability and usability testing from engineering and cultural perspectives. Customers of Sargent Manufacturing reported significant difficulty using the company's website. Analyzing the website from the perspective of different users, I investigated the site's usability using heuristic and user-testing methods. After problems were identified, I created a redesigned site, which I then similarly tested to evaluate improvement.

Introduction

A user interface (UI) is the intersection of product and user. The coin slot and selection buttons on a vending machine or complex, the slew of buttons/commands in a computer application, the steering wheel, gas pedal, brake pedal, and diagnostic lights on a car are all examples of user interfaces. That said, the term *user interface* is often used in relation to a computer interface. In this context, a user interface is defined as, "The aspects of a computer system or program which can be seen (or heard or otherwise perceived) by the human user, and the commands and mechanisms the user uses to control its operation and input data." This project will focus on computer interfaces, specifically those of websites. (Computing, 2009)

Jakob Nielsen, perhaps the most famous usability expert, asserts that usability consists of five components: learnability, efficiency, memorability, minimization of errors, and satisfaction. (Nielsen, Usability Engineering, 1993) The ideal website would be immediately clear to new users, provide them with the information they need immediately, easy to use even after long breaks away from the site, error-free, and provide a pleasant experience for the user. Unfortunately, few (if any) interfaces are perfect. Websites are often poorly laid-out, making navigation counter-intuitive. Applications often have poorly labeled buttons or unclear prompts. New users often get confused by unclear layout, and returning users often get frustrated by awkward or cumbersome ways of entering data. To prevent these problems, interfaces need to be designed for usability. "Usability is … the degree to which people (users) can perform a set of required tasks. It is the product of several, sometimes conflicting design goals." (Brinck, Gergle, & Wood, 2002)

To measure and improve usability, usability studies are often done. A usability study is an important tool for evaluating a UI in which the effectiveness of the UI is judged. Based on the results, changes can be made to improve the interface. Usability studies often involve observing users trying to perform certain tasks, grading their performance, and having them talk about their thoughts either while using it or after. Usability studies can even involve a designer simply looking at the UI heuristically, checking the interface against common design rules or guidelines. These usability test methods can become expensive or cumbersome if done with large numbers of test users or usability testers. Therefore, especially in business, designing and implementing useful and cost-effective usability studies is a necessary challenge. Nielsen has created a process for "discount usability testing." It's designed to be a practical, cost efficient way to improve a user interface. Nielsen describes its practical goals he tries to " focus in achieving 'the good' with respect to having *some* usability engineering work performed, even though the methods needed to achieve this result may not always be the absolutely "best" method and will not necessarily give perfect results." (Nielsen, Usability Engineering, 1993)

In addition to testing an interface to find problems, a designer can improve a user interface by understanding the user. The user's needs, knowledge, and goals all play an important part in determining the best user interface. Complicating this, designers often do not know their users as well as they would hope. Designers must make educated guesses in many cases about who is using their product and how. User interfaces, especially web sites have a very diverse audience. Oftentimes in usability testing, usability heuristics for websites are sometimes based around catering to the general

public and testing treats test users as interchangeable. However, as users have different experiences, perceptions, and abilities, user interfaces that work for certain users or in certain situations might not necessarily be very usable for other users or in other situations. Therefore, when doing usability studies, the study should look at how well the interface deals with different niches of users.

This project took the user interface of a website used by several niche groups that is currently designed with a "One-size-fits-all" approach and see how usable it is for a certain group of users. The website tested will be the one of my current employer, Sargent Manufacturing: www.sargentlock.com. Recently I have heard numerous complaints from end-users of certain products that they can't find what they need on the site. This project will focus on how well the website works for those users and propose an alternative design that better serves them.

One specific type of test user will be exposed to the current website. The website will be analyzed both heuristically and with sample user test, such as task observation, to find problems with the initial design per Nielsen's discount usability methods. These methods will be done with the specific needs, knowledge, and experiences of this niche of user. Based on the results, the initial site will be improved and then tested again. This final product will be compared against the original site to see if the site has become more usable for these users.

Background

There are different approaches to understanding usability. One of the more predominant ones, advocated by famous usability expert Jacob Nielson, takes an engineering approach to the topic. In this model, there are rules to follow and tests to perform. Data from usability tests are analyzed and based on that, the interface is adjusted. Contrasting the engineering method is a cultural approach. In this model the emphasis is on understanding the user. Whereas the engineering approach uses a small number of fairly interchangeable users, the cultural approach differentiates users. While both methods can be used to design and analyze a site, the cultural approach lacks the clear testing methodology that the engineering approach has. In this chapter I outline Nielsen's "Discount Usability Testing" methods, perhaps the most popular approach for the engineering approach to usability testing, cultural usability, and introduce Sargent Manufacturing and its website.

Perspectives on Usability

Usability is a measure of how easy an interface is to use. Typically, usability evaluations are kept separate from discussions of utility, how effective a product is, a characteristic usually more influenced by what the user interface is connected to than the interface itself. Nielsen defines usability as being composed of five components:

> Learnability: How easy is it for users to accomplish basic tasks the first time they encounter the design?
>
> Efficiency: Once users have learned the design, how quickly can they perform tasks?
>
> Memorability: When users return to the design after a period of not using it, how easily can they reestablish proficiency?
>
> Errors: How many errors do users make, how severe are these errors, and how easily can they recover from the errors?
>
> Satisfaction: How pleasant is it to use the design? (Nielsen, Usability 101: Introduction to Usability)

Patrick Jordan however defines it a bit differently. His metrics for usability are *guessability* (how successfully a system can be used the first time), *learnability* (a measure of how much time/effort is required to reach a level of competence with the interface), *experienced user performance* (the "effectiveness, efficiency, and satisfaction" that a long time or fully trained user would have), *system potential* (how effective the system would be if used to its full theoretical potential) , and *reusability* (how effective user who has not used the interface for extended time is when returning). (Jordan, 1994) Jordan's definition includes system potential as part of the measure, something Nielsen's does not. With Nielsen's only actual performance by users is worth measuring, a theoretical performance level that no user actually ever reaches is understandably neglected.

Regardless of the exact definition, the goal of usability is to make it easier and faster for users of an interface to accomplish their desired goals. Just as there are several definitions, there are also several approaches to accomplishing this goal.

Usability Engineering

In his book Usability Engineering, Nielsen presents the engineering model of usability. His approach includes some general rules of user interface design, what he calls his Ten Usability Heuristics list. The rules presented are for user interfaces in general; they are not specific to web design. In other books and articles Nielsen has also created other lists, including ones more specific to websites. These are often long lists of common mistakes and other "Don't Do" lists. These have been modified over time by him as technology and web culture has evolved. Another well known usability expert, Shneiderman, put forward his own, similar set of rules. He referred to them as "The Eight Golden Rules of Interface Design". They are explained in his book Designing the User Interface. Shneiderman also uses his rules as part of an engineering approach to usability. The following rules and principles are common to the two usability experts' approaches.

User interfaces should be as simple and natural as possible. Users should be given all the information they need, and no more. The interface should have commands and options in a logical progression. Additionally, graphic design choices should accurately convey the information of the system. This often involves grouping or color-coding objects in such a way that their relationship is intuitive. Objects near each other on the screen are assumed to be related, as are objects colored the same or boxed together.

Interfaces should speak the users' language. User interfaces are often made by highly technical people familiar with the product and used by less technical people who will know little about the product at first. Commands and options should be named in such a way as to make sense to them. Help files that allow users to search should use plenty of synonyms so users can find answers to their questions. Error messages in particular tend to be confusing to users, as they often reflect a technical problem that the user would not understand. Error message should be understandable by the end-users and contain advice on how to recover from the error. It is also important that the underlying metaphors in the design match the way the user would think of the system; groupings and associations in the software should match how users think of it, not how the information is actually stored.

A good user interface limits the amount an end-user needs to memorize. Information entered in one screen is displayed on related screens. Information that needs to be compared is shown all at once so users don't need to remember previous data. When user input is necessary, the format of the input should be explicitly stated. Ideally an example is given as well. Units should be made clear.

Both Nielsen and Shniederman agree that consistency is key in user interface design. Users can be very frustrated and/or confused when a command or action does not behave the same way on different screens. Screen location of similar data should be in similar locations to make the parallels clear. In addition to internal consistency, an interface ideally is consistent with other interfaces a user is

familiar with. F1 is the universal way to get help on an application. There would have to be a very compelling reason to justify making the help command F3 in a program instead.

Feedback makes it clear to the user that the action they took is having an effect. When there is no feedback at all, users will often wonder if it registered their input. Nielsen has three thresholds he has observed for user interface design. In order to feel instantaneous, a process needs to take 0.1 seconds or less. 1.0 or less will not interrupt a user's thought, allowing them to remain focused on what they are doing. More than 10 seconds and a user will likely start performing other tasks while they wait. Additionally, feedback should be given about irreversible processes like saving over a file. Small actions (such as clicking a mouse) should result in small feedback (cursor moves to new location). Large actions (deleting a folder) should result in larger responses (warning message and confirmation screen). Users should be certain that their input had an effect. This gives users confidence that everything is ok and removes anxiety over whether an action worked as it was supposed to.

In addition to feedback, users also like clearly marked exits. They should be able to cancel a process midway through. On a website, they should always be able to go back and have access to the homepage. An “undo” command should be available whenever possible to correct user mistakes. Users who feel they can easily correct mistakes are more likely to explore the interface, therefore becoming familiar with it faster than users who are not comfortable with an interface.

As mentioned earlier, an interface should be simple to learn when a novice. That said, as users become more experienced, there should be shortcuts available to increase their productivity. The interface should scale with the abilities of the user. Keyboard short cuts and double clicking to perform common actions are both popular ways to speed up advanced users.

Systems should prevent errors whenever possible. The more often an error occurs and the more serious the consequences of the error, the more effort that should go into preventing it. Preventing invalid input will go a long in reducing errors. This may be as simple as replacing a fill in a blank with a drop-down to prevent an invalid input.

Finally, Nielsen recommends making help files and support information as useful as possible. That said; most users do not read help material. When they do it’s usually after something has failed and they have a specific question. Help files should take this type of use into account and make it easy for users to find answers to specific questions. Since help files are often not read, user interfaces should stand on their own as much as possible. Help files should not be relied upon or used as a justification for a confusing interface. (Nielsen, Usability Engineering, 1993)

Web Interfaces

This project specifically deals with web interfaces. In addition to general usability rules, web interfaces have their own specific concerns. Loading times versus users’ attention spans play a much

more important role in web site design. Nielsen states, “Currently, the minimum goal for response time should be to get pages to users in no more than ten seconds, because that is the limit of people’s ability to keep their attention focused while waiting.” Users almost always have an alternative when it comes to web sites, making it much harder to keep users and their attention. As loading times are often more of a technical concern (files sizes, bandwidth, etc.) rather than a design consideration they will be outside of the scope of this project.

Additionally, websites have other expectations to meet. These include technical restrictions from having to run in a browser or having to display properly on almost any monitor. Additionally websites must deal with the implications of “Jakob’s Law of Internet User Experience”. The rule states that, regardless of how wildly popular a website may become, the sum of users’ time on other websites will still be much greater than their time on that one site. Therefore, web sites must be careful to adhere to the conventions and expectations created by other sites to maintain usability. (Loranger & Nielsen, 2006)

Cultural Usability

When undertaking the creation or redesign of a web site or a user interface in general, it is important to understand the users (or potential users) of the interface. The designer must understand who the customers are, what they want and need, and even what type of hardware/software they are using to access your product. (Brinck, Gergle, & Wood, 2002)

Cultural usability focuses on the users’ understanding of the product and the context they put it in. Any “cultural artifact” can be analyzed using the five elements of the circle of “Circuit of Culture”. (Melles, 2008) Huatong Sun argues that engineering approaches to usability tend to only look at the production and consumption aspects. By ignoring the other three components to culture someone blindly following an engineering approach would not fully understand what the underlying product means to the customer and the context they put it in. Sun also claims that these engineering models treat the culture as unchanging. The very act up changing the interface is likely to change the other components of culture and therefore the culture itself.

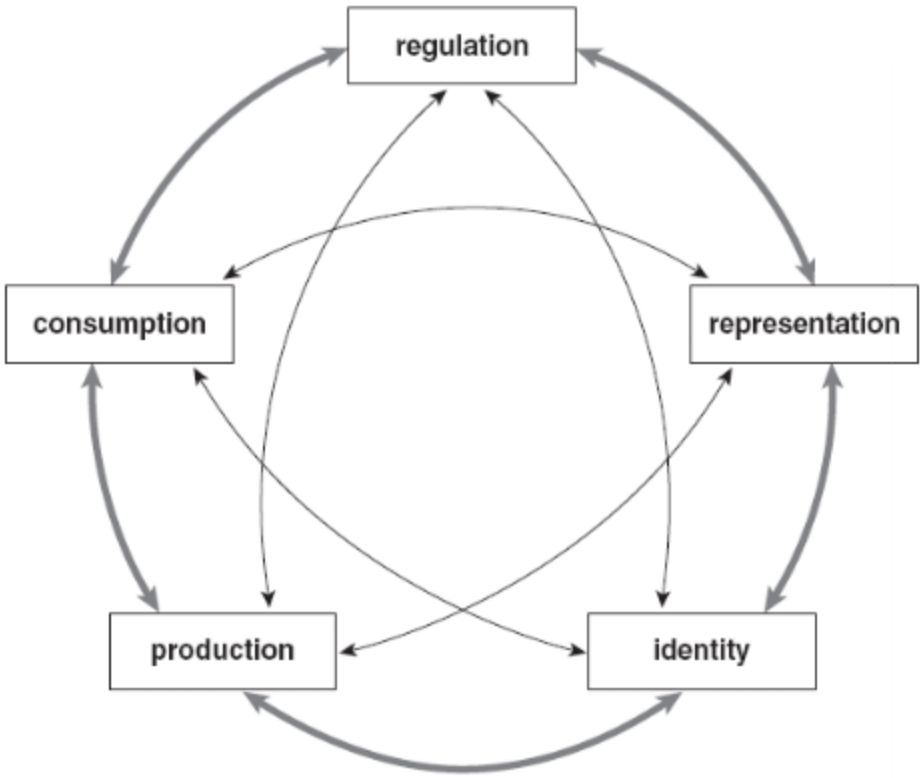

Figure 1 Circuit of Culture (Melles, 2008)

Sun cites an IBM study from 2002 that demonstrated that 60% of usability is related to the user model. The user model is how the user visualizes and understands the product, which directly relates to the user's background. (Sun, 2002)

When cultural usability is not taken into account, interfaces that work very well for people from certain backgrounds may not work well at all for users from other backgrounds. Sun gives an apt example: the old Macintosh interface. This interface consists of a "desktop", "folders", and "documents". Information is sorted by putting these "documents" into the correct "folders" and sorting the "folders. To a middleclass American in the corporate world, this makes sense.

New users can grasp this concept fairly quickly and understand what's going on. Users from outside this background however won't necessarily understand the metaphor. It may take longer for them to use and cause more confusion over time. A farmer who has never been in the business world would likely do better with a different metaphor that relates to what he is familiar with.

Discount Usability Engineering

In several of Nielsen's books, he recommends a *Discount Usability Engineering* approach for testing an interface. While running a large-scale usability study with hundred of users may be a daunting task from both a time and budget standpoint, running a small usability study with three to six users is very reasonable to do. Furthermore, Nielsen claims, a small usability experiment will catch the majority of problems a larger one would. These claims are based on the data from a collection of usability tests

Nielsen had run earlier in his career. In general, he found the percentage of usability problems found to be equal to $(1-(1-L)^n)$, where n equals the number of test users and L equals the percentage an individual user will on average find. Nielsen's data shows L to be approximately 0.31. See Figure 2 to observe the diminishing returns for increasing the number of users.

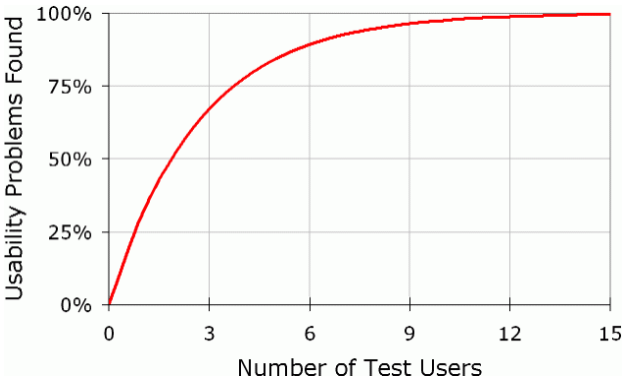

Figure 2 Nielsen, "Why You Only Need to Test with 5 Users"

After a usability study, changes are usually made to correct problems discovered during the testing. Conducting another large-scale test after each change becomes even less practical. Therefore in most cases it is preferable to use the discount usability method iteratively, rather than spend the entire usability budget on one round of testing with larger-scale usability tests. Running a test with 15 users will catch virtually all usability problems. However, the changes made to fix these problems will likely cause new usability problems/limitations or simply fail to fix the previous problem. Therefore, the end product will be more usable if three tests are run with five users each. In between in round the design is improved to remove the problems the previous users found. (Nielsen, Why You Only Need to Test with 5 Users, 2000)

However, not everyone agrees with a five user approach. In their paper *Why and When Five Test Users aren't Enough*, Woolrych and Cockton argue that Nielsen's five user approach is only ideal under certain assumptions: L needs to be at least close to the 0.31 that Nielsen uses in his curve. How close it actually is depends on the nature of the product. Additionally there needs to be little variability in the ability of test users and in the difficulty of finding each bug. The more variability in the difficulty of finding each bug, the more likely test users are to find the same "easy" bugs and for no one find the "hard" ones. The more variability between test user abilities, the more likely it is to get five less capable test users, who will find less than the 85% target. (Cockton, 2001)

Woolrych and Cockton's, stress how Nielsen's model is based on users being of comparable abilities. This would imply a nearly homogenous group of test users. This raises the concern of whether such a group of users could accurately simulate the all the different types of users the interface will eventually have. They take more of a software devleoper's view on the subject looking at usability issues as essentially bugs to be fixed, rather than an experience to be improved.

Below are some of the different methods Nielsen discusses and recommends. In addition to the ones listed here he also discusses focus groups, user feedback, questionnaires, and several others. His

exact terms for the different methods also change between some of his books/articles. The ones shown below are the ones most relevant to the approach I am planning on taking with this particular website redesign.

Heuristic Evaluation

Heuristic evaluation is a process where people (ideally usability experts) look through a user interface for potential design problems. Unlike many of the other usability methods here, this method does not involve users or simulated users of the product. It instead involves usability experts (or someone playing the role of one) coming through the system using a predetermined list of rules. These experts look for places where the rules are broken or where they believe there are design flaws. The design rules that the usability experts use can be a specific list designed by the company, required by the customer, popular in the industry, or it can simply be common sense general design rules. Shneiderman's Eight Golden Rules and Nielsen's Ten Usability Heuristics are well known examples of general design rules.

Scenarios

While heuristics give good advice for things to avoid and general rules to follow, it is often an effective test the planned path users take through an interface. The scenario approach is a good way to test out a proposed layout or method in an interface. "A scenario brings out additional functional requirements and ideas for the user interface… ideas you wouldn't have thought of from an abstract consideration of the design." (Cockton, 2001)The intended path is sketched out on a computer or on paper and note cards. The test user is walked through the intended flow and allowed to comment. On paper, the linking process can be created by demarking links and having separate pages for new pages. Dropdown options can be written on a note card and shown when the user selects the appropriate menu. Users may be asked how they would proceed from a certain mock-up site or asked whether something is clear. Based on the user's feedback and confusions, changes can be made to organization or layout to clarify or improve the design. (Plaisant & Shneiderman, 2010)

User and Task Observation

Heuristics and scenarios are excellent tools for initially planning a layout. When it comes time to measure and evaluate the interface, user and task observation is the quintessential usability test. In such a test, the experimenter observes a test user trying to complete a task or series of tasks given to him/her. The success of the user is documented as are any difficulties they encountered along the way. In this method users are given very little, if any coaching. The experimenter running the test is there to explain the testing process and explain unclear tasks, not to provide help during testing. In this type of testing, much more control is given to the user than in a scenario. A scenario is a guide taking you on a tour, asking you how you like the trail. User task observation is telling someone where they want to end up and watching which trails they take.

The success of the user is measured after the test, by percentage of tasks completed correctly, time taken to complete the tasks or a combination thereof. In addition to these statistical results, the

notes of the experimenter will contain observations about sticking points or unexpected behavior. Oftentimes the process is recorded or the images on the screen captured so that the test can be reviewed in fuller detail after the fact for even more information.

Simplified Thinking Aloud

Like user task observation, a simplified thinking aloud approach involves gauging test users' interactions with the product. However in this approach the test is not focused on time to complete a task or success rate. Instead the test involves a test user navigating through the system, possibly to complete a certain task, possibly just trying the interface out. The user is encouraged to "think out loud", vocalizing their thoughts as they navigate. The user explains why they perform each action, what they are looking for, etc. Anything confusing or frustrating to the user should be remarked upon as well.

During this, the experimenter takes notes based on the user's comments and what they are currently doing. In addition, the experimenter could record the session and/or use screen capture software. After the session, the experimenter reports where users had trouble, where they were confused, their likes/dislikes, etc. This type of experiment, while yielding less "hard data" than the task observation method, can give a better explanation as to user confusion and discover the underlying problems that a task observation would measure but not necessarily clarify.

Between Subject vs. Within Subject Testing

For all the testing methods involving actual test users, the testing can be done either between subject or within subject. The distinction involves how the test process deals with comparing two different interfaces. Between subject testing uses different users for each type of testing. The benefit to this is that users are not more familiar with the topic matter and site when looking at the second interface than they were when they looked at the first. This type of testing is to prevent a clear bias in favor of the second or subsequent interfaces being tested. The downside to this approach is that the difference in abilities between users is not adjusted for. For large number of users this may not be significant as the abilities or users in each group will tend to equal out. In smaller test groups, such as the ones being employed in this project, that difference between users causes significant variability.

While this paper does address different types of users, which would usually make variability in users a good thing, this type of variability is not in respect to the different users but rather between the two different sets of users. That is to say having users of different abilities is good, provided that they are relatively evenly divided amongst the different test interfaces. Where the users to be divided unevenly, the interface tested by the more knowledgeable users would seem better than it actually is and the other interface worse.

Within subject testing is the opposite of between subject. It uses the same users both times. It removes user ability based variability, but introduces a bias in favor of subsequent systems. Users are likely to learn at least something from the initial interface about the tasks, products, or general approach to the interface. This knowledge will likely improve their ability to navigate subsequent interfaces. To minimize this, half of the users should start with one interface first, the other half start

with the other. (Nielsen, Usability Engineering, 1993) Ideally this would even the effects of the users' increased knowledge.

For this project, I opted for between subject testing, as the users I'm focusing on know very little about the industry. These are the types of users who would show the most gains in ability after seeing one version of the site as they are on the beginning of the learning curve. Precautions were therefore taken in the methodology to adjust for differences in the abilities and knowledge of the test users.

A Case Study: The Sargent Manufacturing Website

This project will focus on one website as an example. The website chosen is that of my employer, Sargent Manufacturing, a door hardware company. It was chosen as an example for two reasons. The primary reason was the feedback I received from customers complaining of the site. Users often have great difficulty finding the documentation and answers to their questions on our access control products. Secondly, I wanted to use a website and company that I was intimately familiar with so I could better understand the goals of the company and the needs of the customers.

Sargent makes locks and related products, items that would mount on or near a door. The Sargent website is www.sargentlock.com (Figure 3). Among its product offering, Sargent has keypad and card reader controlled locks: what they call "access control" products. These access control products come in many different series and several types of locks.

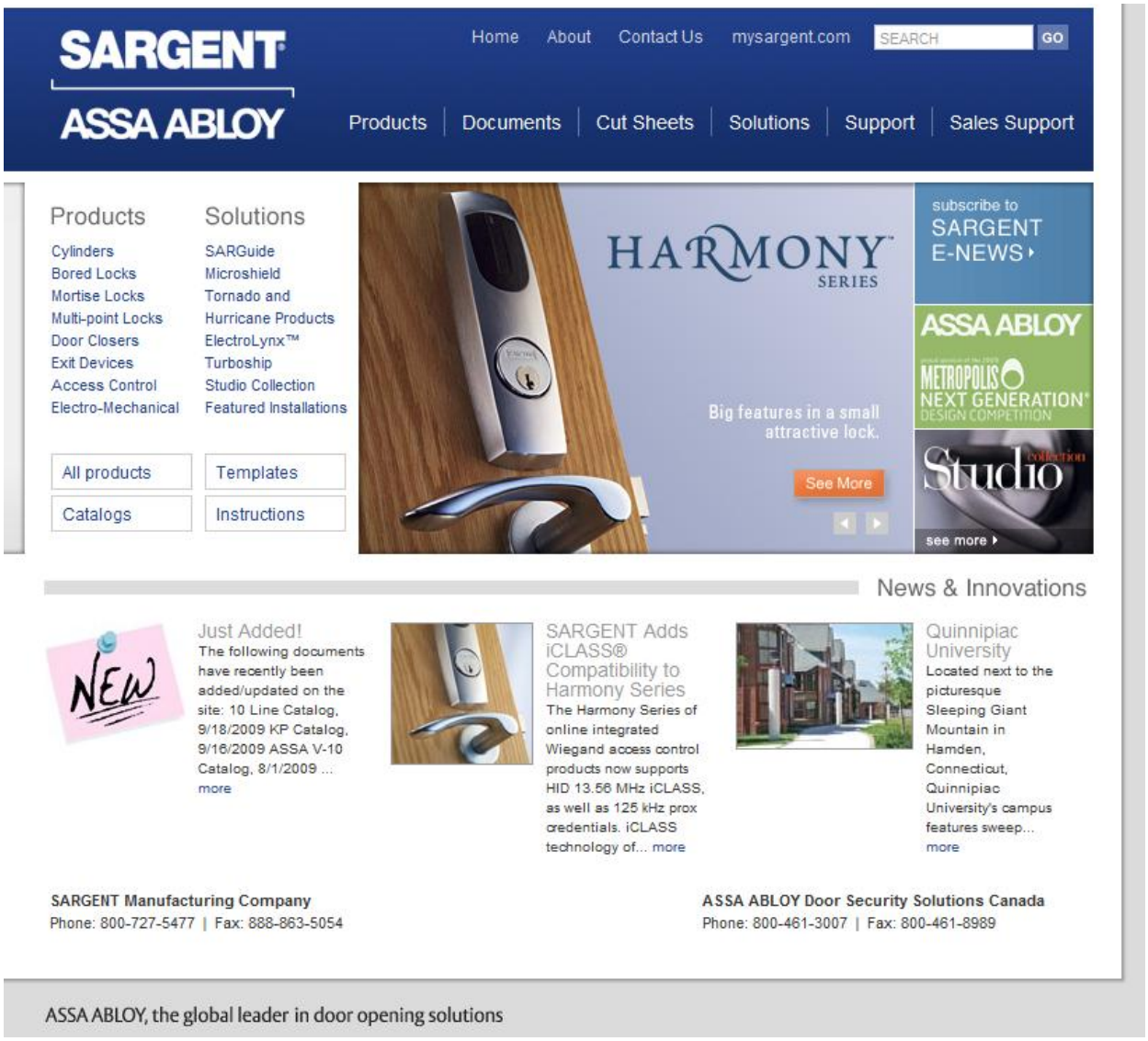

Figure 3 Sargent Manufacturing's Homepage www.sargentlock.com

The series are based on the electronics in the locks. From a user's point of view, the main difference is how the lock is updated with new user info (PIN codes and card information) and how log files of who has come through are kept. The different types of locks fall into three main types: cylindrical, mortise, and exit devices. Cylindrical locks are simpler locks, typical on most regular security doors. Mortise locks are locks inserted into a large hole cut into the side of a door. Exit devices are locks that utilize a "panic bar" or "crash bar" for easy egress from a room. Each type of lock is available in each series of access control products.

Further complicating matters, some of these locks use software. Some of this software is sold by Sargent and marketed as a Sargent product. Other software is sold by Sargent but marketed under its parent company's brand (ASSA ABLOY). Finally, other software is made by third-party companies to work with Sargent locks.

Some of these products are used primarily used in applications where the main operator is an expert on the mechanics of locks. Others are used by experts on access control software. These locks tend to be used in places like hospitals or college campuses, where such an expert is in charge. Some of these products however tend to be used in public K-12 schools or on a handful of executive doors in an office building. The people running these systems often know little about locks or access control software. They were either selected arbitrarily or because they are somewhat more technical than their colleagues. These users often inherit responsibility for these locks suddenly after the previous caretaker has left. These users, the ones unfamiliar with the industry, oftentimes thrust unwillingly into their stewardship of our products are the ones this project is focusing on. Based on the customer feedback I have received, these are the users the website is most failing.

These users often need to find instructions for their locks. Naturally they look to the company website. Once there they often fail to navigate the website properly, never finding the product they have. Others become confused and find information on the wrong product as several products look the same. These users often will eventually give up, calling in the technical support number for the company so someone can direct them to the correct documents.

From my past experiences with customers, I have observed that most of the ones having trouble seem to be from a small to medium business or work for a school. They have little understanding about the lock's capabilities. Some of these locks can have up to 2,000 users with many different types of access, yet many users think of them like an old combination lock. They put one code in there which they refer to "the code" or "our code". They often don't know that the product supports multiple codes and are calling about "changing the code".

The procedure to add/remove users or change their PINs in the locks involves several strings of commands. They are fairly long and formulaic. When these users follow the procedure to change the codes, they often don't see the pattern and simply try to memorize or record each possible operation. This is likely because these formulaic strings are based on memory locations and user types, the kind of concepts understood by firmware writers for locks, but not necessarily by the users as many are not

technical people. The users think of each command as a separate operation this is either memorized or referenced when someone wants to do that one particular thing.

To further complicate things for the users, they often understand and identify their product based on its outside appearance. When they try to identify their product on the website, they try to find a picture that looks like their lock. Unfortunately, there are many products offered by Sargent that look exactly the same from the outside. The differences often are in the electronics which need to be examined closely. Users often misidentify their product from the website as one of the other similar looking products.

These users typically are using typical Windows® desktop computers found in an office building. Sometimes, a user will be out in the field and trying to find this information on a smart phone, although, since many of these locks cannot be programmed without the computer software, it is much less common.

The Sargent site has the unenviable task of trying to present large amounts of different types of information to a variety of users. The large disparity in its user base's knowledge only adds to the challenge. By including architects and designers in its target audience, the site also requires more attention to aesthetics than most. Together this makes for a difficult interface design. Simplifying too much could make the experienced user performance suffer; including too much information could lead to a cluttered or confusing interface with poor guessability. Showcasing the looks and beauty of the product could take space and attention away from the information users need; failing to do so could lose potential customers.

Methodology

This project demonstrated a Nielsen-style discount usability study and reviewed its effectiveness by comparing the final product to the pre-study website. In order to do that, I identified those tests and approaches best suited for this particular website and the limitations. After I decided the general tests, I finalized the details of each step. Some of these steps had to be performed in a certain order as they were conditional on the outcome of the previous step. Others I could run concurrently. The ultimate goal was to better understand usability and usability testing by following this process. The final product was intended to be a more usable website for the inexperienced end-user of Sargent's access control products. A flowchart of the usability testing methodology is shown in Figure 4 Methodology Flowchart; the following sections describe the details.

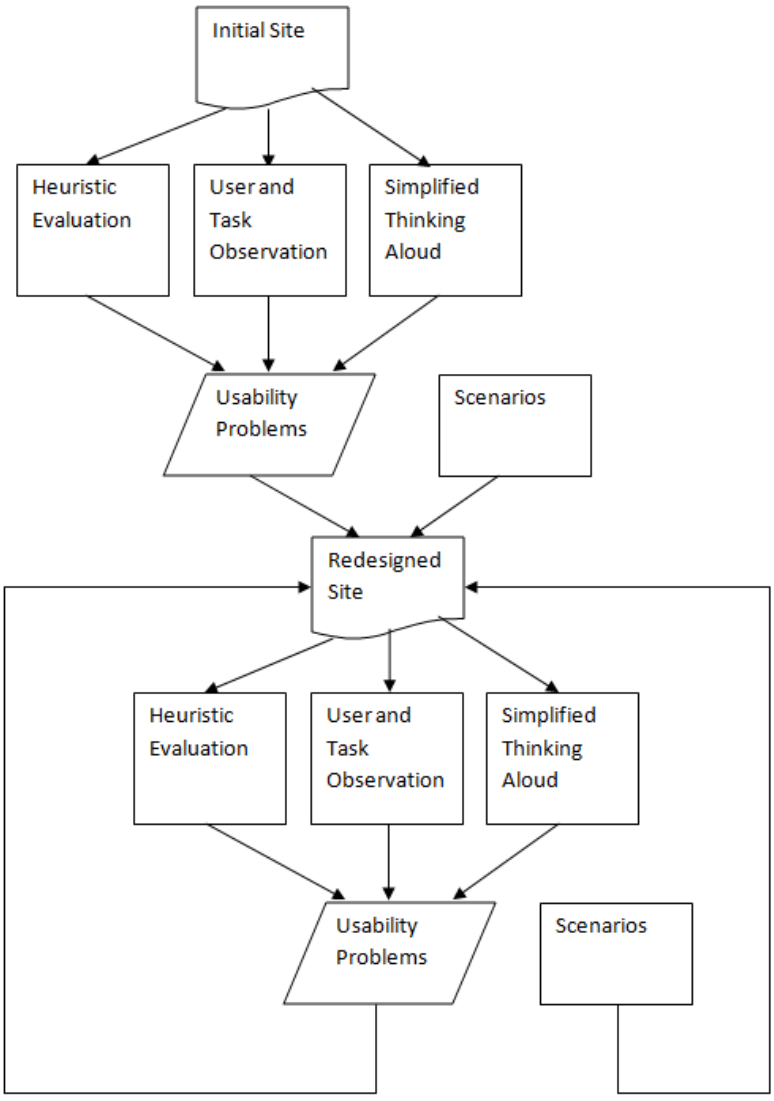

Figure 4 Methodology Flowchart

Identifying Different Users

As the objective of this project was to see how the access control portion of the website works for a certain niche of users, I first had to identify the characteristics of those users. I decided that I would only be focusing on end-users of access control products that are not part of the lock or access control field. That said, I needed to have at least some familiarity with who else was using the site. Knowing that information put the current design into perspective.

To learn about these users I had to talk to them. Assuming that the people who use the website are also likely to call the company, the ones that access this particular part of the site will often talk to me or other application engineers at the company. I interviewed them informally to see who they have encountered visiting the site. As part of the normal part of my job I mentally would keep track of common problems people had with the site. In addition to my own experience, I asked the other application engineers for information about the needs of these different user niches, what information they come to the site looking for and what trouble they run into trying to find it.

Ideally, I would have been able to put a survey on the homepage of the website and another survey on the access control area. This would present any users that the applications engineering group are not aware of. It would also give a rough estimate of the percentages of the different niches. Unfortunately, I did not have access to the website to place a survey. My company was understandably unwilling to advertise usability issues on its website. Even if I could, my estimates would be heavily based on response rates, which are likely to vary significantly among user types as they use the website in different ways and have very different relationships with the company.

Recruiting Testers

To perform many of the approaches I outlined n the previous section, I needed several test users. As this project was not officially sponsored by the company, I was not able to use actual users. However, since my target niche to test this site with consisted of end users who are not lock experts, it was not too difficult to find reasonable test users.

To simulate the users who are appointed to these systems I used friends and acquaintances. The obvious benefit to this approach was an increased willingness for them to assist in the process. Additionally, I was familiar with their technical knowledge and could therefore ensure that I tested with both technically proficient and non-proficient users. Based on this information, I was able to put people with comparable technical levels into the two groups: initial and redesign testers.

The potential concern with this approach is an overly favorable response to the redesign. To guard against this, I considered several options. I could either conceal which version is my work and which is the original. I decided against this approach for several reasons. The actual website, while not particularly usable, is professional and polished looking; it includes JavaScript as well as some extra touches. To reach that level of polish with my redesign would pull the focus of the project away from the usability and more towards aesthetics and the technical subtleties of website design, a direction I did not wish to go. If I were to present my test users with the refined Sargent site and my no-frills, redesign, it would be immediately obvious which was which.

I instead chose to do my best to encourage the users be truthful. I explained that the important part of this project is the process and that they were providing data, not "grading" me. In addition, as the Nielson redesign process can be iterative, I also stressed that my proposal was not necessarily a final result, and that I need to know if another round of revision is necessary, hopefully removing some of their hesitance at providing constructive feedback. This does raise the concern however, that they may become too critical, trying to "edit" the site, pointing out things that did not hinder them, but they think would cause other users issues.

I used an informed consent approach. I explained the goals of the project o them, and instructed them that they can stop at any time for any reason. Like all projects involving human subjects, I went go through the Institutional Review Board to verify that my methods were acceptable and safe.

Employing the Discount Usability Testing Approach

To determine the issues with the current website design and to test my proposed changes, I followed Nielsen's discount usability testing method. Figure 4 shows the process I took.

Initial Heuristic Evaluation

I began with a heuristic evaluation on the initial site to determine the expected stumbling blocks or problems for users. In addition to Nielsen's heuristics, I used Shneiderman's "Golden Rules". As discussed in the Background section, the rules are often similar to Nielsen's, but I felt it was important and helpful to include another perspective on this step. I ran through each group of rules separately and noted all the times the initial site broke a rule. Afterwards, each problem was assigned a value from 0 to 4. A "0" would indicate a break of a rule that did not actually cause any loss of usability; a "4" indicated something that seriously crippled the site to the point of being completely unusable. A total score was created under both methods based on the number of usability "bugs" and their severity.

User and Task Observation

Once the heuristic evaluation had been completed, it was time for some live user testing. I had three volunteers run through user task observation as well as thinking aloud exercises. For the user task observation, I presented each user with a different situation (see Appendix 1 for exact scenarios). These scenarios were real situations actual users had been in and had failed to find what they needed on the site. The test users were given the same background information a real user would have and were given a question to answer. The three different scenarios involved three different products. This was intentionally done as to involve more of the site. They also involved finding three different types of information. (One involved finding a programming guide, one involved finding an ordering catalog, and one involved reading through feature lists). Again, this was done to better test the site. Two of them did not require technically savvy users. The third one did. This was not done to test the site with users of different technical ability. To do that I simply could have enlisted users of different abilities, but given them all non-technical information to find. Instead this was done to test how well technical information was presented while not requiring all of the test users to be so qualified.

For each user, I began by having them read the consent form and then talking over any questions they may have had regarding it. After they had signed the form and their questions were

satisfied, I gave them the scenario. The goal was to both provide a digital copy to read and verbally explain the situation. Due to some technical issues, in some cases I was forced to simply give the situation orally. In either case, I would then answer any questions that a real user would know. If a test user asked a question that a real life user would not know the answer to, I would decline to answer and explain why. For the two situations where a specific product was being asked about, I provided a sample the product and explained how they, as a customer, would have interacted with the product up to this point.

At this point the user was directed to the website. Originally, I had planned to use a saved version of the site so that I did not have to worry about the site changing during the duration of the project. Due to technical issues during testing, I was forced to use the actual website. Thankfully, no major changes had been made to the site since I had run the capture software. Having the test users run the actual site also had the benefit of allowing the search field to function properly and gave the most realistic simulation.

During the test, I remained silent nearby, keeping notes of the paths the users would take and the problems they encountered. Originally I planned on using screen capture software to track every move of the mouse. While this would have been a great way to keep a complete record of the process, due to the previously mentioned technical difficulties, I was forced to change test computers last minute, denying me access to the software. I was able to time the users though, so comparisons could be done later. In the end, taking notes on paper made it easier to review with the user; we did not have to review the entire process, only the spots of interest. I discussed with the users why they had used the site the way they had and what issues that had run into.

Simplified Thinking Aloud

After the task observation had been finished, the user and I would do some simplified thinking aloud. Thinking aloud affects the timing of completing a task, so users were asked to perform this part after the user task observation. We would discuss different parts of the site as well as the site in general. They would weigh in on what they liked and what they thought could be improved. The purpose here was to understand why they are performing each action, to look for how a customer would want to use the site and what misconceptions they may have about the site. Common points of confusion or displeasure were noted so they can be remedied in the redesign.

Scenarios

Based on my results from the first three steps, I composed a list of usability problems from the current site. The goal was then to modify the site so as to remove as many of these problems as possible. With this information I created a basic layout of the new site in html. The overall setup was done roughly and one product was done in detail. I used this as the basis for a scenario run through with a user from the initial task observation testing. During this phase I walked the user through parts of the site, explaining anything that was missing. I elicited feedback on the purposed redesign and asked her how she would interact with it.

She presented some valid criticisms. Some usability problems I thought I had solved from the original, I had not fixed to her satisfaction. Additionally, the redesign had created some new problems that were not in the initial site. This step of the redesign turned into an iterative design process in itself with me getting feedback, incorporating the feedback, and then running new scenarios with the user. Throughout this, I kept Shneiderman's and Nielsen's rules in mind.

Heuristic Evaluation of Redesign

Once I finally settled on a design, I performed a heuristic evaluation of my proposed redesign to compare against the original version. Once again, the design rules used were a combination of the ones laid out in Nielsen's Usability Engineering and Shneiderman's Designing the User Interface. For comparison's sake, I stuck with the 0-4 grading scheme described earlier.

The obvious question here is whether someone can use these rules to judge their own design. Because I understood how I wanted the redesign to work, I was less likely to notice issues with it. That said, these rules are meant to be learned by designers and be applied when designing a site. This implies that a designer can expect to be able to get at least some benefit out of analyzing his/her own design. Additionally, there was not a good alternative, as it would not have been practical to teach these heuristics to a volunteer and have them perform the analysis.

User and Task Observation of Redesign

When the observation process was repeated with my proposed redesign, I used the same situations, same tasks, but different users. The problem with re-using the same test users for the new design would have been that they would be more experienced with the products than before. During their initial attempts, they would have learned some information about the previous website layout as well as the answer to their question. This would most likely make them noticeably faster on a second attempt, even using a modified interface. Conversely, by using different users, it added the variability of the ability of the test user, which in small sample sizes, can be significant. Following Nielsen's recommendations, I used at least three test users for each design.

Had variability in user ability become a problem, I would have found new test users. Half would have been assigned to the original site, half to the redesign. They would then try the task on the other site. While this brings up the problems I mentioned about retesting, by having half do one first, half do the other, I should be able to compensate for this.

Compare, Repeat as Necessary

When the proposed redesign was done being analyzed for usability the results were compared with the findings from the testing of the initial site. Had the redesign failed to make adequate improvement, the process could be repeated to create an even better design. This recursive approach is the way it would typically be done in a corporate setting as well. One of the major benefits to the discount usability study method is that the low cost and time investment to complete one allows for multiple iterations to be run if necessary.

Usability Problems with the Initial Website

I picked the Sargent website for this project because I knew that there were numerous problems with it. Before I could begin redesigning the site, I had to understand what all these issues were. After I had heuristically evaluated the website and found potential issues, I ran user testing to observe realistic failures of the site. These two groups were then combined together as a list of design issues to be remedied in the redesign of the site.

One of the biggest failures of the site is the very audience it seems to be aimed at. Descriptions and information match more what an expert would understand of the product instead of an end user. Industry terms are not explained (e.g., cylindrical, mortise, exit, "access control, etc.), leaving an end-user surfing the site to guess through context or research each term as they come across them. Looking at the main page alone, under the “Products” and “Solutions” columns, there are ten terms that a customer from outside the industry would be unlikely to know (highlighted in pink in Figure 5). These links are the primary way of navigating the site. Without knowing these terms, the customer must follow a guess-and-check method for finding information on their product; none of these terms have a hover-over definition.

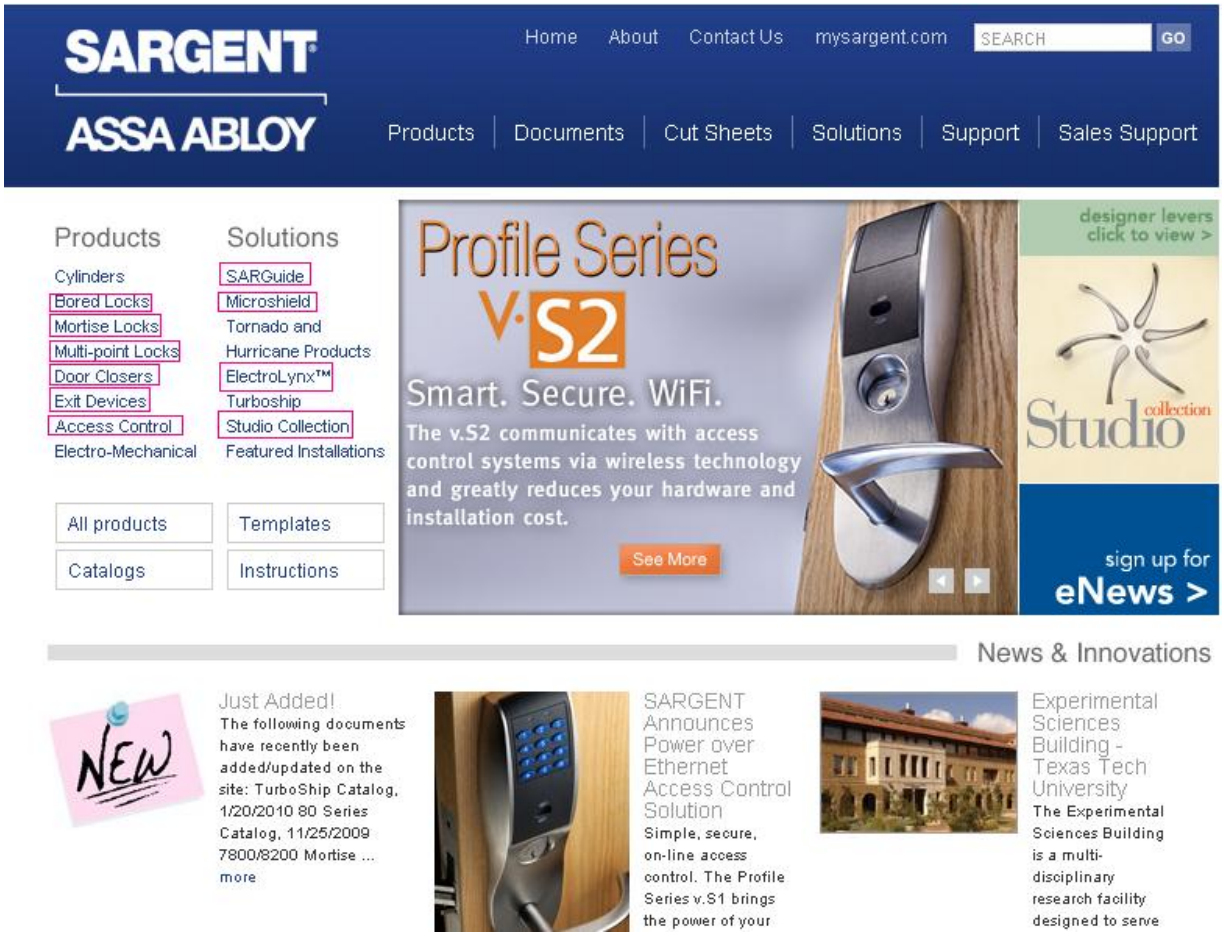

Figure 5 Sargent Main Page with Jargon Highlighted

Each product line should be easily identified by the image on the site. Unfortunately, this is not possible as several products look identical. All of the locks in the “Profile Series” have the same designs to choose from. The only ways to tell them apart is to open them up and look at the electronics or, in some cases, see how the product works. Because the “v.S2 Series” and the “v.G1.5 Series” look the same, you would expect them to have the same images next to their product lines. On the current design they do not.

It looks like the designer of the current site wanted to show different images for each image on the webpage to show the different looks you can have within the Profile Series. In Figure 6, the v.S2 Series image has a 12 button keypad and a bored lock (one of the three major types of door hardware these products can be paired up with). The v.G1.5 image does not have the keypad option and is paired up with a mortise lock (a different type of door hardware). What often happens (as demonstrated in the user testing and during real life examples prior to this project) is that a user looking to find information on his/her v.G1.5 product with a keypad and a bored lock mistakenly believe that they have a v.S2, because that image looks exactly like his/hers. Rather than making it clear that the product lines have the same six different looks (with keypad or without each matched with the three different types of door hardware), the current site gives the impression that a product with a keypad is a v.S2 and a product without is a v.G1.5. Making matters worse, the v.N1 also looks identical, but has no image shown so an end user with that product may very well believe that they have either the v.S2 or the v.G1.5. The problems with having identical products also apply to the Passport 1000 P1 and P2 series which look identical. There is no image for either one on this sub-page.

There is an underlying organization problem with information on the site. Currently, users have to select the door hardware type just to get basic information on the product lines. Both heuristic testing and user task analysis brought this problem to light. The best example of this would be finding the catalog. Sargent catalogs will describe all the options and features for one product line. All three door hardware types are contained in the one document. For example, there is a v.G1.5 catalog. There is not a v.G1.5 mortise catalog. Yet (as shown in Figure 6 and Figure 7), to find the catalog, a customer would have to select either bored, mortise, or exit under the product line and then the download catalog option from that sub-type. Additionally, many of the features are the same across all three types of door hardware. There is no place for information common to the entire product line. Someone using the website would need to read up on all three types to learn common features.

Figure 6 Poor Image Recognition on Current Sargent Site

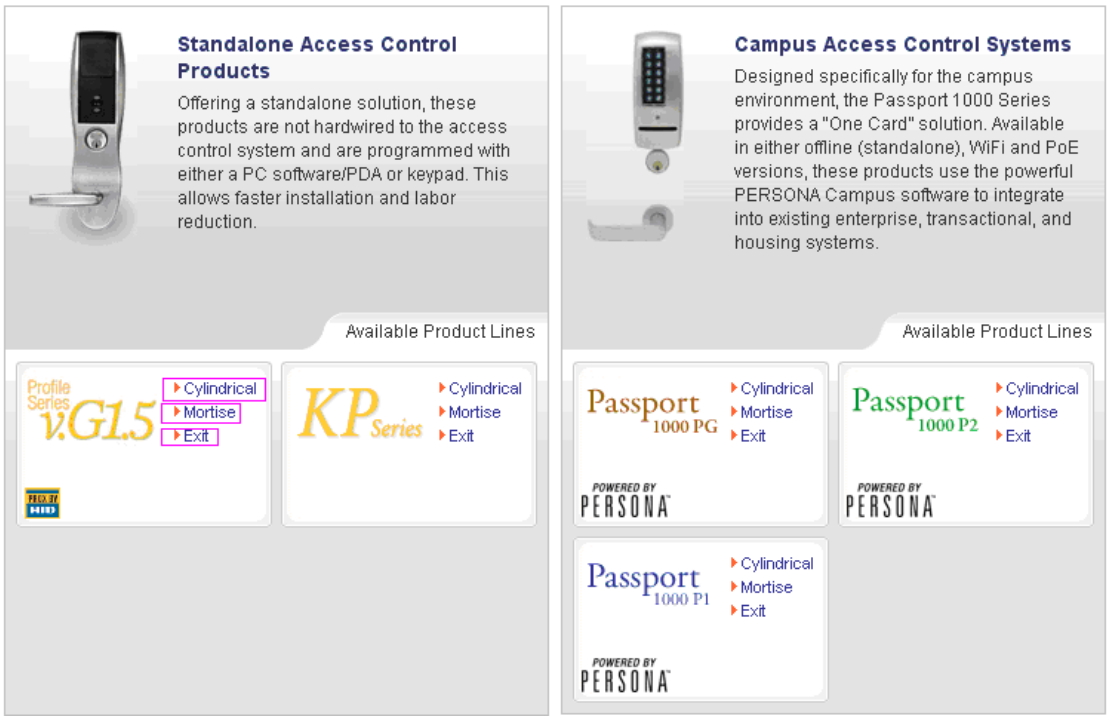

Figure 7 No Common Information Section

Figure 8 No Common Information Section (continued)

A less serious, but equally frustrating, issue has to do with color selection. Some blue text are links, some blue text (namely the product headings) are not. In I've selected an example of each. Test users tried on several occasions to click on the titles. Blue is the most common color for links in general. All of the text based links on the website use blue. By making the titles blue (and worse a similar shade of blue), it presents them as clickable. A similar problem arises with icons. Some icons are clickable links, others are not. In Figure 10 you can see three icons that cannot be clicked. In Figure 9 you can see the HID icon that is a link.

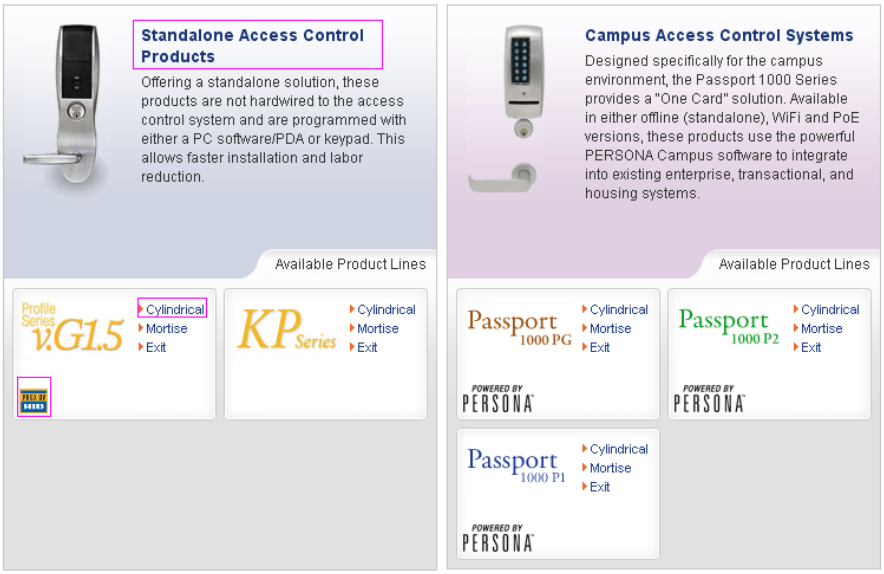

Figure 9 Titles Looking Like Links

Figure 10 Icon Users Cannot Click

Redesign of the Access Control Section of the Sargent Manufacturing Website

The redesigned site was more than just correcting details. The entire approach to the site was modified. The main goals of the redesign were to deal with user's confusion between similar products, remove the need to understand door hardware for basic use, and improve the overall organization. To accomplish these goals pages were re-written, information was moved and clarified, graphics were replaced, and new pages were added.

Originally, the Access Control section of the site consisted of each product line with a link for all three types of door hardware, as shown in Figure 11. These product lines were boxed off in "folders" of related products. Products that belonged in multiple "folders" were only shown in one.

Figure 11 Old Access Control Page

Standalone Products

Standalone products have the convenience of operating without any physical connection to an access control system. They are programmed by PC software and a handheld data transfer device or by typing in commands on the keypad.

Profile Series v.G1.5

KP Series

4293 Standalone Reader

Passport PG

Internet Protocol (IP) Products

IP technology allows for communication between the locks and the access control software using either Power over Ethernet (PoE) or with a standard WIFI, wireless network.

Profile Series v.S1

Profile Series v.S2

Passport P1

Passport P2

Figure 12 New Access Control Page

The new Access Control page still groups the product lines, but the confusing “folder” drawing is removed. A simpler heading approach is taken. Each group has a title, a description of the group of products, and an image of each product line (rather than just one as before). Instead of regular text, the titles link to a comparison of the product lines. Unlike the old site, products that belong in multiple categories are placed in all of the appropriate categories, not just one: The Passport 1000 P1 and P2 under Campus Access Control Systems are really IP products and should be grouped with the Profile Series v.S1 and v.S2. The Passport PG is comparable to the Profile Series v.G1.5 and should be under Stand-Alone Products.

The descriptions have been rewritten to make them more understandable to someone from outside the industry. It focuses on how the customer would interact with the product, while still leaving in the information that an architect or builder would need to know when determining which product to use. For example, Integrated Wiegand originally was described as

> These products fully integrate with open architecture Wiegand-compatible access control systems. They are connected via hardware to the access control system, and offer centralized control of all networked locks with the system.

While not a terrible description of the products, it repeats the term Wiegand without defining it and talks about being connected “via hardware” something vague and not even entirely correct. The new description:

> Integrated Wiegand products fully integrate into 3rd-party access control systems. They are wired into the access control system, offering immediate, centralized control of all locks in the system.

Specifically mentions that they are all wired (a common characteristic to help identify the products) and focuses on the benefits to the user: “immediate, centralized control”. I did not define Wiegand here as it would mean little to an end-user and an expert would already be familiar with the term.

These descriptions proved very helpful to the users during the second round of testing. It helped assure the user with the v.G1.5 that they were in the right place as it mentioned the PDA. It directed the user looking for Wi-Fi locks exactly where they needed to go, helping him find it in less than two minutes. The tester for the original site took over twenty minutes to find the same information and was less certain of his answer.

Standalone Products

Standalone products have the convenience of operating without any physical connection to an access control system. They are programmed by PC software and a handheld data transfer device or by typing in commands on the keypad. Sargent offers a wide variety of standalone solutions.

Use the guide below to determine the appropriate product for your application. Click on a specific product to learn about its specific features, download instruction sheets, or view the product catalog.

	Power	Keypad Available	Prox Card Reader	Magnetic Card Swipe	Software Programmin
KP Series  	4 x C Cell Batteries	Yes	No	No	No
Profile Series v.G1.5 	6 x AA Batteries	Optional	Optional	No	SoloPlus

Figure 13 Product Comparison

When a user clicks on a category it now links to a comparison chart that compares products within the category. (The original site made them look like links, without actually linking anywhere, causing one user to comment, "They look like links, and they ought to be links.") It can be used to help identify an existing product (although there is a separate page for that as well) or it can be used to help decide which product would best fit a customer's needs. This page also has a differently worded description of the product category in case the customer did not fully understand the first one. Each product shown has an image of the product and a link to the general page for that product so a customer can learn more.

Now that each product has an image, customers were more easily identify their product. Before, only about half of the products actually had an image next to them. The test user for the initial site struggled to find the KP product without a graphic to direct her; she never found the information she was looking for, eventually giving up. The KP series does not look like any other product Sargent offers, so with each line assigned an image, the user testing the KP product in the redesign found the correct place to go immediately; she found the document she was looking for in approximately two minutes.

As another change to further help users, each product that has an identical look has an identical icon. The old site created confusion by showing different product combinations for each product that had the same looks, causing customers to focus on the differences between the two images. By showing the same sample image for each, customers with products that cannot be identified by appearance alone will be able to understand that and can look into the several products that look closest. The initial test user for the G1.5 lock was slowed by trying to determine which product from the Profile Series she had. The description matched the G1.5 but the image was closer to the v.S2. The redesign user did not have that problem as it was clear that different lines could look identical.

The other big change was removing the "bored", "mortise", and "exit" links from this part of the page. In addition to the three pages for each product (bored, mortise, and exit) there is now an overview page that contains information that applies across the product line. (This can be seen in Figure 14). The Access Control page links to this overview page, which then links to the other three pages for the product. This allows customers who don't deal with door hardware aspect of the product to learn about the technology feature, find programming guides, etc. without having to learn details that do not affect them.

Access Control

Stand Alone

KP Series

Profile Series v.G1.5

4293 Stand Alone Reader

Passport PG

Internet Protocol

Profile Series v.S1

Profile Series v.S2

Passport P1

Passport P2

Intergrated Wiegand

Harmony

Profile Series v.N1

Wiegand Readers

Campus Systems

Passport PG

Passport P1

Passport P2

Profile Series v.G1.5

The Profiles Series v.G1.5 is a battery-powered stand alone system. Each unit is programmed either at the keypad or via our SoloPlus software. Information to and from the lock is transfered via a PDA or Sargent's proprietary Data Transfer Device.

Hardware Specific Information:

Bored

Mortise

Exit

Documents

Sell Sheet

Catalog

Cut Sheet

Keypad Programming Instructions

Software Programming Manual

Support

Guide to Lock and Builder's Hardware Terminology

Contact Technical Support

How to Identify Your Product

General Feature Overview :

- Up to 2,000 individual users per lock
- 2,000 event transaction history (audit trail) provides parameters such as unlock, egress activation, entry into programming mode, date, time, user number and door number
- PDA (wireless) communication to and from lock
- Locks supports all HID proximity bit formats when programmed through keypad, or while using SoloPlus

Figure 14 Product Line Sub-Page

The overview page for each product has a description of the product, links to the three different hardware types it comes in, documents relevant to the entire line, support links, and a link tree for the entire access control section. Like the product comparison pages, the product description is written with as little industry jargon as possible.

The navigation links on the left serve two purposes. They act as an "accelerator" (Designing the User interface p64), allowing rapid movement through the site by power users. The current page is bolded and in red, minimizing the memory load of the user, allowing them to know at a glance where they are. Other pages are in blue to designate that they are links. Each link leads back to the overview page for the respective product line. For consistency, the product lines are in the same grouping as on the main access control page.

On the bottom right support links were added. Some of this information was available on the previous version of the site, but was not as prominent. *The Guide to Lock and Builders' Hardware*, an excellent guide to the basics of the mechanical side of the products, was buried in the initial site. Now users from outside the industry can more easily get up to speed. Links for technical support contact info and a product identifier was added as well.

To further ease the use of the site, for some links I added hover-over text. An example can be seen in Figure 15. For most links, the text is an explanation of what the link leads to. The hover-over text for the product links on the left give a very brief explanation of the product line.

From the overview page, the users can then select the appropriate hardware type (bored, mortise, or exit). Each selection has an image above it showing what the different hardware would look like with that particular technology. This will help customers identify their existing products, while showing architects the different looks of the product.

Once a customer selects one of the three hardware links, they are directed to the appropriate sub-page. This page includes a larger image of the same hardware/technology combination (See Figure 16). The same support links carry over as do most of the general product line documents. In addition, documents that are specific to certain hardware/technology combinations will now show. On the left side the same navigation links appear. On these pages though, there are sub-headings for the different hardware. As before, the current location is flagged red.

Figure 15 Hover-Over Text

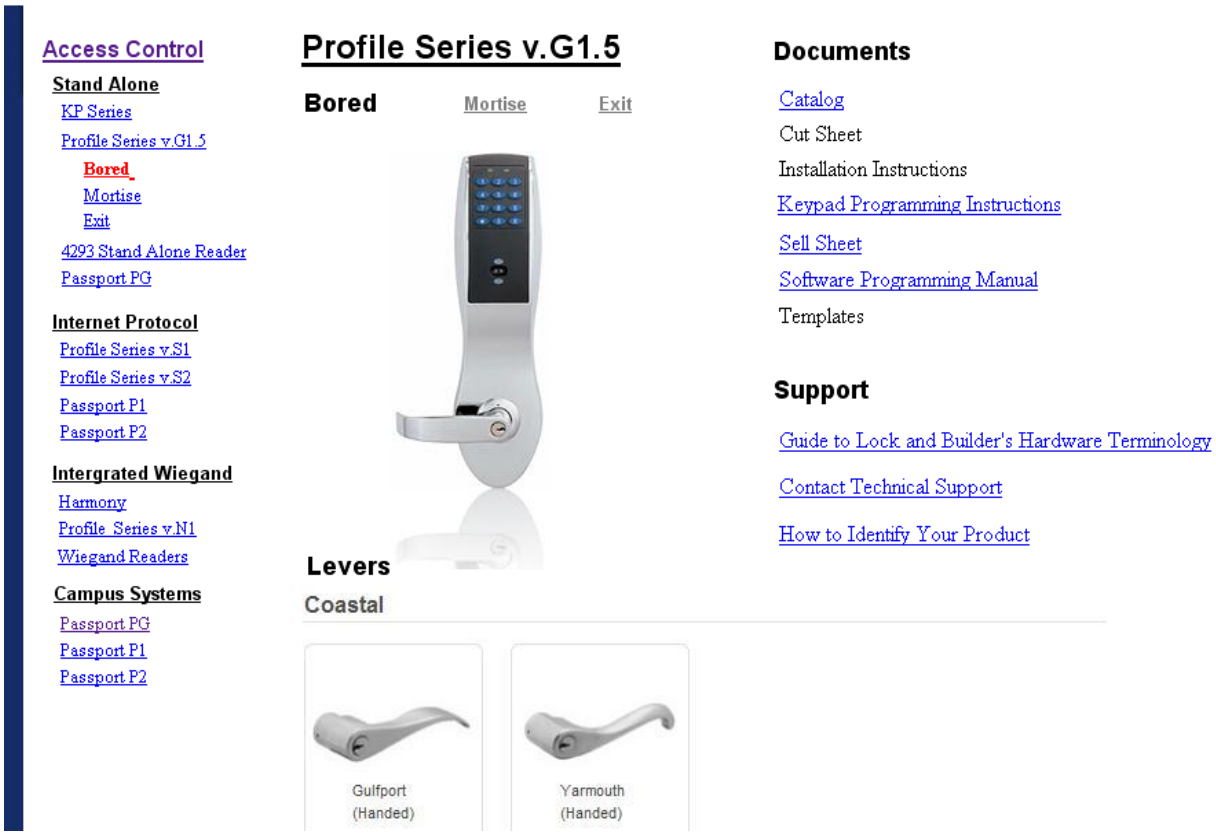

Figure 16 Product Line and Hardware Combination Page

At the top of the page are more links for the different hardware types in the specific product line. The currently selected one is black and large. The two that are not currently selected are smaller and grey. They link to the appropriate sub-page for them. The intended effect is like flipping to the correct tab on a binder.

At the bottom of the page are all of the possible lever styles, finishes, and miscellaneous options for ordering the product (Figure 17). This information used to be under separate tabs. The redesign cleaned up the layout so that there was enough room to put all of that information on one page, saving the user one more click and allowing them to see it all at once. The type of users this redesign is aimed at would not be interested in this information so it did not affect testing. One test user quickly scrolled through this and then moved on. The other two never even looked at it.

Linking off of the both the overview pages and the specific hardware/technology combination pages is a page for identifying access control products (Figure 18). This identifier page gives the customer the information they need to determine exactly what product they have. To determine which product line, all of the possible looks of the electronics are shown with the corresponding profile lines underneath. If that alone is not enough, each product line has the communication method written next to it. No combination of communication method and appearance are duplicated, so this information should be able to definitively determine a customer's product. Additionally, the communications method is one of the most basic traits of the product line and something that the end-user would almost always know. Like the majority of the site, the descriptions avoided jargon as much as possible.

At the bottom of the page (Figure 19), visual indicators are used again. This time it is to identify which type of door hardware is on the product. There are variations even within the three groups, so each type (bored, mortise, exit) have two different images associated with them. Below that are some rules for determining which one you have. Again, these descriptions avoid or explain lock jargon.

Should the user not find the descriptions given sufficient, there is a link for *The Guide to Lock and Builders' Hardware* on the top right. There is also a link for technical support's contact information (linked page shown in Figure 20). Between the images of the products, the descriptions, a pamphlet that teaches the basics of the hardware, and a link for technical support, even end-users unfamiliar with locks should be able to at the very least identify their product.

During the user testing none of the users ended up using the product identifier. One user briefly looked at it while surfing around. No one actually stopped to fully read it. The users found the information on the overview pages and the specific hardware pages. Further testing would be needed to see if under certain situations users needed to use this page or if it's entirely redundant.

Wiegand Readers

Campus Systems

Passport PG
Passport P1
Passport P2

Levers

Coastal

Gulfport (Handed)

Yarmouth (Handed)

Standard

B

B Lever

J

J Lever

L

L Lever

P

P Lever

Finishes

03

Bright Brass, Clear Coated (BHMA 605)

04

Satin Brass, Clear Coated (BHMA 606)

09

Bright Bronze, Clear Coated (BHMA 611)

10

Satin Bronze, Clear Coated (BHMA 612)

10B

Dark Oxidized Satin Bronze, Oil Rubbed (BHMA 613)

10BL

Dark Oxidized Satin Bronze Clear Coated

15

Dull Nickel Plated Clear Coated (BHMA 619)

20D

Dark Statuary Bronze Lacquered

26

Bright Chrome Plated (BHMA 625)

26D

Satin Chrome Plated (BHMA 626)

Prefixes/Options:

- **10** - SARGENT Signature key system
- **25** - 5" (127mm) backset
- **41** - 3/4" (19mm) throw latch x 2-3/4" (70mm) backset
- **60** - SARGENT Removable Disposable Construction Core
- **63** - SARGENT Removable Core Cylinder
- **75** - Handicap Warning on Inside of Lever FF FD Embossed Plastic backing
- **76** - Milled Outside Lever (Mortise and Exits) Handicap Warning on Outside Lever (Cylindrical)
- 77 - Milled Both Levers (Mortise) Handicap Warning on Both Levers (Cylindrical)Abrasive Strip on rail, abrasive coating on lever (Exits)
- **83** - SARGENT Keso Security Removable Core Cylinder
- **84** - SARGENT Keso Security Removable Construction Core Cylinder
- **91** - Remote Power
- **DM** - Forced/Propped door harness
- **SG** - SARGuard/MicroShield antimicrobial clear powder coat (on metal components only)

Figure 17 Levers, Finishes, and Options

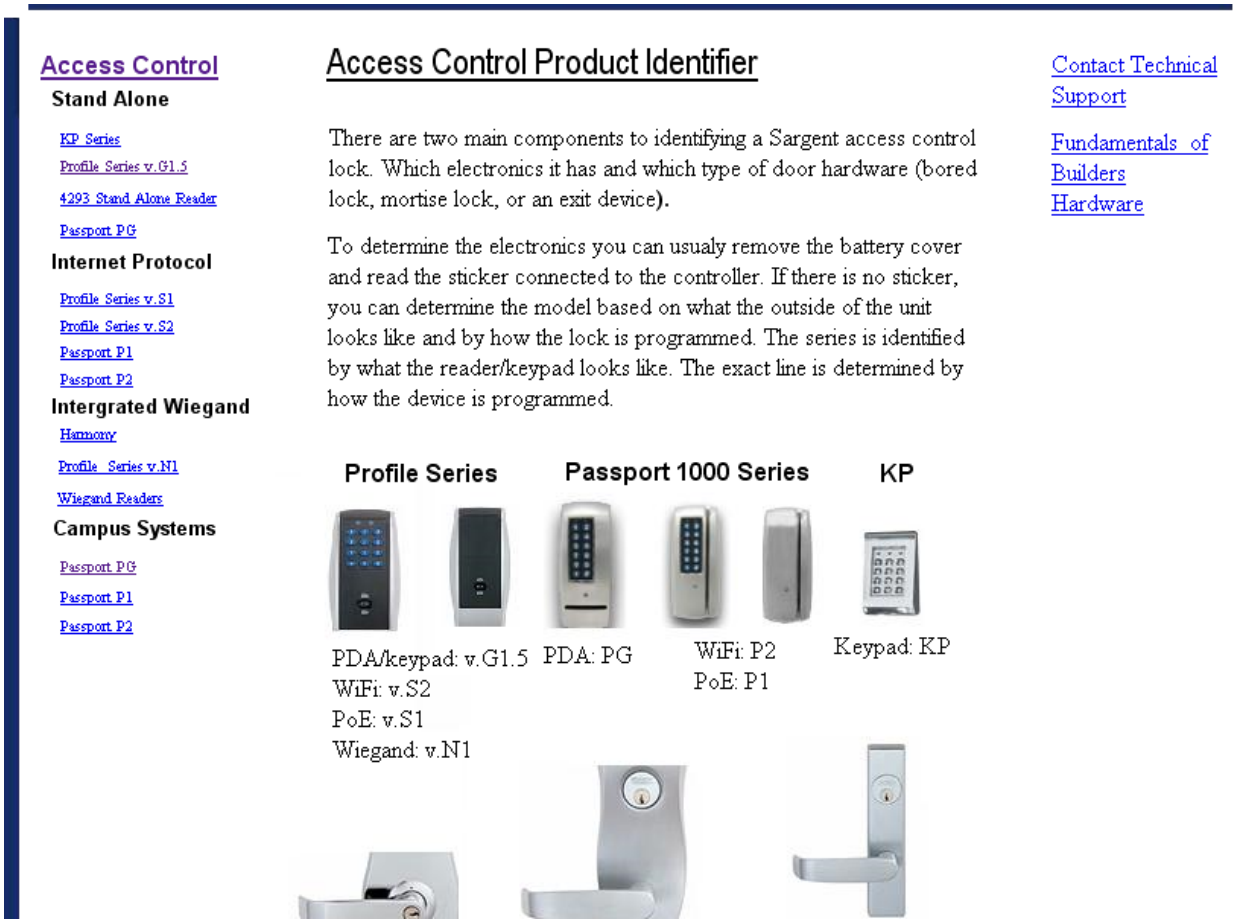

Figure 18 Product Identifier (Top)

Wiegand: v.N1

Bored Mortise Exit

Determining the Door Hardware

As for the door hardware, there are three main options: bored lock, mortise lock, or exit device. The above photos show some examples of each device, looking from the outside.

If your door has a long bar on the inside that unlocks the door when you push on it, it is an exit device. The outside should have a lever attached to a rectangular escutcheon.

If your lock has a cylinder for a key located in the outside lever itself, then it is a bored lock.

If neither of these are true (no bar on inside of door and no cylinder in the actual lever), you have a mortise lock.

Figure 19 Product Identifier (Bottom)

SARGENT
ASSA ABLOY

Technical Support Information

Mechanical Product Support	**800-727-5477**
Electrical Product Support	**800-810-WIRE (9473)** **800810WIRE@ASSAABLOYUSA.com**
Order and Pricing Inquiries	**800-727-5477**

Figure 20 Technical Support Contact Page

Reflections on Usability Testing

In addition to learning the general rules of usability and how to best *design* an interface, this project was also meant to be an experience in the usability testing process. I have collected my observations and thoughts on the different methods employed in each step of the testing process as well as on the larger issues relevant to this type of testing.

Heuristics

When I was doing the heuristic evaluation I found I was taking the wrong approach. Rather than using the rules to find problems, I wanted to find things that I thought were problems and then see which rules they broke. With that approach, the heuristics don't really add anything if I just use them as justification for what I already believed. That method would be closer to the "thinking aloud" approach with me being the tester.

The other concern I had was for the large difference in scores between one set of guidelines and the other. It makes sense that heuristics written by two different people at different times would result in different ratings for the same site, but I thought the scores would at least be closer.

The heuristics I used were because they were from well-known usability experts and have been often cited; however they were general usability rules. Websites probably should have their own guidelines to take into account the differences between a website and an application. Regardless, the approach is the same and while these might not have been the ideal guidelines to follow, it's hard to argue that they are not valid.

Scenarios

Scenarios were very helpful in the beginning stages of my redesign. It caught large problems without requiring too much work building the test system. I used rough html pages, but I could just have easily drawn pages to show the user how the site would work. Had I waited until I did user task observation, I would have had to redo the site, possibly multiple times. For any future testing I would definitely employ a scenario approach

User Task Observation

If I were to do this type of testing again, I would determine in advance how to handle situations with user questions and users trying something unexpected. I would bring users to a testing room rather than testing equipment to users. The testing room would have one way glass or a remote monitor, allowing me not to hover near the user, and I would employ video recorders for both the screen and the test user's face.

Using a portable setup was much more difficult than I would have expected. There was a surprising number of technical issues that came up (could not connect to Wi-Fi, screen capture software would not work, trouble moving files from one machine to another). It would have been better to have my own setup and bring users into that area. Ideally I would be behind one way glass or their computer would be connected to a monitor in another room so I could monitor it there. Watching over his/her shoulder worked, but seemed to cause the user to want to talk to me, if nothing else than to prevent an

awkward silence or to save face when what they tried didn't work. My concern is that my demeanor or reactions might have affected user actions, invalidating the testing method.

Half of the tests were done with screen capture software, half without. The software seemed to help with discussion after the test, as users could be reminded of what they were doing exactly and could better explain. It also recorded hesitation, a useful indicator for when users are trying to puzzle something out. A video of the user's facial reactions would have also been useful to gauge emotion.

For some of these tasks I needed a way to tell the user whether they are right or not, but not simply devolve the experiment into guess and check. One user kept asking if a partially correct answer was correct or not. Had she been using the website for real, she wouldn't have that kind of feedback. What I was hoping for was for the user to confidently say "Here is my answer..." or at least "I cannot find an answer I am confident in". It was a problem in general that people wanted to ask questions of me. They understood I couldn't answer, but they couldn't help themselves. Being located behind one way glass or in another room definitely would have been useful in that regard. In general, it was hard to get users to commit firmly to an answer. This very well could be an indictment of the website more than of the specific users. The website simply may have been too unclear for users to be confident in their answers. Those questions did not happen with the testing of the redesigned website.

I wasn't sure how to respond to a user saying that they would call the support number. In one case I asked them to continue on and see what they could find on the website alone. In the other case, the user was very frustrated and had said so. In that case, I took it as a sign that the user was done. The user's approach to finding her product on the site (guess and check) was clear at that point so there wasn't much else to learn anyway.

This type of testing had a lot of surprises to deal with. With experience, I imagine I would better be able to plan for and adjust for these events. Though, when using people to test anything, I doubt it is ever 100% possible to plan for all contingencies.

Simplified Thinking Aloud

Having the user task observation group then perform simplified thinking aloud on the site made a lot of sense. By retracing their steps and explaining the thought process they followed, I benefitted from seeing how the user thinks, without having to employ more testers, sign more forms, schedule more appointments, etc.

Cultural Usability Testing

Without the well-defined testing methods that engineering usability does, cultural usability makes it difficult to objectively rate two different interfaces. It does not provide the non-subjective timing and data based results of the engineering approach. That said, the cultural usability approach was key in understanding the users of this interface. Failing to do so is arguably the biggest failure of the initial site. Most problems trace back to this misunderstanding of audience.

Were I to have simply employed Nielsen's Discount Usability approach without any analysis of target user, I would have likely made moderate improvements to the site. Running the iterative process

again would then yield some more slight improvements, and again even slighter. An interface aimed at the wrong audience can only be so optimized; the underlying misalignment of intended and actual users would still be there. The engineering approach in general can best be analogized to treating symptoms; with the audience issues being the underlying condition. The combination of the two approaches worked very nicely. Combining the two into one well defined approach would be a useful area of research. Sun draws attention to the lack of a formal testing approach to cultural usability, but it would seem short-sighted if such an approach were not to include the methods and strengths of the engineering approach.

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Appendix 1

These are the documents used for the user task observation section of the testing.

Testing Introduction Form

Thank you for volunteering to help with this project. Before we begin, I would like to explain what this testing is aiming to do, explain how the testing will go, and answer any questions you may have.

You may stop participating in this test at any time, if you so choose. Simply inform me of your desire to do so, and the testing will stop immediately.

This testing is to determine how usable a specific website is for certain users. To test this, volunteers like yourself will be asked to try to navigate the site, find certain information, etc. so I may observe how clear the site is and how easily information can be found. **Please keep in mind this process is about testing the website, not you.** You very well may have difficulty completing the tasks or get frustrated with the site. **Such issues are most likely due to problems with the site. Please do not be discouraged or blame yourself.**

Before you are exposed to the website, you will be given background information about the situation. You will be told what information you are looking for and why. Any information the user you are trying to simulate would have will be provided to you. You will be asked if you have any questions before you are exposed to the site. Questions about the product may or may not be answered, depending on whether the user you are simulating would know it. Questions about the testing process will be answered.

Testing Situation # 1 Background

In this situation you are a teller in a local bank. Two of the doors in the bank have these keypad activated locks on them. *User is given sample unit.* You believe they are made by a company called Sargent. For the past year, you've been using the code 4949* on the keypad to get through either door. Your boss has asked you to change the code to something else.

You have found the Sargent website and now are looking for the instructions to change the code you use to unlock the door. *User is directed to www.sargentlock.com. Test begins.*

Testing Situation # 1 Metrics

Did the user successfully find the document necessary to reprogram the lock?

How long did it take the user to find the document?

How many "wrong paths" did the user go down before achieving the goal?

Testing Situation # 2 Background

In this situation you are a teacher at a public middle school. Your school has these card reader locks on about a dozen doors. *User is given a sample unit*. The locks unlock are predetermined schedules. Outside of those automatic unlock times, they allow teachers/faculty to swipe a card to let them through. The principal has asked you to take over managing the locks, as the last person to do so has left the school suddenly.

You have been told the locks are managed with a software program, but no one can seem to find it. Find the name of the software and how to order it so you can get a new copy and get your lock system up and running again.

Testing Situation # 2 Metrics

Did the user successfully find the name of the software?

Did the user find the correct catalog to order the product?

Did the user successfully determine how to order it?

How long did it take the user to complete each of the three above tasks?

How many “wrong paths” did the user go down before achieving each goal?

Testing Situation # 3 Background

In this situation you handle IT for a medium size business. You know very little about locks. At one of your offices you are looking to add some type of lock that you can manage by software to control who comes through the door when. Ideally you're looking for a lock that you can update wirelessly. Find what, if any, product(s) Sargent has that can be updated using WI-FI. What, if any, product(s) will work with your existing 802.11g access points.

Testing Situation # 3 Metrics

Did the user successfully identify the S2 line?

Did the user successfully identify the P2 line?

Did the user identify any incorrect lines?

How long did it take the user to identify both the S2 and P2?

How long until the user was comfortable saying that those were the only two lines?

Post-Testing Interview Questions

What were your overall impressions of the website?

Was there anything in particular you found frustrating or confusing?

Was there anything in particular you found helpful or useful?

If you could change anything about the site what would it be?

The screen capture software will be pulled up at this point to go back to points of interest. Users will be asked about what they were thinking or trying to do at certain points of interest (places where they hesitated for long periods of time; went back and forth often; took a wrong path; etc.)